



ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE

**UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AND
ASSOCIATED FACTORS AMONG BUILDING CONSTRUCTION
WORKERS IN ADDIS ABABA, ETHIOPIA 2019.**

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EMERGENCY MEDICINE DEPARTMENT

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UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AND
ASSOCIATED FACTORS AMONG BUILDING CONSTRUCTION WORKERS
IN ADDIS ABABA, ETHIOPIA 2019.

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Abbreviations and Acronyms

AAU: Addis Ababa University

DOSHS: Director of Occupational Safety and Health Association

EDHS: Ethiopian Demographic Health Survey

ILO: International Labour Organization

OSHA: Occupational Safety and Health Association

PPE: Personal Protective Equipment

UN: United Nation

WHO: World Health Organization

ABSTRACT

Back ground: Personal Protective Equipment (PPE) is a material, device, equipment or clothing which is used or worn by a worker to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death. Use of personal protective equipment is a universal legal requirement to protect workers against occupational injuries and illnesses in their workplace. The international labor office estimates that every year there are some 125 million work related accidents, 220, 000 of them are fatal.

Objective: This study assessed personal protective equipment utilization and associated factors among building construction workers in Addis Ababa, Ethiopia 2019.

Methods: Institution based cross sectional survey was conducted on the selected construction sites on April 2019. Data was collected by using pre tested Amharic questioner from 206 study subjects with response rate of 100% via face to face interview. EPI info version 7.1 and SPSS version 25 was used for data cleaning and analysis respectively. Independent variables with $P < 0.2$ was transformed from bivariate to multivariate logistic regression. $P < 0.05$ and was declared as associated factor.

RESULT: This study showed that (38.3%) of construction site workers were use at least one personal protective equipment. Presence of safety training, safety brief before commencing work and the availability of governmental visit were associated factors for utilization of personal protective equipment. Regarding, the type of injuries that occur on a majority of workers were abrasion (35%) and climbing at high were the common cause of injury.

CONCLUSION AND RECOMMENDATIONS: PPE utilization and safety measure in construction industries is insignificant and construction site workers are not adapted to take care of themselves as it manifested by low use of PPE. An effort for occupational safety assurance should be put in practice to avoid accidents on building site with unconditional commitment of all the projects. Riddance of hazards and deterrence of accidents on site should be within the proficiency of each site. The client should be involved in safety management coupled with having a great craving for safety.

Key words: Personal protective equipment, construction workers, work site injury

CHAPTER ONE

1.1 Introduction

1.1.1 Background

Personal Protective Equipment (PPE) is any material, device or clothing like gloves, helmets, hard shoes which is used or worn by a worker to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death to the worker(1)

Building construction is a complex sector that has very different hazards, like work at heights, work with power tools, working in the outdoor elements, lack of standards or regulations among workers in terms of expertise in their trade and training standards, low access in equipment's, less regulation and leadership, less safety culture, unclear communication, and enforcement than other sectors.(2)

The World Health Organization defines occupational injury as an epidemic problem in the field of public health in developing countries. The human suffering caused by the injuries is hurtful to the employee, the employer and society According to the International Labor Organization there are 270 million occupational accidents causing 2 million deaths annually (3).

The use of PPE is a universal and legal requirement to protect workers against occupational injuries emergence of hazardous or harmful agents and illnesses in their workplace. These personalized items are very useful, as without them, workers could be exposed to a variety of toxic substances, chemicals, radiation, or incidents, which could result in occupational diseases, injuries, or even fatalities. Among the construction industry 90.1% accidents of fatality cases are preventive(4).

Injuries related to construction work remain a serious problem worldwide. The International Labor Office (ILO) estimates that every year there are some 125 million work related accidents, 220000 of them fatal. According to WHO, 160 million new cases of occupational diseases are caused annually by exposure and dangerous conditions at the work place; 30-40% of them can be expected to lead to chronic diseases and about 10% are likely to result in permanent disability (5,6) .

OSHA standard 1910.132 explains the General Requirements for employers to assess and determine workplace hazards. PPE must properly fit each affected employee and the hazard assessment must be "certified" as such, in writing. Damaged or defective equipment must never be used in the workplace. Employees must understand when it is necessary to use PPE, what

equipment is required, how to use or wear it, how to care for it, how to know when the equipment has reached the end of its useful life and how to dispose of PPE (7).

1.1.2 Statement of Problem

Even if the prevalence of specific work site injury is not clearly known in Ethiopia due to lack of specifically documented data it is terrible for workers and Emergency health care professionals. The impact of occupational health and safety hazards faced by construction workers in developing countries is 10 to 20 times higher than those in Industrialized countries (8). Workers in the construction sector are more exposed to physical psychological , biological and chemical risk factors(9).

Safety issues in the construction industry of developing world receive inadequate attention and provision. It does not get a greater priority , this prevails for many reasons like owing to cost, lack of enforcement and ignorance of the stakeholders (10).

Occupational injuries pose a major public health and developmental problems; which result in a serious health, social and economic consequences on workers and their employers(5). The probability of fatality in the construction industry is five times more likely than in the manufacturing industry(11).

PPE utilization is one of the recommending action for workers to protect from job site injury. Countries on the way of construction like Ethiopia needs healthy and motivated working group. Identifying the gap on PPE utilization uses for any responsible body to act upon it on the area of occupational safety.

1.1.3 Significance of the Study

In Ethiopia even though the prevalence of specific work site injury is not clearly stated due to lack of specifically documented data work site injury is terrible for workers and Emergency health care professionals. Using personal protective equipment is a better means for prevention of work site injuries that occur due to inappropriate working environment.

The finding from this study helps to protect workers from work site injury by identifying the causes and types of injury, optimizing the utilization of available resources, by creating awareness for laborers , by recommend contractors about function, by motivating the law enforcers and health officials in intensifying the implementation of occupational safety and public health act, and other different concerned sectors on the need to improve use of PPEs hence promoting occupational safety and health performance among the workers will improve the productivity of the worker and reduce the malady burden.

Actually there are different organizations that stands for participation on occupational safety including legal provision in Ethiopia, but there is no visible accountability on work flow, clear collaboration and direct responsible for the safety of workers. So this study will also produce consciousness on the significance intersectional collaboration on preparation of manuals, on hazard identification and the types of the personal protective equipment that are supposed to be used while at work including the need of legal action.

This research can also be a reference for further development of research projects.

CHAPTER TWO

LITERATURE REVIEW

2. Introduction

This section contains theoretical and legal perspectives to give minimum emphasis for humanity perspective. The other section contains empirical literatures from previous studies focussing on different factors that influence the utilization of PPE on construction workers.

2.1 Theoretical/ Social Considerations

2.1.1. Health Belief Model

In the HBM, the likelihood that follows the peoples preventive behavior is influenced by their subjective weighing of the costs and benefits of the action, the type of perception for actions predicting capacities (12) .

The likelihood of getting a disease or condition is a perceived susceptibility of individuals and the seriousness of contracting an injury is a perceived severity. Unless they also perceive the taken action as potentially beneficial by reducing the threat their will not be commitment. Individual's self-efficacy is a determinant for using and not using PPE because a given behavior will lead to certain outcomes (13).

2.1.2. Ecological Model

Ecological models, as they have evolved in behavioral sciences and public health, focus on the nature of people's transactions with their physical and sociocultural surroundings, that is, environments. The core concept of an ecological model is that behavior has multiple levels of influences, often including intrapersonal, interpersonal, organizational, community, physical environmental, and policy. Ecological models are believed to provide comprehensive frameworks for understanding the multiple and interacting determinants of health behaviors (14).

2.2 Legal and Policy Considerations

2.2.1 In The World

Occupational safety and health convention of ILO(a company established since 1919 to bring government , employers and workers together) in 1981 (No. 155) and occupational health services convention 1985 (No. 161) adopted a policy by the general conference of international labor

organization for sustaining health management at work has a link with the capability of the national health care and social security system for the maintenance and promotion of international workers' health and working capacity (15).

