

**Master Of Science in Public Health**



**Awareness Of Occupational Health and Safety Among the  
Workers of Ordnance Factory, Wah Cantt**

**By  
Faiza Nadeem**

**Al-Shifa School of Public Health, PIO, Al-Shifa Trust**

**Eye Hospital**

**Quaid-I-Azam University**

**Islamabad, Pakistan**

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**(Awareness Of Occupational Health and Safety Among the  
Workers of Ordnance Factory, Wah Cantt)**

(Faiza Nadeem)

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TO

Al-Shifa School of Public Health. PIO, Al Shifa Trust Eye Hospital,

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## Declaration

In submitting this dissertation, I certify that I have read and understood the rules and regulations of department of public health and Quaid-i-Azam university regarding assessment procedures and offences. I formally declare that all work contained within this thesis is my own apart from properly referenced quotations.

I understand that plagiarism is the use or presentation of others work, whether published or unpublished and can include other candidates work. I certainly understand that any quotation from the published or unpublished works of other researcher must be made prominent by placing inside quotation marks with a complete reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgements.

I declare that this research work has not been accepted in substance for any other degree, nor it is currently being submitted in candidature for any other degree.

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Supervisor  
(Dr. Ayesha Babar Kawish)  
Associate Professor  
HOD Al-Shifa School of Public Health  
PIO, Al Shifa Trust Eye Hospital  
Date: 27-03-2023

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(Faiza Nadeem)  
(362876-PIO/MSPH-2021)  
Date: 27-03-2023

**Dedicated to my maternal grandfather Abdur Raheem**

## ABSTRACT

### **Background:**

Occupational health and safety (OHS) is a defensive barrier for workers against occupational accidents and injuries at all occupations. Due to rapid industrialization and globalization diverse types of hazards are on their onset in all industries. Therefore, there is an urge to assess the awareness of occupational health and safety among ordnance factory workers. By examining the status of awareness, we can evaluate where we are standing and what initiatives need to be taken at policy and performance level to provide workforce a hazard free environment.

### **Objectives:**

1. To assess the awareness of occupational health and safety among Ordnance factory workers.
2. To find out the association of awareness of occupational health and safety with the demographic attributes of Ordnance factory workers.

### **Methods:**

A cross-sectional study was conducted on Ordnance factory workers. A sample of 150 workers were selected by convenient sampling. A well-structured questionnaire was designed by researcher after extensive literature search to screen the awareness of Ordnance factory workers. Data was collected through self administration and analysed by SPSS 17. Descriptive analysis obtained by frequency and percentage. Inferential analysis generated by performing chi-square test to determine association between dependent and independent variables. Reliability was checked by pilot testing (Cronbach's  $\alpha=0.90$ ).

### **Results:**

Adequate awareness of (82,55%) was reported which was remarkable. Majority (99%) of the workers were male (149/150) with matric education (87,58%) belonging to age group (28-37) having salary (25,000<) and were married (89,59%). There was no significant association found between demographic features of workers with awareness of OHS except age and job experience.  $P<0.05$ .

**Conclusion:** The study concluded that awareness of OHS among Ordnance factory workers were high. Age and job experience were the only two demographic characteristics which showed significant association with awareness. By providing more training and intensifying the current established OHS strategies we can amplify the awareness of OHS.

**Keywords:** awareness, occupational health safety, Ordnance factory.

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## **List of Abbreviations**

OHS	Occupational Health and Safety
POF	Pakistan Ordnance factory
WBM	Wah Brass Mills
OHSAS	Occupational Health and Safety Assessment Series
OHSMS	Occupational Health and Safety Management System
OSHA	Occupational Health and Safety Administration
PEC	Pakistan Engineering Council
ICOH	International Commission on Occupational Health
NIOSH	National Institute of Occupational Safety and Health
CCOHS	Canadian Centre for Occupational Health and Safety
DOSH	Department of Occupational Safety and Health
WHO	World Health Organization
ILO	International Labour Organization
GBD	Global Burden of Diseases
UNDP	United Nations Development Programme
HDI	Human Development Index
PPE	Personal Protective Equipment
CI	Confidence Interval
IRB	Institutional Review Board
SDG	Sustainable Development Goals

## **CHAPTER I: INTRODUCTION**

Occupational health is defined as the highest level of physical, mental and social well-being of workers in all workplaces. A field of healthcare that deals with the safety, health and security of workers at workplace. It provides primary level prevention from occupational hazards and considered as preventive medicine. Occupational health and safety is generally treated as occupational health, or occupational safety and is an Interdisciplinary field. Occupational health and safety (OHS) deals with the health, safety, safeguard and welfare challenges of workers in the workplace. By abiding occupational health and safety (OHS)'s laws and standards we are not only making our workplace a better place to work but contributing positively towards society. OHS is concerned with many types of occupational hazards like physical, biological, chemical, psychosocial adverse conditions like ergonomics, injuries and accidents. A better workplace ensures prompt identification and removal of occupational hazard thus leaving a hazard free environment for workers (Suparna, N.S. & Jaiswal, A. 2021).

Nowadays the most demanding issue in human resource management is occupational health and safety (OHS). OHS measures include legal mandate, industrial relations, ethical issues and financial well-being. Safety is a huge class in all occupations whether it can be classified into direct or indirect cost. Direct or specific cost deals with the treatment of the injury and is covered by worker's compensation insurance payments while indirect costs involved workers replacement costs, delays costs, quality control costs, supervision salaries, transportation costs etc. The objective of OHS program is to provide workers a safe and healthy environment free from hazards. For the complete removal of OHS hazards it involves, hazard identification, reporting hazard to relative authority, risk assessment, monitoring and controlling. Kundu. S.C. (2015) stated that there is a positive relation exist between effects of safety climate and safety attitude on safety performance (Kundu, S.C. et al 2015).

Every organisation should be aware of its health and safety objectives and conduct an evident policy for the management of health and safety. For an effective policy it should be respected spiritually and practically. A good health and safety policy will also add value to the performance of the organization, assisting with the personal development of the workers and reducing financial loses. Protecting labours from accidents is important on a social level as it creates a positive economic impact. There is no doubt in saying this that Safety is the most critical investment we can make and what it saves is more important than what it costs us (Hughes, P & Ferret, E, 2007).

Occupational health and safety management system (OHSMS) is an essential part of every organization's management system. Its objective is to achieve safer working conditions to minimise the number of work-related injuries, fatalities and occupational diseases. High performance work system is completely associated with occupational safety. According to (Vulanovic, S. et al 2020) work stress has a significant impact on the OHS performance of the organization. More work stress will influence organizational outcomes such as absenteeism and reduced overall productivity (Vulanovic, S. et al 2020).

Developed countries have enacted numerous safety management systems to decrease the number of accidents. Regulatory bodies like Occupational Safety and Health Administration (OSHA) in United States of America and in Hong Kong are continuously trying to get zero percent accident rate. Moreover, various bonuses are announced to reduce the accident rate. Unlikely Safety is not given considerable importance in developing countries, such as in Pakistan. Occupational tragedies in the form of accidents are neither collected regularly nor reported to Government bodies. Safety rules hardly exist, administrative authority is mostly non-functional and work-related hazards are not evaluated precisely. For example, (PEC) Pakistan Engineering Council which is the main Governance authority for construction in Pakistan has not set the thorough standards and safety acts for the industry. However, a reasonable gap is noticed among short- and long-term workers against their safety performance. Large organizations have a proper safety policy to guide their workers, followed by training and hiring safety team to generate maximum output (Zahoor, H. et al 2016).

According to B. Fernandez-Muniz et al (2008). Occupational accident rate has increased in Spain in recent years due to negligence of safety culture, consuming human cost of Spanish society and loss of economic potential and productivity. According to author by introducing occupational safety management system on firms we can raise safety performance, competitiveness performance and economic-financial performance resulting in reduced accidental rate and material damage (Fernandez-Muniz, B. et al (2009).

According to Zacharatos, A. et al (2005). In developed countries most workers assume that their organizations are already providing them safety measures while working. On the other hand, work related injuries and fatalities are continuously increasing. In United States, there are 6,026 fatal work-related injuries, 3.8 million non-fatal injuries in 1998, resulting in 80 million production days lost for the same year and approximately 60 million days in future

years. In 1999, 833 work related fatalities in Canada were reported, furthermore 379,395 Canadian workers suffered from serious occupational injuries, compensated for salary lost or a permanent disability. The above data clearly depicts the huge cost of occupational injuries and fatalities for organizations in means of production and economic losses (Zacharatos, A. et al 2005).

