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ASSESSMENT OF THE CAUSES OF ACCIDENTS AMONGST CONSTRUCTION EMPLOYEES. A CASE STUDY OF EARTHWAVE CONSTRUCTION PVT.

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF A BACHELOR OF ENVIRONMENTAL SCIENCE HONOURS DEGREE IN SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT

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DECLARATION

Registration number B190745B

I Munashe T Chinyowa do hereby declare that this work is entirely the product of my findings and has never been presented to any academic institution. Any reference to previously published work has been indicated.

Signature of the student… Date: 16 June 2023

To be completed by the supervisor

This dissertation is suitable for submission to the faculty and has been checked for conformity with the faculty guidelines.

Signature of the supervisor……Date……

ABSTRACT

Construction industry accidents continuously occur because the actual causes of the accidents remain unknown. The construction industry contributes significantly to the frequency and severity of accidents. The extent of injuries sustained by the workers range from permanent injuries, deaths, and long periods of absence from work. No study has been conducted to identify the causes of accidents at Earth wave Construction Company. Descriptive cross-sectional study was conducted with both primary and secondary data collection instruments. As a primary data collection tool, a questionnaire was used to collect information on the causes of workplace accidents and the existing controls for reducing workplace incidents and accidents. Secondary data was collected from the company Occupational Health and Safety statistics which was used to analyze the company Occupational Health and Safety performances before and after the adoption of Occupational Health and Safety Management System (OHSMS). Eight-four participants from all the departments at the company were randomly selected and provided their responses which were further analyzed through descriptive statistics graphs and tables using SPSS version 23 at a 95% confidence interval level. The leading cause of the accidents in construction industry are unsafe behaviors and unsafe conditions and there is need for the construction company to invest and adopt to a strong safety culture.

Key terms: Construction, accident, causes, investigation, corrective action.

DEDICATION

I am dedicating this dissertation to my mother Greater Chinyowa and my sister Vongai Chinyowa.

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I would like to appreciate many people who helped me towards the success of my research project. Firstly, my appreciation goes to my supervisor Dr Mabhungu who was helping and guiding me from the onset up until the end of the research. I would also want to extend my appreciation to my mother Greater Chinyowa and my sister Vongai Chinyowa for social, financial, material and spiritual support. Above all my appreciation goes to ALMIGHTY GOD for guiding me and making the whole process successful.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Globally, over 350 million people work directly in the construction industry (Jaafar et al., 2018). Construction plays a pivotal role that economically benefits the nations through infrastructural development (Fan et al., 2017). Despite its many advantages, the construction industry is among the most dangerous in the world due to the high frequency of accidents that are brought on by multiple risks, dangers, and complications (Sousa et al., 2014). The incidents that happen in the construction sector result in fatalities, severe injuries, and property damage, all of which have a detrimental impact on the company's operations (Asanka and Ranasinghe, 2015).

Construction workers have a relatively high frequency of occupational safety and health vulnerabilities (Rupakheti et al., 2018). Over 321,000 people die from occupational accidents each year, compared to 2.02 million who die from occupational diseases (ILO, 2013). It is further reported that 151 accidents involving employees occur every 15 seconds and at least 60 000 fatal incidents occur on construction sites annually, or one every 10 minutes (ILO, 2018). In the United Kingdom and the United States, the construction industry contributes to 7.7% of the total workforce .In retrospect the construction sector has a significant number of accidents and is responsible for 22% of all work-related fatalities annually (Kalatpour and Khavaji, 2016). The construction industry is physically demanding and requires workers to have strength and common accidents are caused by falls from heights, being struck by objects, overexertion, lack of personal protective equipment and disturbed sleep (Das, 2019). The minor injuries sustained include snake or insect bites, sprains and strains, cuts and lacerations, avulsions, and abrasions.

The construction industry contributes significantly to the number of accidents and the extent of injuries sustained by the workers which are often permanent injuries, deaths, and lost time injuries (Souza et al., 2002). In India, construction employees suffer from different health problems caused by poor working environments and carrying heavy loads (Sett and Sahu, 2008). Each year, there are more than 54 000 occupational injuries on the African continent and occupational accident rates in developing countries have been increasing showing a sign of failure to identify the causes of the accidents (Boniface et al., 2013). In Zimbabwe, there is a demand for housing units to meet 32% of the urban population (ZIMSTAT, 2017). Zimbabwe’s

national housing backlog is projected to be 1,4 million housing units, which can be cleared in 15 to 20 years (Wisdom, 2014; Muchadenyika, 2015; GoZ, 2015). When building this much-needed infrastructure the construction employees face a magnitude of safety and health risks due to the nature of the activities conducted. The worst construction tragedy to ever happen in Zimbabwe happened in 1999 when a building elevator carrying 15 employees and construction supplies collapsed from the 17th floor, killing everyone inside. There has been an increase in the construction sector in Zimbabwe. According to a Health and Safety report NSSA (2020), the number of reported work-related accidents in the construction industry from the period 2008 to 2019 is twenty-six. These existing statistics show that there is a gap in reporting work-related accidents among construction companies. Accidents in construction companies will continuously occur if their causes remain unknown and there is a global need for the construction sector to improve its occupational health and safety management systems because they fall short of addressing the root causes of accidents (Manager et al., 2017). Earthwave Construction Company is known as one of the construction companies in Zimbabwe which is certified to the Occupational Health and Safety Management System (ISO 45001:2018) by the Standards Association of Zimbabwe. Despite its certification in the last two years, there has been a series of high turnover, absenteeism, low morale, and demotivation of employees which is believed to be caused by continuous occurrences of workplace-reported and unreported accidents. A safety management systems procedure success' in reducing accidents depends on the worker's engagement and level of focus on safety (Jan K. Wachter et al., 2013) and this has necessitated the need to research assessing the causes of accidents at Earthwave Construction Company.

