WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

OCCUPATIONAL INJURY AND ASSOCIATED FACTORS AMONG BUILDING CONSTRUCTION WORKERS IN WOLKITE TOWN, SOUTHERN ETHIOPIA: 2021.

BSC PH THESIS PROPOSAL

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ADVISORS' APPROVAL SHEET

This is to certify that the thesis entitled "occupational injury and associated factors among building construction workers in Wolkite town, Southern Ethiopia: 2021. Institution based cross-sectional study" submitted in partial fulfillment of the requirements for the degree of Public Health and has been carried out by

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ABSTRACT

Background: - Occupational injury is any personal injury or disease resulting from an occupational accident. Construction sector is identified as one of the most hazardous sectors both in developed and developing countries. It is responsible for more than half of all occupational injuries and deaths worldwide. Injury prevention and control require certain evidence of the problem.

Objective: - To assess prevalence of occupational injury and associated factors among building construction workers in Wolkite town, Southern Ethiopia; 2021.

Methods and Material: - An institution based cross-sectional study was conducted in Wolkite town among building construction workers from July 5 to October 25, 2021. Simple random sampling technique was used to select 459 study subjects. Data was collected by face-to-face interview and using checklist. Data was entered using Epi-data version 4.4.3.1, and analyzed using SPSS statistical package for windows, version 25.0. Descriptive statistics was done to assess basic respondent characteristics. Binary logistic regression model was used to identify factors. Bivariable logistic regression was done to identify candidate variables for multivariable analysis, and multivariable logistic regression was employed to identify independent factors that contribute to occupational injury among building construction workers. Variables with p-value <0.05 were included in the final model.

Result: - The overall prevalence of occupational injury among building construction workers was 43.02% [95 % CI: (38.47%, 47.69%)] in the past one year. Work experience [AOR; 2.05, 95% CI: (1.19, 3.55)], sleep quality [AOR; 2.80, 95% CI: (1.67, 4.69)], safety practice [AOR; 1.70, 95% CI: (1.09, 2.63)], work hour [AOR; 1.86, 95% CI: (1.19, 2.92)], and workplace supervision [AOR; 2.11, 95% CI: (1.29, 3.43)] were found to be significantly associated with occupational injury.

Conclusion and Recommendation: - The prevalence of occupational injury among building construction workers in Wolkite town is higher compared to other studies. Factors like work experience, sleep quality, safety practice, work hour and workplace supervision had influence on occurrence of occupational injury among building construction workers according to this study. To mitigate loss of life and productive time, necessary intervention must have to be implemented. Therefore, programs to decrease the burden of occupational injuries should have to focus on promoting safety practice (including use of personal protective equipment, warning signs and safe walkways), promoting workplace supervision, providing training for less experienced workers, and monitoring employees working hour. Furthermore, interventions on behavior related factors like improving sleep quality of workers have to be considered.

1. INTRODUCTION

1.1 Background

The world health organization definition of occupational health is “The promotion and maintenance of the highest degree of physical, mental social well- being of workers in all occupation” and it considers occupational health service to be responsible for the total of worker and, if possible, his or her family (1). Occupational injury is any personal injury or disease resulting from an occupational accident (2). Occupational injuries is one of the important factor that contribute to disabilities and life threatening situations in the developed and developing countries (3). In 2017 the International Labor Organization estimates that 2.78 million people around the world die to occupational accidents or diseases every year. Globally a non-fatal occupational accident was estimated to be 374 million in a year.

The rate of fatal and non-fatal occupational accidents is increasing overtime. Africa had the highest fatality rate of labor force with 16.6 per 100,000 persons (1). An occupational accident rate in Ethiopia is 16426 per 100,000 workers, the fatal occupational accident rate is 5,596 per year with a mortality rate of 21.5 per 100,000 workers (4).

The current economic growth and development has brought some changes in workplaces in developing countries, including Ethiopia. The construction sector has a disproportionately high rate of recorded accidents than any other sectors (1). It is accountable for most of occupational injuries and deaths worldwide (5). Workers in this sector is subject to different kind of hazards and are more exposed to mechanical, chemical and ergonomic risk factors (6). Injuries and fatalities in the construction sector have been associated with significant economic costs (7). However, work hazard at construction site are not realized at all or recognized to be less dangerous than what they actually are (8).

Ethiopia is currently has relatively strong growth in construction activities and this increase in construction activities is attracting thousands of laborers around the country**.** Sadly, construction sector is suffering from occupational injuries (9). In Ethiopia the framework of the already existing occupational safety and health conditions is breaking down and inadequately enforced, making construction sites more hazardous (10). The organization of

occupational health and safety services is not yet strong enough to handle the growing demands for workers' health and safety in the context of industrialization (9).

1.2 Statement of the problem

International labor organization recently estimated that globally every single day more than 7,500 people deaths occur in work places; 1,000 from occupational accidents and 6,500 from work-related diseases (1). Each year around 60,000 fatal accidents occur on construction sites worldwide. This means one fatal accident occur every ten minutes on construction site. In every six fatal accidents that occur in work place one occurs on a construction site. In industrialized countries, even though the construction sector employs only less than 10% of the labor force, around 25% to 40% of occupational death occur in construction sites (11).