Convention No. 102, Article 72(2), describes that member states should “accept general responsibility for the proper administration of the institutions and services concerned in the application of the Convention”(16). Furthermore; workers have a duty to take care of their own safety. They should therefore be properly informed of hazards and adequately trained to carry out their tasks safely. Employers' responsibilities also needed because occupational hazards arise at the workplace, it is the responsibility of employers to check and ensure the working environment is safe and healthy(17).

2.2.2. In Ethiopia

Ethiopia has been a member state of the ILO since 1923. The issue of governing safety and health at work on legal basis in Ethiopia dates back to 1940s when the first legal instrument Proclamation No.58/1945 was promulgated. In 1964 it replaced by proclamation 232/1964 in order to address the change occurred and currently there is one comprehensive labor law (labor proclamation No 377/06) (16,18).

In this proclamation no article 92 clearly spells out the fundamental obligations of an employer with regard to putting in place of all the necessary measures in order to ensure, work places safe, healthy and free of any danger to the wellbeing of workers. In the same article the employer is obliged to take the measures to safeguard the health and safety of the workers; properly instruct and notified concerning the hazards of their respective occupations and the pre cautions necessary to avoid accident & injury to health. Directives should be given and also assign safety officer, establishes an occupational, safety and health committee, provides workers with protective equipment, clothing and other materials and instruct them of its use, obliged to register and notify to the nearest labor inspection services occupational accident and diseases (16,19).

2.3 Burden/Hazard in Construction Industry

A study in Malaysia construction sites has shown that the number of fatality and permanent disablement cases due to accident is the highest as compared to the other sector. Physical hazard can cause direct injury to the worker and if severe can cause death. This study was concluded that most of the project site workers within the scope of study had a low level of awareness toward

using the personal protective equipment and the equipment is seen to be quite inadequate when compared to the quantity of workers(20) .

Another study done in Serilanka states that construction industry is unique and complex when compared with other industries and it contains a wide range of construction materials and products, which makes the construction industry most hazardous. Lack of awareness about site safety and dislike to wear personal protective equipment were identified as main causes of poor safety practices in construction sites (21).

Similar study in Kampala, Uganda on Construction work employees have 1 in 300 chances of dying while at work place and the likelihood of becoming handicapped by injury is far greater than other industries. Falls is singly account for a large proportion of the total number of accidents and fatalities among construction workers. This study concludes that low utilization of PPE (15.6%) compared to 100% as recommended in the Uganda OHS Act is the major cause. Young age, male sex, lack of formal education, lack of experience, job dissatisfaction, smoking, excess alcohol use, sleeping problems, lack of physical exercise, extended working hours, night work, physically demanding work, and non-use of personal protective equipment were essential factors (9,22).

Comparable study done in Addis Ababa indicates construction industries are full of physical hazards. The most commonly encountered hazards are like machine elements, moving or flying particulate materials, personnel traffic in congested areas, objects placed on elevated surfaces, falling or dropped materials, breakable/shatter able materials, unstable/unsecured equipment or materials, heavy or oversized items handled or transported. The three leading occupational injuries in the study site were puncture (21.0 %) followed by hand injury (11.3%), and back pain (9.7%). The major possible causes were reported as absence of protective devices (40.3%), lifting heavy objects (8.1%) and work burden (8.1%) (23,24). The prevalence of injury among building construction employees in Addis Ababa were 38.3 % in the past 1 year (3).

The Ireland code of practice regarding to hazards in construction industry for industrial relations and labor commission (declaration) Act, 1990 states that industrial relations are going to decay time to time and this may be due to psychological hazards since most activities in construction sites are done under a lot of pressure and rushing to meet delivery dates. This workplace stress will likely lead to both physical and mental ill-health such as depression and violence. Features of

construction work such as heavy workload, limited control and limited social support are the very factors associated with increased stress in construction industries (20).

2.4 Personal Protective Equipment

Personal protective equipment is defined as all equipment used to minimize exposure and it protects against one or more risks to health or safety, e.g. safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses (25). Use of PPE was lowest among construction workers these indicates the need for safety training programs in addition to those provided by the employers. With respect to other important enforcements related to the use of PPE, manufacturers shall continue to improve the style and comfort (26). A cross sectional observational study done in Addis Ababa housing construction shows (96.8%) respondents were not using personal protective devices all the time while they are on duty. Out of the total participants, 67.7% of the workers experienced occupational injuries at least once in the last 12 months. Moreover, the three leading cause of injuries were puncture (21.0%) followed by hand injury (11.3%), and back pain (9.7%) (5).

PPE should provide maximum comfort and minimum weight compatible with the protective efficiency, durable, impose no restriction, should have maximum attractiveness in appearance, constructed in accordance with acceptable standards for performance (27).

A study done in Nigeria regarding PPE utilization justifies that in developed countries PPE is considered a moot point in construction safety discussion, because safety regulations have been developed there in the first place and there is a legal framework for enforcing those regulations. In this study 93.3% of the respondents were taking training on PPE importance, 90% of the respondents need to protect by clothing suitable for working on the construction sites such as trousers, long-sleeve shirt/T-shirt and boots but 81.1% do not wear PPE. The frequent reason for not wearing PPE was uncomfortable, oversized/undersized, not designed for hot and cold weather and heaviness. This study conclude that through supervision and checking including penalties should be present to improve safety on construction site (21,28). Another study done among welders almost all the respondents reported using PPE in the workplace with goggles (98%) being the most commonly used followed by gloves 65.4%, boots 58% and overalls 36.3% (29).

Another study done in Kenya Mombasa aimed for evaluating utilization of personal protective equipment in construction industry by descriptive cross-sectional design based on Purposive sampling method was employed and the result was showed that, 49.0% of the respondents confirmed the presence of the following PPE in their workplace; 2.0% dust masks, 5.0% ear masks, 10.0% helmet, 7.0% overalls, 3.0% used goggles and 2.0% heavy duty gloves. Among the total participants 76.0% of the respondents had never undertaken any safety training especially on PPE use while 24.0% had undertaken safety training. This study concluded that 45.0% the study group were using the right PPE, more than 60% workers suffered some forms of injury / illness. The reason for this was some participants did not have any personal protective equipment and did not see any importance of PPE .Feeling uncomfortable and expensive to buy were also other causes (30).

A similar study in Nairobi on usage of appropriate PPE by the motor vehicle repair workers at all times while they were working showed that 51.25% used appropriate PPE. The reasons for not using PPE as identified by this study included unavailability, cost, discomfort and felt unnecessary for their work. This study determines that demographic features of employees, employees approaches and opinions in efficacy of PPE, workers perception of risk and work environment factors including access of PPE, training and social support for PPE use plays crucial roles in workers decision making process regarding utilization of personal protective equipment (31).

Another study done in Ethiopia Addis Ababa for evaluation of health and safety practice in building construction companies only 53.94% have first aid and occupational health & safety team. Contractors with having PPE (Safety shoe, helmet, goggles, welding masks, face shield, hearing protection, respirator protection) on site was only 56.08 and risk inspection of like Scaffolding and Ladders at regular intervals was 49.4% (27).