In Denmark, 98% of all companies have less than 50 employees, so approximately a third of the total workforce constitute small enterprises. In these small enterprises OHS issues have also been ignored. According to Hastle, P. et al (2006) there is a need for further research on OHS in small enterprises in Denmark (Hastle, P. et al 2006).

OHS is one of the fundamental rights of workforce as it covers workers wellbeing and welfare which are being compromised in least developed countries (LDCs). The reason being lack of skilled OHS staff, lack of industrial medicine, lack of work safety, lack of occupational hygiene, poor economy and illiteracy. Africa, India, Bangladesh, Pakistan, Sri Lanka, Nepal, Vietnam, Thailand and Korea fall under the category of neglecting OHS measures (Ahasan, M.R. & Partanen, T. 2001).

Considering the labour market profile of Pakistan (2018). 206.6 million of estimated Pakistani population containing 147.9 million people as working age group (15- 65yrs). This further divides into 65.5 million employed workforce while remaining is the non- labour or unemployed population. Recent data estimates that 2.7 million of the employed population (61.7 million) experienced occupational injuries in 2017-2018 which is equal to 3.7% injury rate. Furthermore, male workers are more prone to injuries as compared to female workforce, contributing 4.4% of injury rate in 2017-2018 while for female workforce it is 1.5%. In addition to this rural area exhibiting 4.5% of injury rate as compared to 2.4% in urban areas. Among the injury rate which is 3.7%, 4.6% contributed from agricultural sector while 58.4% were reported from modern sectors (Noman, M. et al 2021).

According to Fabiano, B. et al (2004). There are four main factors which can influence accident frequency; economic factors; job design; technology used and human factors. In Germany, a report on manufacturing industries showed that when the size of an organisation increases, it will result in an increased injury rate. On the other hand, within the same network when a small firm has less than 19 workers and a large firm having more than 200 workers showed lower injury rate as compared to medium sized organizations.

## **1.1. Rationale of the study**

By assessing the awareness of occupational health and safety (OHS) among the Ordnance factory workers which will be beneficial from economic, social, political, demographical, environmental means. As limited research was found on a factory whose product is highly sensitive, so there is a need to assess the awareness of occupational health and safety (OHS) in an Ordnance factory. By assessing the awareness level, we can check where we stand currently and what initiatives need to perform in future both at enterprise and national level. The study will contribute to existing evidence to future students for further studies related to this topic. This study will be helpful from public health aspect as it helps in identifying and estimating occupational injuries which create a burden on our health system. This study will be helpful in reducing the research inadequacy as awareness of OHS was not assessed in a sensitive area.

## **1.2. Objectives of the study**

The main objectives of the study are:

1. To assess the awareness of occupational health and safety (OHS) among the workers of Ordnance factory Wah Cantt.
2. To find out association of awareness of occupational health and safety (OHS) with the demographic attributes of Ordnance factory workers.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Occupational Health and Safety (OHS)**

Occupational health and safety (OHS) is an evolving branch of knowledge, as it is a multidisciplinary field often hard to understand or interpret whenever discussions are made on (OHS). Overall OHS concepts are somehow risk oriented, risk identification, risk elimination or risk minimization so risk is an integral part of OHS. Risk is defined as the probability of an unwanted or unpleasant event that can happen while safety is the absence or lack of risk. (Oliveira, C. G. D. et al 2022).

The concept of OHS initially originates in Europe in early 16<sup>th</sup> century. In 1906 in Milan a needful step was taken for the modern global labour force was the creation of the Permanent Commission on Occupational Health which with the passage of time renamed as International Commission on Occupational Health (ICOH), currently ICOH is the world's most remarkable worldwide institution. (Qasim, M. et al 2014).

Occupational health and safety is the discipline concerned with preserving and protecting human resources in the workplace. OHS is a cross disciplinary area which interacts with other disciplines such as public health, safety engineering, ergonomics, occupational medicine, industrial hygiene, toxicology, epidemiology, environmental health, public policy, medical sociology, social law, labour law, occupational health and psychology. Occupational health hence gradually evolved from a mono-disciplinary risk-oriented approach to a multidisciplinary approach that counts for individual's physical, mental and social well-being. Around the world. Acts, legislations and policies were developed with the aim of good health and safe work environment for all workers. Every country has its own act and policy on OHS. In United States of America, the Occupational Health and Safety Act of 1970, was an attempt to protect and secure workers in the workplace. This Act for the very first time established a federal programme nationwide to protect workers from occupational illness, injury and fatalities. The main objective of this act was to ensure that employers will provide their workers a safe working environment free from hazards. The Act created the National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA). Similarly, the Canadian Centre for Occupational Health and Safety (CCOHS) which is an agency of the Government of Canada, was created by an Act of Parliament in 1978. In



Malaysia, the Department of Occupational Health and Safety (DOSH) falls under the Ministry of Labour ensures the safety, health and welfare of workers both in private and public sector.

## **2.2 Objectives of Occupational Health and Safety (OHS)**

The principal objective of OHS worldwide level is to ensure that health and safety is accessible to every worker employed in any domain across the financial system.

The World Health Organisation (WHO) since its initiation has included elements of occupational health in its policy. The need to protect workers from occupational health hazards occupational accidents and promote safety of all at any occupation has been emphasized in key documents of WHO – the Constitution of the WHO, Dissemination of Alma Ata Declaration, Global Strategy on Occupational Health for All, WHO General Programmes of Work and several resolutions of the World Health Assembly. According to Global Strategy on Occupational Health for All, the high priority objectives are as follows:

1. Strengthening of international and national policies for health at work and establishing the necessary policy tools.
2. Development of healthy and safe occupational environment.
3. Development of healthy work activities and promotion of health at work.
4. Strengthening of occupational health and safety (OHS).
5. Development of human resources for occupational health.
6. Establishing of support services for occupational health.
7. Development of occupational health standards based on scientific risk assessment.
8. Establishment of registration, information and data systems, improvement of information services for experts, applicable communication of data and raising public awareness through public health information.
9. Vitalising and energizing of research system.
10. Development of collaboration in occupational health with other services.

(WHO, 1995, p.3).

## **2.3 Key principles in occupational health and safety (OHS)**

According to ILO 2001, key principles in OHS are:

All workers have rights. Workers, employers, organization's management and government should ensure that all worker's rights must be protected and maintained under decent working conditions. Furthermore

1. Work should take place in a safe and healthy working atmosphere.
2. Occupational conditions should be compatible with workers well-being and human state.
3. Occupation should offer real potential for individual achievement, self-satisfaction and a service to community.

Occupational health and safety policies must be established. Such policies must be implemented both at the national and organizational level and must be effectively communicated to all concerned parties.

There is need for dialogue with social associates and other businessmen. This is achievable during planning, observation and execution of such policies. The main aim of occupational health and safety policy and programmes must be protection and prevention. Attempts should be made on primary level prevention as it cost less for any firm. Workplaces along with its environment should be designed to be safe, healthy and protective. (Benjamin.O. Ali. 2001).

## **2.4 Occupational health and safety (OHS) legal Status in Pakistan**

Numerous laws in Pakistan cover occupational health and safety, however there is no single absolute law covering occupational health and safety. There are various segments of legislations which are dealing with OHS in Pakistan.

The Factories Act 1934

The Punjab Factories Rules 1978

Sindh Factories Rules 1975

North-west Frontier Province Factories Rules 1975

West Pakistan Hazardous Occupations Rules 1963

The Mines Act 1923

The Provincial Employees Social Security Ordinance 1965

Dock Labourers Act 1934

Workmen's Compensation Act 1923

Shop Establishments Ordinance 1969

Punjab Code covers few acts mentioned above and contain one OHS related act which is Punjab Occupational Safety and Health Act 2019. (Punjab Code, Labour and Human Resource).

## **2.5 Importance of Occupational health and safety (OHS) in different work-related sectors**

### **2.5.1 Occupational health and safety (OHS) in Construction Industry**

High accident rates mean prevention of work-related accidents in the construction industry needs to be taken seriously. Work related incidents in construction site (falling, stumbling, being hit, slip, trip, burning) can be inhibited by knowing and complying to OHS culture. This awareness and compliance can reduce likelihood of work accidents for construction workers. Workers can identify hazards quickly resulting in improving health and safety conditions at their workplace who regularly attend OHS trainings. With more implementation of OHS it is expected that any firm can prevent and minimize number of injuries, accidents, illnesses, fatalities at any worksite. A study conducted by Rauzana. A. & Dharmas, W. (2021). in Indonesia at Syiah Kuala University, which provide prospective workers for construction industry concluded that 90% students come up OHS knowledge and OHS behavioural awareness which shows incorporation OHS education in curriculum (Rauzana, A. & Dharama, W. 2021).

