

**WORK-RELATED DISEASES AND INJURIES REPORTED TO  
WORKERS COMPENSATION FUND IN TANZANIA  
FROM 2016 TO 2019**

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**Master of Science in Environmental and Occupational Health Dissertation  
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DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH**



**WORK-RELATED DISEASES AND INJURIES REPORTED TO WORKERS  
COMPENSATION FUND IN TANZANIA FROM 2016 TO 2019**

**By**

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**A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree  
Of Master of Science in Environmental and Occupational Health of  
Muhimbili University of Health and Allied Sciences  
October, 2020**

**CERTIFICATION**

The undersigned certify that have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation titled “*work-related diseases and injuries reported to workers compensation fund in Tanzania from 2016 to 2019*” in partial fulfilment of the requirements for the degree of Master of Environmental and Occupational Health of the Muhimbili University of Health and Allied Sciences.

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**DR. HUSSEIN MWANGA**

(Supervisor)

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Date

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I, **Brenda Stephen Shewiyo**, Reg. No; **HD/MUH/T.614/2018** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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**DEDICATION**

I would like to dedicate this work to my family; starting with my husband Anthony Dalali thank you for your understanding and support, my daughter Gianna and son Jeremiah I appreciated your patience and unconditional love throughout my studies. Thank you Mama for your presence and continuous help in covering my absence. Thank you Annie Shewiyo, your presence has contributed to the success of my studies in so many ways, without forgetting Joanitha. May God bless you all for and keep you healthy, your presence is vital to my success.

## ABSTRACT

**Background:** About 2.78 million people are killed by their work every year, which is about 5% of the total global deaths. To reduce this burden effectively the extent of the problem and its contributing factors need to be known. The Tanzania Workers Compensation Fund (WCF) was established in 2015 covering both public and private sectors. WCF receives notifications of work-related diseases (WRD), work-related injuries (WRI), and work-related fatalities (WRF) from all sectors for compensation purposes. The WCF notification system is timely and accurate in data recording, it gives an opportunity to estimate workers' health status in the country, protect the most at risk and monitor future progress of occupational health.

**Objective:** The aim of this study was to determine the trends and factors associated with work-related diseases and injuries reported to WCF between 2016 and 2019.

**Methodology:** This was a descriptive cross sectional study based on data requested from workers compensation registry from 2016 to 2019. The study populations were workers registered to WCF. A total 4847 reported cases of diseases and injuries were analyzed (both descriptive and regression analysis) by using stata version 12.

**Results:** This study found that most of incidences reported to WCF in the 4 years were injuries among which (89%) were non-fatal, (5%) fatal injuries and the remaining (6%) were diseases. Majority both WRD and WRI reported occurred among men (83%) who were married (68%) with a median age of 34 years. Workers in mining sector had 62 fold increased odds of acquiring WRD (AOR=62; 95% CI: 25-156), and health workers were shown to have 4.3 fold increased odds of development of WRD (AOR=4.3; 95% CI: 1.9-9.9). It was also found that majority of injuries occurred at work places but motor traffic accidents accounted for (73%) of all fatal injuries. Transport and storage sector was the leading in fatal reports with 6.4 fold increased odds of encountering fatal injuries compared to workers in manufacturing sector 6.4 (AOR=6.4; 95% CI: 2.5-17) and engineers had a 5 fold increased odds of encountering fatal injuries at their work places compared to mechanics (AOR=5; 95% CI: 0.7-36.5).

**Conclusion and recommendation:** This study has demonstrated increasing trends in work-related diseases and injuries reported to the Tanzanian Workers Compensation Fund. Workers age, sex, sector of employment and occupation are the most important factors associated with the occurrence of these incidences. More studies need to be done to explore other predisposing factors.



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**ABBREVIATIONS**

<b>AOR</b>	Adjusted Odds Ratio
<b>ILO</b>	International Labor Organization
<b>IQR</b>	Inter quartile Range
<b>IRB</b>	Institutional Review Board
<b>MAC</b>	Microsoft access system
<b>NAO</b>	National Audit Office
<b>OSHA</b>	Occupational Safety and Health Authority
<b>PPE</b>	Personal Protective Equipment.
<b>SADC</b>	Southern Africa Development Community
<b>WCF</b>	Workers Compensation Fund
<b>WHO</b>	World Health Organization
<b>WRD</b>	Work-related diseases
<b>WRF</b>	Work-related fatalities
<b>WRI</b>	Work-related injuries

## **DEFINITION OF TERMS**

1. Occupational disease – any disease acquired primarily as a result of an exposure to hazards/risk factors arising from work activities. Their occurrences have a known direct causal relationship with specific work exposures. For example, silicosis in silica-exposed workers or noise-induced hearing loss in workers exposed to loud noise.
2. Work-related diseases (WRD) – are diseases with multiple known causes, where exposures at work play a role together with other causative factors in their development. Hazards at work can accelerate their development or worsen their presentation. For example; degenerative disease of the lower back.  
In this study, the term work-related diseases will be used for typical occupational diseases as well as other diseases related to work exposures.
3. Work-related injuries (WRI) – any bodily damage caused, contributed or significantly aggravated by events or exposures found at work environment; it can also be worsening of a pre-existing injury secondary to hazards found at work. For example fall from height during construction.
4. Work-related fatalities (WRF) – any death that occur while a person is at work, performing work-related tasks. They can be caused by WRD or WRI.

In Job title as defined and grouped in this study;

5. Administrator – included all workers who are in the administration roles example, members of parliaments, village/ward executive officers, managers and directors.
6. Laborer – included all workers doing physical works for example, helpers, forest workers, farm workers, gardeners, cleaners, turn boys, load lifters, artisan etc.
7. Operator – included workers whose jobs are operating machines such as, turning on, filling raw materials and continuity in machine operations.
8. Technician –workers that use specific trained skills on their jobs such as machine maintenance/fixing, cooks/bakers, fire fighters and land scalper.
9. Mechanics – included mechanical works like garage workers, steel fixers, carpenter and painters.

10. Others (in job title) – included all other jobs not included in the list.

In cause of injury;

11. Transportation – included motor traffic accident as driver, passenger, and pedestrian.

12. Explosions – included electric explosions/ shock and machine explosions.

13. Machine faults – included caught by moving machine/substance and struck/hit by moving substance.

14. Burning – included fire, contact by a hot surface/substance.

15. Fall – included fall of person from height, fall of person from same level and stepping on an object.

16. Human/animal attack – included thugs and robbery, dog/ animal and insect bites.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

Occupational disease is any disease contracted primarily as a result of an exposure to risk factors arising from work activity. Work-related diseases have multiple causes, and factors in the work environment, together with other risk factors, play a role in the development or worsening of such diseases. All occupational diseases can be considered part of work-related diseases.(1)Occupational Safety and Health Authority (OSHA) Tanzania considers an injury work-related when an event or exposure in the work environment caused or contributed to the injury or aggravated a pre-existing injury; and death is considered work-related if it occurs at work, performing work or caused by an occupational illness/injury.

About 2.78 million people are killed by their work every year.(2)International Labor Organization (ILO) decent work agenda stated that “Occupational fatalities are not fated, accidents at work don’t just happen and work related illnesses are not random, they are caused.” Work related diseases, injuries and deaths cause intense suffering to both victims and their families, but the cost and solution rest within society as a whole. The agenda encourages men and women to work in dignity by ensuring their voices are heard and fundamental rights are respected.(3)

Reducing the global number of work-related death is a major challenge; to begin solving the problem effectively the extent of the problem need to be known. This is not entirely easy since the countries with the highest number of deaths are the ones with the poorest inspection and reporting systems. Reliable data on work-related diseases, injuries and fatalities are unavailable for most of countries especially the developing countries where to a great extent, work-place safety is not yet recognized as a public health importance/priority.(4)

It is not a coincident that countries with better occupational safety regulations and practices also keep and report reliable statistics of WRD, WRI and WRF. Accurate counts of causation and rates of these accidents are necessary not only to define policy goals and



evaluate programs, but also to recognize the need for an intervention. Nationally, a tally of work accidents and fatalities will help the government to raise awareness regarding occupational hazards as well as to determine its relative urgency compared to other policy issues.(4)

A study done by Loewenson and Rene in 2004 revealed that Southern Africa Development Community(SADC) countries undergo a liberalization of labor market, shifting towards more insecure form of employments which have been associated with reduced enforcement of working condition regulations. These changes, however have shown to expose workers to new chemicals, psychosocial and physical hazards emerging from new forms of industrial processes.(5)

In Tanzania employment is one of the socio-economic and political agenda to keep up with the growing workforce and economy in the country. The government and development partners influence the creation of employment opportunities to ensure success in the national agenda. The National Bureau of Statistics revealed an increased number in total employees by 308,951 from 2015 to 2016 where majority of the employees were from private sectors. Education industry had the leading shares of total employment followed by manufacturing industry and social security industries.(6)

In Tanzania, workers compensation act was assented by the president on 6<sup>th</sup> December 2008. The objective of the act was; to provide compensation to employees for disabilities or deaths resulting from injuries or diseases sustained in course of employment. Though compensation was given but majority of workers were not aware of its existence and hence under reporting of the cases. The data obtained from these compensations are poorly coordinated as stated by the National Audit Office (NAO) hence it cannot be used to give a good estimate of the situation. The act also provides instructions and structure for formation of a workers' compensation fund and its directives.(7)

The workers compensation fund (WCF) was established in 2015 with the directives from the president office to include all public and private employees. Currently it covers all sectors from construction and building, mining, agriculture, administration, transport and

all others. The scheme receives notifications from all sectors on the injuries, diseases and deaths occurring that are work related for compensation purposes.