1.2 Statement of the Problem

Since the establishment of the Earthwave Construction Company in 2018 the company has recorded a total of 21 work-related accidents that caused injuries to employees and property damages. Significantly the last two calendar (2021 and 2022) contributes to 47.62% of the accident statistics. The increase in the frequency of accidents is worrying to all the employees and the top management at the organization. To date, no study has been conducted to engage the employees on the causes of accidents that might not be identified by the existing accident investigation process at the company.

1.3.1 Aim

To assess the causes of accidents among construction employees at Earthwave Construction.

1.3.2 Specific objectives

- To determine the causes of workplace accidents at the Earthwave Construction Company in Zimbabwe.
- To examine the Occupational Health and Safety (OHS) performance at Earthwave Construction using lagging indicators before and after the adoption of the Occupational Health and Safety Management System.
- To examine the existing controls for reducing workplace incidents and accidents at Earthwave Construction Company in Zimbabwe.

1.4 Justification

To lessen the quantity of work environment mishaps at the organization reasons for the mishaps should be distinguished and tended to. The exploration will help Earthwave Development Organization and other development organizations in knowing the conspicuous reasons for working environment mishaps. Working environment dangers and dangers imperil the representatives, property, and the workplace, and effect the intensity and monetary execution of associations and networks. Business related mishaps have significant unfriendly outcomes; representatives are harmed, property is annihilated, the amount and nature of development falls, and there are financial misfortunes because of exiting the workforce and staff nonappearance, which unfavorably influence the association's all's standing and seriousness The exploration will decide the idea of mishaps happening and help the association in deciding remedial measures which will forestall the reoccurrence of the comparative mishaps in future. It will likewise evaluate the viability of existing OHS the executive’s frameworks being carried out at the organization. This examination will assist the association with esteeming the ethos of the central OHSMS than depending on an endorsement gave by the guaranteeing association. Aside from the testament, the association needs to exhibit through better measurements that it is working in the rule of the embraced worldwide guidelines.

CHAPTER TWO: LITERATURE REVIEW

2.1 Nature of the Construction Industry

A large sector of the economy noted for its significant contribution to long-term national development and economic progress is construction (Ofori, 2015). The construction industry contributes to the upkeep and maintenance of the nation's infrastructure, enhancing the quality of life for citizens by fostering the growth of homes, schools, hospitals, and highways (Hosseinian et al., 2012). The construction sector is an essential part of modern civilization and contributes significantly to ensuring sustained growth and employment for skilled, semi-skilled, and unskilled people globally. Unfortunately, employment in the construction sector frequently results in catastrophic losses and unspeakable agony and suffering brought on by accidental death or injury for many workers, as well as for their families and friends (Lingard and Rowlinson, 2005). Despite health and safety regulations in place, construction workers still suffer more injuries and deaths each year than in most other industries.

2.2 Factors Affecting Safety in Developing Countries

Construction has always been a dangerous industry since it requires outside work, heights, the use of complicated site infrastructure and equipment, and safety-conscious worker conduct (Choudhry and Fang 2008). Compared to production, construction is far less secure when it comes to employee safety. The employment of more dangerous gear and work procedures during construction makes the work more dangerous (Helander 1991). Workers on construction sites face various risks because of these circumstances. Such job classification entails a lot of safety risks, and construction employees typically underestimate these risks. In India, construction workers faced problems which include disorganized work, a subpar accident recording and reporting system, an overreliance on foreign labor, and a lack of safety regulations and laws. (Cartam et al., 2000). The main variables impacting safety performance in a study of Chinese construction enterprises were low safety awareness of senior management, lack of training, low safety awareness of project managers, and inadequate allocation of health and safety resources. According to a study conducted in Taiwan workplaces did not consider the value of the safety precautions in place, provided insufficient safety training to new employees, and failed to hire qualified health and safety personnel (Cheng et al. 2010).

2.3 Construction Accidents and Causative Factors

It is well understood that the construction sector has poor health and safety standards and that there is a general lack of awareness of how dangerous construction work may be (CIDB, 2009). It's critical to distinguish between the phrases "accident" and "incident" when talking about accident prevention. According to Asanka and Ranasinghe (2015) and SAMTRAC (2017), an "accident" is defined as an unexpected, planned, or deliberate event that results in harm, loss, or property damage. Similar to the last example, it is an unpleasant event that occurs suddenly, causes harm or damage, and lacks an obvious reason (Asanka et al., 2015).

