

# The Effectiveness of Occupational Health and Safety Practices in Public Technical Training Institutes

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work hazards, OHS policy and procedures, PPEs, Awareness and training and health and safety.

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\***Original Research Papers** are papers that report on original empirical research with a focus on teaching and learning. Papers may be qualitative or quantitative and include an Abstract, Introduction, Method, Results, Discussion, and Reference section, as well as any tables and/or figures.

## Abstract

The study aimed to evaluate the extent of occupation-related injuries and accidents, the use of Personal Protective Equipment (PPE), Occupational Health and Safety (OHS) training, and awareness and implementation of OHS policy among Technical Training Institutes (TTIs).

The study used qualitative and quantitative methods to analyze data from 99 final-year trainees, including 47 auto mechanics, 24 electricians, 16 welders, and six OHS focal persons. Data was collected through self-administered questionnaires and in-depth interviews and analyzed using SPSS-16 and MAXQDA-2020.

The study revealed a commendably low rate of hazards in training institutes (TTIs), with a mere 10.26% and a mean score of 2.1. This positive outcome, a testament to the high awareness of OHS and PPEs, should give reassurance about the current state of OHS practices in TTIs. The training system was a resounding success, with a mean rating of 4.09 for trainees' understanding and use of PPEs. However, the study also identified areas for improvement, particularly the urgent need for improved monitoring and management support. This need for immediate action is crucial for sustaining and enhancing these standards, and it should make the audience feel the urgency of the situation.

The study's findings underscore the high level of compliance with OHS procedures in TTIs, with a remarkably low incidence of injuries and accidents. This not only bolsters the reputation of TTIs but also underscores their commitment to fostering a culture and environment that nurtures the positive character of trainees. These efforts, guided by the principles of sustainability, integration, consistency, implementation, and fun, further elevate the safety standards of TTIs. The study's results suggest the need for continued monitoring and management support to sustain and enhance these standards. Furthermore, the study recommends further research in the field of OHS, particularly a

*Abstract continued on next page...*

study on OHS covering all the institutions, including two National Institute of Zorig Chusum, to get a clearer picture of the OHS practices in Ministry of Education and Skills Development-administered institutions. This reiteration of the need for further research underscores the study's contribution to ongoing improvements in OHS practices.

## Introduction

**Workers account for half of the world's workforce and play** a significant role in socio-economic growth (Berman & Larson, 1993). Therefore, the quality of occupational health services at work substantially impacts their health (Haldane, 2020). Occupational health refers to providing comprehensive health services (personal and impersonal) to staff through preventive, curative, and rehabilitative treatments to improve their quality of life (Park, 2005). It is also known as the working environment's impact on workers' health and productivity (Curran, 1993).

Globally, the protection of workers against work-related injuries and illnesses has, over the years, been an issue of great concern to employees, workers, governments, and the general public (Tonozzi et al., 2016). A safe working environment promotes workers' mental and social well-being. The International Labour Organization (ILO) estimates that every year, approximately 270 million work-related accidents are recorded worldwide, resulting in the death of some 2 million people (ILO, 2005).

In today's Industry 4.0, the Bhutanese industry is developing quickly, keeping pace with scientific and technological advancements. This rapid development has led to a more significant and diverse risk of danger due to technological transfer, employing complicated machines and work equipment to support production. Like people in other developed countries facing challenges in managing OHS-related accidents and injuries, Bhutanese people working in various industries are no exception. According to the Department of Labour, the industry was responsible for 60% of workplace incidents in 2015-2016. Accidents occurred 58.7% of the time in hydropower plant construction and 8.3% in other construction operations (residential, road, and bridge construction). The most construction-related accidents were reported in 2012/13 and 2013/14, with no significant variation from 2012 to 2016.

Despite continuous efforts to make OHS practices more dynamic and involve all walks of life in the institutes, some hitches concern staff and the administration. A fatal accident involving a boy trainee who lost his fingers due to OHS not being practiced mindfully was caused by an instructor's negligence. Although no proper record has been maintained, institutes have experienced a few incidents which leave a permanent emotional fear and mark throughout an individual's life. Dendup et al. (2017) conducted a study on HOF and workplace accident records of the 35 auto mechanics interviewed; 11 (31.4%) had experienced a workplace-related accident in automobile workshops. Similarly, the construction industry in Bhutan accounts for 60% of total workplace accidents (Drukpa, P. & Dendup, P. 2017).

According to DoL (2006), despite the absence of a specific requirement, all work must be carried out without undue risk of injury or occupational disease to any person. The MoLHR plays a crucial role in setting and enforcing Bhutan's occupational health and safety standards. During the recent curriculum review, all stakeholders expressed the same worry, and its relevance was examined in depth. As a result, the module's full title has been changed to "Demonstrating professionalism advancement, protection, and workshop methods" (TPSD, 2017).

It is expected that a strong safety culture results in fewer accidents. Dhendup (2017) showed that a lack of workplace safety culture is a risk factor for workplace accidents. A poor safety culture resulted in a more significant percentage of workplace accidents (37.50%) than a strong safety culture. Similarly, his study found that workplaces with poor safety communication had a higher rate of workplace accidents (37.50 per cent) than those with strong safety communication. His findings backed up prior research, indicating that good safety communication aids an organization in minimizing accidents by keeping employees involved in safety activities, participating in decision-making, and exchanging information and knowledge.

A study by Dukpa (2017) on occupational health and safety practices in Bhutan's construction industry recommends conducting a similar study in other sectors to obtain a more holistic view. Their research found that a similar survey of OHS components practiced in TTIs is indispensable. Thus, this research aimed to explore the level of compliance with

occupational health and safety practices by student-trainees and staff in five TTIs.

## Research Questions

- a. What are the barriers affecting the implementation of occupational health at TTIs?
- b. Are the TTI's current occupational health and safety policies adequate?
- c. What level of Occupational Health and Safety compliance do trainers and trainees practice?