2.5 Conceptual/Theoretical Framework

INDEPENDENT VARIABLE

DEPENDENT VARIABLE

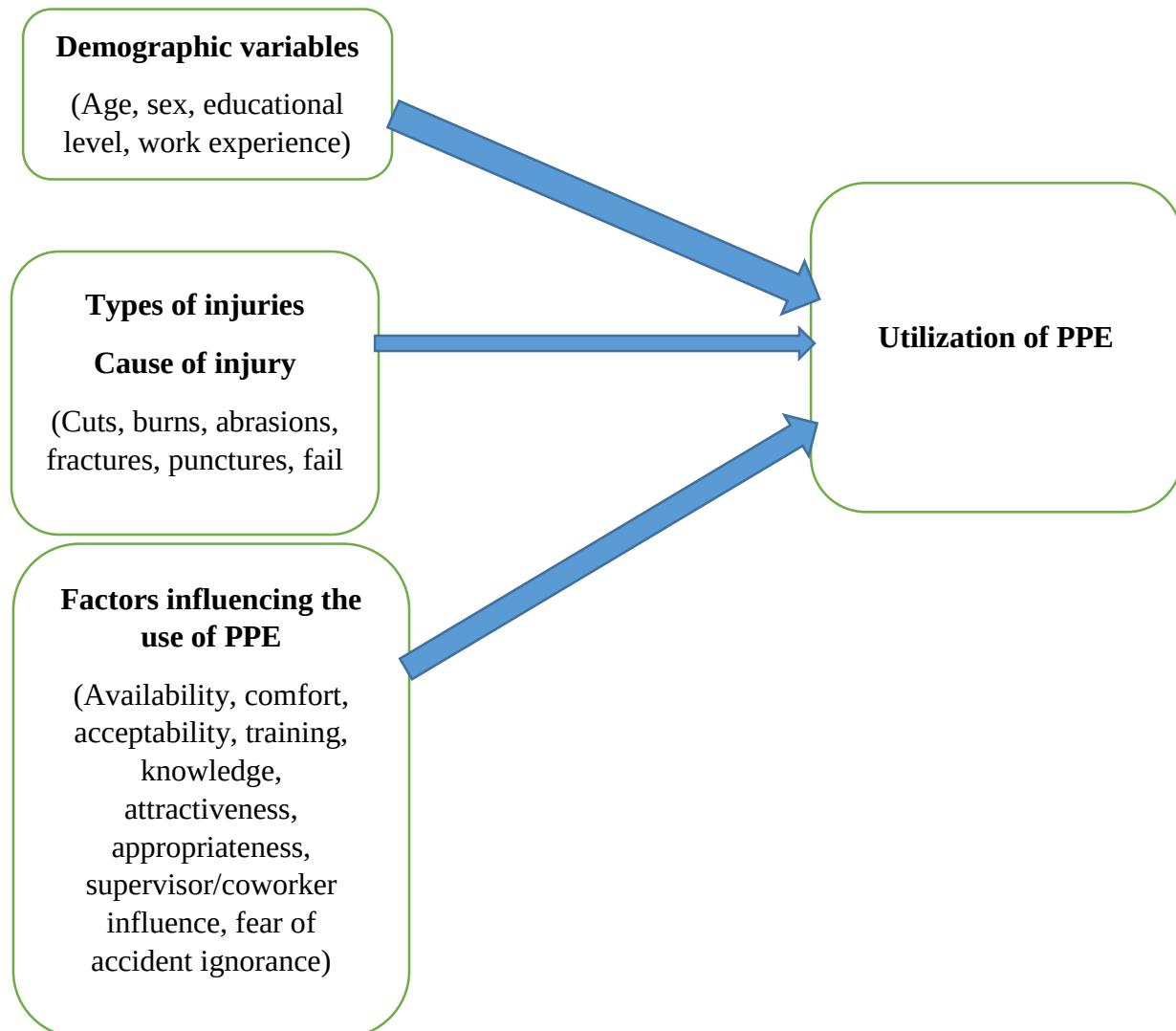


Figure 1: Conceptual framework for Assessment of PPE Utilization and associated factor among construction workers adapted from literatures (30–32)

CHAPTER THREE

OBJECTIVE

3.1 General Objective

To assess utilization of personal protective equipment and associated factors among building construction workers in Addis Ababa, Ethiopia 2019.

3.2 Specific Objectives

1. To assess utilization of personal protective equipment among building construction workers in Addis Ababa.
2. To identify type of causes injury on construction workers among building construction workers in Addis Ababa.
3. To determine associated factors of personal protective equipment utilization among building construction workers in Addis Ababa.

CHAPTER FOUR

METHODS AND MATERIALS

4.1 Study Area and Period

The study was conducted in Addis Ababa construction sites which has direct regulatory communication with Addis Ababa city administration construction office. Addis Ababa is the capital and largest city of Ethiopia and a head seat for African union, set for more than 92 embassies and consular representative's, international agencies. It is also the country's commercial, industrial, and cultural center found in central Ethiopia with an elevation of about 2440 m. above sea level on a plateau that is crossed by numerous streams and surrounded by hills. In Addis Ababa there are more than 2800 registered construction companies which are regulated by government and authorized PLCs (5). This study includes only construction companies which have direct regulation with Addis Ababa construction office during the study period from April to May 2019.

4.2 Study Design

Institutional based Cross-sectional study design was conducted at selected construction sites.

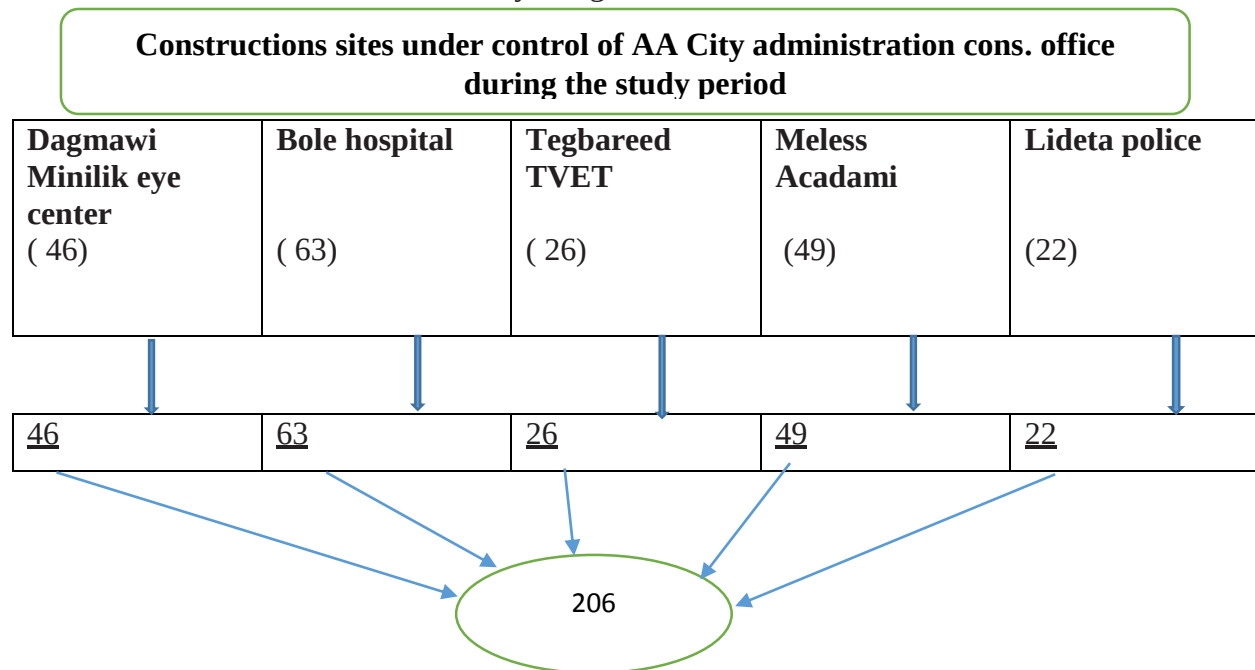


Figure 2: sampling Procedure for PPE utilization and associated factors among Construction Workers In Addis Ababa 2019.

4.3 Source Population

All construction workers in Addis Ababa

4.4 Study Population

Workers who were directly involved in the building construction and who fulfill eligibility criteria.

4.5 Study Subjects and Study Unit

Workers who was directly engaged in building construction work during data collection period by using payroll or attendance sheet.

4.6 Inclusion Criteria

Construction workers at selected organization site who are actively participate at daily routine construction work and stay more than one day.

4.7 Exclusion Criteria

Administrative staffs, field supervisors, other supportive staffs, workers who stay less than one day and who are on sick leave are excluded from the study.

4.8 Sample Size Determination

Lottery method was used to select construction sites a form all construction sites that regulated by Addis Ababa construction office. Dagmawi Minilik eye center, Bole hospital, Tegbareed TVET, Meless Academic and Lideta police construction sites workes was got chance.