When the word "accident" is used, one has the idea that it recently occurred and was unavoidable. It validates the idea that a specific result is unavoidable. Individual accountability and responsibility afterward seem to be erased, and they are likely to offer a means of avoiding rectifying the situation, dodging criticism of current practices, and avoiding pressure to change. Change (Smallwood et al., 2001). Only a few accidents are reported at the construction sites and this is due to poor communication, geographical location, government interference, and cultural barriers (Hämäläinen et al., 2006). According to Marks et al., (2014) an incident is characterized as an unexpected event that happens as a result of something else. Near misses are unanticipated events that do not cause personal injury or property damage but may in other conditions cause an accident that causes personal injury or property damage (Durnwald, 2012). Marks et al., (2014) shows that the construction industry's ability to avoid accidents and maintain worker health and safety would be much enhanced if near-misses were recorded. Near misses are seen as a leading sign that, when found, documented, and studied, enhances the capacity to identify dangers, necessitates safety training, and puts into practice measures. It is often believed that if the primary or primary events that caused the injury are avoided, all injuries may be prevented.

Therefore, to enhance the avoidance principle and encourage an overall improvement in the culture of health and safety, near misses should receive greater focus than accidents. Around the world, mishaps of the same kind keep happening in the construction sector. There are several acknowledged risks associated with construction. Numerous of these risks have been well studied, but they still seem to present an equal risk of death, injury, and sickness. According to statistics, it is commonly acknowledged that the construction sector has the highest risk of fatalities, diseases, and other conditions than any other sector. However, according to Lingard

and Rowlinson (2005), the construction sector hasn't been particularly interested in learning from its errors or implementing solutions to stop these negative effects.

2.4 Accident Causation Theories

Construction accidents can be avoided by identifying the underlying causes of accidents through the use of accident investigation techniques, such as the use of theories on accident causation (Hosseinian et al., 2012). There is presently no consensus on the reasons for accidents, even though several ideas and models have been created throughout the years. To investigate the origins of accidents and their effects, theories or models of accident causation are necessary. As stated by Suraji et al., (2001) actions designed to address accident causes can help reduce or perhaps completely eradicate construction accidents. Abdelhamid and Everett (2000) claim that rather than concentrating on the accidents' immediate or trigger causes, preventative measures or remedial action may enhance accident prevention strategies.

Theoretical frameworks are provided by the theories to direct the investigation of accidents in the past and the identification of dangers in the future (Lehto and Salvendy, 1991).

2.4.1 Multiple Causation Model

According to Peterson (1971), the idea of multiple causations states that each accident is preceded by many events if not countless occurrences. Contributing elements also contribute to accident causation when they unintentionally come together to cause an accident. A guy sliding down a defective stepladder is an example of a common accident scenario; using current accident investigation methodologies, it is very probable that the damaged ladder will be identified as the only act or condition that caused the accident (Petersen, 1971). To prevent a repeat of the incident, the broken ladder needs to be thrown away.

As they may be "immediate/proximate causes" rather than "root causes," accident investigation techniques or methodologies that seek to identify merely the dangerous conduct or circumstance are only helpful in alleviating the symptoms of the issue (Abdelhamid and Everett, 2000). It is necessary to determine the fundamental reasons to achieve long-lasting improvement and stop the same mishaps from happening again. According to Bird and Loftus (1976), the initial occurrence in a chain of management-related events, known as the root cause, is frequently related to management policies, processes, supervision, effectiveness, and training.

2.4.2 Accident Proneness Theory

The popular hypothesis of "accident proneness" emphasizes individual aspects that contribute to accident causes. It is predicated on the idea that certain persons would be more likely than others to get hurt under comparable working conditions, indicating that accidents are not dispersed randomly. An earlier opinion and a more recent view are both present (Hinze, 2006). The more traditional perspective contends that those who are genetically predisposed to injury will experience injury (Klumb, 1995). According to this theory, certain people have innate traits that predispose them to have a higher likelihood of being involved in an accident (Sichel,1971).).

2.4.3 Distraction theory

Hinze (1996) asserts that the Distractions Theory compares risk and productivity and has a site-based emphasis that is constrained. This idea contends that stressed-out workers are more prone to be involved in accidents when they work in hazardous situations. The risks cause workers to get distracted while carrying out their duties, which raises the risk of accidents and reduces productivity (Abdelhamid, and Howell, 2005). When dangers are eliminated and fewer distractions ensue, H&S and productivity can coexist (Peckitt et al, 2004).

2.4.4 Domino Theory

An engineer named Heinrich, who was employed by a US insurance firm, studied 75,000 accident records to create a model that would explain the incidental causes of accidents that result in injuries (Heinrich, 1959). He proposed a theory in which one of five conditions, when combined, causes an accident. Accordingly, accidents are described as occurrences that result from a sequence of events that happen one after another in a predetermined order (Taylor et al., 2004). The theory is categorized as an event-based model or a sequential accident theory (Hosseinian et al., 2012). According to this analogy, if one thing happened, it would trigger the cause of the next, which would then trigger the cause of another, and so on. According to Hosseinian et al., (2012), the accident itself is always brought on by a technical or physical risk or a person's dangerous behavior. The chain of events theory states that accidents often have several causes rather than simply one.

