School of Public Health, College of Health Science,

Addis Ababa University

Assessment of prevalence injuries and determinants among fire fighters of Fire, Emergency Prevention and Rescue Authority, Addis Ababa, Ethiopia

A Research Thesis Submitted To School of Graduate studies of Addis Ababa University, College of Health Sciences, School of Public Health in partial fulfilment of the requirements for the degree in Master of Public Health

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Assessment of prevalence injuries and determinants among fire fighters of Fire and Emergency Prevention and Rescue Authority, Addis Ababa, Ethiopia.

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List of Acronyms and Abbreviations

AAU: Addis Ababa University

AOR: Adjusted Odds Ratio

BSc: Bachelor of Natural science

BOLSA: Bureau of Labor and Social Affairs

CI: Confidence interval

COR: Crude Odds Ratio

E.C: Ethiopian calendar

ETB: Ethiopian Birr

EU: European Union

FS: fire stations

ILO: International Labor Organization

MOLSA: Ministry of Labor Social Affairs

MPH: Master of Public Health

NFPA: National Fire Protection Agency

OSH: Occupational Safety and Health

PPE/D: Personal Protective Equipment/Device

RM: Risk Management

SPSS: Statistical package for social sciences

UK: United Kingdom

US: United States

Abstract

Background

Occupational injury is a global public health burden in developed and developing countries. The nature of a firefighter's job is hazardous and involves rescuing people as well as preventing further escalation of dangerous situations. In US, 68,085 firefighter injuries reported in 2015. Majority injuries were falling (27.2%), Strain (27%) and hit by objects counts (9.0%). In Ethiopia, the prevalence of injury among fire fighters in fire and emergency is unknown. But in Addis Ababa, 452 fire-fighter injuries reported in between 2014 and 2016. This study investigated the prevalence and determinants of occupational injuries among workers in fire & emergency, Addis Ababa, Ethiopia.

Objective: - To assess prevalence injuries and determinants among fire fighters in Addis Ababa Fire and Emergency Authority.

Methods: A cross sectional study was conducted in Addis Ababa fire and emergency authority fire stations. Simple random sampling was used to take on 403 study participants. Data was collected using structured questioner by face to face interview. Data was cleaned using EPI info version 3.5.3 and analysed using SPSS version 20 statistical software. Frequency tables, graphs and descriptive summaries were used to describe the study variables. Bivariate and Multivariate logistic regression model with hierarchical entry analysis were performed.

Results: A prevalence of 27% with [95% C.I: (26.79- 27.21)] respondents reported experienced occupational injuries during the past 12 months among workers of Addis Ababa fire and emergency. All injured respondents, 108 (100%) were hospitalized. Not using PPE, lack of safety & health training, sleeping disorder and lack of warning signs were significantly associated with occupational injuries. The odds of developing injury among fire fighters not using PPE was 3.8 times than those PPE users [AOR: 3.76, 95% CI: (2.23-6.36)]. The odds of developing injury among fire fighters with sleeping disorder was 2.6 times than those without sleeping disorder [AOR: 2.61, 95% CI: (1.53-4.46)]. Safety and Health training and Warning signs had also significantly contributed to the higher risks of occupational injuries.

Conclusion and Recommendation: This study showed the prevalence injury was high not using PPE, lack of health & safety training, sleeping disorder and lack of warning signs were identified as risk factors. Therefore, safety and health training and proper using of PPE should be given due attention in the fire, emergency prevention and rescue authority.

Key words: occupational related injury

1. Introduction

1.1 Background of the study

Occupational injury is a global public health burden in terms of disability adjusted life year which contributed to 1.5% of all causes with estimated economic loss of 5% - 10% growth national product (1). The International Labour Organization estimates that occupational accidents and work-related diseases cause over 2.3 million fatalities annually, of which over 350,000 are caused by occupational accidents and close to 2 million by work-related diseases (2). In USA, 63,350 fire fighter injuries and in addition to injuries there were 7,700 exposures to infectious diseases and 18,500 exposures to hazardous conditions (e.g. Asbestos, chemicals, fumes, radioactive materials, other) were reported by National fire protection agency in 2014, which reinforces the need for continued standards development, as well as fire prevention outreach and advocacy (3). In sub-Saharan Africa, the fatality rate per 100,000 workers is 21 and each year 54,000 workers die and 42 million work related accidents take place that cause at least three days' absence from work (4). The nature of a firefighter's job is hazardous, and involves rescuing people as well as preventing further escalation of dangerous situations. Hence, the health and well-being of firefighters is key to preserving public safety. However, extinguishing fires and rescuing people, along with the risks inherent in the nature of the job, can threaten firefighters' health and safety (5).

Emergencies and disasters which demand a high involvement of emergency workers are likely to occur more frequently and heavily in the future. For Example, Major natural disasters Haiti earthquake in January 2010, the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010, the flood in Pakistan and the Russian forest fires in Moscow in the summer of 2010, and the earthquake and ensuing tsunami in Japan in 2011 (6). Risk management has been increasingly adopted within industry as a formal proactive approach to improving occupational safety and health (7).

Further risk-based regulations, incorporating the "duty of care" stance, stemmed from the 1972 United Kingdom parliamentary commission report for occupational safety and health prevention

legislation (8), requiring that everything reasonably practical be done to protect the worker health and safety. Risk management is currently most broadly implemented as part of the International Organization for Standardization 31,000 standard (9).

Risk management was initially focused on high-risk industries. During the mid-to-late 1980s, the Australian coal mining industry began to implement a risk-based approach to safety and health by government regulation; however, it wasn't until two disasters – the Moura disaster of 1994, in which an underground explosion killed 11 miners, and the 1996 Gretley disaster, where 4 people drowned when tunnelling into an old adjacent mine shaft that had not been documented in the mining plans that meaningful changes to safety were initiated (10).

Global warming and pollution constantly destabilize existing ecosystems. The figures for recorded natural disasters have doubled in the past two decades alone. Continuous climate change will cause more intense natural disasters such as droughts, floods and storms, and will have devastating effects on communities. The incidence of man-made disasters, the consequences of which are often difficult to predict, is also likely to rise (6). Like other African countries, Ethiopia is facing the health problem related to Occupation and at the same time getting the emerging challenges from industrialization and rapid urbanization. Recently, Ethiopia has reinforced its policy towards rapid industrialization for its economic development (11). But occupational health care facilities and activities are not well organized in the country. Nowadays, Ministry of Labor and Social Affairs working on implementation of occupational health and safety in any industries but the practice is still not well organized (11).

Being one of the fastest growing cities in sub-Saharan Africa, Addis Ababa city is vulnerable to varying risks, such as structural fires, floods, human and animal disease epidemics, and environmental pollution, among others. People in urban areas are vulnerable to various everyday risks or threats. In order to deal with the risks and associated emergencies, the Fire & Emergency Prevention & Rescue Authority was established in 1926 E.C. During establishment, its name was 'Fire Emergency Controlling Service.' at the place of current head office area calling 'Arada Georges' in front of St. George Church near to Minilik Square.

The authority should be equipped with the equipment and skilled manpower. Despite years of experience in disaster response, Addis Ababa has yet to establish adequate systems to respond to and prepare for the series of natural and man-made disasters that continue to beset the city. In addition, developing professionals have not yet mastered. Generally, different areas of the city are exposed to various types of risks (human made and natural), therefore, it is important to develop systematic, coordinated and functional response mechanisms to solve critical emergency management problems in the city (12).

1.2 Statement of the problem

Occupational accidents kill nearly a 1,000 people every day and work related diseases provoke the death of almost 5,400 more individuals. There were also over 313 million non-fatal occupational accidents in 2010, meaning that around the world work provokes injury for approximately 860,000 people every day (2). In sub-Saharan Africa, the fatality rate per 100,000 workers is 21 and each year 54,000 workers die and 42 million work related accidents take place that cause at least three days' absence from work (4). The nature of a firefighter's job is hazardous, and involves rescuing people as well as preventing further escalation of dangerous situations. Hence, the health and well-being of firefighters is key to preserving public safety. However, extinguishing fires and rescuing people, along with the risks inherent in the nature of the job, can threaten firefighters' health and safety (5). Fire fighters are routinely exposed to a complex array of job hazards in the course of their work, whether at the scene of a fire, in transit, or even in the firehouse environment (13). In the city of Addis Ababa, between 2011 and 2015 lost more than 40 million USD caused by fire accidents, traffic accidents, flooding altogether more than 36 Million USD – saved from fire incidences. Between 2014 and 2015, fire and emergency authority responses 767 fire related accidents and 182 non fire emergency accidents occurred in the city and 452 fire fighter related injuries occurred during fire accident responding (12). Most of the researches focused on institutional fire outbreaks rather than fire fighters injuries for example in Ghana recorded 53 institutional fire outbreaks and in Kenya, institutional fires have also been experienced in different parts of the country causing injuries, fatalities and massive destruction of properties. For that matter will go through the fire fighters occupational injuries exclusively. Through literature review revealed that there is no researches in Ethiopia focusing on occupational related injuries among fire-fighters. For example due to the complexity and severity of the emergencies occurred in the city the standards of personal protective equipment are not inline (14). Therefore, the purpose of this study will assess prevalence injuries and determinants among fire-fighters in Addis Ababa fire & emergency of fire stations. By giving the result to concerned organizational managers to present more attention the fire-fighters occupational injury prevention aspects as well as for evaluating of professional risk status.

1.3 Rational and Significance of the study

Like many occupations with high physical demand and many hazards, injuries in the fire service are a regular concern for departments and, as recently reported, continue to be elevated (15), and in need of new strategies to aid in their prevention.

There were different researches conducted in the area of different industries regarding work related injuries and illness. But there was limited study in the area of assessing prevalence injuries and determinants of fire service but this study is address the prevalence of occupational injuries and determinants in fire and emergency workers.

Several studies have documented the increased hazards and risks associated with working within the fire service from physiological stresses of fire suppression activities (16), and ergonomic and biomechanical loads (17, 18), during patient assessments and transport, to psychological and post-traumatic stress disorders (19, 20). These diverse sources of hazards suggest that an adaptable approach to managing risks would be benefit to the fire service. Firefighters frequently incur injuries while providing emergency services. Information about fire fighter injuries how and where they occur, work activity at the time of injury, and other key factors is critical for identifying trends, developing prevention programs, and guiding resource decisions, as well as other areas of intervention (13).

So understanding what factors influence the prevalence of occupational injuries among fire & emergency workers will help to develop effective strategies to prevent and control injuries and disabilities occurring in the fire and emergency service and can assist firefighters in effectively carrying out their duty to the public.

2. Literature review

2.1 Work environment of emergency response sections

Emergency responders, including emergency medical services personnel, fire fighters, and law enforcement officers, risk their health and safety to assist in medical emergencies, motor vehicle incidents, building and wild land fires, hazardous material spills, crimes and public disturbances, search and rescue and natural and human-caused disasters. They are exposed to a variety of occupational hazards including motor vehicle crashes en route to a scene, assaults, extreme demands on their musculoskeletal systems, hazardous environments and temperature extremes, contact with hazardous and infectious materials, lengthy and erratic work hours, and stress. Although these hazards are broadly understood, each response incident may vary greatly in types of exposures and complexity such that the hazards may not be readily identifiable or the comparative risk reasonably characterized. Responding to these incidents regularly results in fatal and nonfatal injuries to emergency responders.

In 2007, 5,488 paid and volunteer workers died from an injury at work based on the Bureau of labor Statistics National Census of Fatal Occupational Injuries. Thirteen of the deaths occurred among emergency medical technicians and paramedics; 62 among fire fighting and prevention workers; and 156 among police officers, detectives, and first-line supervisors (21).

Emergency workers comprise large professional groups ranging from fire-fighters, police officers, emergency medical staff (paramedics, emergency medical technicians, doctors and nurses) to psychologists. The nature and conditions of work performed by fire fighters pose serious hazards to their health and life. The main problems arise from exposure to multiple physical (physical and thermal workload) and chemical (toxic chemicals) agents, as well as from particularly high level of stress experienced during emergency operations.

Various hazards leading to occupational health and safety risks for emergency workers range from more general issues related to managerial aspects, to more specific ones related to the character of a given event. As a consequence, excessive physical and emotional strain may result in serious health problems. The specificity and complexity of tasks facing emergency forces make it impossible to control their working conditions. Nevertheless, occupational safety

and health risks for emergency workers should be and certainly can be assessed and reduced, and followed by the implementation of appropriate protective measures (22).

Emergency workers protect human life, property and the environment during daily interventions in accidents, mishaps and large-scale disasters. Interventions usually demand the cooperation of several different groups. Some figures on the involvement of emergency workers in emergency events are given in official and media reports. Around 4,000 emergency workers were involved during mud spills in Hungary (2010) (23); 240,000 emergency workers and 2,000 members of the armed forces were combating forest fires in Russia in 2010 (24); 2,500 rescue workers, including 1,500 firemen, were sent to the vicinity of an earthquake in central Italy (London Evening Standard, 2009). Rescue activities after the earthquake in Kobe (1995) were performed by 29,000 personnel from Self Defence Forces, 83 rescue teams, 110 brigades and 65 other teams sent by Fire Defence Agency, and by 27,000 policemen (25). More than 500 emergency workers were sent to a mine explosion in Russia (26, 27); 200,000 recovery workers were involved in clean-up activities in 1986-1987 after the Chernobyl disaster (27); up to 70,000 emergency and rescue workers took part in the massive operation after the terrorist attack on the World Trade Centre in New York in 2001, including policemen, firemen, and construction workers (28); 5,500 police and emergency workers were mobilized to organize an evacuation during crowd panic in Duisburg, Germany in 2010 (17).