## Literature Review

### Hazard at Work

A hazard is something that has the potential to cause harm. In practice, the danger is usually related to a condition or action that, if left unchecked, can lead to injury or sickness. Preventing injuries and illnesses begins with identifying hazards and eliminating or reducing them as soon as possible (Arora et al., 2020). Accidents cause a broad spectrum of job injuries. According to the Bureau of Labor Statistics, workplace risks resulted in 3,277,700 nonfatal injuries and illnesses in 2009, with 965,000 resulting in missed workdays. Recognizing workplace dangers keeps employees safe and lowers expenses associated with injuries and diseases, including missed productivity (Long, 2013).

According to Woolf (2007), common hazards and their descriptions at the workplace are physical hazards, including heat, cold, vibration and high noise. Working at heights on roofs, ladders, or scaffolding creates a risk of falling. Other equipment-related dangers are electrical shock or exposure to dangerous radiation, such as X-rays, lasers, and radio-frequency energy. Typically, back injuries can be caused by poor lifting technique, and repetitive stress injuries are triggered when using computers for a longer time. Simple housekeeping issues, such as spilt coffee on the floor, might result in a significant slip and fall injury. Driving is the most common source of work-related injury. The occupational injury rate among the six ferroalloy industries was 200 (20%) per 1000 workers yearly, according to this study, which is 1.7 times lower than the general manufacturing workplace injury rate (33.3%) published by the Department of Labour Bhutan in 2015-16 (Dhendup et al., 2017).

### The Occupational Health and Safety Act

Appropriate legislation and regulations and adequate enforcement mechanisms are critical policy instruments for

worker protection. They serve as a foundation for attempts to enhance working conditions in the workplace. The inspection process should use the workers' health surveillance system, which the government, the community, or the business might manage.

The Labour and Employment Act of Bhutan 2007 establishes mandatory minimum standards for everyone. Employers and employees must comply with these requirements by employing appropriate techniques. It has been recognized that stating the duties of those with primary responsibility for OHS measures in general terms is more successful than attempting to control many dangers in minute detail in countries with a solid safety record. The effectiveness of safety measures ultimately depends on how well workers implement them.

### Health and Safety Policies

According to Alli (2008), workplace occupational risk prevention and management measures should be based on a clear, implementable, and well-defined policy at the company level. It should be brief, easy to understand, approved at the highest management level, and widely known throughout the organization. This occupational safety and health policy is the foundation for developing occupational safety and health goals, objectives, performance metrics, and other system components.

The policy can be expressed in organizational mission and vision statements as a document that embodies the enterprise's occupational safety and health values. It should spell out the tasks and responsibilities of the department head or the occupational safety and health team leader, who will drive policy goals into reality inside the company. The employer should establish the policy through information exchange and discussion to ensure workers accept the safety and health policy objectives. In addition, appropriate measures should be taken by the competent authority to guide employers and workers in fulfilling their legal obligations.

The policy should be reviewed regularly to keep it alive. It may need to be updated due to new information, hazards, or organizational changes. Revision may be required if the nature of the work being done changes or new equipment or risks are introduced into the workplace. Establishing new regulations, standards of practice, or official guidelines

relating to the enterprise's operations may also be necessary.

As preserved in the Labour and Employment Act of Bhutan 2007, an employee registered under the Companies Act of the Kingdom of Bhutan (2000) or a small, medium, or large-scale industry or falling outside section 150 (a) and (b) and having twelve or more employees shall prepare and implement an occupational health and safety policy that ensures that each workplace of the enterprise is safe and healthy.

According to the Department of Labor's Annual Report 2018-2019 (DoL, 2019), 45 businesses developed OHS policy statements for the fiscal year 2018-2019. The majority of the workers work in the manufacturing industry. TTIs, as vocational training institutes, are also required to have an OHS policy statement that ensures workplace health and safety.

### **Safety Education and Training**

Education and training are critical to promoting safe labour procedures in the workplace. Workers establish a robust health and safety culture through training and education. Spangenberg, et al. (2003) discovered that well-trained workers on health and safety laws lost much less time due to injury than those without. Training programs could help companies effectively carry out health and safety initiatives, establish a positive attitude, and integrate safety with other goals, e.g. quality. Injuries caused by falling materials, according to Tam, et al. (2004) might be readily avoided by providing construction workers with training programs.

According to Ganguly (2011), human mistakes are responsible for around 90% of workplace mishaps, which can happen anytime during decision-making or task execution. Human error can be avoided by training. Occupational safety and health training should not be viewed as a stand-alone course; it should be integrated into job training and everyday work processes. Institute management must guarantee that everyone involved in vocational education and training is trained in the technical abilities required to complete their tasks. As a result, any training for technical skills should always contain an OSH component (Alli, 2008). In consonant with what Alli (2008) has remarked, a module on OHS is included in the curriculum across all trades in Technical Training Institutions in Bhutan to reinforce OHS implementation. Further, the Department of Labour and

Regional offices provided an awareness program on the Labour and Employment Act 2007 for 3004 participants and awareness on OHS for 1446 participants. Four hundred seventy-seven workers were trained on OHS and 178 on industrial first aid (DoL, 2019).

### **Research design and sampling**

This study employed a self-administered survey questionnaire from 99 trainees of five TTIs and a follow-up by in-depth interview of 5 OHS focal persons. This research is an explorative study, and it used both qualitative and quantitative tools to analyze the data gathered through questionnaires and in-depth interviews. By combining quantitative and qualitative data, this approach effectively obtains detailed information about the effectiveness of feedback modes from OHS focal persons' and trainees' perspectives (Bakla, 2020).

