Knowledge and Preventive Practices among Construction Workers work in KTFT Project Regarding Occupational Health Hazards and Safety: A Descriptive Cross Sessional Study

Anjana Bhattarai *
Pitamber Subedi**

Abstract

This study investigates the knowledge and preventive practices regarding occupational health hazards and safety among construction workers engaged in the KTFT Project in Nepal. Occupational health hazards encompass a broad range of risks, including physical, chemical, ergonomic, and psychosocial factors, which can lead to injuries, illnesses, and fatalities in the workplace. Safety measures play a crucial role in mitigating these risks and ensuring the well-being of workers. Utilizing a mixed methods research design with a cross-sectional approach, data were collected from 124 construction workers and 2 safety engineers through face-to-face interviews and key informant interviews, respectively. The findings reveal that the majority of workers are male, predominantly within the age group of 20-39 years, with varying levels of education and ethnic backgrounds. Injuries and health issues such as musculoskeletal problems, skin-related issues, and respiratory problems are prevalent among the workers. The main causes of accidents include slipping, tripping, and falling, as well as injuries from lifting or carrying objects and falling objects.

Regarding the level of knowledge and preventive practices, the study found that while most workers were aware of the common occupational hazards, their preventive practices were significantly good. Although a significant portion of the workers received some form of training and safety inspections were regularly conducted, gaps in the availability and use of Personal Protective Equipment (PPE) were noted. Furthermore, the research confirms that the KTFT Project solely incorporated labor law guidelines, highlighting compliance with regulatory standards. The research underscores the critical need for enhanced safety training, stricter enforcement of safety regulations, and better provision and utilization of PPE to improve occupational health and safety in the construction sector. These findings provide essential insights for policymakers and stakeholders to address the safety and health challenges faced by construction workers in Nepal.

Keywords: occupational health, hazards, preventive practices, safety measures

Introduction

According to World Health Organization (WHO), occupational health is a diverse activity which endeavors to safeguard and advance the welfare of laborers through the prevention and management of occupational illnesses and mishaps (Gurung et al. 2021). The construction sector includes a variety of tasks such as surface construction (bridge, road, slope, hydraulic structure etc.), underground construction, periodic maintenance, strengthening and alteration, all of which offer substantial health and safety concerns to workers (Hillebrandt, 2000). Regrettably, occupational dangers are common in the construction sector; according to the International Labor Organization (ILO), 860,000 workers are wounded and 6,400 workers die from their injuries each year (Lipnicka, 2020). In addition, 2,000,000 individuals have occupational

* Public Health graduate from Manmohan Memorial Institute of Health Sciences, Institute of Medicine (IOM), Nepal. < yogyatajourney@gmail.com>

** Bachelor's in Civil Engineering, TU, IOE, Thapathali Campus < pitamber.752416@thc.tu.edu.np>

diseases, 160,000,000 sustain injuries, and 350,000 die in industrial accidents annually (Barling & Frone, 2004). According to Olutende et al. (2021) building collapses, electrocution, and being crushed by objects were the main causes of occupational mortality in Bangladesh, accounting for 27.3% of all deaths in the sector.

It is critical to increase awareness and put preventive measures in place in order to solve this global issue, beginning at the national level with education and training initiatives. Aside from counselling, which can help workers maintain mental health during emergencies like the pandemic, the US Department of Labor offers services to help detect, reduce, and eliminate hazards associated to construction. Occupational health and safety issues among construction workers are also common in Nepal, India, China, and other Asian nations, emphasizing the importance of preventive measures as industrialization progresses (Ahasan and Partanen, 2001). Occupational health endeavors to safeguard and promote the welfare of employees by addressing and controlling occupational accidents and diseases through the reduction or eradication of elements and situations that present threats to health and safety within the work environment (Kumar A, Shrivastava SM, Jain NK, Patel P,2015). The welfare of workers is impacted by numerous factors, including occupational hazards that may lead to various issues like cancer, bodily harm, musculoskeletal problems, respiratory ailments, hearing loss, heart conditions, psychological concerns, infectious illnesses, among other conditions.(*Occupational Health*, n.d.).

The construction sector bears significant economic and social importance for any given nation, emphasizing its crucial role in achieving socio-economic development goals through the provision of infrastructure and job opportunities. The construction industry is recognized as a highly unpredictable field where various health risks, such as dust particles, noise, chemicals, manual labor, vibrating tools, heavy loads, and inadequate safety awareness, are prevalent. The health hazards associated with construction work can be broadly classified into Mechanical, Chemical, Physical, and biological categories. Due to its high susceptibility to accidents, it is a matter of serious concern that over 10 million workers worldwide suffer injuries annually in this industry (Giri,2020), (Maiti R ,2008), (Hamid ARA et.al ,2003). It is further postulated that around 20,000 laborers encounter mishaps within the occupational setting, resulting in an approximate loss of 200 lives in Nepal (Joshi S.K,2011), (Occupational Health in Small Scale and Household Industries in Nepal: A Situation Analysis, 2008.) In contrast to the manufacturing industry, which reports an average of 60-80 incidents per 1000 employees, the construction sector records a notably elevated figure of 160-250 incidents per 1000 workers (Acharya et.al,2021).

Occupational health and safety play a crucial role in construction sites due to the presence of a significant workforce operating in hazardous conditions. There is a scarcity of research that specifically examines the occupational safety and health of laborers in Nepal. Hence, the results of this investigation will contribute to the evaluation of awareness regarding occupational safety and the frequency of personal protective equipment (PPE) utilization among laborers. Furthermore, it will bridge these informational deficiencies and offer fundamental information to enhance the well-being and safety of construction workers in Nepal.

