SCHOOL OF MEDICINE AND HEALTH SCIENCES

Compliance to Appropriate Personal Protective Equipment (PPEs) Usage Among Small Scale Welders in Garden Compound, Lusaka

BY

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DECLARATION

I, Luyando Mushinda do hereby declare that this dissertation is my own original work. It has been guided by my supervisor in accordance with the guidelines for Bachelors of Science in Public Health at University of Lusaka.

Signature:L.Mushinda
Date: 01/06/2023

I NOVAN guided and read this dissertation and approved it. I am satisfied that this is the original work of the author under the name it is presented. I confirm that the work has been completed satisfactorily and ready for submission.

Supervisor's signature: Date: 01/06/23

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Contents

LIST OF ACRONYMS AND ABBREVIATIONS

WHO	World Health Organization
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for Social Scientists
TPB	Theory of Planned Behaviour

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ABSTRACT

Background: In developing countries such as Zambia the small-scale welders know little or nothing about the health hazards that can harm their health and how best they can be avoided. Small-scale welders are routinely and regularly exposed to numerous physical, chemical and accidental hazards, which makes them a vulnerable occupational group. The main reasons for their vulnerability are a lack of education, insufficient knowledge, a dearth of awareness of OSH hazards, and non-availability or use of personal protective equipment's (PPEs).

Objective: To determine the factors leading to low compliance of appropriate use of personal protective equipment (PPEs) amongst local welders in Lusaka's Garden compound.

Methodology: This study utilized a quantitative approach, employing a descriptive cross-sectional design. The target population consisted of small-scale welders operating in Garden Chilulu compound in Lusaka district. A sample size of 385 participants was determined using simple random sampling. Data was collected through workplace inspections, interviews, observations, and a questionnaire. Descriptive statistics were used for data analysis.

Results: Welding glasses were the most available PPE (74.81%), followed by safety boots (22.86%) and welding helmets (16.88%). Eye protection was used "All the time" by the majority of participants (365), while hand protection was used least frequently. Hand cuts (60.09%) and hand burns (77.14%) were the most common accidents experienced. There was no association observed between occupational health and safety hazards and awareness among welders as the calculated P-value was 0.231.

Conclusion: Welding glasses were the most widely available (74.81%). The study revealed that hand cuts (60.09%) and hand burns (77.14%) were the most commonly reported accidents and that there was no association observed between occupational health and safety hazards and awareness among welders.

CHAPTER ONE

INTRODUCTION

1.0 Background and Introduction

In developing countries such as Zambia the small-scale welders know little or nothing about the health hazards that can harm their health and how best they can be avoided. High rates of welding injuries are mainly due to poor knowledge on personal protective equipment PPEs. Acute health effects are those that usually occur rapidly as a result of short term exposures to hazards, and are of short duration. Chronic effects on the other hand generally occur as a result of long term exposures to hazards and are of long duration.

Small-scale industries such as small scale welding account for a large proportion of jobs and play a very vital role in Zambia's economic growth and prosperity, but in many cases the jobs are low-paid therefore making them unable in some cases to buy the correct PPE and the job security is poor (Ahmad et al., 2017). The main characteristics of the small-scale industries include: operated and owned independently, closely controlled by managers/owners who contribute to the operating capital and are the principal decision makers (Ismail et al., 2017).

Small-scale welders are routinely and regularly exposed to numerous physical, chemical and accidental hazards, which makes them a vulnerable occupational group. The main reasons for their vulnerability are a lack of education, insufficient knowledge, a dearth of awareness of OSH hazards, and non-availability or use of personal protective equipment's (PPEs).Small-scale industry welders are least aware of safety and health outcomes resulting from the workplace exposures, activities, and materials (Balkhyour et al., 2017). PPEs have proved to be the most decent measure of protection for welders in small-scale where conventional hazards control measures and programs remain a challenge to implement (Basahi et al., 2017).

Nonuse of PPEs can expose workers to many safety and health hazards and risks which ultimately can cause serious health implications (Almeelbi et al., 2016). PPEs can play a vital role in minimizing occupational injuries and accidents which otherwise result in substantial human sufferings and financial losses due to lowered production, hefty fines, health and insurance claims, and absenteeism (Taha, 2000).

The workers in small-scale industries such as welding work in unhygienic conditions, are daily exposed to fuels and chemicals, and rarely use PPEs and other protective measures that can minimize health risks (Kamal et al., 2016). The common hazards are falling and flying objects, sharp edges, dust, vapors and fumes/odors from chemicals, heat, and noise (Ali et al., 2016). Use of PPEs is one of the key components of workplace health and safety practices to ensuring overall health and safety of workers (Apreko et al., 2015).

The Occupational Safety and Health Administration (OSHA) call for all possible measures to be adopted for health and safety of workers from workplace hazards and risks. Depending upon type and level of hazards, OSHA recommends employing different control measures (elimination, substitution, engineering, administrative, PPEs) to eliminate or minimize hazards to the greatest extent possible (OSHA, 2004). Thus, this study which aims at gathering information about occupational hazards and use of personal protective equipment (PPE) among small scale welders in Garden Chilulu, Lusaka, Zambia. Acute health effects experienced by the welders will also be explored as well as the welders' awareness and knowledge regarding occupational hazards and use of PPE.

This study was carried out in Garden Chilulu, Lusaka Zambia, to investigate the compliance of welders toward the use of personal protective equipment required for their work. The study is a descriptive and a cross sectional design. It is a Quantitative study. The simple random sampling technique was used to select the subjects used for this study. A well-structured questionnaire was used to obtain information from the welders.

1.1 Statement of the Problem

Garden compound, Zambia has a high number of local welders. Welding poses, a high range of both well-known and unknown hazards to human health and safety. These hazards can act quickly or may show up only in the long term. Therefore, PPE use by workers across industries should keep them safe from injuries, illness and fatalities resulting from work related hazards (Kirenga, 2019). The hazards arising from workplaces will impact the health and wellbeing of the workers. Personal Protective Equipment usage is important strategy for preventing exposure to hazards that could result in injuries among welders.

The Zambian Occupational health and safety legislation (ACT, 36 of 2010) specifies exposure limits for the substances present in welding gases and fumes. Regardless of the notion that most employers provided PPE for their welders, there seems to be poor adherence to the correct use of PPE among the welders (Moyo et al., 2020). Regardless of the fact that the Zambian Occupational and safety Act no. 36 of 2010 clearly stipulates that PPE is mandatory for all dangerous occupations such as welding, there was limited information to ascertain compliance to appropriate usage of PPE among local welders in Garden Chilulu. Due to lack of compliance to PPE there is an increase in the rate of injuries among small scale welder's examples being cuts, burns and others are losing sight because they are not protecting their eyes

Therefore, this study was conducted to find out what is causing welders not to use PPE because it is increasing the prevalence of acute health effects among small scale welders. The information is important because it will help reduce on the health problems, they are facing due to lack of adherence to PPE.

1.2 Justification

The justification of this study is that there is an increase of injuries among small scale welders in Garden Chilulu due to lack of knowledge and also not using PPE and are least aware of health effects emanating from the activities and materials in their work environment. There is an information gap on welding occupational hazards, level of

awareness and utilization of safety measures as well as prevalence of acute health effects among welders. Therefore, the reasons to why they are not complying to the use of PPEs and knowing the knowledge they have on the correct use of PPE is the reason for this research. This study will contribute to the existing body of knowledge in the field of occupational health and safety, it will also help prevent injuries in as it is cheaper to prevent than to cure or treat.