The target populations for collecting data for this study were the OHS focal persons for qualitative data collection using purposive sampling and the final-year trainees of five TTIs (names mentioned below) for quantitative data collection using stratified sampling. The researchers considered final-year trainees as the study sample, considering their stay in the institute and having gone through OHS training and implementation. They were the appropriate people to obtain the correct information on the subject of the study. (See [Table 1a](#) and [1b](#)).

Before administering the full-scale questionnaire, the researchers did an informal pretesting of the draft questionnaire with ten trainees of TTI Thimphu to determine the significance of the relationship between the variables using the Cronbach-Alpha test. The result showed that the Cronbach Alpha coefficient of 0.913 was established, indicating that the questionnaire was reliable, as shown in Table 2.1. According to Pallant (2001), Cronbach Alpha's value greater than 0.6 indicates moderate reliability and a suitable index. It is deemed low if the Cronbach Alpha's value is less than 0.6. Cronbach Alpha's coefficient ranges from 0.60 to 0.80, a tiny yet acceptable range. Between 0.8 and 1.00, Cronbach Alpha coefficients are regarded as excellent. (See [Table 2](#)).

### **Research instrument and procedure**

A self-administered survey questionnaire and follow-up interview were used to gather data. Before data collection,

**Table 1a: Quantitative sample size, total sample size: 99**

Sl#	Institute	Dzongkhag	Category of sample	No. of sample
1	TTI, Khuruthang	Punakha	Trainees	20
2	TTI, Samthang	Wangdue Phodrang	Trainees	20
3	TTI, Chumey	Bumthang	Trainees	16
4	TTI, Ranjung	Tashigang	Trainees	20
5	TTI, Thimphu	Thimphu	Trainees	23

**Table 1b: Qualitative Sample size: 5**

Sl#	Category of sample	No. of sample
1	OHS focal person	1
2	OHS focal person	1
3	OHS focal person	1
4	OHS focal person	1
5	OHS focal person	1

the trainees were given consent, informed of their voluntary participation and assured that the data would be confidential and for research purposes. Based on the literature review, the survey design consists of 7 clusters of closed-ended questions. While trainees responded to the closed question by selecting four feedback modes, the OHS focal persons responded to the semi-structured interview questions.

### **Interview**

An interview is a dialogue in which the goal is to gather specific information (not needed)—the discussion aimed to acquire valid and trustworthy information from the interviewee's responses to questions. A semi-structured interview was conducted with OHS focal persons of the six TTIs utilizing purposive sampling to achieve the desired result. The idea of using interviews was to complement the findings from the survey questionnaire and as well as to cross-check information gathered from trainees, thereby increasing the validity of the data collected. Thus, it gave the researchers a deeper understanding of all aspects of the subject under investigation.

### **Questionnaire**

This research took the form of a series of questions that respondents were asked to answer to gain information on the subject of study. The self-administered survey questionnaire with five-point Likert Scale questions was used to assess respondents' belief in the effectiveness of Occupational

**Table 2: Cronbach Alpha coefficient**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.909	0.913	32

Health and Safety Management Systems (OHSMS) in providing a safe working environment for employees and the system's impact on the organization's productivity.

### **Significance of the Study**

The significance of this research can be seen in a variety of ways. First, the findings could help the TTIs develop successful occupational health and safety measures. Thanks to this work, trainers and trainees will recognize their particular health and safety issues. Based on the recommendations it also serves as a basis for other private TVET organizations to implement effective health and safety policies in their facilities. Finally, policymakers may use the study to help them decide on health and safety practices and procedures.

### **Method of data analysis**

The data collected was analyzed at the end of the data collection. The responses were classified and summarized based on the information provided by the respondents. The analysis was performed using both qualitative and

quantitative tools. The current Statistical Package for the Social Science (SPSS) data analysis program was used for quantitative data. In contrast, MAXQDA-2020 was used to analyze qualitative data collected from in-depth interviews, which employed coding of themes.

## The Findings of Quantitative Study

### Response Rate:

The overall institute response rate was 100%, according to the records of the total number of second-year trainees shared by the management of five TTIs. The details of the response rate are attached herewith. (See [Figure 1](#)).

### Descriptive Statistics

This is an overview of the descriptive information of the variables of interest. It primarily presents the output of the categorical variables, namely gender, age, institution, and course type.

### Trainees' demographics and backgrounds

The table below indicated that most of the trainees (60.6%) were 21-25 years old, and more than 25% fell in the age group of 16-20. A little more than 22% (f=22) of the participants were female, while 77.7% were male. This indicates that female enrolment in TTIs is significantly low. The TVET Statistics of Bhutan published by MoLHR in 2020 also marked the same situation, with an average enrolment per institute in the last five years (2015-2019) estimated at 722 (527 males and 201 females). This has produced a GER

of 1.85% for males and 0.76% for females. (See [Table 3](#)).

### Courses offered in institutions

Forty-seven participants had an automobile background, followed by electrical and welding, with 24 and 16, respectively. An equal number of four participants from computer hardware and networking, furniture making, and domestic house wiring added diversity to the sample group. The table below reveals the information on different courses undertaken by the participants. (See [Table 4](#)).

### Training place hazards

The five-point Likert Scale, such as 1–Never, 2–Rarely, 3–Occasionally, 4–Frequently, and 5–Very Frequently, was used to collect data, which was then computed with an interval scale of 1 to 1.8–Never, 1.81 to 2.60 – Rarely, 2.61 to 3.40 – Occasionally, 3.41 to 4.20 – Frequently, and 4.21 to 5 – Very Frequently. After that, the computed mean ratings were compared with the above verbal interpretation to determine the existence of hazards in the training places.

As shown in the table below, the statements “Do repeated actions with your hands or wrists for three hours during the day (sorting, assembling, cleaning, pulling, pushing)” and “Work in noise levels that are so high” have the highest mean ratings of 2.80 and 2.74, respectively, indicating that trainees are occasionally exposed to these workplace hazards in public TTIs.