2.5 Overview of the Health and Safety Legislation in the Construction Industry

Both Section 28.01 of the Work Act and Notice No. 68 of 1990 of the Public Government managed retirement Authority's Mishap Anticipation Laborers Pay Plan contain word related wellbeing and security guidelines that apply to all businesses and laborers in all areas of the

economy in Zimbabwe. The administration of word related wellbeing and security in Zimbabwe is completed by the Zimbabwe Office of the Worldwide Work Association, the Service of Public Assistance, Work, and Social Government assistance, the Public Federal retirement aide Authority, and the Zimbabwe Word related Wellbeing and Wellbeing Chamber, which is contained the public authority, businesses, and trade guilds. Eight guidelines are remembered for the Industrial facilities and Works Act 14:08 of 1976. These incorporate the common principles (RGN 262), building, underlying, and exhuming work guidelines (RGN 264), lifts and uncovering guidelines (RGN 278), evaporator guidelines (RGN 279), hardware guidelines (RGN 302), pressure vessel guidelines (RGN 303), and electrical guidelines (RGN 304). Extra regulations that are applicable to the development area incorporate the NSSA Act 17:04, NSSA (Mishap Anticipation and Pay Plan) Guidelines SI 68 of 1990, the Pneumoconiosis Act (Cap 15:08), and the Radiation Security SI 62 of 2011. It is expected to consolidate the Follows up on Manufacturing plants and Works, the NSSA, Pneumoconiosis, and Radiation Security to decrease legitimate vulnerability.

CHAPTER THREE: METHODOLOGY

3.1 Description of Study Area

The study was conducted in Ruwa, Mashonaland East with coordinates -17.888711ºS, 31.23227740ºE Earthwave Construction Administration offices, Machinery Workshops, and Stores are located. Figure 3.1 shows the study area map.

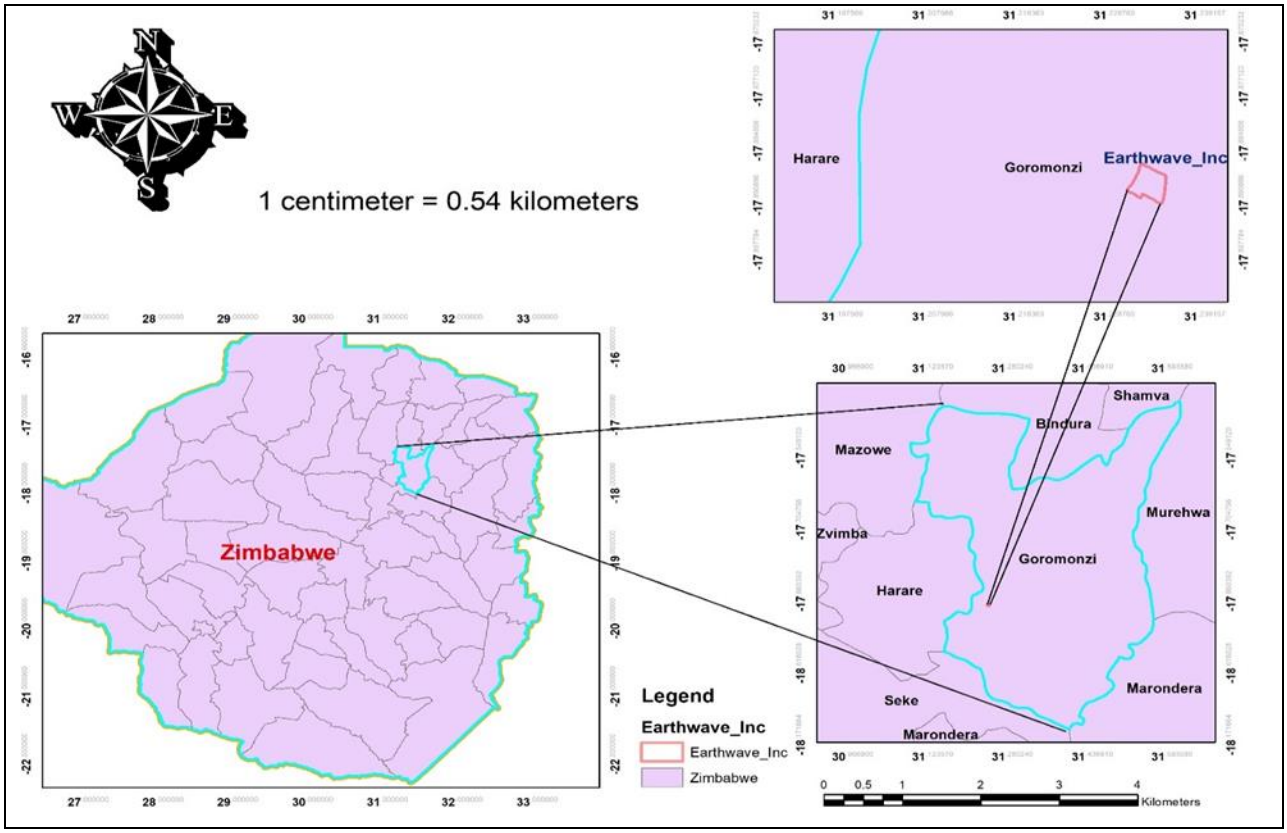


Fig 3.1: Study map

3.2 Research Design

A descriptive cross-sectional study design was selected because it captures numerous factors at once, quick to complete, relatively affordable and allows analysis of large number of results and outcomes to develop new theories (Shyamala et al., 2016). Data was collected through self-administered questionnaires and secondary data making the study both qualitative and quantitative. Questionnaire was used to collect data on the causes of the workplace accidents and for determining the effectiveness of the existing controls in reducing workplace incidents and accidents. Secondary data was used to verify the Occupational Health and Safety performance using lagging indicators before and after the adoption of the Occupational Health and Safety

Management System. This research design was selected because it gave room for in-depth description of the topic of the study, it is also cost efficient in terms of time and budget for the researcher.