### **2.5.2 Occupational health and safety (OHS) in Health Sector**

A study conducted by Ancita Iral D'Souza in (2013) on the awareness of OHS among healthcare workers in radiology department of a selected hospital. The result depicted that majority 83.7% of the respondents were aware of OHS measures, 80% of OHS measures were present in department of Hospital setting. It was observed that the awareness on general perspectives of radiation safety and PPE was high as compared to the awareness on updated knowledge about radiation safety. A student or healthcare professional visiting a fully equipped healthcare department is in no danger from radiation with maximum knowledge on OHS when visiting (D'souza, A. I. et al 2013).

### **2.5.3 Occupational health and safety (OHS) in Agriculture Sector**

A study conducted by Moradhaseli, S et al. (2018). in Mahidasht, Kermanshah Province, Iran to assess OHS among farmers. The result showed most of the farmers had a negative attitude towards the OHS issues, mean awareness which was  $61.59 \pm 6.2$  out of 100, had a significant correlation with social status ( $r=0.37$ ;  $p=0.001$ ), conclusively level of farmer's awareness about OHS is moderate (Moradhaseli, S. et al 2018).

Another study conducted by Islam, M. T. (2018). In Dumki, Bangladesh to identify farmers

knowledge about OHS and its associated hazards. As 85% of population in Bangladesh is related to agriculture for their living. Results showed farmers have very poor knowledge on occupational hazard and safety. Farmers only focus on their indigenous knowledge gained by their forefathers and lack modern techniques and health policy. Farmers mean knowledge scores were significantly different based on their education ( $F(1,30)=4.747, p<0.01$ ). Farmers aged 20-40 yrs. were significantly more knowledgeable on OHS and hazards in agriculture ( $FKL=0.27$ ) than farmers who were 41-60 yrs. ( $FKL=0.24$ ) (Islam, M. T. et al 2018).

#### **2.5.4 Occupational health and safety (OHS) in Mines**

Within developed countries huge advancement has been made in reducing occupational injuries, illnesses and fatalities in mining industry. Australia is a mining country. A publication made by David Cliff in (2016) showed fatalities in Australian coal mining are 65 in 1991-2000 and 19 in 2001 to 2010. Difference in the rate of fatalities in both decades clearly depicts the progression and implementation of technology, system and OHS culture. Technology not only confined to autonomous vehicles but extended to the use of remote control equipment. With the help of recent technology and understanding major mining hazards the incidence of multiple fatalities has been reduced, the last fire explosion in an underground mine that caused fatalities was in 1994, after that for over 10 years there was no fatality incident occur (2000 – 2013) in Australia (Cliff, D. 2016).

When mining started on a huge scale in South Africa in late 19<sup>th</sup> century, mine workers faced highest degree of risks in safety and health. With the passage of time safety performance of mines improved in south Africa but not as the same rate as in developed mining countries like Australia, Canada and USA. About 4% of the total workforce in South Africa consist of miners, an imbalanced high percentage of occupational fatalities, 15% of the assumed total are related to mining industry, this clearly shows that data collection from an unreliable source. Constraints to improving OHS in South Africa should be overcome and system thinking, accident investigation, risk assessment, safety culture, OHS legislations needs to be introduced (Hermanus, M. A 2007).

## **2.6 Occupational health & safety (OHS) and Challenges in Pakistan**

A labour force survey of 2012-2013 stated that Pakistan's total labour force is 59.74 million comprising 45.98 million of males and 13.76 million are females. Employment shares are construction (7.4%), manufacturing (14.1%), transport (5.5%), agriculture (43.7%) and wholesale trade is (14.4%). Unfortunately, Pakistan lacks a proper national system for recording work-related injuries and accidents. Most accidents are not reported to labour department so no appropriate stats are available. When data from 10330 industrial accidents were examined, a decline in accident rate was observed with an average of 3.1 accidents per 1000 factories, on the other hand occupational fatalities increased with an average of 23 fatalities per 100000 factory workers (Muzammil, et al 2019).

Another study by Hassan, S.M. (2018). on 70 welders in Lahore, to assess level of awareness of OHS and related hazards. This study showed 47% experienced eye injuries, 50% other injuries, with a low level of awareness on OHS also there was an association found between education and awareness of health risk ( $x^2=6.885$ ;  $p=0.032$ ). The challenges in the path of OHS in Pakistan are lack of funding, lack of training, lack of research, illiteracy, lack of motivation by employers, lack of safety equipment & technology, negative attitude of management towards safety culture (Hassan, S.M. (2018).

## **2.7 Global Status of Occupational Health and Safety (OHS)**

**28<sup>th</sup> April** is the world day for Safety and Health at work. In 2003 ILO started to celebrate world day to stress prevention from occupational accidents and diseases at work globally. Among SDG's no.3, Good Health & well-being and no 8, Decent work prioritise health and safety at work.

A global survey on occupational health services in selected international commission on occupational health (ICOH) member countries was conducted by Rantanen, J. et al (2017). To assess the status of OHS globally. A questionnaire covering on main aspects of OHS was generated on the basis of ILO Convention no.161. this questionnaire was sent to 58 ICOH national secretaries, 49 national secretaries responded (response rate 84.5%) that employ 70% of the total world labour force. Results concluded that 67% had an officially adopted OHS policy and implement it under assistance and guidance of OSH authorities, institutes. 82% of countries possess OSH resources but differ in equity terms. Average OHS coverage of healthcare workers was 24.8% with a huge gap among countries whereas estimated global coverage of OHS in this survey was 18.8%. More than two thirds, 69% of countries

provide curative and preventive services while 29% countries only provide preventive services. OHS financing was arranged either by direct financing 35% or by multiple sources of funding 63%. Correlation coefficients were calculated between OHS coverage, UNDP human development Index (HDI) and world economic forum competitiveness Index, both analyses yielded a positive and statistically significant relation (Rantanen, J. et al (2017)).

Globally, an ILO estimates showed 2.3 million work-related deaths occurred annually. The huge mortality burden came from occurrence of occupational diseases accounting for 2 million fatalities while the remaining are due to occupational injuries. The GBD 2015 study reported 1,086,000 deaths of which 204,000 are from occupational injuries and 882,000 are from occupational diseases (Takala, J. et al. 2017).

## **2.8 Occupational health and safety (OHS) in Developing Countries**

Occupational health and safety have been a problem in developing countries from last two decades. The increasing number of occupational accidents and illnesses forces developed countries to pay attention on the working conditions of developing countries. This clearly showed that the situation is alarming and need immediate action (Kholti, R. E. et al 2018).

There is no doubt occupational health remains neglected in developing countries due to multiple reasons including social, political instability and economic factors. There is need of a true political mechanism that intervene and translates scientific findings into policies, regulations that should be enforced by governing bodies at enterprise and national level. Examples of such countries which lack research in occupational health are Bangladesh, Central America, Lebanon, South Africa, Thailand which lack governmental interest in occupational health and safety (Nuwayhid, I. A. 2004). This fact is supported by an ergonomics survey conducted by Ahasan, M. R et al (1999). in Bangladesh, where the aim of the study was to assess work-related problems in metal handling tasks and to point out obstacles to the development of safety and health measures. Results showed dissatisfaction with salary (73.5%), job demands (55.4%), restlessness (52.5%), employer's fault-finding attitude (38.5%) leads to overall job dissatisfaction (58.3%) and psychosocial problems of workers. Similarly, in South Africa, research conducted by Pilusa, M. L et al (2018). The aim of the study was to assess the knowledge of workers about occupational legislation, its benefits for their health and safety. One hundred and ten respondents were sampled from a population of 1590 workers.

Research findings showed eighty-two (75.54%) respondents were unable to name even one act of OHS legislation, only eighteen (16.36%) were knowledgeable about OHS legislations. It also concluded that to protect workers from potential occupational health and safety risks, government has to disseminate occupational legislation that should be implemented in work settings (Pilusa, M. L. et al 2018).