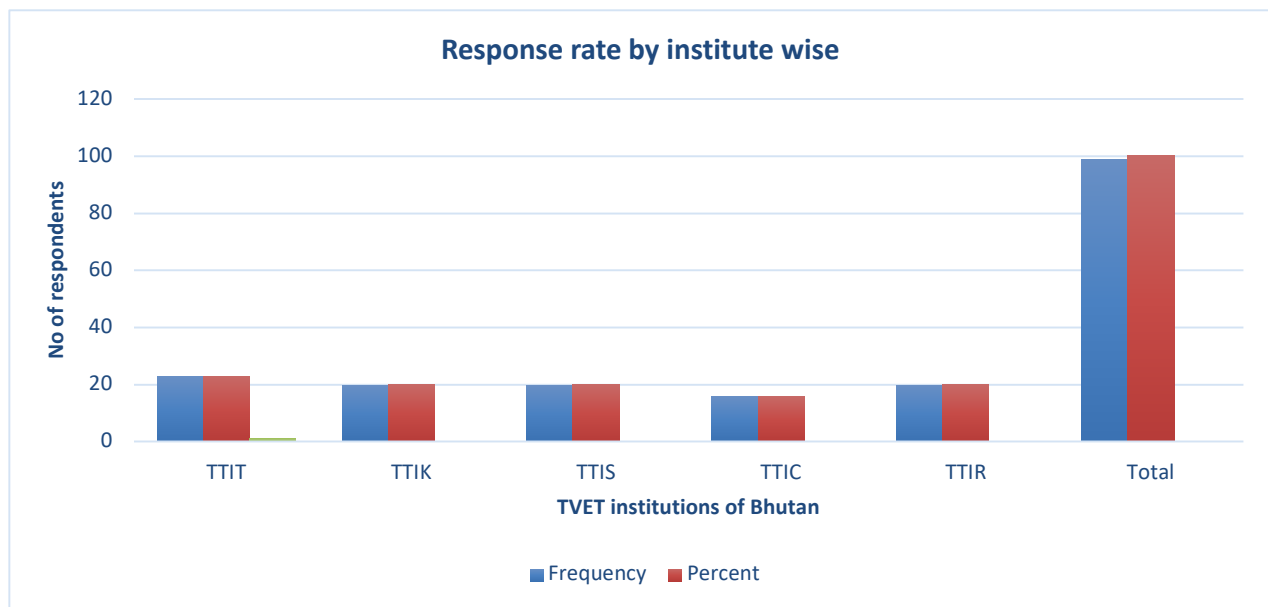


Figure 1: Response rate

**Table 3: Gender \* In range \* Institute Cross tabulation (Demographic details)**

Institute	Gender	Age 16-20	Age 21-25	Age 26-30	Age 31+	Total
TTIT	Male	1	19	1	1	22
	Female	0	1	0	0	1
<b>Total</b>		1	20	1	1	23
TTIK	Male	0	8	3	0	11
	Female	0	6	2	1	9
<b>Total</b>		0	14	5	1	20
TTIS	Male	2	15	1	0	18
	Female	2	0	0	0	2
<b>Total</b>		4	15	1	0	20
TTIC	Male	12	3	1	0	16
<b>Total</b>		12	3	1	0	16
TTIR	Male	2	7	1	0	10
	Female	6	4	0	0	10
<b>Total</b>		8	11	1	0	20

**Table 4: Institute \* Courses offered in TTIs\* Cross-tabulation (Details of participants' courses)**

Institute	Auto mobile	Welding	Electrical	Computer hardware and networking	Furniture Making	Domestic House wiring	Total
TTIT	23	0	0	0	0	0	23
TTIK	0	0	20	0	0	0	20
TTIS	20	0	0	0	0	0	20
TTIC	0	16	0	0	0	0	16
TTIR	4	0	4	4	4	4	20
<b>Total</b>	47	16	24	4	4	4	99

As specified in the above-computed interval scale for interpretation, if the mean rating falls within 1.81 to 2.60, hazards in the workplace are rare. The lowest mean rating scored by the statement “Interact with hazardous substance” is 2.01, demonstrating that student-trainees do not face hazardous substances like chemicals, flammable liquids, or gases. Thus, the rest of the statements have a mean rating of 2.01 to 2.55, signifying that workplaces in all the TTIs are safe and hazards are managed well. (See [Table 5](#)).

### Workplace policies and procedures

In this section, the five points Likert Scale such as 1- Strongly disagree, 2 - disagree, 3 - Neutral, 4 -Agree and 5 - Strongly agree were used to collect data to understand

the workplace policies and procedures, which was computed with an interval scale of 1 to 1.8 - Strongly disagree, 1.81 to 2.60 -Disagree, 2.61 to 3.40 - Neutral, 3.41 to 4.20 - Agree and 4.21 to 5 - Strongly Agree. After that, the computed mean ratings were compared with the theoretical mean rating (assuming a normal distribution of responses) of 2.50 to determine the effectiveness of OHS policies and procedures.

Interestingly, the table below indicated that all the statements under OHS policies and procedures scored the mean rating of 3.41 and above, indicating that TTIs included in the study have the OHS policies and procedures strictly implemented. The statement “I experienced some harassment in the institute” has a mean rating of 1.43 -

strongly disagreeing with the lowest mean, indicating that trainees in all five TTIs do not experience harassment or bullying from trainers or fellow trainees. This suggested that the learning environment is conducive and free of harassment. (See [Table 6](#)).

### Occupational health and safety awareness

In consonant with the workplace policies and procedures, the same five-point Likert scale value was used to explore trainees' awareness of occupational health and safety. The table below indicates that all the observants agree with all the statements used to determine the awareness level of OHS. When compared with the theoretical mean, it was observed that all the participants were clear on their roles and responsibilities laid down in the OHS policy and procedures indicated, with the mean ranging from 4.04 to 4.04, respectively. However, a low mean score of 3.87 and

3.12 was recorded in "I know about workplace safety, and emergency call numbers are displayed in the workplace," indicating that the participants neither agreed nor disagreed. (See [Table 7](#)).

