

Master of Science in Public Health



*Assessment of occupational Health safety and
vulnerability measures in Pharmaceutical industries
of Islamabad*

By

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Assessment of occupational Health safety and vulnerability
Measures in Pharmaceutical industries of Islamabad

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Declaration

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

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

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ABSTRACT

Background: The concept of occupational Health and Safety in developing countries is limited and diseases and accidents at work are one of the most appalling tragedies of the modern industrial age therefore the incidence of occupational diseases and injuries is high. No sufficient data about OHS are available in Pakistan because the majority of accidents are not reported to the Labour Department. Pakistan also has poor occupational safety and health legislation and infrastructure.

Objectives: The aim of this study is to determine the association between occupational health safety and vulnerability measures with sociodemographic features of pharmaceutical workers.

Methodology: The cross-sectional study was conducted on twelve pharmaceutical industries. The total sample by using Previous prevalence 59.74% and by adding 5% non-responsive was 388. The Data was collected through a semi structured questionnaire OHS vulnerability measures. All level of workers from most senior to most junior was included and those who had injuries outside the industry were excluded. The data collected was analyzed by using descriptive and inferential statistics techniques. Chi-square test was used to investigate the association between dependent and independent variables.

Results: Results indicated that sociodemographic variables had no significant association between occupational health safety and vulnerability measures among workers of the pharmaceutical industries. The highest percentage for occupational safety was found 89(42.6%) and risk of Occupational Hazards was found 104(58.1%) while the overall association between occupational health safety and vulnerability of hazard was found statistically non-significant ($X^2=0.019$, $df=1$, $p=0.892$).

Conclusion: The study concluded that occupational vulnerability is high in pharmaceutical workers because of less occupational safety, so it is required that administration and management should focus on creating awareness of occupational health and safety, efforts should be made to create suitable environment where factory workers can practice healthy and good occupational safety and can reduce occupational injuries and accidents.

Keywords: occupational safety, vulnerability of occupational hazards, occupational risk, Knowledge of occupational safety, Participation in occupational safety.

**Dedicated to my Sweet mother who is heaven for me on earth and my
beloved uncle who is like my father**

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CHAPTER I

INTRODUCTION

Health and safety at work are one of the vital aspects of human concern. It aims to adapt the operating atmosphere to employees for the upliftment & prolongation of the very best level of mental, physical and social wellbeing of employees. Occupational Health and Safety (OHS) or Workplace Health and Safety (WHS) are two localities involved with the security, health, and well-being of individuals involved in work. Safety and health programs at work embrace making a secure and healthy work atmosphere. According to the World Health Organization (WHO), “occupational health deals with all aspects of health and safety at the workplace and places a powerful stress on primary hindrance of risks”. Health has been defined as "a condition of complete physical, mental and social wellbeing and isn't merely the non-existence of un-wellness or infirmity". The research study identifies health risks and outlines awareness of work-related health risks for pharmaceutical workers. This included evaluating health risks for workers, assessing health risks for workers and possible control to prevent and mitigate the impact of hazards on workers' health and well-being. General health risks within the pharmaceutical business embrace exposure to dirt and noise, repetitive motion disorders, methanol exposure, and ultraviolet illumination exposure (Khanna, 2019).

Occupational health and safety practices is the large concern for protection from hazards at the workplace. According to the International labor organization (ILO) and World Health Organization (WHO), occupational health is described as “Occupational health should be a goal at the maintenance and promotion of the top most quality of mental, physical and social well-being of employees in all kinds of work”. Occupational health and safety (OHS) is a multidisciplinary field include, the disciplines of occupational medicine, occupational nursing, industrial hygiene, epidemiology, toxicology, and engineering. Occupational Health and Safety practices help to enhance the productivity as well as decrease the workplace accidents through progressive guidance over the performance of workers. International Labor Organization (ILO) has stated that an occupational accident affects the lives of human being. Approximately, 317 million accidents have taken place with human being per year. In 2014, thousands of peoples have died due to heat waves in Karachi. The governments of Sindh were not serious against heat waves issue and only fixed

minimum 1% of the total budget for Sindh environment. This insufficient budget is unable to stabilize the environment for the human being in Sindh (Mariam, 2020).

The pharmaceutical industry is a vital component of health-care systems all over the world engaged in discovery, development, manufacture, and marketing of medicines for human as well as animal health. Pharmaceutical industries also have many environmental problems, like the other chemical industries. The pharmaceutical industry is based primarily on the scientific formulation, research, and development of drugs, that are helpful in the prevention or treatment of diseases and disorders. The manufacturing of APIs and formulation processes involves the use of various chemicals which includes various corrosive and irritant agents such as acids, bases, oxidizing and reducing agents, solvents, and many more which can be found sometimes at very high concentrations and are hazardous to health of persons performing the various processes during manufacturing and formulation of medicines. The effective management of the chemical risks linked to the handling of these agents is mandatory for the safety of the workers in the industry, ethically and also legally as per the rules and guidelines of various acts regulating the functioning of the pharma industry. (PRINCY AGARWAL*, ANJU GOYAL, RAJAT VAISHNAV, 2018).

The main aim of this study is to highlight the pharmaceutical industry hazards its types and assessment of occupational health, safety and vulnerability aspects of occupational workers against these hazards. As occupational health services have a central role in the creation of a comprehensive health care system for all workers. So, it is required to give focus in this field for achieving high level of occupational health and safety like other developed countries. The study aimed to document the different aspects of occupational health and safety at some specific pharmaceutical industries. This will hopefully lead to a greater awareness of the problem and consequent involvement of senior management regarding the prevention and management of occupational injuries. This broadened scope of occupational health and safety will make provision for health promotion and injury prevention programmes. This study might assist the company concerned in shifting the focus of the occupational health clinic from curative to preventive services by establishing baseline data which can be used to monitor future occupational health and safety knowledge and practices. (Laran Chetty, 2006).

An increasing rate of injuries might create a sense of fear and insecurity amongst workers. This study would identify those injuries that occur most frequently as well as those workers who are exposed most often to occupational hazards. In addition, it would enable the pharmaceutical companies to evaluate worker knowledge and practices with regard to safety measures and procedures. (Mst. Nasrin Banu^{1,a}, Md. Salauddin^{2,b,*}, Kazi Md. Al Noman^{3,,} 2021)

OBJECTIVES:

- To assess occupational Health safety and vulnerability Measures in pharmaceutical industries of Islamabad
- To find association between occupational health safety and vulnerability measures with sociodemographic features of pharmaceutical workers.

CHAPTER II

LITERATURE REVIEW

Occupational safety and health (OSH) are a cross-disciplinary area and it is concerned with guarding the safety, health and welfare of people who are engaged in work or employment. Health is associated to the physical conditions of both mind and body, of all people at the workplace including the workers, contractors and visitors, and their protection from harm in the form of injury or disease. Safety is related to the physical condition at the worksite and applies to a state where the risk of harm and damage has been removed or reduced to a tolerable level. And the protection of environment is comprised of usually two types. First is the internal environment at the workplace and it is related to overall condition in the workplace. Second are the harmful conditions which are present in the external environment outside the workplace. The occupational health specialist plays a very important role in maintaining the safety and health of employees by carefully assessing the work site for potential hazards that can cause serious harm and reducing or preventing the risk inflicted by them (MALIK, 2013).

The occupational hazards have developed enormously high mishap rates, occupational diseases, and harmful effects on the pharmaceutical industries. Pharmaceutical industries have different types of hazards e.g., physical, biological, chemical and ergonomic hazards. These hazards lead to an unhealthy environment, number of accidents and dangerous/fatal diseases in the workplace. Industries of Pakistan require uncompromising development in terms of occupational health and safety practices implementation because they did not give as much consideration as they need. A work-related death in Pakistan is much higher than any progressive countries. The occupational injuries have the great impact on the lives of workers, that expand the risk of occupational injury these are sleeping disturbance, fatigue, lack of training and job stress at the occupational place. The solution to these problems is to promote the basic health and safety technique to every worker. Health education among younger, male and female workers minimizes the stress and sleep disorder. (S.Durai, 2014).

Physical health fitness, skill development, and psychosocial happiness are related to workability. The risk factors that have been mostly seen in labor work occupation are; two different jobs in a day, late shift, performing duty full time and having over time are the main causes of an occupational injury. Another factor related to occupational health is very

complicated. The race/ethnicity has a great impact on the occupational hazards. Most workers are obstinate and deviate themselves owing worst impact on the occupation. Korea and the USA get the same type of hazards in finishing, mining, forestry, construction, agriculture and textile sectors. The United States of America is more anxious about health and safety, but Korea also gives more prevalence to save their industries from occupational risk. However, the Surveillance system and safety initiative decision is required to prevent occupational risk and injury at Korea (RAJAT, 2018).

Taylor et al (1970) conducted research on the physical health of workers. His research based on the chronic disability, to discover about the records of disable people working in industry, excluding for those who were registered with the Department of Employment and Productivity. A combined survey conducted by six factory doctors consisting of 11,399 men of aged 16- 64 from seven companies is illustrated. In which 10.8 per cent of the population (1233 men) were recognized as having chronic medical impairments, which could affect working capability. The frequency increased from 3% under the age of 25years to 28% per cent over the age of 60. The only 1/3 of these men was formally registered and they were not true representative of the entire disabled either in terms of severity or of diagnosis. The most occurring reason of disablement were chronic bronchitis and asthma, disorders of the backbone, coronary heart disease and severe visual loss (Phillips M , 2002).

Claire (1987) High injury rates tend to occur in lower socio- economic groups whose perception of causation and work experience place them at odds with management. At the same time injuries are treated, investigated and compensated at an individual. Further, patterns of behavior, injuries and overt conflict may be related to the levels of control experienced at work A case study results demonstrated that a conflict of interest was recognized by both workers and management and resulted acceptance of 'restrictive labor practices', as survival mechanisms. This recognition of inherent danger, injury-avoidance withdrawal and the contradictory nature of control for safety and production, by both sides, is de facto legitimation of occupational injuries being embedded in the social relations of production - rather than being 'accidental' (Abdel-Moty E, Khalil TM , p. 2006).

Strasser (2003) explained in the environmental health and safety management and auditing programs that numerous standards and regulations serve as a basis for both occupational health and safety programmers and for auditing programmes. For instance, Occupational Safety and Health Administration (OSHA) is one source of US workplace,

standards. Other countries had standards and regulations similar to OSHA's standards (Munir, 2014).

2.1. Contextual Factors of Occupational Health System:

There are different factors, which directly or indirectly create effect on OHS. Worker (labor) education, age, income, awareness, knowledge, personal or physical health, injury and disease benefits, economic conditions, role of management compensation plans, occupational health and safety management and admin standards, labor behavior were responsible to create awareness and knowledge about occupational health and safety environment health and safety management system and affective audit and inspection system. These factors were identified in the different parts of the world which we discuss as below. Karagüven discovered association among work accident, stress level and educational background of pharmaceutical workers. The results indicated that accidents on workplace are directly linked with the worker's stress level and educational background. The stress level also linked with sex and national differences of pharmaceutical workers. (Adami NJ., 2006).