## **2.9 Occupational health and safety (OHS) in Developed Countries**

With the passage of time, developed countries have done well to mitigate occupational injuries as they focus and pay more attention on the health component of OHS as compared to the safety component. By reducing the number of labours working in hazardous workplaces, by maintaining and promoting safety we can improve health component of OHS. Another important element in reducing the number of occupational accidents is to step in economic structures. Risky, hazardous and labour oriented workplaces such as in manufacturing industries have been reduced or replaced by machines in developed countries also much of labour-oriented work takes place in developing countries especially Asia. It is very common that in developed countries more than two thirds of all workers are working in service occupations. Processes involving mechanization, reassembling and electrification seems to participate to effortless jobs with least exposure to injuries (Takala, J. et al 2017).

## **2.10 Operational Definitions:**

Some important terms are defined as follows.

### **i. Occupational Health and Safety (OHS)**

“The science of the anticipation, recognition, evaluation and control of hazards arising in or from workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and general environment.” (Ali, B. O. 2008). This field is necessarily huge, enclosing various disciplines, multiple occupations and environmental hazards.

### **ii. Awareness**

The quality or state of being aware: knowledge and understanding that something is happening or exists (Oxford dictionary). Awareness of Occupational health & Safety means workers who are aware of Occupational health and safety (OHS), personal protective equipment, types of hazards, occupational safety practices and incident reporting. It is measured on two levels.

### **iii. Adequate awareness**

When the score of awareness variable falls above the mean value (79) it showed adequate or good awareness.

### **iv. Inadequate awareness**

When the score of awareness variable falls below the mean value (79) it showed inadequate or low awareness.

### **v. Pakistan Ordnance Factories (POFs)**

The Pakistan Ordnance Factories (POF), Pakistan’s largest defence supplier and industrial complex. It consists of fourteen factories that are essential to Pakistan’s conventional arms production. It is a major defence contractor, firearms and military contractor located in Wah Cantt, Punjab, Pakistan. Products include rifles, pistols, machine guns, grenades, rockets, military and commercial explosives.

### **vi. Hazard**

Occupational or environmental exposure to individual susceptibility that increase risk (Tadesse, T. & Admassu, M. 2006). In current study Physical hazard, Chemical hazard, Biological hazard, Electrical or Mechanical hazards were assessed.



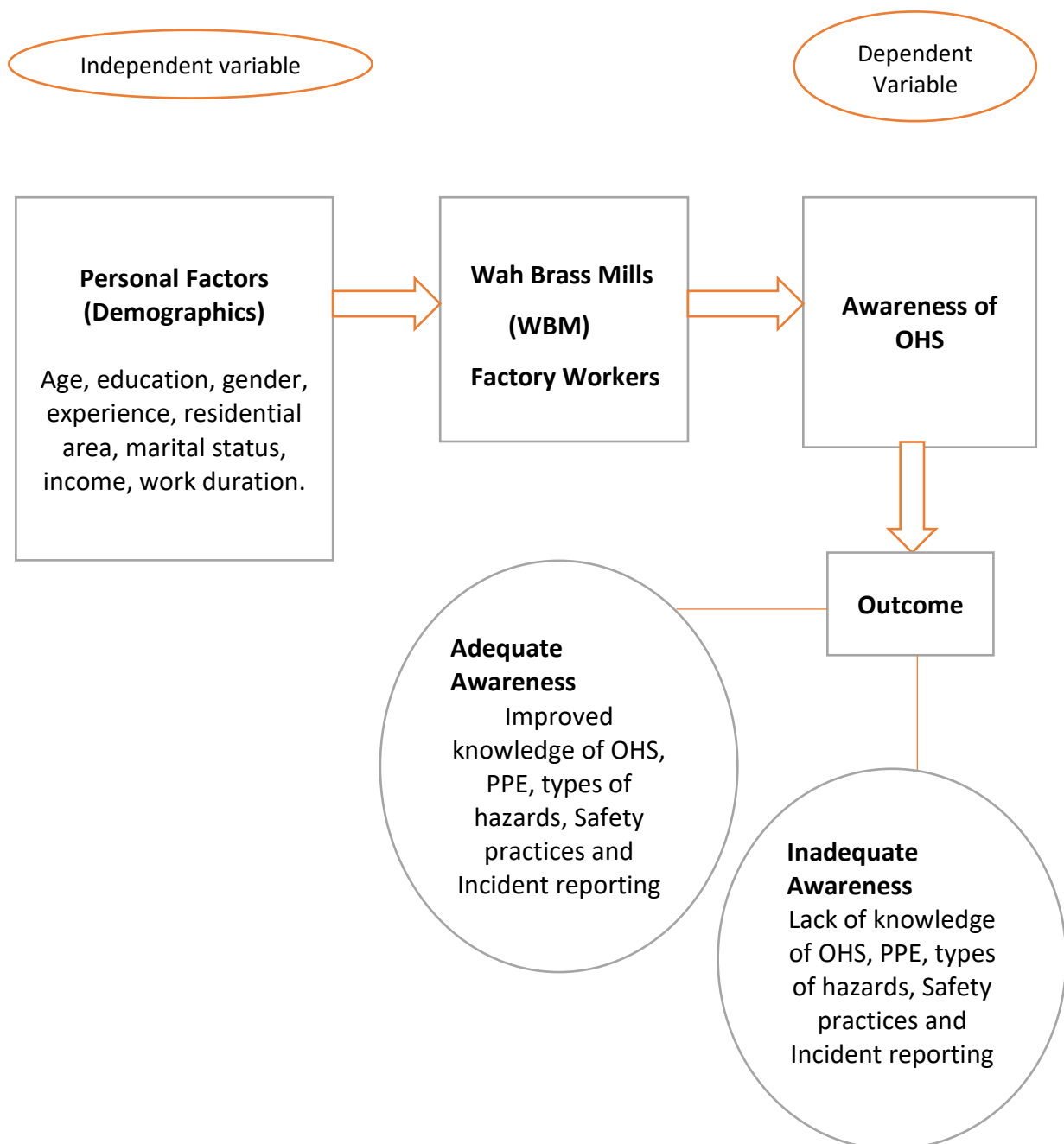
**vii. Worker**

Someone who works, especially at manual or industrial labour or with a particular material e.g. A factory worker. (Cambridge Dictionary)

**viii. Wah Brass mills (WBM)**

Wah Brass Mills (WBM) Pvt Ltd. is a subsidiary of Pakistan Ordnance factory located in Wah cantt. It is specialized for producing Copper, Brass, Gilding metal and Gilding metal Clad Steel which are used for defence products.

## 2.11. Conceptual Framework



**FIG 1: Conceptual Framework of awareness of OHS**

## **CHAPTER III: RESEARCH METHODOLOGY**

### **3.1. Study Setting**

Study was conducted in the Wah Brass Mills (WBM) which is a subsidiary of Pakistan Ordnance Factories (POF). WBM is situated in Wah Cantt. Wah Cantt is a military cantonment located in Wah in the Punjab province of Pakistan. It is a part of Tehsil Taxila and District Rawalpindi. It is located 35 KM away from Rawalpindi towards North on G.T road. Wah cantt has a rich historical ethnic background and is a multicultural city. Its area consists of 58.27 km<sup>2</sup> with a population of 380,103(2017). Wah Cantt is famous for high literacy rate which is approximately 96%. Its climate is very hot in summer with an average temperature ranging from 27.5°C-40°C in June and is cold in winter ranges from 17°C-5°C in January. Wah cantt is surrounded by three important and distinctive cities Rawalpindi, Taxila and Islamabad. Wah Cantt is also privileged of having 1<sup>st</sup> ammunition factory Pakistan Ordnance factory (POF) in 1951. Wah Brass Mills (WBM) (Pvt) Ltd, formerly known as POF Brass Mills, which is part of POF was established in 1954, its first upgradation took place in 1978 to increase the production capacity of product (7000 MT) and second upgradation took place in 2016 (24000 M.T per annum). WBM products include Copper, Brass, Gilding Metal, Gilding Metal Clad Steel which are executed in the form of plates, sheets, strips, tubes, rods, coils, cups and are used for multi-purposes and as defence products.

### **3.2. Study Design**

A quantitative research approach using cross sectional study design was used for current study.

### **3.3. Study Duration**

Duration of this study was six months (September 2022-February 2023).

### **3.4. Study Population**

Study was conducted on the factory workers of Wah Brass Mills (WBM).