European emergency workers are also involved in dealing with major catastrophes around the world. After the earthquake in Haiti in 2010, a 64-member search and rescue team was sent from the UK; more than 500 personnel, particularly rescue workers, were sent by France; 450 troops, 50 doctors, technicians and specialists were sent from Spain; more than 20 emergency workers were sent from Portugal; a plane with search and rescue team went from the Netherlands; and three medical teams were sent from Hungary (29).

2.2 Tasks of fire-fighters

The range of emergency tasks covered by fire-fighters obviously includes preventing and combating fire, but also includes tasks such as assisting in major transport accidents (aviation and maritime accidents, car crashes involving trapped people), industrial accidents, natural

disasters, terrorist attacks or civil riots, or when special technical help is needed. They are often in charge of environmental protection, for example when a hazardous material jeopardises the environment (30), and they provide help in situations where animals present a danger to human life or are trapped (31). Fire-fighters often also have supplementary training as emergency medical technicians or paramedics. According to an International Labor Organization report (32), in European countries there is on average one fire-fighter for every 1,000-1,200 inhabitants. In 2003, there was one fire-fighter for every 26 inhabitants in Austria (in total 294,340 workers), for every 32 inhabitants in Switzerland (in total 210 500), and for every 69 in Germany (in total 1,162,819). However, in Italy, there was one fire-fighter for every 2,036 inhabitants (in total 28,000), in Greece one for 1,563 inhabitants (6,400), and in Bulgaria one for 1,438 inhabitants (5,910). The situation is significantly different in, for instance, African countries such as Mali, where the ratio is one fire-fighter to every 33,435 inhabitants. In many countries, professional fire services coexist with volunteer fire brigades. In Ethiopia, especially in Addis Ababa one fire fighter serves for 6386 inhabitants (12). Volunteer fire brigades are needed in order to ensure rapid help in regions in which a professional fire brigade is not maintained, or where the manpower of the professional fire services is not sufficient. In Germany, legislation generally makes provision for professional fire brigades in big and medium-sized cities (obligatory in cities with 80,000 – 100,000 inhabitants). However, career fire-fighters often need the assistance of volunteer fire-fighters, and these generally outnumber the professionals. There are 100 professional fire services employing 27,600 career fire-fighters, against 23,000 volunteer fire brigades which can call on 1.3 million volunteer fire-fighters. In 2005, requests for technical assistance was the most common reason for call-outs of German fire-fighters (51%); this was followed by fire/explosion (18%), false alarms (16%), animal rescue (4%) and other interventions (11%) (30).

In France, 237,940 people were working as fire-fighters in 2007: 80% as volunteers, 15% as professionals, and in Paris (departments 92, 93 and 94) and Marseille, 5% who were also military staff (33). Belgium has 251 fire services for 589 local authorities. These services consist of 5,000 professional fire-fighters and 11,000 volunteer fire- fighters(34). 42,324 full-time fire-fighters were working in the United Kingdom (excluding Northern Ireland) in 2008(35). The Republic of Ireland has 222 fire stations, run by 1,206 full-time and 1,952 retained part-time fire- fighters. Whereas full-time fire-fighters tend to be employed in

conurbations such as Dublin, Cork, Limerick or Galway, retained fire-fighters are mainly deployed in rural areas. The Dublin Fire Brigade runs 15 of the above-mentioned fire stations with 850 fire-fighters. They responded to 22,391 fire calls in Dublin in 2003(36). In Greece, 8,740 full-time fire-fighters and 5,500 seasonal fire-fighters were active in 2007 (37).

In Finland, the number of full-time employees in the rescue service system (including fire-fighters and paramedics/ambulance drivers) is approximately 5,000 (38).

In 2008, in Romania, approximately 41,407 (97%) full-time fire-fighters were registered within operative units, and approximately 1,237 (3%) members of the auxiliary staff were assigned to educational institutions, research units, study centre, bases, workshops, technical stores, and logistics and maintenance units. In 2008, through its fire-fighting structures, carried out 88,820 interventions, out of which 15,530 (17%) were fires, 9,131 uncontrolled burnings (10%), 5,000 'other' emergency situations (6%), 2,859 providing assistance to individuals (3%), and 4,193 local community protection operations (5%)(39).

There were approximately 1,134,400 fire fighters in the U.S. in 2014, according to estimates based on NFPA's 2014 National Fire Experience Survey. This is a decrease of 1% from 2013. Career fire fighters include full-time uniformed fire fighters regardless of assignments, e.g., suppression, prevention/inspection, administrative. For the purpose of this survey, career fire fighters include only fire fighters in public fire departments that protect people, their residences, and public buildings; they do not include fire fighters working in private fire brigades, or for state and federal agencies (40).

2.3 Prevalence of work related injuries

Study on work related injuries among fire fighters in Lodz, Poland revealed that the majority of injuries (40%) occurred during compulsory physical training, being responsible for 41% of post-injury absence at work. The workers employed for less than one year were at highest risk of injury. Injuries during emergency operations made 25% of all injuries and accounted for 24% of post-injury absence. The analysis of data showed that the frequency of injuries was not significantly aged-dependent, however, the duration of work disability was found to increase by 20% with increasing age of workers. The results indicated the need for undertaking preventive

interventions to minimize occupational hazards to those involved in fire fighting may be also responsible for injuries (41). Study conducted in manufacturing industries China, India and Sweden and in South Korean fire fighters showed the prevalence of 11.26%, 11.96%, 10.2% and 18% respectively (42-45). Similarly study in Greece also revealed that the prevalence injury was 10.8% and 7.2% an absence from work more than two days (46). Study also conducted in Addis Ababa iron and steel industries showed the prevalence of 35% (47). Study conducted in Addis Ababa prevalence of injury among workers engaged in operations in two metal factories was 333per1000 per year (48).

2.4 Types of injuries and Injured body parts

Study also done in Greece on type and causes of injuries in fire fighters showed that of the respondents, 356 (10.8%) reported having been injured at work, which in 238 (7.2%) had necessitated an absence from work of more than two days. The most commonly injuries were acute back pain, strain and ankle injuries (46). US reports showed 71,815 fire fighter injuries occurred in the line of duty in 2010, in addition to injuries, there were 11,200 exposures to infectious diseases and 25,700 exposures to hazardous conditions. From the total injuries or 45.4% occurred during fire ground operations. An estimated 13,355 occurred at non fire emergency incidents, 4,380 while responding/returning from an incident 7,275 during training activities, and 14,190 occurred during other on duty activities (49).

The major types of injuries received during fire ground operations were: strain, sprain, muscular pain (52.8%), wound, cut, bleeding, bruise (14.2%), burns (5.9%). Strains, sprains and muscular pain accounted for 59% of all non fire ground injuries. The leading causes of fire ground injuries were overexertion, strain (25.7%) and fall, slip, jump (22.5%) (49). Similarly, study conducted in USA, most commonly injuries were muscle strains and sprains (74%), extremity injuries (60%), back injuries (54%) and burns (28%) (50). Study conducted by US fire department showed that from the total injuries of 3,984,300 occurred from 2000-2001 was of these injuries 123,900 occurred to emergency responders (3% of the total). Among responder injuries, EMS personnel had 18% (21,900) of the injuries; fire fighters had 30% (37,300); and law enforcement officers had 52% (64,800). Among the 37,300 fire fighter injuries, 71% of the injuries occurred to career fire fighters and 21% occurred to volunteer fire fighters. Study

conducted on emergency responders in United states revealed that the most common injuries to fire fighters were sprains and strains (33%), contusions and abrasions (13%), lacerations (8%). Nonfatal fire fighter injuries were fires and explosions (32%) and bodily motions (20%). Injury events for career fire fighters were primarily fire and explosion related (30% and 38%, respectively), followed by non fire- related bodily motion events that accounted for 24% of injuries to career fire fighters. Contact with objects and equipment contributed to 16% of injuries to career fire fighters (21).

2.5 Factors associated with injuries

Researchers have increasingly recognized that industrial accidents are caused by a dynamic interaction between factors in the social and physical environments, that is, characteristics of the individual and the organization as well as technical forces (51). The study in USA indicated working in jobs with overtime schedules was associated with a 61% higher injury hazard rate compared to jobs without overtime. Working at least 12 hours per day was associated with a 37% increased hazard rate and working at least 60 hours per week was associated with a 23% increased hazard rate (52). The study in South Korean fire fighters indicated high job demands, interpersonal conflict, poor organizational system, poor work environment were associated with occurrence of occupational injury (45). Studies in Addis Ababa iron and steel industries indicated that lack in health and safety training, sleeping disorder and PPE use were significantly associated with occupational injuries and study in Addis Ababa large scale metal manufacturing industries also showed lack of warning signs during activities was significantly associated with occupational injuries (47, 53). Study conducted in Addis Ababa among workers in iron and steel industries showed Flying objects, falling, and machinery caused 43% of the injuries. Workplace hazards including unguarded machines, splitting materials, metal sparks, molten metal, excessive heat, and slippery and unleveled floors contributed to the occurrence injuries in the factories (48).

2.6 Conceptual Framework

Conceptual framework is a structure of connected idea or concept that indicates how it is put together. It guides the researcher during the development of the study and enables the researcher

to link the findings to determinants. The conceptual framework for this study which tried to show by using the arrows; the socio-demographic characteristics, work environment related factors and

behavioural factors have relation one to the other as well as on the outcome. It is prepared by principal investigator after reviewing for different literatures.

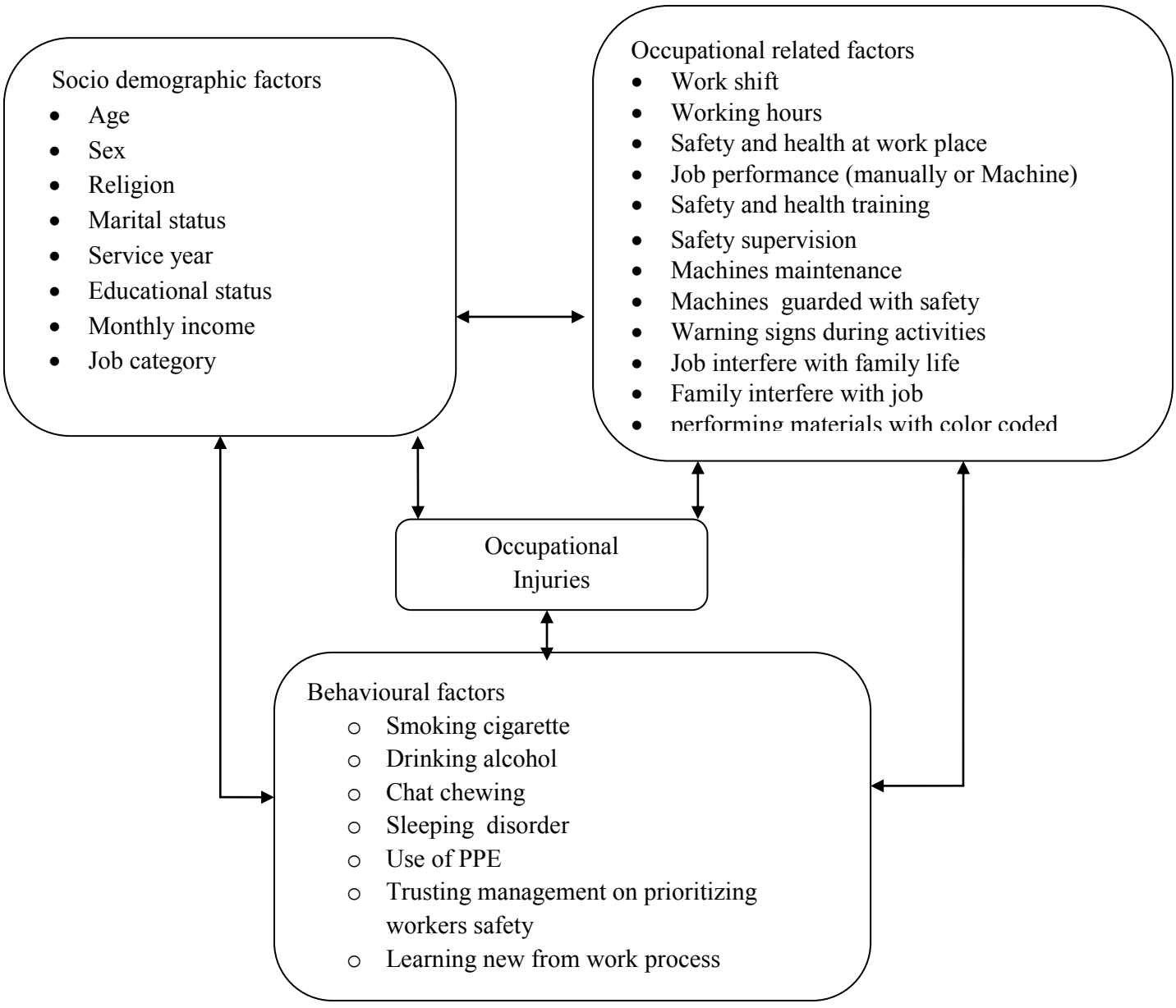


Fig 1: Conceptual frame of determinants related to occupational injuries

3. Objective of the study

3.1 The general objective of the study

To assess the occupational related injuries and determinants among workers in Addis Ababa Fire and Emergency Prevention and Rescue Authority.

3.2 Specific objective of the study

- To assess occupational related injuries among fire fighters in Addis Ababa Fire and Emergency Prevention and Rescue Authority.

- To assess determinants of injuries among fire fighters in Addis Ababa Fire and Emergency Prevention and Rescue Authority.