The consequence for this high accident results in absence from work, loss of productivity, permanent disabilities and even fatalities (12). According to 2017 ILO report, globally the average economic cost of occupational injury and illness is 4% GDP and it differs between 1.8 and 6% GDP in a country (1, 13). About 13 billion dollars estimated is lost annually by fatal and nonfatal construction injuries. More than 1.36 billion dollars lost annually for medical expenses of nonfatal injuries alone (7).

In addition, the construction sector has five times higher risk of fatality than manufacturing sector (14). In developing countries the impact of occupational health and safety hazards faced by construction workers in construction sites is 10 up to 20 times greater than those in developed countries (13). In United States of America a 19 years research results showed that about 11.5% of work related injuries are among construction workers (15). In Egypt, among construction sector workers about 13% of work-related deaths and 18% of occupational injuries were reported (16). In 2014, the injury rate for Kampala district Uganda was 3,797 per 100,000 workers and the fatality rate was 84 per 100,000 workers (17). According to a recent study in India show that 165 out of every 1,000 construction workers are injured on the job (18). In Ethiopia, more recent institution-based studies in the town of Addis Ababa and Jimma, have reported injury prevalence of 38.3% (19) and 41.4% (20) respectively. Also another study done in Dessie town shows the prevalence of occupational injury was 32.6% (21).

There are different factors that have been identified and reported in studies as they have influence on occupational injury. These are like age of the worker (22), sex (23), educational status (21), work experience (19, 24), extended working hour (23, 25), safety training (23, 26),

knowledge on occupational health and safety (24), work type (24), sleeping disturbance (27), khat chewing (19), drinking alcohol (24, 27), supervision (26), work satisfaction (23, 25) and use of personal protective equipment (19, 23, 25) were found to be factors which has association with occupational injury.

There are scarce of data on occupational injuries especially in developing countries, this causes negligence of the problem and inadequate allocation of resources in prevention activities, which has direct effect on workers safety and health (1). In Ethiopia, due to scarce of data on occupational injuries at national and local level, the efforts done by responsible stakeholders in preventive work of occupational injury were poor. The labour law proclamation No. 377/2003 gives the powers and duties for inspectors in inspection services. Their role is to ensure that the safety and health of workers are respected and strong system is put in place (28). However, there are no adequate inspection services in construction sector (28). In fact, by some contractors or developers' efforts like making the process safer, preparing and using safety guidelines and providing personal protective equipment were used to reduce occupational injuries and fatalities in construction sites. But the measures taken to control and prevent occupational injuries were inadequate (29).

Despite the growing trend of construction sector, far too little attention has been given to the problem (9). Uncontrolled occupational injuries may end up with failures of the business, social development, national economic crises, and many more (1). A review report conducted in 2016 in Ethiopia, indicates that there are gaps on research, capacity, policy and regulation, training, organizational structure, monitoring, and evaluation as well as database for intervention in construction sector on occupational health and safety (9). Therefore, this study aims to contribute in assessing the prevalence and factors related to occupational injuries among building construction workers, including variables which didn't assessed in previous studies, such as knowledge, attitude and safety practice).

1.3 Significance of the study

The current study was intended to inform a need for credible attention by showing the prevalence of the problem and identifying significant contributing factors for occupational injuries in construction sector. There are many expected benefits in conducting this study. Among those benefits, findings of the study will be an important input in preventing occupational injury and promoting occupational health and safety of construction workers. Also, this study enables concerned body to give more attention to health of construction workers, prioritize the problem and design cost-effective interventions. In turn employees will be benefited by subsequent preventive actions by those stakeholders engaged on the health of construction workers. Additionally, it will serve as a baseline document by giving prompt ideas on occupational injury for scholars or students and offer important information's for further studies.

2. LITERATURE REVIEW

2.1. Prevalence of occupational injury among construction workers

Occupational injury among construction workers around the world is a common problem, although its magnitude and severity differ. In developing countries the magnitude of accidental injury is higher compared to developed countries (1, 19).

A study conducted in Ilam, West Iran on work related injury among construction workers has indicated a 82 % prevalence of occupational injury (30). In a study conducted on injuries among construction workers in Ahmedabad City, India, the prevalence of an injury was found to be 22.9 % (31). A study done in China on non-fatal unintentional injury and related factors among male construction workers has reported a prevalence of 34.82% injury (32). Similarly a study conducted in China the prevalence of occupational injury was reported to be 69.82% (33). Moreover, Study finding from western Norway indicate that the proportion of occupational injury were 27.5% (34). In Study done in Mexico, 40% of the workers reported having had at least one accident during their working life in construction (35). A three years period study in Kuwait on non-fatal occupational injuries among construction workers, reported the construction workers constituted more than half of the total number of occupationally injured workers (36).

A study on work-related diseases and occupational injuries among workers in the construction industry in Egypt showed 13% of work-related deaths and 18% of occupational injuries among workers (16). Another study in Egypt on non-fatal occupational injuries and safety climate among construction building workers has indicated a 46.2% prevalence of accidental injury (37). Additionally, a result from Kampala city, Uganda, revealed that among construction workers 32.4% were injured (38). Another study done in Kampala, Uganda, founds the injury rate for Kampala district was 3,797 per 100,000 workers (17). While another study in Nigeria reported 39.25% prevalence of occupational injury (39). A 2017 literature on common construction site hazards in Nairobi Kenya has reported the prevalence of injury to be 74% (40).