1.3 General objectives

To determine the factors leading to low compliance of appropriate use of personal protective equipment (PPEs) amongst local welders in Lusaka's Garden compound.

1.4 Specific objectives

1. To determine the availability of PPEs in line with the law among welders in Garden compound.
2. To assess accidents associated with welding due incorrect use of PPE.
3. To evaluate the occupational health and safety hazards associated with welding.

1.5 Research Questions

1. What are the PPEs in line with the law available to welders in Garden compound?
2. What are the accidents associated with welding due to incorrect use of PPE?
3. What occupational health and safety hazards are associated with welding?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter focuses on how international and local authors have presented their views and findings on the compliance to personal protective equipment among small scale welders in Garden Chilulu Compound Lusaka, Zambia. According to the World Health Organization WHO (2012), the major cause of illness and accident among welders is due to exposure to different occupational hazards because of their working environment. PPE is one of measures that used to protect welders' exposure against hazards when doing their work. The hazards that are reduced by PPE include biological, physical, mechanical and chemicals.

2.2 Global Laws on Health and Safety

The International Labor Organization (ILO) has estimated that over 2 million people die every year from work related accidents and diseases and that over 300 million non-fatal accidents are recorded each year. This translates into more than 6000 deaths and over 800 000 non-fatal accidents every day. In addition, ILO estimated that more than 160 million people suffer from occupational and work-related diseases. In many low- and middle-income countries such as Zambia, statistics on occupational accidents and injuries are limited, in cases where such information is available it is largely impaired by under reporting Umoren (2016). Considering the differences between countries, economic sectors and social groups, it is reasonable to agree that occupational deaths and injuries take a heavy toll among the poor and least protected.

Notwithstanding that personal protective equipment is considered as the last resort for control of hazards in a workplace, to be used only when other possible engineering and management controls have been put in place, it stands out as the most decent measure of protection for welders in small enterprises where conventional occupational safety

control principles remain a challenge to implement. Awareness of proper use of PPE, occupational hazards being avoided and the related health effects is therefore cardinal among the welders, lack of which may have an influence on the effectiveness of the PPE.

2.3 Zambian Perspective on Health and Safety

The absence of policies or regulations that directly address health and safety of welders in Zambia was clearly evident based on a review of literature. In general, self-employed persons and those working in small scale enterprises are covered under the Occupational Health and Safety (OHS) Act, which applies to all places of work in all sectors of the economy. The OHS Act was enacted by an act of Parliament in 2010 to provide for the following: establish the Occupational Health and Safety Institute and its functions; establishment of health and safety committees at workplaces and for the health, safety and welfare of persons at work; duties of manufacturers, importers and suppliers of articles, devices, items and substances for use at work; protection of persons, other than persons at work, against risks to health or safety arising from, or in connection with, the activities of persons at work; and associated matters. Among many other requirements listed in the OHS Act, Part IV outlines duties of employers and self-employed persons to persons other than employees including duties of persons in control of workplaces or plant with regard to prevention of health and safety risks at work. In addition, Part V gives powers to authorized officers under the OHS Act to enter and inspect any premises used as a workplace, or where any person is employed or is about to be employed, which may also include small and medium enterprises (Almeelbi et al., 2016). Other pieces of legislation that provide for safety and health of the workers in Zambia include: the Factories Act which is applicable to workplaces defined as factories; the Mining Regulations, applicable to the mining industry; the Ionizing Radiation Act that provides for the protection of the public and workers from dangers arising from the use of devices or materials capable of producing ionizing radiation; the Workers' Compensation Act which provides for the establishment and administration of a Fund for the compensation of workers who are disabled by accidents,

or diseases contracted by workers in the course of their employment. Other related laws such as the Public Health Act, Environmental Management Act (i.e., pesticides and toxic substances regulation) and Employment Act also touch on safety and health issues such as provision of sanitary facilities and personal protective equipment for workers.

2.4 Practice of PPE amongst the workers (welders)

Kumar (2014), conducted a study on the ineffective use of personal protective equipment in different areas of laundry department at the linen receiving area where workers were not wearing gloves or masks. Workers did not wear gloves or mask because they rarely come in contact with linen and it was also uncomfortable to wear the mask as they experience difficulties in breathing and communicating.).

Similarly, a study by Garbaccio (2015) showed that the use of various types of personal protective equipment such as gloves, masks and goggles were generally low because the use of PPE was discomforting able, allergic, cost and non-provision.

Omoijiade (2018), conducted a comparative cross-sectional study about personal protective equipment compliance among laundry workers in secondary and tertiary health facilities which showed that all the respondents of the private secondary and government tertiary hospitals who needed nose mask, hand gloves and coveralls for their duties were always given to them, whereas, all the respondents in the government secondary hospital reported that it was rarely given to them.

This is in contrast to a study Tamene (2020) about barriers to personal protective equipment use among laundry 8 workers in government hospitals who reported that no use of PPE was due to unavailability. Majority of respondents who failed to use nose mask, hand gloves and coveralls reported unnecessary, discomfort, imitating others, latex allergy as their reasons for non-compliance. Although all of the respondents in the private secondary and government secondary hospitals who needed googles for their duties were never given, as well as respondents in the government tertiary hospital who needed earplugs for their duties Omoijiade (2018), Kumar (2014) noted that workers do not use earplugs because it was not available to them and further confirmed in a

report by Kenya Ministries of Health and Intra-Health International (2013).

Similarly, Umoren (2016) reported that, “workers do not use PPE and their reason for non-use was discomfort, ignorance, wrong attitude and high cost of PPE”. Tadess (2016) reported that their reasons for not using PPE were lack of PPE, lack of practice and uncomfortable to use and lack of safety education. It was also found that the chances of using PPE among workers who served for more than 10 years were slightly less when compared to those who served for less than or equal to 10 years. The possible reasoning for this may be that those who served for a longer period could be accustomed to the work environment and developed false consciousness of safety, which made them not to comply with safety precautions including proper use of PPE.

Attitude and practice related to chemicals and personal protective equipment among workers which reported that their failure to use PPE was lack of supply of access to PPE, uncomfortable to use, PPE not useful and PPE easily damaged. Among workers, there was a common understanding that the availability of facemask has no protective value. Although permanent workers were significantly higher in PPE use than temporary workers. The permanent workers were motivated by their supervisor Asgedom (2019).

Honda (2016), showed that non-compliance with PPE in the workplace should be punished. It will encourage other workers to comply and promote safety working environment. But using incentives such as a naming staff champions for complying with use of PPE has also proven to increase PPE use in the workplace.

2.5 Knowledge of employees regarding PPE

A study on personal protective equipment uses among health care providers by Archana-Lakshmi (2018) showed that appropriate use of PPE among the workers was 18.1% due to unavailability of PPE and followed by unaware of the importance of PPE. The use of gloves was 100%; mask 96%, googles 4.4%, apron 62.3% and hair cover 58%. However, the use of shoe covers 10 and goggles was very low. The reason for the low use of them was that they were not available. According to the standard precaution

guidelines, shoe cover should be used to avoid spill of blood and bloody fluids over the leg. In contrast to a study done in Brazil about the adherence and knowledge about the use of PPE among workers showed that most respondents (71.5%) did not use PPE. The use of different types of PPE was generally low with gloves being (26.4%), a mask was (13.2%), the cap was (3.4%) and googles was (3%) Their reasons for not using PPE were discomfort, allergy, cost and non-provision (Garbaccio, 2015).