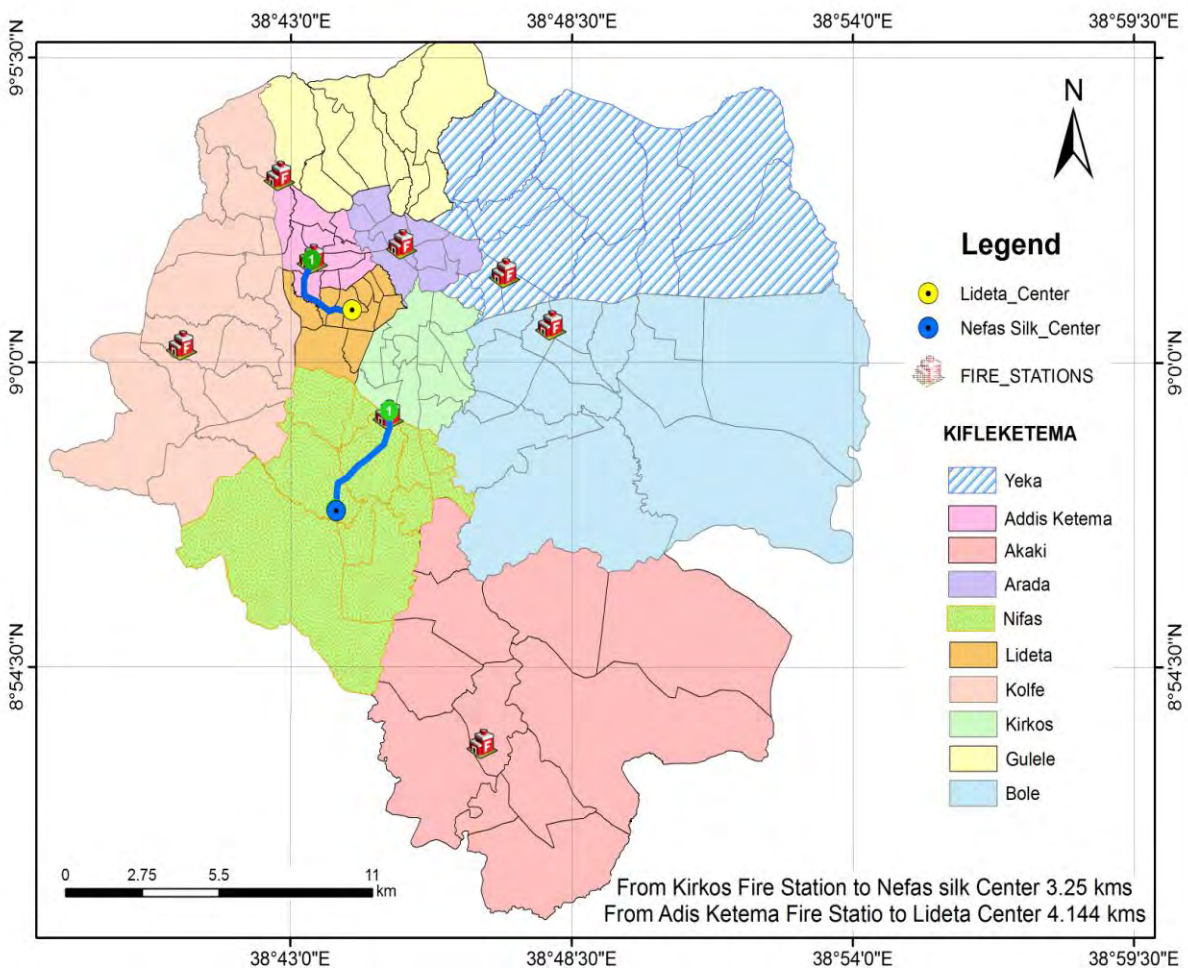
4. Research Methodology

4.1 Study design

Institutional based cross sectional study was used.

4.2 Study Area description

The study was conducted in Addis Ababa Fire and Emergency Authority; Arada, Kirkos, Addis ketema, Nifasilk, Akaki, Bole, Kolfe and Gulele fire stations.



Addis Ababa is the capital city of Ethiopia founded in 1886. Addis Ababa is sub divided in 10 sub cities and 117 woreda administrations. According to 2007 census the total population of the city is 3,384,569 populations with an estimated area of 519.49 sq km and estimated population density of people 5271 per square kilo meter. The religion most believers in Addis

Ababa is of the population are Ethiopian Orthodox Christians with 74.7%, while 16.2% are Muslim, 7.7% Protestant and 0.48% catholic.

Addis Ababa Fire emergency management was established in 1926 E.C as Agency. And restructured as Authority called Addis Ababa Fire emergency management Authority.

The Authority has 1293 workers (administrative, paramedics, fire fighters, search and rescue workers, prevention awareness workers and relief workers) and 8 fire stations (in 8 sub cities).

4.3 Source of population

All workers in the selected fire stations was considered as a source population and the required sample size will drawn from this population.

4.4 Study Population

All fire fighters in the fire stations was considered as the study population.

4.5 Sample unit

The selected fire fighters in the fire stations was considered as the study samples and all the require information will be collected from these study samples.

4.6 Eligibility criteria

Inclusion criteria: All fire fighters working in Addis Ababa Fire and Emergency Prevention and Rescue Authority who are willing to participate in this study.

Exclusion criteria: Fire fighters who are seriously ill (unable to communicate).

4.7 Sample size determination procedures

Sample size for the first objective was determined by single population proportion formula. by using 95% confidence interval and 5% margin of error, the sample size was calculated below. Since our current occupational injury rate or proportions of any related concepts to occupational

injury among fire fighter issues was un known, a rate of 50% is preferred to obtain the largest possible sample size. To compute for non-response rate, 5% of the required was added, and then the total sample size becomes 403.

$$n = \frac{Z(\alpha/2)^2 P(1-P)}{d^2}$$

Where
n = Sample size required
P = Assumed proportion of work related injuries among fire fighters in FAE
$Z_{\alpha/2}$ = confidence level at 95% =1.96, using level of significance of α =0.05
d = Margin of error to be tolerated =0.05

$$n = \frac{(1.96)^2 (0.5)(1-0.5)}{(0.05)^2} = 384 \text{ with 5\% non response rate} = 403$$

For second objective: using double population proportion formula based on the following assumptions: work related injuries among workers not using personal protective equipment or device (PPE/D) being 63.6%, work related injuries among workers using PPE/D being 50.5% (54). Because of lack of data studied in this study we use related studies. but this was not better to this study so we choose increasing the proportions and the power. So, PPE users being 63.6% and PPE not users being 50.5%. A type I error of 5%, power to detect the assumed difference 90% and a 5% non response rate, the sample size required for the study is 161 in each group, a total of 322.

$$n_1 = \frac{(Z(\alpha/2)\sqrt{2p} + z1-\beta\sqrt{p_1q_1+p_2q_2})^2}{(p_1-p_2)^2}$$

$n_1 = n_2$, $n_t = n_1+n_2$

Where n_1 = number of workers using PPE

n_2 = number of workers not using PPE

p_1= proportion of workers not using PPE (0.636)

p_2=proportion of workers using PPE (0.505)

$p = \frac{p1 + p_2}{2} = 0.0705$ $q = 1-p = 0.9295$

$z_{\alpha/2}$ = critical value at 95% level of significance= 1.96

$z1-\beta$ = standard normal distribution value corresponding to 90% power to detect the assumed difference =1.28.

$$n_1 = \frac{[1.96\sqrt{2 \times 0.0705 \times 0.9295} + 1.28\sqrt{0.636 \times 0.364 + 0.505 \times 0.495}]^2}{(0.636 - 0.505)^2}$$

n_1 = 146 (workers using PPE) with 5% non response rate= 161

$n_1 = n_2$ =161 =total sample size was = 322

This sample size is small because of the difference between the two group of populations (P1 & P2) is high. So, the decision was done by comparing the sample size in objective one [403] and sample size in objective two [322] in terms of representativeness. The first objective sample size [403] was taken for the study.

4.8 Sampling techniques

All fire stations of fire and emergency authority were selected for this study. The study samples that have been determined in the sample size determination were distributed in all fire stations according to their proportion number. Simple random sampling technique that considered a reasonable representation of all workers in the fire and emergency authority was employed. Fire fighters list in the fire stations was sample frame (list of fire fighters). Finally, simple random sampling technique was applied to select the study participants from each fire station. To choose the respondents by constructing a sampling frame and writing identification code on each of paper identical in terms of color, size and the same shape to limit the bias. Study participants were selected by simple random sampling method from each fire station through lottery method. The calculated sample size (n=403) was allocated proportionally to the size of the selected fire stations of Addis Ababa fire and emergency prevention and rescue authority.

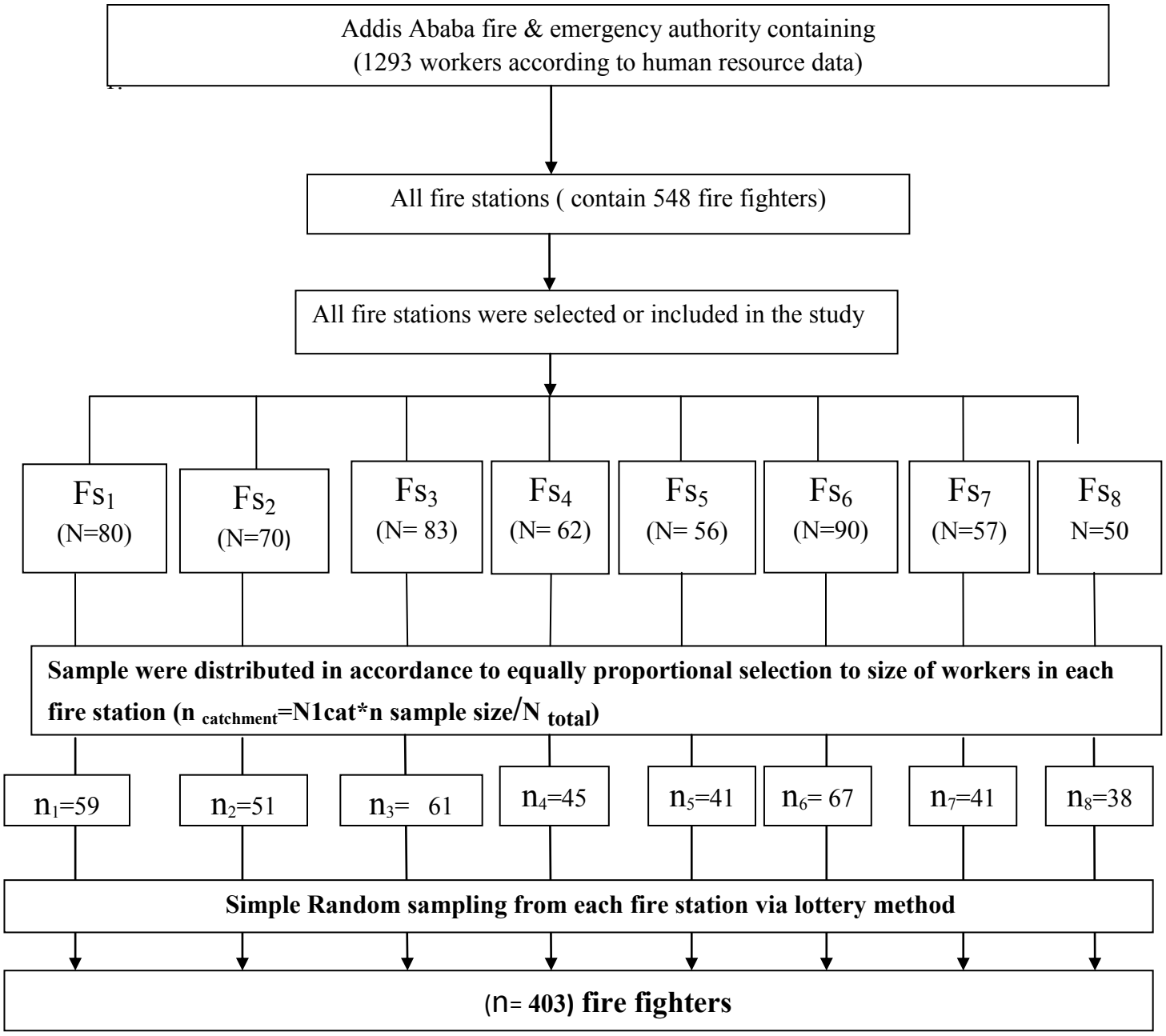


Figure 2: Schematic presentation of sampling procedure

Note: Fs $_1$ = Arada fire station, Fs $_2$= Kirkos fire station, Fs $_3$ = Addis/k fire station, Fs $_4$ = N/silk fire station, Fs $_5$ = Akaki fire station, Fs $_6$ = Bole fire station, Fs $_7$ = Kolfe fire station and Fs $_8$ = Gullele fire station

4.8 Data collection procedures

4.8.1. Data Collection instrument

Data was collected using self structured questionnaire designed by reviewing pertinent research findings on the issue under caption. The questionnaires were constitute information on socio-demographic variable, occupational related variable and behavioural and psychosocial variables. To check whether the translation is consistent with the Amharic version the questionnaire was back translated to English. The data collection instrument was pretested in the similar fire & emergency service setting workers which was not selected for the study before the final administration of the questionnaire. Finally, observational check list also used to observe working environment of fire fighters during duty and incident responding.

4.8.2. Data Collection procedures

One supervisor and four health professional data collectors were used. Individual's knowledge in occupational health and safety issues who were working in occupational health and safety, environmental health, were used as data collectors. Four day training was given for the data collectors to help for internalization of the questioner and how to collect in the field (field data collection). Mean while any doubts in the questionnaire was clarified and data collected within 25 days. Pre-test was done in the week before data collection. Actual data collection was conducted from Dec. 2016 to June, 2017.

4.9 Study Variables

4.9.1 Dependent variable

- Occupational injury

4.9.2 Independent variables

- Socio-demographic factors:- Age, Sex, Religion, Marital status, Educational status, Salary income and Years of service.

