JIMMA UNIVERSITY
INSTITUTE OF HEALTH SCIENCES, FACULITY OF PUBLIC HEALTH,

DEPARTMENT OF EPIDEMIOLOGY

OCCUPATIONAL INJURY AND ASSOCIATED FACTORS AMONG CONSTRUCTION WORKERS AT KOYSHA HYDRO DAM OMO RIVER BASINE, SOUTHWEST ETHIOPIA.

BY: SINTAYEHU TAREKEGN (BSc)

A RESEARCH THESIS SUBMITTED TO JIMMA UNIVERSITY, FACULITY OF PUBLIC HEALTH, DEPARTMENT OF EPIDEMIOLOGY; IN PARTIAL FULFILMENT FOR THE REQUIRMENTS OF THE DEGREE OF MASTER'S IN GENERAL PUBLIC HEALTH

JIMMA, ETHIOPIA

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Abstract

Background: - Construction industry has been identified as one of the most hazardous industries both in industrializing and non-industrialized countries. Work-related injuries in construction sector is a major public health problem resulting in serious social and economic consequences that could be prevented if appropriate measures are taken.

Objectives: - This study was employed to assess the prevalence of occupational injuries and associated factors among construction workers at Koysha hydro-dam, Southwest Ethiopia, 2021.

Methods: - Construction site based cross-sectional study was employed on 409 randomly selected study subjects. The data were collected by face-to-face interview. After checking for completeness and consistency, entered into Epi-data manager and analyzed using SPSS version 25. Data exploration were computed and presented with tables and figures. Bivariate analysis was run with each independent variable. Then variables with P-value < 0.20 were included in multivariable logistic regression analysis. Hosmer-Lemeshow goodness of fit test was checked. Finally, conclusion was made for that variables with P-value <0.05 in multivariable regression analysis.

Results: - The annual prevalence of work-related injury among Koysha hydro-dam construction workers were 37.7%. The mean age of participants was 31(SD±8.33) years. Twenty-nine (18.8%) of injured respondents were hospitalized. Work related injury was significantly associated with male sex [AOR=15.16;95%CI 6.60,34.82], formal education [AOR=0.5;95%CI 0.29,0.85], non-use of PPE [AOR=11.04;95%CI 5.04, 24.18] long working hours [AOR=2.15; 95% CI 1.24, 3.73], on-job training [AOR= 0.39; 95% CI 0.18, 0.83] and alcohol consumption [AOR=5.44; 95% CI 2.99, 9.89].

Conclusion: - Alcohol consumption and being male increase the risk of work-related injury. On job training, use of personal protective equipment, working ≤72 hours per week and education were associated with low risk of work-related injury. On-job training, regular monitoring of workers for substance abuse and encouraging workers to use PPE were crucial to reduce the occupational injury and safeguard the workers.

Key words: - Occupational injury, dam construction, Personal protective equipment, construction workers.

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Acronyms

AAU Addis Ababa University

AOR Adjusted Odds Ratio

OR Odds Ratio

COR Crude Odds Ratio

EEPP Ethiopian Electric Power Project

ETB Ethiopian Birr

GDP Gross Domestic Product

ILO International Labor Organization

IRB Institutional Review Board

OSH Occupational Safety and Health

PPE Personal Protective Equipment

SNNP South Nations Nationalities and peoples

SPSS Statistical Package for social science

USD United States Dollar

US United States

WHO World Health Organization

1 Introduction

1.1 Background

An occupational injury is any physical injury to a worker associated with the performing workers at the work place(1,2). According to the WHO's "Global Burden of Disease study" there are about five million injury related deaths annually, accounting nearly 10% of the global mortality(3). Globally about 160 million people live with work related injuries that resulted in four days and above absence from work in each year. This burden hurt directly the once country economy(3). The ILO believes that, the cost of occupational injury varied between 1.8% and 6% of GDP among different countries, averaged at the world to be 4%of the global GDP or 1.25 trillion USD(4).

Construction is dangerous industry with high rates of fatal and non-fatal injuries(5). It recognized as having high accident rates which results in absence from work, loss of productivity, premature disabilities and even fatalities(5). It is responsible for more than half of occupational injuries and deaths worldwide(6). The injury risk can also be influenced by workers characteristics (7).

Construction is a sector that has very specific hazards, such as working at height, work with power tools, more than one contractor working at a single site with lack of coordination, lack of standards or regulations among workers and expertise, standard trainings, less regulation and enforcements than other sector(8).

Studies commonly reveal that, there are factors that are significantly associated with occupational injury. These factors include, lack of health and safety training programs, young workers, male sex, lack of formal education, frequent alcohol consumption(9,10) sleeping problem, (5,8) lack of physical exercise, low job experience, (11,12) extended working hour, night work, (13,14) smocking,(15,16) physical demanding work, nonuse of personal protective equipment(12)

The impact of occupational health and safety hazards faced by construction workers in developing countries is 10 – 20 times higher than those of developed countries(16). Sub-Saharan Africa has the highest rate per worker of occupational injury followed by Asia (except China and India)(9,17). Literature showed that the prevalence of occupational injuries among construction

workers at different countries was, in Turkey 30%, in Egypt 46.2%, in Kenya 74%(18). Only 5-10% of the workforce in developing countries has access to some kind of occupational health and safety services(19,20).

In Ethiopia, information regarding construction injuries is rare and very limited attempts have been made to investigate(10). The result of studies on occupational injury vary from 38.3% to 38.7% in building construction in Addis Ababa(21).

Ethiopia has long history in dam construction. Even though much literature search, there is limited study found(2). Genale Dawa hydro dam construction is the only study literature found with prevalence of occupational injury 57.8%.

1.2 Statement of the problem

An occupational injury is the most prevalent among construction industry(2). In developing countries, the work-related injuries are the most commonly reported occupational illness and the reasons for long term sick leave and disabilities(3). It is known that case of human suffering and the major financial burden on the community, on employers and individuals(2).

Worldwide, millions of workers are work under poor and risky environment(3). Because of these, occupational injuries and diseases continue to be the leading cause of work-related deaths(22). Every day 6300 people die as a result of occupational accident or work-related illness worldwide(23). WHO/ILO report shows that every 15 second a worker dies from occupational accident or disease(21).

Most private construction companies lack an occupational health and safety regulations(22). No regular monitoring and control hazards, no supervision of hygiene and sanitary facilities even if the nature of construction work is dusty and difficult to apply hygienic practice(10,14). No regular provision of PPE and control at work site. Some construction owners has no rule for medical checkup during engagement(24,25). In some, there is no safety training, no cross check of documents and licenses(26). Everything is trying and error, till perfect or injury occurs(9).

The companies have their own hidden rule with which they handle or harass their workers. The only workers resist the torments of the company stay in the work(27). The way they report the accident is so different from the rule and regulations of ILO/OSH.

Death report is very minimal than it happens(4). Most workers obligated to take long rest (sick leave) soon after the fatal accident. If he/she dies with in the sick leave days or after, it considered as natural death(28).

Ethiopia has long history in dam constructing, but study literatures. Genale Dawa hydro dam is the only dam construction on which study conducted with prevalence rate 57.8%(2). The situation of OSH in Ethiopia remains as its premature stage(25). There is no much strength in relation to policy, implementation of legislation, infrastructure, skill and capacity. All in all the weakness predominates(24,25).

Many researchers were study on construction worker's "occupational hazard" but only some countries identify the health status of construction workers by routine surveillance(24,25). The issue of PPE, even if it is taken care by the bargaining, not backed by the necessary studies and evaluation of work place hazards and their impact on health and safety(30).

1.3 Significance of the study

There is less information about prevalence of work-related injuries and associate factors among dam construction workers. In developing countries like Ethiopia, the occupational injury is not properly reported when compared to developed countries. To report sever accidents and accidental deaths, it relies on political will and or kept secret. So, this study provides the base line information for policy makers to incorporate in OSH policy. It will provide valuable information for researchers in different discipline and project officials. For employee and employers use to design a strategy to prevent occupational accidents. The governmental bodies become the safe guard for workers, wastage of assets.

The contracting company, Salini Impregilo (webuild) have been working construction long ago, but there is no any research conducted in relation to health.

2 Literature Review

Globally, hundreds of millions of people are working in unsafe conditions(7). Occupational safety and health broadly defined as a science of the anticipation, recognition, evaluation and control of hazards arising in or from the place of work that could damage the health and welfare of workers, taking in to account the possible impact on to the surrounding communities and general environment(31). Among all industries, construction is considered as extremely hazardous working environment. As a result, the health status of construction workers need careful attention during and out of industry(29,30).