Similarly, a study of occupational health and safety measures in the laundry department of a private tertiary care teaching hospital Kumar (2014) stated that workers were not wearing hand gloves and mask. Workers felt that it was unnecessary to wear mask as it makes it difficult to breath and also for them not to wear

In contrast to a study done to assess the awareness regarding occupational health hazards among the employees in the laundry. The study by Umoren (2010) reported that most respondents were aware of PPE. The majority (94%) of the participants knew at least one PPE. The most commonly known PPE by participants were protective coverall (68%.7), safety boots (62.7), gloves (51.8%) and safety goggles (39.8%). However, other types of PPE like facemask and helmet were poor. Earmuff was unknown to the participants as a protective tool though the noise was identified as one hazard and use of ordinary sunglasses.

2.6 The importance of PPE practice

A study of PPE use and occupational exposures in small industries at Saudi Arabia Balkhyour (2018) showed that small industries employees are more vulnerable occupational group due to shortage of resources, lack of awareness, and lack of education, ineffective legislation and non-use of PPE. This will put employees at risk of illness, injuries and other negative health outcomes.

It was further supported by a study Abokhashabah et al., (2017) which stated that small industrial employees lack knowledge, understanding and information on the proper use of PPE which will result in negative health effects at workplaces. In addition, it is vital to ensure that employees are aware of PPE and use them effectively to prevent harmful

situations, Ahmad (2017).

Furthermore, welding at small scale has brought a lot of harm to the health of humans. With regard to human health, the findings of the studies have shown that low compliance to PPE. Welders are undergoing the following health conditions due to low compliance Head injury, Eye injury, Hearing loss, Cuts and burns, Foot injury.

The studies have shown that mitigation measures were put in place but it has been noticed that individuals are still getting harmed because of working in their small workshops. The literature also shows that there is a gap on the compliance to appropriate PPE as a result of the level of knowledge of the exposed population, comfortability, and their attitude towards using PPE they have been working without PPE and they think it's normal to get injured while doing their work. Therefore, there is need for more studies in different countries to be done as it is shown that low compliance to PPE has a negative effect on an individual's health. This study will provide information needed which can help in prevention of the health effects faced by welders due to low compliance to PPE and also contribute knowledge to the body of occupational health and safety they will be able to come up with better decisions and policies to do with PPE.

2.7 THEORETICAL FRAMEWORK

Workers in industrial workplaces are at increased risk of developing, occupational hazards, work-related accidents, and diseases. Personal Protective Equipment use (PPE) may protect the user against accident or safety risks in the working environment. Educational interventions may improve knowledge and practice related to prevention, but little is known about their knowledge and exposure prevention. The theory that will be used is the theory of planned behavior in relation to low compliance to (PPEs) use among small scale welders in garden compound Lusaka, Zambia.

The theory of planned behavior (TPB) as a behavior change theory, is widely applied to alter and improve different health behaviors such as nutritional behavior of women students self-monitoring intention and safe practices in workshops and laboratories the

appropriate method of manual load carrying among worker, effectiveness of training on the workers' safety performance in this case PPE compliance.

The TPB is an extension of the theory of reasoned action which includes an additional construct called the perceived behavioral control. The TPB assumes that behavioral intention determines behavior directly and indicates that three factors influence an individual's intention namely attitudes toward a behavior, subjective norms, and perceived behavioral control (PBC).

When an individual want to perform a behavior, he/she, first, evaluates the outcome and then forms an intention to perform it. Subjective norms are based on the fact that the individual is influenced by others in the society including partners, parents, religious leaders, relatives, and health officials and accordingly performs or avoids performing a behavior under their influence or pressure. In fact, the individual builds his intention based on the demands of others. PBC refers to the degree to which an individual feel that the performing of any given behavior is under his volitional control. If the individual believes that there are no opportunities or resources to perform a particular behavior, he/she is likely not to form a strong intention to perform that behavior even though he/she might have positive attitudes toward it or believe that important others would approve it.

Considering that the TPB can help to predict and understand environmental and individual factors affecting behavior, the present study is aimed at assessing the effect of the TPB-based training intervention on the use of PPE. The results of this study will be helpful in improving health behaviors and health of the workforce in turn may lead to increase the productivity of production centers.

2.8 CONCEPTUAL FRAMEWORK

The conceptual framework outlines the relationship between the dependent variables and the independent variables which gives out the overall outcome of a study.

Conceptual framework on the compliance to appropriate personal protective equipment Usage among small scale welders in Garden compound Lusaka

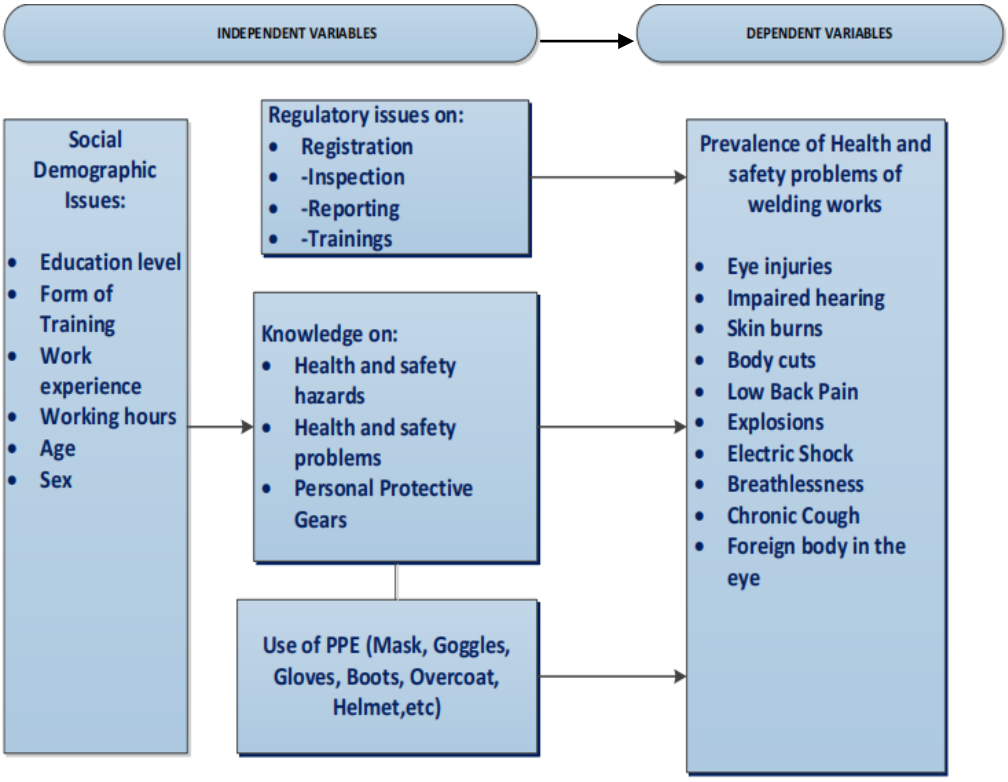

Figure 1. conceptual framework on the compliance to PPE usage among small scale

Source: by the Researcher.

CHAPTER THREE

3.0 METHODOLOGY

This section shows the methods and materials that will be used in the collection, processing and analysis of data while taking into account the ethical considerations.