3.3 Sampling and Sample Size

The objective populace involved the whole arrangement of qualified components in light of picked models. (Creswell, 2009). In this review, the populace contained all workers from Earthwave Development Organization from every one of the divisions. As refered to by Lawrence (2006) , the base example size ought to be no less than 10% of the entire populace to diminish inspecting mistakes and guarantee fair portrayal, 85 specialists were chosen as an example size out of 109 laborers who work at the organization. A separated irregular examining approach and purposive testing were utilized to choose respondents for the review at the association. In delineated examining the populace was separated into little gatherings called layers from every one of the divisions at the association and tests was arbitrarily chosen from every layer and afterward purposive testing was utilized to subjects which have the truly necessary data for the exploration (Kothari, 2011). Purposive examining was utilized to research workers who were with the association when being ensured in word related wellbeing and the board frameworks, subjects who have been with the association over the most recent 5 years and the people who are perceptive of the current SHEQ exhibitions and status of the association which incorporated the HR division and the SHEQ division. The exploration utilized the blended testing techniques approach on Table 3.1 to guarantee applicable information is accumulated per layer.

Table 3.1: Sample size and selection method

Population		**Sample**	
Strata	**Size**	**Size**	**Selection Method**
Brick Layers	50	42	Stratified random sampling and convenience sampling.
Painters	15	12	Stratified random sampling and convenience sampling.
Machinery Workshop	3	2	Purposive Sampling.

Supervisors			
SHEQ Officer	1	1	Purposive Sampling.
Human Resource Officer	1	1	Purposive Sampling
Directors	3	1	Convenience and Purposive sampling
Carpenters	10	7	Convenience and Purposive sampling
Electricians	8	6	Purposive sampling
Machinery Operators/Drivers	6	4	Convenience and Purposive sampling
Tilers	12	9	Convenience and Purposive sampling
Total	**N=109**	**n=85**	

The total number of company employees is 109 and the sample size is 85 which is determined using Cochran's formula. Considering that the study population is small to ensure accurate findings from the study a 95% confidence level interval was used which is conducive to the duration and available resources for the research. See the formula and calculations in Appendix 1.

3.4 Data collection

Information was gathered utilizing both essential and auxiliary information sources. For essential information, self-managed polls were utilized though optional information was gathered through the SHEQ execution information kept somewhat recently in the SHEQ office.

3.5.1 Questionnaires

The questionnaire was comprised of closed and open-ended questions. The questionnaire was designed in such a way that it spoke to all the participants in the study .The questionnaire responses were arranged question-by-question for data presentation. Respondents filled questionnaires by themselves to ensure confidentiality. Responses for closed questions are

standardized, and this helps in response interpretation. The questionnaire includes gathering information pertaining to demographic factors, cause of workplace accidents and the of the existing controls in managing workplace accidents. Refer to Appendix 2 for the questionnaire.

3.5.2 Secondary Data

Existing Occupational Health and Safety lagging and leading indicator statistics were collected from the Safety Health and Environmental Management department and it was further analyzed so as to verify the Occupational Health and Safety performance before and after the adoption of the Occupational Health and Safety Management System.

3.6 Statistical Analysis

Data from the questionnaire was sorted, coded, and entered into the Statistical Package for Social Sciences (SPSS), version 23.0 (SPSS, Chicago, IL, USA), where it was analyzed using descriptive statistical methods, percentages and graphs.

3.7 Ethics

A credible research study requires attention to ethics. Several ethical principles were observed throughout the research from Chapter 1 to Chapter 5. This research provides accurate information on data, methods, and other factors without fabricating or falsifying any of them. Rules of consent were abided by and private information was not disclosed without the subjects' permission. Before capturing information on the questionnaire, everything was explained and consent was asked for. This research was carefully reviewed by colleagues and proof read for flaws to prevent casual mistakes and neglect. Additionally, the research was meticulously documented. All contributions to the research are acknowledged by the researcher. He makes a good-faith effort to prevent plagiarism by properly citing. The research was conducted following these ethical considerations.

CHAPTER FOUR: RESULTS

4.1 Demographic Characteristics of research participants

In this survey, the males were the major respondents contributing to 90.60% of the participants as the construction industry is a male-dominated industry. Data was collected from all the departments at the organization and the bricklayers were the most dominant group which contributed 49.40% followed by painters who contributed 14.10%, tilers at 10.60%, carpenters at 8.20%, electricians at 7.10%, drivers 4.7% and lastly but not least the human resource officer, SHEQ officer, and the director contributed to 1.20% each respectively. 48.20 % of the participants had a work experience between 11-20 years followed by 25.90% who had 21-30 years of experience, and those who had 0-10 years of work experience contributed to 15.30%. Find the demographic characteristics in table 4.1.