OHS includes all the factors which are related to the work including the working methods, nature of the work and the working environment that may cause injuries, diseases or other health impacts among the workers. It includes deafness from loud noise in the workplace, unsuitable environment, mechanical risk during the use of machinery, physical and mental strain from monotonous and heavy work, long working hours or very high speed, the physical and chemical hazards which includes intoxication from the irritating substances and inhaled fumes, dusts, vapors or gases, skin diseases which are used in the workplace. The relation between structural modification, injuries and accidents, behavior, organizational environment and physical environment seemed strong. (Austin R, 2000).

The general international statistics and historical view indicates that Occupational health and safety has always been challenging and the integration of OHS into worksite management, allocation of safety activities, and role of the employees' involvement in safety matters are the features that previous literature classifies as correlated to lower injury rates. Physical working conditions comprise of work space, and the width of the stairs, lighting, fire escape facilities, and the number of toilets. Evidence shows that the physical working conditions are often poor in the industries (Pandey, 2019).

While many of the potential hazards introduced into the industry are because of the fact that the machines became larger, speedier and much more complex in operation. Also, the materials and the operational processes became more complex which infused the workplace with potential health hazards. The workers had to cope with work stress due to mechanization and the demand for increasing productivity which exerted an increasing influence on their well-being. The purpose of the adopting new technologies and flexible manufacturing methods are to shorten process times and to maximize the effective work time thus increasing the speed and intensity of work. This increases stress and strain level leading to the occurrence psychosocial and ergonomic problems. (Ahmed W. , 2014).

In the media work-related injuries and illnesses is widely discussed but according to the international labor organization still the actual numbers not known accurately (ILO 2003). According to data of 2003 the accidents at work and diseases annually take some 2 million lives world-wide and they cost an estimated \$1,250,000 million US dollars to the global economy. Most recent data from Europe gives account of around 4 million people injured at work resulting in more than three days of absence from work. (Aftab, 2016)

1.Physical injuries at work place

A study showed that the physical injuries in industrial workers were ranging from moderate to serious in severity. Whereas the hands and the fingers were mostly damaged in these accidents. Injuries indicated that the fingers of the upper extremity accounted for highest number of accidents. The thumb, index and middle fingers of both left and right hand were maximally affected in accidents. The majority of accidents in case of lower extremity were on the foot, toe and then leg. The environmental noise exposure is linked with various adverse psychological and physiological health effects. (Mariam, Shahida, 2021).

2.Seasonal influences on health of workers at work place

Seasons also have a strong influence. A number of questionnaire studies have found links between low relative humidity (RH 5–30%) and an increase of occurrence of dry air and the sensory irritation of the upper airways and eye. Further studies showed less complaint by an increase of relative humidity. The associations are more dominant at room temperatures above 22°C and generally more common during the heating season. Several of the studies also indicate that a temperature increase, which could result in some decrease of relative humidity, increases the frequency of symptoms of eye-irritation. Also, high temperature could lead to desiccation of the workers eyes. However, clear relations between the symptoms and thermal climate have

not been found in a number of studies. Several factors may affect the conclusion, and the reason for this discrepancy is not clear. (Mahmood, 2001).

3. Human factors and ergonomics at workplace

Some specific ergonomic problems also exist in most of the industries which includes training, awareness, motivation, and occupational health and safety programs with regard to management. Hand tools, machines, manual materials handling and workstations with regard to the work and workplace design. Upper-body and neck aches, discomfort, fatigue, backaches, wrist and hand pain, dissatisfaction and stress with regard to work; workforce and problems of noise, heat, humidity and dust with regard to the environment. Hence the work environment exposes workers to many health hazards and contributes to respiratory diseases, injuries, musculoskeletal disorders, cancer, reproductive disorders, cardiovascular diseases, eye damage and hearing loss, mental and neurological illness as well as other communicable diseases. Working conditions are very poor in hazardous industries, so the workers are affected most in those industries and face diseases like lung cancer, skin and eye allergies, deafness. So, health and safety council must be set up by the government at national, provincial and plant levels to ensure that lives and health of workers are protected. (Bhusnure, 2018)

4. Risk

A risk is a random event that may possibly occur and if it did occur, it would have a negative impact on the organization goals. In risks analyzing stage, assessing the likelihood or risk occurrence, identification of existing and new controls for minimizing the likelihood of risks and cost identification of this purpose can be observed. Risk analysis may be qualitative, semi-quantitative or quantitative. Past records, experiences, industrial practice, market research, experiments and judgment that techniques used in the risk analysis stage. Four methods that includes in risk analysis which are hazard identification, risk assessment, determining the signification of a risk, communicating risk information. Therefore, improving productivity of the workers and OHS is major concerns of industry especially the developing countries. Some common features of industries are inappropriate workplace design, ill-structured jobs, mismatch between job demands and workers abilities, unsuitable environment. Workplace hazard reduces the productivity of the workers and quality of work and product cost increases. Promotion of Health is an important part of occupational health professionals. Health educators, safety officers, and physicians play role in workplace health promotion and should be trained accordingly. (Talwar, 2020) et al.

5. Environmental and human health risk assessment

Environmental and human health risk assessment is the initial stage of Environmental management system. To improve the quality of life it is a necessary for industries to do careful assessment both before and during operation. After implementation to a scenario, it was concluded that it can define the sources of the risk along with certain risk classes which support the decision makers to identify which risk source should be given priority. Also, they can without difficulty point out and rank all the factors which are contributing in those risk sources. While developing management alternatives for on-going and unfounded, the environmental decision makers can utilize this approach for the industrial plants which are using hazardous materials. (Abdul Hafeez, 2020).

2.2. Similar national and international studies:

2.2.1. Burden of Occupational safety and health In Pakistan:

In Pakistan, as the majority of accidents are not reported to the Labor Department's so there is no data available about occupational health and safety (OHS). Diseases and accidents are dreadful tragedy in the work place. As thousands of workers are routinely exposed to hazardous chemicals, therefore the incidence of occupational diseases and injuries are very high in Pakistan. Pakistan ranked 9th populated country in 2010 With the total Labor force of 54.9 million, 41/1000 receives injury every year. (MuhammadNoman, 2021).

The healthy workers are most productive and useful. The high accident rates, occupational diseases, and unhealthy working environments are the outcome of the introduction of hazards technologies in industry. Majority of workforce is illiterate and not familiar with the protective measures which should be adopted during their jobs. Most of the workforce is not prepared to cope with the hazards posed by manufacturing and industrial processes. The legislation regarding occupational health and safety is obsolete and needs revision. The country lacks the basic infrastructure and qualified personal for giving occupational health and safety services to the labor force. Therefore, a huge number of workers will be at risk if no future attempts are made to improve OH&S The rapid rate of changes in working life will also require increasing flexibility with the consideration of occupational health, hygiene, and safety requirements at different workplaces. World Health Organization (WHO)

contributes an idea that the workplace can be place where accidents & diseases are prevented and health is protected. Furthermore, workplace is capable of providing a surrounding for improvement or formation of good health. Healthy workers are industrious and lift up healthy families. (Munir, Hafiza Mubeen, 2001).

Healthy worker plays a vital role to overcome poverty. Industrial processes result in pollution and many environmental exposures that are harmful to health. Such processes may be influenced by occupational health and safety programs. Occupational safety and health can be helpful in improving the employability of workers with the better workplace design, provision of a healthy and safe work environment, training and assessment of work demands, medical checkup, health screening and evaluation of practical capacities. A healthy worker is essential for sustainable societal and economic development on a universal, public and local level. The traditional approach to maintain health and safety in the workplace has primarily focused on the enforcement of legislation and assessment of workplaces to ensure conformity with health and safety standards. Since the industrial revolution, this approach has been useful in overcoming many specific occupational hazards. But it has not been very successful in the past several decades, especially in developing countries due to various reasons. The use of chemicals in manufacturing and industrial processes has expanded considerably in recent years in both the industrialized and the developing countries. Massive occupational and environmental problems are faced resulting from the production and use, storage, transport, handling and disposal of chemicals. Currently, there are more than eight million known chemicals. About 100,000 chemicals are in chemicals enter the market every year. (Dongare, 2021).

In Pakistan there is a poor occupational health and safety legislation and infrastructure which need to be promoted. In Pakistan, there is no particular complete law which covers occupational health and safety. There are various laws related to health and safety in different sectors. Different portions of legislation deal with various aspects of occupational health and safety in Pakistan. Health promotion is an essential part of the occupational health professional's mandate. Physicians, nurses, safety officers and health educators they will play different roles in workplace health promotion and should be trained accordingly e.g., the role of the occupational health nurse is to educate, screen and counsel workers, whereas that of an occupational hygienist is to

assess the control of health hazards while keeping in touch with the development and progress of health promotion programs. (Irran, 2016).

In Pakistan, the main training institution working for different aspects of occupational health and safety is the Centre for Improvement of working Conditions and Environment (CIWC&E) situated in Lahore. Since it became operational, CIWC&E has organized 135 training health and safety. Some researchers have concluded that it is difficult to evaluate causes of morbidity in pharmaceutical workers because manufacturing processes and additives differ between factories and exposures are to multiple chemicals. (Salman, 2019).

2.2.2. Burden of Occupational health safety worldwide:

Numerous research studies have been conducted on Occupational Health and Safety (OHS) aspects in pharmaceutical and other industries such as Chemical, Mining, and Agriculture etc. in various parts of the world. About 2.3 million people die due to occupational accidents and diseases (The International Labor Organization), 317 million suffer nonfatal occupational injuries & 160 million suffer occupational illnesses. (Am J Ind Med. Concha-Barrientos M).

A literature search is a fundamental section of the complete research procedure and makes an important contribution to nearly every operational step. In this chapter, under the various sections, different studies are reviewed which were conducted on Occupational health and safety all over the world with respect to our research objectives. The various sections such as the factors effecting OHS, the work place hazards, causes of industrial accidents, existing medical protection and facilities and life style, behavior and attitude of the workers as well as management. We reviewed the different studies conducted on OHS all over the world. The current review is an attempt to give a comprehensive draft of the findings of the research studies performed in different parts of the world with respect of our research objectives in order to provide information about possibilities of improving occupational health and safety situation in pharmaceutical industry and recognize its significance. (Hemant Bhanawat) et al.

The general international statistics and historical view indicates that Occupational health and safety has always been challenging (Hinze 2006) and the integration of OHS into worksite management, allocation of safety activities, and role of the employees' involvement in safety

matters are the features that previous literature classifies as correlated to lower injury rates. Physical working conditions comprise of work space, and the width of the stairs, lighting, fire escape facilities, and the number of toilets. Evidence shows that the physical working conditions are often poor in the industries (Waqas Ahmed Khan, 2014)

Wigmore (2009) found that the exceptional way to stay away from the problems is to eliminate dangerous substances and use available substitutions (choice of protected or least toxic substances). The pharmaceutical business is exclusive in that its employees deal with hazards that may have biological impact. Large scale pharmaceutical agencies have equipped numerous safety and fitness applications that focus on both private and corporate responsibility. They also extend a categorization module, called a tamper strip, to categorize the chemical and biological hazards in their facility. examined the effect of health and safety at work on labor productivity in Zimbabwe in the industrial food industry and concluded that a lack of expertise on OSH practices causes such problems. (chetty)et al.