Correctly documented compensation claims are used worldwide as source of data to evaluate workers' health. These data can explain what is happening in the country pertaining to occupational health. The data can identify most compensated diseases, injuries and causes of deaths with their associated factors. They are also used to track the trend of these diseases and injuries yearly, and as means of monitoring to some of the control measures and campaigns put in place.

As any other developing country Tanzania WRD, WRI and WRF notification system is not clearly established/ organized. However, the WCF notification system is timely and accurate in data recording which gives an opportunity to estimate workers health status and plan a better compensation scheme to fit the need of workers. Having current situation known will and give room to do monitoring of the status in near future.

## **1.2 Problem statement**

It has been estimated that 2.78million work-related deaths occur globally each year, which is about 5% of the global deaths. Among those, 2.4million are attributed to work-related diseases and fatal work accidents accounts for the remaining 1.38million deaths. Asia alone accounts for two third of all work related deaths followed by Africa 11.8% and Europe 11.7%.(2)

Reducing this number requires knowledge of the actual burden of WRD, WRI and WRF in every country. Lack of awareness, underreporting and under coverage of compensation schemes are the greatest challenges in knowing the actual burden in Africa and other developing countries(8). However, it is estimated that in Southern Africa region alone 18,000 workers die from work related accidents, more than 13million are injured and 67,000 contract occupational diseases.(9)In 2013 the National Audit Office of Tanzania reported 121 fatal injuries from different sectors, construction and building being the leading cause by 23.7%, followed by transport 20.61% and mining sectors 20.51%. NAO acknowledges the validity and reliability of these data since the reporting and data keeping system is poorly coordinated.(10)

Currently Tanzania is experiencing economic growth from different sectors.(9)The country is in an industrialization strategy which involves constructions of different factories, increase in formal employments and development of infrastructures. With these changes, the situation is far different from the 2013 report and the current status of occupational illnesses, injuries and deaths is unknown.

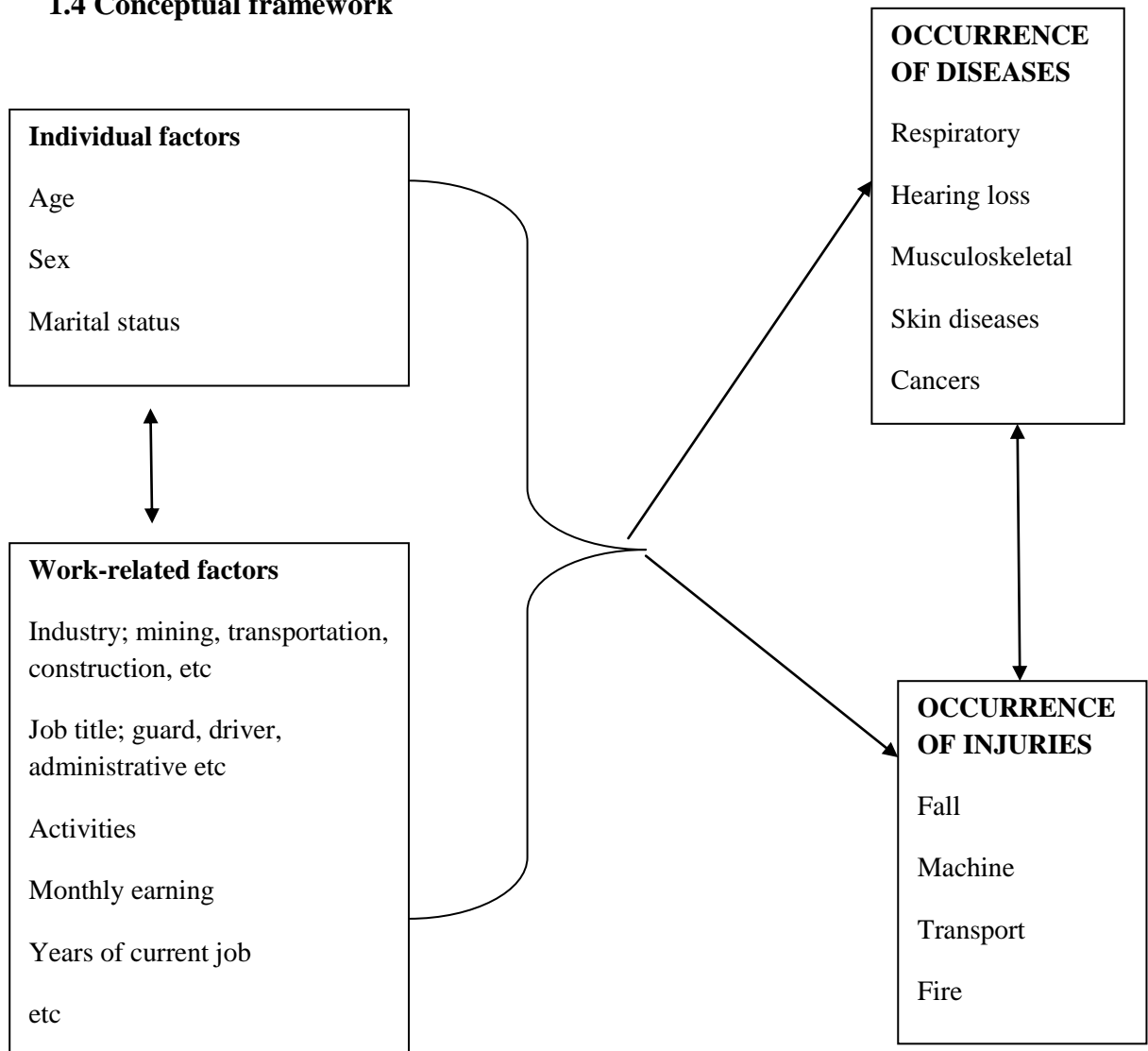
The aim of this study was to identify the trend of work-related diseases and injuries and associated factors from different sectors as reported to WCF. The obtained information will create awareness on the areas with greatest burden and highest risks and finding a proper way to protect and compensate workers to reduce the burden.

### **1.3 Rationale of the study**

In our country workers are injured everyday but majority of these injuries are not notified or compensated. The current numbers pertaining to work-related injuries and disease are not known. Different industries have different level of diseases and injury incidences. This study aimed at providing information on the trends of work-related diseases and injuries occurring among workers and leading industries with highest claims of diseases, injuries and fatalities and the types of industries, jobs and activities associated with these diseases and injuries. The study will use the prevalence of work-related injuries from Ethiopia to obtain the minimum required sample size, since its level of economy is almost similar to Tanzania hence working environments will be almost similar.

The information obtained will create awareness to designated ministry, workers compensation fund and public health on types of industries and jobs that have the highest risks and thus need more protection. This will strengthen workers' safety and produce an appropriate compensation plan to cater for the growing need of the country. Moreover, this will empower workers to take precautions while at work in protecting their own health.

### 1.4 Conceptual framework



**Figure 1.1: Conceptual framework to understand factors associated with WRD and WRI.**

(Conceptualized by a author)

From the conceptual framework (figure 1) it is shown that there is a direct and indirect association between individual factors, work-related factors and occurrence of work-related diseases and injuries.

### **Individual factors**

Sex; due to cultural gender roles, male workers are expected to be at a higher risk of WRI and WRD exposures than female workers since most high risk jobs and activities in the society are done by men.

Age; young and middle aged workers are more exposed to risks jobs and activities than older workers due physical capacities and lack of experience. They are put as front liners hence acquire WRI and WRD more frequently.

Marital status; marriage comes hand in hand with familial responsibilities, married workers might be forced to take job overtimes so as to generate more income to cover family costs hence predisposing themselves to WRI and WRD than unmarried workers.

### **Work-related factors**

Industry type; there are industries that are known to be more risky than others; some of them include mining, construction and transportation industries. Working in these industries requires extra caution and knowledge of the danger than industries like education and finances.

Job title and activities; in every industry certain jobs titles and activities tend to be more risky than others for example drivers and mechanics are at higher risk of WRI and WRD in any sector than administrative workers.

## **1.5 Research questions**

### **1.5.1 Broad Research question**

What are the trends and factors associated with work-related diseases and injuries reported to WCF between 2016 and 2019?

### **1.5.2 Specific Research questions**

1. What are the trends in work-related diseases reported to WCF?
2. What are the trends in work-related injuries reported to WCF?
3. What are the factors associated with work-related diseases reported to WCF?
4. What are the factors associated with work-related injuries reported to WCF?