3.1 STUDY APPROACH

The research study used a quantitative approach which will involve quantitative data that will be analyzed in order to attain the set objectives and answer the questions of the study. A quantitative research approach requires information from a larger number of respondents, while explaining the prevalence, extend, attitude and nature of issues (Kumar, 2011). In this study, a quantitative approach was used to assess how many people are in compliance with the use of PPE

3.2 STUDY DESIGN

This study was descriptive and used a cross sectional design. The cross-sectional design was used to assess factors related to exposure (i.e., welding health hazards, awareness of welding health hazards and personal protective equipment) and outcome (i.e., acute health effects and use of personal protective equipment) at the same time. Other variables being; sex, age, marital status, level of education, type of training, welding work experience, work activities, welding method and length of daily shift (OSHA, 2004).

3.3 STUDY POPULATION / TARGET POPULATION

The target population for the study were small scale welders in Lusaka district specifically Garden Chilulu. Thus, small scale welders operating in market areas and roadsides of Lusaka district in Garden Chilulu compound were included. The study excluded workers who were not involved in welding, with an exception of helpers and supervisors in the same premises (workshops/stands) where welding activities were taking place, because they were expected to have similar exposures and health effects.

Welders who did not give consent to participate in the study were also excluded from the study.

3.4 SAMPE SIZE, SAMPLING PROCEDURES

Sampling procedures refer to how respondents or participants will be selected for observation, Mungenda, (2003). The researcher used simple random sampling which means every member of the target population has an equal chance of being selected.

The following are the variables that were considered in this study:

Social-economic variables

- Income

Demographic variables

- Knowledge
- Education level
- Experience

Personal variables

- Attitudes

The formula used to calculate the sample size is n = Z2p(1-p)/ W2. Using the CI of 95% and margin error of 5%, the sample size used for this study was calculated as follows; n = Z2p(1-p)/ W2

Where:

n = is the desired sample size

Z = standard normal deviate (1.96)

p = proportion of the target population (.50)

W = marginal error

n = (1.96)2(.5*.5)/ (.5)2 = 384.2 = 385 welders

3.5 DATA COLLECTION METHODS

A pretested checklist was used during workplace inspections to collect data on work related health hazards and personal protective equipment used. The checklist was used to take notes on the personal protective equipment. Also, notes were taken during inspections on general indoor and outdoor work environments and work habits, interviews, observations and a questionnaire is an instrument that were used for the collection of data. Rowley (2014), questionnaire is one of the most extensively used means of collecting data and is typically adopted in surveys to profile a population. Therefore, considering the quantitative nature of this study, it becomes necessary for questionnaires to be used.

3.6 DATA ANALYSIS

Data analysis refers to breaking down of data into characteristics to find answers to the research question (Strydom, 2011). The data was analyzed by the researcher using the Statistical Package for Social Sciences (SPSS) version 26- Computer Software Data analysis method that was used is descriptive statistics, it summarizes or describes the characteristics of a dataset it is important because it will help in making more informed decisions that will guide in making the right decisions towards the use of PPE.

3.7 ETHICAL CONSIDERATIONS

This research study was performed after the topic was approved by my supervisor, University of Lusaka Research Ethics Committee Board and National Health Research Authority. All the participants during data collection were given an assurance close that the data was collected anonymously and will be kept confidential. Furthermore, all previous Scholars whose works have been included in this report has been cited accordingly.

Ethical considerations are issues that deal with matters that are right or wrong. According to (Polit & Beck,2012), when Humans are used in a study, participants care

must be exercised to ensure that their rights are protected and therefore, permission is important from the respondents.

a) Informed Consent.

The researcher was able to demonstrate that the participants was freely given consent or permission of being involved in the researcher's investigation and that they fully understand what the research is all about.

b) Confidentiality.

The researcher kept and treated any information shared as confidential as possible. It helped protect the privacy of the participants.

c) Avoidance of Harm.

The researcher protected the participants from being harmed

CHAPTER FOUR

4.0 RESULTS

4.1 INTRODUCTION

This section presents the results of the study, including an overview of the types of PPE used by the small-scale welders, the frequency of usage, accidents associated with welding due to incorrect use of PPE and occupational health and safety hazards associated with welding.

4.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY PARTICIPANTS

This study comprised 385 respondents. The majority of the respondents were males 380 (98.70%) and they were followed by females 5 (1.30%). The age of our respondents was grouped into 3 categories with those aged less than 20 being the least 36 (9.35%), the majority 289 (75.06%) were aged between 20 and 35, and finally the age group above 35 years of age 60 (15.58%).

The marital status of our study participants showed that the majority of them were married 257 (66.75%), followed by those who were single 94 (24.42%), the divorced 26 (6.75%) and the least being the widowed 8 (2.08%). Looking at the level of education of our respondents, the majority reached only as far as primary level of education 196 (50.91%). This was followed by those who went up to secondary level of education 120 (31.17%) and amongst those who have been to school, the least were those who attained the highest level of education which is tertiary 26 (6.75%). Only 43 (11.17%) have never been to school.

Most of our study participants 359 (93.25%) leant welding through apprenticeship. Only 26 (6.75%) of our respondents attained technical training.

Table 1. Sociodemographic Characteristics of Our Study Participants

Variables	Frequency	Percentage (%)
Gender		
Male	380	98.70
Female	5	1.30
Age		
<20	36	9.35
20 to 35	289	75.06
>35	60	15.58
Marital Status		
Single	94	24.42
Married	257	66.75
Divorced	26	6.75
Widowed	8	2.08
Level of Education		
Never Been to School	43	11.17
Primary	196	50.91
Secondary	120	31.17
Tertiary	26	6.75
Form of Training		
Apprenticeship	359	93.25
Technical training	26	6.75

4.3 AVAILABILITY OF PERSONAL PROTECTIVE EQUIPMENT AMONG WELDERS

The availability of PPEs in line with the law among welders in Garden compound was tackled categorically by specifying the type of PPE. In relation to eye protection equipment, only 65 (16.88%) of our respondents were using welding helmets while 288 (74.81%) of the study participants were using welding glasses. The other type of PPE we looked at is Ear protection. None of our study participants made use of ear protection equipment.

Under respiratory tract protection equipment, though only a few, 43 (11.17%) of our respondents used facemasks and 21 (5.45%) used respirators. Amongst our study respondents, 88 (22.86%) used safety boots while the majority 234 (60.78%) used ordinary shoes as feet protection. A few of our study participants 5 (1.30%) used

Insulated safety gloves as hand protection equipment.

Leather apron was the least used general body protection equipment 15 (3.90%). This was followed by the work suit 61 (15.84%) while the majority of our respondents 309 (80.26%) used ordinary clothes.

Therefore, the most available PPE among Garden Compound welders is welding glasses 288 (74.81%), which was followed by safety boots 88 (22.86%), welding helmet 65 (16.88%), coverall 61 (15.84%), face masks 43 (11.17%), respirators 21 (5.45%), leather apron 15 (3.90%) and the least being insulated safety gloves 5 (1.30%).