In Ethiopia, a study conducted in Gondar on prevalence of work-related injuries among building construction workers is identified to be 38.7% (22). Another study in Gondar shows almost similar prevalence of 39% (24). More recent institution-based studies to determine the

prevalence of occupational injuries among construction workers in the town of Addis Ababa, Jimma and Bale Robe have reported injury prevalence of 38.3% (19), 41.4% (20) and 39.2% (26) respectively. Also another study done in Dessie town shows the prevalence of occupational injury to be 32.6% (21).

2.2. Characteristics of occupational injury

Study done in Egypt on work-related diseases and occupational injuries among workers in the construction industry indicated that contusions (29.4%) and cuts (22.4%) were the most common injury types among construction workers (16). Whereas, a three years period study in Kuwait revealed that fractures (59.4%) and wounds (cut, contused, and penetrating) (24%) were the commonest types of injuries among construction workers (36). A study done in Addis Ababa the main types of injuries reported were cut (36.2%) and abrasions (26.6%) (23). Another study done in Gondar founds that Abrasion or laceration was the leading type of injury, which accounts for 48.75% (24).

In a study that was conducted on construction workers treated at the George Washington university emergency department over a 7-year period, the main cause of injury were struck by sharp objects (26.1%), struck by/against an object (19.9%), and falling (17.1%) (41). Study conducted in Kenya indicates falling from height and being hit by falling objects contributes about 64% of all construction site accidents (40). Also, most study show that the leading cause of occupational injury among construction workers were falling from heights, falling from the same level, struck by an object, cut by sharp object and slipping or splashing objects (19, 20, 23, 24).

Study among Egyptian workers in construction industry reported that head 23.7%, upper limb 15.1%, lower limb and trunk 13.8% and eyes 14.6% were the parts of the body commonly affected (16). Different studies also shows that upper (arm) and lower limb (leg), finger/hand/ and head injury are the most common body part of injury among construction workers (19, 20, 23, 26). Study done in Kenya also established that hand (41.4%), head (30.8%) and Leg (25.3%) are the most vulnerable parts of the body during accidents (40).

Study conducted in Turkey indicated the major activities at time of the accident reported were material handling (13.7%), fixing wooden objects (7.6%), operating machineries (6.7%), masonry/brick layer (1.8%), and welding 0.8% (42). According to study conducted in Kenya

- Individuals who started working in the construction site after the data collection was already began were excluded.

4.5. Sample size determination

Sample size for the first specific objective was calculated by Epi info version 7 using population survey, considering proportion of occupational injury of previous study done in Dessie town, Northeast Ethiopia, which showed 32.6% prevalence of occupational injury among construction workers (21). With 95% confidence interval certainty, 4.5% confidence limits (degree of precision). By anticipating a 10% non-response rate, the sample size for the study became **459**.

Sample size for second objective was calculated by Epi info version 7 using double population proportion formula assuming 95% confidence interval and 80% power of the study (Table 4.1).

Table 4. 1: Sample size determination using factors associated with occupational injury among building construction site workers in Wolkite town, Southern Ethiopia.

Variables	AOR	95% CI	power	Percent of Outcome in Unexposed	Ratio (Unexposed: exposed)	N	n + 10% nonresponse	Reference
Worker experience	2.79	1.72-4.53	80%	47%	1	144	159	(24)
Alcohol drinking	3.16	2.09-4.79	80%	50.3	1	122	135	(24)
Training on OHS	3.36	1.54-7.33	80%	24%	1	110	121	(20)
Working hour	2.02	1.14-3.58	80%	35%	1	286	315	(20)
Not using PPE	3.04	1.65-5.60	80%	25.5%	1	128	141	(20)

The sample size determined using the prevalence of occupational injury from previous study was greater than the sample size calculated using independent variables. So, the final sample size for the study was **459.** As other studies show this sample size was optimal (20, 21, 38).

4.6. Sampling procedure

The study was carried out in five randomly selected active building construction sites, which has been constructed by grade 1-8 licensed construction firms, in Wolkite town. The sites were randomly selected by the lottery method. Thereafter, the total sample size was proportionately

allocated for the 5 randomly selected construction sites based on their average number of workers they have during data collection period (i.e., 118 to site 1 (N1 = 125), 87 to site 2 (N2 = 93), 76 to site 3 (N3 = 81), 91 to site 4 (N4 = 97), and 87 to site 5 (N5 = 92). Using workers in the registration book as a sampling frame, the participants were drawn from the site's list of workers using simple random sampling.

The sample size for each building construction site (n_{inst}) was calculated as follow:

$$n_{inst} = (N_{inst} * n) / N$$

Where:

n_{inst} = sample size to be assigned for specific construction site

N_{inst} = number of workers in the specific construction site

n = total sample size

N = total number of workers in selected construction sites

Accordingly, sample size for sites; based on the fore mentioned formula.