The ILO shows that, in Ethiopia, the economy lost over 234 million USD annually from 1992 – 2002 because of labor loss(4). The accidents are reported only around 10% of the undertakings that are covered by legislation(33). Out of all occupational accident 19.5% is reported by the construction industry. The school age children rushed to be a laborer. New culture and unknown communicable disease emerged with construction workers(2).

2.1 Prevalence of Occupational Injury

Prevalence of work-related injury among construction workers in USA 39.9%(34), Japan 35.6%(35) and India 22.9% in the one year period. In 2013 study conducted in India, the prevalence of occupational injury among construction workers had 12.1 % in less than one year period(36). Studies done in north Africa, Egypt a year prevalence of occupational injury among construction workers 18.4%(37). Other study conducted in one of Ethiopian cities, Gonder, one year prevalence of occupational injury among building construction workers were 38.7%.The other study done in Afar region Tendaho Agricultural development social company workers 383/1000 and north Gonder zone among small and medium scale industry workers, annual prevalence of occupational injury rate 335/1000and were recorded (38,39). The study conducted in Addis Ababa among building construction the annual prevalence of occupation injury were 38.3%(3). These whole shows that occupational injury in the field of construction is very high and has multidirectional impact.

The study conducted on dam construction, at Genae Dawa 3D hydro-dam, with the prevalence of occupational injury report 57.8%(2).

2.2 Socio-demographic Factors Associated Occupational Injury

In different investigatons socio-demographic variables have significantly associated with occupational injury(2). In developing and developed countries, gender is significantly associated with occupational injury(3). Being male sex, occupational injury is high(39). In other study being a female(8). In developed countries, such Canada, Japan, Germany, China male gender 2.5 times more likely reported occupational injury.(35,40) In contrary study conducted in Ethiopia, Gonder, Afar, and Addis Ababa female workers had higher occupational injury than male.(39)

Other studies of occupational injury reveal younger workers is prone more to occupational injury than older workers.(16,43) Other study conducted in India, a matched case control study of occupational injury in underground coal mine workers shows, the age 45 and above had greater risk for work related injury(26).

In Ethiopia the study conducted in Amhara regional states, there is significant relation to young age(9). Socio-demographic factors such as educational level, marital status has significant with occupational injury(6). The study conducted in India, increase in education, decrease in occupational injury(7).

Institutional based study conducted in Ethiopia, Gondar among the workers of small and medium scale industry show that work experience had highly or significantly associated with occupational injury. Minimal experienced in their position or less familiar with the machine is increased risk of having work related injury(38).

2.3 Common Occupational Injuries, cause and part of body affected

Multiple studies show that the top cause of occupational injury among construction worker are strike by an object, falling from height, cutting by sharp objects, falling on level ground by slipping(3,26). Studies conducted in Egypt construction worker's injured body part, head injury 23.7%, Upper limb 15.1%, lower limb and trunk 13.8% and each eye 14.6% were the commonly affected(5). Similar study in Mit-Ghamr city,Dakahlia Egypt shows that upper and lower limbs, fingers and hands are the most common body parts prone to occupational injury in the field of construction industry(43).

In Ethiopia, Gondar show skin disorder is the most common problem in construction. Skin disorder accounts 16%, eye problem and head ache 15%, musculoskeletal problem and cut of forearm by sharp instrument14%.(45) Similarly study conducted in dam construction workers in Ethiopia Genale Dawa hydro dam construction reveal hand and lower leg is the most injured parts of the body.(2)

2.4 Working Environment determinants of Occupational Injury

Working hour per day or week, supervision at work place and health and safety training has significant associations with occupational injury(35,43). The study done in Ethiopia textile factory workers shows that workers did not train on health and safety were 1.8 times more likely to report work related injury than workers who trained(43). But health and safety information access did not show significant association to the occupational injury. There is evidence from literature dictation, the work environment has determinants of occupational injury.(43) In the contrary, study done in Ethiopia, Addis Ababa health and safety training did not show significant association in the occurrence of occupational injury.(3,26)

2.5 Behavioral determinants of Occupational Injury

Behavioral determinants of occupational injury have no difference in developing and developed countries(11). In different study, tobacco, drug use and alcohol consumption at work place is the main determinants(23,25). Different investigator agreed that the factors associated to occupational injury are nonuse of PPE, work experience and khat chewing are greatly associated.(3,43). Overtime work is one of the determinants of occupational injury. Study done at Mit-Ghamr city,Dakahlia Governor Egypt among building construction worker, extended work hours short duration work experience, lack of vocational training and job stress were significantly associated with occupational injury (13,25).

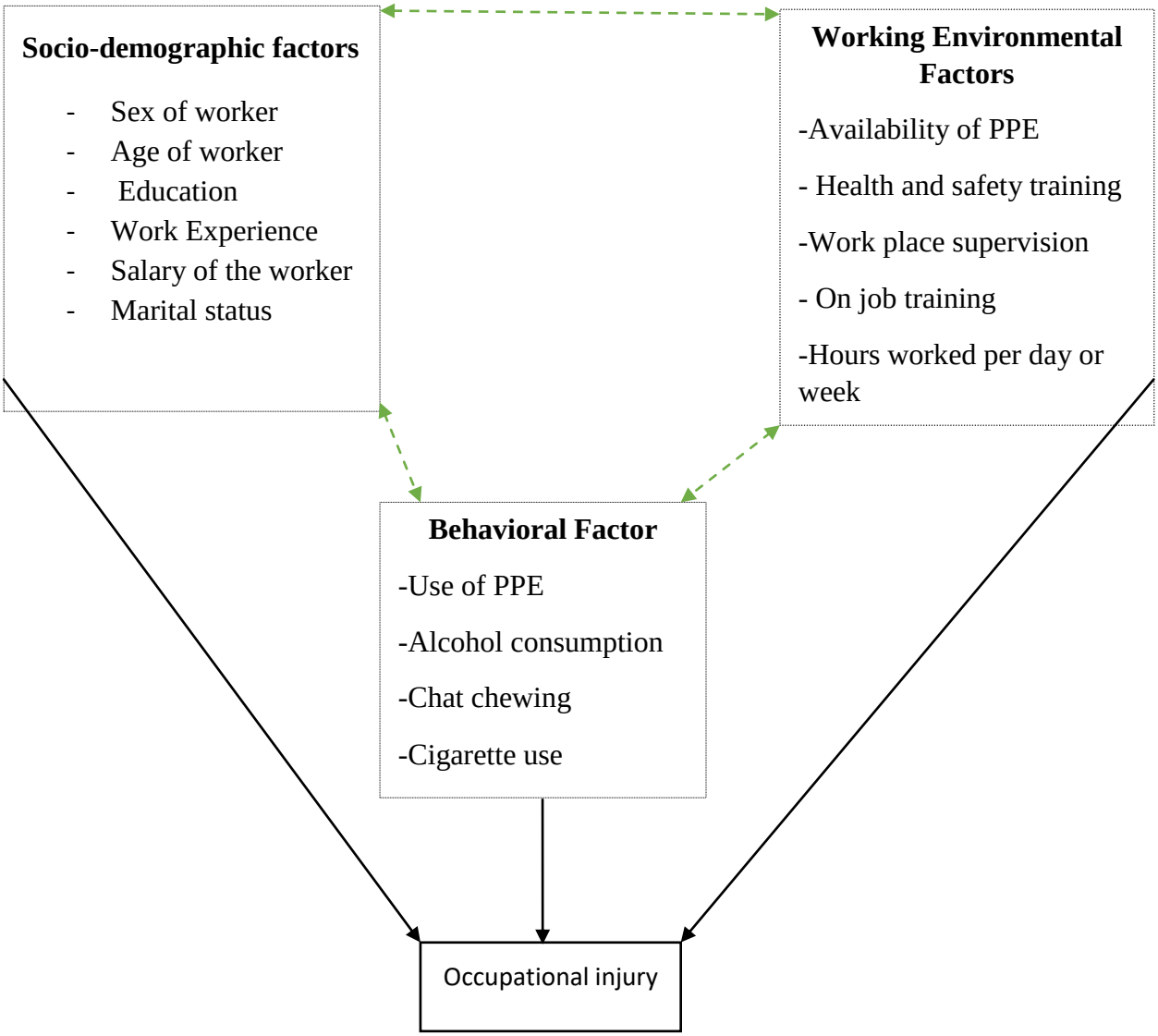

Figure 1:conceptual framework of occupational injury of Koysha hydro-dam workers 2021, adopted from literature review (2,33)

As shown in conceptual framework, there are several factors influencing occupational injury. Socio-demographic, working environment and behavioral factors are contribute for the increase or decrease risk of occupational injury. Specially PPE use is very crucial in behavioral characteristics in different studies. Among Koysha hydro dam, the nature or geography and the temperature has its own impact in increasing the risk of occupational injuries.