- Occupational related factors:- Working hours, Work shift, Health and Safety training, Job performance /manual or machine/, Presence of supervision, Work place instability, Warning signs, Use of mobile devices to move materials safely, Safely designed and color marked materials, Safely guarded machines, Timely maintained machines and Safety & Health at work place, Job interfere with family life and Family interfere with job.
- Behavioural and psychosocial factors:- Smoking cigarette, Drinking alcohol, Khat chewing, Sleeping disorder, PPE use, Trusting management at work place, Conditions in work allows to be productive, Priority of safety workers with management at work place, Learning new from work process, Chances of promotion and Promotions handling fairly.

4.10 Operational definitions

- Occupational injury:- An injury sustained on fire fighter in connection with the performance of his or her work in emergency responding within one year that causes hospitalization and working days lost as reported by the fire fighter.
- PPE:- This include items such as gloves, safety glasses, safety shoes, earplugs or muffs, hard hats (helmets), respirators, or coveralls, vests and full body suits worn to minimize exposure to serious workplace injuries.
- Cigarette smoking:- is the inhalation of smoke of burning tobacco encased in cigarettes, and cigars who smokes every day, 1-2 days and 3days.
- Drinking alcohol:- is an action of drinking alcohol contains a substantial amount of the psychoactive, a depressant which causes intoxication and unconsciousness who drinks every day, 1-2 days and 3days.
- Sleeping disorder: changes in sleeping patterns or habits.
- Health and safety training:- A worker who has got any kind of training in one year period through any kind of methods about safety and health rule implemented in fire and emergency fighting.
- Work place instability:- The intentional use of power, threatened or actual, against another person or against a group, in work-related circumstances, that either resulting

or has a high degree of likelihood of resulting in injury, death, psychological harm, mal development, or deprivation.

4.11 Data management

Data was checked for completeness and any incomplete information has been excluded from the entry. Each questioner was coded, stored in appropriate area and checked for completeness by the principal investigator during and after data collection. Data was entered into prepared EPI info version 3.5.1 computer software package templates and exported to SPSS V.20 for cleaning and analysis. After the entry of every questionnaire was completed, the soft copy of every questionnaire was checked with its hard copy to see for the consistency. Data was edited, cleaned by running simple frequency, cross tabulation to check for inconsistencies and completeness. After the cross checking, cleaning has been made to avoid missing values and other inconsistencies before analysis. Cleaned data was exported to SPSS version 20 software package for analysis.

4.12 Data analysis

After the data was edited, coded, and entered into SPSS version 20 software program for analysis, odds ratio with 95% confidence interval was used to measure the association between work related injuries and the independent (socio demographic, work environment related, behavioural and psychosocial) variables.

For first specific objective:- descriptive findings were presented by frequency tables, graphs, percentage and 95% C.I were used to summarize the socio-demographic, behavioural and working environment.

For second specific objective:- to assess the determinants with work related injuries cross tabulation, bivariate regression analysis was used to explore presence of statistical association between different independent variables and outcome variables using crude odds ratio (COR) with 95% C.I.

Finally, to assess the independent factors associated with occupational injury, multivariate logistic regression model with hierarchical entry of variables was done by considering the conceptual frame work (Figure 1). To limit the number of variables and unstable estimate in the subsequent models only variables with P-value <0.2 in the bivariate analysis were taken to the regression. In the first model, the effect of socio demographic variables on the occurrence of occupational injury was assessed. In the second model, the effect of behavioral and psychosocial variables was added, and their effect was assessed in the presence of socio demographic factors. Finally, work environment factors were added to explore their effect in the presence of socio demographic factors and behavioral & psychosocial factors in the final model. Finally, variables with p-value <0.05 in the multivariate analysis were considered significant, and presented by Adjusted Odds Ratio (AOR) with 95% C.I.

4.13 Data quality control methods

To maintain the quality of the data structured, pre-tested questionnaires and standardized questionnaire was used to collect information. Four day training was given to all data collectors and supervisors on the objective of the study, the content of the questionnaire, ethical issues of the study and field data collection procedure. The overall coordination was made by the principal investigator. The collected data was frequently checked at the field by the principal investigator and the supervisor through close follow up. The questionnaire was checked for completeness every night at the time of data collection. Missed variables during the first visit were filled by re-interviewing the study participants. Feedback on previous day activities was given for both data collectors and supervisors before the next day data collection. After data collection, the collected data was rechecked for its completeness and consistency by the supervisor and principal investigator. Then, it was entered into EPI info version 3.5.

4.14 Ethical consideration

Ethical clearance was obtained from the Ethical Committee of Addis Ababa University School of public health. Formal letter was written for Addis Ababa fire and emergency prevention rescue Authority which was taken from Addis Ababa University School of Public Health. Participants

were informed about the purposes of the study. The participants were informed that they have full right to discontinue or refuse to participate in the study.

Verbal consent was obtained from the respondents and brief explanation of the aim of study was provided with the questionnaire. Any information forwarded was kept private and his/her name and identification card number was specified.

Confidentiality also maintained by omitting their names and personal identification or privacy. The study has no risk on participant and there is also no direct benefit for being participated on the study. There is no benefit the study participants can get in terms of money or other item.

On the other hand, the study findings would be used to design strategies for prevention and control mechanism of work related injuries and related factors of fire & emergency workers.

The Addis Ababa city fire and emergency workers will benefit from interventions/measures to be taken by the authority on the identified gaps in improving occupational related injuries prevention and control strategies. If injury occurred at the time of data collection, it will be reported for clinic or first aid will be given if possible.

4.15 Dissemination of results

The finding of the study will be disseminated to Addis Ababa University, School of Public Health, City Addis Ababa government of Fire & Emergency Authority and Bureau of Addis Ababa Social Affairs.

The findings will be also disseminated through publishing on national and international journals and presentations on scientific conferences.

5. Results

5.1 Socio demographic characteristics

Out of 403 respondents, 400 respondents participated in the study brings the participation rate to 99.3%. Majority of respondents, 366 (91.5%) were males and 193 (52.7%) were married. Most of 195 (48.75%) of respondents were in the younger age group (less than 30 years age) and 305 (76.2%) followers of Ethiopian orthodox. The mean, median and mode age of respondents were 33.73, 31 and 30 with the minimum and maximum age of 22 and 63 respectively. Majority of study participants 207 (51.75%) have educational level of technical and vocational training diploma, and 127 (31.75%) were secondary school complete. Work experience of respondents shows, 266 (66.5%) had served from 1-5 years. Regarding monthly salary 336 (84.0%) responders had earned between 3000 and 4000 Ethiopian Birr. From those respondents 297 (74.25%) were junior fire-fighters (Table 1).

Table 1. Socio demographic characteristics of participants in fire and emergency, Addis Ababa, 2017 (n=403)

Variable	Frequency	%
Sex group		
Male	366	91.5
Female	34	8.5
Age group		
20-30year	195	48.8
31-40year	119	29.8
41-50year	64	16
>51year	22	5.5
Religion		
Orthodox	305	76.2
Protestant	79	19.8
Muslim	16	4.0
Marital status		
Married	211	52.8
Single	189	47.2
Educational status		
Read and write	21	5.2
Secondary school	127	31.8
Diploma	207	51.8
Degree and higher	45	11.2
Service in year		
1-5 year	266	66.5
6-10 year	63	15.8
>10 year	71	17.8
Monthly Salary income in ETB		
3000-4000ETB	336	83.8
4001-5000ETB	48	12.1
5001-6000ETB	16	4.0
Job category		
Junior fire fighter	297	74.2
Senior fire fighter	103	25.8

5.2 Prevalence and distribution of occupational related injuries

One hundred eight 108 (27.0%) with 95% C.I: (26.79-27.21) of study participants had responded that they had incident at job resulted occupational injury in the last 12 months giving the prevalence rate of 27.0%. Out of total injured respondents 80 (74.1%) and 19 (17.6%) were injured one time and two times respectively in the past 12 months before the survey. Out of injured respondents, 105 (98.2%) of participants had reported that they were hospitalized. A total of 759 working days were lost due to injury.

Injured respondents were asked about body part affected, types, sources, days of the week of injury occurrence and time occurrence injury. Study participants responded that upper extremity 42 (10.5%) abdominal/thoracic 17 (4.2%), head/neck injury 24 (6.0%); lower extremity 17 (4.2%), back injury 8 (4.2%) were commonly affected parts of the body. Wounds 29 (7.2%), Suffocation 28 (7.0%), sprains and strains 21 (5.2%), fracture and dislocation 10 (2.5%) were predominantly occurred type of injury.

Among injured fire-fighters who were assigned at different emergency responding activities 46 (11.5%), 30 (7.5%), 10 (2.5%), 8 (2.0%) were injury occurred at fire incident, fall accident during activities, chemical substances and electric incident respectively.

Regarding days of injury occurred 14 (13%), 10 (9.2%) and 7 (6.5) injuries occurred on Saturday, Tuesday and Sunday respectively. But 55 (13.8%) didn't now days of injury occurred. Injured participants were also asked about time of injury occurred and 61 (15.2%), 16 (4.0%) were responded Evening and Morning were more times of injury occurred respectively. But 19 (4.8%) didn't now time of injury occurred (Table 2).

Table 2: Distribution, Severity, injured body parts, Causes and Types of occupational related injuries among workers in fire & emergency, Addis Ababa, May, 2017 (n=403)

Variable	Frequency	%
Injuries in the past 12 month		
Yes	108	27
No	292	73
Occurrence in the past 12 month		
Once	80	74.1
Twice	19	17.6
Three times	6	5.6
Four and above	3	2.8
Injuries in the last 2 weeks		
Yes	25	6.2
No	375	93.8
Injuries in the last 2 weeks		
Once	23	92
Twice	2	8
Affected body part		
Abdominal/thoracic	17	15.7
Head/neck	24	22.2
Upper extremity	42	38.9
Lower extremity	17	15.7
Back	8	7.4
Causes of injury		
Fire	46	43
Fall accident	30	28
Exposure to chemical substance	10	9.3
Electric	8	7.5
Machinery	6	5.6
Hot substance	1	0.9
Lifting objects	6	5.6
Days of injury occurrence		
Monday	7	6.5
Tuesday	10	9.3
Wednesday	5	4.6
Thursday	6	5.6
Friday	4	3.7
Saturday	14	13
Sunday	7	6.5
Don't remember	55	50.9

Time of injury occurrence		
Morning	16	14.8
After noon	7	6.5
Evening	61	56.5
Holly day	5	4.6
Don't remember	19	17.6
Types of injury		
Wounds	29	26.8
Suffocation	28	25.9
Sprains and strains	21	19.4
Fracture and dislocation	10	9.3
Puncture	7	6.5
Chemical poisoning	5	4.6
Electric	4	3.7
Burns and heat related	4	3.7
Hospitalized/laid at home		
Yes	108	100
No	0	
Number of days hospitalization (274 days)		
≤ 24 hour	34	31.5
>24 hour	74	68.5
Number of days absentee from works (759 days)		
≤ 5 days	34	31.5
>5 days	74	68.5

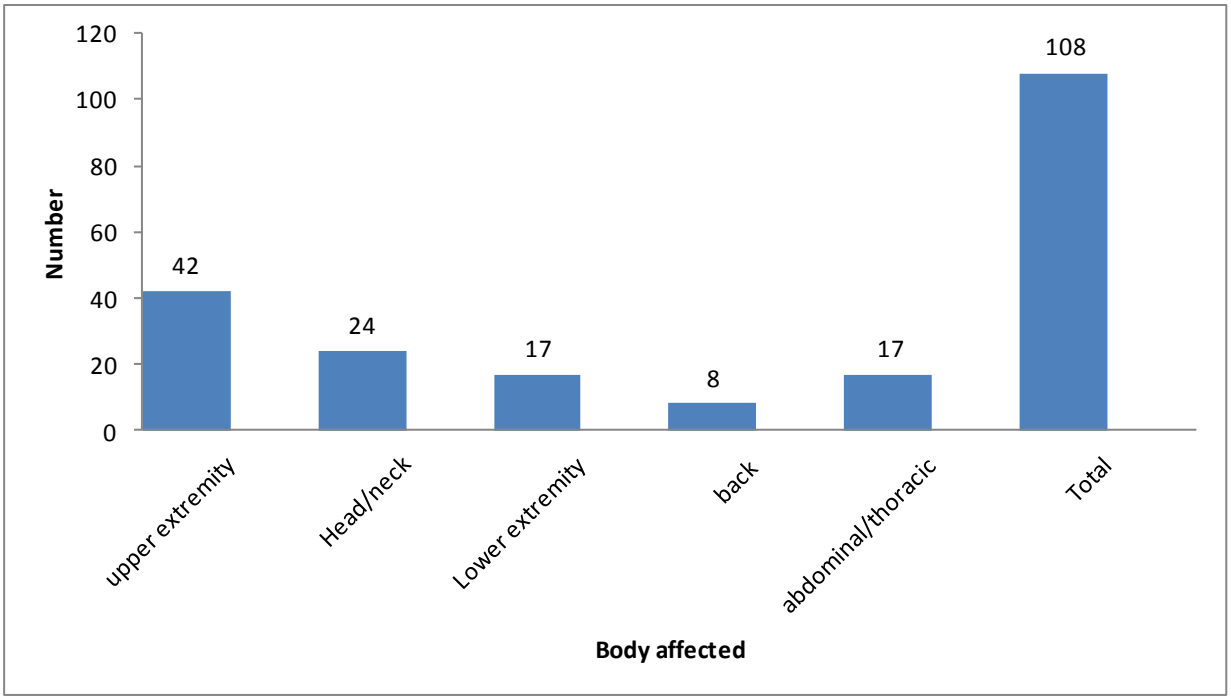


Figure 2 : Prevalence of injuries on different body parts among workers in fire & emergency, Addis Ababa, Ethiopia, May, 2017 (n=403)