## **1.6 Research objectives**

### **1.6.1 Broad objective**

To determine the trends and factors associated with work-related diseases and injuries reported to WCF between 2016 and 2019.

### **1.6.2 Specific objectives**

1. To assess trends in work-related diseases reported to WCF
2. To assess trends in work-related injuries reported to WCF
3. To determine factors associated with work-related diseases reported to WCF
4. To determine factors associated with work-related injuries reported to WCF

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Work-related diseases

Work-related disease (WRD) is a medical/ legal concept. It is an integration of medical diagnosis, and assessment of work exposures to conclude that the disease has been exacerbated by the working conditions. Their occurrence is in close association with the development of industry, introduction of new substances and theoretical knowledge concerning their effects on environment and the human body.(11)

The International Labor Organization (ILO) concept of decent work that has been proposed to its member countries includes promotion of equality, safety and dignity of workers worldwide. To this end, the measurement of indicators such as the number of occupational injuries, illnesses and deaths to majority of member states are insufficient and unreliable. This is due to several factors such as, workers lack of knowledge about the risks to which they are exposed, underreporting in the formal sector, and inadequate registry and notification systems that do not permit comparisons among and within countries.(12)

The nature of work-related diseases has been changing rapidly; changes in technology, social and economical conditions have brought about knowledge of existing and development of new hazards. Studies have shown that in developing countries 30% to 50% of workers in primary industries and high risk sectors suffer from silicosis and other pneumoconiosis. At the same time musculoskeletal disorders and mental disorders are on the rise mainly due to sedentary work, raise in computer use, and poor ergonomic conditions in working stations.(13)

In Southern Africa region 67,000 workers contract WRD every year. In Tanzania the actual prevalence of WRD is not known but different work exposures have been shown to cause different types of diseases. The most reported WRD are respiratory and musculoskeletal disorders mostly from mining, industrial and agriculture sectors; and the prevalence of hearing loss among workers in steel companies have been observed to be 10% higher than that of workers from other workplaces.(9,14)

The number of occupational and WRD can be considered an indicator of efficient preventive actions in workplaces in the country. With the current global occupational health and safety strategies much emphasis is put on prevention of occurrence of work related diseases. Reliable statistical data collection of these diseases is important to enable evidence based policy making. It is equally important to know the factors behind these disease numbers, with a reliable reporting system changes in incidences will reflect not only changes in conditions and processes in workplaces but also awareness of health risks among workers, employers and physicians. (1)

## **2.2 Work-related injuries**

In Bangladesh; the 2013 Rana Plaza collapse claimed more than a thousand lives of garment factory workers and the Tazreen Fashion factory fire killed more than a hundred workers. These two tragedies alarmed the government into forming a series of policies and strategies on training, awareness campaigns, development of insurance schemes and frequent safety inspections. Everyday thousands of workers die globally and hundred thousand suffer permanent disabling injuries due to work-related accidents. Most of these injuries and deaths occur in isolation and are not put to public knowledge.(4)

Worldwide WRI are becoming a serious public health problem with higher rates of injuries occurring in low-income countries, including sub-Saharan Africa, compared to high-income countries. This is mainly because the focus on occupational health and safety, including the prevention of occupational injuries, is very limited in low-income countries. Also majority (80%) of the workforce in developing countries is involved in heavy and dangerous work with only 5-15% of this workforce has access to occupational health services.(15)

There are 13million WRI in Southern Africa annually causing over 18000 deaths of workers. Tanzania as any other developing country has not established a proper data collection system hence the numbers of reported accidents are minimal; In 2003 and 2004 reported accidents were 1692 and 1884 respectively and NAO estimated 121 fatal injuries in 2013 of which construction, mining, transport and manufacturing industries were the leading causes.(9,10)



The risk of work-related injuries is higher to some work sectors like mining, transport, building/construction and forestry as compared to others. In order to create a safe working environment a good reporting and accident investigation system is needed, to reveal the actual causation of these accidents and put preventive and protective programs.(16)

Workers compensation claims if correctly documented can be a reliable source of data in estimating the number of injuries in a country, but most employees are not aware of their rights to claim compensation and employers do not understand their roles with respect to injury/disease among their workers. The lack of awareness therefore impacts the rate of reporting and proper employee benefits from work related accidents.(17)

### **2.3 Factors associated with work-related diseases and injuries**

Globally the leading causes of work-related fatalities are circulatory diseases (31%), work-related cancers (26%), respiratory (17%), injuries (14%) and communicable diseases (9%). In Africa however communicable diseases is the leading cause (30%), followed by injuries (24%), circulatory diseases (20%), malignancies (14%) and respiratory diseases (12%).(2)The ILO collects and publishes global accidents and fatality rates that are based on national recording and notification systems. Notably reliable data is unavailable to limited number of countries (about one third of all ILO member states). To most of countries the information is not harmonized and under reporting is common.(8)

Understanding predictors and trends of diseases and injuries will aid in policy making to reduce the burden and compensation planning. Some researchers have observed a downward trend in number and rates of both diseases and injuries since the adaptation of OSHA in 1970. However this might not be true in most developing countries since they still experiencing industrialization and employment peaking.(18)

A study done by Boniface *et al* among tanzanite mine workers revealed majority of injured workers were aged between 18 – 30 years due to their risk taking behaviors and lack of awareness on danger. Years of working experience was another factor of which majority of injured workers had a working experience below 5years.(19)

There is a statistically significant association between social demographic factors and occurrence of WRD, WRI and WRF.(12,20) These social demographic characteristics can potentially affect the nature and extent of occurrence of diseases, injuries and can surely

influence social consequences.(21) Increase in age can result into more frequent morbidity/ co morbidity, sickness absence, lower physical capacities, and higher cumulative work exposures(22) and being male presented with a higher risk of WRF and permanent injuries compared to female.(12)

It has been observed that education level alone cannot reduce accident rates to a high risk workplace where there is poor use of appropriate tools and unsafe environments.(20)Different social economical position pauses different levels of occupational risks, in such way that lower and higher social economical positions sets distinction between blue and white collar workers with different task demands and working environments.(22)

## CHAPTER THREE

### 3.0 METHODOLOGY

#### 3.1 Study design

This was a descriptive cross sectional study based on data requested from workers compensation registry from 2016 to 2019. It was a retrospective review of workers information data collected by WCF from 2016 to 2019.

#### 3.2 Study population

All workers registered to workers compensation fund from 2016 to 2019.

#### 3.3 Sample size

The sample size formula for estimation of a single proportion:

$$n = \frac{Z^2 P(100 - P)}{\varepsilon^2}$$

Where,

$n$  = Minimum sample size

$z$  = Standard normal deviate for given confidence level (CI) = 1.96 for a 95% CI

$p$  = Expected proportion of workers who are likely to contract WRI = 49.9%  
( study done in Ethiopia 2019 (15) )

$\varepsilon$  = Margin of error (the precision) = 3%

Sample size calculation:

$$n = \frac{1.96^2 49.9(100 - 49.9)}{3^2}$$

$$n = 1,068$$

Assuming a 20% of files were incomplete, then  $n = 1068/0.8 = 1,334$  files.

The calculated  $n$  (1,334) is a minimum sample size required for study viability, but in the study all claims reported from 2016 to 2019 (5167 claims) were used.

### 3.4 Sampling

All of case incidents reported from 2016 to 2019 were gathered (total of 5167 files); where only 4847 were analyzed. The 320 excluded cases included 4 fatal cases from 2016/2017 which had unmentioned cause of death, no nature of incident, no body part involved, no sex or age of the worker. Other 3 fatal cases from 2019 were concluded as not work related. 4 disease reports from 2016/2017 were also excluded because they did not explain any social demographic characteristics of the workers and did not mention the type of disease reported. The remaining 309 excluded cases were non fatal injuries from 2016 to 2019. these had missing age, sex, and more than one major independent variables. (Appendix A)

### 3.5 Variables

**Table 3.1: Variables used in the study were as follows;**

Independent variables	Dependent variables
Age	Incident type
Gender	1. Disease
Marital status	2. Injury
Incident year*	Accident outcome
Job title*	1. Fatal
Employment sector*	2. nonfatal
Disease type*	
Cause of injury*	
Nature of injury*	
Location of injury	
Body part injured*	
Incident time	

\*=**major variables**

### **3.6 Data collection**

Data of all workers reported was abstracted from the MAC database to an excel software for storage. Then the data was cleaned and transferred to STATA version 12 for analysis. The data collection tool was a standard tool, adapted and modified from the standard ILO occupational health surveillance data collection methods. The WCF has a routine data cleaning program to ensure validity. Moreover all steps in abstraction and analysis of data was systematic to make sure results were valid and reliable.(2)

### **3.7 Data analysis**

The data analysis was conducted using STATA version 12. Descriptive statistics was performed for all variables. Analysis for trends of diseases and injuries and the rate of occurrence of these incidences in the selected four years was done. Bivariate analysis was performed for association between all the social demographic characteristics and work-related factors and occurrence of diseases and injuries. The multivariable logistic regression between work-related risk factors and occurrence of WRD and WRI was done, and adjustment was done by using age, gender, marital status and location of incidence. Throughout the result analysis a 95% confidence level and p-value less than 0.05 was considered indicating statistically significant association between dependent variables and independent variables (cause, nature, body part injured).