While many of the potential hazards introduced into the industry are because of the fact that the machines became larger, speedier and much more complex in operation. Also, the materials and the operational processes became more complex which infused the workplace with potential health hazards. The workers had to cope with work stress due to mechanization and the demand for increasing productivity which exerted an increasing influence on their well-being. The purpose of the adopting new technologies and flexible manufacturing methods are to shorten process times and to maximize the effective work time thus increasing the speed and intensity of work. This increases stress and strain level leading to the occurrence psychosocial and ergonomic problems (Harrison 2003). In the media work-related injuries and illnesses is widely discussed but according to the international labor organization still the actual numbers not known accurately According to data of 2003 the accidents at work and diseases annually take some 2 million lives world-wide and they cost an estimated \$1,250,000 million US dollars to the global economy. Most recent data from Europe gives account of around 4 million people injured at work resulting in more than three days of absence from work. (Kaminski, 2001)et al.

In Malaysia a study was directed to examine the awareness regarding health and safety among the staff members who are working in the higher learning institutions. The main objective was to study the connection between the organizational policies regarding safety at the workplace, environment of the office, attitudes of staff-members, and commitments by the management. The findings showed that there was a very significant co-relation among the analyzed

and studied variables, which suggested that it is necessary for the management of the organization to set up and promote some safety codes in the organization. (Ahmed W. , 2014)

In Thailand a study was carried out to present a general impression of the status of OSH Management in enterprises which are both medium and small (SMEs). The industries were medium having 100 to 299 workers and small having 20 to 99 workers. All over Thailand the response rate received from small industries was 22.4% and from medium size industries the response rate was 14.7%. Many enterprises take excellent care of the hygiene and health of their workers and thus have arranged numerous welfare facilities for this purpose. Maximum accident cases were reported from the production enterprise. Insufficient representation of workers may undermine the effectiveness of workers' control on changes in working conditions and reduce the pressure on managers to commit to safety. Also, these small firms usually show weaker workers representation in health and safety as compared to large scale mills/industries. (RAJAT, 2018)

Another study investigated the influence of the practices for risk prevention and the organizational factors which comprised of the safety measures, intensity of risk, risk prevention, quality management tools implementation, the enhancing the empowerment of the workers, and the usage of flexible technologies for production. The results showed that the emphasis upon the prevention activities, empowerment of workers, and the wise use of quality management tools are the factors which contribute to lessen the number of injuries. In contrast to all this higher accident rates were observed as a result of implementing flexible manufacturing processes. (Ahmed s. s.)et al

A major problem in Turkey and all over the world is the occupational accidents. As a result of these occupational incidents every year nearly one thousand people die and two thousand people are injured leading to temporary or permanent disability. As a result, this leads to social and economic problems for these people and their families suffer from occupational accidents socially and psychologically. Also, the economy of the country suffers badly and the employers are encountered with economic loss and work day loss. In this study the results of occupational accidents which took place between the years 2000 to 2005 in Turkey were assessed. (Hemant Bhanawat)et al

In Zimbabwe an ergonomic assessment was also conducted to identify the potential musculoskeletal risk factors. Hazards due to work postures, manual handling, and speed of work

or hand tool use were identified in the various processes including bale breaking, waste pressing, and spinning, scouring and winding. (salman, 2019)et al

2.3. Laws of occupational health and safety in Pakistan:

Various laws in Pakistan cover occupational health and safety. There is no single complete law covering occupational health and safety. The following parts of legislation deal with various aspects of occupational health and safety in the country (Shafi and Shafi, 1977)

1. Factories Act 1934
2. Punjab Factories Rules 1978
3. Sindh Factories Rules 1975
4. North-West Frontier Province Factories Rules 1975
5. West Pakistan Hazardous Occupations Rules 1963
6. Mines Act 1923
7. Provincial Employees Social Security (occupational Deceases) regulation 1967
8. Provincial Employees Social Security Ordinance 1965
9. Workmen’s Compensation Act 1923 and Rules 1961
10. Dock Laboure’s Act 1934
11. West Pakistan Shops and Commercial Establishments Ordinance 1969

The health and safety measures prescribed in most of these laws have not been up dated with the changing time and period. Very few technical standards have been prescribed in any of these laws. Moreover, the occupational exposures limits (OELs) which are very common all over the world, are still missing in the laws in Pakistan.

2.4. OPERATIONAL DEFINITIONS:

2.4.1. Occupational health and safety:

The ILO definition of occupational health is “The promotion and maintainance of the highest degree of physical, mental and social well- being of workers in all occupation. (Kaminsk, 2001)

2.4.2. Hazard:

A hazard is any object, situation, or behavior that has the potential to cause injury, ill health, or damage to property or the environment. (Sevashram Road, 2007)

2.4.3. Risk:

Risk can be defined as a measure of the probability and severity of adverse effects. Risk is the likelihood that a person may be harmed or suffers adverse health effects if exposed to a hazard.’ (Sweta Chakraborty , 2012).

2.4.4. Vulnerability:

The quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally. (Sweta Chakraborty , 2012)

2.4.5. Industrial hazard:

Can be defined as any condition produced by industries that can cause injury or death to personnel or loss of product or property. (Austin R, 2000)

2.4.6. Hazardous materials:

Are chemicals that if released or abused can pose a threat to the environment or health. They include industrial chemicals, pesticides, agricultural chemicals, pharmaceuticals, cosmetics, and food chemicals that may be present at the workplace and “have a negative effect on a worker’s health as a result of direct contact or exposure to the chemical substance. (Sevashram Road, 2007)

2.5. Types of industrial hazards:

There are many types of industrial hazards like Physical hazards, Chemical hazards, biological hazards, Psychosocial hazards and Mechanical hazards.

2.5.1. Physical hazards:

Physical hazards are noise, vibration, fire, temperature, Electricity, pressure, fibres, lighting, humidity, cold, stress(hypothermia), heat, stress (hyperthermia) dehydration (due to sweating) oxygen deficiency, pressure, non-ionizing radiation (Ultraviolet, Visible, Infrared radiation) (Talwar, 2020)

2.5.2. Chemical hazards:

Chemical hazards are flammable/explosive materials, liquid or gases, vapours, solids, mists, smoke, fog or smogs and sensitizing agents.

2.5.3. Biological hazards:

Biological hazards are dust, viruses, bacteria, fungi, protozoa, Helminthes, blood borne pathogens, molds, recombinant DNA molecules, human tissues and cell culture

2.5.4. Psychosocial hazards:

Psychosocial hazards workplace practices & systems, payment systems, type of work, risks involved in work, monotony, long working hours, lack of recognition, job satisfaction, poor remuneration, poor man management, lack of welfare activities, tensions at home Strikes and unexplained reduction in production.

2.5.5. Mechanical hazards:

Mechanical hazards can be classified as,

By type of agent are: Impact force Collisions, Falls from height, Struck by objects, Confined space Slips and trips Falling on a pointed object Compressed air/high pressure fluids (such as cutting fluid) Entanglement Equipment-related injury.

By type of damage: Crushing and Cutting, Friction and abrasion, Shearing Stabbing and puncture Poor maintenance/ housekeeping. (Abdul Hafeez, 2020)

Health Hazards:

General health hazards in the manufacture of pharmaceuticals include dust and noise exposures, repetitive motion disorders, exposure to formaldehyde, and exposure to ultraviolet radiation. Dust becomes airborne during manufacture and is a problem for operators; in addition, filling and packaging of the finished product may pose an allergic hazard from dust. Ensuring sterility of the product often involves exposure to formaldehyde and ultraviolet radiation. Formaldehyde may cause lung cancer, Hodgkin's disease, and prostate cancer. Acute exposures can cause pulmonary edema (lungs fill with fluid, making breathing impossible) and pneumonia leading to death. Formaldehyde also causes allergic dermatitis. In some cases, anti-inflammatory drugs are prescribed, and surgery may be required in very severe cases. It is very important to remember that treatments for tendinitis and carpal tunnel syndrome will not work unless the cause of the problem, the job or tool design, is changed to eliminate the twisting and bending of the hand and wrist. (Waqas Ahmed Khan, 2014).

Some Specific Health Hazards:

Hazards specific to the pharmaceutical industry result from exposure to the active drug which usually takes place during the last phase of production. Hormones Health impairment due to pharmaceuticals has been described and observed mainly in hormone and antibiotics production workers. The effects of occupational exposure to hormones may be severe. For male workers, exposure to estrogens may give rise to breast development; for female workers, there may be menstrual disorders, abnormal overgrowth of the endometrium and excessive bleeding during menopause. Exposure of male workers to progestogen may bring about a lack of sexual desire and testicular pain. On the other hand, exposure of female workers to androgens is known to cause menstrual and ovarian function disorders, diminished fertility, increased frequency of spontaneous abortions, and symptoms of masculinity. (RAJAT, 2018).

2.6. Conceptual framework of study:

Age

Marital status

Job experience

Level of education

Working hours

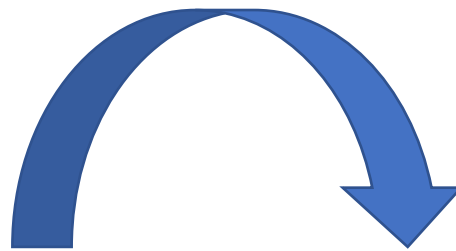
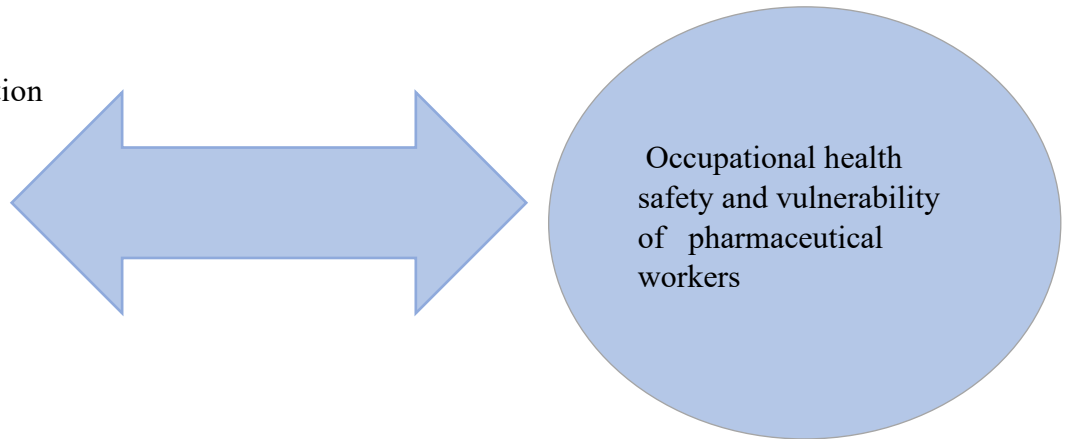
Shift work

Level of stress

Dependents

Salary range

Earners



➤ Provision of occupational health and safety

- Hazardous control measure
- Information about chemical and its hazards
- Proper Waste disposal
- Warning signs
- Proper Storage and house keeping
- Storage and housekeeping
- Audit/Monitoring and surveys
- Injury treatment Centre
- Proper Chemical transportation hazards
- Labor union
- Working hours
- Provision of Medical facilities

Good physical & Mental health

Less vulnerable to occupational



CHAPTER III

MATERIALS AND METHODS

The materials and methods provide a path to researcher how to complete the procedure of collecting, analyzing and interpretation of data. Research methodology provides the scientific framework of your research process. It evaluates the quality and validity of your research study. Hence, the focal objective of this chapter is assessment of the occupational health safety conditions in industry influence both the workers and management as well. The current study based on quantitative research methodologies employed for achieving comprehensive understanding of the occupational health safety and vulnerability measures of pharmaceutical industries.