3 Objectives

3.1 General Objective

To assess the prevalence of occupational injury and associated factors among koysha hydro dam construction workers, Southwest Ethiopia, 2021.

3.2 Specific Objectives

To assess the prevalence of occupational injury among koysha hydro dam construction workers, 2021.

To identify factors associated with occupational injury among koysha dam construction workers 2021.

4 Methods

4.1 Study area and period

The study was conducted at SNNP regional state, Konta S/Woreda Koysha hydro dam construction workers, Southwest Ethiopia in, 2021. The site is located at the distance of around 551 km from the capital, Addis Ababa. Koysha hydro dam is one of the largest dam construction projects in the country. It is surrounded with the beautiful natural forests and precious wild lives in the currently sounded national park Chebera Chorchora.

The contracting company Salini Impregilo (webuild) is one of the largest world's constructing companies working in about 50 countries round world. Today, it is the work home of around four thousand permanent and temporary Ethiopian citizens. The dam will produce about 2260Mega watt electric power at its finish, irrigation and fishing as well(46,47).

4.2 Study design

A construction site based cross-sectional study design was employed.

4.3 Source population

The source population were employees working in koysha hydro dam construction, who directly involve in dam construction process.

4.4 Study population

The Ethiopian citizen, working in koysha hydro dam construction, who directly involve in construction process and fulfil the inclusion criteria.

4.5 Inclusion criteria

Ethiopian citizen, permanent employee, who involve directly in the process of dam construction, have been working at least one year in the company and on work while data collection period.

4.6 Sample size determination

The required sample size was determined by using single population proportion formula based on the following assumption. The prevalence of occupational injury among dam construction workers at Genale Dawa dam was 57.8%(2)

$$n = \frac{\left(Z\frac{\alpha}{2}\right)2*P(1-P)}{d2}$$

$(Z\alpha/2)^2$ = standard normal distribution = $(1.96)^2$

CI = Confidence interval = 95%

d= margin of error = 0.05

$\frac{(1.96)2 \times 0.588(1-0.578)}{(0.05)2}$ =372, 10%, for non-respondents. Then total sample size is = **409**

4.7 Sampling method

Koysha hydro dam have a total of 3945 workers. From these, 1012 of them were involving directly in dam construction process and fulfill the inclusion criteria. The study subjects were selected by simple random sampling (lottery method) to address (omit) the workers on sick leave and maternity leave till the needed number fulfilled (Figure 2).

TOTAL WORKES OF KOYSHA HYDRODAM CONSTRUCTION		
	3945	
TOTAL WORKERS DIRECTLY INVOVE IN CONSTRUCTION PROCESS		
	1012	
TOTAL SAMPLES SELECTED BY SIMPLE RANDOM SELECTION		
	409	

Figure 2: The sampling method of Koysha hydro dam construction workers, 2021.

4.8 Data collection

First, covid-19 prevention measures, face mask and sanitizer were used. Data collectors were selected, four staff nurses and one health officer as a supervisor. Training was takes place from June 6 – 8, 2021, roll play take place in all aspect of data collection tools, questioning techniques, ethical issues to clear ambiguities. The data collection was started on Thursday, June 10 – 21,2021. Data were collected by using structured questionnaire. The questionnaire was mainly focusing on socio-demographic, behavioral and environmental factors that associated with occupational injury. Socio-demographic consists of sex, age, marital status, education, monthly income and work experience. Environmental part contains- availability of PPE, health and safety training, on-job training, site safety supervision and length of working hours. From behavioral characteristics, use of PPE and mal-behaving of the workers, such as smoking, chewing and alcohol consumption.

4.9 Data quality assurance

The questionnaire was prepared originally in English, and changed to Amharic, because Amharic language is the dominant language used by worker of different nations. Data collection was taken place face-to-face interview. In the daily data collection, the filled questioner was submitted to supervisor. The consistent and complete (correctly filled) data were submitted to principal investigator. There was discussion in daily basis to clear ambiguity in the process. Five percent of the sample was spot-checked at the field by supervisor and principal investigator.

4.10 Study variables

4.11 Dependent variable

- Occupational injury

4.11.1 Independent variables

- Socio demographic factors (sex, Age, Marital status, Educational status, work experience).
- working environmental factors (Availability of PPE, health and safety training and supervision, on job training, length of hour worked per week).

- Behavioral factors (Smocking, chewing khat, alcohol consumption, use of PPE).

4.12 Definitions of operational terms

- Occupational injury: - Any physical injury or damage resulted from an accident in the work of construction in the past one year.(1)
- Personal protective equipment: - utilization of specialized clothing or equipment worn by employees for protection against health and safety hazards. Workers were classified as those who used PPE when they observed wearing at least half of the followings (glove, ear plug, respiratory mask, Helmet, overall, Goggle, face shield, and shoes worn during specific activity.(48)
- Cigarette: - An employee who were smoking one cigarette a day or occasional for at least one year (49,50).
- Alcohol drinker: - An employee who drinks alcohol at least five drinks per week for men and two drinks for female for at least one year. (49).
- Khat chewer: - An employee who is chewing khat three times a week for at least one year.(3)

4.13 Data entry and processing

After data collection, it was checked for completeness and consistency. The data entered into computer using Epi-data manager and exported to SPSS version 25 for statistical analysis. First, bivariable logistic regression analysis was employed for each independent variable with the occupational injury and then those whose p-values < 0.20 selected as candidate of multivariable logistic regression to control possible confounders. Multivariable logistic regression analysis was done to identify factors associated with occupational injury. Hosmer-Lemeshow test and the goodness-of-fit test shows, the logistic regression model was of good fit (Chi-square =2.905, P-value = 0.940). Adjusted odds ratio (AOR) and 95% CI was used to measure the strength of associations and their statistical significances. Descriptive statistics were used to summarize and present the data in well-organized manner.

4.14 Ethical consideration

The study was conducted after getting ethical clearance from Institutional Research Board (IRB) of Jimma University institute of health. Support letter was written from the department of epidemiology and communicated to the construction managers. Each participant was re-assured orally for confidentiality of the information they provide to this study. After their response advised for their gaps.

4.15 Dissemination

A detailed report of this study which consists of the main findings will be disseminated to JU, then to Salini impregilo (webuild) to fulfill the gaps and konta woreda health and social Affairs bureau to follow the filled gaps, SNNP construction bureau, SNNP Labor and Social Affair Bureau. In addition, effort will be exerted to publish the study findings in the reputable scientific journal.

5 Results

5.1 Socio-demographic characteristics

A total of 409 participants were interviewed for the study with the response rate of 100%. About sixty four percent of the workers were under the age 34 years. The mean age of the workers was 31.64(SD ±8.33) years. From the total participants 294 (71.9%) were male. Regarding marital status, close to half (47.7%) were married and 160(39.1%) were single. About two-third (62.6%) of the workers were able to read and write. In case of monthly income including over time and accommodations two-third (66.5%) were earn less than 5000 ETB and 63.6% of the workers have less than five years of work experience. (Table 2).

Table 1: Selected socio demographic characteristics of occupational injury among Koysha hydro dam construction workers, southwest Ethiopia, 2021 (n=409)

Variables	**Category**	**N (%)**
Sex	Male	294 (71.9)
	Female	115 (28.1)
Age years	20 -34	262 (64.1)
	≥35	147 (35.9)
Marital status	Married	195 (47.7)
	Single	160 (39.1)
	Divorced	30 (7.3)
	Widowed	14 (3.4)
	Separated	10 (2.4)
Educational status	read & write	256 (62.6)
	Formally educated	153(50.9)
monthly income	≤ 5000	272 (66.5)
	>5000	135 (33.5)

5.2 Working Environment related variables

All respondents were asked about working time per week. More than 64% of the workers were working >72 hours per week. The working condition were day and night, in this case one group handover to the other group (24 hours) the whole week. Most of the workers 383(93.6%) had supervision at work place. One third (33.3%) of workers involve in manual working activities like pulling, pushing, lifting and caring. From those 76(55.9%) were working ≥4 hours per day. (Table 3).