1. Yejoka international hotel block G+5 (YIC) construction site: $n_{inst} = (N_{inst} * n) / N = (125 \times 459) /488 = 118$
2. Sport office construction site(SOC) : $n_{inst} = (N_{inst} * n) / N = (93 \times 459) /488 = 87$
3. Gurage zonal office construction site(GZO): $n_{inst} = (N_{inst} * n)/N = (81 \times 459) /488 = 76$
4. WKU central Administration G+5(WKU): $n_{inst} = (N_{inst} * n) / N = (97 \times 459) /488 = 91$
5. Branda G+5 construction site(BCS): $n_{inst} = (N_{inst} * n) / N = (92 \times 459) /488 = 87$

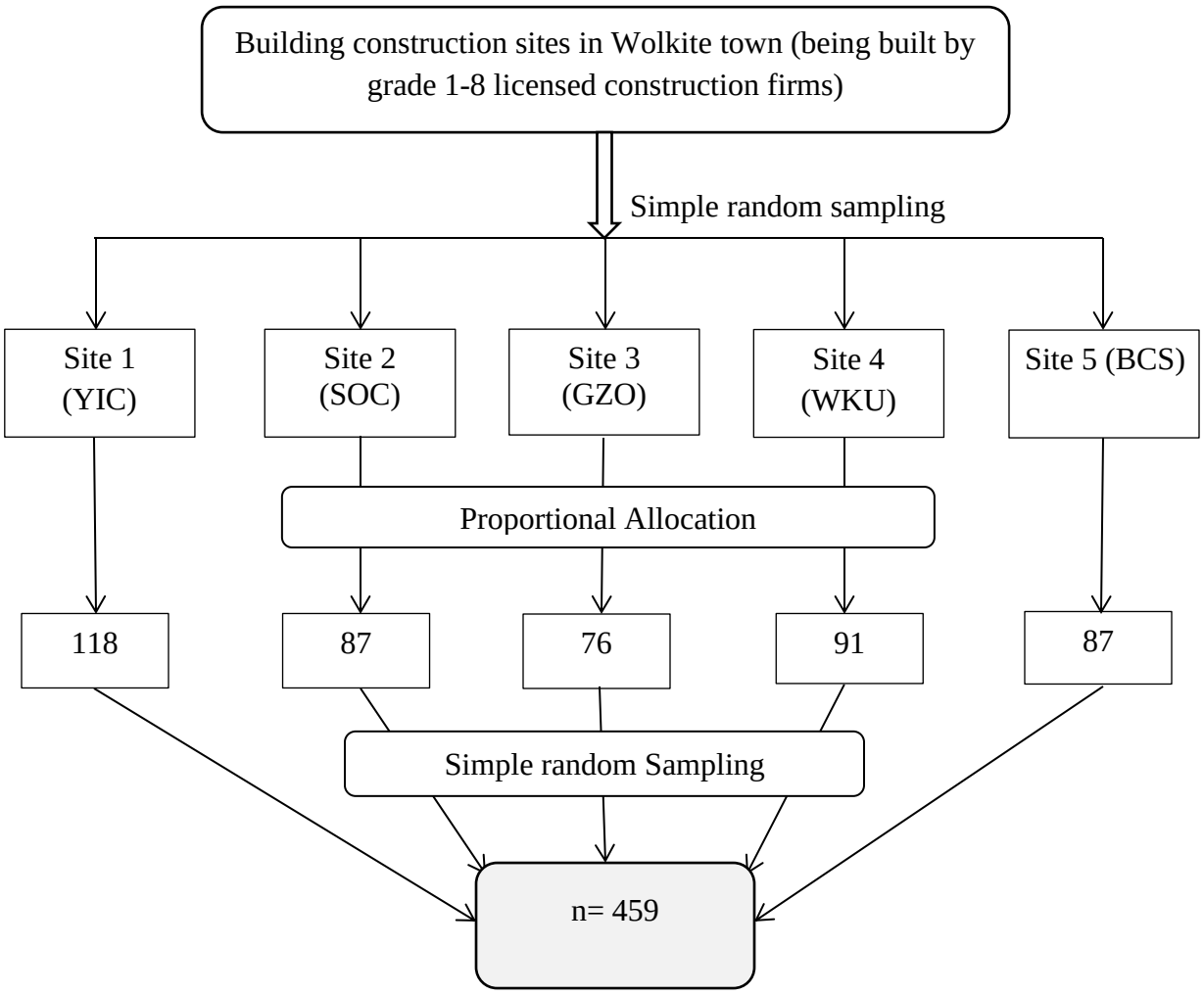

Figure 4. 1: Schematic presentation of sampling procedure of the study on occupational injury and associated factors among building construction workers in Wolkite town, Southern Ethiopia 2021.

4.7. Study variables

4.7.1. Dependent variable

- Occupational injury

4.7.2. Independent variables

Socio-demographic variables

- Age, Sex, Marital status, Educational status, Religion, Employment status, Type of work, Work experience, and Monthly income

Behavioral related factors

- Khat chewing, Alcohol drinking, Cigarette smoking, Safety practice, Job satisfaction, Knowledge on OSH, Sleep quality and Attitude on OSH

Environmental related factors

- Working hours, Training on OSH, Availability of PPE, and workplace supervision

4.8. Operational and Key terms definitions

Occupational injury: Any physical injury resulting from an accident in the course of construction work in the past 1 year prior to this study, at least one episode of injury. It includes all minor injuries such as cuts, Abrasion and severe injury (disabilities) that causes hospitalization, working days lost as reported by the worker (19).