### **3.5. Study Participants**

Workers of Wah Brass Mills (WBM) from all three units were included in this study. There were three units who were directly involved in product's production, maintenance and quality check. Foundry and rolling unit; it involves in product's synthesis by rolling, milling,

annealing, pickling and cutting. Maintenance unit; it maintains all processes runs smoothly. Quality Check; this unit ensures and check the quality of product matches with the standards provided.

### **3.5.1. Inclusion criteria**

1. Factory workers, working in all three units (Foundry & rolling unit, Quality check, Maintenance unit).
2. Factory workers having experience of at-least six months.
3. Factory workers who were willing to participate.

### **3.5.2. Exclusion criteria**

1. Workers who were on contracts.
2. Workers who were absent or on leave.

## **3.6. Sampling:**

### **3.6.1. Sampling Strategy**

As WBM was a sensitive industry to proceed and due to limited access, Non-probability Convenient sampling technique was used. A total of 250 workers were working in three different shifts, morning, afternoon and night shift. Each shift was carrying 83 workers, making a sum of 250 workers in total. Data was collected from morning, afternoon and night shifts.

### **3.6.2. Sample Size:**

Sample size for this study was calculated at 95% CI by using Open-Epi software. Eligible population size was 250 and with this known population prevalence of occupational health & safety (OHS) which was unknown taken as 50%. Reason for unknown prevalence was limited research on explosive industry. The calculated sample size was 150 at 95% CI and 5% margin of error.

## **3.7. Data Sources**

Primary data was collected through self-administered well-structured questionnaire which was distributed to factory workers by factory supervisors.

## **3.8. Data Collection Tool**

### **3.8.1. Content of the Questionnaire**

Data was collected using a self-administered questionnaire adapted from Prajwal, M. S. et al (2020). The questionnaire consisted of two segments. Section A included demographic information of respondents while Section B comprised of 7 elements and a total of 35 items under these elements. Segment 2 of questionnaire was designed to assess awareness of OHS among the factory workers. A 3-point Likert scale was used to record the awareness of OHS among the factory workers of WBM. Questionnaire was interview administered when data was collected from supervisors by researcher and self-administered when filled by workers.

### **3.8.2. Study Variables**

#### **3.8.2.1. Independent variable:**

Socio demographic features were taken as independent variables (Age, Gender, Educational level, Residential area, Marital status, Monthly salary, and work duration).

#### **3.8.2.2. Dependent variable:**

There were seven components which were used as dependent variables to assess awareness of OHS among factory workers (General awareness of OHS, awareness on Physical hazards, Chemical hazards, Electrical/Mechanical hazards, Biological hazards, PPE used and awareness on occupational safety practices and incident reporting).

## **3.9. Data Collection Process**

### **3.9.1. Validity**

**3.9.1.1. Face Validity:** after a through literature study, questionnaire was made. It was discussed and reviewed with factory's management and team leaders.

**3.9.1.2. Content Validity:** questionnaire was discussed with supervisors and floor people to get the opinion as it was completely understandable and error free.

### **3.9.2. Reliability**

Reliability was checked by performing pilot test. Cronbach's Alpha value of 0.90 was obtained which measures the reliability and internal consistency between various items mentioned in the questionnaire.

### 3.9.3. Pilot Testing

Data was collected after pilot testing. As a result of pilot testing which is conducted on non-study individuals including 10% of actual sample size, major changes were made in questionnaire. Cronbach alpha of 0.90 was found.

#### Reliability Statistics

Cronbach's Alpha	(N) Number of Items
0.909	27

### 3.9.4. Data Collection

Factory workers were working in three different shifts. Data from all shifts were collected by respective supervisors after taking consent and data from supervisors were collected by researcher after taking consent. Only those workers were included who willing to participate and covered the inclusion criteria. After taking consent questionnaire was handed to worker to fill the form accordingly. Researcher was present during data collection process for morning and evening shifts to clear the doubts of the respondents while night shift workers filled up the form under their respective supervisor.

### 3.9.5. Data Entry

Data was entered into SPSS version 17.0. Serial numbers along with alphabets were assigned to the questionnaires to retain confidentiality of workers. Serial number belongs to worker while alphabet belongs to different units to avoid overlapping of data, hence keeping data mutually exclusive. Data was entered into SPSS according to the serial number in the questionnaire. Missing information was checked by checking the serial number.

### 3.9.6. Data Confidentiality:

After collecting data, it was accessible to researcher only and confidentiality of data was maintained by researcher.

### **3.10. Data Analysis:**

#### **3.10.1. Descriptive Analysis**

Descriptive analysis achieved with the help of frequencies and percentages of independent variables (Sociodemographic characters) & dependent variable (OHS awareness) whereas mean was calculated after computing 37 items of OHS awareness to generate single Dependent variable. Data was presented in tables and graphical form.

- 1) Age was categorized into 4 categories: 18-27, 28-37, 38-47, 48>
- 2) Gender as: Male & Female
- 3) Educational level was categorized as: illiterate, Middle, Matric, Intermediate >
- 4) Experience in years was categorized as: 0-2, 3-5, 6-8, 9>
- 5) Residential area was categorized as: Urban, Rural
- 6) Marital status was categorized as: Married, Un-married, Separated, Widowed
- 7) Monthly salary was categorized as: up to 15,000. Rs.15,001-20,000.  
Rs.20,001-25,000. above Rs.25,000.
- 8) Work duration: less than 7 hrs, 8 hrs, 9 hrs, 10>.

For further data analysis coding or scoring system was used. 3-point Likert scale was used to assess the awareness of OHS for dependent variable. (Not aware=scored as 0, Moderately Aware=scored as 1, Fully Aware=scored as 2). When a respondent answered Fully aware he scored 2, when a respondent answered moderately aware, he scored 1 and when a respondent answered not aware, he scored zero. Scores were then generated using SPSS. Mean was calculated for awareness of OHS (Mean of Awareness=79) after computing seven elements of section B part of questionnaire using scores and then two categories were made. Scores below mean were categorized as Inadequate awareness of OHS while scores above mean were categorized as Adequate awareness of OHS.

#### **3.10.2. Inferential Analysis**

As all the Independent and Dependent variables were categorized, a Chi-square test was performed to find out the association between dependent variables and independent variables. which was also generated on SPSS, results were recorded in tables.

### **3.11. Ethical Consideration**

Research study was approved by Institutional Review Board IRB of Al-Shifa School of Public Health. Not only this, but permission had also been granted by CEO of Wah Brass Mills along with other management including admin and HR. All management including supervisors were already aware of research purpose and collected data will be used only for educational purposes. Written consent forms were taken from all studied participants. No risks or benefits observed.

**3.11.1. Voluntary participation:** All workers participated voluntarily and they can quit any time without providing any reason.

**3.11.2. Confidentiality:** The collected data was used only for research purposes and it will keep confidential.

**3.11.3. Anonymity:** No names were recorded or asked during collection of data.



## CHAPTER IV: RESULTS

### Descriptive Statistics:

In descriptive statistics, individual characteristics along with sociodemographic attributes were explained with the help of frequencies and percentages.

#### 4.1. Socio Demographic characteristics of Respondents:

A total number of 150 participants were part of this study. First demographic attribute was Age, which was categorized into four categories. There were 63 respondents (42%) in 1<sup>st</sup> category ranging from 18-27. Second category of age was 28-37, consisting of 66 respondents (44%). Third category of age was 38-47, consisting of 14 respondents (9.3%). Fourth category was 48>, consisting of 7 respondents (4.7%). Next attribute was Educational Level, which got four categories, there were zero participant who fall under illiterate category.

2<sup>nd</sup> category was Middle, 7 respondents cleared middle education (4.7%). 3<sup>rd</sup> category was Matric, 87 respondents cleared matric (58%), 4<sup>th</sup> category was Intermediate> , 56 respondents Were qualified intermediate or above (37.3%). Residential Area; classified into two categories. 1<sup>st</sup> one is Urban, 124 respondents were urban localized (82.7%), 2<sup>nd</sup> category was Rural in which 26 respondents were rural localized (17.3%). Gender is the next attribute; there were 149 male respondents (99.3%) while only one female was working (0.7%). Job experience categorized into four categories; about 35 respondents (23.3%) fall under 0-2years category of work experience, 2<sup>nd</sup> option was 3-5years, 83 respondents (55.3%) got work experience from three to five years, while 18 respondents (12%) got 6-8years of work experience. Last category was 9>, 14 respondents (9.3%) got more than nine years of working experience. Marital status; there were 89 respondents who were married (59.3%) and 61 respondents (40.7%) who were un-married, zero respondents were observed as Separated and Widowed. Next attribute was Monthly Salary; there was only 1 respondent (0.7%) who got Salary fall under the category of Rs.15,000-20,000, while Rs.25,000> got 149 respondents (99.3%). There were zero respondents observed who fall under Rs.15,000 and Rs. 20,001- 25,000. Last attribute was No of working hours; there were 146 workers (97.3%) who were working for 8 hours, while only 4 workers (2.7%) were working for 10> hours. Still zero respondents were observed for less than 7 hours category and 9 hours category.