Table 2 working environmental related variables among Koysha hydro-dam construction workers, Southwest Ethiopia, 2021 (n=409)

Variables	Category	N (%)
Hours worked per week	≤72** hrs/week	145 (35.5)
	>72 hrs /week	264 (64.5)
H/safety supervision	Yes	383 (93.6)
	No	26 (6.4)
Manual work (puling, pushing or caring)	Yes	136 (33.3)
	No	273 (66.7)
weight of the object (pulled, pushed or carried)	<25kg	23 (16.9)
	≥25	113 (83.1)
Time spent on manual work	< 4hrs	60 (44.1)
	≥4 hrs	76 (55.9)
Duty need Visual concentration	Yes	36 (8.8)
	No	373(91.2)

**the workers start working 7:00am end 7:00pm and handover to the other group (night shift) every day whole the week. Sunday is rest day for some departments (12*6=72 hours per week). Other departments work on Sunday. Supervisors and professionals even more (12*7=84^{++}hours per week)

5.3 Availability and use of PPE

Even though 376 (91.9%) responded that they were using PPE while on work, but not always. Out of these workers 313(83.2%) use PPE all the time while on work. The rest, 63 were not using PPE all the time due to its discomfort and no access. The most used types of PPE were mask, helmets and boots(shoes). More than 85% (350) of workers were respond, PPE were supplied by the company. Almost all (403) had training on safety and health during new engagement. Inversely 364(89%) of the respondents had not trained on job in connection of their new job even though they change (improve) their position (qualification) (Table 4).

Table 3:Availability and utilization of PPE and safety training among Koysha Hydro-dam construction workers, Southwest Ethiopia.2021 (n=409)

Variable	Category	N (%)
Type of PPE most used	Mask, helmet, boots	202(53.8)
	helmet & boots	174 (46.2)
Use PPE all the time	Yes	313 (83.2)
	No	63 (16.8)
The reason not using PPE all the time	Discomfort	44 (10.8)
	Negligence	6 (1.5)
	no access	11 (2.7)
Source of utilization	Company	358 (87.6)
	Self	25(6.2)
Safety training during new engagement	No	6(1.5)
	Yes	403(98.5)
On job training	No	364(89)
	Yes	45(11)

5.4 Distribution of behavioral factors

Construction work expose workers to multiples of mal behaviors that contribute to occupational injury. Among the total respondents, 90(22%) smoke cigarette, 111(27.1%) drink alcohol, and 77(18.8%) chew chat and 8.1% not using PPE regularly (Table 5).

Table4: Distribution of behavioral factors of Koysha hydro-dam construction workers Southwest Ethiopia. 2021 (n=409)

Variables	Category	N (%)
Use of PPE	Yes	376 (91.9)
	No	33 (8.1)
Smoking cigarette	No	319 (78)
	Yes	90(22)
Drink alcohol	No	298(72.9)
	Yes	111(27.1)
Chew khat	No	332(81.2)
	Yes	77(18.8)

5.5 Magnitude of occupational injury

The prevalence of occupational injury in the last one year was 37.7%. Among these 41(26.6%) of them were injured on Sunday. More than one-third (42.2%) of injury occurred on midnight of working time. Lower extremity (leg) 39(25.3%) was the most injured body part. The types of accident were struck by an object 91(59.1%). The main reason of respondents for their injury were, 69(44.8%) beyond their control and the other reason “it was the working behavior”. Eighty-one (52.6%) respondents were working at ground level during the injury, and the rest 46(30%) were working both at height and on the ground. Of the total injured workers, 29(18.8%) were hospitalized (Table 6).

Table 5:Magnitude of occupational injury in Koysha hydro-dam construction, Southwest Ethiopia. 2021 (n=409)

Variables	Category	N (%)
Occupational injury in the last 12 months	Yes	154(37.7)
	No	255(62.3)
Injured body parts	lower extremities	39(25.3)
	Fingers	36(23.4)
	Chest	27(17.5)
	upper extremities	19(12.3)
	Back	18(11.7)
	Others**	15 (9.8)
Types of accident (n=154)	struck by object	91(59.1)
	hit by falling object	17(11)
	falling at ground level	17(11)
	struck against an object	16(10.4)
	falling from height	13(8.4)
date of injury	Monday	17(11)
	Tuesday	12(7.8)
	Wednesday	22(14.3)
	Thursday	11(7.1)
	Friday	34(22.1)
	Saturday	16(10.4)
	don't remember the day	1(0.6)
time of injury	Morning	20(13)
	Afternoon	16(10.4)
	Evening	53(34.4)
	Midnight	65(42.2)
working condition	at height	27(17.5)
	Ground	81(52.6)

	Both	46(29.9)
Hospitalization	No	125(81.2)
	Yes	29(18.8)
length of hospitalization	less than 3 wk	27(88.1)
	3 and more wks	2(6.8)

**injured different parts of the body with small number.

5.6 Factors associated with the occupational injury

Bivariate logistic regression analysis was done for each variable and only variables with P-value <0.20 were taken to a multivariable regression model. From socio-demographic factors, sex and education, from environmental factors, on-job training and long working hours, from behavioral factors, alcohol consumption, cigarette smoking and non-use PPE were candidates of multivariable logistic regression.

From the socio-demographic variables, sex and education of the respondents remained statistically significant after controlling the possible confounders. The odds of having work related injury among male workers were 15.16 [AOR=15.16, 95% CI 6.60-34.82] times higher as compared to female workers. Formal education is associated with decreased risk of occupational injury by 50% [AOR= 0.5, 95% CI 0.29-0.85] as compared to being able read and write.

From working environment variables, long working hours per week, and on job training were found significantly associated with occupational injury. The odds of having work related injury among worker working >72 hour per week was 2.15 times high compared to workers who work ≤72 hour per week [AOR= 2.15, 95% CI 1.24-3.73]. On job training decreases the odds of work-related injury by 61% when compared to non-trained workers [AOR= 0.39, 95%CI 0.18-0.83].

From behavioral factors such as non-use of PPE, and alcohol consumption were found to be significantly associated with occupational injury. Workers who did not use PPE regularly during work were 11.04 [AOR=11.04; 95%CI: 5.04-24.18] times more likely to be injured than workers who used PPE while working. Similarly, workers who drink alcohol five days per week for male and two days for female per week were 5.44 [AOR= 5.44; 95% CI 2.99-9.89] times more likely to have occupational injury than non-drinkers (Table 9).

Table 6 Factors associated with Occupational injury among Koysha hydro-dam construction workers Southwest Ethiopia, 2021 (n=409)

		Occupational injury				
		Yes	**No**	**COR (95%CI)**	**AOR (95%CI)**	**P-Value**
Sex	Male	141	153	7.23(3.88, 13.4)	15.16(6.6,34.82)	<0.001*
	Female	13	102	1		
Education	Read & write	113	143	1		
status	Formally educated	36	69	0.66(0.41,1.05)	0.50(0.29,0.85)	0.01*
Use of PPE	Yes	99	242	1		
	No	55	13	9.76(4.41,21.62)	11.04(5.04,24.18)	<0.001*
On job	Yes	14	53	0.38(0.21,0.71)	0.39(0.18,0.83)	0.01*
training	No	140	202	1		
Hours	<=72 hrs	38	107	1		
worked/wk	>72 h	45	113	1.12(.67,1.86)	2.15(1.24, 3.73)	0.01*
Alcohol	Yes	69	42	5.00(2.60,6.51)	5.44(2.99, 9.89)	<0.001*
consumption						
	No	63	192	1		

6 Discussion

Work-related injuries cause some adverse complications by which financial loss and reduction of production are inflicted and its prevention is of great importance. To achieve this aim, a multidimensional collaboration should be created between governmental and company authorities and other related people and organizations(48).

This study attempts to assess the overall prevalence of occupational injury and associated factors among Koysha hydro-dam construction workers in Southwest Ethiopia, 2021. In this study, the prevalence of occupational injury in the last 12 months were 37.7% which is low in relative to similar dam construction(2). This study result is in line with the findings of studies done in Ethiopia(3,9) which were 38.3%, 38.7%, respectively and findings from studies of some other western countries (11,35) 39.9%, 35.6%respectively. It is slightly higher than study in India (36) 29.9%, and Egypt 18.4%. The discrepancy may be the study area like awareness of hazard control and prevention, accessibility of safety service, emphasis on prevention measure such as short- and long-term training and encouragement to use safety tools that effectively decrease the prevalence of occupational injury.

This study identified important predictors that influence occupational injuries. The odds of having work-related injury among male workers were 15.16 times higher as compared to female workers. Male workers much more in number than female in the field of construction(3). Male workers also exposed easily to substance abuse that contribute to occupational injury(37). Females have high care of themselves when compared to male(10).

Another important finding of the study was, the odds of formally educated workers decreased occupational injury by 50% when compared to workers who can read and write. Other studies reveal the same(2,36). Educated workers can judge better of risk of accident. Educated workers assign in commanding position(10).

Long working hours were the other factor contributing to occupational accident. The odds of workers, working >72 hours per week were 2.15 times higher when compared to workers working $\leq$72 hours per week.

The reason could be explained by the fact that fatigue associated with long hours of work that may increases the likelihood of work related injuries, and that exceptionally long hours may also result in injuries associated with breaching physical endurance limits (7,9).