Table 2. Availability of PPE Among Welders in Garden Compound

Type of PPE	Frequency	Percentage (%)
Eye Protection		
Welding helmet	65	16.88
Welding glasses	288	74.81
Ear Protection		
Ear plugs	0	0
Ear muffs	0	0
Respiratory Tract Protection		
Face masks	43	11.17
Respirators	21	5.45
Feet Protection		
Safety boots	88	22.86
Ordinary shoes	234	60.78
Hands Protection		
Insulated safety gloves	5	1.30
Body Protection		
Work suit/coverall	61	15.84
Leather apron	15	3.90
Ordinary clothes	309	80.26

4.3.1 FREQUENCY OF USAGE OF PERSONAL PROTECTIVE EQUIPMENT

Looking at the rows, we can see that eye protection is used "All the time" by 365

individuals and "Sometimes" by 20 individuals. Similarly, ear protection is used "All the time" by 4 individuals and "Sometimes" by 381 individuals. Respiratory tract protection is used "All the time" by 8 individuals and "Sometimes" by 377 individuals. Feet protection is used "All the time" by 50 individuals and "Sometimes" by 335 individuals.

However, there appears to be a discrepancy in the usage of hand and body protection. The table indicates that only 2 individuals use hand protection "All the time" and 3 individuals use it "Sometimes", while 59 individuals use body protection "All the time" and 326 individuals use it "Sometimes". This may suggest that hand protection is not being used as frequently as it should be, while body protection is used more frequently.

Table 3. Frequency of Usage of PPE

Type of PPE	**All the time**	**Sometimes**
Eye Protection	365	20
Ear Protection	4	381
Respiratory Tract Protection	8	377
Feet Protection	50	335
Hands Protection	2	3
Body Protection	59	326

4.4 ACCIDENTS ASSOCIATED WITH WELDING DUE TO INCORRECT USE OF PPE

It is imperative to emphasize that some of our respondents experienced two or more of the accidents noted in Table 3. Among those who experienced cuts, cuts in the hands 266 (60.09%) was the most experienced accident which was followed by cuts in the feet 121 (31.43%) and the least being cuts in the body trunk 51 (13.25%). Then, among those who got burnt, hand burns 297 (77.14%) occurred in the majority of our respondents which was followed by feet burns which occurred in 134 (34.81%) of the study participants, and the least being body trunk burns which occurred in 88 (22.86%) of our respondents. These were the common accidents which occurred to our

respondents triggered by incorrect use of PPE.

Table 4. Accidents Associated with Welding Due to Incorrect Use of PPE

Characteristic	Frequency	Percentage (%)
Cuts		
Hands/arms	266	60.09
Body trunk	51	13.25
Feet	121	31.43
Burns		
Hands/arms	297	77.14
Body trunk	88	22.86
Feet	134	34.81

4.4.1 INTENSITY OF THE ACCIDENTS EXPERIENCED

Amongst those who experienced accidents caused by incorrect use of PPE, the management and effects of those accidents shown in Table 4. Those respondents who experienced hand cuts, only 18 attained medical treatments while 248 did not seek medical treatment. The majority of those who experienced hand cuts had their work affected those accidents. Only 9 respondents who experienced body trunk cuts attained medical treatment while the majority 42 opted not to. However, 38 of those who had body truck cuts had their work affected by the accident. Our respondents who experienced feet cut, the majority 100 did not see medical treatment while only 21 of them attained medical treatment. Most of them 101 had their work affected while only 20 claimed not to have their work affected.

Of the study participants who experienced hand burns, only 38 attained medical treatment while 259 opted not to. Even though the majority of them opted not to seek medical treatment, 276 of them had their work affected by this accident. Only 17 of our respondents who experienced body burns attained medical treatment while 71 of them decided not to. The majority of them 79 still had their work affected by this accident while only 9 of them claimed not have their work affected. Of those respondents who experienced feet burns, only 6 went to seek medical treatment while the majority 128 did not seek medical treatment. Even though that was the case, the majority of these

respondents affected by feet burn reported to have their jobs affected.

Table 5. Intensity of The Accidents Experienced

Characteristics	Attained medical treatment		Was work affected?	
	Yes	**No**	**Yes**	**No**
Cuts				
Hands/arms	18	248	250	16
Body trunk	9	42	38	13
Feet	21	100	101	20
Burns				
Hands/arms	38	259	276	21
Body trunk	17	71	79	9
Feet	6	128	122	12

4.5 OCCUPATIONAL HEALTH AND SAFETY HAZARDS ASSOCIATED WITH WELDING

Amongst all the occupational health and safety hazards associated with welder, most of the welders 365 were aware of bright light which can cause eye injuries as their occupational hazard. This is also the reason welding glasses were the most used PPE as it is well known can impair vision. This is then followed by noise exposure noted by 341 welders. Welding generates high levels of noise which can damage hearing and prolonged exposure can cause hearing loss. Welding also generates intense heat, fire or explosion noted by 314 welders of our respondents which welders should take precautionary measures to prevent accidents caused by these hazards.

The other most noted occupational health and safety hazards include: welding fumes and gases 295, flying sparks or particles 256, electric current 219, and vibrations 218. The occupational health and safety hazards which were least known to our respondents are uncomfortable work posture 199, sharp edges 146 which cause most cuts and falling objects given recognition by 136 welders as an occupational health and safety hazard.

The chi-square test was conducted to measure the association of occupational health and safety hazards awareness classified as aware and not aware among welders. A P-Value of .231 was obtained from the test. This means that there is no association

between occupational health and safety hazards and awareness among welders.

Table 6. Occupational Health and Safety Hazards and Levels of Awareness

Occupational Health and Safety Hazards	**aware**	**Not aware**
Uncomfortable work posture	199	186
Vibrations	218	165
Falling objects	136	249
noise	341	44
Flying sparks	256	129
Welding fumes and gases	295	90
Sharp edges	146	239
Electric current	219	166
Heat, fire or explosion	314	71
Bright light	365	20

CHAPTER FIVE

5.0 Discussion

5.1 DEMOGRAPHIC DATA

This study had 98.70% males which shows that the field of welding in Garden compound is largely dominated by the males. This finding is similar to the study conducted by Magoolo (2020) which showed that 100% of its participants were males. The majority of our respondents 75.06% were aged between 20 and 35 indicating the dominance of youths in this field. Our study also shows that 66.75% of our respondents were married which agrees with the findings of Z'gambo (2015) which revealed that 69% of its respondents were married. The majority of our respondents 50.91% have reached as far as primary level of education. The findings of Z'gambo also agree with our finding which revealed that 52% of its respondents reached primary and basic level of education. Apprenticeship 93.25% is a form of training most of our respondents attained. This finding is consistent with the finding of Magoolo which revealed that the majority of its respondents 84% attained apprenticeship as a form of training.

5.2 AVAILABILITY OF PERSONAL PROTECTIVE EQUIPMENT AMONG WELDERS

The findings of this study revealed that a relatively small proportion of welders in Garden Compound were using appropriate PPE to protect themselves from the hazards of welding. In terms of eye protection equipment, only 65 (16.88%) of the study participants were using welding helmets, while the majority, 288 (74.81%), were using welding glasses. This finding is consistent with a study conducted by Abumere and Adebayo (2020) in Nigeria, which reported that welding glasses were the most commonly used eye protection equipment among welders, with 70% of the participants reporting its use. This finding is also consistent with a study conducted by Esu and Ekanem (2021) in Cross River State, Nigeria, which reported that safety goggles, hand

gloves, and safety boots were the main PPE utilized by study respondents based on self-report or observation of welders. However, it is important to note that welding glasses do not provide complete protection from welding hazards, and welding helmets are recommended for better protection.