4.9 Sampling Procedure

Survey was done from workers at selected construction site based on eligibility criteria for the interview by using payroll/attendant sheet as sampling frame.

4.10 Study Variables

4.10.1 Dependent Variable

Utilization of personal protective equipment.

4.10.2 Independent Variable

Age

Sex

Educational Level

Work Experience

Availability of Material

Awareness

Perception for injury

Supervision

4.11 Data Collection Technique and Instrument

Data was collected by using pretested and structured Amharic questionnaire via face to face interview. Questionnaires include socio demographic, behavioral, and environmental factors that affect PPE utilization within the construction area. Data was collected by six BSc health professionals and two supervisors from MSC candidates. Training and clarification was given for all data collectors and supervisors. Additionally, principal investigator was involved in solving ambiguities and making further clarifications on the spot.

4.12 Data Quality Assurance

To assure data quality pre-testing of the questionnaire was done by 5% of the total sample size at construction site at Akaki TVET construction site. Data entry had been done by Epi Info in daily bases, there was proper categorization and coding of the data including timely checking of the completeness of questionnaires during data collection. PI was engaged in follow up and checking the completeness of questionnaires through the overall data collection period.

4.13 Data Entry Processing and Analysis

Data was checked for completeness, inconsistencies, cleaned, coded. Then the collected data was entered into Epi info version 7.1 and exported to SPSS version 25 for statistical analysis. Univariate analysis was done at 20% level of significance to screen out potentially significant independent variables. The association between the dependent and independent variables were analyzed using binary logistic regression model. Those variables in bivariate analysis whose p value less than 0.20 were included in multivariate logistic regression for not to miss associated factors. Then multivariate analysis was computed for those factors that showed a statistically significant association in bivariate analysis to identify factors that independently influence the occurrence of dependent variables and Finally, variables whose p value less than 0.05 ($p < 0.05$) in the logistic regression were considered as statistically significant association and they were interpreted by using their adjusted odds ratio.

The output of descriptive statistics was reported by percent, pie chart and graphs to summarize data.

4.14 Ethical Clearance

Ethical clearance was taken from AAU emergency medicine ethical review committees. A formal permission letter was obtained from city government of Addis Ababa Construction office prior to data collection for each study sites. Informed consent was given after clear description of the objectives of the study and its procedures for participants prior to proceeding data collection. All the study participants were given informed about the purpose and benefit of the study along with their right to refuse.

4.15 Dissemination of Research Finding

The result of the study will present to AAU emergency medicine department, will report to Ethiopian society of emergency professionals, ministry of labor. The finding the study will present at scientific conferences and effort will have to publish in relevant scientific and popular journals.

4.16 Operational Definition of Terms

Personal Protective Equipment – Any material, device, equipment or clothing which is used or worn by a worker to protect them from exposure or contact with any harmful material or energy which may cause injury, disease or even death to the worker.

Utilization – The use of PPE consistently and appropriately to prevent injuries and illness.

Occupational Health – A cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment.

Occupational Injuries – These are any physical injuries resulting from an occupational accident at the work place.

Risk – Is the likelihood that a person may be harmed or suffers adverse health effects if exposed to a hazard at the workplace.

CHAPTER FIVE

RESULT

5.1 SOCIO DEMOGRAPHIC CHARACTERSTICS

A total of 206 respondents were included for the interview and all the respondents were completely respond the questioner with a response rate of 100%.

Among the respondents (76.2%) were male. The mean age of respondents was 25.5 (SD $\pm$ 4.07). Majority respondents were below 30 years (88.3%). The study also showed that (59.2%) were single. Regarding educational status (30.1%) of the respondents were illiterate. Majority (59.7%) participants had work experience of less than one year and work duration was 7-8 hours [162(78.6%)]. For (71.4%) of workers the recruiting system was temporary base (table 1).

Table 1: Selected socio-demographic characteristics participants on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

Variable		Frequency	Percent
Sex	Male	157	76.2
	Female	49	23.8
Age	<=30	182	88.3
	>30	24	11.7
Marital status	Married	81	39.3
	Single	122	39.2
	Divorced	3	1.5
Working Hour	< than 5 hour	7	3.4
	5-6 hour	7	3.4
	7-8 hour	162	78.6
	9-10 hour	19	9.2
	11-12 hour	11	5.3
	1 day to 1 year	123	59.7
	working	1 to 5 year	63
Experience	6 to 10 years	15	7.3
	10 and above	5	2.4
Term of employment	Permanent	59	28.6
	Temporary	147	71.4
Level of Education	Illiterate	62	30.1
	Primary	54	26.2
	Secondary	49	23.8
	Above college	41	19.9

5.2 Status of PPE Utilization

The finding of this study showed that (38.3%) of participants had used any personal protective equipment (fig.3).

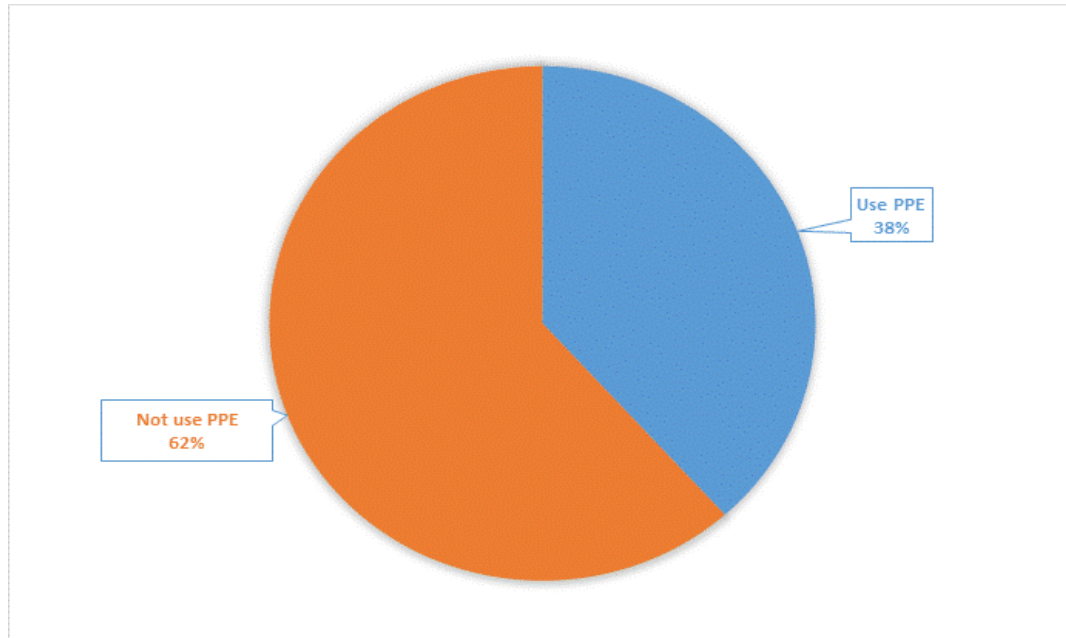


Figure 3: status of PPE utilization among construction workers on assessment of PPE utilization among construction workers in Addis Ababa, Ethiopia, 2019.

5.3 Reasons for Not Utilizing PPE

This research had showed various types of reasons why construction workers did not use PPEs in their work place. Of which (30.6%) were responded PPE not available, 34(21.3%) were no information for using (fig 4).