Permanent employee: Any contract of employment between employee and employer concluded for an indefinite period (51).

Temporary employee: Any employment contract between employee and employer made for defined period (51).

Training on OSH: health and safety education provided for workers to create basic understanding of occupational health, workplace hazards, injury prevention and safety (24).

Injury severity: characterized by hospitalization more than 24 hour and absence from work over three days in the last one year (20).

5.3. Environmental related characteristics

Out of the total respondent, 59.91% of the employees had worked for more than eight hours per day. The majority 300 (67.57%) of employees reported workplace supervision had never occurred in the past 12 months. Regarding safety and health training, 346 (77.93%) of the respondent did not attend any kind of workplace safety and health training (Table 5.4). From those who has attended safety and health training, 48 (49.97%), 40 (40.81%), and 10 (10.2%) of them get the training from their workplace, from government and get from both their workplace and government respectively. For only one hundred and twenty-one (27.25%) of the participant personal protective equipment were avail. Out of personal protective equipment available, 51.98% were gloves (Figure 5.1).

Table 5. 4: Environmental characteristics of building construction workers of Wolkite town, Ethiopia, 2021.

Variables		**Frequency (N)**	**Percent (%)**
Work hour per day	≤ 8 hr./day	178	40.09
	> 8 hr./day	266	59.91
Workplace supervision	Yes	144	32.43
	No	300	67.57
Safety and health training	Yes	98	22.07
	No	346	77.93
PPE available to workers	Yes	121	27.25
	No	323	72.75

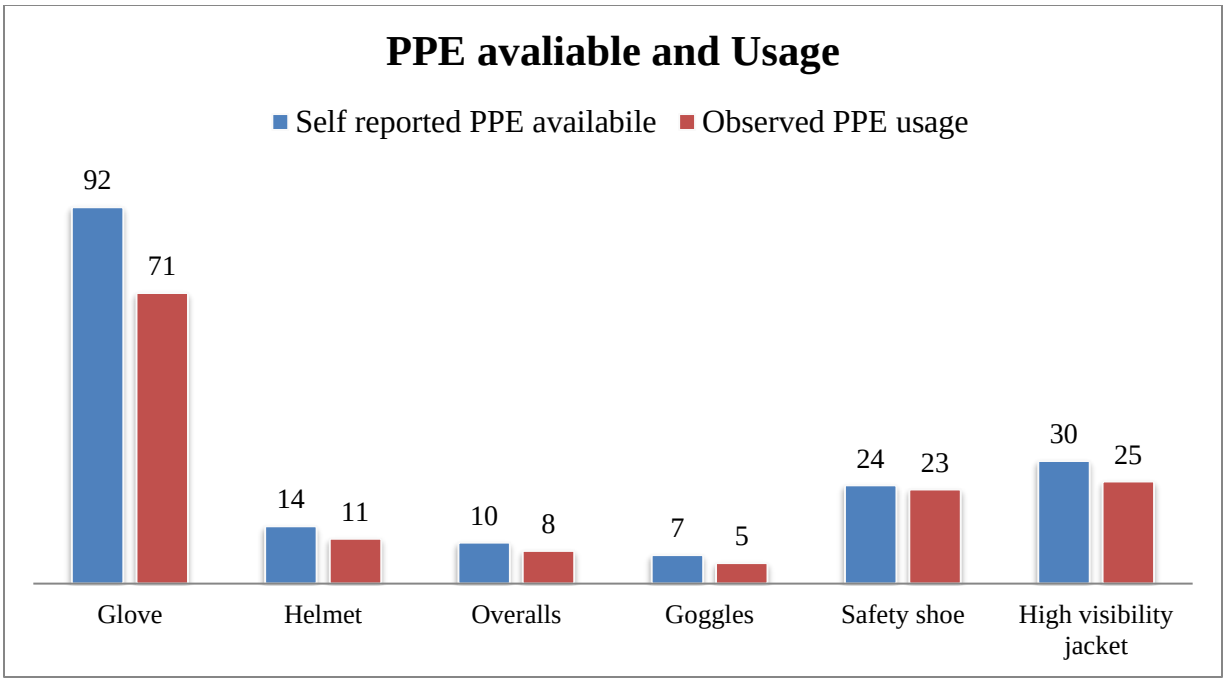

Figure 5. 1: Types of PPE available and observed PPE usage among building construction workers in Wolkite town, 2021.