3.1. Study Design:

In this study cross-sectional study design was used to ascertain the occupational health and safety of workers regarding pharmaceutical industry. A cross-sectional survey was used as it is less expensive, external influences are limited and loss of participants can be minimized.

3.2. Study Setting:

The current research was conducted in twelve pharmaceutical manufacturing units of Rawat (Islamabad) to check the occupational health safety and vulnerability measures

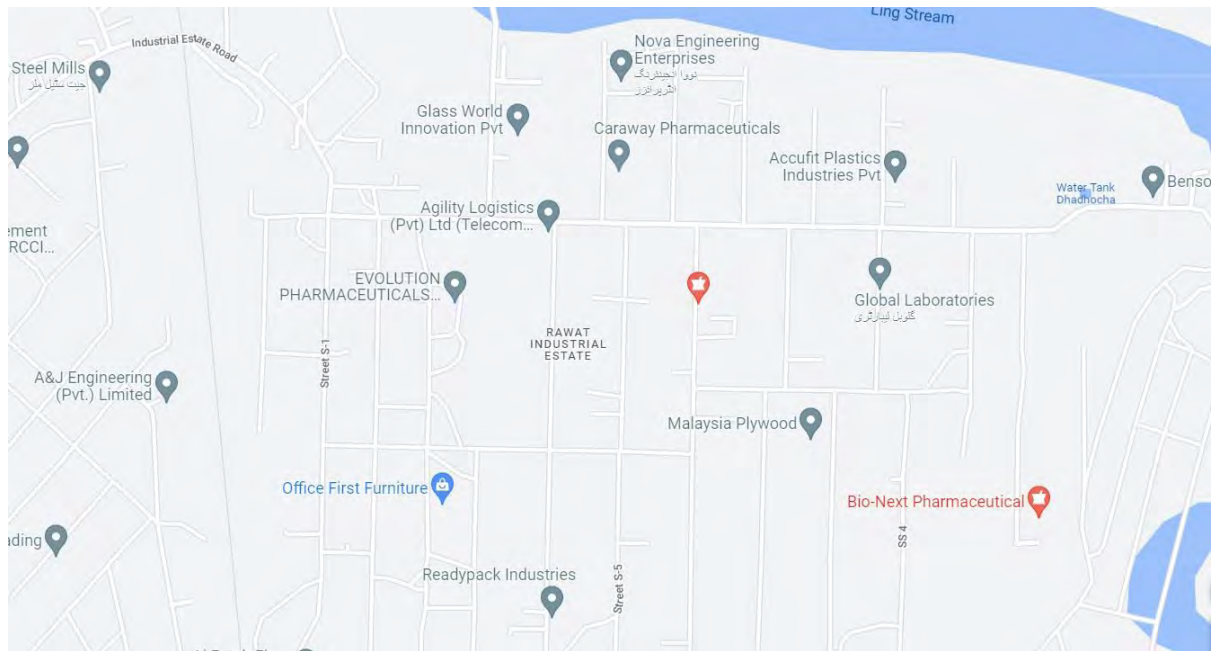


Figure 1: Map of Pharmaceutical Industries of Rawat Industrial Estate.

3.3. Study Population:

Questionnaire was distributed to the males and female employees of twelve pharmaceutical industries of Rawat Islamabad after taking informed consent from them.

3.4. Study Duration:

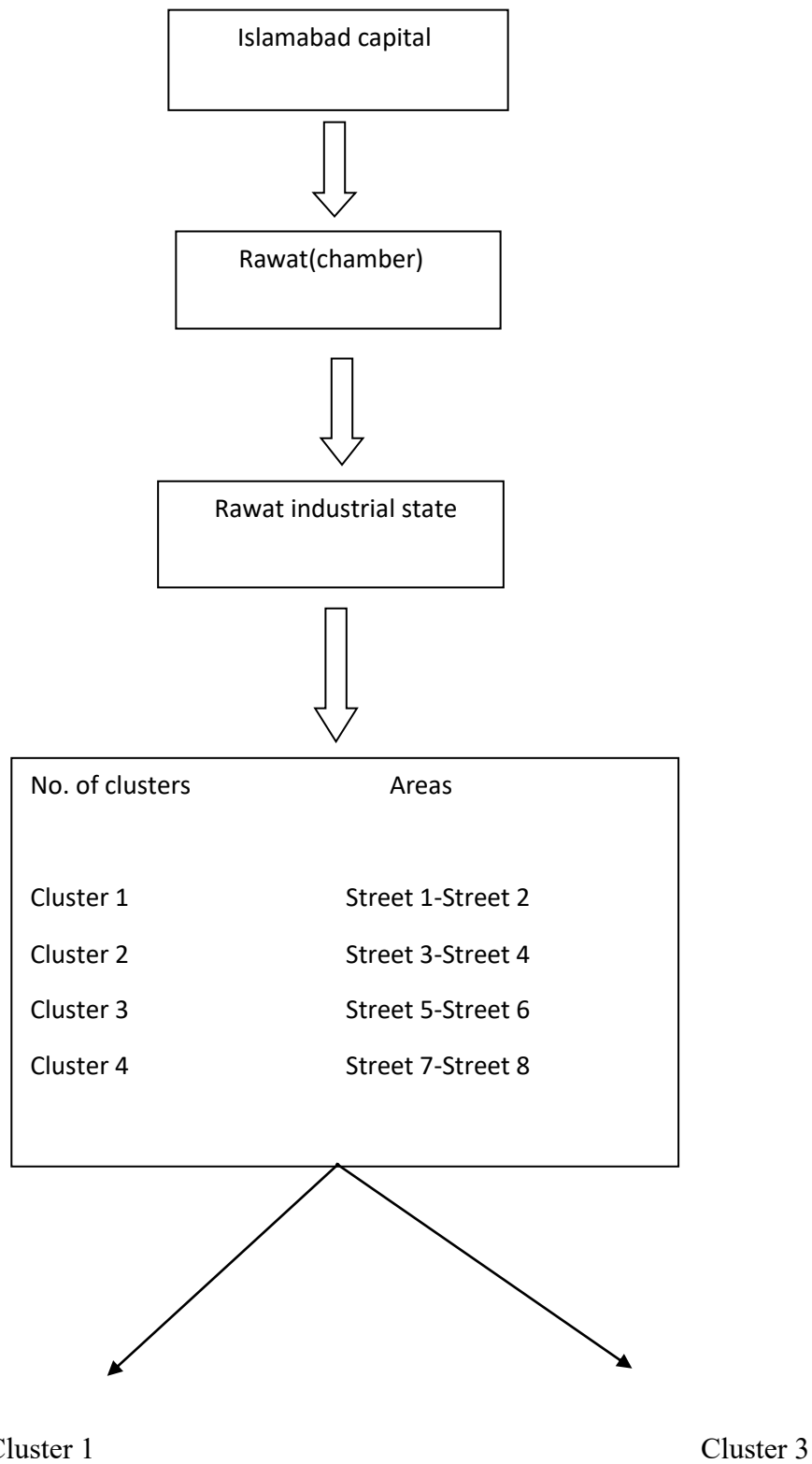
The Study duration was six months.

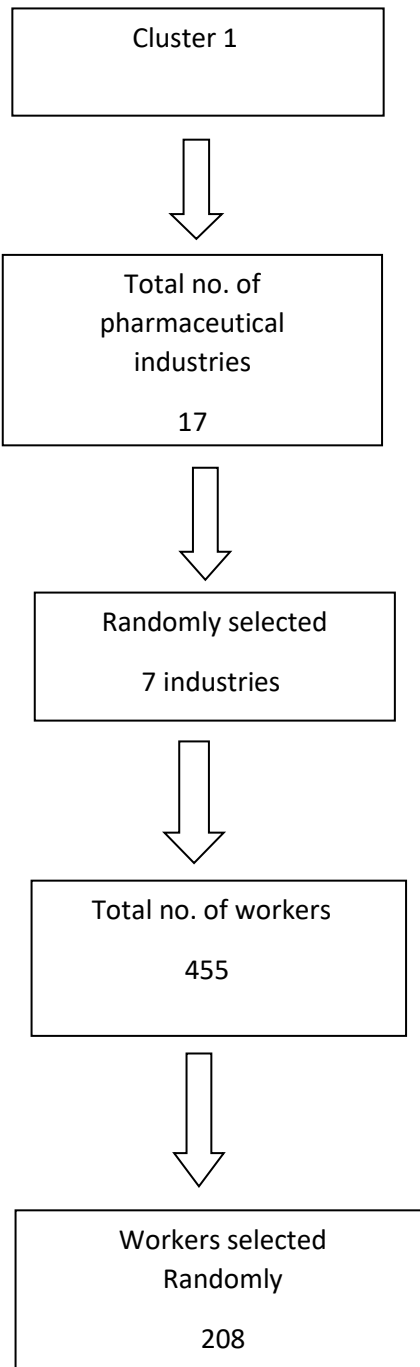
3.5. Sample Size:

Sample size used in this research study by using open epi was 388. By using Previous prevalence 59.74% and by adding 5% non-responsive it becomes 388.

3.6. Sampling technique:

In this research cluster multistage Random sampling was used





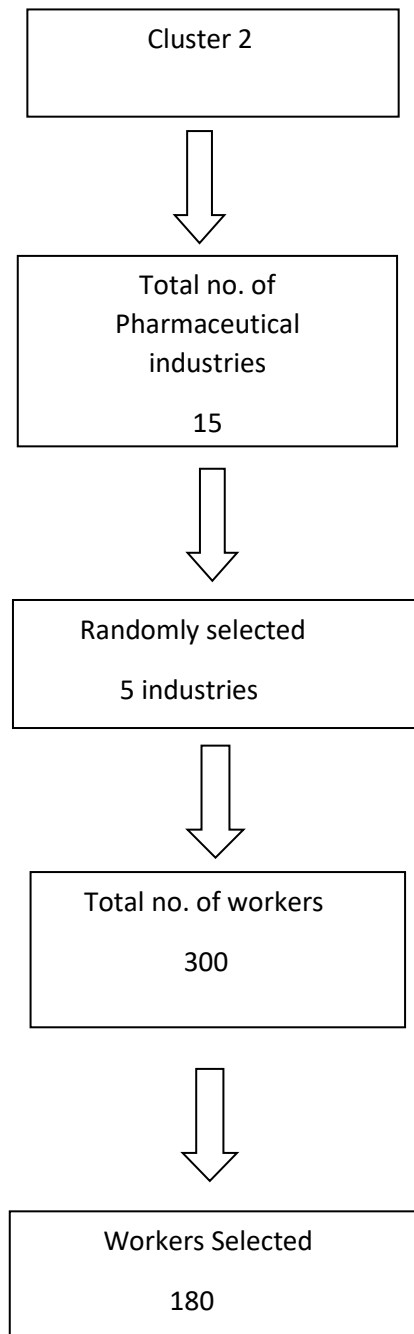


Figure 2: Cluster Multistage Random Sampling

3.7. Inclusion and exclusion criteria:

Inclusion Criteria

- Male and female workers from the most senior to the most junior with age range from 20-60 years were included.