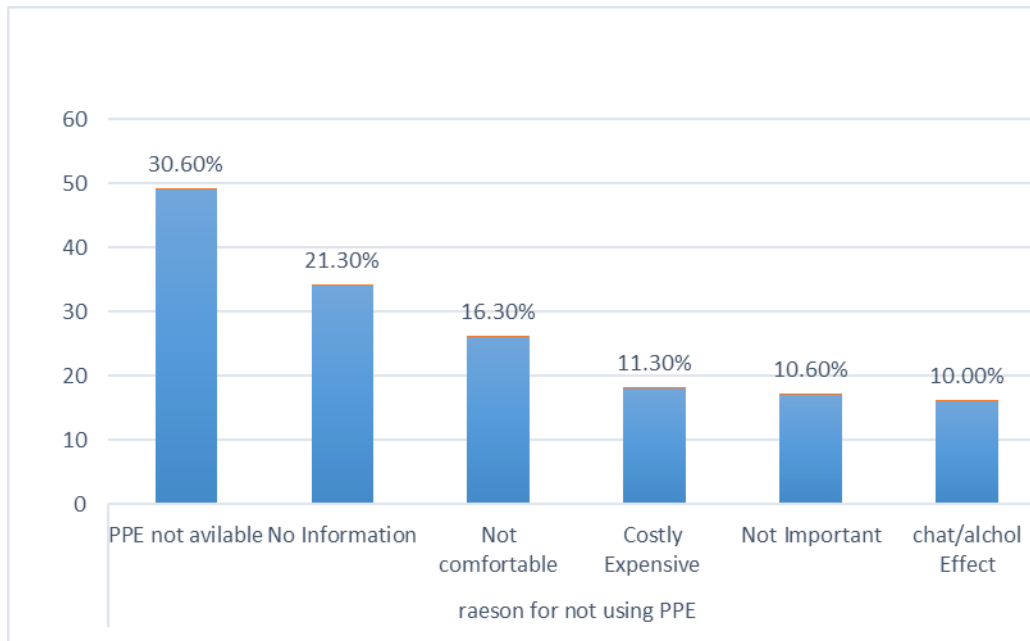


Figure 4; specified reasons for not using PPE in construction sites and its frequency on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

5.6. Pressure for Using PPE

Based on the response obtained regarding enforcement or supervision on PPE utilization (82.5%) of participants were do not remember anybody who enforce or supervise them regarding to PPE use (fig 5).

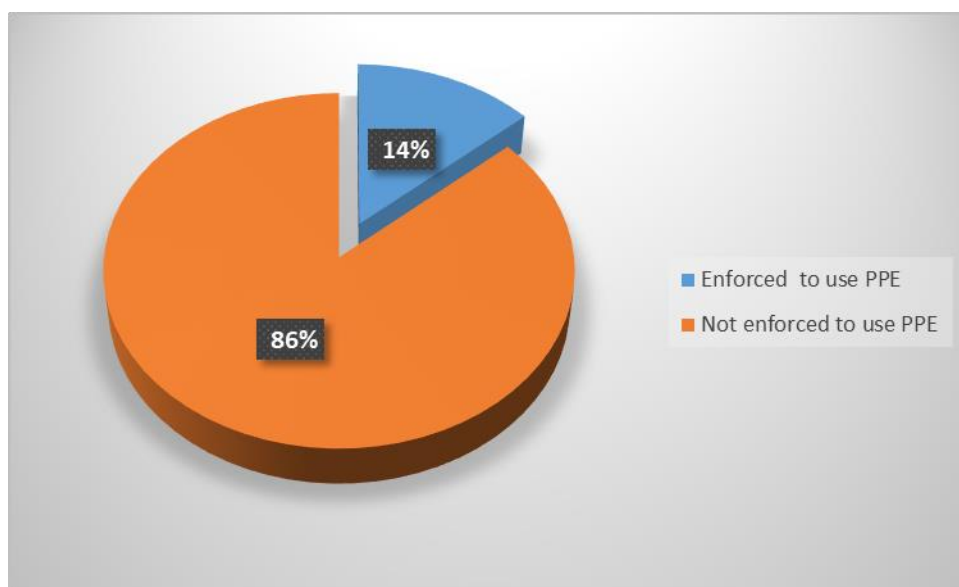


Figure 5: The presence of pressure on PPE utilization among construction workers on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

5.7 Awareness of Construction Workers on Cause of Hazards and Injuries

According to our finding climbing at high was the major (25.9%) cause of injury followed by dust /fugs (22.7%). The study indicates the presence multiple causes (fig.3).

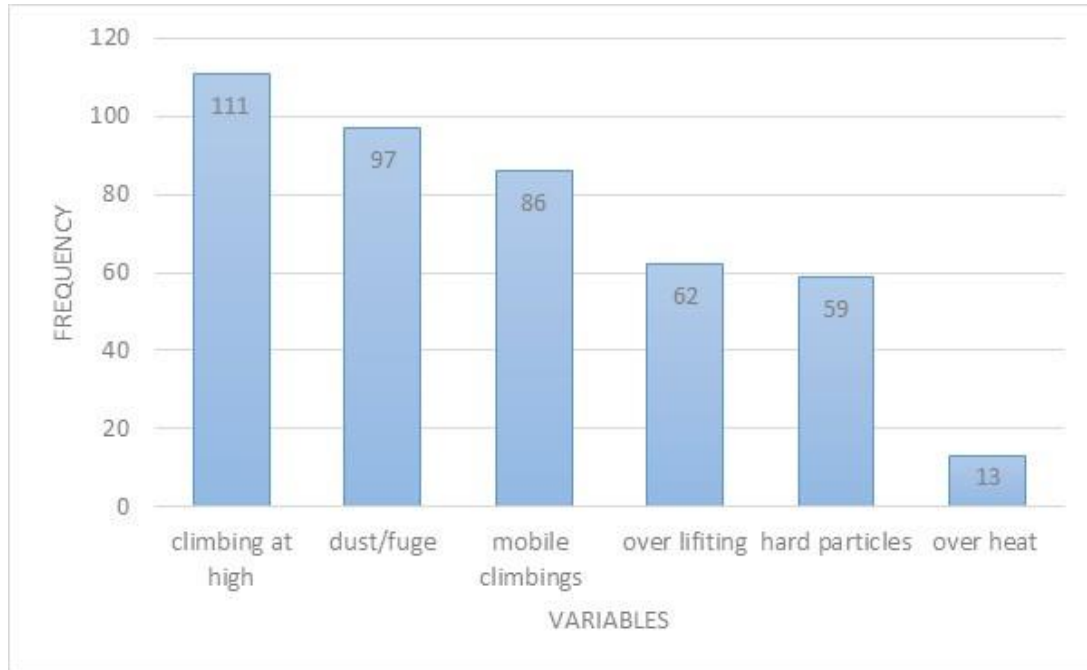


Figure 6 :Awareness on the cause of injury among construction workers on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

5.8 Type Injuries Perceived and Suffered by Construction Workers

Our study identified that the most commonly perceived type of injury was abrasion by 35.3% and 2% of them was perceived permanent disability. In other way 32.2% was suffered abrasion and 5.6% was suffered by back pain while they were at work site. Multiple cause of injury and more than one perceptions were identified (table 3).

Table 2: Type of injuries perceived and suffered by construction workers on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

Variables		Frequency	Percent
Type Of Injury Perceived	Abrasion	140	35.3
	Piercing/Cut	93	22.7
	Muscular Pain	71	18
	Bone Fracture	46	11.5
	Sprain/strain	39	10.5
	Permanent Disability	10	2
Type Of Injury Suffered	Abrasion	109	32.20
	Piercing/Cut	104	30.80
	Bone Fracture	46	13.60
	Sprain/Strain	34	10.10
	Muscular Pain	26	7.70
	Back Pain	19	5.60

5.9 Preparedness for Injury Prevention

In this study preparation for protection of injury was tried to asses by variables like knowing any type of PPE, the presence of safety training and safety brief before commencing actual work. Based on this finding 84.5% of participants can call at least one PPE (table 3).

Table 3 : preparedness for injury protection on PPE utilization and associated factor among construction workers in Addis Ababa, Ethiopia 2019.

Variable		Frequency	Percent
Knows any PPE	Yes	174	84.5
	No	32	15.5
Safety training	Yes	65	31.6
	No	141	68.4
Safety Brief	Yes	73	35.4
	No	133	64.6

5.7 Factors Associated with PPE Utilization

Independent variables like age, level of education, term of employment, year of experience, availability of safety training, PPE utilization training, perception of injury, knowledge on PPE, safety brief before commencing work and availability of enforcement or pressure to use PPE was tested by binary logistic regression.