### Training on the use of PPEs

The table below describes the mean rating of trainees' knowledge of personal protective equipment and OHS guidelines. The mean rating was compared as above, and it found that the statement, "Young people are involved in the formulation of OHS guidelines," scored the lowest mean rating of 3.26, interpreted as neutral or unsure of their involvement. The rest of the statements have a mean rating of 3.41 and above, indicating they agree and strongly agree. Interestingly, most respondents agreed that they were trained in using PPEs. (See [Table 8](#)).

**Table 5: Training hazards**

Statements	N	Min	Max	Mean	Std. Deviation
Manually lift 20kgs more than five times	99	1	4	2.34	0.81
Do repetitive movements with your hands	99	1	5	2.8	0.99
Perform tasks or use work methods that are not familiar	99	1	5	2.55	0.982
Interact with hazardous substances	99	1	5	2.01	1.005
Work in bent, twisted or awkward position	99	1	4	2.31	0.955
Work at a height of two meters or more	99	1	4	2.2	0.869
Work noise levels that are so high	99	1	5	2.74	1.084
Stand for more than two hours in a row	99	1	5	2.29	1.127
Valid N (listwise)	99				

**Table 6: workplace policies and procedures**

Statements	N	Min	Max	Mean	Std. Deviation
I experienced some harassment in the institute.	99	1	4	1.434343	0.91
Everyone receives workplace safety training.	99	1	5	3.919192	0.93
There is regular communication on safety management.	99	1	5	3.777778	0.89
Safety systems are in place to prevent hazards.	99	1	5	3.707071	0.87
There are OHS policy guidelines.	99	1	5	3.89899	0.90
There is an active and effective committee or focal person.	99	1	5	3.626263	0.96
Incidents and accidents are investigated quickly.	99	1	5	3.565657	0.83
There is clear communication on safety procedures.	99	2	5	3.979798	0.77
Valid N (listwise)	99				



**Findings of the qualitative data:  
In-depth interview**

*What are the responsibilities of an OHS focal person?*

The participants discussed their roles and responsibilities as OHS focal persons. The table below shows the roles and responsibilities of the institute’s OHS focal persons. Almost 15.38 % (f=12), when asked about their significant roles and responsibilities as OHS focal persons, mentioned that apart from their primary role as trainers, they also have to conduct awareness programs on OHS components for new trainers and trainees every year and monitor OHS practices in the institute. The in-depth interview data analyses also revealed that the OHS focal person’s job is to display OHS signs and symbols and ensure the use of PPEs by trainers and trainees. Their roles and responsibilities were not limited to the above ones only. They remarked that they must maintain records of injuries and accidents in the institute with follow-up action. “They provide awareness on OHS to trainers and

trainees” came significantly in all the interviews”, followed by “maintaining records of the accidents and injuries” as per the OHS procedures. (See [Table 9](#)).

**Barriers or challenges**

*What barriers or challenges do focal persons face in implementing OHS Procedures in TTIs?*

To explore the barriers that hamper the implementation of OHS procedures in TTIs, the following question has been asked: “What might be some of the foreseeable barriers to implementing OHS?” It was found that 16.67% (f=12) codes extensively discussed barriers to executing their roles and responsibilities or ensuring a safe learning environment. Among the codes in the table, “lack of technical support from management” was the highest in frequency, followed by lack of OHS policy and guidelines, inadequate budget and limited training opportunities with (f=2) each. (See [Table 10](#)).

**Table 7: Occupational health and safety awareness**

Statements	N	Min	Max	Mean	Std. Deviation
I am clear on the rights and responsibilities of OHS.	99	2	5	4.181818	0.68
I am clear on my employer’s rights and responsibilities.	99	2	5	4.080808	0.67
I know how to perform in a safe manner.	99	3	5	4.20202	0.59
I know precisely whom to report on hazards.	99	1	5	4.040404	0.82
I know about workplace safety.	99	3	5	3.878788	0.64
I know precautions to be taken while doing work.	99	2	5	4.191919	0.65
Safety signs and symbols can be seen in the classroom.	99	1	5	4.090909	0.92
Emergency call numbers displayed in the workplace.	99	1	5	3.121212	1.11
Valid N (listwise)	99				

**Table 8: Training on the use of PPEs**

Statements	N	Min	Max	Mean	Std. Deviation
I feel free to voice my concerns on workplace safety.	99	1	5	3.686869	0.865
The management considers my concerns about improving OHS.	99	2	5	3.444444	0.717
Young people are involved in the formulation of OHS guidelines.	99	1	5	3.262626	0.887
The first aid boxes are accessible during injuries.	99	2	5	3.818182	0.908
The principle of five Ss is practiced enough.	99	1	5	3.717172	0.959
Trainees are given adequate PPEs.	99	1	5	3.838384	0.900
Trainees are trained on how to use PPEs.	99	1	5	4.090909	0.980
Valid N (listwise)	99				

### Opinion on Personal Protective Equipment

What is your opinion on using Personal Protective Equipment (PPEs) by your trainers and trainees?

Regarding trainers' and trainees' knowledge of the use of PPEs, the interview data revealed that the incidence among the trainees seemed to be a poor and fair level of knowledge and practice on PPE usage. There seemed to be different opinions on the use of PPEs. Among the codes under this theme, 7.78% (f=7) of them remarked that wearing PPE is uncomfortable, especially during work. They recognized that the focal person's OHS concerns are immediate safety and protective action when trainees are in training, and the workplace is essential. The focal persons thought OHS meant wearing appropriate footwear, uniforms, gloves, goggles and other PPE. Some of the responses were:

*"PPE is the last control method from hierarchy injuries."* (interview 1). While other participants responded that:

*"All required continued reminders to use PPEs to make it a habit."* (Interview 2). (See [Table 11](#)).