The other important predictor from environmental factors is on job training. On job training decreases occupational injury with the Odds of 61% as compared to non-trained workers. In construction work no formal training take place to change the work place or position(44). Activity matters in construction to be a complicated machine operator without training for the position that needs special skill(23).

From behavioral factors, use of PPE were important and associated with occupational injury. Workers who did not use PPE during work were 11.04 times more likely to be injured than workers who use regularly. Use of PPE is one of the important measures to safeguard workers from exposure to occupational hazards. Specially in developing countries, conventional occupational safety control measures remain a challenge to implement(3). PPE is the lowest measure in the hierarchy of hazard control that works because it depends on workers' behavior(18).

Alcohol consumption is the other cause of work-related injury. The odds of workers who drink alcohol were 5.44 times more likely to have occupational injury when compared to non-drinkers. This study is in line with other studies(7,9). Alcohol primarily affects two sites of balance and movement regulation, namely the inner ear in acute alcoholism and the vestibular nuclei and cerebellum in chronic alcoholism(11)

Most of the workers (59.1%) were injured with strike by an object. The others were (11%). strike (hit) by falling objects from the height. Other studies have similarity(3,44) but the others were aversely stated (2,11), the main cause of injury were strike by falling object and followed by strike by object. Most of the injury (42.2%) were at night working time. This has similarity with other studies (13,14).

With these injuries, the most affected body part where lower leg 35.9% and followed by fingers 23.4% (3,26). Concerning the date of injury, Sunday 46.6% (39). The next date with high number of injuries were on Friday (22.1%). Of all injured workers, 18.8% were hospitalized. Most of hospitalized causalities 48.3% were stayed in hospital for less 3 weeks.

In general, most of the comparison literatures were building constructions and other laboring activities. Genale Dawa dam construction is the baseline for this study. The dam construction is a bit different to other construction works. The site is far from community, no access for medical emergencies, no access for sufficient food, surrounded with “no”.

7 Strength and Limitations of the Study

7.1 Strength

- The sample size is large in relative to study populations and tried to make representative.
- The response rate of the study was total for sample size (100%)
- use of face to face interview during data collection reduces non-respondent rate, permits clarification of questioners, and addressing all participants who differ in educational status.
- It is base line for the next health related studies in dam construction.

7.2 Limitations

- The study did not find fatalities and sever injuries, during this study the participants were on work. They might be in hospital or at home.
- Since the study was a one-year cross sectional, there may be possibility of recall bias that there may be over or under reporting.
- There may be health workers effect bias.

8. Conclusion and Recommendations.

8.1 Conclusion

Consistent use of personal protective equipment during work were found to be the important factor to decrease occupational injury. Awareness or training and education are needed specially for high risk groups such male sex, long hour workers. Long hours working without rest in construction is habitual and owners enforce the workers with little over-time incentive. Alcohol consumption lead workers to addiction and expose to hazardous practice. Such mal-behaviors were used to minimize the discomforts around the work.

Most of construction workers engage in lower position. Without any formal training, they change their position and works in hazardous place such as operating heavy machines. If the accident happens, even not get formal compensation being not licensed for the position.

8.2 Recommendation

- Ministry of health, SNNP health bureau, Koysha S/woreda health office, EEPP office, labor and social affair bureau, should have emphasis to reduce occupational injury, mostly construction area.
- Ministry of Labor and social affair should assign occupational safety and health professionals, free of company pressure, to monitor, remind and re enforce to fulfill the basic safety and health matters.
- The supervisors of EEP should understand the need and benefits of workers, care and control for country's assets, should have a sense of representative of people rather than self benefited.
- Workers should cooperate for the monitoring of substance abuse. and promote use of PPE reduce occupational accidents.
- The company should have program to check for substance abuse on every day before they start their routine work.
- Further studies be invited from different discipline, being mega-projects consume much domestic capital.
- Every door should be open for investigators being company's management were interlocked and difficult to penetrate the bureaucracy.

References

1. Goals, Sustainable Development 1998: 1-4. Occupational injuries. p. 1–4.
2. Hussen J, Dagne H, Yenealem DG. Factors Associated with Occupational Injury among Hydropower. 2020;2020:12–5.
3. Tadesse S, Israel D. Occupational injuries among building construction workers in Addis Ababa , Ethiopia. J Occup Med Toxicol [Internet]. 2016;1–6. Available from: http://dx.doi.org/10.1186/s12995-016-0107-8
4. Office IL. Promoting Safety and Health at Work Prevention: 2005;
5. Nahmias MM. Occupational Safety and Health in EGYPT A National Profile. 2005;(January).
6. Rommel A, Varnaccia G, Lahmann N, Kottner J, Kroll LE. Occupational Injuries in Germany : Population-Wide National Survey Data Emphasize the Importance of Work-Related Factors. 2016;1–16.
7. Bhattacherjee A, Kunar BM. Epidemiology : a tool for risk analysis of mine injuries. 2012;328(February 2011):490–500.
8. Wang X, Largay J. The Construction Chart Book. 2013.
9. Adane1 MM, , Kassahun Alemu Gelaye1 GKB, Hardeep Rai Sharma2 and Walelegn Worku Yalew1. Occupational Injuries Among Building Construction Workers in Gondar. 2013;1(5):1–5.
10. Lund F, Marriott A. SCHOOL OF DEVELOPMENT STUDIES Occupational Health and Safety and the Poorest. 2011.
11. Article O. Individual characteristics in occupational accidents due to imbalance: a case-control study of the employees of a railway company. 2003;330–5.
12. Tamene A, Mulugeta H, Ashenafi T, Thygerson SM. Musculoskeletal Disorders and Associated Factors among Vehicle Repair Workers in Hawassa City , Southern Ethiopia. 2020;2020.
13. Caruso CC, Ph, D 2004. Overtime and Extended Work Shifts : Recent Findings on Illnesses , Injuries , and Health Behaviors. 2004;
14. Persaud H, Williams S. Long Working Hours and Occupational Stress-related Illness and Injury. 2017;

15. Organization IL. Occupational Health and Safety Networks IAPRP Profile of the Inter-African Association for the Prevention of Occupational Risks. 2019;

16. Karmaker C, Roy R, Ahmed T. Prevalence of Accidental Injuries among Building Construction Workers in Bangladesh. 2020;(April).

17. Agrivision C, Limited C. ENVIRONMENTAL IMPACT ASSESSMENT FOR MUNSHIWEMBA INTERMEDIATE DAM PROJECT. 2011;

18. Gürcanli GE, Müngen U. Analysis of construction accidents in Turkey. Ind Health. 2013;51(6):581–95.

19. Geneva ILO. Fundamental rights at work and international labour standards. 2003.

20. Labour I, Departmen, Standards2012 RE. relating to international Handbook of procedures labour Conventions and Recommendations. 2012.

21. Dr. Gerry Eijkemans. Meeting Report WHO-ILO Joint Effort on Occupational Health and Safety in Africa. 2001;(March).

22. Hanna Mersha1 STM and LD. Prevalence of occupational injuries and associated factors among construction workers in Addis. 2017;9(January):1–8.

23. Universitet K, Institutet K. International Organizations as Drivers of Change in Occupational Health. 2020;(July).

24. Jazari MD, Jahangiri M, Khaleghi H, Abbasi N. PREVALENCE OF SELF-REPORTED WORK-RELATED ILLNESS AND INJURIES AMONG BUILDING CONSTRUCTION WORKERS ,. 2018;724–33.

25. OCCUPATIONAL MOLASA. Technical Memorandum Ethiopia Labour Inspection Audit.

26. Damtie D, Siraj A. The Prevalence of Occupational Injuries and Associated Risk Factors among Workers in Bahir Dar Textile Share Company, Amhara Region, Northwest Ethiopia. J Environ Public Health. 2020;2020.

27. Tadesse BT, Submitted T. ASSESSMENT OF PREVALENCE OF WORK RELATED INJURIES AMONG SMALL AND MEDIUM SCALE INDUSTRIAL WORKERS IN NORTH GONDAR ZONE , AMAHARA REGIONAL STATE. 2005;

28. Ministry of Labour and Social Affairs. Profile for Ethiopia. ILO Ctry Profiles. 2006;1–95.

29. Haupt T, Deacon C, Smallwood J. Importance of healthy older construction workers. Acta Structilia J Phys Dev Sci. 2005;12(1):1–19.

30. Milad Derakhshan Jazari1 , Mehdi Jahangiri2*, Hamed Khaleghi1, Narges Abbasi1, Soheil Hassanipour3, 1, Mahnaz Shakerian1 MK, 1. PREVALENCE OF SELF-REPORTED WORK-RELATED ILLNESS AND INJURIES AMONG BUILDING CONSTRUCTION WORKERS, SHIRAZ, IRAN. :1–95.