5.4. Prevalence of injury and its characteristics

Out of 444 construction workers participated in this study, the overall prevalence of injury found was 43.02% (95% C.I: 38.47%, 47.69%) during the last 12 months. Out of injured respondent one hundred and forty-three (74.87%) of the injured respondents encountered more than one injury. The main types of injuries reported were cut/laceration 31.25%, back pain 23.95%, and abrasion/contusion 17.97% (Figure 5.2). The three leading causes of injuries were cut by sharp objects 38.62%, followed by hit by object 22.51%, and fall from ground level 11.25% (Table 5.5). From the total respondents most of injuries happened in fingers 30.63%, followed by trunk/chest 26.96% and feet 12.83% (Figure 5.4). In this study, the agent of occupational injury was hand tools 52.33%, fall 26.33%, lift 14%, machineries 5%, and others 2.3%. Majority of (47.09%) of participant were handling materials during injury, followed by heavy lifting 32.11% and fixing wood 7.95% (Table 5.5). Among the total injured workers 11.52% were hospitalized, of which 31.82% were hospitalized for more than 24 hours. Around 32.46% of injured workers were absent from their work for more than 3 days (Table 5.6).

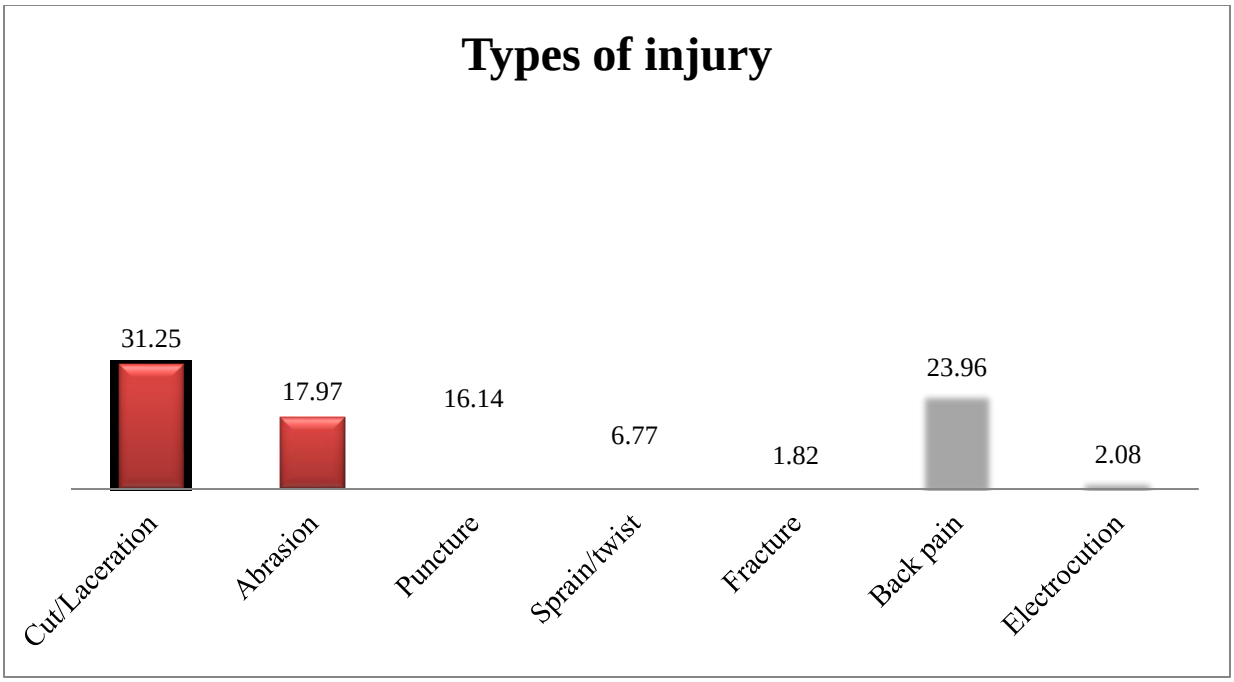

Figure 5. 2: Types of injury among building construction workers in Wolkite town, 2021.