Regarding ear protection, none of the participants in the current study were using ear protection equipment. This finding is similar to that of a study by Magoolo (2020) in Dar Es Salaam, Tanzania, which reported that only 3% of the welders used earmuffs. However, this finding is concerning as welding noise can lead to permanent hearing loss, and ear protection is crucial for preventing hearing damage.

In terms of respiratory tract protection, only a few of the study participants used facemasks (43, 11.17%) or respirators (21, 5.45%). This finding is consistent with a study by Z'gambo (2015) in Lusaka, Zambia in which Garden compound is one of the areas, which reported that only 16% of welders used respirators for respiratory protection. This is a worrying finding as welding fumes and gases can cause a range of respiratory problems, including bronchitis, asthma, and lung cancer.

Regarding feet protection, 88 (22.86%) of the study participants used safety boots, while the majority (234, 60.78%) used ordinary shoes. This finding is inconsistent with a study by Esu and Ekanem (2021) in Cross River State, Nigeria, which reported that safety boots were the most frequently used PPE among welders. However, it is important to note that safety boots provide better protection against foot injuries, including burns and cuts, than ordinary shoes.

Regarding hand protection, only a few participants (5, 1.30%) used insulated safety gloves. This finding is different from that of a study by Chukwu et al. (2019) in the Owerri North LGA, Imo State, Nigeria, which reported that only 80.7% of welders used safety gloves. Our finding is concerning as welding can cause severe burns and cuts to the hands, and proper hand protection is crucial for preventing these injuries.

Finally, the majority of the study participants (309, 80.26%) used ordinary clothes for body protection. This finding is consistent with a study by Magoolo (2020) in n Dar Es

Salaam, Tanzania, which reported that 55% of welders used ordinary clothes for body protection. However, it is important to note that ordinary clothes do not provide adequate protection against the hazards of welding, and appropriate body protection, such as coveralls, is necessary.

In conclusion, the findings of this study highlight the inadequate availability and use of PPE among welders in Garden Compound, with many participants using inappropriate or inadequate PPE. This is consistent with the findings of other studies, both nationally and internationally, and underscores the need for greater awareness and education on the importance of PPE use and the hazards of welding. A concerted effort is required from both employers and employees to improve the availability and use of appropriate PPE in the welding industry.

5.2.1 FREQUENCY OF USAGE OF PERSONAL PROTECTIVE EQUIPMENT

Our findings revealed that eye protection is the PPE that was used "All the Time" by the majority of our respondents 365 as compared to any other PPE. This finding is inconsistent with the finding of Z'gambo (2015) which found that eye protection was never used always 69%.

The rest of all other types of PPE were used "Sometimes" by our respondents which are: Ear protection 381, respiratory Tract Protection 377, Feet Protection 335, Hands Protection 3, and Body Protection 326. This indicates lower usage of PPE. These findings are consistent with the findings of Sikana (2020) that found low compliance in wearing and how frequent PPE was used.

The findings of our study suggest that eye protection most frequently used PPE than other types of PPE. The usage of PPE varies depending on the type of equipment, and employers should ensure that workers are adequately protected by providing them with the appropriate PPE. The findings of our study are consistent with previous studies conducted in Zambia, although there are some variations.

5.3 ACCIDENTS ASSOCIATED WITH WELDING DUE TO INCORRECT USE OF PPE

The findings from Table 4 indicate that incorrect use of PPE can result in a range of accidents for welders. The most common accidents were cuts in the hands (60.09%), followed by burns in the hands (77.14%). These findings are similar to the results of a study conducted by Z'gambo (2015), who found that the most common welding-related injuries were cuts and burns to the hands and fingers. In another study conducted by Magoolo (2020), burns (93%) and cuts (89%) were the most common injuries reported by welders. The high incidence of hand injuries in our study is concerning, as hands are crucial for performing welding tasks and an injury to the hands can result in decreased productivity and potential disability.

Furthermore, Table 5 reveals that many of the respondents who experienced accidents due to incorrect use of PPE did not seek medical treatment. This is the uniqueness of this study as there is no other study which reported seeking of medical treatment due after an accident caused by incorrect use of PPE. However, it is important to note that the majority of our respondents reported that their work was affected by the accidents they experienced, indicating that these injuries can have a significant impact on work productivity and quality. These findings are similar to what Sikana (2020) found in her study.

5.3.1 INTENSITY OF THE ACCIDENTS EXPERIENCED

The findings of this study revealed that a considerable number of respondents who experienced accidents due to the incorrect use of PPE did not seek medical treatment. Specifically, in the case of hand cuts, only 18 out of 266 respondents sought medical treatment. This is similar to the findings of a study conducted by Kunda, Musonda, & Bwalya (2019), where only 25% of the participants who had hand injuries sought medical treatment. However, this is in contrast to another study by Esu & Ekanem (2021) which found that 63.3% of respondents sought medical attention after

experiencing hand injuries.

Regarding body trunk cuts, only 9 out of 51 respondents sought medical treatment in this study, while the majority (42) did not. This is consistent with the findings of a study by Sikana (2020), which found that only 15% of respondents sought medical attention after experiencing body injuries. However, this finding contrasts with the results of a study by Z'gambo (2015), which found that 50% of the respondents sought medical attention after experiencing body injuries. The variation in findings could be attributed to the differences in the nature of the workplace and the severity of the injuries.

The majority (100) of the respondents who experienced feet cuts did not seek medical treatment, while only 21 sought medical treatment. This finding is consistent with the results of a study by Kunda, Musonda, & Bwalya (2019), which found that 72% of respondents did not seek medical attention after experiencing foot injuries. However, this finding is in contrast to the results of a study by Sikana (2020), which found that 70.2% of the respondents sought medical attention after experiencing foot injuries.

The findings of this study revealed that a significant number of respondents who experienced hand burns did not seek medical treatment. Specifically, only 38 out of 297 respondents sought medical treatment, while the majority (259) did not. This finding is consistent with the results of a study by Chama, Chirwa & Ngoma (2019), which found that 69.2% of respondents did not seek medical attention after experiencing hand burns. However, this finding contrasts with the results of a study by Sikana (2020), which found that 80% of respondents sought medical attention after experiencing hand burns. The difference in findings could be attributed to the differences in the severity of the burns and the availability of medical facilities in the respective workplaces.

Regarding body burns, only 17 out of 88 respondents sought medical treatment in this study, while the majority (71) did not. This finding is consistent with the results of a study by Chama, Chirwa & Ngoma (2019), which found that 80.2% of respondents did not seek medical attention after experiencing body burns. However, this finding contrasts with the results of a study by Z'gambo (2015), which found that 60.7% of

respondents sought medical attention after experiencing body burns. The variation in findings could be attributed to the differences in the severity of the burns and the nature of the workplace.

Only 6 out of 137 respondents sought medical treatment after experiencing feet burns in this study, while the majority (128) did not. This finding is consistent with the results of a study Abumere and Adebayo (2020) in Nigeria, which found that 80% of respondents did not seek medical attention after experiencing feet burns. However, this finding contrasts with the results of a study by Chukwu et al. (2019) which found that 60% of the respondents sought

5.4 OCCUPATIONAL HEALTH AND SAFETY HAZARDS ASSOCIATED WITH WELDING

One study conducted by Asfaw et al., (2017) in Ethiopia found that welding fumes and gases (86%) were the most prevalent occupational hazard among welders, followed by eye injuries caused by bright light (78%). This is in contrast to our study, where eye injuries (365) were the most commonly recognized hazard, followed by noise exposure (341) and fire or explosion (314). However, both studies highlight the need for appropriate PPE, such as welding glasses, to protect against eye injuries and the importance of adequate ventilation to reduce the risk of exposure to welding fumes and gases.