31. Stansfeld SA. Commentary : The problem with stress : minds , hearts and disease. 2002;1113–6.

32. SHINE S. Determinants of Occupational Injury among the condominium house construction workers of Addis Ababa city , Ethiopia . Unmatched case control study. 2013;

33. Tadesse T, Kumie A. Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-Scale Industries in Gondar wereda , north Gondar zone , Amhara Regional State ,. 2001;(10).

34. Arabia S, Arabia S, Arabia S. HEALTH AND SAFETY PERCEPTION OF CONSTRUCTION WORKERS. 2018;107–18.

35. Yusaku Morita, MD, PhD, Masanori Ohta, MD, PhD, Ying Jiang, PhD, Hiroshi Tanaka, MD, and Hiroshi Yamato, MD P. Relationship Between Nicotine Dependency and Occupational Injury in a Japanese Large-Scale Manufacturing Enterprise. 2018;656–62.

36. Koroma ET, Kangbai JB. Agro-industrial accidents linked to length of service , operation site and confidence in employer adherence to safety rules. 2020;4–9.

37. Khashaba E, El-gilany AH, Motawei SM. Risk factors for non-fatal occupational injuries among construction workers : A case – control study. 2017;

38. Berhe1 A, Yemane2 D, Azeb Gebresilassie2. Occupational Medicine & Health Affairs Magnitude of Occupational Injuries and Associated Factors among Small- Scale Industry Workers in Mekelle City , Northern Ethiopia. 2015;3(3).

39. Zalat MM, Shetta SS. Awareness of Hazard Control Measures among Garage Workers at Zagazig East Delta. 2012;8(10):5025–32.

40. Akata AN, Keda TI, Akahashi MT, Aratani TH, Ojou MH, Wanson NGS, et al. The Prevalence and Correlates of Occupational Injuries in Small- Scale Manufacturing Enterprises. 2006;366–76.

41. Yiha O, Kumie A. Assessment of occupational injuries in Tendaho Agricultural Development S . C , Afar Regional State. (14).

42. Chercos DH, Berhanu D. Work related injury among Saudi Star Agro Industry workers in Gambella region , Ethiopia ; a cross-sectional study. 2017;1–8.

43. Aderaw Z, Engdaw D, Tadesse T. Determinants of Occupational Injury : A Case Control Study among Textile Factory Workers in Amhara Regional State , Ethiopia. 2011;2011(377).

44. Governorate D, Abbas RA, Zalat MM, Salah N, Ghareeb E. Non-Fatal Occupational Injuries and Safety Climate : A Cross-Sectional Study of Construction Building Workers. 2013;2013(December):69–79.

45. Abera Kumie1, Tadesse Amera2, Kiros Berhane3, Jonathan Samet3, Nuvjote Hundal3 F. HHS Public Access. 2017;30:17–27.

46. CORPORATE SI. Water infrastructure for the future: dams, hydroelectric plants and hydraulic works. Articlr O. 2018;

47. Complex GH. Salini and the Gibe Hydroelectric Contextualising development. 2015;

48. Labor USD of, Administration OS and H. Personal Protective Equipment. 2004;

49. Orgaiiizatioii WH organization. Guidelines for controlling and monitoring the tobacco epidemic World. 1998;

50. Pulvers K, Scheuermann TS, Drph DRR, Ba BB, Luo X, Ahluwalia JS. Classifying a Smoker Scale in Adult Daily and Nondaily Smokers. 2014;16(5):591–9.

Annex I Questionnaire

Assessment of prevalence and Factors affecting occupational injuries among Koysha Hydro Dam construction workers, SNNP regional state, Konta Special woreda, South Ethiopia.

Jimma University School of Public Health

Questionnaire on the Assessment of Occupational Injury and Associated Factors among

Dam Construction Workers in Koysha Hydro power dam SSNP, Konta S/Woreda 2021

Hello! My name is ---------- I am interviewing with construction workers who have directly involved in construction work. Ato sintayehu Tarekegn is student of Jimma University and want to assess the prevalence and factors associated with occupational injury among dam construction workers for the fulfillment of the master's degree of public health. You are selected randomly and we are requesting you to answer the questions that we have prepared for you. We will ask you a series of 47 questions which will take 20-30 minutes of your time. Your answers to these questions will remain confidential. Your name will not be written on questionnaire. You have the rights to withdraw from the study at any stage or to restrict the information you provide from being used as a part of the data analysis. There is no anticipated risk except time consumption.

Confidentiality: - Any information forwarded will be kept private and his/her name will not

specified

Do you agree to participate in the study?

A. Yes ---------- continue with the interview

B. No -------- go to the next interview

Thank you for being voluntary to participate in the study.

Part I: Socio-demographic characteristics of respondents

Questionnaire Identification number----------

No	Question	Possible Response	Remark
101	Sex	1 male 2 Female	
102	Age	-------in year	
103	Marital status	1. Married 2.Single 3. Divorced 4.Widowed 5. Separated	
104	Educational status	1.Illitrate 2.read and write 3.Primary school (1-8) 4.Secondary school (9-10) 5.Technical and vocational 6. Degree or higher	
105	monthly income including over time	----------ETB/month	
106	Work experience	---------- in years	

Part II Availability and utilization of personal protective measures

Questionnaire Identification number----------

No	Question	Possible answer	Remark
201	Do you use any PPE while you are on work?	1.Yes 2.No	If No, skip to 206
202	If yes to Q201 what type? (more than one answer is possible)	1. Glove 2. Ear plug 3. Respirator (mask) 4. Helmet 5. Overalls 6. Goggles 7. Face shield 8. Boots /shoes 9. Others, specify	
203	If yes to Q201, do you use PPE all the time while on working	1.Yes 2.No	If yes, skip to 205
204	If No to Q203, what are the reasons not use safety equipment(s) all the time? (more than one answer is possible)	1. Not to fill discomfort 2. To safe time 3. Not aware of risk 4.careless/negligence 5. No access 6 other, spacify	
205	From where do you get PPE? (more than one answer is possible)	1.It is supplied by company 2. You buy it for your self	
206	Have you had training on any type of occupational safety issues when you were first engaged in	1.Yes 2.No	

	this job?		
207	Have you ever had on job training on any type of occupational safety issues while changed the position?	1.Yes 2.No	
208	If yes to Q207, from where did you get? (more than one answer is possible)	1. From company 2. others specify	

Part III: occupational (work related) injury characteristics

Questionnaire Identification number----------

No	Question	Possible answer	Remark
301	Have you had an accident at work that resulted injury to you in the last 12 months	1. Yes 2. No	If no skip to Part IV
302	If yes how many times?		
303	Have you had an accident at work that resulted injury to you in the last 2 weeks?	1. Yes 2. No	
304	If yes for 303, how many times?		
305	Day of injury	1. Monday 2.tuesday 3.Wedensday 4.Thuresday 5.Firday 6.Saturday 7.Sunday 8.I don't remember	

306	Time of injury	1.Morning 2.Afternoon 3.Evening 4.Midnight 5.I don't remember	
307	Parts of the body affected	_____	
308`	Types of accident	1.Fallig from height 2.struck by object 3.stuck against an object 4.Hit by falling object 5.Falling at ground level 6.other specify----------	
309	What was your reason(s) 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. I think accident is beyond control 5. It is the working behavior 6. It is due to not using PPE 7. I don't remember 8. Others (specify)	
310	Working condition	1.At height 2.Ground 3.Both 4.underground	
311	Were you hospitalized due to injury?	1.yes 2.No	
312	If yes for Q311, how long it takes (hours)	----------	

Part -IV-Working environment related variables

Questionnaire ID: _____

No	Question	Possible answers	Remarks
401	Hours worked per week	----------hrs	
402	Is there Regular health and safety supervision?	1.Yes 2.No	
403	Have you had safety training in relation with new employment, equipment, or Work Process?	1.Yes 2.No	
404	Does your work involve manual handling activity (pulling, pushing, carrying, and lifting)?	1.yes 2.No	
405	If yes for Q404 On average how much weight did you handled per day?	1.light (not greater than 5kg) 2. medium (6-25kg) 3. heavy (25-50) kg) 4.very heavy (greater than 50kg)	
406	On average how much time did you spend at this work per day	1. Not more than 2 hours. 2. 4. hours 3. above 4 hours	
407	Did your work need visual concentration?	1.Yes 2.No	
408	Do you use vibrating tools at your work place?	1. Yes 2. No	
409	If the answer for Q408 is yes for how long per day	1.Not greater than 1 hour 2. 2-4 hours 3. greater than 4 hours	
410	Are machines you are working with always guarded or installed With	1. Yes 2. No	

	safety devices?		
411	Are machines you are working with always maintained Immediately when old or unsafe?	1. Yes 2. No	