**Table 1: Socio-demographic Profile**

	<b>Variables</b>	<b>Number</b>	<b>Percentages (%)</b>
<b>1.</b>	<b>Age</b>		
	18-27	63	42
	28-37	66	44
	38-47	14	9.3
	48>	7	4.7
<b>2.</b>	<b>Gender</b>		
	Male	149	99.3
	Female	1	0.7
<b>3.</b>	<b>Educational Level</b>		
	Illiterate	0	0
	Middle	7	4.7
	Matric	87	58
	Intermediate >	56	37.3
<b>4.</b>	<b>Experience (years)</b>		
	0-2	35	23.3
	3-5	83	55.3
	6-8	18	12
	9>	14	9.3
<b>5.</b>	<b>Residential Area</b>		
	Urban	124	82.7
	Rural	26	17.3
<b>6.</b>	<b>Marital Status</b>		
	Married	89	59.3
	Un-married	61	40.7
	Separated	0	0
	Widowed	0	0
<b>7.</b>	<b>Monthly Salary</b>		
	Up to Rs.15,000	0	0
	Rs.15,001-20,000	1	0.7
	Rs.20,001-25,000	0	0
	Rs.25,000>	149	99.3
<b>8.</b>	<b>No of working Hours</b>		
	less than 7 hrs	0	0
	8 hrs	146	97.3
	9 hrs	0	0
	10>	4	2.7

## 4.2. Outcome Variable:

Section B part of questionnaire consisted of 35 questions in total. These 35 questions covered occupational health and safety from all aspect including general awareness (4 questions), awareness on hazards, physical hazards (4 questions), chemical hazards (3 questions), electrical/Mechanical hazards (3 questions), Biological hazards (3 questions), PPE used (3 questions), occupational safety practices and incident reporting awareness (15 questions), all these 35 questions were collectively used to assess awareness of OHS among Ordnance factory workers, Wah Cantt. These 35 questions were then computed on SPSS to generate a single outcome variable: Awareness.

After generating awareness variable, which is also a dependent variable, Mean, (79) was calculated awareness variable. Then recoding of awareness variable generated on SPSS which categorized awareness into 2 categories. Frequencies less than mean value (79) marked as Inadequate awareness and coded as 1 in SPSS while frequencies greater than mean value (79) marked as Adequate awareness and coded as 2.

### 4.2.1. Descriptive Analysis of Awareness Variable

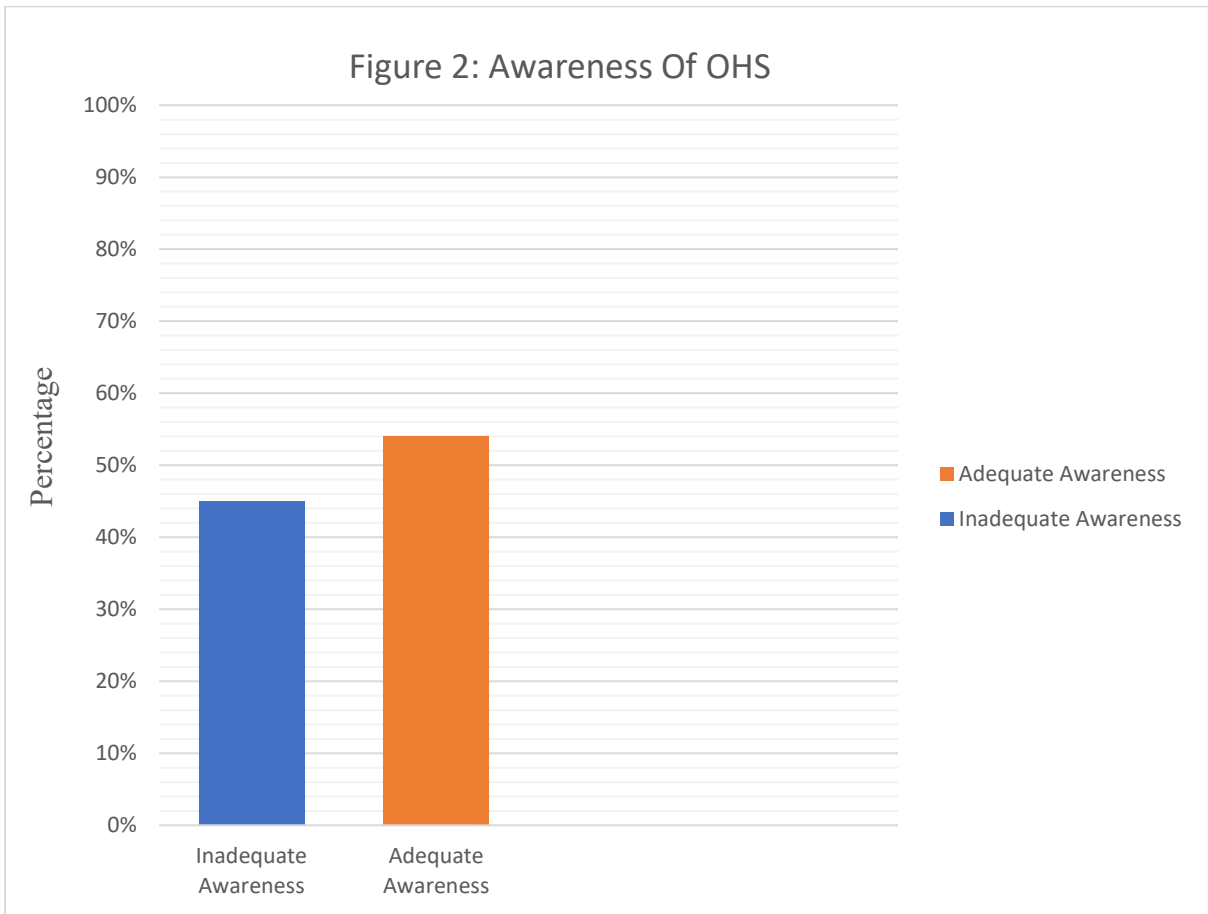
A total number of 150 respondents were included in this study. 68 respondents (45.3%) fall under the category of Inadequate awareness, coded as 1 while 82 respondents (54.7%) were part of Adequate awareness category, coded as 2.

**Table 2: Percentage & Frequency Of Awareness of OHS**

<b>Awareness Variable</b>	<b>Coding</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Inadequate Awareness</b>	<b>1</b>	<b>68</b>	<b>45.3</b>
<b>Adequate Awareness</b>	<b>2</b>	<b>82</b>	<b>54.7</b>
<b>Total</b>		<b>150</b>	<b>100</b>

If we simplified the above result, it clearly showed that the frequency of Adequate awareness 82 (54.7%) was greater than the frequency of Inadequate awareness 68 (45.3%). Thus, it was concluded that the awareness of OHS among 150 respondents was high.

Figure 2: Awareness Of OHS



### **4.3. Association of Socio demographic with Awareness of OHS:**

When Age and Awareness scores were cross tabbed the highest percentage of Adequate awareness was observed among 28-37 years (41) followed by 18-27 years (24). Adequate awareness score of 38-47 years was 10 and 48 > years was 7. The association between age and awareness score was found statistically significant. ( $\chi^2=15.853$ ,  $df=3$ ,  $p= 0.001$ ).

The cross tabulation of Education level and Awareness scores showed the highest percentage of Adequate awareness was found among Matric (43) followed by Intermediate (36) and then in Middle (3) while overall association between education level and awareness score was found statistically non-significant. ( $\chi^2=3.449$ ,  $df=2$ ,  $p=0.178$ ).

The cross tabulation of Job Experience and Awareness generate following result, highest percentage of Adequate awareness observed in job experience group 3-5 years (43), followed by 0-2 years (14), 9 > years (13) and 6-8 years (12) respectively. The association between job experience and awareness score was found statistically significant. ( $\chi^2=12.597$ ,  $df= 3$ ,  $p=0.006$ ).