Another study conducted by Al-Enezi, Alghanim & Al-Otaibi (2014) in Kuwait found that the most commonly reported occupational hazards among welders were noise exposure (81%) and heat stress (77%). This is similar to our findings, where noise exposure (341) and intense heat (314) were among the most recognized hazards. Both studies emphasize the need for appropriate PPE, such as hearing protection and heat-resistant clothing, to mitigate these hazards.

The findings from this study also highlight some hazards that are less commonly recognized by welders, such as uncomfortable work posture (199), sharp edges (146),

and falling objects (136). This is consistent with a study conducted by Abumere and Adebayo (2020) in Nigeria, which found that welders had poor ergonomics and were exposed to hazards such as sharp edges and falling objects. These findings emphasize the need for comprehensive hazard assessments that consider all potential hazards and appropriate measures to prevent them.

However, different from our finding that there is no association between occupational health and safety hazards and awareness among welders, a study by Budhathoki et al. (2023), revealed that Education and duration of employment were significantly associated with the awareness of hazards and of PPE and its use. The welders who reported using PPE during welding were two times more likely to have been aware of hazards (OR=2.52, 95% CI 1.09 to 5.81) and five times more likely to have been aware of PPE compared with the welders who did not report the use of PPE (OR=5.13, 95% CI 2.34 to 11.26).

In conclusion, this study provides important insights into the occupational health and safety hazards associated with welding and highlights the need for appropriate PPE and hazard assessments to mitigate these hazards.

CHAPTER SIX

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

CONCLUSION

This study presents valuable insights into various aspects related to the utilization of Personal Protective Equipment (PPE), accidents resulting from improper PPE usage in welding, and occupational health and safety hazards associated with welding. Among the different types of PPE examined, welding glasses were the most widely available (74.81%), followed by safety boots (22.86%) and welding helmets (16.88%). However, no participants used ear protection equipment.

Significant usage discrepancies were observed among various PPE categories. Eye protection was consistently used by a large number of participants (365), while hand protection was less frequently employed. Body protection was utilized more often than hand protection, indicating a potential gap in PPE usage practices.

The study revealed that hand cuts (60.09%) and hand burns (77.14%) were the most commonly reported accidents. Feet cuts (31.43%) and feet burns (34.81%) were also significant. These accidents were primarily caused by improper use of PPE.

Participants demonstrated varying levels of awareness regarding occupational health and safety hazards associated with welding. Bright light (365), noise (341), and heat, fire, or explosion (314) were the hazards most recognized by respondents. Conversely, uncomfortable work posture (199), sharp edges (146), and falling objects (136) were the hazards least known to participants. However, there was no association observed between occupational health and safety hazards and awareness among welders

LIMITATIONS

Recall bias is one of the limitations this study experienced. This is so as the study compiled information on accidents participants had in the past. As a result, there is a good probability that some people may have forgotten what they went through in the

past. Participants were therefore asked about any welding related accidents issues they had ever encountered.

The possibility of social desirability bias and self-reports are also limitations of this study. But in order to reduce this risk, PPE usage at the workplaces of every sampled welder was observed.

Actual PPE use and frequency of use could not be determined because data was only gathered once during the course of the study. For instance, several of the welders claimed to always wear specific PPE, even though there was no means to verify their claims. It is equally plausible that they did not.

RECOMMENDATIONS

- Enforcement of regulations: The Zambian government should enforce regulations that mandate small-scale welders to use appropriate PPEs. Inspections should be conducted regularly to ensure that small-scale welders comply with these regulations.
- Training and education: Small-scale welders in Garden Compound, Lusaka should be provided with training and education on the proper use of PPEs, as well as on the potential risks associated with welding without using them. This training can be conducted by government agencies, non-governmental organizations, and private companies.
- Access to PPEs: Small-scale welders in Garden Compound, Lusaka should be provided with affordable and easily accessible PPEs, such as welding helmets, gloves, aprons, and boots. This can be achieved through collaboration between government, non-governmental organizations, and the private sector.

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Appendices

CONSENT FORM

SCHOOL OF MEDICINE AND HEALTH SCIENCES

My name is Luyando Mushinda a fourth year Public Health student at the University of Lusaka pursuing a Bachelor's Degree in Public Health. I am conducting a study on compliance to appropriate usage of personal protective equipment among small scale welders in garden compound. This research is one of the University requirements for acquiring a Bachelor's Degree in Public Health. The findings of the study will be used by the Ministry of Health through the Government to establish policies and also in decision making. You are chosen for this study on purpose. Therefore, your involvement is however, entirely voluntary and are no consequences if you refuse to participate. Please be assured that your identity will and responses to this form will be completely private.

AUTHORIZATION LETTER

SCHOOL OF MEDICINE AND HEALTH SCIENCES LEOPARDS HILL CAMPUS
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SCHOOL OF MEDICINE AND HEALTH SCIENCES RESEARCH ETHICS COMMITTEE

Ref no: IORG0010092-2023/033

Date: 15th DECEMBER, 2022

LUYANDO MUSHINDA - BSPH19218103

Re: RESEARCH TITLE: COMPLIANCE TO APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPES) USAGE AMONG SMALL SCALE WELDERS IN GARDEN COMPOUND, LUSAKA

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS Research ethics committee
2. Approval from the Lusaka District health Management or equivalent health authorities should be sought.
3. The study tools should be added.
4. An informed consent form should be attached and filled by all study participants (If dealing with primary data)
5. The risks and benefits should be included in the consent form.
6. Ensure before commencement that approval is sought from ZNHRA

Congratulations and the committee wishes you success in your work.

Prof Kasonde Bowa
MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)
Chairman- UNILUS REC
Professor of Urology and Consultant Urologist
Executive Dean
University of Lusaka and University Teaching Hospital School of Medicine and Health Sciences.

NATIONAL HEALTH RESEARCH AUTHORITY

Lot No. 18961/M, off Kasama Road, Chalala, P.O. Box 30075, LUSAKA

Tell: +260211 250309 | Email: znhrasec@nhra.org.zm | www.nhra.org.zm

Ref No: NHRA00006/21/03/2023 **Date: 21st March, 2023**

The Principal Investigator,
Luyando Mushinda,
University of Lusaka,
Lusaka, Zambia.

Dear Ms. Mushinda,

Re: Request for Ethical Clearance and Authority to Conduct Research

The National Health Research Authority is in receipt of your request for ethical clearance and authority to conduct research titled **"Compliance to Appropriate Personal Protective Equipment Usage among Small Scale Welders in Garden Compound, Lusaka."**

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised;
2. Progress updates are provided to NHRA bi-annually from the date of commencement of the study;
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours faithfully,

NATIONAL HEALTH RESEARCH AUTHORITY

Prof. Godfrey Biemba,
DIRECTOR/CHIEF EXECUTIVE OFFICER

DATA COLLECTION TOOL

With reference to the study approach, which was used in this study as quantitative study approach, an appropriate data collection tool is a questionnaire to be used in the research so that the main objective of the study is achieved accordingly.