Table4.1: Demographic Characteristics

Demographic Variable	**Category**	**n=85**	**%=100**
Sex	Male	77	90.6
	Female	8	9.4
Profession	Brick Layers	42	49.4
	Painters	12	14.1
	Machinery Workshop Supervisors	2	2.4
	SHEQ Officer	1	1.2
	Human Resource Officer	1	1.2
	Directors	1	1.2
	Carpenters	7	8.2
	Electricians	6	7.1
	Machinery Operators/Drivers	4	4.7

	Tilers	9	10.6
Work Experience	0-10 years	13	15.3
	11-20 years	41	48.2
	21-30 years	22	25.9
	31 and above	9	10.6

4.2 Causes of workplace accidents at the Earthwave Construction Company in Zimbabwe.

All the participants indicated that unsafe working conditions are the leading cause of accidents at Earthwave Construction Company. Human behavior is the second leading cause of construction accidents with 94.10% agreeing and 5.90% disagreeing that human behavior does not cause accidents. 92.90% of the participants further stated that workers not wearing PPE, 91.80% workplace safety regulations, policies and procedures not followed, electrocutions and power tools contributed to 62.40%, and absence or lack of weekly safety meetings also contributed to 70.60% of accident causation. 10.60% of the participants stated that trenching and excavations are the least cause of accidents. Table 4.2 below shows the participant's responses to the causes of workplace accidents.

Practice Variable	***Participant Response***		
		N	***%***
Human Behavior	Yes	80	94.1
	No	5	5.9
Worker not wearing personal protective equipment	Yes	79	92.9
	No	4	4.7
	I don't know	2	2.4
Physical fatigue causes accidents.	Yes	41	48.2
	No	37	43.5
	I don't know	7	8.2
Absence or lack of weekly safety meetings	Yes	60	70.6

	No	20	23.5
	I don't know	5	5.9
Safety items not available at site	Yes	52	61.2
	No	26	30.6
	I don't know	7	8.2
Workers working whilst suffering from health conditions.	Yes	20	23.5
	No	54	63.5
	I don't know	11	12.9
Lack of supervision and control on workers' adherence of wearing adequate PPE.	Yes	44	51.8
	No	35	41.2
	I don't know	6	7.0
Workplace safety regulations, policies, and procedures not followed.	Yes	78	91.8
	No	7	8.20
Unsafe working conditions	Yes	85	100
Improper scaffolding	Yes	23	27.1
	No	38	44.7
	I don't know	24	28.2
Electrocutions and power tools	Yes	53	62.4
	No	28	32.9
	I don't know	4	4.7
Trenching and excavations.	Yes	9	10.6
	No	66	77.6
	I don't know	10	11.8

4.2.1 Descriptive Statistics for Causes of workplace accidents

The conducted descriptive statistics to ascertain the causes of workplace mean responses ranged from 1.00-2.14. The respondents agreed that all the stated causes led to accidents occurring at Earthwave Construction Company with an overall mean of 1.44. An average standard deviation of 0.51 shows a small variation in the responses given in the research instrument. Table 4.3 below shows the descriptive statistics.

Table 1.3: Descriptive statistics for the causes of accidents

Descriptive Statistics

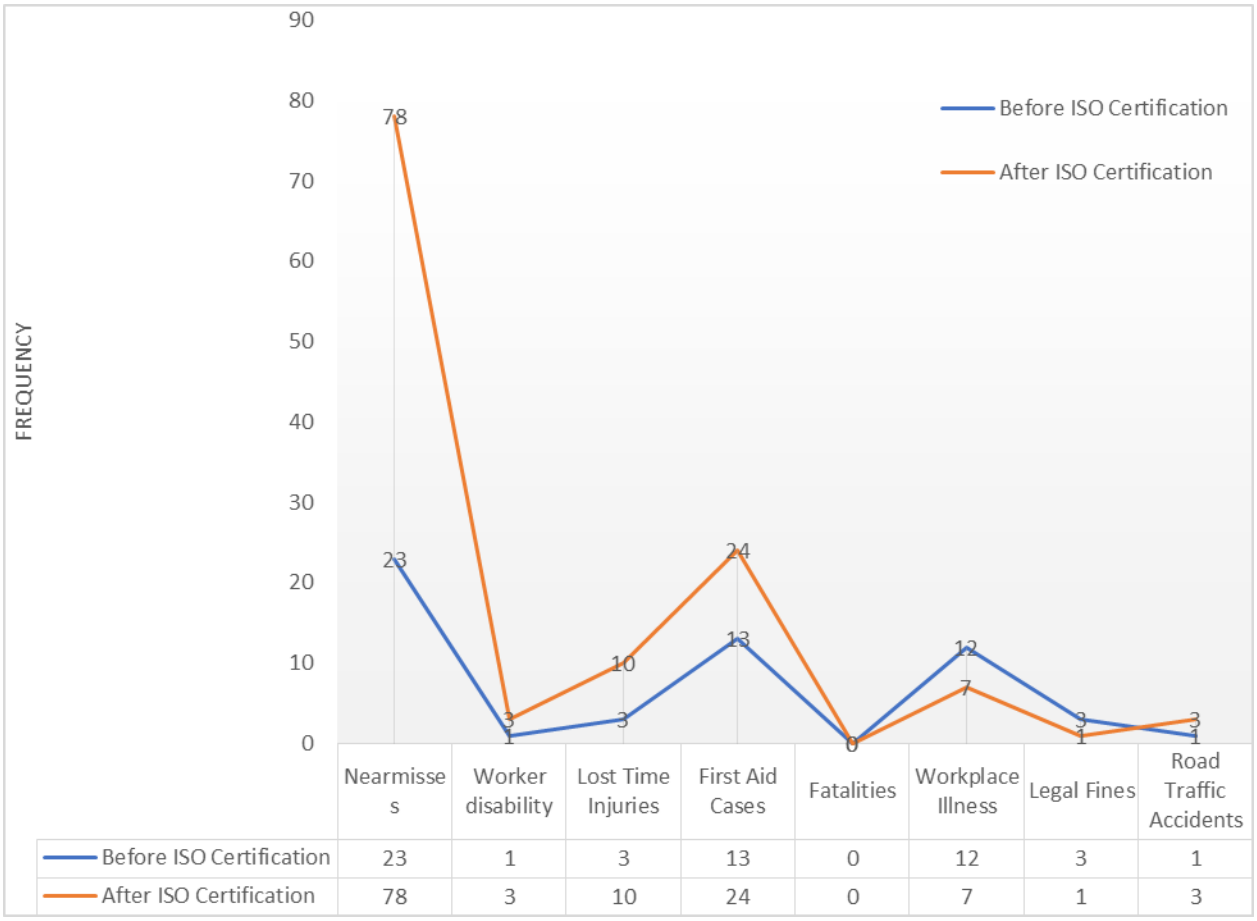
	N	Mean	Std. Deviation
Factors particular to individual(Human Behavior)	85	1.06	.237
Conditions of site	85	1.29	.531
Falling Hazards	85	1.07	.258
Unsafe Working Environment	85	1.00	.000
Hit by Tools, Equipment and falling	85	1.20	.507
Trenching and Excavation Hazards	85	2.01	.475
Scaffolding Accidents	85	2.01	.748
Motor Vehicle Accidents	85	1.74	.742
Stepladder Misuse	85	1.09	.332
Electrocutions and Power Tool Accidents	85	1.42	.585
Slips and Trips	85	1.24	.610
Improper design	85	2.14	.726
Unspecified suitable safety procedures	85	1.41	.583
Not adhering to safety regulations	85	1.08	.277
Lack of appreciation after the completion of the job	85	1.62	.672
No supervision to see if people are wearing provided safety items	85	1.55	.627