### Kinds of hazards exposed by TTIs

What are the types of hazards TTI faculty and trainees face?

To ascertain what the participants in the survey questionnaire responded to regarding the hazards TTIs faculties and trainees were exposed to, the above question was asked in the in-depth interview with focal persons. The data analysis revealed that 10.26% (f=8) codes discussed the kinds of hazards to which TTIs were exposed. In general, the participants replied that risks could be categorized into many types, such as physical, chemical, biological, ergonomic, and psychological hazards. Among the above dangers, TTIs faced moderate chemical hazards (f=2) and frequent physical risks (f=3). One of the participants noted that they also face dust and heat hazards (f=1) more regularly, depending upon their occupations. The interview data also discovered that respiratory troubles were prevalent due to fumes from painting in some automobile institutes. The focal person also remarked that unlike significant manufacturing and other private industries, threats in training institutes are manageable and of a minor degree. (See [Table 12](#)).

**Table 9: Roles and responsibilities of the focal person**

Theme	Frequency	Percentage	Codes
Roles of the focal person (+)	14	17.94	Provide awareness(f=3), ensure continuous use of PPEs(f=2), maintain records of accidents and hazards(f=3), display OHS information and safety signs(f=3), monitor and conduct classes(f=1), maintain a safe and risk-free environment(f=1), familiarize and comply with the health and safety statutory requirement(f=1).

**Table 10: Challenges or Barriers**

Theme	Frequency	Percentage	Codes
Barriers/ challenges	13	16.67	Lack of space(f=1), lack of proper OHS policy and guidelines(f=2), inadequate budget(f=2), limited training opportunity for FP(f=2), lack of technical support from the management(f=4), lack of participation on OHS procedures(f=1), lack of OHS knowledge by PF(f=1)

**Table 11: Understanding about PPEs**

Theme	Frequency	Percentage	Codes
Understanding about PPEs	7	7.78%	PPE provide safety (f=4), wearing PPEs is uncomfortable (f=2), the last control method from hierarchy injuries (f=1),

## OHS Training and Monitoring

The researchers asked the following questions to confirm the replies provided in the survey questionnaire on the frequency of OHS training and the monitoring provided by the institute and the Ministry:

*“To what degree do you think the monitoring, inspection and evaluation of safety practices are done?”*

The focal persons of the TTIs have responded that the frequency of OHS monitoring from the Ministry was rare and minimal. To this, the participants have responded as follows:

*“In this regard, it has been done minimum, but it could have been done more efficiently if the concerned agencies had built the capacity building equally.” (Interview 1).*

*“We do monitoring, inspection and evaluation of occupational health and safety (OHS) before we execute any tasks/practical, but in reality, people take occupational health and safety lightly because of self-complacency.” (Interview 2).*

The interview data also revealed minimal training for focal persons on OHS. One of the participants has responded as follows:

*“Once in a year or not at all. Training conducted virtually was not effective at all. Training should be conducted in theory and practice to ensure effective occupational health and safety in the institute. It will be much better, and I should say that there will be lots of changes within the organization on occupational health and safety.” (Interview 3).*

In terms of OHS training provided by the institute to the trainees, it was stated that OHS training was conducted once a year when they had new recruitment to orient on this component. It was also learned that concerned trainers train trainees as per the curriculum, indicating that OHS training is adequate. The following responses support the frequency of training provided by the institute:

*“As per the curriculum, OHS classes are taken at the beginning of the year for one week, and after that concern, trade instructor will take care during their respective session.” (Interview 4).*

The overall thematic coding in this section indicated that 11.71%(f=5) of the respondents discussed the lack of regular training on OHS and monitoring, as shown in [Table 13](#).

### Status of OHS practiced in TTIs

The OHS guidelines and policy implementation in TTIs seemed satisfactory, as 7.69% (f=6) of the participants said that trainers and trainees have good knowledge of OHS policy guidelines. They also stated that 40% of the faculty and trainees practiced whatever they learnt during the OHS training. To note precisely what the participant said on this question:

*“I should say good because we do not have any serious casualties so far, but still, we have miles to go, and we have been exercising occupational health and safety in every task we perform. We need more practices on occupational health and safety to be competent enough.”*

Also, one of the participants from TTIs said that their status of OHS practices is average only.

**Table 12: Kinds of hazards**

Theme	Frequency	Percentage	Codes
Kinds of hazards faced by TTIs	8	10.26%	Heat(f=1), chemical(f=2), physical(f=4), dust and respiratory hazards(f=1).

**Table 13: Training and awareness on OHS**

Theme	Frequency	Percentage	Codes
OHS Training and Monitoring	9	6.41%	Monitoring is minimal or once a year(f=4), OHS training once or not at all (f=5)

## Discussion

The in-depth interviews and survey questionnaire results disclosed minimal training hazards in the TTIs. However, there were some incidences where trainers and trainees were exposed to physical, heat and respiratory hazards at their workstations (10.26%). The qualitative data analysis also revealed that trainers and trainees in TTIs minimally interacted with hazardous substances like chemicals and flammable gas ( $m=2.1$ ). Apart from physical injuries, there was a possibility of other non-physical work-related injuries in the study area, as per the survey data, resulting from excessive noise levels and prolonged inhalation of contaminated air (fumes from painting in automobile institutes and dust). According to available studies, this could culminate in reduced hearing acuity and work-related asthma (Monney et al., 2014). A study conducted by Dendup et al. (2017) indicated a similar finding, which discovered that, among ferroalloy industry workers, contact with objects and equipment (44.2%), contact with hot substances (26.7%), and falls from height (20.9%) were the three most common causes of occupational accidents. Being struck by flying or falling objects is considered coming into contact with moving objects and equipment. The primary cause of the contact with hot materials is contact with the molten ore while tapping. The results of this investigation corroborate those of Alli's (2008) study, which found that in the ferroalloy business, contact with items in translational motion, rotation, or flight was responsible for 29% of accidents.