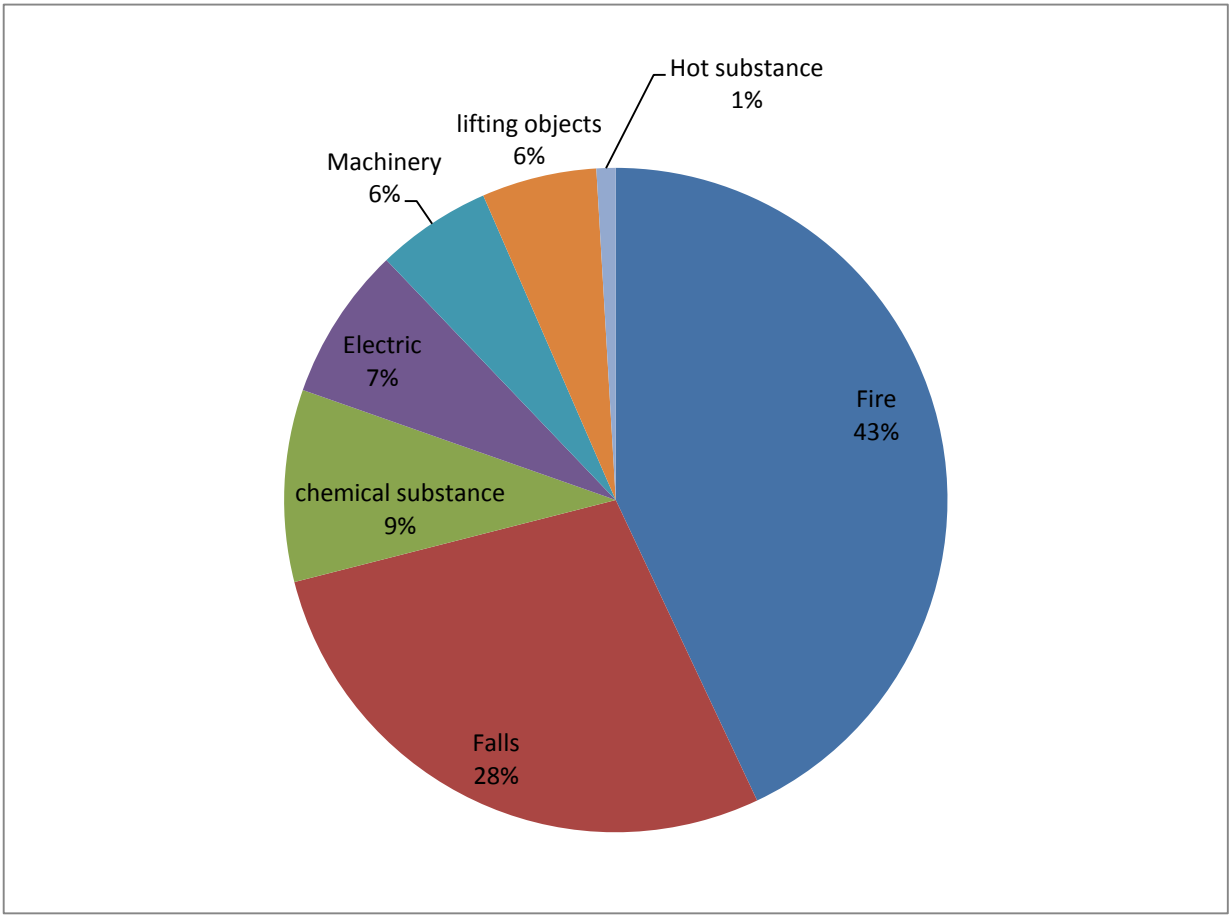


Figure 2: Causes of occupational injuries among fire & emergency fire fighters, Addis Ababa, Ethiopia, May, 2017 (n= 403)

Source: Fire and emergency authority, Mercato fire accident, 2016

5.3 Description of Occupational related factors

Three hundred eighty six (96.5%) participants worked for more than 48 hours per week.

Three hundred thirty (82.5%) of participants had not been regularly supervised at work about safety. Two hundred fifty four (63.5%) had never taken on job safety and health training.

Only one hundred forty six (36.5.0%) of respondents received on job safety and health training. Three hundred eighty six (96.5%) of participants had work shift. Three hundred fifty two (88%) of participants were reported accidents respond using both (manually and machine). Two hundred thirty two (68%), Two hundred sixty three (65.9%) of respondents revealed that no functional dangers or warning signs during activities, machines not maintained timely respectively. Two hundred thirty nine (59.7%) of participants were also revealed family interfere with work on job develop frustration and similarly two hundred seventeen (54.2%) of participants were revealed job interfere with family life (Table 3).

Table 3. Work Environment characteristics of study participants in Fire and emergency Addis, Ababa, Ethiopia, May, 2017 (n=403)

Variable	Frequency	%
Work shift		
Yes	386	96.5
No	14	3.5
Working hour		
> 48 hour	386	96.5
≤ 48 hour	14	3.5
Safety & health at work place		
Yes	190	47.5
No	210	52.5
Safety supervision		
Yes	70	17.5
No	230	82.5
Health and Safety training		
Yes	254	63.5
No	146	36.5
Work place instability		
Yes	60	15
No	340	85
Job performance		
Manually	31	7.8
Machine	17	4.2
Mixed	352	88
Family interfere with work		
Yes	239	59.7
No	161	40.3
Use mobile devices to move materials safely		
Yes	319	79.8
No	81	20.2
Job interfere with family life		
Yes	217	54.2
No	183	45.8

Safely designed and color marked materials		
Yes	249	62.2
No	151	37.8
Functionally warning signs during activities		
Yes	168	32
No	232	68
Safely guarded machines		
Yes	310	77.5
No	90	22.5
Timely maintained machines		
Yes	136	34.1
No	263	65.9

5.4 Behavioural and psychosocial characteristics of the study participants

Concerning behavioural and psycho-social factors, 106 (26.5%) of participants used to drink alcohol, 166 (41.5%), have sleeping disorder. Of those having sleeping disorder 118 (29.3%), 27 (6.9%) and 21 (5.3) reported that as reason working in Evening , working more than one task at time and working more than 8 hour respectively. Regarding availability of PPE, 262 (65.1%) used personal protective equipment at work places. And of those not using personal protective equipment 141 (34.9%) cited 60 (14.9%), 57 (14.1%), and 24 (5.9%) were reported as reason, unavailability (not being provided on time) PPE/D, not comfortable to use, lack of awareness on PPE respectively (Table 4).

Table 4. Behavioural & psychosocial factors of respondents in Fire & Emergency, Addis Ababa, May, 2017 (n=403)

Variable	Frequency	%
Habit of cigarette smoking		
Yes	17	4.2
No	383	95.8
Frequency of cigarette smoking		
Every day	6	26.1
1-2 day	10	43.5
3 day	3	13
4-5 day	4	17.4
Habit of alcohol drinking		
Yes	106	26.5
No	294	73.5
Frequency of alcohol drinking		
Every day	5	4.6
1-2 day	72	66.1
3 day	13	11.9
4-5 day	19	17.4
Habit of chat chewing		
Yes	25	6.2
No	375	93.8
Frequency of chat chewing		
Everyday	2	8.3
1-2 days	18	85
3 days	1	4.2
4-5 days	3	12.5
Trusting management at work place		
Yes	145	36.2
No	255	63.8
Thinking treated in respect of organization		
Yes	154	38.5
No	246	61.5
Conditions in work allows to be productive		
Yes	323	80.8
No	77	19.2

Priority of safety workers with management at work place		
Yes	110	27.5
No	290	72.5
Learning new from work process		
Yes	151	37.5
No	249	62.5
Chances of promotion		
Yes	62	15.5
No	338	84.5
Promotions handling fairly		
Yes	51	12.8
No	349	87.2
Sleeping disorder		
Yes	166	41.5
No	234	58.5
PPE use		
Yes	262	65
No	141	35
Reason for not using PPE		
Poor availability	60	42.6
Lack of awareness	24	17.0
Not comfortable to use	57	40.4

6. Bivariate analysis

6.1 Socio demographic characteristics associated with Occupational related injuries

From socio-demographic factors sex was significantly associated with work related injury. The odds of developing injury among males were 2.98 times higher than that of females [COR: 2.98, 95% CI: (1.02-8.66)] (Table 5).

Table 5. Bivariate analysis for socio demographic factors with Occupational related injuries among fire & emergency workers in Addis Ababa, May, 2017 (n=403)

Variable	Occupational injury		COR (95% CI)	P- value
	Yes	No		
Sex				
Male	104	272	2.98 (1.02-8.66)	0.045*
Female	4	30	1.00	
Age Group				
20-30 year	52	143	1.00	0.517
31-40 year	37	82	1.24 (0.75-2.05)	
41-50 year	15	49	0.84 (0.43-1.63)	
>50 year	4	18	0.61 (0.19-1.90)	
Marital status				
Married	53	158	1.00	0.371
Single	55	134	1.22 (0.79,1.90)	
Educational level				
Read and write	3	18	0.33 (0.08,1.31)	
Secondary school(9-12)	31	96	0.65 (0.31, 1.35)	0.362
Diploma	59	148	0.79 (0.40, 1.60)	
Degree and higher	15	30	1.00	
Job category				
Junior fire fighter	81	216	1.05 (0.63,1.75)	
Senior fire fighter	27	76	1.00	0.835
Service year				
1-5 year	74	192	1.57 (0.82-2.98)	
6-10 year	20	43	1.89 (0.86 -4.17)	0.261
>10 year	14	57	1.00	
Salary income				
3000-4000 ETB	96	240	1.20 (0.38,3.81)	
4001-5000 ETB	8	40	0.6 (0.15,2.34)	
5001-6000 ETB	4	12	1.00	0.227

Note-*Significant at p-value <0.05, **significant at p-value <0.01, ***significant at p-value <0.001 and ****Eligible for multivariate analysis <0.2.

6.2 Occupational related factors associated with occupational injuries

In work environment related factors, Poor health and safety at work place, lack of functional dangers or warning signs during activities, family interfere with work on the job, job interfere on family life, working on unguarded machine or uninstalled safety devices and raw materials or products not stored by coded in color were statistically associated with work related injuries. The odds of developing injuries among workers assigned at a work environment lacking warning signs or functional dangers during activities were 2.2 times than those workers working in that opposite work environment [COR:2.19, 95% CI:(1.36-3.53)]. The odds of developing injuries among workers facing family interference with work were 3.2 times higher than those workers working without family interference with work [COR: 3.20, 95% CI:(1.60-6.52)]. The odds of developing injuries among workers working on unguarded machine or uninstalled with safety devices were 2.1 times than those workers working with safely guarded machines [COR: 2.07, 95% CI:(1.25-3.40)]. Finally the odds of developing injuries among workers working in environment with raw materials or products not stored by coded in color were 1.6 times than those workers working in environment with raw materials and products properly ordered and color coded [COR:1.63, 95% CI:(1.04-2.55] (Table 6).

Table 6. Bi-variates analysis for determinants associated with injuries among fire-fighters in fire and emergency, Addis Ababa, May, 2017(n=403)

Variable	Occupational injury		COR 95%CI	P- value
	Yes	No		
Work shift				
Yes	105	281	1.37 (0.37-5.00)	0.634
No	3	11	1.0	
Hours worked per week				
>48 hours	105	281	1.37 (0.37-5.00)	0.634
<48 hours	3	11	1.0	
Safety supervision				
Yes	43	27	1.0	0.383
No	65	265	1.31 (0.71-2.39)	
Safety and Health training				
Yes	47	193	1.0	0.077****
No	61	99	1.5 (0.96-2.36)	
Job performance				
Manually	23	8	1.0	0.933
Machine	13	4	0.88 (0.22-3.51)	
Mixed	256	96	1.09 (0.47-2.49)	
Family interfere with work				
Yes	78	161	2.12 (1.31-3.42)	0.002*
No	30	131	1.0	
Work place instability				
Yes	86	38	1.71 (0.96-3.05)	0.069****
No	22	254	1.0	
Safety & health at work place				
Yes	32	158	1.0	0.0001***
No	76	134	2.8 (1.74-4.49)	
Job interfere with family life				
Yes	75	142	2.40 (1.50-3.84)	0.0001***
No	33	150	1.0	

Use of mobile devices to move materials safely				
Yes	91	228	1.0	
No	17	64	1.5 (0.83-2.70)	0.174****
Performing materials color marked to prevent from accidents				
Yes	58	191	1.0	
No	50	101	1.63 (1.04-2.55)	0.033*
Functional warning signs during activities				
Yes	31	137	1.0	
No	77	155	2.19 (1.36-3.53)	0.001**
Machines guarded with safety devices				
Yes	73	237	1.0	
No	35	55	2.07 (1.25-3.40)	0.004*
Machines always maintained				
Yes	35	101	1.0	
No	73	190	1.11 (0.693-1.77)	0.667****

Note-*Significant at p-value <0.05, **significant at p-value <0.01, ***significant at p-value <0.001 and ****Eligible for multivariate analysis <0.2.