Conceptual Framework

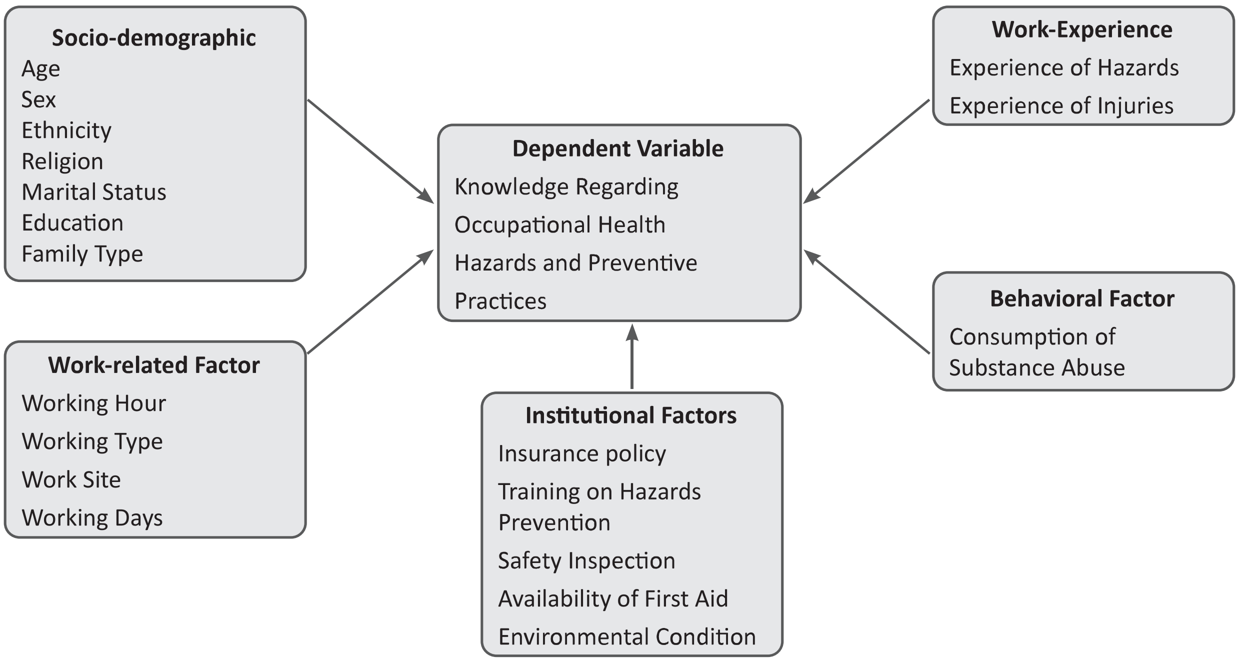

Figure 1:Conceptual Framework

Literature Review

The examination of existing literature was conducted by inputting specific keywords such as "knowledge and occupational hazards, Health hazards and construction sites Health hazards and preventive practice and construction worker, Risk assessment in hydropower projects" into search engines like Google, Google Scholar, SCISPACE, and Pub Med. The process of performing a literature review involves delving into and analyzing existing literature to identify significant gaps in knowledge that are relevant to our research. By means of a literature review, earlier research outcomes can be pinpointed, which in turn sheds light on the viability of the research subject.

A study conducted in Nigeria revealed that while a majority of respondents (61.9%) had good knowledge of occupational hazards, a significant majority (85.7%) reported poor adherence to occupational safety measures (Oluwafemi et.al, 2017). Findings from a similar study conducted in India indicated that among two hundred construction workers, 70% were afflicted with at least one form of disease. Among the various ailments, skin diseases were the most prevalent (78.6%), followed by respiratory issues (45.7%) and musculoskeletal disorders (32.8%) (Hamid R,2021). This study indicates a high prevalence of issues among workers who did not undergo any training. Additionally, it highlights limited accessibility to protective measures, with only 28% of workers having the chance to utilize any form of protective measure(Hamid R,2021).A separate study conducted in Nepal revealed that insufficient awareness regarding hazard management, misunderstanding of workplace safety regulations, and insufficient involvement of safety measures were the primary factors impeding the utilization of Personal Protective Equipment (PPE) in the workplace(Acharya UR & Shrestha SK,2021). The majority of studies indicate a higher participation of males in factory work compared to females. For instance, a study conducted in Namibia found that all workers surveyed were male (Nghitanwa EM & Zungu L,2017). In a study conducted in Nepal, it was found that 86.5% of the workers were male, while 13.5% were female (Gurung et al. 2021). A study among industrial workers in Nepal revealed that 13% of workers in the Chaudhary Group of Industry did not utilize any form of Personal Protective Equipment (PPE). The primary obstacle to the non-utilization of PPE was the lack of availability, responded by 33.3% of respondents (Acharya SR,2014).Safety training emerges as one of the pivotal factors influencing both knowledge of health hazards and preventive practices. Studies have consistently demonstrated that adequate training significantly diminishes the risk of hazards at construction sites while concurrently enhancing workers' understanding (*Occupational Health*, 2023). Legislation stands out as a highly effective and prompt approach to mitigate existing hazards. According to a survey conducted in Hong Kong, safety regulations have been instrumental in altering behavior and ensuring the enforcement of Personal Protective Equipment (PPE) usage (Tam V & Fung I ,2008).A systematic review and meta-analysis among construction workers revealed that injury prevalence ranged from a minimum of 33% to a maximum of 84% among workers in Dessie town and Addis Ababa city, Ethiopia. Additionally, the study highlighted that the recording and reporting of injuries pose further challenges to prevention efforts in the sector (Ashuroz et.al ,2021).