QUESTIONNAIRE FORM FOR OCCUPATIONAL HAZARDS AND USE OF PERSONAL PROTECTIVE EQUIPMENT AMONG SMALL SCALE WELDERS IN GARDEN COMPOUND, ZAMBIA

ID Number_____

Market/stand number_____

Initials of Interviewer _____

Date of Interview_____

SECTION A: DEMOGRAPHIC AND GENERAL INFORMATION

[Please tick (√) and fill in where appropriate]

1. What is the sex of the welder?

I. Male () ii. Female ( )

2. How old were you on your last birthday?

Age (years) _____

3. What is your marital status?

I. Single ( ) ii. Married ( ) iii. Divorced ( ) iv. Widowed ( )

4. What is the highest level of education you attended?

I. None ( ) ii. Primary ( ) iii. Basic ( ) iv. Secondary ( ) v. Tertiary ( )

5. How did you train to become a welder?

I. Apprenticeship training ( ) ii. Technical training ( ) iii. Other _____

6. Where any of the following covered in your training to become a welder?

I. How to conduct your work safely ( )

ii. Health effects related to your work ( )

iii. Use of protective clothing ( )

SECTION B: EXPOSURE INFORMATION

[Please tick (√) and fill in where appropriate]

1. For how long have you worked as a welder or in a welding workshop?

No. of years____

2. How long is your normal work day?

Please specify: _____

<5 hours ( ) 5-6 hours ( ) 7-8 hours ( ) 9-10 hours ( ) 11-12 hours ( )

3. Apart from welding, what other activities do you perform in your work?

I. Grinding ( ) ii. Painting ( ) iii. Cutting ( ) iv. Hammering ( ) v. Cleaning ( )

vi. Other activities_____

4. What welding methods do you normally use?

i. Manual Metal Arc (MMA) Welding ( ) ii. Gas Welding ( )

ii. Other _____

5. How much time do you normally spend on welding?

Please Specify: _____

I. <1 hr. ( ) ii. 1-3 hrs. ( ) iii. 4-6 hrs. ( ) vi. >7 hrs. ( )

6. What products do you normally make or do you work on in your workshop/stand?

_____

7. What materials do you normally use when welding?

Please

Specify_____

SECTION C: HAZARDS AND PPE KNOWLEDGE

[Ask the respondent the open-ended questions below and tick the response options given or

note down where necessary].

1. In your welding work, what do you know can cause injuries or harm to your health and/or

the health of your fellow workers?

1) Bright light

2) Heat, fire or explosion

3) Electricity

4) Sharp edges/metals

5) welding fumes and gases

6) Flying sparks/particles

7) Noise

8) Failing objects

9) Vibrations

10) Uncomfortable work postures

Other _____

2. What personal protective equipment do you know welders can use to protect

themselves

when welding?

1)Welding helmet

2)Work suit/coverall, Leather apron

3)Hand shield

4)Ear muffs/ear plugs

5)Goggles

6)Rubber soled, steel toe cap, safety shoes

7)Respirators/face mask

8)Insulated gloves

Other_____

SECTION D: USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

[Please tick (√) and fill in where appropriate]

1. PPE for Eyes and Face

Do you use anything to protect your eyes and face when welding?

Yes ( )

No ( )

[If yes, specify]

i. Safety goggles ( )

ii. Welding shield ( )

iii. Welding helmet ( ) Other _____

How often do you use the mentioned protective equipment when welding?

i. All the time ( )

ii. Sometimes ( )

2. PPE for Hearing

i.

Do you use anything to protect your ears/hearing when welding?

Yes ( )

No ( )

[If yes, specify]

Ear muffs ( )

Ear plugs ( )

Other_____

How often do you use the mentioned ear/hearing protection when welding?

All the time ( )

Sometimes ( )

3. PPE for Lung and Respiratory airways

i. Do you use anything to cover your nose/mouth or to help you breathe when welding?

Yes ( )

No ( )

[If yes, specify]

Face masks ( )

Respirators ( )

Other _____

ii.

How often do you use the mentioned protection when welding?

All the time ( ) Sometimes ( )

4. PPE for Feet and Hands

What type of shoes do you wear when welding?

Safety boots ( )

Ordinary shoes ( )

Other _____

How often do you use the mentioned protective shoes when welding?

All the time ( )

sometimes ( )

Do you use anything to protect your hands when welding?

Yes ( )

No ( )

[If yes, specify]

Insulated safety gloves ( )

Other _____

iv.

How often do you use the mentioned gloves when welding?

All the time ( ) Sometimes ( )

5. PPE for the body trunk

What do you use to cover your body when welding?

Work suit/coverall ( )

Leather apron ( )

Ordinary clothes ( )

Other _____

How often do you use the mentioned protective clothing?

All the time ( )

Sometimes ( )

CUTS

1. Have you ever experienced cuts on any of the following body parts during your work in

the past two weeks?

i. Hands/arms. Yes ( ) No ( ) ii. Body trunk. Yes ( ) No ( ) iii. Feet Yes ( ) No ( )

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2. Did you ever have to stay away from work because of any of these cuts? Yes ( ) No ( )

3. Did you ever have to go to a clinic/hospital because of these cuts?

Yes ( ) No ( )

BURNS

1. Have you ever experienced burns on any of the following body parts during your work in

the past two weeks?

i. Hands and/or arms. Yes ( ) No ( )

ii. Body trunk. Yes ( ) No ( )

iii. Feet Yes ( ) No ( )

1. Did you ever have to stay away from work because of any of the burns?

Yes ( )

No ( )

2. Did you ever have to go to a clinic/hospital because of the burns?

Yes ( )

No ( )

HEALTHY WORKER EFFECT CONTROL

1. Do you know anyone working a welder who quit their job due to an injury from work?

Yes ( )

No ( )

2. Do you know anyone working as a welder who died who died as a result of injury at work?

Yes ( )

No ( )

Respiratory Effect Confounder Control

1. Have you ever smoked?

Yes ( )

No ( )

2. Do you smoke at present?

Yes ( )

No ( )

Have you given up smoking in the last month?

Yes ( )

No ( )

4. Are you currently on medication for a respiratory illness?

Yes ( )

No ( )

SECTION F: RECOMMENDATIONS FOR FUTURE ACTION

1. In your own opinion, what do you feel can be done to improve the welfare of people working as welders?

_____

_____

_____

_____

THE END!

THANK YOU FOR YOUR PARTICIPATION.

WORK PLAN

ACTIVITY	DEC2023 - FEB 2023	FEB2023- MAR2023	MAR2023 – APR2023	APR2023 – MAY 2023
ETHICAL CLEARANCE FROM UNILUS REC AND FUNDING AUTHORITIES				
DATA COLLECTION				
DATA ANAYSIS				
DRAFT REPORT WRITING				
SUBMISSION TO SUPERVISOR				
SUBMISSION OF REPORT AND FINALIZING				

WORK BUDGET

ACTIVITY	DESCRIPTION	UNIT	AMOUNT(K)
DATA COLLECTION	TRANSPORT	1	300
	QUESTIONNAIRE	150	500
ETHICAL CLEARANCE		1	500
LUNCH	LUNCH	1	200
AIRTIME AND BUNDLES	AIRTIME AND BUNDLES	1	250
RESEARCH ASSISTANTS	ASSISTANTS	2	300
TOTAL			2050 10% INCIDENTIALS =205

GRAND TOTAL			2255