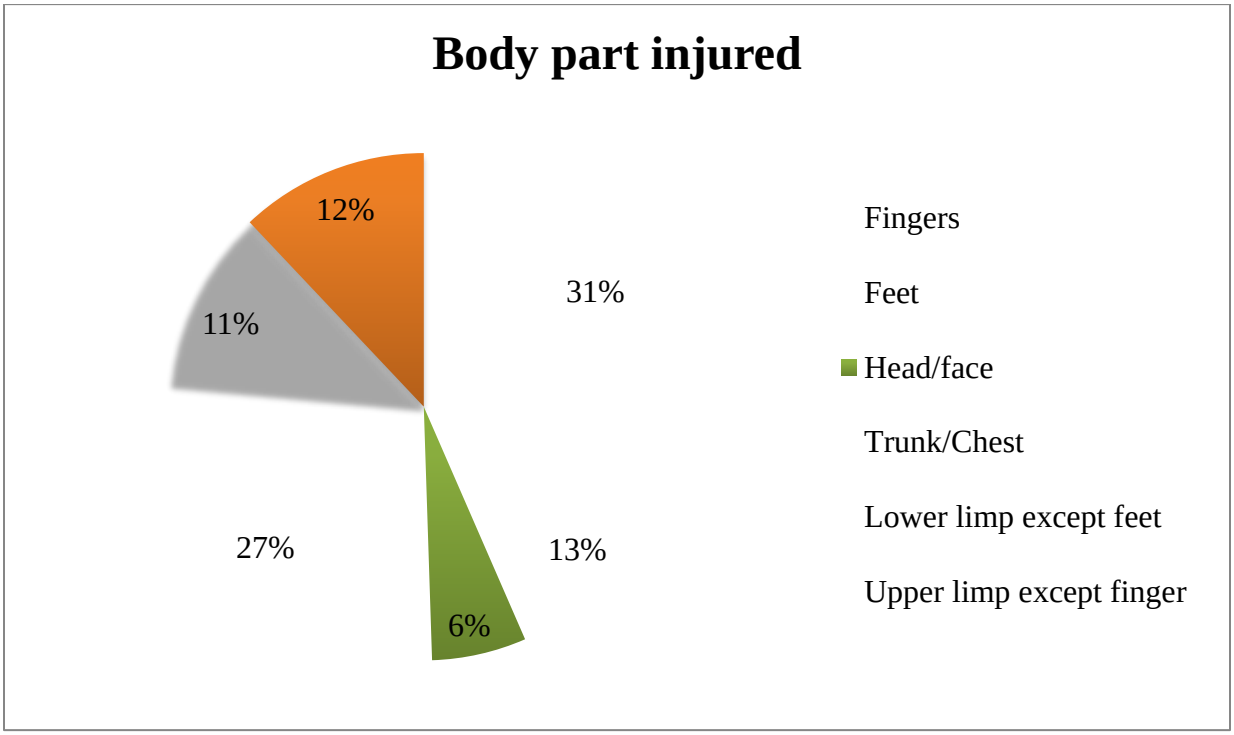

Figure 5. 3: Body part injured among respondents in building construction sites, Wolkite town, 2021.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

The prevalence of occupational injury among building construction workers in Wolkite town is higher compared to other studies. More than two-third of injured workers sustained more than one injury. Cut/laceration was the main type of injury. The leading cause of injuries was cut by sharp objects. Fingers/hand was the most hurt part of the body during injury; this indicates that PPE targeting extremities might reduce injury. One-third of injured workers were absent from their work for more than 3 days, this poses a big burden on both the health system and workers' families in economy perspective. Factors like work experience, sleep quality, safety practice, work hour and workplace supervision had influence on occurrence of occupational injury among building construction workers according to this study. Therefore, an intervention must be in place to mitigate this problem.

7.2. Recommendation

Recommendations to the workers

The workers should have to be restrained from activities which lead them to occupational injury, including not getting adequate sleep and not obeying safety procedures and measures (including use of personal protective equipment, respecting warning signs, using safe walkways and etc.). Employees must have to try to get sufficient sleep and rest before they went to work. Furthermore, they have to ask for their occupational safety and health rights at workplace.

Recommendations for Employers

The employers should have to provide training on occupational safety and health, this will increase workers awareness of dangers present at work site and improves their safety practice. The employers should also have to provide personal protective equipment to workers so that they perform their work in safe manner. Furthermore, they don't have to enforce the employees to work over time.

Recommendations for government

The responsible government bodies need to implement an occupational supervision to monitor and enforce safety requirements at worksites and protect workers safety and health rights. Also, modifying their surveillance system with current advanced technology and safety condition is very advisable.

8. STRENGTHS AND LIMITATIONS OF THE STUDY

Strengths of the study

One of the strengths of this study is inclusion of some variables like ‘knowledge on OSH’, and ‘attitude on OSH’ of workers as factor variable, which were not included in previous studies done in construction sector.

Limitations of the study

This study has limitations that should be noted. Since interviewer administered, questionnaire was used to collect data, it might be prone to social desirability bias; in that workers might report more socially acceptable responses than their actual day to day practice. It is also prone to recall bias due to 12 months recall period. Severely injured workers might not be at work during this study time. This may lead the study to be vulnerable to healthy worker bias. Moreover, inclusion of minor injuries in study may result in under or over-estimation of injuries.

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210.10	I feel good about my job.					
211	**Question for assessing workers safety practices.**	**RESPONSE(S)**				
		Strongly agree (5)	**Agree (4)**	**Neutral (3)**	**Disagree (2)**	**Strongly disagree (1)**
211.1	I use appropriate PPE in proper way or in accordance with the training and instructions					
211.2	I always participate in every OSH issues.					
211.3	I am involved in medical examinations offered by the organization or myself.					
211.4	I operate any safety appliances, tools or equipment's on reasonable and probable grounds.					
211.5	I follow safe work procedures or precautions and know how to perform all my activities in a safe way.					
211.6	Whenever any work related incidents happen, I reports to my immediate supervisors orally and by using formats.					
211.7	I am free from impairments related to drug abusers like alcohol, cigarette smoking, khat chewing any violent behaviors					

Part-3: Environmental factors

SN	Questions	Possible Response	Skips
301	How many Hours do you work per day?	_____hours	
302	How many Days do you work per week?	_____Days	
303	Do you have regular health and safety supervision?	1. Yes 2. No	
304	Have you ever had on job training on any type of occupational health and safety issues?	1. Yes 2. No	If no skip to 306
305	If yes to Q404, from where did you get? (more than one answer is possible)	1. From institution 2. From Gov't 3. From NGOs 4. Others---------	
306	Have necessary PPE been made available for You?	1. Yes 2. No	If no skip the next Que.
307	If yes What type of PPE is available for you? (more than one answer is possible)	1. Gloves 2. Ear plug 3. Respirators 4. Helmet 5. Overalls 6. Goggles 7. Safety shoe 8. High visibility Jacket 9. Others---------	