Part-V- Workers behavior and characteristic

No	Question	Possible answer	Remarks
501	Do you smoke?	1.Yes 2.No	If No skip to 503
502	If yes for Q501, how often?	1.Every day 2.1-3 days/ week 3.Ocassionally	
503	Do you drink alcohol?	1.Yes 2.No	If No skip to 505
504	If yes to Q503, how Often?	1. Every day 2. 1-3days/wk. 3.Ocassionally	
505	Do you chew khat?	1.Yes 2.No	If no, skip to507
506	If yes to Q505, how Often	1. Every day 2.1-3 days/wk. 3.Ocassionally	
507	Do you have any sleeping disorders	1.Yes 2.No	If no skip to 509
508	If yes to Q507, what is the reason	1. Working greater than 8 hours without Shifting 2. Working in evening 3. Trying to work more than one task at a time 4. Excessive heat 5. Others, Specify___	

Annexe II Amharic Questionnaires

በጥናቱ ላይ ለሚሳተፉ የሚሰጥ መረጃ

ጤና ይስጥልኝ፡ እኔ _____ እባላለሁ። እዚህ የመጣሁት ይህንን ጥናት ለማካሄድና ከሙያ (ስራ) ጋር በተያያዙ ጉዳቶች እና መንስኤ ሊሆኑ ስለሚችሉ ነገሮች ከ20-30 ደቂቃ ብቻ የሚፈጅ 50 ጥያቄ ልጠይቅዎት እፈልጋለሁ ። እርስዎ የሚሰጡን ትክክለኛ መልስ ለተለያዩ ከሙያ ጋር በሚደርሱ ጉዳቶችን በመከላከል እና በመቆጣጠር ጤናማ የሰራተኛ ሀይል እንዲፈጠር ይረዳል። እርሰዎ የተመረጡት በኢጣ ነዉ።

በዚህ ጥናት ላይ የሚሳተፍ ማንኛዉም ሰዉ ከዚህ በታች ስለ ጥናቱ የተሰጠዉን መረጃ በትክክል ተረድቶ ፍቃደኝነቱን ሲያሳይ ብቻ ነዉ።

የጥናቱ ርዕስ፡ በኮይሻ ግድብ በስራ ላይ ያሉ ሰራተኞች ላይ የሚደርሱትን ከሙያ ጋር የተያያዙ ጉዳቶችን ና መንስኤዎቻቸዉን፣ ብዛታቸው እና አጋላጭ መንስኤዎቻቸዉን ለይቶ ማወቅ ነዉ።

የተጠኝዎች መብት፡ በጥናቱ ላይ መሳተፍም ይሁን አለመሳተፍ ይችላሉ፡ ተሳታፊዎች ጥናቱን በፈለጉት ቦታ ማቋረጥ ይችላሉ፡ መመለስ ያልፈለጉትንም ጥያቄ መዝለልም ይችላሉ።ተሳታፊዎች ማንኛዉንምንያልገባቸዉን ጥያቄ መጠየቅ ይችላሉ። የጥናቱ ሚስጢራዊነቱ፡ በመላሾች የሚሰጥ ማንኛዉም አይነት መልስ በሚሰጢር ይያዛል፡ ስማቸዉም

አይገለፅም።

የተሳታፊዎች የፈቃደኝነት መጠየቂያ ቅፅ

ይህ መጠይቅ በኮይሻ ግድብ ስራ ላይ በሚደርስ ከስራ ጋር የተያያዙ ጉዳቶችን ለማጥናት የተዘጋጀ ነዉ።

ከላይ ያለዉን ፎርም ብታነቡት ወይም ቢነበብልዎት እና ስለ ጥናቱ ፍሬ ሀሳብ ቢረዱ እርስዎ በዚህ ጥናት

ላይ ይሳተፋሉ?

አዎ_____

አልሳተፍም_____

ክፍል 1፡ ማህበራዊና ስነ-ህዝባዊ ገፅታዎችን የተመለከቱ ጥያቄዎች

ተ.ቁ	ጥያቄ	የመልስ አማራጮዎች	ዝለል
101	ፆታ	1. ወንድ 2.ሴት	
102	እድሜ		
103	የጋብቻ ሁኔታ	1. ያገባ/ች 2. ያላገባ/ች 3. የፈታ/ች 4. የሞተችበት/ባት 5. ተነጣጥለው የሚኖሩ	
104	የትምህርት ደረጃ	1.ማንበብና መፃፍ የማይችል/ትችል 2.ማንበብና መፃፍ 3.የመጀመሪያ ደረጃ ትምህርት(1-8) 4.የሁለተኛ ደረጃ ትምህርት(9-12) 5.ሙያና ቴክኒክ 6. የመጀመሪያ ድግሪና ከዚያ በላይ	
105	የወር ገቢ	----------ብር	
106	የስራ ልምድ	---------ዓመት	

ክፍል 2 የመከላከያ መሳርያዎች አቅርቦትና አጠቃቀም በተመለከተ

ተ.ቁ	ጥያቄ	የመልስ አማራጮዎች	ዝለል
201	ስራ በሚስሩበት ግዜ የአደጋ መከላከያ ይጠቀማሉ	1.አዎ 2.የለም	
202	ለጥያቄ ቁ.201፡ መልስዎ አዎ ከሆነ ምን አይነት(ካንድ በላይ መልስ መስጠት ይቻላል)	a. ጓንት b. የጆሮ መከላከያ c. የአፍና የአፍንጫ መሸፈኛ d. የጭንቅላት መከላከያ e. ሁለንም የሰውነት ክፍል f. የአይን መከላከያ መነፅር g.የፊት መሸፈኛ h.ቦቲ/ቆዳ ጫማ --	
203	ለጥያቄ ቁ.201 መልስዎ አዎ ከሆነ መከላከያዎቹን ሁል ግዜ ይጠቀማሉ	1.አዎ 2.የለም	
204	ለጥያቄ ቁ.203 መልስዎ የለም ከሆነ ሁሌ መከላከያ እንዳይጠቀሙ	a.ስለማይመች 1. አዎ 2. የለም b.ስዓት ለመቆጠብ1. አዎ 2. የለም c.ጉዳት ያመጣል ብዬ ስለማላስብ1. አዎ 2. የለም	

	የሚያደርጎት ነገር ምንድን ነው;(ካንድ በላይ መልስ መስጠት ይቻላል)	d.ግዴለሽነት 1. አዎ 2. የለም e.ስለሌለኝ 1. አዎ 2. የለም	
205	መከላከያ መሳርያውን ከየት ነው የሚያገኙት(ካንድ በላይ መልስ መስጠት ይቻላል)	1.ከተቋሙ 2.እራሴ እገዛዋለሁ 3. ከሌላ/ይጠቀስ/ ----------	
206	በዚህ ስራ ስትስማሩ የጥንቃቄ ስልጠና ወስደው ነበር	1.አዎ 2.የለም	
207	በስራ ላይ እያሉ የጥንቃቄ ስልጠና ወስደው ያውቃሉ	1.አዎ 2.የለም	
208	ለጥያቄ 207 መልሶ አዎ ከሆነ ስልጠናውን ከየት ነው ያገኙት(ካንድ በላይ መልስ መስጠት ይቻላል)	1.ከተቋሙ 2. መንግስታዊ ካልሆነ ግብረስናይ ድርጅት 3.ሌላ ካለ ይጠቀስ----------	

ክፍል 3፡ የስራ ላይ ጉዳትን በተመለከተ

ተ.ቁ	ጥያቄ	የመልስ አማራጮዎች	ዝለል
301	ባለፉት አስራ ሁለት ወራት ውስጥከስራዎ ጋር በተያያዘ የደረሰበዎት አደጋ አለ?	1. አዎ 2. የለም	
302	ባለፉት ሁለት ሳምንታት ውስጥከስራዎ ጋር በተያያዘ የደረሰበዎት አደጋ አለ?	1. አዎ 2. የለም	
303	ለጥያቄ ቁጥር 301 እና 302መልሰዎ አዎ ከሆነ ለስንት ጊዜ?	1.ባለፉት 12 ወራት ውስጥ----ጊዜ 2.ባለፈትሁለት ሳምንታት----ጊዜ	
304	አደጋው የደረሰብዎት ዕለት መቼ ነው?	1.ሰኞ 2.ማክሰኞ 3.ዕረቡ	