Exclusion Criteria

- Those who were injured outside the working environment were excluded.

3.8. Data Collection:

Tool used:

Data was collected from respondents in different departments. Use of a questionnaire OHS VULNERABILITY MEASURES with little modifications and inclusive literature review was managed in order to achieve goals and objectives.

The tool assess OHS vulnerability measures had four areas

Part 1: Workplace Hazards

Part 2: Workplace policies and procedures

Part 3: Occupational health and safety awareness:

Part 4: Participation in occupational health and safety

The OHS vulnerability measures was designed to be filled out in an organization whose vulnerability to work injury and illness was being assessed.

- Part 1 of the Questionnaire ask how often a worker does certain task or how often he/she experience certain hazardous conditions in the workplace.
- Part 2,3 and 4 ask the worker about three types of resources that may lessen the effects of being exposed to hazardous condition: OHS policies and procedures, OHS awareness and OHS empowerment.

This survey was part of OHS vulnerability measure developed by the institute for work and health, a non-profit organization based in Toronto, Canada that aims to promote, protect and

improve the safety and health of working people by conducting actionable research that valued by the employers, workers and policy makers.

PROCEDURE OF DATA COLLECTION:

The examination of the present study was analyzed using appropriate statistical and mathematical tools, including percentages, frequencies, mean, standard deviation, and chi square test of association depending on the objectives of the study.

Pilot testing:

A pilot study was conducted to improve and refine the contents of the questionnaire. This pilot study was conducted at a pharmaceutical industry where 38 participants were chosen as a sample of convenience to complete the questionnaire. The results of the pilot study (indicated that the participants were similar to those in the study in terms of culture and that all questions were clear and unambiguous. Therefore, no changes were made to the questionnaire after the pilot study. The Reliability was checked by Pilot testing (with 10% of sample check) and Cronbach's Alpha and it was 0.345

3.9. Ethical Considerations

Ethical clearance has been obtained prior to the commencement of this study. Informed consent was required from all participants prior to the completion of the questionnaire This was achieved by means of a consent form that acquainted the participant with the purpose of the study, the time frame by which the questionnaire should be completed and returned to the researcher as well as the associated risks and benefits involved associated with this study. This was achieved by arranging group discussions with workers. The participants were requested to sign a consent form, which was handed out at the end of the respective group discussion participants were entitled to decline to answer any question(s) that they may feel uncomfortable with pertaining to the questionnaire. All participants were informed that they do not risk job loss or any other institutional sanctions by not being involved in this research study. The outcome of the project will be made available to Senior Management, representatives and workers. The researcher will also make himself available to give a presentation to the workers on the outcome and recommendations of the study if required.

3.10. Data Analysis:

Data analysis was done through SPSS software (Statistical Package for the Social Sciences) 26. SPSS is the flexible package that helps to analyze several types of data. The quantitative

approach involves a semi structured questionnaire. For this purpose, 420 questionnaires were given to the workers of the pharmaceutical industry and out of that 388 were usable for this study. After accumulating the questionnaires, data was analyzed through SPSS software. Demographic variables were analyzed by frequencies and percentages.

Outcome variables were computed as occupational hazards, workplace policies and procedures, awareness of occupational hazards and participation of workers in occupational safety. Association of independent and dependent variables was analyzed by chi-square test of association.

■ **Independent variables:**

It includes age, gender, marital status, socio economic status, salary range, level of education, no. of dependents, no, of earners, job experience, shift work, duty hours and Industry settings.

■ **Dependent variables:**

Outcome variables are occupational hazards, workplace policies and procedures, awareness of occupational hazards and participation of workers in occupational safety.

CHAPTER IV RESULTS

Descriptive Analysis:

In this the analysis description of personal characteristics and socio-demographic is summarized in detail.

4.1. Socio Demographic Characteristics of Respondents.

A total number of 388 respondents were included in this study. The distribution of the category for gender was 336 respondents (85.3%) were male and 52 respondents (13.2) were females. The distribution of workers according to age was 83 respondents (21.1%) were I age category ranging from 20-30 years, 139 (35.3%) were in the age category 30-40 years, 113 (28.7%) were in the age category 40-50 years, 46 (11.7%) were in the age category 50 -60 years, and 7 (1.8%) were having age above 60 years.

The education qualification of respondents shows that about 244 (61.9%) had primary education, 107 (27.2%) had a middle school education while 31 (7.9%) had a Bachelors, and 6 (1.5%) have Master's Degree. Out of 388 respondents about 53 (13.5%) had salary below 10000/-, 133 (33.8%) had salary between 10000-20000/-, 157 (39.8%) had salary between 20000-30000/- and 45 (11.4%) had a salary range between 30000-40000/-.

The Duration of duty of the respondents shows that 136 (34.5%) had work 8-10 hrs. daily, 134 (34.0%) had work 10-12 hrs. daily, 80 (20.3%) had work 12-14 hrs. daily, 25 (6.3%) had work 14-16 hrs. daily, and 13 (3.3%) had work more than 16 hrs. daily. Out of 388 respondents about 322 (81.7%) were married, 52 (13.2%) were unmarried, 8 (2.0%) were widowed, and 6 (1.5%) were divorced.

The number of dependents in the families of the respondents show that 47 (11.9%) families had 1 dependent in their family, 134 (34.0%) families had 2 dependents in their family, 123 (31.2%) families had 3 dependents in their family, 60 (15.2%) families had 4 dependents in their family, and 24 (6.1%) families had more than 4 dependents in their family. Out of 388 respondents 103

(26.1%) had 1 earner in their family, 151 (38.3%) had 2 earners in their family, 106 (25.9%) had 3 earners in their family, 23 (5.8%) had 4 earners in their family, and 5 (1.3%) had more than 4 earners in their family.

The job experience of the respondents shows that about 42 (10.7%) had 1-2 years job experience, 134 (34.0%) had 2-3 years job experience, 110 (27.9%) had 3-4 years job experience, 63 (16.0%) had 4-5 years job experience, and 39 (9.9%) had more than 5 years job experience. About 213 (54.1%) were day shift workers, 98 (24.9%) were night shift workers, and 77 (19.5%) were shift workers.

Table 1: Socio Demographic Characteristics of Respondents.

Sr. No.	Variables	Categories	Frequency (F)	Percentage (%)
1	Gender	Male	336	85.3
		Female	52	13.2
2	Age	20-30	83	21.1
		30-40	139	35.3
		40-50	113	28.7
		50-60	46	11.7
		>60	7	1.8
3	Level of Education	Primary	244	61.9
		Middle/Elementary	107	27.2
		Bachelors	31	7.9
		Masters	6	1.5
4	Salary Range	Below 10000	53	13.5
		10000-20000	133	33.8
		20000-30000	157	39.8
		30000-40000	45	11.4

5	Duration of Duty	8-10 hrs.	136	34.5
		10-12 hrs.	134	34.0
		12-14 hrs.	80	20.3
		14-16 hrs.	25	6.3
		Above than 16 hrs.	13	3.3
6	Marital Status	Married	322	81.7
		Unmarried	52	13.2
		Widowed	8	2.0
		Divorced	6	1.5
7	No. of Dependents in the Family	1	47	11.9
		2	134	34.0
		3	123	31.2
		4	60	15.2
		More	24	6.1
8	No. of Earners in the Family	1	103	26.1
		2	151	38.3
		3	106	25.9
		4	23	5.8
		More	5	1.3
9	Job experience (In Years)	1-2 Years	42	10.7
		2-3 Years	134	34.0
		3-4 Years	110	27.9
		4-5 Years	63	16.0
		More than 5 Years	39	9.9

10	Shift Work	Day Worker	213	54.1
		Night Worker	98	24.9
		Shift Worker	77	19.5

4.2. Association of Socio-Demographics with risk of Occupational Hazards

Socio-demographic variables were accessed for association with occupational hazards by applying chi-square.

Occupational hazards were seen with gender categories. Gender categories females (84.6%) had less risk of occupational hazards followed by males (49.1%). The result was found statistically significant. ($X^2 = 22.847$, $df=1$, $p=.000$).

Occupational hazards were seen with age categories. Age categories more than 60 years had less risk of occupational hazards (85.5%) followed by age group category 50-60 years with percentage of low risk (65.2%), then followed by age group category 40-50 years with percentage of low risk (52.2%), then followed by age group category 20-30 years with percentage of low risk (51.8%), and then followed by age group category 30-40 years with percentage of low risk (51.1%). The result was found statistically non-significant. ($X^2 = 5.943$, $df=4$, $p=.203$).

Occupational hazards were seen with level of education category, it was found that the lowest risk of occupational hazard was found in primary individuals (57.0%), followed by the middle individuals (50.5%), bachelors had (45.2%) less risk of occupational hazards, then followed by masters' individuals (33.3%). The result was found statistically non-significant. ($X^2 = 3.405$, $df=3$, $p=.333$).

Occupational hazards were seen with salary range category. It was found that the individuals had salary below 10000 had low risk of occupational risk (62.3%), followed by the individuals had salary range between 30000-40000 (62.2%), between 20000-30000 (52.2%), and the followed by the individual had salary range between 10000-20000 (49.6%). The result was found statistically

non-significant. ($X^2=3.901$, $df=3$, $p=.272$).

Occupational hazards were seen with duration of duty category and it was found that the category 10-12 hrs. had low risk of occupational hazards (51.5%), followed by the 8-10 hrs. group (51.0%), 12-14 hrs. (50.0%), followed by the individuals had duration of duty more than 16 hrs. (46.2%) and then followed by 14-16 hrs. (44.0%). The result was found statistically non-significant. ($X^2=4.884$, $df=4$, $p=.299$).

Occupational hazards were seen with Marital status category of the individuals and it was found that married individuals had less risk of occupational hazards (54.7%), followed by unmarried (51.9%), followed by divorced individuals (50.0%), and then followed by the widowed individuals (37.5%). The result was found statistically non-significant. ($X^2 =1.059$, $df=3$, $p=.787$).