Variables with P value less than 0.2 during the bivariate analysis were included in the multivariate logistic regression. Among them Safety Training, PPE use training, safety brief before commencing work and governmental visit were shows association with PPE utilization. Those who took general safety training on PPE use were about 2 times more likely to use personal protective equipment [AOR CI 95% 2.343(1.084,5.062) than those who does not took training , those who had safety brief before commencing work were About 4 times more likely to use personal protective equipment (AOR [95% CI 4.156(1.921,8.988), those who had PPE use training are 4.8 times more likely to use PPE [AOR CI (95%) 4.821(2.263,10.272)] and workers who are pressurized or supervision by anybody were 5 times more likely to use PPE [AOR CI 95% 5.04(1.938,13.106)] than who did not (table 4).

Table 4: Bivariate and multivariate regression of variables on PPE utilization and associated factor among building construction workers in Addis Ababa, Ethiopia 2019.

<i>Variable</i>		PPE use		COR (95%CI)	P Value	AOR (95%CI)	P Value
		Yes	No				
Age	<=30	73	109	2.009(0.761,5.302)	0.159	0.896(0.237,3.392)	0.871
	>30	6	18	1		1	
Level Of Education	Illiterate	18	44	1.731(0.756,3.966)	0.194	2.37(0.8,7.02)	0.120
	Primary	20	34	1.204(0.524,2.765)	0.661	1.652(0.56,4.869)	0.363
	Secondry	24	25	0.738(0.320,1.703)	0.476	1.011(0.344,2.973)	0.985
	> College	17	24	1		1	
Term Of Employment	Permannt	18	41	0.619(0.325,1.179)	0.144	0.718(0.306,1.686)	0.446
	Tempory	61	86	1		1	
Year Of Experience	< 1 Yr.	45	78	1		1	
	1 - 5 Yr.	24	39	0.406(0.043,3.855)	0.433	0.545(0.42,7.025)	0.642
	6 -10 Yr.	9	6	0.167(0.015,1.879)	0.147	0.251(0.016,3.931)	0.325
	> 10 Yr.	1	4	0.433(0.047,3.997)	0.461	0.463(0.38,5.642)	0.546
Safety Training	Yes	36	29	2.829(1.543,5.189)	0.001	2.343(1.084,5.062)	0.030
	No	43	98	1		1	
PPE Use Training	yes	48	27	5.735(3.084,10.66)	0.000	4.821(2.263,10.272)	0.000
	No	31	100	1		1	
Perceives Any Injury	Yes	75	111	1		1	
	No	4	16	0.37(0.119,1.15)	0.086	0.863(0.204,3.642)	0.841
Suffer Injury	Yes	70	100	1		1	
	No	9	27	0.476(0.211,1.075)	0.074	0.768(0.261,2.265)	0.633
Knows Any PPE	Yes	74	100	1		1	
	No	5	27	0.250(0.92,0.681)	0.007	0.477(0.135,1.677)	0.248
Safety Brief Before Work	Yes	44	29	4.248(2.315,7.797)	0.000	4.156(1.921,8.988)	0.00
	No	35	98	1		1	
Enforcement ,Supervision	Yes	27	9	6.808(2.993,15.49)	0.000	5.04(1.938,13.106)	0.001
	No	52	118	1		1	

CHAPTER SIX

6.1 DISCUSSION

Our result confirmed that only 38 % of workers have been using at least one PPE material while they are working. This finding is parallel with a studies done in Saudi Arabia 12% of the participants used PPE all the time while. Another study in Kampala, Uganda, showed low use of PPE which is 15.6% among building construction workers. An observational study done in Ethiopia among Addis Ababa condominium construction sites 96.8% of workers were not using PPE all the time while they are on duty, but ILO recommendation is 100% safety wear for all industry workers (5,33). This gap might be due to poor knowledge, lack of PPE materials, using stimulant substances, unavailability of safety alerts and enforcements. The raised result for this study than the previous one may be due to the difference in methodologies and the presence of minimum public awareness and increment injury perception.

In this study, we have shown that the reasons for not using PPE were unavailability of material (30.6%), lack of information to use PPE (31.3%) and PPE materials are not comfortable to use (16.3%). This is in line with this a study done in Nigeria showed that the reason for not using PPE was uncomfortable, oversized/undersized, not designed for hot and cold weather and heaviness. In another similar study the reason for not using PPE were lack access of materials (93.5%), discomfort and results in work delay (6.5%) (34). Such types of reasons might be due to lack of interest and awareness from workers, lack of concern from responsible bodies, lack of comfort and low advanced PPE materials, prioritizing money than safety from construction companies

In this study we have found that the leading work site injuries were abrasion (38.8%). followed by piercing /cut (32.2%) and puncture (21.0 %). In a similar study done in Addis Ababa condominium site workers the common injury was hand injury (11.3%), back pain (9.7%) this shows that using at least minimum available PPE material for not exposing body can reduce the majority of injuries.

In our finding the identified common cause of injury were climbing at high (25.9%), dust/fug (22.7%). In a similar study done in Addis Ababa condominium site workers the common cause was lifting heavy objects (8.1%)(3). This may be due poor working environment, nonprofessional workers, using old climbing materials, using woods and local materials to construct bridge around slab and waiting locally constructed climbing materials for long period of time so it affected by

seasonal variations, heavy lifting, lack of concern from designers for possible cause of injuries, limited working space, excessive work load and untrained work force.

In this study we provide evidence that unavailability of safety training, lack of PPE utilization training, lack of safety briefing before commencing work and nonexistence of enforcement were significant factors of PPE utilization. This is an equivalent result with a research done in Nigeria, supervision is needed so that a supervisor should be appointed to ensure compliance. while Several measures and punishments should be meted out to contractors who violate safety policy (35). This could be due to negligence of safety issue from responsible bodies, lack of external pressure for worker's sake, nonexistence of safety related obligation for construction license, shortage of engineering control and hazard notification from designers, deficiency of workers control from managers, lack of conducive environment including ineffective communication between managers (kabos) on forming of suitable working condition and health and safety lack of implementing safety policies.

This result also shows monitoring and supervision regarding to construction site safety is low. Even though; studies and acts declared that each contracting company should ensure continuous monitoring and supervision. It is also supported by Ethiopian Labor Proclamation No 377/06 in Article 92 and ILO code of conduct (14,36) since it clearly spells out the fundamental obligations of an employer with regard to putting in place of all the necessary measures in order to ensure, work places are safe, healthy and free of any danger to the well-being of workers. Unavailability of monitoring and supervision is basically lack of concern from responsible bodies.

In this study the odds of PPE utilization among workers who had enforcement were about five times high when compared to those who did not. The reason behind this could be that fear of punishment or seeking award.

In case of most of Addis Ababa construction sites consultants who are directly engaged in qualified construction industry got working authorization from Addis Ababa city housing and construction authority by gratifying the outlined necessities. But in the requirements nothing is expected from these firms with respect to Occupational safety and hygiene. On the contrary on Ethiopian labor proclamation employer is obliged to take measures to safeguard the health and safety of the workers; Moreover, the proclamation ensure that workers are properly instructed and notified concerning the hazards of their respective occupations and the pre cautions necessary to avoid

accident & injury to health. Directive is given and also assign safety officer, establishes an occupational, safety and health committee, provides workers with protective equipment, clothing and other materials and instruct them of its use, obliged to register and notify to the nearest labor inspection services occupational accident and diseases(1,18). This is not practical in the study site.

Safety training and PPE use training increases PPE utilization by about 2 and 4 odds in sequence. It shows that majority of workers has lack in information and poor in technical but easy actions.

Even though it doesn't show association with PPE utilization female sex, age greater than 30 and workers who previously experience injury has better utilization of PPE than others. This may be due males are self-exposed and defendant in nature, age greater than 30 may get lesson from experience and workers who sustain injury previously may learn from action and it is the raise of action taking for a reaction happening by identifying solution PPE as a means of solution.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.1 CONCLUSION

This study has declared only 38 % of workers have been using at least one type of PPE. Majority of respondents mention different reasons for not using PPE on their working site those are unavailability of material by, lack of information to use PPE and PPE materials are not comfortable to use.