6.3 Behavioural and psychosocial factors associated with work related injury

In behavioural and psychosocial factors, cigarette smoking, Personal Protective Equipment use (PPE), sleeping disorder, poor trusting of the management in an organization on safety issues, poor treatment of first responders in respect of management in an organization, poor priority giving for first responders safety in management of an organization, routine work or lack of learning new thing from work process, poor chances for promotion and poor promotion handling for workers were significant association to occupational related injuries. The odds of developing injuries among workers who smoke cigarette were 4.2 times higher than workers not smoking cigarette [COR: 4.16, 95% CI: (1.54-11.21)]. The odds of developing injuries among workers not using personal protective equipments at work were 1.95 times than those properly using personal protective equipments (PPE) at work [COR:1.95, 95% CI: (1.22-3.12)]. The odds of developing injuries among workers who had poor trusting on the management of an organization in safety issues were 1.91 times than those have trust in management of an organization in safety issues [COR:1.91,95% CI: (1.17-3.12)]. The odds of developing injuries among workers who had not treated with respect of the organization was another factors show 1.92 times than those workers treated in good approach in respect of an organization [COR:1.92, 95% CI: (1.19-3.10)]. The odds of developing injuries among workers not learning new thing from their job process during activities were 2.1 times than those learnt new thing from routine work or from their job process during activities [COR:2.08, 95% CI: (1.27-3.39)]. The odds of developing injuries among workers working in poor management of an organization in prioritizing safety of workers 3.63 times than those working in management of an organization prioritizing safety of workers [COR:3.63, 95% CI: (1.94-6.82)]. The odds of developing injuries among workers working of an organization having poor chances of promotion 2.1 times than

those working in an organization having good chances of promotion [COR:2.1, 95% CI: (1.04-4.35)]. The odds of developing injuries among workers working in organization of poor handling promotion 3 times than workers working in organization having good promotions handling [COR:3.09, 95% CI: (1.28-7.49)] (Table 7).

Table 7. Bivariate analysis for behavioural factors among fire fighters in Fire & Emergency, Addis Ababa, May, 2017 (n=403)

Variable	Work related injury		COR 95%CI	P -value
	Yes	No		
Cigarette smoking				
Yes	10	7	4.16 (1.54-11.21)	0.005**
No	98	285	1.0	
Alcohol drinking				
Yes	33	73	1.32 (0.81-2.15)	
No	75	219	1.0	0.264
Chat chewing				
Yes	10	15	1.88 (0.82-4.33)	
No	98	277	1.0	0.136****
Trusting management at work place				
Yes	28	117	1.0	
No	80	175	1.91 (1.17-3.12)	0.01*
Thinking treated with respect of an organization management				
Yes	30	124	1.0	
No	78	168	1.92 (1.19-3.10)	0.008*
Conditions in work allows to be productive				
Yes	87	236	1.0	
No	21	56	1.02 (0.58-1.78)	0.952
Priority of safety workers with management at work place				
Yes	13	97	1.0	
No	95	195	3.63 (1.94-6.82)	0.0001***
Learning new from work process				
Yes	28	123	1.0	
No	80	169	2.08 (1.27-3.39)	0.003*
Chances of promotion				
Yes	10	52	1.0	
No	98	240	2.12 (1.04-4.35)	0.039*
Promotions handling fairly				
Yes	6	45	1.0	
No	102	247	3.09 (1.28-7.49)	0.012*
Sleeping disorder				
Yes	66	100	3.02 (1.91-4.76)	
No	42	192	1.0	0.0001***
Use of PPE				
Yes	41	218	1.0	
No	67	74	4.81 (3.01-7.70)	0.0001***

Note-*Significant at p-value <0.05, **significant at p-value <0.01, ***significant at p-value <0.001 and ****Eligible for multivariate analysis <0.2.

6.4 Work environment observation

Working environment of studied fire stations was observed on duty and 5 of them fire stations of workers were not wearing appropriate PPE at the time of observation. Workers randomly asked about why they not using PPE, and most of them responded the organization not providing on time, not comfortable to use due poor quality of the PPE and due to excessive heat (temperature). Some working machines (fire trucks) were not guarded with safety devices to prevent workers from accidents. Some machines (fire trucks) were also observed in fire stations not maintained and out of functions. Workers in these fire stations were also not using hearing protection PPE and protection gloves, safety shoe during inspection. They told because of excessive heat absorption. All fire stations have not posted safety sign and symbols on working environment and working machines for workers to protect themselves from accidents. And all fire stations had no safety and health personnel. None of working machines (fire trucks) observed with first aid equipment and only one central clinic had in the head quarter.

7. Multivariate logistic regression

In behavioural factors, PPE use and sleeping disorder sustained their significance. The odds of developing injuries among workers who had not habit of PPE use at work were 3.8 times than those PPE users at work [AOR: 3.76, 95% CI: (2.23-6.36)]. The odds of developing injuries among workers with sleeping disorder or those sleeping at work place 2.6 times than those compared with not have sleeping disorder at work place [AOR: 2.61, 95% CI: (1.53-4.46)].

In work environment factors, lack of safety & health training and lack of warning signs during activities were significantly associated to work related injuries. The odds of developing injuries among workers working without health and safety training were 2.2 times than those properly trained in health and safety [AOR: 2.22, 95% CI: (1.26-3.88)]. The odds of developing injuries among workers working on environment lack of warning signs during their activities were 2 times than those workers working in environment with warning signs [AOR: 2.02, 95% CI: (1.09-3.75)] (Table 8).

Table 8: Multivariate logistic regression analysis of adjusted effect of selected socio demographic, work related factors and behavioural factors of participants associated with occupational related injury in Fire & Emergency, Addis Ababa, May, 2017 (n=403)

Characteristics	Injury		COR (95%CI)	AOR (95% CI)		
	Yes	No		Model 1	Model 2	Final Model
Sex group						
Male	104	272	2.87 (1.02-8.66)	3.82 (1.19 -12.21)*		
Female	4	30	1.0	1.0		
PPE use						
Yes	65	218	1.0		1.0	1.0
No	43	74	1.95 (1.22-3.12)		3.92 (2.36-6.52)*	3.76 (2.23-6.36)
Sleeping disorder						
Yes	55	79	2.79 (1.77-4.42)		2.81 (1.67-4.71)**	2.61 (1.53-4.46)**
No	53	213	1.0		1.0	1.0
Priority of safety workers with management at work						
Yes	13	97	1.0		1.0	
No	95	195	3.63 (1.94-6.82)		2.43 (1.14-5.17)*	
Safety and Health training						
Yes	61	190	1.0			1.0
No	47	99	1.5 (0.96-2.36)			2.19 (1.25-3.86)*
Warning signs						
Yes	31	137	1.0			1.0
No	77	155	2.19 (1.36-3.53)			1.86 (1.01-3.45)*

RG- Reference Group, * Significant at p- value <0.05, **significant at p value <0.01 and

***significant at p- value <0.001

8. Discussion

This study shows the prevalence of occupational related injury on substantial level. Since there is no research done related to prevalence injury and determinants in the fire service organizations. A number of factors that determine the occurrence of injury were recorded. Not using personal protective equipment/device, sleeping disorder, absence of safety & health training and lack of warning signs during activities was significantly associated with occupational related injury. In this study, the overall prevalence of occupational related injury among fire & emergency workers was 27% with [95% C.I: (26.79- 27.21)] experienced injuries in the past 12 months. This finding is higher than that of study conducted in south Korean fire service and in Greece where the prevalence injury rate was about 11.26% and 10.8% respectively (45, 46). The disparity in prevalence injury might be due to difference in sample size, study area, definitions and settings. And management of occupational health and safety programs in those fire services might be better than management of occupational safety and health programs in fire and emergency service Addis Ababa. The present study injury prevalence rate is 27%, higher than that of manufacturing industries in China, India and Sweden prevalence injury with 11.96%, 10.2% and 18% respectively (42-44). Which might be due to variation in socio-economic levels of work force, technology, work place, and environmental conditions, lack of safety and health training and management of occupational health and safety services and practices? However, the injury rate was lower than that reported from study of workers in Iron and Steel Industries Addis Ababa (47). This variation in prevalence of occupational related injuries might be related to the difference in sample population, settings and might be due to less fire accidents occurred in the last 12 months results less injuries occurred.

80 (74.1%) of injury respondents reported they had sustained occupational related injury once. Regarding to severity which was measured by hospitalization/staying at home and days away from work, showed with 105 (98.2%) hospitalization and 70 (67.3%) hospitalized more than 24 hours higher and 759 working days lost were lower than with other finding (53). This might be difference of study population; nature of activities performed at different working section could bring variation. In addition, hospitalization and working days lost can result to increase medical cost, compensation cost, absenteeism which adversely affects the workers, families and the organization working capacity. Activities in fire fighting demand high muscle energy and

accidental contact with fire and sharp machines and falls during activities might cause injury. In addition, in this study, injured workers hospitalization (98.2%) higher than a study found in Addis Ababa iron and steel industry the injured workers hospitalization to be 62.2% (54). The possible explanation could be the difference in the nature of the work and the type of machineries used. Regarding days of injury 14 (13%), 10 (9.2%) and 7 (6.5) injuries occurred on Saturday, Tuesday and Sunday respectively. This report is consistent with report in USA fire fighter injuries but not in Tuesday (13). This could be because of Saturday and Sunday in Ethiopia are the weekend times then house activities might be performed than the other days and add up for fire accidents.

In this study, the most frequently injured body parts were upper extremity (arms/hands) with the highest frequency of 42 (38.9%) followed by head and neck 24 (22.2%) and lower extremity counts 17 (15.7%). Study in Greece and USA report on fire fighters injuries showed consistent result (46, 49). These were the most active body parts in emergency responding and also exposed directly to machines. According to this study, Wounds 29 (26.8%), Suffocation 28 (25.9%), Sprains and Strains 10 (9.3%), Fracture and Dislocation 7 (6.5%) were predominantly occurred types of injury. Study done in Greece sprains and strains were commonly type of injuries (46). This finding may be attributed to low availability & utilization of PPE/D, absence of regular training regarding safety and machine safeguards, limited skills on machines & tools in use; inadequate understanding occupational hazards may increase the type of injuries. In addition to, more involvement in work which has direct exposure to fire, fall down during activities and exposure to chemical substances were the cause of injury. Besides, great concern may not be given by both the fire fighter and manager.

This study depicted that the most frequent causes of occupational injuries were exposed to fire 46 (43%), falls 30 (28%) and exposed to chemical substance 10 (9.3%) followed by lifting objects 6 (5.6%), machinery 6 (5.6%) and hot substances 1 (0.9%). This study supported by firefighter injuries report in USA, an analysis of work related causes and the circumstances of injuries among fire fighters in Poland and Study in Addis Ababa Iron and Steel industry (21, 41, 47, 49). But the reason for this study could be due to machines not guarded safely, non use of personal protective equipment/device, combined with lack of warning signs during activities; the risk of being injured was high. The most common 61 (56.5%) time of injury was in the Evening followed by Morning 16 (14.8%). Even though, having three working shifts with 8 working

hour interval in the fire and emergency service. But possible explanation for high frequency of injury could be due to lack of PPE, discomfort when using PPE and sleeping disorder, working more than one incident at a time were found to be the major causes of injury.

From work environment factors safety and health training and lack of warning signs were significantly associated with injury when adjusted to other variables. Untrained worker on safety procedures to be taken before, during and after performing the job probably not properly use PPE and the risk of getting injury is high. The result showed that only 36.5% of respondents took trainings. In addition, 17.5% respondents reported that their work place was supervised. In line with, 35.2% of respondents stated that personal protective equipments were not used due to poor availability, poor quality and poor awareness. And 65.9% respondents reported that machines not maintained timely. These factors could add up and put these fire service workers in a huge risk towards various dangers and injuries occurring in their work place. This result also similar to study conducted on the past revealed safety and health training associated with occurring occupational injury (47, 55).

Similarly, warning signs associated with occurring occupational injury is consistent with study done in Addis Ababa large scale metal manufacturing industry (53). Working on unguarded machines and work related instability were not associated with the occurrence of occupational injury. The finding was inconsistent with other study (47). This could be also variation in sampling and setups.

From behavioural factors not use of personal protective equipment/device and sleeping disorder were associated after adjusting other variables. Similar study (47) showed sleeping disorder and not using personal protective equipment as factor for occurring occupational injury. This study shows that the higher magnitude of work related injury in workers not using PPE compared to workers using PPE.

This study also shows habit of cigarette smoking, habit of alcohol drinking and habit of chat chewing were not associated with work related injuries. This might be due to workers may not want express this personal behaviours at a time of data collection.

9. Strengths and limitations of the study

9.1 Strength

Since, there is no published data on the prevalence injury and determinants among fire fighters in Ethiopia context, but the present study acts as baseline information to governmental and non governmental bodies for further research.

9.2 Limitation

- Since the study was a one year cross sectional study, the possibility of recall bias may result in under reporting and misreporting of events.
- Lack of similar studies globally and in Ethiopia context made difficult in comparing results.

10. Conclusions and Recommendations

10.1 Conclusions

This study showed the prevalence of work related injury is high among fire firefighters in Addis Ababa Fire & Emergency Authority compared with the study in South Korea and Greece fire and emergency services. The most commonly occurred occupational related injuries among fire fighters were upper extremity, head & neck injuries. Among variables lack of health & safety training, not using PPE, Sleeping disorder and lack of warning signs were identified as risk factors and significantly associated with occurring occupational related injury. Occupational injuries are assumed to be preventable with the provisions of occupational health and safety programs in work places. Therefore, the organization due attention for fire fighters injury prevention to save the public safely, because fire fighters are always at dangerous situations during emergency responding.

10.2 Recommendations

The following points are strongly recommended forwarded accordingly.

To the Addis Ababa Fire and Emergency Prevention and Rescue Authority

- The organization should give emphasis for proper using of PPE by all firefighters.
- Fire fighters should train on properly use of PPE at work place prevents major occurrence of injuries.
- Fire fighters with sleeping disorder should be assessed for routine case of sleeping and proper measure should be taken.
- Appropriate health and safety training on occupational safety and health should be conducted for all fire fighters.
- Hazard signs (warning signs) in the work place (working machines) are important before, during and after accident situations to prevent fire fighters from accidents.
- Therefore, greater attention should be given to the risk factors which results injury in fire protection related services in order to reduce the occurrence of injuries.