When the cross tabulation of Residential Area and score of Awareness performed, the highest percentage of Adequate awareness was observed in Urban group (71), followed by Rural (11). The overall association was found statistically non-significant. ( $\chi^2=1.939$ ,  $df=1$ ,  $p=0.164$ ).

The cross tabulation of Marital Status and Awareness score showed highest percentage of Adequate awareness found among Married group (52) and in un-married group it was (30). The association between marital status and awareness score was found statistically non-significant. ( $\chi^2=1.249$ ,  $df=1$ ,  $p=0.264$ ).

The cross tabulation of Monthly Salary and Awareness score showed that the highest percentage of Adequate awareness observed in group Rs.25,000 >, (81). The overall association between monthly salary and awareness score was found statistically non-significant. ( $\chi^2=0.835$ ,  $df=1$ ,  $p=0.361$ ).

When no. of working hours and awareness score were cross tabbed, the highest percentage of Adequate awareness was found in group 8 hours (78), followed by 10 hours > (4). The association between no. of working hours and awareness score was found statistically non-significant. ( $\chi^2=3.408$ ,  $df=1$ ,  $p=0.065$ ). All socio demographic variables except age and job experience showed statistically non-significant association with awareness of OHS.

**Table 3: Association of Socio demographic with Awareness of OHS**

Variables	Inadequate (68)	Adequate (82)	X <sup>2</sup> Results
	Awareness	Awareness	
<b>Age:</b>			
18-27	39(26%)	24(16%)	x <sup>2</sup> =15.853, df=3, p=0.001
28-37	25(16%)	41(27%)	** Highly Significant
38-47	4(2.6%)	10(6.7%)	
48 >	0	7(4.6%)	
<b>Educational Level:</b>			
Middle	4(2.6%)	3(2%)	x <sup>2</sup> =3.449, df=2, p=0.178
Matric	44(29%)	43(28%)	NS
Intermediate >	20(13.3%)	36(24%)	
<b>Job Experience:</b>			
<b>(in Years)</b>			
0-2	21(14%)	14(9.3%)	x <sup>2</sup> =12.597, df=3, p=0.006
3-5	40(26%)	43(28%)	**Highly Significant
6-8	6(4%)	12(8%)	
9 >	1(0.66%)	13(8.6%)	
<b>Residential Area:</b>			
Urban	53(35%)	71(47%)	x <sup>2</sup> =1.939, df=1, p=0.164
Rural	15(10%)	11(7.3%)	NS
<b>Marital status:</b>			
Married	37(25%)	52(35%)	x <sup>2</sup> =1.249, df=1, p=0.264
Un-married	31(21%)	30(20%)	NS
<b>Monthly Salary:</b>			
Rs.15,000-20,000	0	1(0.66%)	x <sup>2</sup> =0.835, df=1, p=0.361
Rs.25,000 >	68(45%)	81(54%)	NS
<b>No. of Working Hours:</b>			
8 hours	68(45%)	78(52%)	x <sup>2</sup> =3.408, df=1, p=0.065
10 > hrs	0	4(2.7%)	NS

α= 0.05

\*Significant

\*\*Highly Significant

NS=Non-significant

## CHAPTER V: DISCUSSION

By prioritising OHS awareness in any business, it will be helpful in reducing risk, accidents and injuries resulting in improving efficiency and productivity in any industry.

The demographic stats (table 1) of this study showed that major strength of workers were male as there was only one female worker. More than one third of respondents belonged to (28-37yrs) age group. The strength of workers with matric qualification was higher than the number of workers with Intermediate and above Intermediate qualification. More than half of the respondents had three to five years of working experience. About two-third of respondents were married and one-third were un-married. Almost all workers earned salary more than twenty-five thousand rupees which shows the financial stability of the factory. More than two-third of workers belonged to urban residence. With the exceptions of few workers, rest of them worked for eight hours.

This study was conducted to assess the awareness of OHS and to find out the association of awareness of OHS with demographic attributes of the Ordnance factory workers in Wah Cantt. In this study 55% of workers showed Adequate awareness of OHS and 45% showed Inadequate awareness of OHS. Risk reduction from occupational injuries and diseases among working college students may also be attained by introducing OHS strategies including integration of OHS curriculum, promotion of Institutional OHS student health services and introducing OHS online courses for students, administration and faculty members. (Balanay et al, 2014).

The demographic stats in (table 1) showed that among Age variable, majority of workers (66.44%) belonged to (28-37) group. When discussing awareness, the highest percentage (41.27%) of adequate awareness was found in this (28-37) group. Then the 2<sup>nd</sup> highest category for adequate awareness was (18-27) having (24.16%) of respondents. Total strength of (38-47) age group was low (14.9%) but adequate awareness was high (10.6.7%). All respondents in age group 48> showed 100% adequate awareness (7.4.6%).

The study concluded that there was no significant association found between awareness of OHS with demographic characteristics of factory workers. Only Age and Job Experience were the two demographic attributes which showed significant association with awareness. Whereas study conducted by Nordlof, H. et al. (2017). in Sweden showed that there might be some other factors which could show association with OHS, which were company size, safety culture, work environment priority and perceived profitability showed statistically significant association with occupational health and safety management practices (Nordlof, H. et al 2017).

When considering Job Experience, the highest percentage (43,28%) of adequately aware respondents fall under (3-5yrs) category, followed by (0-2yrs) having adequate awareness of (14,9.3%) and (6-8yrs) having (12,8%) respectively. Category (9yrs>) of job experience got 99% of respondents who were adequately aware (13,9%).

In this Study only Age ( $p=0.001$ ) and Job experience ( $p=0.006$ ) showed statistically significant association with awareness of OHS. The reason being with increasing age factor, experience will automatically increase. Furthermore, a study conducted among textile industry workers in Pakistan significant association of prevalence of respiratory symptoms with age and job experience ( $p=0.02$  and  $p=0.001$ , respectively). (Humayun, A. et al 2022). Similarly, according to Saliq, Khan, Shah & Khattak (2017). age of workers has direct impact on OHS of any workplace, too young or very aged workforce are more prone to OHS hazards and illnesses. Likewise for job experience, industries who hired more experienced workforce showed low rate of accident. The study conducted by Saliq, Khan, Shah & Khattak (2017). in Pakistan showed more workers having 5-10 years of experience associated with reduced accident fatalities annually. (Saliq, Khan, Shah & Khattak 2017).

According to this study the educational status showed there was zero illiterate in factory, the higher frequency of adequate awareness of OHS was found in category matric which was (43, 28%) as compared to category (Intermediate >) where adequate awareness was (36, 24%). This clearly showed that workers with less education like matric were more aware of OHS as compared to more educated respondents. Descriptive stats showed that there was no significant association found between education & awareness of OHS ( $p=0.178$ ). According to a study conducted by Uzuntarla, F. et al (2020). there was statistically significant relationship found between safety awareness and safety behaviour ( $p=0.001$ ), moreover increasing safety awareness increases safety behaviour obviously ( $p<0.001$ ) on the other hand there was no significant relationship found between safety behaviour and demographic variables including education (Uzuntarla, F. et al 2020).

A study conducted by Yaas, M. H. et al (2018). In Iraq at a petrochemical industry where the association of OHS awareness with demographic variables were assessed. Results of this findings showed that there was a significant association exist ( $p<0.05$ ) between workers OHS awareness and age, service period & education (Yaas, M. H. et al 2018).

In this study considering Gender there were 149 males (99.3%) and only one female (0.66%) as it was a manufacturing industry gender-based role is preferred which is no doubt physical demanding as well but other reasons might exist. A study conducted by Suliman, M. et al



(2017). in Swat, Pakistan identified significant association ( $p=0.000$ ) with gender wise isolation in Pakistani industries and women were facing separateness from top positions. Significant result was also found ( $p=0.002$ ) for male's decision-making regarding females work access and study area. A significant association was found ( $p=0.002$ ) when females were less paid in industry as compared to males. In the same study significant association was found for women's employment either to continue or discontinue a job is in a man's hand.

In this study respondents were classified in two groups on the basis of residential area i.e., Urban & Rural. Urban got higher frequency of respondents for adequate awareness (71, 47%) while for Rural adequate awareness was (11, 7.3%). Reason for higher adequate awareness among Urban background might be due to living in an advance area as compared to rural where it was low. There was no association found between residential area and awareness of OHS. When considering stats of Monthly Salary, the higher frequency of adequate awareness (81, 54%) was found among category (Rs. 25,000 >). Findings for this study showed there was no significant association found between Monthly salary and Awareness of OHS, while another study in a textile industry conducted by (Malik, N. 2010). in Pakistan showed the association of awareness of OHS with residential area (Urban & Rural) was highly significant (0.009) whereas in the same study, association of OHS with monthly income showed non-significant results (0.930). Past researches showed different trends of association of OHS with different demographic attributes. (Malik, N. 2010).