In this study we identify the leading work site injuries and the causes of injuries. Abrasion and piercing /cut were the common type of injury and clamping at high and dust/fug are common reasons.

This study also delivers hint for predictors influencing PPE utilization which includes unavailability of safety training, training on PPE use, lack of safety brief before commencing work and absence of enforcement.

This result can use as a pioneer for occupational and safety related institutions and used for strengthening workers' safety so as to improve productivity of manufacturing industries

7.2 RECOMMENDATIONS

Based On Our Findings We Would Like Recommend the Following Bodies: -

For the government:

The Ministry of Labor should implement OSHA, 2007 act and Ethiopian labor proclamation (377/2001) especially on provision of free PPEs to all workers and monitoring and supervision. Regular supervision and enforcement of clients should be unconditional to all the project contributors. Clients' involvement in safety issue for riddance of hazards and deterrence of accidents should be considered as the proficiency of each construction.

Ministry of Health: MOH Emergency directorate should extend services on awareness creation, safety mobilization by different menses including training, education, media alert and broadcasting. Reporting of accident should be labeled with its cause to give recognition.

For construction companies: Should use standard materials, avail convenience safety equipment's, create safety awareness and checking and putting into practice of safety check and

toolbox briefing for a five - to ten-minute session just prior to starting work. Designers and leading contractors should put in their best judgment to distinguish the hazard from the work type and pass the information to the laborers.

For construction site works: They have to be alert to take precaution and should say “safety first” on all activities they perform and better to engage theme selves’ in safety training including PPE. Exercising information and experience sharing from person to person with different background.

For researchers: This study has done by single methodology and limited variables. It will be better if different methods.

CHAPTER EIGHT

STRENGTH AND LIMITATIONS OF THE STUDY

8.1 STRENGTH OF THE STUDY

- ✓ Since there was no study done on PPE utilization and associated factor among building construction workers the finding will serve as base line information for further research and important for policy makers to design strategy to prevent and control occupational injury.
- ✓ Using face interview during data collection reduce non response rate, permit clarification of questionnaires and addressing all participants without educational status.
- ✓ This finding spreads new sight for emergency care health professionals on occupational safety from different eclectic views of perspectives including legal, social and conceptual view of safety requirements.

8.2. LIMITATIONS OF THE STUDY

- ✓ Across-sectional study design could result in recall bias and a point in time survey so to assess in detail including practice better to use observational study
- ✓ Lack of published similar studies particularly in Ethiopia made difficult in comparing results
- ✓ Minor but sever cases are not identified due to the methodology and sample size.

CHAPTER NINE

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Annexs

Annex A: - English questionnaire

Information Sheet

My name is **Meseret Yitayew** and I am MSc in Emergency Medicine and Critical Care Nursing (EMCCN) student in Addis Ababa University. Now I am working as data collector for the research being conducted to assess utilization of personal protective equipment among building construction workers I kindly request you to express your understanding freely.

The Study Title: Assessment of PPE Utilization and Associated Factors among Building Construction Workers Addis Ababa 2019.

Purpose of The Study: The main aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Degree in EMCCN for the principal investigator. Moreover, the result of the study will be used as evidence and input for construction safety officers.

Risk and Discomfort: By participating in this research project, there is no risk that comes to the participants. Whereas expressing full concern and understanding is of great important to the research project which is in turn important for overall implementation of program.

Benefit: The research has no direct benefit to those who have participated in this project. But the indirect benefit of the research for the participant and overall as a country is great, as identifying area of improvement and taking appropriate decision helps to improve the quality of EMS Service.

Confidentiality: The information acquired from the participant is confidential. There was no information that could identify in particular. The findings of the study in general for the study community and will not reflect anything particularly of individual persons.

Rights to Refusal or Withdrawal: You have the right to permit or not for this study. If you decide to permit the study, you have the right to terminate the study at any time if you consider something related to the study is wrong.

Contact Address: This research project will be reviewed and approved by the institutional review board of College of Medicine, Addis Ababa University.

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Part one
questions on socio-demographic characteristics

No	Question	Possible response	Code	Remark
101	Sex	1 Male 2 Female		
102	Age	----- in yrs.		
103	Highest level of Education	1. No education 2. primary school 3. Secondary school 4 .College/university		
104	Marital Status	1. Married 2.Single 3. Divorced 4.Widowed		
105	No of years worked in Building construction	1. 1 days to 1 year 2 .1 years to 2 year 3 .2 years to 3 year 4 .3 years to 4 year 5 .more than 4 year		
106	Term of employment	1. permanent 2. Temporary		
107	How long is your working hour	1. less than 5 hr 2. 5-6 hours 3. 7-8 hours 4. 9-10 hours 5. 11-12 hours		

Part two

questions on factors of Personal Protective Equipment Utilization including risky activities

201	Have you ever undertaken safety training on construction site?	1 Yes 2 No		
202	Was the training help full ?	1 . yes 2 . No		
203	Are there any safety briefs given to you before commencing any works on a daily basis?	1. yes 2. no		
204	Do you know of any type of injuries associated with construction?	1 Yes 2 No		
205	If the answer is YES, which ones do you know of, Injury	1. muscular pain 2. abrasion 3. cut 4. piercing 5. bone fracture 6. death/ permanent disability		
206	Have you ever suffered injury in your course of work?	1. yes 2. no.		

207	Which of the following are common cause of trauma	1 clamping at high 2 dust/fuge 3 over lifting 4 hard particles 5 mobile clamping aids 6 over heat		
208	If yes for the above , which one ?	1 muscular pain 2 abrasion 3 cut/piercing 4 sprain/strain 5 bone fracture		
209	Do you know any Personal Protective Equipment?	1 yes 2 no		
210	If question is YES which PPE do you know?	1 Safety boots 2 face/ear masks 3 Helmet 4 googles 5 Heavy duty gloves 6 Safety belts 7 other		
211	Have you received any training on how to use PPE	1 yes 2 No		
212	Do you have any private Personal Protective Equipment	1 . yes 2. No		
213	If YES for the above question	1 Safety boots 2 face/ear masks		

	which ones do you have	3 Helmet 4 Goggles 5 Heavy duty gloves 6 Safety belts		
214	If YES for the above Q , how you get ?	1 Borrowed 2 Provided by Employer 3 Bought myself		
215	Do you use any type of PPE at your work site ?	1 yes 2 No		
216	If YES for the above Q when do you use, then	1 always on duty 2 when supervisor is around 3 when it's cold 4 When I feel good		
217	If NO for the above question no., why?	1 Not important 2 Uncomfortable to use 3 not available at the site 4 Expensive to buy 5 not aware of to use 6 because of any alcohol or chat usage		
218	Do government officials or anybody visit/enforce you for safety issue?	1 yes 2 No		
220	When was the supervision ?	1 month a go 2 three months ago 3 six month ago		

Thank you

Annex B: - Amharic questionnaire

ጤና ይስጥልኝ፡ እኔ _____ እባላለሁ፡፡ የአዲስ አበባ ዩኒቨርሲቲ የድንገተኛ አደጋዎች ህክምና ተመራቂ ተማሪ ነኝ ፡፡ የመጣሁት በግንባታ የስራ ቦታዎች የሚያጋጥሙ አደጋዎችና ተያያዥ መንስኤዎቻቸውን ለይቶ ለማወቅ የሚያስችል ጥናት ለማካሄድ ነው፡፡ ይህን ለማሳካት ተጠኝዎች፡ ለዉጤታማነቱ በጣም ወሳኝ ናቸው፡፡ ለዚህም የእርስዎ ትክክለኛ ምላሽ በአጽንኦት ይፈለጋል የሚሰጡን መረጃ በሙሉ በሚስጥር ይያዛል፡፡ በጥናቱ ላይ መሳተፍም ይሁን አለመሳተፍ ይችላሉ ፡