### **3.8 Ethical consideration.**

Ethical clearance was obtained from the Senate Research and Publications Committee of Muhimbili University of Health and Allied Sciences. Approval of data collection was obtained from the WCF director general. Confidentiality was ensured during the data abstraction and storage; thus names of the workers were removed soon after abstraction from the database.

## CHAPTER FOUR

### 4.0 RESULTS

In this chapter 4847 reported cases of work-related diseases; work-related fatal and work-related non-fatal injuries from 2016 to 2019 were gathered and analyzed.

#### 4.1 Social demographic characteristics of workers

Majority of workers that had reported incidences of WRD or WRI to WCF between 2016 to 2019 were men (83%) and married (68%) with a median age of 34 years (inter quartile range: 17 – 74 years). Most of incidences reported to WCF in the 4years are injuries among which (89%) were non-fatal, (5%) fatal injuries and the remaining (6%) were work-related diseases.

(Table 4.1)

**Table 4.1: Social demographic characteristics associated with work-related diseases and injuries reported to WCF**

<b>Variable</b>	<b>Overall N (%)</b>	<b>Work-related diseases N (%)</b>	<b>Work-related fatal injuries N (%)</b>	<b>Work-related non-fatal injuries N (%)</b>	<b>P value(Chi- squared test)</b>
<b>Age (N)</b>	<b>4653</b>	<b>259(6)</b>	<b>236(5)</b>	<b>4157(89)</b>	
Median(IQR)	34(17-74)	37(31-45)	35(29-42)	34(27-44)	0.02 <sup>^</sup>
<31	1766 (38)	61 (24)	70 (30)	1634 (39)	
31-49	2194 (47)	156 (60)	135 (57)	1903 (46)	<0.001
50+	693 (15)	42 (16)	31 (13)	620 (15)	
<b>Sex (N)</b>	<b>4725</b>	<b>264</b>	<b>235</b>	<b>4217</b>	
Female	802 (17)	45 (17)	18 (8)	731 (17)	
Male	3923 (83)	219 (83)	217 (92)	3486 (83)	0.001
<b>Marital status (N)</b>	<b>3652</b>	<b>224</b>	<b>193</b>	<b>3234</b>	
Not married	1174(32)	61 (27)	53 (27)	1060 (33)	0.082
Married	2478 (68)	163 (73)	140 (73)	2174 (67)	

P value used was from chi-square calculated for large coefficient tables representing both injuries and diseases.

<sup>^</sup> = Wilcoxon rank sum test

**Table 4.2: Work-related factors associated with work-related diseases and injuries reported to WCF**

<b>Variable</b>	<b>Overall N (%)</b>	<b>Work-related diseases N (%)</b>	<b>Work-related fatal injuries N (%)</b>	<b>Work-related non-fatal injuries N (%)</b>	<b>P value(Chi- squared test)</b>
<b>Employment sector (N)</b>	<b>4820</b>	<b>266</b>	<b>243</b>	<b>4311</b>	
Accommodation, Food & Beverage	143 (3)	12 (5)	8 (3)	123 (3)	
Administrative & support	518 (11)	16 (6)	51 (21)	451 (10)	
Agriculture, Forestry	921 (19)	16 (6)	28 (12)	877 (20)	
Construction	436 (9)	46 (17)	27 (11)	363 (8)	
Electricity, Gas & Steam	191 (4)	6 (2)	12 (5)	173 (4)	<0.001
Financial and Insurances	75 (2)	3 (1)	4 (2)	68 (2)	
Human Health and Social	203(4)	5 (2)	4 (2)	194 (5)	
Information & Technology	101(2)	17(6)	11 (5)	73 (2)	
Manufacturing	1,094 (22)	17 (6)	16 (7)	1,061 (25)	
Mining and Quarrying	169 (4)	112(42)	4 (2)	53 (1)	
Professional, Scientific&Technical	241 (5)	7 (3)	13 (5)	221 (5)	
Security groups	202 (4)	2 (1)	8 (3)	192 (4)	
Transportation and storage	316 (7)	2 (1)	37 (15)	277 (6)	
Whole sale & retail trade	210 (4)	2 (2)	20 (8)	185 (4)	
<b>Job title (N)</b>	<b>3525</b>	<b>208</b>	<b>202</b>	<b>3323</b>	
Administrator	157 (4)	7 (3)	12 (6)	138 (4)	
Drivers	337 (9)	7 (3)	56 (28)	274 (8)	
Electrician	55 (1)	1 (1)	1 (1)	53 (2)	
Engineer	18 (0.5)	1 (1)	3 (1)	14 (1)	
Guard	292 (8)	21 (10)	16 (8)	255 (7)	
Health worker	150(4)	19 (9)	6 (3)	125 (4)	
Laborer	534 (14)	17 (8)	27 (13)	490 (15)	<0.001
Mechanics	362 (10)	20 (10)	8 (4)	333 (10)	
Office worker	197 (5)	20 (10)	19 (9)	158 (5)	
Operator	851 (23)	58 (27)	16 (8)	777 (23)	
Others	320 (9)	15 (7)	10 (5)	295 (9)	
Teacher	84 (2)	1 (1)	10 (5)	73 (2)	
Technician	377 (10)	21 (10)	18 (9)	338 (10)	

P value used was from chi-square calculated for large coefficient tables representing both injuries and diseases.

#### 4.2 Trends in work-related diseases reported to WCF from 2016 to 2019

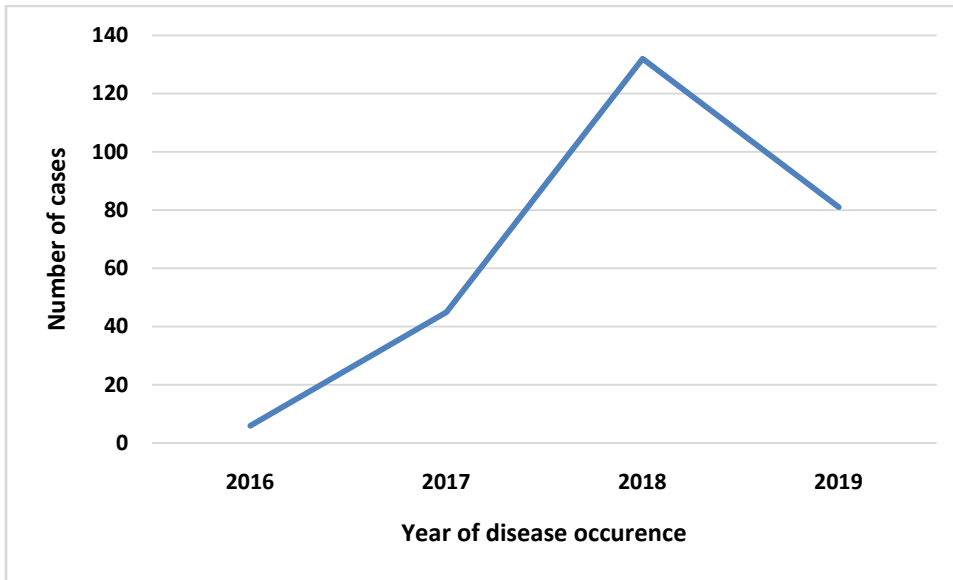
A total of 263 work-related diseases were reported to WCF from 2016 to 2019. Musculoskeletal disorders of the back being the leading disease type (75%), followed by pulmonary tuberculosis (9%), hearing loss (7%). Trends of total WRD reports have been increasing yearly with the highest record of 2018 (50%), followed by 2019 (30%); but findings have shown no statistical significance in increase in disease numbers yearly (with a chi square for trend=0.00 and p value= 0.995). There was no death reported secondary to any work-related disease. (Table 4.3)