Occupational hazards were seen with job experience (in years) category, it was found that individuals had 3-4 years of experience had less risk of occupational hazards (57.3%), followed by 4-5 years' experience (57.1%), followed by 1-2 years' experience (54.9%), followed by 2-3 years' experience (53%), and then followed by the group had more than 5 years' experience (41.0%). The result was found statistically non-significant. ($X^2=3.429$, $df=4$, $p=.489$).

Occupational hazards were seen with shift work category, and it was found that the group night shift had low risk of occupational risk (59.2%), followed by day work shift (52.6%), and then followed by shift worker (50.6%). The result was found statistically non-significant. ($X^2 =1.577$, $df=2$, $p=.455$).

Table2: Association of Socio-Demographics with risk of Occupational Hazards.

Sr. No	Variables	Less Risk of Occupational hazards	More Risk of Occupational hazards	X^2 Results
1	Gender			$X^2=22.847$,
	Male	165(49.1%)	171(50.9%)	$df=1$,
	Female	44(84.6%)	8(15.4%)	$p=.000$

2	Age			$X^2=5.943$, df=4, p=.203
	20-30	43(51.8%)	40(48.2%)	
	30-40	71(51.1%)	68(48.9%)	
	40-50	59(52.2%)	54(47.8%)	
	50-60	30(65.2%)	16(34.8%)	
	>60	6(85.5%)	1(14.3%)	
3	Level of Education			$X^2=3.405$, df=3, p=.333
	Primary	139(57.0%)	105(43.0%)	
	Middle/Elementary	54(50.5%)	53(49.5%)	
	Bachelors	14(45.2%)	17(54.8%)	
	Masters	2(33.3%)	4(66.7%)	
4	Salary Range			$X^2=3.901$, df=3, p=.272
	Below 10000	33(62.3%)	20(37.7%)	
	10000-20000	66(49.6%)	67(50.4%)	
	20000-30000	82(52.2%)	75(47.8%)	
	30000-40000	28(62.2%)	17(37.8%)	
5	Duration of Duty			$X^2=4.884$, df=4, p=.299
	8-10 hrs.	83(51.0%)	53(39.0%)	
	10-12 hrs.	69(51.5%)	65(48.5%)	
	12-14 hrs.	40(50.0%)	40(50.0%)	
	14-16 hrs.	11(44.0%)	14(56.0%)	
	Above than 16 hrs.	6(46.2%)	7(53.8%)	

6	Marital Status			
	Married	176(54.7%)	145(45.3%)	$X^2=1.059,$ df=3, p=.787
	Unmarried	27(51.9%)	25(48.1%)	
	Widowed	3(37.5%)	5(62.5%)	
	Divorced	3(50.0%)	3(50.0%)	
7	Job experience (In Years)			
	1-2 Years	23(54.9%)	19(45.2%)	$X^2=3.429,$ df=4, p=.489
	2-3 Years	71(53%)	63(47.0%)	
	3-4 Years	63(57.3%)	47(42.7%)	
	4-5 Years	36(57.1%)	27(42.9%)	
	More than 5 Years	16(41.0%)	23(59.0%)	
8	Shift Work			
	Day Worker	112(52.6%)	101(47.4%)	$X^2=1.577,$ df=2, p=.455
	Night Worker	58(59.2%)	40(40.8%)	
	Shift Worker	39(50.6%)	38(49.4%)	

4.3. Association of Socio-Demographics with Provision of Policies and Procedures

Socio-demographic variables were accessed for association with provision of policies and procedures by applying chi-square.

Provision of policies and procedures were seen with gender categories. Gender categories females (50.0%) had good provision of policies and procedures followed by males (47.6%). The result was found statistically non-significant. ($X^2=0.102$, df=1, p=.749).

Provision of policies and procedures were seen with age categories. Age categories more than 60 years had good provision of policies and procedures (57.1%), followed by age group category

30-40 years with good provision of policies and procedures (51.1%), then followed by age group category 50-60 years with percentage of good provision of policies and procedures (50.0%), then followed by age group category 40-50 years with percentage of good provision of policies and procedures (46.9%), and then followed by age group category 20-30 years with percentage of good provision of policies and procedures (42.2%). The result was found statistically non-significant. ($X^2=2.021$, $df=4$, $p=.732$).

Provision of policies and procedures were seen with level of education category, it was found that the good provision of policies and procedures was found in bachelor's individuals (58.1%), followed by the middle individuals (51.4%), masters had (50.0%) good provision of policies and procedures, then followed by primary individuals (45.1%). The result was found statistically non-significant. ($X^2=2.596$, $df=3$, $p=.458$).

Provision of policies and procedures were seen with salary range category. It was found that the individuals had salary range between 30000-40000 had good provision of policies and procedures (55.6%), followed by the individuals had salary below 10000 (50.9%), between 10000-20000 (52.2%), and the followed by the individual had salary range between 20000-30000 (43.9%). The result was found statistically non-significant. ($X^2=2.286$, $df=3$, $p=.515$).

Provision of policies and procedures were seen with duration of duty category and it was found that the category 8-10 hrs. had good provision of policies and procedures (51.5%), followed by the 12-14 hrs. group (48.8%), 10-12 hrs. (48.5%), followed by the individuals had duration of duty more than 16 hrs. (38.5%) and then followed by 14-16 hrs. (28.0%). The result was found statistically non-significant. ($X^2=5.168$, $df=4$, $p=.270$).

Provision of policies and procedures were seen with Marital status category of the individuals and it was found that unmarried individuals had good provision of policies and procedures (55.8%), followed by widowed (50.0%), followed by married individuals (47.5%), and then followed by the divorced individuals (0%). The result was found statistically non-significant. ($X^2=6.839$, $df=3$, $p=.077$).

Provision of policies and procedures were seen with job experience (in years) category, it was found that individuals had more than 5 years of experience had good provision of policies and

procedures (59.0%), followed by 3-4 years' experience (51.8%), followed by 2-3 years' experience (47.0%), followed by 1-2 years' experience (45.2%), and then followed by the group had 4-5 years' experience (38.1%). The result was found statistically non-significant. ($X^2=5.181$, $df=4$, $p=.269$).

Provision of policies and procedures were seen with shift work category, and it was found that the group day shift had good provision of policies and procedures (50.7%), followed by shift worker (46.8%), and then followed by night shift (42.9%). The result was found statistically non-significant. ($X^2=1.710$, $df=2$, $p=.425$).

Table 3: Association of Socio-Demographics with Provision of Policies and Procedures.

Sr. No	Variables	Poor Policies and Procedures	Good Policies and Procedures	X^2 Results
1	Gender			$X^2=0.102$, $df=1$, $p=.749$
	Male	176(52.4%)	160(47.6%)	
	Female	26(50.0%)	26(50.0%)	
2	Age			$X^2=2.021$, $df=4$, $p=.732$
	20-30	48(57.8%)	35(42.2%)	
	30-40	68(48.9%)	71(51.1%)	
	40-50	60(53.1%)	53(46.9%)	
	50-60	23(50.0%)	23(50.0%)	
	>60	3(42.9%)	4(57.1%)	
3	Level of Education			$X^2=2.596$, $df=3$, $p=.458$
	Primary	134(54.9%)	110(45.1%)	
	Middle/Elementary	52(48.6%)	55(51.4%)	
	Bachelors	13(41.9%)	18(58.1%)	
	Masters	3(50.0%)	3(50.0%)	

4	Salary Range			
	Below 10000	26(49.1%)	27(50.9%)	X ² =2.286, df=3, p=.515
	10000-20000	68(51.1%)	65(48.9%)	
	20000-30000	88(56.1%)	69(43.9%)	
	30000-40000	20(44.4%)	25(55.6%)	
5	Duration of Duty			
	8-10 hrs.	66(48.5%)	70(51.5%)	X ² =5.168, df=4, p=.270
	10-12 hrs.	69(51.5%)	65(48.5%)	
	12-14 hrs.	41(51.2%)	39(48.8%)	
	14-16 hrs.	18(72.0%)	7(28.0%)	
Above than 16 hrs.	8(61.5%)	5(38.5%)		
6	Marital Status			
	Married	169(52.5%)	153(47.5%)	X ² =6.839, df=3, p=.077
	Unmarried	23(44.2%)	29(55.8%)	
	Widowed	4(50.0%)	4(50.0%)	
	Divorced	6(100.0%)	0(0%)	
7	Job experience (In Years)			
	1-2 Years	23(54.9%)	19(45.2%)	X ² =5.181, df=4, p=.269
	2-3 Years	71(53%)	63(47.0%)	
	3-4 Years	53(48.2%)	57(51.8%)	
	4-5 Years	39(61.9%)	24(38.1%)	
	More than 5 Years	16(41.0%)	23(59.0%)	

8	Shift Work			X ² =1.710, df=2, p=.425
	Day Worker	105(49.3%)	108(50.7%)	
	Night Worker	56(57.1%)	42(42.9%)	
	Shift Worker	41(53.2%)	36(46.8%)	

4.4. Association of Socio-Demographics with Occupational Safety Awareness

Socio-demographic variables were accessed for association with occupational safety awareness by applying chi-square.

Occupational safety awareness was seen with gender categories. Gender categories males (42.9%) had good safety awareness followed by females (32.7%). The result was found statistically non-significant. (X²=1.917, df=1, p=.166).

Occupational safety awareness was seen with age categories. Age categories 50-60 years had good safety awareness (43.5%) followed by age group category 20-30 years with percentage of good safety awareness (43.4%), then followed by age group category more than 60 years with percentage of good safety awareness (42.9%), then followed by age group category 30-40 years with percentage of good safety awareness (41.7%), and then followed by age group category 40-50 years with percentage of good safety awareness (38.9%). The result was found statistically non-significant. (X²=0.508, df=4, p=.973).

Occupational safety awareness was seen with level of education category, it was found that the good safety awareness was found in master's individuals (50.0%), followed by the primary individuals (47.1%), middle had (32.7%) good safety awareness, then followed by bachelor's individuals (25.8%). The result was found statistically non-significant. (X² =9.916, df=3, p=.019).

Occupational safety awareness was seen with salary range category. It was found that the individuals had salary between 30000-40000 had good safety awareness (57.8%), followed by the individuals had salary range below 10000 (45.3%), between 10000-20000 (39.8%), and the

followed by the individual had salary range between 20000-30000 (36.9%). The result was found statistically non-significant. ($X^2=6.716$, $df=3$, $p=.082$).

Occupational safety awareness was seen with duration of duty category and it was found that the category 12-14 hrs. had good safety awareness (45.0%), followed by the 8-10 hrs. group (42.6%), 10-12 hrs. (42.5%), followed by the individuals had duration of duty 14-16 hrs. (28.0%) and then followed by more than 16 hrs. (23.1%). The result was found statistically non-significant. ($X^2=4.231$, $df=4$, $p=.376$).

Occupational safety awareness was seen with Marital status category of the individuals and it was found that widowed individuals had good safety awareness (50.0%), followed by married (43.2%), followed by divorced individuals (33.3%), and then followed by the unmarried individuals (30.8%). The result was found statistically non-significant. ($X^2=3.238$, $df=3$, $p=.356$).