የመጠይቁ መለያ ቁጥር _____ -- የግንባታዉ ቦታ መለያ ቁጥር/ስም _____ አድራሻ----- የመረጃ

ስብሳቢው ስምና ቀን _____

ፈቃደኛ ነዎት 1. አዎ ----- 2. አይደለሁም-----

መገልገያ መሳሪያ ማለት ማንኛውም ለሰራተኛ ደህንነት የሚዉል ማንኛውንም ቁስ ማለት ነው፡፡

ክፍል 1 ማህበራዊና ስነ-ህዝባዊ ገፅታዎችን የተመለከቱ ጥያቄዎች				
No	ጥያቄዎች	መልሶቻቸው	ቁጥርክድ	Remark
101	የታ	1. ወንድ () 2. ሴት ()		
102	ዕድሜ	----- ዓመት		
103	ከፍተኛ የትምህርት ደረጃ,	1. አልተማርኩም () 2. የመጀመሪያ () 3. ሁለተኛ () 4. ከፍተኛ ኮሌጅ () 5. ዩኒቨርሲቲ ()		
104	የጋብቻ ሁኔታ,	1. ያገባ () 2. ያላገባ () 3. የተፋታ () 4. ባሎቻቸው የሞቱባቸው ()		
105	በግንባታ ስራ ውስጥ የሠሩበት ዓመታት ብዛት (የስራ ልምድ)	1. 1 ቀን - 5 ዓመት () 2. 6 - 10 ዓመት () 3. 11 - 15 ዓመታት () 4. 16 - 20 ዕድሜ () 5. ከ 25 በላይ ()		
106	የቅጥር ሁኔታ;	1. ቋሚ () 2. ጊዜያዊ () 3. መሰረታዊ መነሻ ()		
107	መደበኛ የስራ ሰዓትዎ ምን ያህል ነው?	1. <5 ሰዓት () 2. 5-6 ሰዓት (), 3. 7-8 ሰዓት (), 4. 9-10 ሰዓቶች () 5. 11-12 ሰዓት ()		

ክፍል 2 የአደጋ መከላከያ ልብስ አጠቃቀምና ለአደጋ አጋላጭ ሁኔታዎችን በተመለከተ

201	በግንባታ ቦታ ላይ ስለሚያጋጥም ማንኛውንም (የጉዳት መከላከያ) የደህንነት ስልጠና ወስደዋል?	1. አዎ () 2. አይ ()		
202	ከላይ ላለው ጥያቄ መልስ አዎ ከሆነ ስልጠናው ለእርሶ ጠቃሚ ነበር ?	1. አዎ 2. አይ ()		
203	በየቀኑ ማንኛውንም ስራ ከመጀመሩ በፊት ለእርስዎ የሚሰጥ የደህንነት ጥቆማዎች (ማኒቃቂያዎች) አሉ ወይ?	1. አዎ 2. አይ ()		
204	ከግንባታ ስራ ጋር የተያያዘ ማንኛውንም ዓይነት ጉዳት ስምተው ያዉቃሉ ?	1. አዎ 2. አይ ()		
205	ከላይ ላለው ጥያቄ ቁጥር መልስ አዎ ከሆነ የትኛው ያውቃሉ	1. ከከፍታ ቦታ መወደቀ () 2. የጡንቻ ህመም / ጉዳት 3. የቆዳ መላጥ () 4. መቆረጥ () 5. መበሳት () 6. ከላይ ያሉት ሁሉም 7. ሌላ		
206	በሥራዎ ቦታዎ ማንኛውንም ጉዳት ደርሶብዎት ያውቃል?	1. አዎ () 2. አይ ()		
207	አደጋ በስፋት የሚደረሰባቸው ሁኔታዎች የትኞቹ ናቸው ከ አንድ በላይ መምረጥ ይቻላል	1. ከፍታ ቦታ ላይ መስቀል 2. አቧራ 3. ጭስ 4. ከአቅም በላይ የሆነ ሸክም 5. ፍንጣሪዎች 6. የሚነቃነቁ መንጠላጠያዎች 7. ከፍተኛ መቀት		
208	የትኞቹ ጉዳዮች ነበር የደረሱብዎ;	1. የጡንቻ ህመም / ጉዳት 2. የቆዳ መላጥ () 3. መቆረጥ () 4. መሰበር () 5. ከላይ ያሉት ሁሉም ፣ ሌላ		
209	ማንኛውንም ከጉዳት/ አደጋ መከላከያ መሳሪያ ያዉቃሉ?	1. አዎ 2. አይ ()		
210	ከላይ ላለው ጥያቄ መልስዎ አዎ ከሆነ የትኛው መገልገያ መሳሪያ ነው?	1. የደህንነት ጫማዎች () 2. የፊት ማሰክ () 3. የጀሮ መሸፈኛ () 4. የራስ መሸፈኛ () 5. መነጽር () 6. ከባድ / ወፍራም ጓንት () 7. የደህንነት ቀበቶ () 8. ሌላ የሚለይ		

211	ማንኛውም የግል የደህንነት መጠበቂያ መገልገያ መሳሪያ አለዎት?	1. አዎ 2. አይ ()		
212	አዎ ከሆነ, የትኞቹ ናቸው? (ከአንድ በላይ መምረጥ ይቻላል)	1. ደህንነት ጫማዎች () 2. የፊት ማሰክ () 3. የጆሮ መሸፈኛ () 4. የራስ መሸፈኛ () 5. የቧራ መነጽር () 6. መጥበሻዎች () 7. ከባድ / ወፍራም ጓንት () 8. የደህንነት ቀበቶ () 9. ሌላ የሚለይ		
213	እነዚህን መገልገያ መሳሪያዎች እንዴት መጠቀም እንዳለብዎት ስልጠና ወስደዋል/	1. አዎ 2. አይ ()		
214	እነዚህ የ አደጋ መከላከያ መገልገያዎች የግልዎት ናቸው;	1. አዎ 2. አይ ()		
215	የ አደጋ መከላከያ መገልገያ መሳሪያዎችን እንዴት አገኛቸዋል ?	1. በዉሰት () 2. ከ መስሪያ ቤቱ የተገኘ () 3. በግሌ የገዛሁት () 4. ሌሎች የሚለዉቁ		
216	በስራ ቦታዎ ላይ ማንኛውንም ዓይነት የ አደጋ መከላከያ መሳሪያ ይጠቀማሉ?	1. አዎ 2. አይ ()		
217	ከላይ ላለዉ ጥያቄ አዎ ከሆነ. መቼ ነው የሚጠቀሙት?	1. ሁልጊዜ 2. ሱፐርቫይዘሮች ሲኖሩ () 3. ብርዳማ ሲሆን () 4. መልበስ ደስ በሚለኝ ጊዜ		
218	ማንኛውንም ዓይነት የ አደጋ መከላከያ መገልገያ መሳሪያ በጭራሽ የማይጠቀሙ ከሆነ ለምን? (ምክንያት),	1. ጥቅም የለዉም 2. ምቹ አይደለም () 3. ስራ ቦታ ላይ አይገኝም () 4. ዋጋው ከፍተኛ ነዉ () 5. እንደጠቀም አልተነገረኝም 6. ስለምመረቀን 7. ሌላ		
219	የመንግሥት የጤና እና የደህንነት ባለስልጣናት የግንባታ ቦታ አደጋ መከላከልን የሚመለከት ጉብኝት ይጎበኛሉ?	1. አዎ 2. አይ		
220	አዎ ከሆነ የመንግሥት የጤና እና የደህንነት ባለስልጣናት የኮንስትራክሽን ቦታዎችን ለመጨረሻ ጊዜ በየትኛው ወር ይጎበኙ?	ከ 1 ወር ገደማ ከ 3 ወር ገደማ ከ 6 ወር ገደማ		

አመሰግናለሁ! መልካም የስራ ቀን ይሁንዎት

Annex C: Declaration

I the undersigned declare that this thesis [*PPE utilization and associated factor among construction workers*] is my original work and has not been presented in this or any other university and all source of materials and contributors used for the thesis have been fully acknowledged.

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