**Table 4.3: Work related diseases reported to WCF yearly**

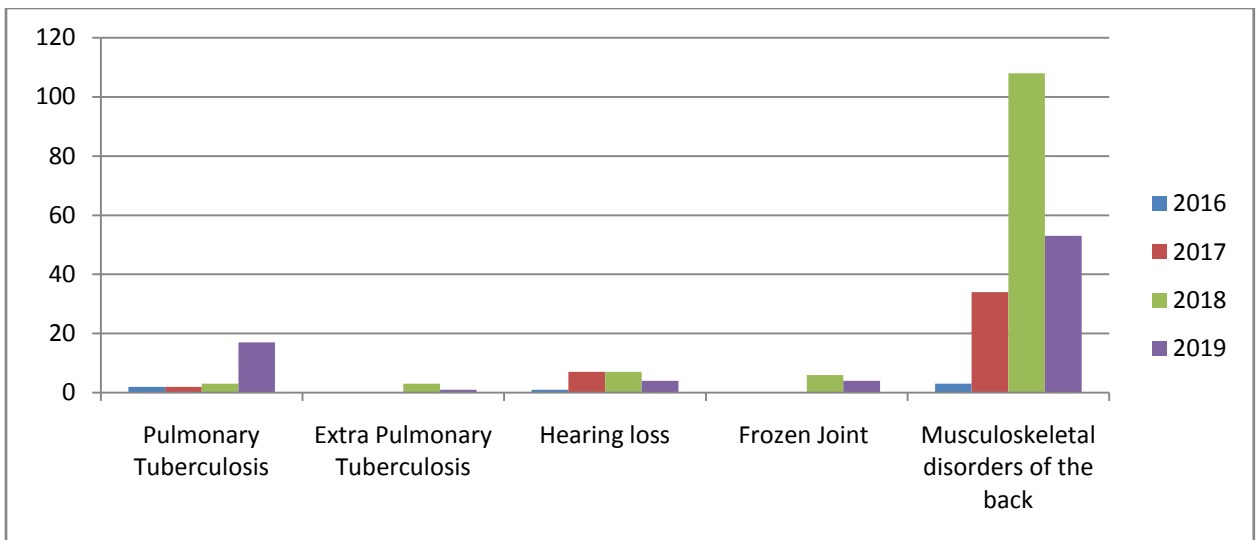
<b>Disease type</b>	<b>2016 n ( % )</b>	<b>2017 n ( % )</b>	<b>2018 n ( % )</b>	<b>2019 n ( % )</b>	<b>Total</b>
Pulmonary Tuberculosis	2 (9)	2 (9)	3(12)	17 (70)	<b>24 (9)</b>
Allergic dermatitis.	0 (0)	0 (0)	0 (0)	1 (100)	<b>1 (0)</b>
Occupational asthma	0 (0)	0 (0)	2 (100)	0 (0)	<b>2 (1)</b>
Extra Pulmonary Tuberculosis	0 (0)	0 (0)	3 (75)	1 (25)	<b>4 (2)</b>
Occupational rhinitis	0 (0)	1 (100)	0 (0)	0 (0)	<b>1 (0)</b>
Noise induced hearing loss	1 (5)	7 (37)	7 (37)	4 (21)	<b>19 (7)</b>
Work-related upper limb disorders	0 (0)	0 (0)	6 (60)	4 (40)	<b>10 (4)</b>
Lead Toxicity	0 (0)	0 (0)	1(100)	0 (0)	<b>1 (0)</b>
Diffuse Lung fibrosis	0 (0)	1 (33)	1 (33)	1 (33)	<b>3 (1)</b>
Musculoskeletal disorders of the back	3 (2)	34 (17)	108 (54)	53 (27)	<b>198 (75)</b>
<b>Total</b>	<b>6 (2)</b>	<b>45 (18)</b>	<b>131 (50)</b>	<b>81 (30)</b>	<b>263</b>

**Musculoskeletal disorders of the back:** included disc bulge, prolapse, desiccation, muscle spasm, and other degenerative spine disorders.





**Figure 4.1: Trends in the number of Work-related diseases reported to WCF from 2016 to 2019**

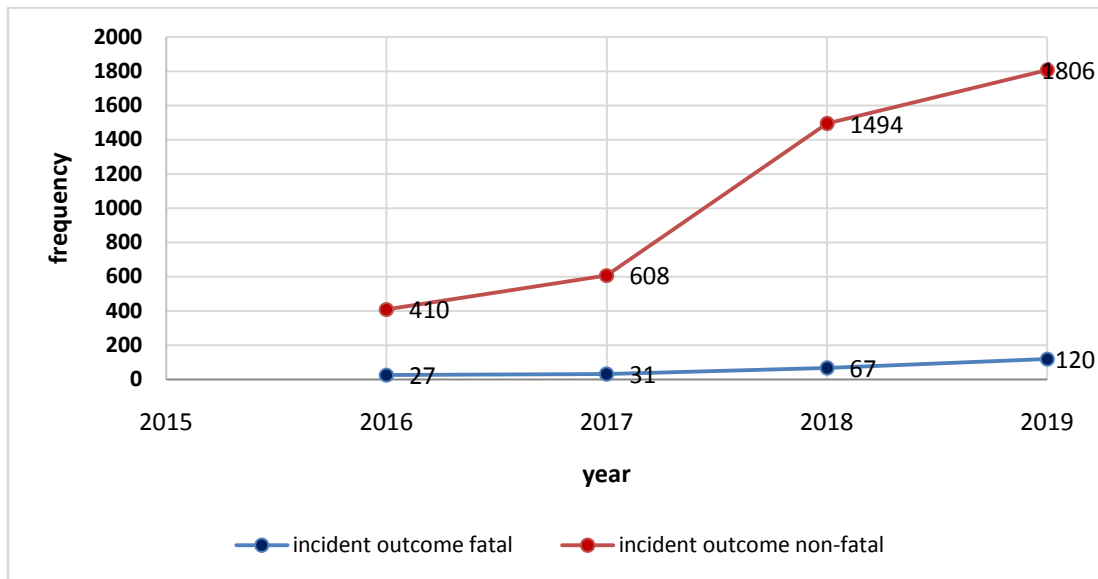


**Figure 4.2: Trend in specific work-related diseases, 2016 to 2019**

The above figure shows how diseases have been trending in the four observed years.

### 4.3 Trends in work-related injuries reported to WCF from 2016 to 2019

A total of 4,563 workers had work-related injuries from 2016 to 2019. Of which 5% of them were fatal. 2019 had highest number of injuries (42%), followed by 2018(34%), 2017(14%). There was no statistical significance in the increase in the number of accidents in the four years (with a statistical chi square for trend=0.76 and  $p=0.384$ ). (Figure 4.3)



**Figure 4.3: Trends in Work-related Injuries reported to WCF from 2016 to 2019**

### 4.4 Factors associated with work-related diseases

Majority of WRD were reported by workers aged 31-49 years (60%), with a statistical significance in occurrence of those diseases among different age groups ( $p$  value  $<0.001$ ). Further regression analysis observed workers aged 31-49 years had a 2.3 fold increased odds of developing WRD (AOR=2.3; 95% CI: 1.7-3) compared to workers  $<30$  years old. There was no difference observed in occurrence of WRD between different genders and marital status ( $p$  value  $>0.2$ ). (Table 4.4)

Sector of employment workers are in, had shown to predispose workers to development of WRD. Workers employed under mining and quarrying sector were leading in reporting of

WRD (42%), followed by workers under construction and building sector (17%). There was a statistical significance ( $p$  value  $<0.001$ ) in occurrence of WRD to workers employed in different sectors. With reference to workers under electric, gas and steam sector, workers in mining and quarrying sector had 62 fold increased odds of acquiring WRD (AOR=62; 95% CI: 25-156), followed by workers in information and technology sector who had a 5 fold increased odds of acquiring WRD (AOR= 5; 95% CI: 1.8-13.8). Construction and building, accommodation food and beverage sectors also had 3.2 and 2.7 times the risks respectively of developing WRD as compared to reference group (AOR=3.2; 95% CI:1.3-8) and (AOR=2.7; 95% CI: 1-7.6) respectively. (Table 4.6)

Types of job workers has had shown to be another important factor contributing to development of WRD. The study have shown statistical significance in WRD occurrence among workers with different job titles ( $p$  value  $<0.001$ ). Where taking into consideration the age, gender and marital status of workers; health workers were shown to have 4.3 fold increased odds of development of WRD (AOR=4.3; 95% CI: 1.9-9.9) compared to labourers, followed by office workers and operators with a 4 and 3 fold increase odds of acquiring WRD respectively (AOR=4.1; 95% CI: 1.9-8.7), (AOR= 2.8; 95% CI: 1.5-5.4). (Table 4.6)

#### **4.5 Factors associated with work-related injuries**

Findings of this study have shown that males had a higher rate of encountering both fatal and non-fatal injuries (92%) and (83%) respectively ( $p=0.001$ ), and workers aged 31-49 years had higher incidences of both fatal and non-fatal injuries compared to the other age groups (57%) and (46%) respectively ( $p<0.001$ ). Further analysis has shown that males had a 2.5 fold increase odds of encountering fatal injuries compared to females (OR=2.5; 95% CI: 1.6-4.1). (Table 4.1 and 4.4)

Location of injury had a significance in the outcome of the injury being fatal or non-fatal ( $p<0.001$ ), thus although majority of injuries reported occurred at work places (69%), conveyance injuries accounted for (73%) of all fatal injuries. Results have further shown that, injuries occurring at conveyances had a 6 fold increased odds of being fatal (AOR=6.1; 95% CI: 4.5-8.3) compared to injuries occurring at work places. (Table 4.4)