Research Methodology: This study utilized a mixed methods research design with a cross-sectional approach to obtain an in-depth understanding of occupational safety among construction workers working at the KTFT Project in Nepal. The target population included construction workers engaged in tunnel, bridge and slope construction activities at two specific project sites - Lanedada and Dhedre under the KTFT Project in Nepal. Sampling techniques was followed as Non-Probability, Convenience sampling technique. The objective was to assess the workers' level of awareness on occupational hazards and preventive practices pertinent to their job roles. Primary data was gathered through face-to-face interviews with workers using a standardized semi-structured questionnaire, while qualitative insights were obtained from key informant interviews with 2 safety engineers. Appropriate data collection procedures were followed to systematically obtain the information. The quantitative data was analyzed using IBM SPSS Statistics Version 26 and qualitative data underwent manual content analysis.

Sample Size: The sample size was calculated using formula as follows:

Whereas n = sample size = Population size, e = Desire margin of error (Proportion)

As estimated, we have got total population less than 1000 and Population defined for sample size calculation is of 600.

Population size (N) = 600

Margin of error(e) = typically 8%,0.08

Sample size (n) = ?

To calculate the sample size by following formula,

$n = N/(1+N\times e^2)$

$n= 600/(1+600\times 0.08^2)$

$n = 123.96$ (124)

Sample size of this study was 124 obtained from using formula.

Ethical Consideration

Ensuring ethical conduct of the research was a top priority. Approval for the study was obtained from the Army Headquarters and KTFT administration given that the target population included military personnel involved in the construction project. Informed consent was a critical aspect due to sensitivities around occupational health and safety data. Thus, a formal informed consent process was followed where details of the study were explained verbally in the local language to each participant before starting interviews. Confidentiality and anonymity were strictly maintained throughout research process. Only aggregated information was reported without revealing identities. Participation was made fully voluntary without any coercion. Minimal risks to participants during interviews were mitigated by allowing them to skip questions or withdraw at any time.

Findings

Demographic Characteristics of Respondent

Table 1 illustrated the demographic characteristics of the respondents showed that the average age was 31 years. Most individuals were between 20-39 years old, comprising around two-thirds of the sample. All respondents were male. Education levels were mixed, with close to half having a primary education and about a third with secondary education. The dominant ethnic group was Janajati, representing over 70% of respondents. The majority religion was Hinduism at 82%. Married status prevailed at approximately three-quarters of the sample. Family type was split almost evenly between nuclear and joint setups.

Work-Related Factor

The table shows work-related characteristics of 124 workers in a construction project. About two-thirds (60.5%) of the workers had work experience of one year or less in this particular project, while slightly more than one-third (39.5%) had worked in the project for over a year. An overwhelming majority (98.4%) of the workers put in seven working days per week, while only a tiny minority (1.6%) worked six days a week. Almost three-fourth (96.8%) of the workers worked eight hours or less per day, but a small percentage (3.2%) worked over eight hours daily. Regarding the working sites, about one-fifth (20.2%) of workers were at slope sites, one-third (33.1%) at tunnel sites and close to two-thirds (46.8%) at bridge sites. When it came to the type of work, more than one-fourth (27.4%) were involved in masonry work, around one-tenth each were steel frameworks (11.3%) and welders (15.4%), while the rest were distributed between various other work types in smaller percentages.

Table 1: Socio-Demographic Factor

Characteristic	Category	Number (n) = 124	Percentage (%)
Age in completed years Mean=31.72, SD=8.829	<20	3	2.4
	20-29	55	44.4
	30-39	39	31.5
	40-49	23	18.5
	≥50	4	3.2
Sex	Male	124	100
Education of Respondents	Illiterate	5	4
	Literate	11	8.9
	Basic Education (1-8)	59	47.6
	Secondary Education (9-12)	40	32.3
	More than secondary or above	9	7.3
Ethnicity	Janajati	89	71.8
	Brahmin	8	6.5
	Chhetri	21	16.9
	Dalit	5	4
	Madhesi	1	0.8
Religion	Hindu	102	82.3
	Buddhism	16	12.9
	Christian	6	4.8
Marital Status	Married	96	77.4
	Unmarried	28	22.6
Family Type	Nuclear	64	51.6
	Joint	60	48.4

Table 2: Work-Related Factor

Characteristic	Category	Number(n)=124	Percentage (%)
Work Experience in this Project	≤1	75	60.5
	>1	49	39.5
Working Days in Week	6	2	1.6
	7	122	98.4
Working Hours per day	≤8	120	96.8
	>8	4	3.2
Working Site	Slope	25	20.2
	Tunnel	41	33.1
	Bridge	52	46.8
Type of Work	Masonry	34	27.4
	Steel Frama-work	14	11.3
	Welder	19	15.4
	Driller	10	8.1
	Blaster	5	4.0
	Electrician	2	1.6
	Rock Pulling	12	9.7
	Helper	28	22.6

Behavioral Factor

Table 3 presents data on behavioral factors related to substance abuse among the study participants. The majority (73.4%) reported engaging in substance abuse, while 26.6% did not. The types of substances abused, based on multiple responses from the subset of participants, indicate that alcohol consumption was the most prevalent (59.3%), followed closely by cigarette smoking (53.8%). Chewing tobacco (1.1%) and other substances (2.2%) were reported to a much lesser extent.