Occupational safety awareness was seen with job experience (in years) category, it was found that individuals had more than 5 years of experience had good safety awareness (56.4%), followed by 4-5 years' experience (46.0%), followed by 1-2 years' experience (40.5%), followed by 2-3 years' experience (39.6%), and then followed by the group had 3-4 years' experience (36.4%). The result was found statistically non-significant. ($X^2=5.527$, $df=4$, $p=.237$).

Occupational safety awareness was seen with shift work category, and it was found that the group day shift had good safety awareness (50.7%), followed by night work shift (49.0%), and then followed by shift worker (39.0%). The result was found statistically non-significant. ($X^2=3.026$, $df=2$, $p=.220$).

Table 4: Association of Socio-Demographics with Occupational Safety Awareness.

Sr. No	Variables	Poor Safety Awareness	Good Safety Awareness	X^2 Results
1	Gender			$X^2=1.917$,
	Male	192(57.1%)	144(42.9%)	$df=1$,

	Female	35(67.3%)	17(32.7%)	p=.166
2	Age			
	20-30	47(56.6%)	36(43.4%)	X ² =0.508, df=4, p=.973
	30-40	81(58.3%)	58(41.7%)	
	40-50	69(61.1%)	44(38.9%)	
	50-60	26(56.5%)	20(43.5%)	
	>60	4(57.1%)	3(42.9%)	
3	Level of Education			
	Primary	129(52.9%)	115(47.1%)	X ² =9.916, df=3, p=.019
	Middle/Elementary	72(67.3%)	35(32.7%)	
	Bachelors	23(74.2%)	8(25.8%)	
	Masters	3(50.0%)	3(50.0%)	
4	Salary Range			
	Below 10000	29(54.7%)	24(45.3%)	X ² =6.716, df=3, p=.082
	10000-20000	80(60.2%)	53(39.8%)	
	20000-30000	99(63.1%)	58(36.9%)	
	30000-40000	19(42.2%)	26(57.8%)	
5	Duration of Duty			
	8-10 hrs.	78(57.4%)	58(42.6%)	X ² =4.231, df=4, p=.376
	10-12 hrs.	77(57.5%)	57(42.5%)	
	12-14 hrs.	44(55.0%)	36(45.0%)	
	14-16 hrs.	18(72.0%)	7(28.0%)	
	Above than 16 hrs.	10(76.9%)	3(23.1%)	

6	Marital Status			
	Married	183(56.8%)	139(43.2%)	$X^2=3.238,$ df=3, p=.356
	Unmarried	36(69.2%)	16(30.8%)	
	Widowed	4(50.0%)	4(50.0%)	
	Divorced	4(66.7%)	2(33.3%)	
7	Job experience (In Years)			
	1-2 Years	25(59.5%)	17(40.5%)	$X^2=5.527,$ df=4, p=.237
	2-3 Years	81(60.4%)	53(39.6%)	
	3-4 Years	70(63.6%)	40(36.4%)	
	4-5 Years	34(54.0%)	29(46.0%)	
	More than 5 Years	17(43.6%)	22(56.4%)	
8	Shift Work			
	Day Worker	130(61.0%)	83(50.7%)	$X^2=3.026,$ df=2, p=.220
	Night Worker	50(51.0%)	48(49.0%)	
	Shift Worker	47(61.0%)	30(39.0%)	

4.5. Association of Socio-Demographics with Participation in Occupational Safety and Health

Socio-demographic variables were accessed for association with participation in occupational safety and health by applying chi-square.

Participation in occupational safety and health were seen with gender categories. Gender categories males (44.3%) had more participation in occupational safety and health followed by females (32.7%). The result was found statistically non-significant. ($X^2=2.498$, df=1, p=.114).

Participation in occupational safety and health were seen with age categories. Age categories 30-40 years had more participation in occupational safety and health (48.2%) followed by age group

category more than 60 years with percentage of more participation in occupational safety and health (42.9%), then followed by age group category 40-50 years with percentage of more participation in occupational safety and health (41.6%), then followed by age group category 20-30 years with percentage of more participation in occupational safety and health (38.6%), and then followed by age group category 50-60 years with percentage of more participation in occupational safety and health (37.0%). The result was found statistically non-significant. ($X^2 = 2.977$, $df=4$, $p=.562$).

Participation in occupational safety and health were seen with level of education category, it was found that the more participation in occupational safety and health was found in bachelor's individuals (51.6%), followed by the primary individuals (42.6%), middle had (41.1%) more participation in occupational safety and health, then followed by masters' individuals (33.3%). The result was found statistically non-significant. ($X^2 = 1.329$, $df=3$, $p=.722$).

Participation in occupational safety and health were seen with salary range category. It was found that the individuals had salary range between 30000-40000 had more participation in occupational safety and health (51.1%), followed by the individuals had salary range between 10000-20000 (45.1%), between 20000-30000 (40.1%), and the followed by the individual had salary below 10000 (37.7%). The result was found statistically non-significant. ($X^2 = 2.574$, $df=3$, $p=.462$).

Participation in occupational safety and health were seen with duration of duty category and it was found that the category 10-12 hrs. had more participation in occupational safety and health (47.8%), followed by the 8-10 hrs. group (47.1%), 14-16 hrs. (36.0%), followed by the individuals had duration of duty 12-14 hrs. (32.5%) and then followed by more than 16 hrs. (23.1%). The result was found statistically non-significant. ($X^2 = 8.360$, $df=4$, $p=.079$).

Participation in occupational safety and health were seen with Marital status category of the individuals and it was found that unmarried and divorced individuals had more participation in occupational safety and health (50.0%), followed by married (41.6%), and then followed by widowed individuals (37.5%). The result was found statistically non-significant. ($X^2 = 1.505$, $df=3$, $p=.681$).

Participation in occupational safety and health were seen with job experience (in years) category, it was found that individuals had 1-2 years of experience had more participation in occupational safety and health (50.0%), followed by 2-3 years' experience (47.0%), followed by more than 5 years' experience (41.0%), followed by 3-4 years' experience (39.1%), and then followed by the group had 4-5 years' experience (36.5%). The result was found statistically non-significant. ($X^2 = 3.549$, $df=4$, $p=.470$).

Participation in occupational safety and health were seen with shift work category, and it was found that the group shift worker had more participation in occupational safety and health (49.4%), followed by day work shift (42.3%), and then followed by night shift worker (38.8%). The result was found statistically non-significant. ($X^2 = 2.024$, $df=2$, $p=.363$).

Table 5: Association of Socio-Demographics with Participation in Occupational Safety and Health.

Sr. No	Variables	Less Participation	More Participation	X^2 Results
1	Gender			$X^2 = 2.498$,
	Male	187(55.7%)	149(44.3%)	$df=1$,
	Female	35(67.3%)	17(32.7%)	$p=.114$
2	Age			$X^2 = 2.977$,
	20-30	51(61.4%)	32(38.6%)	$df=4$,
	30-40	72(51.8%)	67(48.2%)	$p=.562$
	40-50	66(58.4%)	47(41.6%)	
	50-60	29(63.0%)	17(37.0%)	
	>60	4(57.1%)	3(42.9%)	

3	Level of Education			
	Primary	140(57.4%)	104(42.6%)	X ² =1.329, df=3, p=.722
	Middle/Elementary	63(58.9%)	44(41.1%)	
	Bachelors	15(48.4%)	16(51.6%)	
	Masters	4(66.7%)	2(33.3%)	
4	Salary Range			
	Below 10000	33(62.3%)	20(37.7%)	X ² =2.574, df=3, p=.462
	10000-20000	73(54.9%)	60(45.1%)	
	20000-30000	94(59.9%)	63(40.1%)	
	30000-40000	22(48.9%)	23(51.1%)	
5	Duration of Duty			
	8-10 hrs.	72(52.9%)	64(47.1%)	X ² =8.360, df=4, p=.079
	10-12 hrs.	70(18.0%)	64(47.8%)	
	12-14 hrs.	54(67.5%)	26(32.5%)	
	14-16 hrs.	16(64.0%)	9(36.0%)	
	Above than 16 hrs.	10(76.9%)	3(23.1%)	
6	Marital Status			
	Married	188(58.4%)	134(41.6%)	X ² =1.505, df=3, p=.681
	Unmarried	26(50.0%)	26(50.0%)	
	Widowed	5(62.5%)	3(37.5%)	
	Divorced	3(50.0%)	3(50.0%)	

7	Job experience (In Years)			
	1-2 Years	21(50.0%)	21(50.0%)	X ² =3.549, df=4, p=.470
	2-3 Years	71(53.0%)	63(47.0%)	
	3-4 Years	67(60.9%)	43(39.1%)	
	4-5 Years	40(63.5%)	23(36.5%)	
	More than 5 Years	23(59.0%)	16(41.0%)	
8	Shift Work			
	Day Worker	123(57.7%)	90(42.3%)	X ² =2.024, df=2, p=.363
	Night Worker	60(61.2%)	38(38.8%)	
	Shift Worker	39(50.6%)	38(49.4%)	

4.6. Association of Risk of Occupational hazards with Occupational Safety:

Occupational safety was assessed with occupational hazards by applying chi-square test of association

The highest percentage for more occupational safety 89(42.6%) was found in those who had less risk of occupational hazards, while the overall association between occupational safety and risk of hazard was found statistically non-significant (X²=0.019, df=1, p=0.892).

Table 6: Cross tabulation of Occupational hazards with occupational Safety.

Variables	Less occupational safety	More occupational safety	X ² Results
Less Risk of Occupational hazards	120(57.4%)	89(42.6%)	X ² =0.019, df=1, p=.892
More Risk of Occupational Hazards	104(58.1%)	75(41.9%)	

CHAPTER V

DISCUSSION

Occupational safety is an important issue to be considered due to higher morbidity and mortality rates associated with workplace environment. The world health organization considers workplace safety priority setting for health promotion in 21 centuries.

This study was conducted to assess occupational safety and their vulnerability towards occupational hazards. The study showed that occupational safety is significantly not associated with vulnerability. Previous literature showed that occupational safety was not being informed by administration in industry settings and was least important in developing countries. Sample size for this study was 388 and all responded Properly. Respondents were between age 20-60 years. Workers from twelve industries were taken in age category ranging from 20-60years.

The distribution of workers according to age was 83 respondents (21.1%) were within age category ranging from 20-30 years, and 7(1.8%) were having age above 60 years. The qualification of respondents shows that about 244 (61.9%) had primary education and respondents about 53 (13.5%) had salary below 10000/Rs . The duration of duty of the respondents shows that 136 (34.5%) had work 8-10 hrs. daily and 134 (34.0%) had work 10-12 hrs. daily. The number of dependents 24 (6.1%) families had more than 4 dependents in their family. Out of 388 only 5 (1.3%) had more than 4 earners in their family.

The job experience of the respondents shows that about 42 (10.7%) had 1-2 years job experience, and 39 (9.9%) had more than 5 years job experience. Out of which 77 (19.5%) were shift workers.