**Table 4.4: Factors associated with work-related disease and injuries reported to WCF**

Variable	Disease		Fatal injuries	
	N (%)	OR (95%CI)	N (%)	OR (95% CI)
<31	61 (24)	ref	70 (30)	ref
31-49	156 (60)	2.3(1.7-3.0)**	135 (57)	1.5(1.1-1.9)*
50+	42 (16)	1.8(1.2-2.7)*	31 (13)	1.1(0.7-1.6)
<b>Gender</b>				
Female	45 (17)	ref	18 (8)	ref
Male	219(83)	1(0.7-1.4)	217 (92)	2.5(1.6-4.1)**
<b>Marital status</b>				
Not married	61 (27)	ref	53 (27)	ref
Married	163 (73)	1.3(0.9-1.7)	140 (73)	1.3(0.9-1.8)
<b>location</b>				
Conveyance	N/A	N/A	169 (73)	6.1(4.5-8.3)**
Work place	N/A	N/A	62 (27)	ref

\*=p<0.05, \*\*=p<0.001, OR: unadjusted odds ratio, CI: Confidence interval

It was also seen that majority of non-fatal injuries were reported by workers employed under manufacturing and agriculture and forestry sectors (25%) and (20%) respectively. There was a statistical significance in occurrence of both fatal and non-fatal injuries among different groups of workers employed under different work sectors (p value <0.001). After taking into consideration the age, gender, marital status and location of the injury where conveyance injuries were involved; workers in transport and storage sector have a 6.4 fold increased odds of encountering fatal injuries compared to workers in manufacturing sector 6.4 (AOR=6.4; 95% CI: 2.5-17). Followed by workers in administration and support sector who had shown a 5.5 increased odds of fatal injuries (AOR=5.5; 95% CI:3-13.8) other high risk sectors was information and technology sectors with 5.1 times the risk compared to the reference group. (Table 4.2 and 4.6)

On the injuries occurring at work place alone (where conveyances were removed); workers under information and technology sector had a 4.6 fold increased odds of encountering fatal injuries (AOR=4.6; 95% CI: 1.2-18) compared to workers in agriculture and forestry

sector. Followed by workers under electric, gas and steam sector and construction sectors who had 3.4 and 2.8 times the risk of encountering fatal injuries compared to the reference group respectively (AOR=3.4; 95% CI: 1.1-10.3) and (AOR=2.8; 95% CI: 1.2-6.9). (Table 4.7)

Different job titles had shown different rates in reporting fatal injuries (with statistical significance  $p < 0.001$ ). Majority of non-fatal injuries were reported by operators (23%) and accounted for (8%) of fatal injuries. By taking into account, age, sex and marital status of workers together with the location of the injuries; Teachers had 3.4 fold increased odds of encountering fatal injuries compared to laborers (AOR=3.4; 95% CI:1.3-8.5), while drivers and office workers both had a 2.8 fold increased odds of encountering fatal injuries compared to the reference group. (Table 4.2 and 4.6)

Considering work place injuries alone (removing conveyances); engineers had a 5 fold increased odds of encountering fatal injuries at their work places compared to mechanics (AOR=5; 95% CI: 0.7-36.5) and office workers had 7.2 times the risk of fatal injuries compared to the reference group (AOR=7.3; 95% CI: 1.4-37).(Table 4.7)

The injuries reported had several different causes with statistical significance ( $p < 0.001$ ), among which explosions and motor traffic accidents were the leading causes of fatality (19%) and (18%) respectively. Also type of body part involved in the injuries contributed to the incident outcome where compared to others, majority of fatal injuries involved multiple body parts (10%) ( $p < 0.001$ ). (Table 4.5)

**Table 4.5: Types and causes of injuries reported to WCF.**

<b>Variable</b>	<b>Overall N (%)</b>	<b>Work- related fatal injuries N (%)</b>	<b>Work- related non- fatal injuries N (%)</b>	<b>P value(Chi- squared test)</b>
<b>Cause of Injury (N)</b>	<b>2848</b>	<b>231</b>	<b>2617</b>	
Animal / human attack	131 (5)	10 (4)	121 (5)	
Burning	106 (4)	2 (1)	104 (4)	
Explosions	80 (3)	15 (6)	65 (2)	
Fall	587 (21)	14 (6)	573 (21)	<0.001
Hand tools faults	18 (7)	0 (0)	185 (7)	
Machine faults	785 (28)	21 (9)	764 (29)	
Motor traffic accidents	974 (34)	169 (73)	805 (30)	
<b>Body part injured (N)</b>	<b>3848</b>	<b>164</b>	<b>3684</b>	
Head	423 (11)	33 (20)	389 (11)	
Lower extremities	867 (22)	1 (1)	865 (23)	
Multiple injuries	899 (23)	115 (70)	784 (21)	<0.001
Trunk	127 (3)	12 (7)	103 (3)	
Upper extremities	1551 (40)	3 (2)	1543 (42)	
<b>Time of accident</b>	<b>4392</b>	<b>96</b>	<b>4295</b>	
Day time	3359 (76)	76 (79)	3282 (76)	0.529
Night time	1033 (24)	20 (21)	1013 (24)	
<b>Location of injury</b>	<b>2856</b>	<b>231</b>	<b>2625</b>	
Conveyance	979 (34)	169 (73)	810 (31)	<0.001
Work place	1877 (66)	62 (27)	1815 (69)	

Day time= 6:00-18:59, night time=19:00-5:59.

**Table 4.6: Factors associated with occurrence of work-related diseases and fatal injuries**

Variable	Disease		Fatal injuries	
	N (%)	AOR	N (%)	AOR
Administrator	7 (3)	2.0(0.8-5.3)	15 (7)	1.3 (0.7-3)
Drivers	7 (3)	0.5(0.2-1.6)	58 (28)	2.8 (1.5-5.3)*
Engineer	2 (1)	2.5(0.3-21.5)	9(4)	2 (0.6-5.8)
Guard	21 (10)	2.7(1.3-5.7)*	18(9)	1.1 (0.5-2.3)*
Health worker	19 (9)	4.3(1.9-9.9)*	6 (3)	0.8 (0.3-1.7)
Laborer	17 (8)	ref	26 (13)	Ref
Mechanics	20 (10)	2.1(1.0-4.6)*	8 (4)	0.8 (0.3-1.7)
Office worker	20 (10)	4.1(1.9-8.7)*	22 (11)	2.8 (0.4-5.9)*
Operator	58 (27)	2.8(1.5-5.4)*	17 (8)	0.3 (0.1-0.8)
Teacher	1 (1)	1 ( 0.2-7.2)	10 (5)	3.4 (1.3-8.5)*
Technician	21 (10)	2.3(1.7-4.7)	18 (9)	1.1 (0.5-2.4)
Others	15 (7)	1.6(0.7-3.4)	0	
<b>Employment sector</b>				
Accommodation, Food & beverage	12 (5)	2.7 (1-7.6)*	8 (3)	5 (1.7-19)*
Administrative & support	16 (6)	0.5 (0.2-1.5)	51 (21)	5.5 (3-13.8)*
Agriculture, Forestry	16 (6)	0.4 (0.2-1.2)	28 (12)	1.5 (0.6-4)
Construction	46 (17)	3.2 (1.3-8)*	27 (11)	4.1 (1.6-10.5)*
Electricity, Gas & Steam	6 (2)	Ref	12 (5)	2.8 (1-8.4)
Financial and Insurances	3 (1)	1.3 (0.2-4.3)	4 (2)	2 (0.4-8.7)
Human Health and Social	5 (2)	0.4 (0.9-1.5)	4 (2)	1 (0.2-4.2)
Information & Technology	17(6)	5 (1.8-13.8)*	11 (5)	5.1 (1.5-16.6)*
Manufacturing	17 (6)	0.5 (0.2-2)	16 (7)	Ref
Mining and Quarrying	112(42)	62 (25-156)*	4 (2)	1.2 (0.1- 11)
Professional, Scientific& technical	7 (3)	0.6 (0.2-2)	13 (5)	4.2 (1.4-12)*
Security groups	2 (1)	0.4(0.1-1.8)	8 (3)	1.2 (0.3-4.3)
Transportation and storage	2 (1)	0.2 (0.04-1.1)	37 (15)	6.4 (2.5-17)*
Whole sale & retail trade	2 (2)	0.5 (0.1-1.9)	20 (8)	3.7 (1.3-11)

\*= p value <0.05, AOR= adjusted odds ratio, variables odds to disease were adjusted against age, gender and marital status. And odds to injuries were adjusted against age, gender, marital status and incident location.