The study also uncovered that low or no incidence of accidents and injuries in TTIs was credited to the prevalence of trainees ages 16 to 31. This finding corresponds to the study conducted by Dhendup P., & et al. (2017), which found that the higher the age, the higher the risk of experiencing workplace accidents. The workers between 35-44 years were more susceptible (27.6%) to workplace accidents than the rest. In contrast, this finding differs from the findings of Ajslev et al. (2017), where young workers between 18 and 24 years were highly susceptible to workplace accidents. The low rate of injuries in TTIs was credited to the high level of awareness of OHS and PPEs. The quantitative data revealed that training on the use of PPEs for trainees scored a mean rating of 4.09, indicating that TTIs have a robust system of trainees being trained once they enroll in the institute. However, the focal person interviews showed that training of the focal persons by the agency concerned and monitoring the OHS implementation in TTIs was minimal or not at all. It was also

learnt that training conducted virtually is not practical. It was suggested that frequent OHS focal persons or trainers be provided to strengthen OHS management and prevent accidents and injuries. A similar finding in hazard training was proposed in an Australian survey of 270 workplaces in the hospitality industry, which recommended the need for improvement in induction training for young workers (Hicks, 2009 as cited in Mostafa & Momen, 2014). Indeed, the importance of providing occupational safety education in secondary school has been widely recognized.

According to Enshassi et al. (2008), the rate of injury among workers will decrease if supervisors are well-trained, as they play a vital role in the workers' safety. This report shows that private companies have severe occupational health and safety issues. Previous research has indicated that having supervisors more responsible for workplace safety reduces accidents. As a result, it was advised that the Ministry of Labour and Human Resources strictly implement OHS laws and practices training for managers, supervisors and workers. Managers and supervisors should be held more liable and accountable for workplace safety issues. According to the study conducted by Ashola (2017), improved psychological wellness of employees is ensured by manager's communication, formalization, and implementation of safety management policies and practices. Managers must choose the kind of maintenance culture that will save costs and ensure worker safety. Encouraging managers to communicate regularly about operational issues, particularly maintenance techniques, is crucial to addressing workers' safety demands. Moreover, a strong strategy for creating a comprehensive safety management culture is to involve staff members in operational decision-making. Other studies have demonstrated that inadequacies in risk management account for 84% of workplace accidents in the construction industry in Britain. These are trailed by issues resulting from workers (70%), equipment and PPE shortcomings (56%), workplace issues (49%), and material suitability and conditions (27%). Given the obvious costs associated with building for employers, workers, and society, safety awareness in the construction sector has grown over the past few decades (Haslam et al., 2002).

The above findings prove that a strong safety culture would result in fewer accidents, which is closely associated with the findings of this study. This can be ensured only by a sound safety management system or OHS policy through a

coordinated and systematic approach to managing OHS. When comparing the two data sets, the survey data showed that TTIs have a higher prevalence rate of workplace policies and procedures, with a mean rating of 3.89. In contrast, the interview data revealed that although there is a firm OHS policy, the implementation of the OHS procedures is either good or average. The participants stated that only 40% of the trainers and trainees put into practice what they learned. The reason for an average implementation of OHS policy in TTIs could be a lack of a strong monitoring system, as the focus is equally burdened with teaching and other administrative loads. In line with this conclusion, research by Dendup et al. (2017) found that more workers (39%) risk their safety by disregarding safety procedures when workloads grow. The study also found that workers with adequate workplace safety awareness and competency are at higher risk (23.68%) than those levelled as good (19.92%). Inadequate education and awareness of health and safety were the main factors contributing to the poor safety culture, mainly in the private sector. Sometimes, workers cannot understand the simple safety signs displayed at their worksite, while safety signs are conspicuously absent in many others. Dendup found in his study that a similar result was also revealed by the quantitative data on occupational health and safety awareness, which showed that trainees of TTIs were well informed of the OHS, resulting in more minor injuries and accidents. One reason for the low prevalence of occupational accidents was that trainers cultivate trainees' understanding in some ways, including briefing at the beginning of practice, giving sanctions when some are not serious in practice, and others showing videos due to work accidents. Hence, trainees are afraid not to be serious when in practice.

Even though faculty and trainees were given a complete set of personal protective equipment to prevent accidents and injuries, this study revealed that many do not use PPEs despite constant reminders and penalties. The reason for not being used was that the person felt uncomfortable or unfamiliar. A study conducted by Dukpa (2017) also showed that workers in the construction sector strongly opposed using personal protective equipment (PPE), claiming that it hinders their performance and makes them uncomfortable. The finding of this study is in line with the results of Edytya et al. (2020), where 40% of an accident occurred due to workers not using PPE and the findings of Tanko, B.L and Anigbogu (2012), where 81.1% of workers do not use PPE provided to them. It should be noted that, in the absence of workplace

risk assessment, safety equipment plays a critical role in determining the level of injuries. Notwithstanding, similar reasons for not using PPEs were shared in a study conducted by Monney et al. (2014) that the host of hazards at the shops, the use of PPE among the artisans was low. The justification only reinforced the fact that these artisans are either ignorant or just careless about the health implications of their work. The study by Dukpa et al. (2017) noted that workers needed to be reminded to wear and monitor personal protective equipment. Despite companies providing PPE and workers understanding its importance, it was also discovered that PPE was not used consistently. It was inferred that PPE was inconvenient and hindered their ability to work.