Occupational hazards were seen with gender, age categories, marital status, job experience, shift work and salary range. Females (84.6%) had less risk of occupational hazards followed by males (49.1%). Age categories more than 60 years had less risk of occupational hazards (85.5%) followed by age group category 50-60 years with percentage of low risk (65.2%). Occupational hazards were seen with level of education category, it was found that the lowest risk of occupational hazard was found in primary individuals (57.0%). Occupational hazards were seen

with salary range category. It was found that the individuals had salary below 10000 had low risk of occupational risk (62.3%). Occupational hazards were seen with Marital status category of the individuals and it was found that married individuals had less risk of occupational hazards (54.7%), followed by unmarried (51.9%) Occupational hazards were seen with job experience (in years) category, it was found that individuals had 3-4 years of experience had less risk of occupational hazards (57.3%)

Provision of policies and procedures were seen with gender categories. Gender categories females (50.0%) had good provision of policies and procedures followed by males (47.6%). Provision of policies and procedures were seen with level of education category, it was found that the good provision of policies and procedures was found in bachelor's individuals (58.1%), followed by the middle individuals (51.4%), Provision of policies and procedures were also seen with salary range category. It was found that the individuals had salary range between 30000-40000 had good provision of policies and procedures (55.6%).

Claire (1987) High injury rates tend to occur in lower socio- economic groups whose perception of causation and work experience place them at odds with management. At the same time injuries are treated, investigated and compensated at an individual Further, patterns of behavior, injuries and overt conflict may be related to the levels of control experienced at work A case study results demonstrated that a conflict of interest was recognized by both workers and management and resulted in acceptance of 'restrictive labor practices', as survival mechanisms. (Adami NJ., 2006)

In other study by Jeffery that long extended working hrs. are associated in acute reaction in the form of fatigue, stress and other Health behaviors in form of smoking and some chronic diseases like musculoskeleton disorders and some heart diseases. (Kaminsk, 2001)

Tadees and Israel reported that lack of safety awareness are the first major causes of injury among workers. In addition, Latte et al revealed that lack of safety training and awareness increases the odds of injuries among pharmaceutical workers Another factor that may be associated with injury is shiftwork. Of the 120 shift workers in another study, 102 (85%) indicated that the change in shift affected their productivity and safety. In this regard, industrial

management has the responsibility of ensuring an optimal working environment that is conducive to remaining awake and alert and to monitor the performance of workers at the different working schedules to promote safety and production. Supervisors need to be sensitive to the challenges faced by workers working outside conventional hours. Health professionals must ensure that shift workers are made aware of the potential problems associated with shiftwork and offer appropriate advice. Some of the advice may include dietary planning, modifications to their sleep regime and even adjustments to the working environment by making provisions for adequate rest facilities during shiftwork. (Phillips M , 2002)

A meta-analytic study on the effects of shiftwork on sleep by Pilcher, Lambert, Moore and Huffcutt (1997) found that rotating shifts had a less negative effect on sleep and sleepiness than a fixed shift. Based on these findings the author suggests that rotating shifts is preferable as disturbances to the sleep cycle and accumulation of sleep debt is minimized. The initial training on safety must commence by educating workers on all aspects of safe working practices and this knowledge must be applied at the workplace. Senior management also has the responsibility to ensure that special training needs are identified and specific training documents containing relevant information are readily available and maintained for future reference. A relevant study was conducted that the accidents at manufacturing sites can be reduced by proper training and use of personal protective equipment's used by all workers. Moreover, workers attending safety training programmes experience 1.5 times decline in prevalence of injuries than among other workers. (Sweta Chakraborty , 2012)

Recommendations:

In order to keep workers safe from occupational hazards and to provide occupational safety to them following recommendation should be made.

- It is concluded that occupational health and safety measures are below average level. It is therefore, strongly recommended that more concentrated efforts should be made to make available all the needed facilities to the workers.
- There is no proper awareness regarding the OHS among the workers it is therefore, manager and administration should arrange trainings for the workers regarding the OHS measures.
- It is concluded that there were minimal medical facilities available to the workers and it is therefore, strongly recommended that pharmaceutical owners should increase medical facilities for the workers in the industries.
- Level of awareness regarding the OHS and the use of PPE is very low among the workers. Therefore, it is strongly recommended that managers should arrange seminars/workshop to create awareness about the OHS measure and its related consequences.
- The training material provided to the Labour officers should be up-dated in Urdu language.
- There is a shortage of qualified and trained persons in the field of OHS so it is suggested to fill this gap by introducing some components of occupational health and safety, especially chemical safety into the syllabi of the technical and professional courses related to the engineering and medical subjects.
- Detailed routine checkups on monthly basis are recommended to keep the workers healthy.
- Media campaigns should be run for awareness of occupational hazards of workers.

CONCLUSION:

The study concluded that occupational health safety was poor among workers they have less awareness about occupational hazards and there is very low provision of occupational safety. Workplace policies and Procedures have least importance in pharmaceutical industries. Therefore, workers are more vulnerable to workplace hazards.

WAY FORWARD:

workplace safety is a joint responsibility of all individuals to create a healthy and safe workplace. It is the responsibility of administration and management to provide occupational safety. workers on their behalf are also responsible for their safety and health. Efforts should be made to create healthy occupational environment for employees. workers should also follow the GMP (Goods manufacturing practices) and standard operating procedures at their workplace. If they did not follow, they will be more vulnerable to occupational hazards. Training Programmes and motivation to follow occupational safety practices can minimize occupational risks and vulnerability. Hence, it is the responsibility of the administration to educate workers and employers in the construction and maintenance of safe and healthy workplaces, intervene when security responsibilities are not executed and should provide information and resources to prevent injuries and workplace illnesses.

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Annexure A

Questionnaire:

SECTION - A

SOCIO-DEMOGRAPHIC FEATURES

1. Gender

- Male
- Female

2. Age _____(Years)

3. Marital status:

- Married
- Unmarried
- Widowed
- Divorced

4. Level of education

- Primary
- Middle/ Elementary
- Bachelors
- Masters
- Others..... (specify)

5. Salary range From

- Below 10,000
- 10,000-20,000
- 20,000-30,000
- 30,000-40,000

6. Duration of Duty

- 8-10 hrs.
- 10-12 hrs.
- 12-14 hrs.

- 14-16 hrs.
- Above than 16 hrs.

7. No. of dependents in the family

- 1
- 2
- 3
- 4
- More than 4

8. No. of Earners in the Family

- 1
- 2
- 3
- 4
- More than 4

9. Job experience (In years)

- 1-2 years
- 2-3 years
- 3-4 years
- 4-5 years
- More than 5

10. Shift work

- Day worker
- Night worker
- Shift worker

SECTION-B

OCCUPATIONAL HEALTH SAFETY AND VULNERABILITY FEATURES

Part 1: Workplace Hazards

This section asks about the kinds of health and safety hazards you might be exposed to in your job.

In your job, how often do you ...?	Never	Once a year	Every 6 months	Every 3 months	Every month	Every week	Every day	NA
Manually lift, carry or push items heavier than 20 kg at least 10 times during the day								
Do repetitive movements with your hands or wrists (packing, sorting, assembling, cleaning, pulling, pushing, typing) for at least 3 hours during the day								
Perform work tasks, or use work methods, that you are not familiar with								
Interact with hazardous substances such as chemicals, flammable liquids and gases								
Work in a bent, twisted or awkward work posture								
Work at a height that is 2 Meters or more above the ground								
Work in noise levels that are so high that you have to raise your voice when talking to people less than one metre away								
Experience being bullied or harassed at work								
Stand for more than 2 hours in a row								

Part 2: Workplace policies and procedures

At my workplace...	Strongly agree	Agree	Disagree	Strongly disagree	NA
Everyone receives the necessary workplace health and safety training when starting a job, changing jobs or using new techniques					
There is regular communication between employees and management about safety issues					
Systems are in place to identify, prevent and deal with hazards at work					
Workplace health and safety is considered to be at least as important as production and quality					
Incidents and accidents are investigated quickly in order to improve workplace health and safety					
Communication about workplace health and safety procedures is done in a way that I can understand					

Part 3: Occupational health and safety awareness:

At my workplace...	Strongly agree	Agree	Disagree	Strongly disagree	NA
I am clear about my rights and responsibilities in relation to workplace health and safety					
I know how to perform my job in a safe manner					
If I became aware of a health or safety hazard at my workplace, I know who (at my workplace) I would report it to					
I have the knowledge to assist in responding to any health and safety concerns at my workplace					
I know what the necessary precautions are that I should take while doing my job					

Part 4: Participation in occupational health and safety

At my workplace...	Strongly agree	Agree	Disagree	Strongly disagree	NA
I feel free to voice concerns or make suggestions about workplace health and safety at my job					
If I notice a workplace hazard, I would point it out to management					
I know that I can stop work if I think something is unsafe and management will not give me a hard time					
I have enough time to complete my work tasks safely					

Annexure B

Informed Consent:

Title of study:

Assessment of occupational Health safety and vulnerability Measures in Pharmaceutical industries of Rawat (Islamabad)

Researcher:

Mobeen Kanwal, MSPH student, Al Shifa School of Public health Rawalpindi.

Purpose:

The purpose of this study is access occupational health safety and vulnerability measures in pharmaceutical industries of Rawat Islamabad. The main purpose of this study is to check association between sociodemographic features of workers and occupational health safety.

Procedure:

In this study, you will fill adapted questionnaire containing 34 questions. Your identity 'll be kept confidential.

Time Required:

It is anticipated that it will take approximately 20 minutes of your time to complete the survey.

Voluntary Participation:

Your Participation in this study is voluntary. You have the right to not open or complete the anonymous survey

Confidentiality:

Data from the surveys will be completely anonymous and reported in aggregate form. Your name will not be collected at any time. After data collection, the interview and demographic responses will be password-protected. Once submitted the researcher will not be able to withdraw responses due to anonymity and de-identified data.

Risks:

While the research survey poses minimal risk there is no risk of loss of confidentiality to participants. There are no anticipated risks in this study.

Benefits:

There are no direct benefits associated with participation in this study the potential benefit from this research is to study and to access occupational health safety and vulnerability measures in pharmaceutical industries of Rawat Islamabad. The main purpose of this study is to check association between sociodemographic features of workers and occupational health safety and vulnerability measures.

Payment:

You will receive no payment for participating in the study.

Right to withdraw from study:

You have the right to withdraw from the study at any time before submitting the survey without penalty. If you have questions about the study, contact the following individual:

Mobeen Kanwal

mobichudary@gmail.com

Contact # 03040129161

Certificate of Consent:

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Name of Participant _____

Signature of Participant _____

Annexure C

IRB Approval Letter:



**AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI**

No. MSPH-IRB/12-16
Date: 01st Oct, 2021

TO WHOM IT MAY CONCERN

This is to certify that Mubeen Kanwal D/O Ghulam Hussain is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. She has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-I-Azam University, Islamabad. Her research topic which has already been approved by the Institutional Review Board (IRB) is "Assessment of Occupational Health safety and vulnerability measures in Pharmaceutical industries of Islamabad, Pakistan".

Please provide her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head of Department, MSPH
School of Public Health, PIO
Al-Shifa Trust, Rawalpindi