Part 4: occupational injury characteristics

SN	Questions	Possible Response	Skips
401	Have you encountered injury in your workplace in the past 12 months?	1. Yes 2. No	If no skip the rest questions
402	If yes to Question 401, What type of injury you encountered? (more than one response is possible)	1. Cut/ laceration 2. Bruise/contusion 3. Puncture/stab 4. Sprain/twist	

		5. Fracture 6. Back pain 7. Electrocution 8. Loss of body part 9. Other_____	
403	If yes to Question 401, What was the cause of the injury? (more than one response is possible)	1. Cut by sharp objects 2. Falling from ground level 3. Falling from height 4. Hit by object 5. Slipping 6. Contact electric line 7. Other_____	
404	Please tell us the anatomical location of injured body part. (more than one response is possible)	1. Fingers 2. Feet 3. Face/head 4. Trunk/ Chest 5. Lower limp (excluding feet) 6. Upper limp (excluding fingers) 7. Other_____	
405	What was the agent of injury? (more than one response is possible)	1. Hand tools 2. Machine 3. Fall 4. Other_____	

406	What type of work activity you were involved during the accident?	1. Handling material 2. Heavy lifting 3. Driving 4. Other _____	
407	What treatment do you get during injury?	1. first aid (treated at site) 2. hospitalized for less than 24 hr 3. hospitalized for greater than 24 hr	.
408	How many injuries you encountered in one year period?	_____	
409	Days lost due to injury	_____ days	

Appendix 4:

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207.4	¯ f ;H þ¹J õá5" yq¶Ñ åõyèyê´ ¹ê?	1. q— 2. q´				
207.5	¯Ï¹J õyèy²ê: / / õá ú 5 ;H ê¶ y÷Rê Ï¹J õyèy²Ÿº' æ qf· a'?	1. q— 2. q´				
207.6	5» ËF– æ q¶Ñç² yJæ å÷Ræ~ EKR•– J qån:å' ² 8æ?	1. q— 2. q´				
207.7	¯v Jøæ ² õ ² vfºJ õá ú vf¹å;J ² æ?	1. q— 2. q´				
207.8	¯û² ¶ZfaJdåfaJf ¯÷²õè~F úê~KRfd •ëRf å´E' ² æ?	1. q— 2. q´				
207.9	5 è´ ¯÷¶ q¶Ñ—ÞR åõyèyê¯÷ · Ÿº—Rf² æ?	1. q— 2. q´				
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402	åæ²!401 õê q—yäaúf q´aJÏ¹J a5 ²ÑáûJ? (y qf» 5è´õê ´Pèê	1. õ# æ 2. »:¶8/ f5 ø'äJ 3. õ'ÑJ/õ5 J 4. õHá 5. õ 5 6. ¯Æ 8ãõú 7. ¯ué~J ~ ~ 8. ¯ 'aJf q|ê øäJ 9. éè_____	
403	åæ²!401 õê q—yäa¯Ï¹F õf u úf a5? (y qf» 5è´õê ´Pèê	1. åJ 8å' aÎ õ# æ 2. yõ J è´ õ'¶" 3. yy H è´ õ'¶" 4. 5v õõHJ 5. õf HJ 6. 5ué~J ~õ²¤ 7. êè_____	
404	¯Ff¯ 'aJ q|ê è§a' Ï¹J ¯¶ ;J? (y qf» 5è´õê ´Pèê	1. ¯vËäJ 2. ¯vÓ äJ 3. J/ 4. q´f 5. Jy/¶ J 6. vÓ (y äKR'î) 7. vË(y äKR'î) 8. êè_____	
405	5úf»a' Ï¹J ¯¶ ;J? (y qf» 5è´õê ´Pèê	1. 5vËõ ² 2. 5ø f 3. 5õ'¶" 4. êè´Îåþ_____	
406	Ï¹F ¶ ;J úf v¯ a5?	1. v E ~ù 2. v v²a ' 3. v¯a¹' 4. êè_____	
407	Ï¹J ¶ ;J ¯J a' ¯HyöJ?	1. v¢' ;H 2. ä Hê El' (å qf» f :P) 3. ä Hê El' (yqf» f 5è´)	.
408	512 ' J ' æ fI Ï¹J ¶ ;J?	_____	
409	5Ï¹J ú~f²J å fJ f y è´ ?	_____ f	

Appendix 5: Observation Checklist

S.N	Questions	Yes	No	Remarks
1	Workers wearing proper eye protection for the task (glasses, goggles)?			
2	Workers use proper gloves?			
3	Workers wear proper protective clothing?			
4	Workers wear proper foot protection (safety shoes, boots)?			
5	Workers wearing proper hearing protection where the hazard exists (ear plugs, ear muffs)?			
6	Workers wearing proper Head Protection where hazard exists?			
7	Workers wearing high visibility Jacket when needed?			
8	Workers applies proper manual lifting techniques (using legs, back straight, weight close to body, feet flat on floor, knees bent)?			
9	Workers following demarcated walkways?			