**Table 4.7: Factors associated with injuries occurring at work places alone reported to WCF**

<b>Variable</b>	<b>Fatal N (%)</b>	<b>Fatal OR (95%CI)</b>
<b>Age</b>		
<31	29(40)	2.9(0.8-9.7)
31-49	41(56)	4.5(1.4-14.9)*
50+	3(4)	ref
<b>AOR</b>		
<b>Employment sector</b>		
Administrative & support	7(9)	1.9(0.6-5.7)
Agriculture & Forestry	10(13)	ref
Construction	14(18)	2.8(1.2-6.9)*
Electricity, Gas & Steam	7(9)	3.4(1-10.3)*
Financial and Insurances	1(1)	2(0.2-17)
Human Health and Social	2(3)	1.3(0.3-6.1)
Information & Technology	4(5)	4.6(1.2-18)*
Manufacturing	11(14)	0.7(0.3-2)
Professional, Scientific & Technical	4(5)	1.6(0.5-5.4)
Transportation and storage	4(5)	1.2(0.3-4.6)
Whole sale & retail trade	7(9)	2(0.6-7)
<b>Job title</b>		
Administrator	4 (7)	3.9 (0.5-28)
Drivers	7 (12)	5.6(1-28)*
Engineer	3 (5)	5 (0.7-36.5)*
Guard	7 (12)	3.4 (0.6-19)*
Health worker	1 (2)	2.9 (0.2-34)
Labourer	12 (21)	3.9 (0.8-18)
Mechanics	2 (3)	ref
Office worker	6 (10)	7.3 (1.4-37)*
Operator	6(10)	1 (0.02-8.2)

AOR= adjusted odds ratio (adjusted to age, gender and marital status), \*=p<0.05,

OR=unadjusted odds ratio



## CHAPTER FIVE

### 5.0 DISCUSSION

This study was conducted to determine the trends of work-related diseases and work-related injuries reported to WCF from the year 2016 to 2019, together with the associated factors. It was observed that the most age group of workers affected by WRD is between 31-49 years. Operators and workers employed in mining and quarrying sector had the highest risk of contracting WRD. Males had two times the risk of contracting both fatal and non-fatal injuries than females and engineers and workers under information and technology sectors had a higher risk of fatal injuries at their work places.

#### 5.1 Trends in work-related diseases

This study found that disease rates have been increasing yearly with a slight drop in 2019 where the leading types of WRD reported to WCF were musculoskeletal disorders of the back (75%), pulmonary tuberculosis (9%) and noise-induced hearing loss (7%). These findings were similar to the report in 2015 which stated that in Tanzania the most reported WRD are respiratory and musculoskeletal disorders. (9) Another study found out that there was an increase in prevalence of hearing loss reported by workers in steel companies. (14)

#### 5.2 Factors associated with work-related diseases

It was also observed that most WRD cases were reported by workers aged 31-49 years with a statistical significance ( $p=0.001$ ), gender had no difference in acquiring these diseases. The same findings had been reported by a previous study which suggested that social demographic characteristics can affect the nature and extent of occurrence of WRD. (21) Another study observed that an increase in age can result into more frequent morbidity/ comorbidity, lower physical capacity and higher cumulative work exposures. (22) This finding is also theoretically true since increased age comes with increase risk of diseases, hence more protective effort should be put to older workers.

Different work exposures have shown to cause different types of diseases (9), in this study employment sector a worker was in has been shown to be one among important factors in acquiring WRD with statistical significance ( $p<0.001$ ). Workers in the mining and quarrying sector had a higher rate of development of WRD (42%), with 62 folds increased

odds compared to the reference group. Other working sectors with higher risk included workers in information and technology sector who had a 5 fold increased odds of acquiring WRD. Construction and building, accommodation food and beverage sectors also had 3.2 and 2.7 times the risks respectively of developing WRD as compared to reference. A study done in Finland reported similar findings where there was an association between sector of employment and development of WRD. It was observed that although trends of WRD had been decreasing, workers under manufacturing, mining and quarrying, construction, agriculture, forestry and fishing sectors continued to have high incidence rates of WRD. This can be due to the type of works demanded by these sectors (mostly physical works) with involvement of various hazards. (1) Another study by *Newman Lee* revealed that due to economical moderation occupational disorders have shifted from industries and agriculture to include hospital and office buildings. (23) This finding is also theoretically true since the sectors observed to have higher risk are known to have multiple hazards at high exposure rates; example the mining and quarrying sector is known to have a range of both physical and chemical hazard.

There have been an observed association between WRD development and the type of job a worker has, (with a statistical significance  $p < 0.001$ ). This was also observed by a study in Sweden where there were higher rates of development of nasal cancer in certain occupations than others (24). In this study health workers showed to have 4.3 fold increased odds of development of WRD compared to labourers, followed by office workers and operators with a 4 and 3 fold increase odds of acquiring WRD respectively. Since majority of WRD are musculoskeletal diseases, health workers and office workers are exposed to prolonged sitting during working hours hence at higher risk as observed.

### **5.3 Trends in work-related injuries**

Findings have shown both fatal and non fatal injury cases have been increasing for the past four years and of all injuries reported from 2016 to 2019(5%) were fatal. The injuries reported had several different causes, among which explosions and motor traffic accidents were the leading causes of fatality (19%) and (18%) respectively. A study done in among Tanzanite mine workers revealed that most frequent causes of fatality were falls and

machine faults. (19) While another study in Gambia reported that, among the few reported work-related injuries, the leading causes were personal injuries, fall and burns. (28)

#### **5.4 Factors associated with work-related injuries**

Males had a higher rate of encountering both fatal and non-fatal injuries, and workers aged 31-49 years had higher incidences of both fatal and non-fatal injuries compared to the other age groups. Further analysis has shown that males had a 2.5 fold increase odds of encountering fatal injuries compared to females. ILO reported that in low income countries where agriculture is a bigger employment area, the difference in work-related fatalities between male and females is likely to be smaller. (3) This finding was different from a study in Mexico which reported higher risks of fatal injuries to males than females (12). This finding is theoretically true since males in our society are normally exposed to more risk jobs than female.

It was observed that although (69%) of all WRI occur at work places, (73%) of all fatal injuries occurred at conveyances. Results have further shown that, injuries occurring at conveyances had a 6.1 fold increased odds of being fatal compared to injuries occurring at work places. This finding was opposite to a study done in Chile which explained that, after considering multiple variables, it was observed that majority of fatal injuries occurred at workplaces and not during commuting (63%). (27)

Workers sector of employment is an important risk factor to fatal injuries where many studies has pointed out agriculture forestry and fishing sector being the leading industry in reporting fatal injuries to workers, followed by construction and mining sectors. (3,12,23,25,28) This study have shown a significant association between workers sector of employment and occurrence of fatal injuries. It was also seen that majority of non-fatal injuries were reported by workers employed under manufacturing and agriculture and forestry sectors (25%) and (20%) respectively. Further analysis has shown that, (by including conveyances) workers in transport and storage sector have a 6.4 fold increased odds of encountering fatal injuries compared to workers in manufacturing sector. Other high risk sectors included administration and support sector and information and technology sectors with 5.5 and 5.1 times the risk compared to the reference group respectively. Since commuting accidents account for 73% of fatal injuries, workers in

sectors that involve a lot of travelling time are at a higher risk of encountering fatal injuries as observed.

While considering work place injuries alone workers under information and technology sector had a 4.6 fold increased odds of encountering fatal injuries compared to workers in agriculture and forestry sector. Followed by workers under electric, gas and steam sector and construction sectors that had 3.4 and 2.8 times the risk of encountering fatal injuries compared to the reference group respectively. In 2013 the National Audit Office of Tanzania reported 121 fatal injuries from different sectors, construction and building being the leading sector, followed by transport and mining sectors. (10)

A study by *Mitchell O* concluded that occupation /job title had proven to be more important than industry type in explaining job risk pattern. (26) In this study findings have shown a strong association between ones occupation and occurrence of fatal injuries. Majority of non-fatal injuries were reported by operators (23%) and accounted for (8%) of fatal injuries. Other occupations with high rates of non-fatal injuries included labourers (15%), mechanics and technicians (10%). Findings further showed that teachers had 3.4 fold increased odds of encountering fatal injuries compared to laborers followed by drivers and office workers with 2.8 times the risk of encountering fatal injuries compared to reference group. Since majority of fatal injuries are commuting it drivers are expected to be at a higher risk, but teachers having such a risk is theoretically unexpected hence more exploration should be done on further factors exposing them to commuting injuries at this rate. A study in Chile also found that the leading activities to encounter fatal injuries were freight land transportation and engineering works in construction companies. (27)

While considering work place injuries alone (removing conveyances); engineers had a 5 fold increased odds of encountering fatal injuries compared to mechanics and office workers who had 7.3 times the risk of fatal injuries compared to reference group. Office workers who have shown high risk of fatal injuries were killed by thugs and robbery, and machine faults.

### **5.5 Study strength and limitations**

The study used actual reported cases of disease and injuries that occur attributed to work and working environments, giving us an estimate of what is happening to workers in or

country. However due to the nature of the study, other important factors predisposing to occurrence of diseases, injuries and fatalities could not be assessed example, the use of personal protective equipment at work, hazard exposure levels at work, personal working hours and many others.

Incomplete documentation and lack of information in the data received limited the amount of information to be harvested from it hence creating lack of other important details example, duration of employment workers had and level of education of workers.

## **CHAPTER SIX**

### **6.0 CONCLUSION AND RECOMMENDATIONS**

#### **6.1 Conclusion**

This study has described that incidents of work-related diseases reported by workers have been increasing yearly, the most reported diseases are musculoskeletal disorders of the back, pulmonary tuberculosis and noise induced hearing loss. The rate of WRD development is the same between genders but increases with age. The study has also shown that occupations at highest risks of WRD development are health workers, office workers and operators and those workers who are in mining and quarrying sector has the highest risk of acquiring diseases.