The worker was suffering from health problems	85	1.89	.598
Unavailability of safety items on site	85	1.47	.647
Absence or lack of weekly safety meetings	85	1.35	.592
Worker not wearing personal protective equipment.	85	1.09	.366
Physical fatigue caused the accident	85	1.60	.640
Valid N (list wise)	85		

4.3 Occupational Health and Safety performance at Earthwave Construction using lagging indicators before and after the adoption of the Occupational Health and Safety Management System(OHSMS).

Statistics of the lagging indicators collected to verify the Occupational Health and Safety (OHS) performance before and after the adoption of the Occupational Health and Safety Management System indicated the following. From the statistics the number of reported near misses increased from 23 to 78, the number of worker disabilities increased from 1 to 3, lost time injuries increased from 3 to 10, first aid cases from 13 to 24 and road traffic accidents increased from 1 to 3. However, the number of legal fines reduced from 3 to 1 whereas the number of workplace illness decreased from 12 to 7. Figure 4.1 below shows the graph showing lagging indicators before and after adoption of the Occupational Health Safety Management System (OHSMS).

12 to 7. Figure 4.1 below shows the graph showing lagging indicators before and after adoption of the Occupational Health Safety Management System (OHSMS).



	Nearmisses	Worker disability	Lost Time Injuries	First Aid Cases	Fatalities	Workplace Illness	Legal Fines	Road Traffic Accidents
Before ISO Certification	23	1	3	13	0	12	3	1
After ISO Certification	78	3	10	24	0	7	1	3

Fig 4.1: Graph showing lagging indicators before and after adoption of Occupational Health and Safety Management System

4.4 Current controls for reducing workplace incidents and accidents at Earthwave Construction Company in Zimbabwe.

Data collected on the current controls for reducing workplace incidents and accidents at Earthwave Construction had 64.70% of the participants strongly disagreeing that all the employees are subjected to health surveillance regularly in the workplace.51.80% disagreeing that the number and quality of PPE are adequate in our workplace, 58.80 % disagree that accidents involving personal injuries or material/equipment damage are investigated in workplace. Positively it was also found that 67.10% agreed that all the employees are trained and informed about the dangers and risks in the workplace and 60.00% of the participants agreed that all the employees are informed about instructions and codes related to occupational safety. Table 4.4 shows the participants responses to controls for reducing workplace incidents and accidents

.

Table 4.4: Responses to controls for reducing workplace incidents and accidents

Practice Variable	***Participant Response***		
		N	***%***
Adequate PPE is available in the sufficient quantities and quality in our workplace.	Strongly Agree	1	1.2
	Agree	13	15.3
	Disagree	44	51.8
	Strongly Disagree	24	28.2
Assembly points and emergency exits are designated in our workplace	Strongly Agree	7	8.2
	Agree	29	34.1
	Disagree	38	44.7
	Strongly Disagree	11	12.9
Emergency situations are communicated to all employees beforehand	Agree	38	44.7
	Disagree	32	37.6
	Strongly Disagree	15	17.6
First-aid and medical equipment are in designated places in our	Strongly Agree	2	2.4
	Agree	44	51.8