To Bureau of labour and social Affairs (BOLSA)

- Regional BOLSA should apply health and safety practice in governmental organizations.
- Implementations of the regulation provisions on occupational health and safety measures in governmental organizations should be due attention.
- Emphasis should be given on regulation of workers safety and health in work places based on Labor Proclamation No. 377/ 2003 and Labor Proclamation No. 515/2007 on public civil servants.

To city of Addis Ababa Municipality

- The municipality should facilitate the city fire code regulations to monitor and evaluate the safety measures of different settings.
- Implementations of the regulation provisions on occupational health and safety measures in governmental organizations should be due attention.
- Emphasis should be given on regulation of workers safety and health in work places based on Labor Proclamation No. 377/ 2003 and Labor Proclamation No. 515/2007 on public civil servants.

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Annex - 1: Participants information sheet AND Consent form

Participant's information and consent form sheet

Participant's information sheet

Greetings: Hello, my name is ----------.I am here on behalf of Hadush G/Egziabher, post graduate student from AAU, School of public health. I am member of research team on assessment of work related injuries and associated factors and requesting you to participate in this study which would require your response to an interview on some related issues.

Title of the study: Assessment of occupational related injuries and determinants among workers in Addis Ababa Fire and Emergency Prevention and Rescue Authority Addis Ababa, Ethiopia.

Objective: To assess the occupational related injuries and determinants among workers of Fire and Emergency Prevention and Rescue Authority Addis Ababa, Ethiopia

Benefit of the study: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design of occupational health and safety programs based on the recommendations and the findings.

Risk or Discomfort of the study: The study has no any risk for the participant and interview also will be private to make safe participants from management related problems.

Rights of the participant: Participating and not participating is the full right and participants can stop from participation in the study at any time. And also the participant can skip question which the worker does not want to respond. Participants can ask any questions which is not clear for understanding.

Confidentiality: to establish secured safeguards of the confidentiality of research data, your name will not be written in this form and all information given by you will be kept strictly confidential.

Whom to contact: If you will have any question about the research please contact:

Hadush G/Egziabher (PI), at 0946914988; Email: haduems16@gmail.com or

Dr Abera Kumie (Advisor) at the School of Public Health of Addis Ababa University 0911882912 Email: aberakumie2@yahoo.com.

At this time, do you want to ask me anything about the purpose or content of this interview? Are you willing to paricipate in the study?

Consent form:

I, _____hereby give my consent to participate in this study. I have been given the necessary information about the research in a language I understand. I have also understood that I can withdraw my consent any time without penalty of loss of personal benefits.

1. If yes, continue to the next page 2. If no, thank and skip to the next participant.

Name of Research Assistant_____ Signature:_____

Date of Interview: _____

English and Amharic Questioner form

Questioner ID_____

Name of fire station by code_____
Interviewee code_____
Name of interviewer_____ Signature _____
Name of supervisor _____Signature _____.
Date of interview _____

Result of interview

1. Completed

2. Respondent not available

3. Refused

4. Partially Completed.

Part I socio demographic characteristics

No	Questions	possible response
101	Sex	1. Male 2. Female
102	Age	----------
103	Religion	1. Orthodox 2. Protestant 3. Catholic 4. Muslim 5. Others
104	Marital status	1. Married 2. Single 3. Divorced 4. Widowed 5. Separated
105	Educational status	1. Illiterate 2. Read and write 3. Primary school (1-8) 4. Secondary school (9-12) 5. Technical and vocational 6. Degree or higher
107	Employment condition	----------
108	Job category	1. Junior fire-fighter 2. Senior fire-fighter 3. incident commander
109	Salary	1. 3000-4000birr 2. 4001-5000birr 3. 5001-6000birr

Part Two: work related injuries

No	Questions	possible response
201	Have you had an incident that resulted injury and hospitalization to you in the last 12 months?	1.Yes 2. No
202	Have you had an incident at work that resulted injury and hospitalization to you in the last 2 weeks?	1.Yes 2. No
203	If yes for Q201 or 202, how many times?	1. In 12 months---------- 2. In 2 weeks----------
204	Parts of the body affected	1. Abdominal /thoracic 2. Head/Neck 3. Upper extremity 4. Lower extremity 5. Back 6. Others (specify)…….
205	Types of injury	1. Burns and Heat related 2. Wounds 3. Sprains and strains 4. Poisoning 5. Fracture and Dislocation 6. Puncture 7. Electric shock 8. Suffocation 9. Others specify ……..
206	What was your personal condition at the time of injury?	1. I was new for the work process 2. Thinking about private affairs 3. Due to other medical problem 4. Accident is beyond control 5. It is the work behaviour 6. It is due to not using PPD/E 7. I don't remember 8. Others (specify) ……
207	What was the source of injury?	1. Machinery 2. Electricity 3. Fire 4. Falls 5. Hot substances 6. chemical substance 7.Lifting heavy objects 8. Others specify…….
208	What was the days of the week injury occurred?	1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5) Friday 6) Saturday 7. Sunday 8) I don't remember
209	How much is the time when injury occurred?	1. Morning 2. Afternoon 3. Evening 4. Midnight 5. I don't remember
210	Have you hospitalized or being laid on the bed at home due to injury?	1. Yes 2. No
211	If your answer for Q210 is 'yes' how long?	1. $\leq$ 24 hour 2. > 24 hour
212	The number of days you are absent from work due to injury	1. $\leq$ 5 day 2. > 5 day

Part –III- workplace related factors

No.	Questions	possible response
301	How much is your weekly working hour?	1. > 48 hrs 2. ≤ 48 hrs
302	Is your workplace is regularly supervised on safety and health?	1. Yes 2. No
303	Have you had safety and health training in connection with your job?	1. Yes 2. No
304	Have you had any work shift?	1. Yes 2. No
305	If yes for Q304, How often?	1. 8hr 2. 12hr 3. 24hr
306	Have you ever faced any work related instability like workplace violence, nervousness, managerial (colleagues) disagreement?	1. Yes 2. No
307	Do you always get safe and adequate water for your hygiene?	1. Yes 2. No
308	How often do the demands of your family interfere with your work on the job?	1. Yes 2. No
309	Do you trust management at the place where you work?	1. Yes 2. No
310	Do you think you are treated with respect in your organization?	1. Yes 2. No
311	The conditions on your job allow you to be about as productive as you could be?	1. Yes 2. No
312	Safety and health conditions where you work are good?	1. Yes 2. No
313	Is safety of workers is a high priority with management where you work?	1. Yes 2. No
315	Your job requires that you keep learning new things?	1. Yes 2. No
316	Is the chances for promotion is good in your position?	1. Yes 2. No
317	Promotions are handled fairly?	1. Yes 2. No
318	The way you performing your job is	1. by hand 2. by machine 3. both
319	Do you use mobile devices near worksites to lift or move materials safely at last 12 months?	1. Yes 2. No
320	Are performing materials colour marked to prevent you from accidents?	1. Yes 2. No
321	Are there always functional dangers or warning signs during your activities?	1. Yes 2. No
322	Are machines always guarded or installed with safety devices during your activities?	1. Yes 2. No
323	Are machines always maintained immediately when old or unsafe?	1. Yes 2. No

Part –IV- Behavioural factors

Q.N	Questions	possible response
401	Duration in same workplace in hour/day/month/year	1. 1-5 years 2. 6-10 years 3. > 10 years
402	Have you had any medical problem before or after you work in this area?	1. Yes 2. No
403	If yes for Q402,types of problem	----------
404	Do you smoke cigarette?	1. Yes 2. No
405	If yes for Q404, how often?	1) Everyday 2) 1-2 days 3) 3 days 4) 4-5 days
406	Do you drink alcohol?	1. Yes 2. No
407	If yes for Q406, how often?	1. Everyday 2. 1-2 days 3. 3 days 4. 4-5 days
408	Do you chew chat?	1. Yes 2. No
409	If yes for Q408, how often?	1. Everyday 2. 1-2 days 3. 3 days 4. 4-5 days
410	Do have any sleeping disorders?	1. Yes 2. No
411	If yes to Q410, what is the reason?	1. Working more than 8 hour without shifting 2. Working in evening 3. Trying to work more than one task at a time 4. Others explain
412	Do you use any personal protective device during emergency response?	1. Yes 2. No
413	If No to Q412, what is the reason? What are your reasons for not using personal protective equipment?	1. Organization providing PPE is not adequate 2. Lack of awareness 3. Not comfortable to use 4.Poor quality 5. Other specify

Observational checklist for the work environment
Name of fire station (Code)_____

1. Is there warning signs or safety rules in the workplace?
a. Yes b. No

Yes requires no lack of such signs or posts while inspection around.
2. Do the employees use the necessary personal protective devices?

a. Yes b. No

No requires lack of such equipment and used by each workers while inspection around.
3. Do all equipments have appropriate protective arrangement?

a. Yes b. No

Yes requires no lack of such arrangement while inspection around.
4. Does the fire station have safety and health personnel?

a. Yes b. No

Yes requires either implementation as result of initiatives from health and safety personnel or written action worked out with them?
5. Does the fire station follow written health and safety plan of action in the workplaces?

a. Yes b. No

Yes requires the completion of at least one of the measures in the plan.

6. Does the inside working machines have first aid equipment?
a. Yes b. No

Yes requires the presence of first aid equipment during data collection.

7. Does machines maintained timely?

a. Yes b. No

Yes requires there is no un maintained machines in the fire station during data collection.

8. Does machines safely guarded with safety devices?

a. Yes b. No

Yes requires there is no machines without safety devices.

የመጠይቁ መለያ ቁጥር _____የድርጅቱ ስም _____ አድራሻ_____

መጠይቁ የተሞላበት ቀን_____

ጤና ይስጥልኝ እንደምን አሉ? እኔ_____ እባላለሁ፡፡ እዚህ የመጣሁት ይህንን ጥናት የሚያካሂድ የአዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮለጅ የሕብረተሰብ ጤና ትምህርት ክፍል የድህረ ምረቃ ተማሪ የሆነውን አቶ ሃዱሽ ገ/እግዚአብሄር ወክዬ ነው ፡፡ በአዲስ አበባ ከተማ እሳትና ድንገተኛ አደጋዎች መከላከልና መቆጣጠር ባለስልጣን ውስጥ በሚሰሩ አደጋ ተቆጣጣሪዎች በስራ ምክንያት የሚከሰቱ ጉዳት መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው፡፡ ስለዚህ በጥናቱ ላይ ተሳትፎ ለማድረግ ወይም ላለማድረግ እንዲወስኑ በቅድሚያ የተወሰነ መረጃ እንሰጥዎታለን ፡፡

የጥናቱ ርዕስ

በአዲስ አበባ ውስጥ በሚገኙ የእሳትና ድንገተኛ አደጋዎች መከላከልና መቆጣጠር ባለስልጣን በአደጋ ተቆጣጣሪ ሰራተኞች ላይ የደረሱ የሥራ ላይ የሚደርሱ ጉዳት መጠንና ተያያዥ መንስኤዎች ለማጥናት ነው፤

የጥናቱ መግቢያ

በዓለማችን በየቀኑ 1000 የሚሆኑ ሰዎች ከሥራ ጋር በተያያዘ በሚከሰት አደጋ እና 5,400 በተለያዩ በስራ ላይ በሽታ ምክንያት ይሞታሉ፡፡ በአዲስ አበባ ከተማ እሳትና ድንገተኛ አደጋዎች የአደጋ ተቆጣጣሪዎች በ2006 እና በ2007 ዓ.ም በጥቅል ከ452 በላይ በአደጋ ተቆጣጣሪዎች በአደጋ ምላሽ ጊዜ አደጋ ሊደርስ ችለዋል፡፡ ስለዚህ ይህ ጥናት ወቅታዊ መረጃ በመስጠት የፖሊሲ አውጭዎች ትኩረት በመሳብ በአገር አቀፍ በአደጋ ተቆጣጣሪ ሰራተኞች በሥራ ላይ የሚደርሱ አደጋዎችን ለመከላከል ስትራተጂዎችን ለመንደፍ ያስችላቸዋል፡፡

ከጥናቱ የሚገኝ ጥቅም

አንድ ሠራተኛ ይህን መጠይቅ በመመለስ ስለተሳተፈ ቀጥተኛ የሆነ ጥቅም አያገኝም፡፡ ነገር ግን የዚህ ጥናት ውጤት ለሚመለከታቸው አካላት ሁሉ የሚሰራጭ በመሆኑ በቀጣይ ሥራ ላይ የሚደርስ አደጋ በመከላከል ከፍተኛ ሚና የሚጫወት በመሆኑ በተዘዋዋሪ ተጠቃሚ ይሆናል፡፡

በጥናቱ የመሳተፍ ሲጋት

አንድ ሠራተኛ በዚህ ጥናት ላይ በመሳተፉ ምክንያት የሚደርስ ምንም አይነት ጉዳት የሌለ ሲሆን በተጨማሪም መጠይቁን የሞላው ሠራተኛ ማንነት ለተቋሙ አስተዳደር ሆነ ለሌላ አካል አይገለጽም፡፡

የጥናቱ ተሳታፊዎች መብት

በዚህ ጥናት መሳተፍ እና አለመሳተፍ የአንድ ሠራተኛ ሙሉ መብት ነው፡፡ ከዚህ ባሻገር በጥያቄ ለመመለስ የማይፈልገውን ጥያቄ መዝለልም ሆነ ከጥናቱ በየትኛውም ሰዓት እራሱን ማግለል ይችላል፡፡ በተጨማሪ ያልገባው እና የተጠራጠረበት ጥያቄ ካለ የጥናቱን አስተባባሪ መጠየቅ ይችላል፡፡