Table 3: Behavioral Factor

Characteristic	Category	Number(n)=124	Percentage (%)
Consume Substance Abuse	Yes	91	73.4
	No	33	26.6
Type of Substance Abuse n = 159*	Smoking Cigarette	49	53.8
	Drinking Alcohol	54	59.3
	Chewing Tobacco	1	1.1
	Others	2	2.2

*Multiple Response

Prevalence of Injury and Hazards

Table 4 highlights the prevalence of various injuries and hazards among study participants in a construction setting. Major findings include that nearly two-thirds of participants experienced electric shocks (64.5%) and wounds from sharp instruments (62.9%). Over four-fifths reported musculoskeletal problems (83.1%), and approximately three-quarters had skin-related issues (76.6%) and respiratory problems (72.6%). More than half encountered ENT problems (54%). Conversely, head and leg injuries were reported by about one-seventh (14.5%) and cardiovascular problems by roughly one-tenth (10.5%).

Regarding the causes of accidents on construction sites, reflecting multiple responses nearly all participants reported slipping, tripping, or falling (93.5%). Over four-fifths experienced injuries while lifting or carrying objects (87.1%). About two-thirds were struck against fixed objects (67.7%), over three-quarters suffered injuries from hand tools (77.4%), and almost nine-tenths were injured by falling objects (89.5%). Three-quarters reported exposure to electric currents (75.0%), while a small fraction cited other causes (5.6%). These findings underscore the high prevalence and variety of occupational hazards in construction environments.

Table 4: Prevalence of Injury and Hazards

Characteristic	Category	Number (n)=124	Percentage (%)
Experience of Electric Shock	Yes	80	64.5
	No	44	35.5
Experience of Wounds Cut from Sharp Instrument	Yes	78	62.9
	No	46	37.1
Head and Leg Injury	Yes	18	14.5
	No	106	85.5
Experience of Musculoskeletal Problem	Yes	103	83.1
	No	21	16.9
Experience of Skin-Related Problem	Yes	95	76.6
	No	29	23.4
Experience of Respiratory Problem	Yes	90	72.6
	No	34	27.4
Experience of ENT problem	Yes	67	54
	No	57	46
Experience of Cardiovascular Problem	Yes	13	10.5
	No	111	89.5
Cause of Accident in Construction site n=615*	Slipping, Tripping, Falling	116	93.50
	Injured while lifting/carrying object	108	87.10
	Striking against fixed/stationary object	84	67.70
	Injured by hand tools	96	77.40
	Injured by falling object	111	89.50
	Exposure to electric current	93	75.0
	Others	7	5.60

*Multiple Response

Institutional Factor

Table 5 details institutional factors affecting the study participants. Notably, 63.7% had respond health insurance policy have prevailing on construction site, while 36.3% did not. A significant majority, 80.6%, received training before joining, whereas 19.4% did not. The sources are trained varied, with 45% trained by a construction safety officer, 28% by a co-worker, 12% by a site engineer, 10% by a foreman, 3% by a contractor, and 2% by a project manager. Regarding the types of training received, 93.1% underwent PPE training, 74.5% received welding safety training, 38.2% had power tool handling training, 17.6% were trained in protection from falling, 18.6% received OSHA construction training, and 2.9% had excavation and trenching training. Safety inspections were universally provided (100%), with the frequency of inspections varying: 4% occurred once a week, 0.8% twice a week, and 95.2% more than once a week.

Knowledge on Occupational Health Hazards and safety

Table 6 highlights the participants' knowledge on Occupational Health and Safety (OHS) in a construction setting. Nearly nine-tenths of participants had heard about occupational health hazards (OHH), primarily from co-workers (over nine-tenths) and safety officers (about three-quarters). Participants recognized physical, mechanical, chemical, and biological hazards, with over nine-tenths acknowledging physical and mechanical risks. Common hazards included loud noise, extreme temperature, and hand vibrations.

Table 5: Institutional Factor

Characteristic	Category	Number (n)=124	Percentage (%)
Health Insurance Policy	Yes	79	63.7
	No	45	36.3
Received Training Before Joining	Yes	100	80.6
	No	24	19.4
Trained by	Construction Safety officer	45	45
	Contractor	3	3
	Project Manager	2	2
	Site Engineer	12	12
	Co-worker	28	28
	Foreman	10	10
Type of Training n=250*	PPE Training	95	93.10
	Welding safety Training	76	74.50
	Power tool handing training	39	38.20
	Protection from Falling	18	17.60
	OSHA construction training	19	18.60
	Excavation and trenching	3	2.90
Provision of safety Inspection	Yes	124	100
How many times of safety inspection occurred	Once a week	5	4
	Twice a week	1	0.8
	More than a week	118	95.2