		4.ሐሙስ 5.ዓርብ 6.ቅዳሜ 7.እሁድ 8.አላስታውስም፤	
305	ምን ጊዜ ነው አደጋው የደረሰብዎት?	1.ጠዋት 2.ከስዓት 3.ማታ 4.ሌሊት 5.አላስታውስም	
306	ጉዳት የደረሰበት የሰውነትዎ ክፍል	a. አይን b. ጥርስ c. እጅ d. ጆሮ e. እግር f. ራስ g. እጅ h. ደረት i. ጀርባ j.ለላ ካለ ይጠቀ	
307	የጉዳቱ አይነት	1. ከከፍታ ቦታ መውደቅ 2.በተቀመጡ እቃዎች መወጋት 3. ከተቀመጡ ነገሮች ጋር መጋጨት 4. የሚወድቁ ነገሮች 5.መሬት ላይ መውድቅ 6.ሌላ ካለ ይጠቀስ	
308	አደጋው ለምንየደረሰበዎ ይመስለዎታል?	a. ለስራው ሂደት አዲስ ነበርኩ b. ስለ ግል ህይወቴ እያሰብኩ ነበር c. ሌላ የጤና ችግር ስለነበረብኝ d. አደጋን መከላከል ስለማይቻል ነው ጉዳቱ የደረሰዉ e. የስራው ባህሪ ስለሆነ ነው f. የአደጋ መከላከያ ባለማደረጌ ነው g. አላስታውስም	
309	የሚስሩበት ቦታ የት ነው	1.ከፍታ ቦታ 2.መሬት/ምድር/ 3.ሁለቱም ቦታ 4 ከመረት ስር	
310	በአደጋው ምክንያት በጤና አልጋ	1. አዎ 2. የለም	

	ይዘው ነበር		
311	ለጥያቄ ቁ.310 መልሰዎ አዎ ከሆነ ለምን ያህል ጊዜ(በቀናት)	----------በቀናት	

ክፍል 4፡ የስራቦታን በተመለከተ

ተ.ቁ	ጥያቄ	የመልስ አማራጮዎች	ዝለል
401	በሳምንት በአማካይ ምን ያህልሰአትይሰራሉ?	0 <48ሰአት፣1 48-72, 2, 73-84 3, 85 ና ከዛ በላይ	
402	በመደበኛ የስራ ቦታዎ የሙያ ደህንነትናጤንነት ቁጥጥር ተደረጎ ያውቃሉ	1.አዎ 2. የለም	
403	የሙያ ደህንነትና ጤንነት ስልጠና ወስደው ያውቃለ?	1.አዎ 2. የለም	
404	በስራ ቦታዎ ከፍተኛ ዕቃ የማንሳት፣ የማጓጓዝ፣ መግፋትና የመሸከም የመሳሰሉትን ስራ ያከናውናለ?	1.አዎ 2. የለም	
405	ለጥያቄ ቁ.404 መልሰዎ አዎ ከሆነ በቀን በአማካይ ምን ያህልክብደት ያነሳለ?	1.ቀላል (ከ5ኪግ የማይበልጥ) 2. መካከለኛ(ከ6-10ኪግ) 3. ከባድ (ከ11-20ኪግ) 4.በጣም ከባድ (ከ 20ኪየሚበልጥ)	
406	በአማካይ በዚህ ስራ ላይ ለምን ያህልጊዜ ይቆያሉ?	1. ከ2 ሰአት ያነሰ 2. ከ2-4ሰአታት 3. ከ 4 ሰአታት በላይ	
407	ስራዎ የማየት ትኩረትን የሚሻ ነውን?	1. አዎ 2. አልመለከትም	
408	በስራ ቦታዎ እርግብግቢት ያለባቸውንመሳሪያዎች ይጠቀማሉ?	1.አዎ 2. የለም	
409	ለጥያቄ ቁ.408 መልሰዎ አዎ ከሆነ ለምንያህል ጊዜ?	1.ከ1 ሰአት አይበልጥም 2. ከ2-4 ሰአት 3. ከ 4 ሰአት በላይ	
410	ስራ በሚሰሩበት ጊዜ የሚሰሩበት ማሽን ከላል አለው?	1.አዎ 2. የለም	
411	ማሽኑ ሲበላሽ በወቅቱ ጥገና ይደረግለታል?	1.አዎ 2. የለም	

ክፍል 5፡ የሰራተኞችን ባህሪ በተመለከተ

ተ.ቁ	ጥያቄ	የመልስ አማራጮች	ዝለል
501	ያጨሳሉ?	1.አዎ 2. የለም	መሌሰዎ የለም ከሆነ ወደ ጥያቄቁ.503 ይሸጋገሩ
502	ለጥያቄ ቁ.501 መልሰዎ አዎ ከሆነ በስንት ጊዜ	1.በየቀኑ 2 ከ.1-3 ቀን በሳምንት 3. አልፎ አልፎ	
503	አልኮን ይጠጣሉ?	1.አዎ 2. የለም	መልሰዎ የለም ከሆነ ወደ ጥያቄ ቁ.505 ይሸጋገሩ
504	ለጥያቄ ቁ.503 መልሰዎ አዎ ከሆነ በስንትጊዜ?	1. በየቀኑ2 ከ.1-3 ቀን በሳምንት 3. አልፎ አልፎ	
505	ጫት ይቅማሉ?	1.አዎ 2. የለም	መልሰዎ የለም ከሆነ ወደ ጥያቄ ቁ.507 ይሸጋገሩ
506	ለጥያቄ ቁ.505 መልሰዎ አዎ ከሆነ በስንት ጊዜ	1. በየቀኑ 2 ከ.1-3 ቀን በሳምንት 3. አልፎ አልፎ	
507	ስራ ላይ እያሉ የእንቅልፍ ችግር አለበዎት	1.አዎ 2.የለም	መልሰዎ የለም ከሆነ ወደ ጥያቄ ቁ.509ይሸጋገሩ
508	ለጥያቄ ቁ.507 መልሰዎ አዎ ከሆነ ምክንያቱ ምንድን ነው?	a. ያለ ዕረፍት/ቅያሬ ከ8 ሰአት በላይ መስራት b. በምሽት መስራት c. በእንድ ጊዜ ከእንድ በላይ ስራ መስራት d. ከፍተኛ የሙቀት ጫና	

ይህ የመጠይቃችን መጨረሻ ነው። አነዚህ ጥያቄዎች ጊዜ ወስደው በመመለስ ላደረጉልን ትብብር ከልብ እናመሰግናለን።

Annex III Bivariate analysis

Bivariate analysis of socio-demographic, Environmental and behavioral characteristics effects on occupational injury at Koysha hydro-dam construction workers South west Ethiopia, 2021 (n=409)

Socio-demographic factors					
	Category	Occupational injury			
		Yes	**No**	**Sig**	**COR(95%CI)**
Sex	Male	141	153	<0.001**	7.23(3.88, 13.4)
	Female	13	102		1
Age	Less 20	0	9	0.996	
	20 -34	97	156	0.999	.000(.00, 1)
	35 and more	57	90	0.931	.982(.64,1.49)
Marital status	Married	71	124	0.839	
	Single	64	96	0.818	1.16(.75,1.79)
	Divorced	9	21		.74(.325,1.00)
	Widowed	6	8	0.56	1.31(.43,3.93)
	Separated	4	6	0.889	1.16(.32,4.265
Education status	Read & write	113	143	<0.001**	1
	Formally Educated	36	69	<0.001**	.660(.41,1.059)
Income	≤5000	98	174	0.526	
	>5000	44	60	0.97	1.30(.82,2.06)
Work experience	Less 5	96	164	0.443	
	6 - 10 yrs	43	75	0.217	.98(.62,1.54)
	More than 10	15	16	0.227	1.60(.76,3.38)
Environmental Factor					
Use of PPE	Yes	99	242		1

	No	55	13	<0.001**	0.097
Supplier of PPE	Supplied by company	135	215	0.752	
	Buy it for self	5	12	0.951	1.047
Health and safety training	Yes	152	251	0.826	1.21(.29,6.69)
	No	2	4		
On job training	Yes	14	53	0.003**	.381(.214, .714)
	No	140	202	<0.001**	1
Hours worked per week	≤72 hrs	38	107		1
	>72 hrs	71	35	.000*	5.50(2.68,11.3)
Work place supervision	Yes	145	238	0.741	1.15(.50,2.65)
	No	9	17		1
Behavioral Factors					
Cigarette use	Yes	40	50	0.133*	1.44(.89,2.31)
	No	114	205		1
Alcohol consumption	Yes	69	42	<0.001**	4.11(2.60,6.51)
	No	85	213		
Chat chewing	Yes	32	122	0.433	1.22(.74,2.03)
	No	45	210		
Sleeping disorder	Yes	39	192	0.889	1.03(.65,1.64)
	No	63	192		