Occupational Health and Safety (OHS) culture is critical to any organization, particularly in technical training institutes where students and staff are exposed to various potential hazards. To address this, the Technical Training Institute developed a culture of OHS that operates and carries out the principles of sustainability, integration, implementation, consistency, and fun. To ensure the sustainability of the OHS culture, the institute focuses on embedding safety awareness and practices into the core of its operations during the orientation program and consistently applying this OHS component while doing the training. This can be achieved through comprehensive training programs that educate all stakeholders, including students, faculty, and other staff, on the importance of occupational safety and health. Additionally, the institute established clear policies, procedures, and accountability measures to reinforce the commitment to OHS.

It is also essential that OHS concepts be incorporated into every facet of the institute's operations. This entails adding safety concerns to research initiatives, facility management, and curriculum design. OHS will become a seamless and essential component of the organization when it is in line with the academic and operational goals of the institute. It is critical to apply and communicate OHS procedures consistently. The institute works hard to ensure that safety policies and procedures are followed consistently in all departments and activities and that any updates or modifications are successfully shared with all parties involved. Keeping daily logs of minor accidents and injuries also promotes a healthy work environment, complies with legal requirements, and raises safety standards.

Nevertheless, the institute considers adding innovation and fun to its safety programs to promote an interesting and pleasurable OHS culture. This includes engaging training sessions, gatherings with a safety theme, and recognition schemes honouring outstanding OHS procedures. Enhancing OHS to be a fun and engaging part of the institute's culture will increase community buy-in and commitment. Through the establishment of an Occupational Health and Safety culture based on the values of sustainability, integration, implementation, consistency, and enjoyment, the Technical Training Institute can establish a secure and lively setting that promotes the health and welfare of its staff, faculty, and students, while also serving as a model for the larger community. Other agencies within and outside can replicate the above ideas.

Additionally, this study explored the challenges TTIs face when implementing OHS policies: a lack of funds, limited training opportunities for the focal person, lack of supervisory support, lack of standard OHS policy and guidelines, and non-compliance in using PPEs. These are the cross-cutting challenges all TTIs face in maintaining the OHS policy and Act standards. A lack of funds is one of the major issues that deter the implementation of the Act and policies, which demands procurement of PPEs, regular training on OHS, and continuous monitoring and evaluation of the program.

### **Limitations of the study**

This study's design is a restriction in and of itself because it is a snapshot. The study is limited to a few vocational institutions, which may not represent other institutions not included. The findings may not be generalizable to all TTIs with different sizes, locations, or demographics as the current study has a sample size of 99 final-year trainees selected for examination on the 31 items limited to certain occupations for information processing load.

The qualitative design used in this study included a purposeful sample of current OHS focal persons of six TTIs as the data collected may be limited in scope, focusing on specific departments or types of hazards. This could overlook other significant OHS issues present in vocational institutions. The quantitative element used in this study was administered to a stratified sample of final-year trainees in six TTIs. Therefore, the statistics do not reflect all trainees, but the data may be substituted to comparable people in similar situations.

Other limitations include differences in regulations, policies, and safety practices between the studied institutions, which limit the results' applicability to other settings. OHS practices and conditions continuously evolve, and the study does not capture the most current practices or newly emerging hazards. Further, external factors such as local regulations, economic conditions, and societal attitudes towards health and safety may influence the study results and limit their broader applicability.

Thus, a comprehensive study of all TTIs, including two National Institute of Zorig Chusum (NIZCs), is warranted to obtain a holistic picture of the necessary policy considerations.

### **Conclusion**

This is the first time a mixed-method study has been conducted on occupational health and safety practices in TTIs. Even though the findings are informative, there are few opportunities for comparisons to previous studies in the global context and none in the Bhutanese context, limiting comparison. The examination of the survey result showed that the workplace injury rate is two times lower compared to the record maintained by the Department of Labour in the construction sector. Based on the study results conducted in the TTIs, the compliance level of TTIs in OHS is good or average, with very minimal records of injuries and accidents. This proved that TTIs try to provide the best culture and environment conducive to growing and developing the positive character of trainees, which are carried out according to the principles of sustainability, integration, consistency, implementation, and fun. A good safety culture can shape worker behaviour towards work safety, manifested through safe work behaviour. However, the study suggested having a uniform SOP for OHS implementation across all TTIs. Further, there is a need to strengthen the implementation of basic occupational health and safety practices in all the TTIs in formal training sessions and during their apprenticeship (OJT) to instill in them the need to protect themselves at the workplace. This would require a strong collaboration between TTIs and relevant stakeholders such as the Department of Labour, Department of Workforce Planning and Skills Development and industries to organize training-of-trainers workshops for trainers who subsequently train their apprentices.

The literature review indicated that Bhutan is not unique in confronting the implementation of the OHS policy (Dukpa et al., 2017). Their study found significant gaps in Bhutan's workplace health and safety: lack of competent human resources, inadequate OHS training, poor health promotion, lack of safety data on construction sites, and an organized safety management system. Concerning their findings, this study also discussed many issues or challenges TTIs face. The prominent issues highlighted are the institute's OHS focal person's lack of skills and knowledge in managing OHS, inadequate OHS training, lack of monitoring and support from management, and insufficient budget.

In summary, the interview of the focal persons suggested the following strategies to strengthen the safety implementation in TTIs:

1. Comprehensive training for all the faculties and trainees on occupational health and safety (OHS) should be provided;
2. Institute reward system to those who implement and practice OHS policies;
3. Effective use of labels and signs to communicate important information quickly;
4. Ensure trainers, trainees and staff have the right tools to prevent accidents and injuries;
5. Conduct regular inspections of tools and equipment;
6. Implement safety protocols from the start;
7. Have regular meetings on workplace safety;
8. The management should support the OHS focal person.

## Conclusion

We appreciate the five TTI principals for allowing us to conduct a survey and share workplace information. We also appreciate all the people who have helped us conduct this research, especially Mr. Phuntsho Dhendup, Labour Officer of the Department of Labour, then under the Ministry of Labour and Human Resources, for reviewing the paper and the OHS focal trainers for interviewing with us. We would also like to thank all the trainees involved in the survey.

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