In this study for Marital status, higher frequency of adequate awareness was found among married category (52, 35%) and it was (30, 20%) for un-married workers. There was no significant association found between awareness of OHS & Marital status.

Findings of this research showed there was no association found between no. of working hours and awareness of OHS. For category 8-hours adequate awareness was found (78, 52%) which was higher.

## **5.1. Limitations:**

While conducting research on occupational health and safety some limitations had occurred.

1. As this was a sensitive area management allowed researcher limited access, self-reported data collected hence biased based.
2. Management allowed few days for data collection as research setting was in a sensitive area.
3. There was a huge disparity (female=1, male=149) among gender so researcher was unable to establish chi-square test for inferential analysis.
4. Due to strict privacy policy researcher was unable to perform simple random sampling, convenient sampling was the only preferred way of data collection.
5. Current study was conducted on a specific population with a small sample size therefore aftermaths of this study cannot be traced to a broader extent without any further investigation.

## **5.2. Strengths:**

1. As Ordnance factory got primary importance reason being handling defensive product there was a need to focus on awareness of multiple hazards & research provision.
2. Questionnaire (Prajwal, M. S. et al 2020). was used and adapted to screen maximum awareness of workers in an Ordnance factory.
3. Occupational health & safety (OHS) is an Industrial based term, instead of performing this study in any hospital, an Ordnance factory has been selected.

### **5.3. Conclusion:**

The main aim of this research was to assess the association of awareness of occupational health and safety (OHS) with demographic features of Ordnance factory workers. A cross-sectional study was conducted among Ordnance factory workers to firstly evaluate OHS awareness and then to find out any association exist between awareness and demographic features. The study concluded that adequate awareness of workers was higher than the inadequate awareness while Age & Job Experience were the only two demographic attributes which showed significant association with awareness of OHS.

## **5.4. Recommendations:**

As adequate awareness of OHS among Ordnance factory workers was ten times higher than inadequate awareness, it will get better if the frequency of already existing OHS strategies will increase by taking following initiatives.

### **5.4.1. General recommendations**

1. Management played a central role in any industry, so management should increase the frequency of provision of OHS related trainings & risk assessment on monthly and quarterly of a year.
2. Regular review of policy should be maintained to maximize best policy implementation.
3. Worker's feedback should be given prime importance to amend policy improvement.
4. Priority on Safety culture should be emphasized which is achievable by policy implementation.

### **5.4.2. Specific Recommendations**

1. Regular monitoring and surveillance of working area can reduce chances of any hazard activity.
2. For welfare of workers mental & physical health, there should be free on-site gym, pool and yoga classes to reduce stress on daily basis.
3. Firefighting, first aid trainings & evacuation drills should be regularly conducted.
4. Supervisors of all shifts should monitor working area before and after shift to make working place hazard free.
5. Management should hire more OHS & safety officers to ensure absolute coverage of hazards and to maximize productivity.
6. Although exhaust system was operational, there is bit more room for ventilation improvement as inner area was lead smoked.

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## ANNEXURE A

### Questionnaire

#### SECTION – A Demographics

Please read all questions properly and choose the appropriate one. Please fill all information accurately so that appropriate results are obtained, all information will be kept confidential.

Age:

- 18-27                       28-37                       38-47                       48>

Gender:

- Male                       Female

Educational level:

- Illiterate                       Middle                       Matric                       Intermediate>

Experience: (in years)

- 0-2                       3-5                       6-8                       9 >

Residential Area:

- Urban                       Rural

Marital Status:

- Married                       Un-married                       Separated                       Widowed

Monthly Salary:

- Up to Rs 15,000                       Rs.15,001-20,000                       Rs.20,001-25,000                       Above Rs.25,000.

Work duration:

- Less than 7 hours                       8 hours                       9 hours                       10>

SECTION B - Questionnaire Survey

Kindly tick the best option.

Survey component ratings. Not aware < ----- > Fully Aware

Items	Not Aware	Moderately Aware	Fully Aware
How aware are you of occupational health and safety			
How aware are you of the term OHSAS			
Are you aware of personal protective equipment, PPE			
Are you aware of occupational hazard			
<b>Awareness on hazards:</b>			
1. Physical hazards due to 1.1. Fall 1.2. Slip 1.3. Noise 1.4. Vibration			
2. Chemical hazards due to 2.1. Inhalation 2.2. Ingestion 2.3. Skin irritation			
3. Electrical/Mechanical hazards due to 3.1. Fire 3.2. Shock 3.3. Burns			
4. Biological hazards due to 4.1. Infections 4.2. Multiple symptoms 4.3. Respiratory problems			
5. PPE used to 5.1 protect whole body 5.2 reduce all risks 5.3 prevent from injuries, cuts, falls.			
Importance of hand washing			
Floors clean and dry			
Ventilation system/exhaust			

Job rotation/breaks			
Covid-19 vaccination			
Hazard warning signs			
First aid boxes availability			
How to handle fire extinguisher			
Sufficient Exits to permit prompt escape			
Employee's training on emergencies, evacuation, drills.			
Separate store for the storage of chemicals			
Methods of chemical transfer and transportation			
Significance of regular Health check up			
Occupational Hazard reported to higher authority			
Record system regarding Occupational hazard			

## ANNEXURE-B

### INFORMED CONSENT

**TITLE OF STUDY:**

Awareness of Occupational Health and Safety (OHS) among the workers of Ordnance factory Wah Cantt.

**RESEARCHER:**

Faiza Nadeem MSPH Student, Al Shifa School of Public Health Rawalpindi.

**PURPOSE:**

The purpose is to evaluate the awareness of occupational health and safety (OHS) among the Ordnance factory workers.

**PROCEDURE:**

Interviews will be conducted for this study. Self-administered questionnaire and interview based questionnaire held considering respondents convenience. Expected time for interview would be 6-8 minutes for each questionnaire. Participants are autonomous for participation and have right to leave the questionnaire. You may have the right to not complete the survey. Your name will not be mentioned at any time. After data collection, the interview and Participants' details will be kept secretly. Once submitted the researcher will not be able to withdraw responses due to anonymity. There are no direct benefits associated with participation in this study. The only benefit from this research is to evaluate the awareness of OH&S among factory workers. So this study will be helpful in creating awareness of safety measures while working in an industry. There are no anticipated risks in this study. There will be no payment for participating in this research. You have the independence to withdraw from the study at any time before submitting the survey without any disadvantage.

Thank you for your participation in this study.

Consent.

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I have read and understood the above information and agree to take part in the study.

Signature \_\_\_\_\_ Date \_\_\_\_\_

## ANNEXURE C – IRB Letter

## ANNEXURE D – Data Collection Letter

## ANNEXURE E – Gantt Chart

Activities	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023
Literature Review							
Synopsis writing and IRB Approval							
Pilot Testing							
Data Collection & Entry							
Data Analysis							
Write up							
Thesis Submission							

## ANNEXURE F - Budget

<b>Budget item</b>	<b>Transport</b>	<b>Stationery</b>	<b>Printing</b>	<b>Publishing</b>
		<b>&amp;</b>		
		<b>Internet</b>		
<b>Pilot testing</b>	<b>600 Rs/-</b>	<b>6,000 Rs/-</b>	<b>4000 Rs/-</b>	<b>-</b>
<b>Data collection</b>	<b>13,000 Rs/-</b>	<b>7,000 Rs/-</b>	<b>-</b>	<b>-</b>
<b>Thesis write-up</b>	<b>2,000 Rs/-</b>	<b>7,000 Rs/-</b>	<b>5,000 Rs/-</b>	<b>7,000 Rs/-</b>
<b>Total</b>	<b>15,600 Rs/-</b>	<b>20,000 Rs/-</b>	<b>9,000 Rs/-</b>	<b>7,000 Rs/-</b>
<b>Expenditure</b>				
<b>Grand total</b>	<b>51,600 Rs/-</b>			



## ANNEXURE G – Scale Reliability

### Reliability Statistics

<b>Cronbach's Alpha</b>	<b>(N) Number of Items</b>
0.909	27

Figure I : Reliability of Awareness of OHS