*Multiple Response

Table 6: Knowledge on OHS

Characteristic	Category	Number (n)=124	Percentage (%)
Heard about OHH	Yes	111	89.5
	No	13	10.5
Source of information* n=212	Safety officer	80	72.1
	Co-worker	101	91.0
	Radio	7	6.3
	Television	3	2.7
	Pamphlet/Poster	3	2.7
	Internet	3	2.7
	Foreman	15	13.5
Type of OHH* n=395	Physical	105	94.6
	Chemical	102	91.9
	Biological	84	75.7
	Mechanical	104	93.7
Physical Health Hazard* n=336	Loud Noise	103	93.6
	Extreme Temperature	95	86.4
	Vibration of hands	92	83.6
	Acids	8	7.3
	Backpain	34	30.9
	Snakebite	4	3.6
Chemical Health Hazards n=111	Exposure to Acid	105	94.6
	Extreme temperature	3	2.7
	Vibration of hand	3	2.7
Biological Health Hazard	Environmental Smoke	11	9.9
	Availability of snake and wildlife	96	86.5
	Loud Noise	4	3.6
Mechanical Health Hazard	Heavy Equipment operation	100	90.1
	Backpain	6	5.4
	Extreme Temperature	2	1.8
	Don't Know	3	2.7
Health Problem Occur on Underground Construction Workers* n=461	Respiratory Problem	112	90.3
	Injuries	87	70.2
	Headache	83	66.9
	Anxiety and stress	32	25.8
	Visual impairment	72	58.1
	Hearing Damage	66	5
	Skin-related problem	9	7.3

Characteristic	Category	Number (n)=124	Percentage (%)
Health Problem occur due to Exposure of Dust* n=389	Asthma	117	94.4
	Lung cancer	14	11.3
	Skin irritation	100	80.6
	Eye irritation	105	84.7
	Heart Disease	48	38.7
	Increase RBC Count	5	4.0
Health Problem occur Due to Loud Noise	Hearing Problem	124	100.0
Construction Site Policies	Compulsory Use of PPE	121	97.6
	Compulsory Safety Officer	93	75.0
	Insurance of Workers	17	13.7

Health issues among underground workers included respiratory problems (about nine-tenths), injuries (seven-tenths), headaches (two-thirds), and visual impairments (nearly three-fifths). Dust exposure led to asthma (over nine-tenths), eye irritation (five-sixths), and skin irritation (over four-fifths), while loud noise universally caused hearing problems. Construction site policies ensured the use of PPE (more than nine-tenths) and safety officers (three-quarters), but only one-seventh provided worker insurance. These findings underscore high OHS awareness and prevalent health issues in the construction environment.

Knowledge on PPE

Table 7 illustrates the participants' knowledge regarding Personal Protective Equipment (PPE) in the construction industry. All participants had heard about PPE. The most commonly known types were helmets, boots, protective gloves, high visibility jackets, and masks, each known by more than nine-tenths of participants. Protective goggles

Table 7:Knowledge on PPE

Characteristic	Category	Number (n)=124	Percentage (%)
Heard about PPE	Yes	124	100.0
Type of PPE Known* n=994	Welding Face shield	68	54.8
	Protective Goggles	87	70.2
	Helmet	114	91.9
	Hair Net	60	48.4
	Ear Plug	71	57.3
	Boots	113	91.1
	High Visibility Jacket	79	84.7
	Protective Gloves	105	84.7
	Hazardous Material suits	72	58.1
	Safety belts/Harness	102	82.3
	Mask	113	91.1
	Other	10	8.1

Characteristic	Category	Number (n)=124	Percentage (%)
Benefit of Using PPE	Reduction in injury	116	93.5
	Avoid incident/Accident	80	64.5
	Protect from Respiratory problem	31	25.0
	Protect from chronic illness	8	6.5
	Others	2	1.6
PPE only Adequate for Prevention of health hazards	Yes	55	55.6
	No	69	44.4
Preventive Practice Need to be done*n= 331	Periodic Medical Examination	67	97.1
	Safety Training	65	94.2
	Inspection of Worker on PPE use	57	82.6
	Keep the material on proper place	52	75.4
	Maintain the hygiene of workplace	47	68.1
	Maintain Personal Hygiene of Workers	41	59.4
	Other	2	2.9

were known by about seven-tenths, safety belts/ harnesses by over eight-tenths, and welding face shields by more than half of the participants. The benefits of using PPE were widely recognized, with nearly all participants citing a reduction in injury, nearly two-thirds mentioning the avoidance of incidents/accidents, one-quarter highlighting protection from respiratory problems, and a small fraction noting protection from chronic illness. When asked if PPE alone is adequate for preventing health hazards, opinions were divided: just over half believed it was sufficient, while the remainder disagreed. Preventive practices deemed necessary included periodic medical examinations by nearly all participants, safety training by over nine-tenths, inspection of PPE use by more than four-fifths, proper placement of materials by three-quarters, and maintaining workplace and personal hygiene by more than two-thirds and three-fifths, respectively.

Preventive Practices

Table 8 details prevention practices among construction workers. All participants (100%) had PPE and wore it daily. The most commonly used types of PPE included helmets (more than nine-tenths), masks (over nine-tenths), boots (about seven-eighths), and protective gloves (over three-quarters). High visibility jackets were used by about three-fifths, while safety belts were used by nearly half. Less commonly used PPE included protective goggles (about two-fifths), hazardous material suits (one-fifth), welding face shields (about one-eighth), hair nets, ear plugs, and other items (each used by less than one-tenth).

Additionally, a significant majority of participants (over seven-eighths) checked their tools and materials before going to the worksite, while a small fraction (about one-eighth) did not.