ምስጢራዊነት

በዚህ መጠየቅ የተሰጠው መረጃ ሚስጥራዊነት የተጠበቀ ሲሆን የሠራተኛ ስም በፍፁም አይገለፅም፡፡

ስምምነት

ይህን መጠይቅ ሲሞሉ በጥናቱ አላማ ተስማምተው በፈቃደኝነት በጥናቱ ላይ ለመሳተፍ እንደተስማሙ ይቆጠራል፡፡

መጠይቁን ያስሞላው ሰው ስም_____ ፊርማ_____

የሱፐርቫይዘሩ ስም_____ ፊርማ_____

የመጠይቁ ውጤት

1. በሙሉ ተሞልቷል ☐ 2. በግማሽ ተሞልተዋል ☐ 3. ተሳታፉው አልተገኘም ☐ 4. ለመሙላት ፍቃደኛ አልሆነም ☐

ማሳሰቢያ፡- ያልገበዎት ወይም ጥያቄ የሆነቦዎት ሁኔታ ካለ በ 0946914988 ደውለው መጠየቅ ይችላሉ፡፡

ክፍል አንድ
ማህበራዊ እና ስነ-ሕዝባዊ ሁኔታዎችን በተመለከተ

ተቁ	ጥያቄዎች	አማራጭ መልሶች
101	ጾታ	1. ወንድ 2.ሴት
102	ዕድሜ	----------
103	ሀይማኖት	1.ኦርቶዶክስ ክርስትያን 2.ፕሮስትስታንት 3.ካቶሊክ 4.ሙስሊም 5. ሌላ ካለ
104	የትምህርት ደረጃ	1. ማንበብ እና መጻፍ የሚችል 2. የመጀመርያ ደረጃ ትምህርት ያጠናቀቁ/1-8/ 3. ሁለተኛ ትምህርት ያጠናቀቁ/10-12/ 4. ቴክኒክና ሙያ እና ኮሌጅ ዲፕሎማ 5. የመጀመርያ ዲግሪና ከዚያ በላይ
105	የጋብቻ ሁኔታ	1. ያገቡ 2.ያላገቡ 3.የፈቱ 4.በሞት የተለዩ
106	የቅጥር ሁኔታ	----------
107	የስራ ድርሻ	1. ጁኒየር ፋይር ፋይተር 2. ሺኒየር ፋየር ፋይተር 3. አደጋ መሪ
108	የወር ደመወዝ	1. 3000-4000 ብር 2. 4001-5000 ብር 3. 5001-6000 ብር

ክፍል ሁለት
ከስራ ጋር በተየያዘ ጉዳትን በተመለከተ

ተቁ	ጥያቄዎች	አማራጭ መልሶች
201	ባለፉት 12 ወራት ውስጥ ከስራዎ ጋር በተያያዘ የደረሰበዎት ጉዳት አለ?	1. አለ 2. የለም
202	ባለፉት ሁለት ሳምንት ውስጥ ከስራዎት ጋር በተያያዘ የደረሰበዎት ጉዳት አለ?	1. አለ 2. የለም
203	ለጥያቄ 201 ወይም 202 መልስዎት አለ ከሆነ ስንት ጊዜ ነው ጉዳት የደረሰዎት?	1. በአስራ ሁለት ወራት ውስጥ---------ጊዜ 2. በሁለት ሳምንት ውስጥ ------- ጊዜ
204	የተጎዳቦዎት የሰውነት ክፍል?	1. በሆድና በደረት አከባቢ 2. ከአንገት በላይ ጉዳት 3. እጅ አከባቢ 4. እግር አከባቢ 5. ጀርባ 6. ሌላ ካለ ይጥቀስ--
205	የጉዳቱ ዓይነት?	1. ቃጠሎ 2. የመቁሰል አደጋ 3. ወለምታና ስር መዞር 4. መመረዝ 5. ስብራት 6. መወጋት 7.በኤሌክትሪክ መያዝ 8.በጭስ መታፈን 9. ሌላ ካለ ገለጽ.....

206	አደጋ የደረሰዎት በምን ምክንያት ነው ብለው ያስባሉ?	1. ለስራው አዲስ በመሆኑ 2. ስለ ግል ሕይወት እያሰቡ ስለነበር 3. በሌላ የጤና ችግር ምክንያት 4. አደጋን መከላከል ስለማይቻል 5. የስራው ባሕሪ ስለሆነ 6. የጉዳት መከላከያ መሣሪያ ስላልተጠቀምኩ 7. የጉዳቱን ምክንያት አላስታውስም 8. ሌላ ምክንያት ካለ ይጠቀስ .....
207	የጉዳቱ መንስኤ ምን ነበረ?	1. በማሽን 2. በኤሌክትሪክ 3. እሳት አደጋ 4. በመውደቅ 5. በሞቋት ነገሮች 6. በኬሚካል 7. ከባድ ዕቃዎችን በማንሳት 8. ሌላ ምክንያት ካለ ይጠቀስ
208	አደጋው የተከሰተው በምን ቀን ነበረ?	1. ሰኞ 2. ማክሰኞ 3. ረቡዕ 4. ሐሙስ 5. አርብ 6. ቅዳሜ 7. እሁድ 8. ቀኑን አላስታወስም
209	አደጋው የተከሰተበት ሰዓት?	1. ጠዋት 2. ከሰዓት 3. በምሽት 4. በበአላት 5. አላስታውስም
210	በአደጋ ምክንያት በጤና ተቋማት ወይም በቤት ተኝተው ያውቃሉ?	1. አዎ 2. የለም
211	ለጥያቄ 210 መልስዎት አዎ ከሆነ ለምን ያህል ጊዜ?	1. 24 ሰአትና ከዛ በታች 2. ከ 24 ሰአት በላይ
212	በአደጋ ምክንያት ከሥራ የቀሩበት ቀናት ብዛት	1. 5 ቀንና በታች 2. ከ 5 ቀን በላይ

ክፍል ሶስት

የሥራ ቦታን በተመለከተ

ተቁ	ጥያቄዎች	አማራጭ መልሶች
301	በሳምንት ምን ያህል ሰዓት ይሰራሉ?	1. ከ48 ሰዓት በላይ 2. ከ48 ሰዓት በታች
302	በሥራ ቦታዎ ላይ የጤና እና የድህንነት ቁጥጥርና ክትትል ሳይቋረጥ እየተደረገ ነው?	1. አዎ 2. የለም
303	ከሥራዎት ጋር በተገናኘ በጤንነት እና የደህንነት ዙሪያ ስልጠና ወስደው ያውቃሉ?	1. አዎ 2. የለም
304	በስራ ላይ መቀያየር/ፈረቃ አድርገው ያውቃሉ?	1. አዎ 2. የለም
305	በተራ ቁጥር 304 መልስዎ አዎ ከሆነ በየስንት ሰዓት?	1. በየ8 ሰዓት 2. በየ12 ሰዓት 3. በየ24 ሰዓት 4. ልላ ካለ

		ይጠቀስ
306	ከስራ ጋር በተገናኘ ሁከት ወይም በኃይል መደፈር፣ የአዕምሮ መሳት ወይም ከኃላፊ ወይም ከሌሎች ሠራተኞች ጋር ያለመስማማት ወይም ተጣልተው ያውቃሉ?	1. አዎ 2. የለም
307	በስራ ቦታ የግል ንጽህናዎትን መጠበቅ በቂ እና ንፁህ ውሃ ያገኛሉ?	1. አዎ 2. የለም
308	የሚሰሩት ሥራ ከቤተሰብዎ ጋር ባሎት ግኑኝነት ላይ አሉታዊ ተፅዕኖ ያሳድራል?	1. አዎ 2. የለም
309	ከቤተሰቦት ጋር ባሎት ግኑኝነት አማኳኝነት በሥራዎ ላይ ውጥረት ወይም ጭንቀት ገጥሞት ያውቃል?	1. አዎ 2. የለም
310	በመስሪያቤቶ ባለው አስተዳደር ያሎት እምነት?	1. አዎ 2. የለም
311	መስሪያቤቶ እርሰዎን የሚያስተናግድበት መንገድ?	1. አዎ 2. የለም
312	የሚሰሩት ሥራ ያሎትን አቅምና እውቀት አሟጦ ከመጠቀም አንጻር እንዴት ያዩታል?	1. አዎ 2. የለም
313	በስራ ቦታዎ ያለው ደህንነትና የጤንነት ሁኔታ?	1. አዎ 2. የለም
314	የሚሰሩበት መ/ቤት ለሰራተኞች ደህንነትና ጤንነት ቅድሚያ የመስጠት ደረጃ?	1. አዎ 2. የለም
315	የሚሰሩት ስራ አዲስ እውቀት ከማስገኘት አንጻር ያለው ደረጃ?	1. አዎ 2. የለም
316	በስራ ቦታዎ የደረጃ ዕድገት የማግኘት እድል ምን ያህል ነው?	1. አዎ 2. የለም
317	በመስሪያቤቶ ያለው የደረጃ ዕድገት አሰጣጥ ፍትሀዊነት?	1. አዎ 2. የለም
318	ስራዎትን የሚያከናውኑበት ሁኔታ	1. በእጅ 2. በማሽን 3. በሁለቱም
319	ከባድ የሆኑ ቁሳቁሶችን በእጅ ማንሳት፣ ማውረድ እና ከቦታ ቦታ ማንቀሳቀስ ስራ አለ?	1. አዎ 2. የለም
320	ለስራ ግብዓት የሆኑ መሳሪያዎች በአግባቡ አደጋ በማያስከትል ሁኔታ ምልክት ተደርጎባቸው ይቀመጣሉ?	1. አዎ 2. የለም
321	ሁል ጊዜ የሚሰሩ የአደጋ ሁኔታን የሚገልፁ ምልክቶች አሉ?	1. አዎ 2. የለም
322	ማሽኖች ሁል ጊዜ አደጋ እንዳያደርሱ ጥንቃቄ ይደረጋል?	1. አዎ 2. የለም
323	ማሽኖች ጥገና ሲያስፈልጋቸው በወቅቱ ይጠገናሉ?	1. አዎ 2. የለም

ክፍል አራት
የሰራተኛው የሕይወት ዘይቤን በተመለከተ

ተ.ቀ	ጥያቄዎች	አማራጭ መልሶች
401	በያዙት ሥራ የቆዩበት ጊዜ ምን ያህል ነው በቀን/በወር/በዓመት	----------
402	ወደዚህ ስራ ከመግባትዎ በፊት የጤና እክል ነበረቦት?	1.አዎ 2. የለም
403	ለጥያቄ 402 መልስዎ አዎ ከሆነ ችግሩ ምን ነበር? የለም ከሆነ ወደሚቀጥልው ጥያቄ ይለፉ	----------
404	የሲጋራ ሱስ አለቦት ?	1.አዎ 2. የለም
405	ለጥያቄ ቁጥር 404 መልስዎ አዎ ከሆነ በሳምንት ለምን ያህል ጊዜ? መልስዎ የለም ከሆነ ወደ ሚቀጥለው ጥያቄ ይለፉ፡፡	1. ሁል ጊዜ 2. 1-2 ቀናት 3. 3 ቀናት 4. 4-6 ቀናት
406	የአልኮል መጠጥ ይጠጣሉ?	1.አዎ 2. አልጠጣም
407	ለጥያቄ ቁጥር 406 መልስዎ አዎ ከሆነ በሳምንት ለምን ያህል ጊዜ? መልስዎ የለም ከሆነ ወደ ሚቀጥለው ጥያቄ ይለፉ፡፡	1. ሁል ጊዜ 2. 1-2 ቀናት 3. 3 ቀናት 4. 4-6 ቀናት
408	ጫት ይቅማሉ?	1.አዎ 2.አልቅምም
409	ለጥያቄ ቁጥር 408 መልስዎ አዎ ከሆነ በሳምንት ለምን ያህል ጊዜ? መልስዎ የለም ከሆነ ወደ ሚቀጥለው ጥያቄ ይለፉ፡፡	1. ሁል ጊዜ 2. 1-2 ቀናት 3. 3 ቀናት 4. 4-6 ቀናት
410	በስራ ቦታዎ ሆነው እንቅልፍ የሚያስቸግርበት ሁኔታ አለ?	1.አዎ 2. አያስቸግረኝም
411	ለጥያቄ ቁጥር 410 መልስዎ አዎ ከሆነ ምክንያቱ ምንድነው ብለው ያስባሉ?	1. በቀን ከስምንት ሰዓት በላይ ያለፈረቃ መስራት 2. በማታ መስራት 3. በአንድ ጊዜ ከአንድ በላይ የሆነ ሥራ ማከናወን 4. ሌላ ካለ ቢጠቀስ .....
412	በሥራ ላይ የሚደርሱ አደጋዎችን ለመከላከል እንዲያስችልዎት የአደጋ መከላከያ መሣሪያዎች እና ቁሳቁሶችን ይጠቀማሉ?	1.አዎ 2. አልጠቀምም
413	ለጥያቄ ቁጥር 412 መልስዎ የለም ከሆነ ምክንያቱ ምንድ ነው?	1. ተቋሙ የአደጋ መከላከያ መሣሪያዎች እና ቁሳቁሶችን በወቅቱ ስለማያቀርብ 2. ግንዛቤ ስለሌኝ 3. ለስራ ስለማይመቹኝ 4. ጥራት ስለሌው 5. ሌላ ካለ ቢጠቀስ .....

Declaration

I, the under signed, declared that this is my original work and has not presented in this or any other University and all sources of materials used for this thesis have been fully acknowledged.

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This thesis has been submitted for examination for our approval as university advisor.

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Date: _____