Work-related injuries have been increasing in the observed four years, where majority of injuries occurred at work places but majority of fatal injuries occurred during conveyance. This study described that majority of fatal injuries involves multiple organs and are caused by explosions and motor traffic accidents. Teachers, drivers and engineers are the leading occupations to encounter fatal injuries. Workers employed in transportation and storage, accommodation food and beverages, information and technology and administration and support sectors are at a higher risk of encountering fatal injuries.

#### **6.2 Recommendations**

Work-related diseases have shown to cause no deaths in the past four years, but the actual situation might not be true. Since WRD take time to develop (for example cancer) and might take even longer time to cause death; a worker might be out of work and the disease could go unnoticed. There should be a good coordination system of assessment of cause of deaths (in hospitals) to workers in order to rule out the possibility being work-related. That is to say there should be a good occupational history and hazard exposure assessment done to all workers at any health facility and the worker should be informed to report to WCF of the illness if suspected to be work-related by the attending health worker for further confirmation.

Further studies need to be done to explore other factors contributing to the higher incidences of WRD, WRI and WRF. Important factors that could be further studied include workplace hazard exposure levels, physical stresses, working hours and use of PPEs. Furthermore, awareness should be done to occupations and work sectors shown to have high risk of fatal injuries and proper prevention measures to be taken.

The WCF notification form should include other important information such as employment date, years in the current job and workers education level. There should be a regular follow up to insure proper documentation is done during transferring of information to the MAC system to reduce information gaps.

## REFERENCES

1. Oksa P, Sauni R, Talola N, Virtanen S, Nevalainen J, Saalo A, et al. Trends in occupational diseases in Finland , 1975 – 2013: a register study. *BMJ Open* 2019;1–8.
2. Hämäläinen P, Takala J, Boon T. Global estimates of occupational accidents and work-related illnesses 2017. Singapore. Workplace Safety and Health Institute.2017;21p
3. Somavian J. United Nation, Safety in numbers. Geneva, Switzerland.ILO; 2003: 27p
4. Kharel U. The Global Epidemic of Occupational Injuries.Santa Monica, Calif. RAND Corp. 2016;(May):125p.
5. Loewenson R. Occupational Health and Safety in Southern Africa : Trends and Policy Issues.Harare Zimbabwe.ILO SAMAT. 2004;32p.
6. Chuwa A, Kwesigabo E, Minja R, Millinga G, Mtindo M, Mongo J, et al. Formal sector employment and earnings. Dar es Salaam Tanzania. National Bureau of Statistics; 2018 May: 113p.
7. African risk and Insurance Services. Workmen’s compensation act 2008. Aris client brief(4):1–15.
8. Takala J. Global Estimates of Fatal Occupational Accidents.*Epidemiology Resource Inc.* 1994 Sept;640–6.
9. Mrema E, Ngowi A V, Mamuya S. Status of Occupational Health and Safety and Related Challenges in Expanding Economy of Tanzania. *Annals of Global Health* . 2015;81(4):538–47.
10. Ngowi G.B, Nyakia J.I. A performance audit report on the management of occupational health and safety in Tanzania. National Audit Office. Jan 2013;104 p. Report No. 2.



11. Szeszenia-Dąbrowska N, Wilczyńska U. Occupational diseases in Poland – an overview of current trends. *IJOMEH*. 2013; 457-70.
12. Gonzalez-delgado M, Gómez-dantés H, Alfredo J. Factors Associated with Fatal Occupational Accidents among Mexican Workers: A National Analysis. *PLOS ONE* 2015 March;1–19.
13. Darton W. United Nation. Global trends on occupational accidents and diseases. *BMJ Open* 2015;(April):1–7.
14. Nyarubeli IP, Tungu AM, Moen BE, Bråtveit M. Prevalence of Noise-Induced Hearing Loss Among Tanzanian Iron and Steel Workers: A Cross-Sectional Study. *Int. J. Environ. Res. Public Health*. 2019; 1367-16.
15. Benti A, Kumie A, Wakuma S. Prevalence of occupational injury and associated factors among workers in large-scale metal manufacturing factories in Addis Ababa, Ethiopia. *Ethiop. J. Health Dev.* 2019;33.
16. Allmanova Z, Vlčková M, Balazova Ž. Trends in Workplace Injuries in Slovak Forest Enterprises. *Int. J. Environ. Res. Public Health*. 2019;141-16.
17. Willie MM. Compensation for Occupational Injuries and Diseases. *iMedPub journals*. 2018;1–2.
18. Bhushan A, Leigh P. National Trends in Occupational Injuries Before and After 1992 and Predictors of Workers' Compensation Costs. *Public Health Reports*. Sept-Oct 2011. Volume 126:625–34.
19. Respicious Boniface, Lawrence Museru, Victoria Munthali RL. Occupational injuries and fatalities in a Tanzanite mine: Need to improve workers safety in Tanzania. *Pan Afr Med J*. 2013:1–7.
20. Viego V, Sagui N. Recent Trends in Occupational Injuries and Diseases in Argentina: A Panel Data Approach. *Occupational Diseases and Environmental*

- Medicine.2015 Nov;3:57–75.
21. Dembe AE. The Social Consequences of Occupational Injuries and Illnesses. *Am. J. Ind. Med.*2001;40.
  22. Molen HF Van Der, Vries S De, Sluiter JK. Occupational Diseases among Workers in Lower and Higher Socioeconomic Positions. *Int. J. Environ. Res.Public Health.* 2018;11-6.
  23. Newman Lee. Current concepts; Occupational illnesses. *the new England journal of med.*2014;333-17
  24. Hemelt M, Granstom C, Hemminki K. Occupational Risks for Nasal Cancer in Sweden. *JOEM.* 2004; vol 46
  25. Ooteghem P. Work-related Injuries and Illnesses Botswana. *Int J Occup Env Health.* 2006;vol12-1
  26. Mitchell o. The Relation of Age to Work-place Injuries. *Monthly Labur Review.* July 1988;pp 8-13
  27. Bachelet V. Work-related Injuries Resulting in Death in Chile: a cross section study on 2014 and 2015 registries. *BMJ Open.* 2018;8
  28. Demba AE,Ceesay O, Mendy G. Preventin of Work-related Accidents, including high risk sectors such as agriculture, construction and mining. *Gambia.ISSA/ATPM.*2013;25

**Appendix A: Sampling flow chart**

<b>Variable</b>	<b>Overall</b>	<b>Excluded</b>	<b>Included;n (%)</b>
Disease	267	4	263 (99)
Fatal injuries	252	7	245 (97)
Non fatal injuries	4648	309	4339 (93)
<b>Total</b>	<b>5167</b>	<b>320</b>	<b>4847</b>



**Appendix C: Ethical clearance letter**

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES**

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Ref. No. HD/MUH/T.614/2018

15<sup>th</sup> May, 2020

IRB#: MUHAS-REC-04-2020-255

Brenda Stephen Shewiyo,  
MSc. Environmental and Occupational Health,  
School of Public Health and Social Sciences,  
MUHAS.

**RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED: "WORK RELATED DISEASES AND INJURIES REPORTED TO WORKERS COMPENSATION FUND IN TANZANIA FROM 2016 TO 2019."**

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from **15<sup>th</sup> May, 2020 to 14<sup>th</sup> May, 2021**. In case you do not complete data analysis and dissertation report writing by **14<sup>th</sup> May 2021**, you will have to apply for renewal of ethical clearance prior to the expiry date.

Dr. Emmanuel Balandya

**ACTING: DIRECTOR OF POSTGRADUATE STUDIES**

cc: Director of Research and Publications  
cc: Dean, School of Public Health and Social Sciences, **MUHAS**

**Appendix D: WCF data collection approval letter****WORKERS COMPENSATION FUND**

Telegraphic address "WCF"  
 Tel: +255 22 2926107  
 +255 22 2926108  
 Fax: +255 22 2926109  
 Email: [info@wcf.go.tz](mailto:info@wcf.go.tz)  
 Web: [www.wcf.go.tz](http://www.wcf.go.tz)  
 In reply please quote:



P.O. Box 79655  
 GEPF House  
 Plot No.37  
 Regent Estate  
 Bagamoyo Road  
 Dar es Salaam

Ref. No.BC.357/527/01/45

29<sup>th</sup> May 2020

Brenda Stephen Shewiyo,  
 Muhimbili University of Allied Science (MUHAS),  
 P.O Box 65013,  
 DAR ES SALAAM.

**RE: PERMISSION TO OBTAIN AND USE THE WORKERS COMPENSATION FUND  
 DATA FROM 2016 TO 2019**

Refer the above subject matter and your letter dated 18<sup>th</sup>May 2020.

This is to inform you that your request to use the collected workers compensation data for your dissertation as specified in your letter has been granted. Please note that you are required to observe confidentiality in all the information to be collected and you may liaise with Ms. Naangela Msangi who is our Workplace Risk Assessment Manager for further assistance.

We wish you all the best.

  
 Masha J. Mshomba  
 DIRECTOR GENERAL