Table 8: Prevention Practices

Characteristic	Category	Number (n)=124	Percentage (%)
Have PPE	Yes	124	100.0
Wear PPE Daily	Yes	124	100.0
Type of PPE Used	Welding Face	15	12.1
	Protective Goggle	51	41.1
	Helmet	116	93.5
	Hair Net	12	9.7
	Ear Plug	11	8.9
	Boots	107	86.3
	High visibility Jacket	75	60.5
	Protective Gloves	97	78.2
	Hazardous Material Suits	25	20.2
	Mask	117	94.4
	Safety Belt	61	49.2
	Others	12	9.7
Check Tools and Material before going to worksite	Yes	108	87.1
	No	16	12.9

Level of Knowledge on OHH and Preventive Practices

Table 9 presents the level of knowledge on occupational health hazards (OHH) and preventive practices among the study participants. Nearly seven-tenths (69.4%) of participants had adequate knowledge of OHH, while about three-tenths (30.6%) had inadequate knowledge. Regarding preventive practices, slightly less than half (48.4%) had adequate knowledge, whereas slightly more than half (51.6%) had inadequate knowledge. These findings indicate that while a majority of participants are well-informed about OHH, there is a notable gap in knowledge regarding preventive practices.

Level of Preventive Practices

Table 10 details the level of preventive practices among the study participants. A substantial majority, nearly three-quarters (74.2%), demonstrated good preventive practices, while about one-quarter (25.8%) exhibited poor practices.

Table 10:Level of Preventive Practices

Variables	Category	Number (n) = 124	Percentage (%)
Preventive Practices Mean = 9.39 SD = 1.92	Good Practices	92	74.2
	Poor Practices	32	25.8

Table 9: Level of Knowledge on OHH

Variables	Category	Frequency (n)=124	Percentage (%)
Knowledge on OHH Mean = 19.17, SD = 4.76	Adequate Knowledge	84	69.4
	Inadequate Knowledge	38	30.6
Knowledge on Preventive Practices Mean = 14.16; SD = 5.02	Adequate Knowledge	60	48.4
	Inadequate Knowledge	64	51.6

Association between Level of Knowledge and Independent Variables

Table 11: Association between Levels of Knowledge with Independent Variables

Variables	Category	Knowledge on OHH		χ 2	p-value
		Adequate n (%)	Inadequate n (%)		
Type of work	Masonry	20(23.3)	14(36.8)	Fisher Exact 16.321	0.013
	Steel Framawork	9(10.5)	5(13.2)		
	Welding	15(17.4)	4(10.5)		
	Driller	8(9.3)	2(5.3)		
	Blasting	3(3.5)	2(5.3)		
	Electrician	2(2.3)	0(0)		
	Rock Pulling	4(4.7)	8(21.1)		
	Helper	25(29.1)	3(7.9)		
Experience of Electric Shock	Yes	67(77.9)	13(34.2)	21.981	0.001
	No	19(22.1)	25(65.8)		
Experience of any Head and Leg Injuries	Yes	6(7)	12(31.6)	12.855	0.001
	No	80(93)	26(68.4)		
Experience of Skin-Related Problem	Yes	72(83.7)	23(60.5)	7.913	0.005
	No	14(16.3)	15(39.5)		
Experience of Respiratory Problem	Yes	67(77.9)	23(16.5)	4.001	0.045
	No	19(22.1)	15(39.5)		
Experience of ENT problem	Yes	61(70.9)	6(15.8)	32.263	0.001
	No	25(29.1)	32(84.2)		
Experience of Cardiovascular problem	Yes	5(5.8)	8(21.1)	6.521	0.01
	No	81(94.2)	30(78.9)		
Health Insurance Policy	Yes	68(79.1)	11(28.9)	28.637	0.001
	No	18(20.9)	27(71.1)		
Received Training before Joining	Yes	74(86.0)	26(68.4)	5.245	0.022
	No	12(14.0)	12(31.6)		

Logistic Regression of Associated Variable with Level of Knowledge

Table 12 represents bivariate and multivariate logistic regression between level of knowledge and associated variables. It reveals that the odds of having level of knowledge among those who experienced electric shock was 6.781 times (COR=6.781, 95% CI 3.197-14.384) higher compared to those who did not experience electric shock. Similarly, experience of head and leg injuries showed higher odds of knowledge in bivariate analysis (COR=6.154), but was associated with lower level of knowledge in multivariate analysis (AOR=0.180, 95% CI 0.057-0.572)/The odds of having higher level of knowledge was 9.377 times (AOR=9.377, 95% CI 2.902-30.298) higher among those experienced ENT problems even after adjusting for confounders in the multivariate analysis.

Table 12: Logistic Regression Analysis between Level of Knowledge and Associated Variables

Variables	Category	COR	92% CI	p-value	AOR	92% CI	p-value
Experience of Electric Shock	Yes	6.781	3.197-14.384	0.001	0.211	0.069-0.644	0.015
	No	Ref					
Experience of Head and Leg Injuries	Yes	Ref					
	No	6.154	2.355-16.079	0.001	0.180	0.057-0.572	0.009
Experience of Skin – Related Problem	Yes	3.354	1.547-7.273	0.006	0.823	0.228-2.970	0.790
	No	Ref					
Experience of Respiratory Problem	Yes	2.30	1.099-4.811	0.048	0.253	0.072-0.883	0.054
	No	Ref					
Experience of ENT problem	Yes	13.013	5.382-31.464	0.001	9.377	2.902-30.298	0.001
	No	Ref					
Experience of Cardiovascular Problem	Yes	4.320	1.488-12.543	0.016	0.333	0.8001.389	0.178
	No	Ref					

Association between Levels of Practice with Independent Variables

Table 13: Association between Level of Preventive practices with Independent Variable

Variables	Category	Knowledge on OHH		χ 2	p-value
		Adequate n (%)	Inadequate n (%)		
Working Site	Slope	23(25.0)	2(6.3)	20.616	0.001
	Tunnel	37(40.2)	4(12.5)		
Type of work	Bridge	32(34.8)	26(81.3)	Fisher Exact 21.361	0.001
	Masonry	19(20.7)	15(46.9)		
	Steel Framawork	12(13.0)	2(6.3)		
	Welding	11(12.0)	8(25.0)		
	Driller	9(9.8)	1(3.1)		
	Blasting	5(5.4)	0(0)		
	Electrician	1(1.1)	1(3.1)		
	Rock Pulling	8(8.7)	4(12.5)		
	Helper	27(29.3)	1(3.1)		
Experience of Electric shock	Yes	64(69.4)	16(50.0)	3.970	0.46
	No	28(30.4)	16(50.0)		
Experience of Skin Problem	Yes	75(81.5)	20(62.5)	4.794	0.029
	No	17(18.5)	12(37.5)		
Experience of ENT problem	Yes	57(62.0)	10(31.3)	9.013	0.003
	No	35(38.0)	22(37.5)		
Health Insurance Policy	Yes	64(69.6)	15(46.9)	5.287	0.021
	No	28(30.4)	17(53.1)		
Received Training before Joining	Yes	80(87.0)	20(62.5)	9.098	0.003
	No	12(13.0)	12(37.5)		
Training Provided By	Construction Safety Officer	35(43.8)	10(50.0)	Fisher Exact 13.907	0.007
	Contractor	3(3.8)	0(0)		
	Project Manager	0(0)	2(10.0)		
	Site Engineer	8(10.0)	4(20.0)		
	Co-worker	27(33.8)	1(50.0)		
	Foreman	7(8.8)	3(15.0)		

Logistic Regression of Associated Variable with Level of Preventive Practices

Table 14 represents bivariate and multivariate logistic regression between level of preventive practices and associated variables. It revealed that the odds of having higher preventive practices among workers at slope sites was 7.155 times (AOR=7.155, 95% CI 1.326-38.605) higher compared to those working at bridge sites. Similarly, the odds were 8.309 times (AOR=8.309, 95% CI 1.803-38.294) higher for those working at tunnel sites compared to bridge sites. Having health insurance emerged as a predictor of higher preventive practices in the adjusted analysis, with the odds being 5.504 times (AOR=5.504, 95% CI 1.190-25.460) compared to those without insurance.

Table 14: Logistic Regression of Associated Variables with Level of Preventive Practices

Variables	Category	COR	92% CI	p-value	AOR	92% CI	p-value
Working site	Slope	9.344	2.372-36.804	0.004	7.155	1.326-38.605	0.041
	Tunnel	7.516	2.681-21.070	0.001	8.309	1.803-38.294	0.015
	Bridge	Ref					
Experience of Electric Shock	Yes	2.286	1.096-4.768	0.049	2.962	0.830-10.576	0.135
	No	Ref					
Experience of Skin – Related Problem	Yes	2.647	1.197-5.854	0.032	1.347	0.358-5.061	0.694
	No	Ref					
Experience of ENT problem	Yes	3.583	1.665-7.709	0.004	0.433	0.1-1.866	0.315
	No	Ref					
Health Insurance Policy	Yes	2.590	1.241-5.409	0.024	5.504	1.190-25.460	0.05
	No	Ref					
Training before Joining	Yes	4	1.730-9.248	0.004	2.953	0.715-12.198	0.181
	No	Ref					

Observation Finding

PERSONAL PROTECTIVE EQUIPPEMENT	
Hard hats provided:	Yes
Safety glasses provided:	Yes
Protective gloves provided:	Yes
Steel-toed boots provided:	No
Respiratory protection:	Yes
SITE SAFETY MEASURES	
Clear signage for hazardous areas:	Yes
Properly maintained temporary structures:	Yes
Adequate site lighting:	No
Fall prevention (guardrails, nets):	Yes
ENVIRONMENTAL CONDITION	
Prevention of environmental contamination	Satisfactory
Proper disposal systems for construction waste	Satisfactory
Adequate toilet and washing facilities	Satisfactory
Availability of drinking water facilities	Yes
Clear emergency exits:	Yes

Implementation of ILO Guideline

This table illustrated the results suggest that the KTFT Project have successfully implemented all the essential labor standards and occupational health & safety provisions as recommended by ILO.

Table 15: Implementation of ILO Guidelines

Labour Act Provision	Number (n) = 124	Percentage (%)
Child labor Availability	No	100
Discrimination among Workers	No	100
Equal remuneration for equal works	Yes	100
Safety and Health Plan at site	Yes	100
Prevention of communicable diseases	Yes	100
Medical expenses and compensation for workers	Yes	100
Working Hours	Yes	100
Extra wages for overtime work	Yes	100
Regular Medical Checkup of workers	Yes	100
Warning sign in case of emergency	Yes	100
Routine inspection of heavy machine and equipment	Yes	100

Flow Chart of Occupational Health and Safety Ensure in KTFT Project

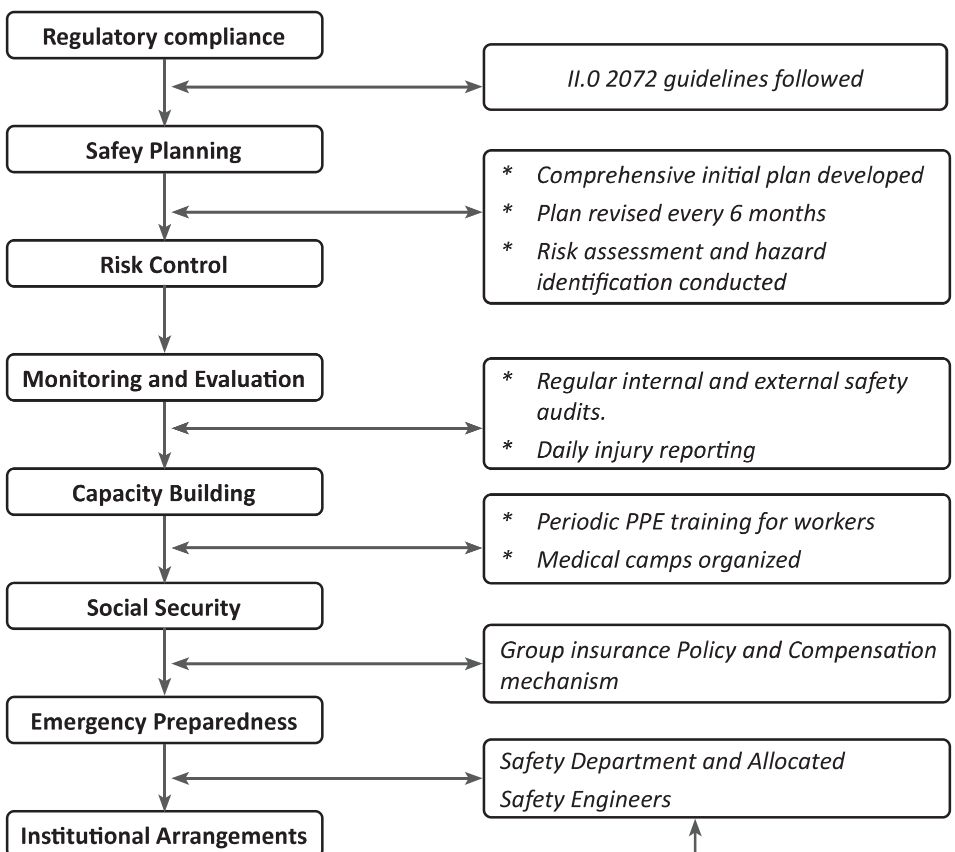

Figure 2: Flowchart of Occupational Health and Safety ensure in KTFT Project

Discussion

The discussion of the study findings indicates that a significant portion of respondents, constituting the majority alongside other demographics, fell within the age group of 20-29. Furthermore, the study observed a predominant affiliation with the Hindu religion (82.3%) among participants, coupled with a high percentage of married individuals (77.4%). These trends closely align with the outcomes of a study conducted among construction workers in Pokhara Metropolitan City (Adhikari S &Wagle S,2022). Similarly, the age distribution of the respondents bears resemblance to a study conducted among construction workers in Nigeria (Chika C,2022). Similarly, the current study indicates that the prevalence of skin infections, musculoskeletal problems, respiratory issues, and ENT problems were 83.1%, 23.4%, and 54%, respectively. These findings align with a study conducted among construction workers in the Kashmir Valley. This similarity could be due to comparable working conditions, environmental factors, and occupational hazards faced by construction workers in both regions (Hamid R,2021). Research findings reveal that 69.4% of respondents possess adequate knowledge of occupational health hazards, which contrasts with a study conducted among the labor population of the Nepalese workforce. In that study, two-thirds (66.67%) of respondents had inadequate knowledge. This discrepancy could be attributed to the mandatory presence of safety officers at construction sites (Gurung P et.al,2021). Research indicates that 74.2% of respondents demonstrate good practices, which contrasts with findings from a study conducted in Pokhara Metropolitan City. In that study, only slightly more than one-third (36.2%) of construction workers exhibited good practices (Adhikari S &Wagle S ,2022). This discrepancy might be due to the strict policies and enforcement of continuous PPE usage at the KTFT construction site.

Conclusion

The study of occupational health hazards and safety practices among construction workers involved in the KTFT Project in Nepal reveals several critical insights. Workers, predominantly young adult males, with varying levels of education and experience, reported extensive work hours and a high prevalence of substance abuse. The study highlighted a significant incidence of workplace injuries and health issues, including electric shocks, musculoskeletal problems, respiratory issues, and accidents from slipping, tripping, and falling. Despite the high rate of injuries, a majority of workers had health insurance and received some form of safety training, primarily from safety officers and co-workers. The knowledge about occupational hazards and the benefits of using personal protective equipment (PPE) was widespread, with most workers regularly using PPE such as helmets, masks, boots, and gloves. However, there were mixed opinions on the adequacy of PPE alone in preventing health hazards, indicating the need for additional preventive measures. Regular safety inspections and comprehensive training programs were recognized as essential for improving workplace safety. To enhance the occupational health and safety of construction workers, the study recommends improving the availability and maintenance of PPE, increasing the frequency of safety inspections, promoting health and hygiene practices, and addressing substance abuse among workers. These measures aim to create a safer and healthier work environment for construction workers in the KTFT Project.

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