workplace.	Disagree	34	40.0
	Strongly Disagree	5	5.9
All the employees undergo periodic medical surveillance in our workplace.	Agree	3	3.5
	Disagree	27	31.8
	Strongly Disagree	55	64.7
All the employees are subjected to safety inductions that highlights dangers and risks in the workplace.	Strongly Agree	15	17.6
	Agree	57	67.1
	Disagree	13	15.3
Instructions and codes related to occupational safety are given to all employees.	Strongly Agree	13	15.3
	Agree	51	60.0
	Disagree	20	23.5
	Strongly Disagree	1	1.2
There is a monitored Occupational Health and Safety suggestion box in our workplace.	Agree	11	12.9
	Disagree	50	58.8
	Strongly Disagree	24	28.2
There is selection of OHS boards and committees in our workplace.	Agree	8	9.4
	Disagree	55	64.7
	Strongly Disagree	22	25.9
There is investigation of personal injuries or material/equipment damage in our workplace.	Agree	32	37.6
	Disagree	50	58.8
	Strongly Disagree	3	3.5
There is regular monitoring of OHS precautions in our workplace	Strongly Agree	2	2.4
	Agree	33	38.8
	Disagree	40	47.1
	Strongly Disagree	10	11.8
There is periodic review of dangers and risks, to ensure a robust OHS department.	Agree	17	20.0
	Disagree	47	55.3
	Strongly Disagree	21	24.7

CHAPTER FIVE: DISCUSSION

5.1 Causes of workplace accidents at the Earthwave Construction Company in Zimbabwe.

From the concentrate every one of the members declared that perilous circumstances were the main source of the work environment mishaps. This was trailed by human way of behaving which incorporate perilous demonstrations which added to 94.21%. Besides, laborer not wearing PPE contributed 92.9% of the causes and not following work environment security guideline, arrangements and methods added to 91.8%. This is reliable with the finding of a review which was directed by Majid and Singh, (2008) in Malaysia which expressed that laborers carelessness, inability to notice work methodology unfortunate administration and inability to utilize individual defensive gear. From this study minimal reasons for mishaps were ill-advised platform, laborers working while experiencing medical issue and digging and unearthings with added to 27.1%, 23.5% and 10.6 % individually. Notwithstanding, these discoveries are conflicting with the review lead by Chong and Siang (2014) who found that mishap in Malaysia development works are noticeably brought about by stepping on, striking against or struck by object, falls, in the middle among items and overexertion or exhausting developments. In one more concentrate by Lubega et al, (2000), the reasons for mishap in Uganda Development works are absence of familiarity with wellbeing guidelines, absence of requirement of security guidelines, unfortunate respect for wellbeing by individuals associated with development projects, drawing in awkward faculty, physical and close to home pressure. Electric shocks and power instruments added to 62.4% of the reasons for mishaps which is fundamentally higher than the 38% which was found from the investigation of (Enshassi and Mohammaden, 2012).

5.2 Occupational Health and Safety performance at Earthwave Construction using lagging indicators before and after the adoption of the Occupational Health and Safety Management System.

Eight incidental results were assessed as execution markers when the organization reception to the ISO the executives framework. The discoveries represent that there was a radical expansion in the quantity of trailing results after the organization was ensured. The extraordinary expansion in the quantity of reactive results shows that there is a viable system for revealing mishaps and episodes at work. The expansion in the quantity of close to misses can be upheld by the way that the organization has a wellbeing society of keeping mishaps from happening through researching and proffering restorative activity to every one of the recognized close to misses consequently expanding the recurrence. The quantity of lawful fines is diminished as the association can distinguish every one of the legitimate commitments that are appropriate to its activities. Likewise, vital to note is the decrease in the quantity of sicknesses. From this review, it tends to be broadcasted that the quantity of ailments can be diminished when an association executes OHSMS.

5.3 Controls for reducing workplace incidents and accidents at Earthwave Construction Company in Zimbabwe.

The procedure and methods used for accident investigation are inadequate, and the reports mistakenly identified direct and contributing reasons rather than root causes, according to an examination of the causes of construction accidents. The results indicate that, as part of a health, safety, and environmental management system, behavioral health and safety treatments or corrective action based on direct or contributing reasons will not always avoid accidents. Instead, they could lessen but not eliminate accidents. Corrective action may be conducted if it is based on direct, indirect, or contributing reasons rather than the underlying core problem (Nakhlawy, 2010). Although this corrective step would have contributed in some little way to the avoidance of the accident happening again, it does not address the underlying fundamental cause of the disaster, making it more likely to happen again. Investigations into accidents frequently center on the worker as the accident's main contributor. According to Whittington et al. (1992), focusing on individual failures led to a dependence on temporary fixes rather than identifying deeper organizational or managerial issues. As much as worker negligence played a role in the accident, there were other contributing factors as well. This included management failure to rotate teams

on physically demanding tasks, a lack of supervision, health and safety awareness, and culture within the organization. These accidents will keep happening if the underlying primary reasons are not addressed. All fundamental causes must be looked at since the goal of any accident inquiry should be to stop a repeat of the disaster (Lee, 2009).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

From the study it can be concluded that unsafe working conditions is the leading cause of workplace accidents. At the organization employees are exposed to poorly maintained equipment, poor lighting, working in hazardous areas and working overtime etc. Furthermore, human behavior significantly contributes as a cause of accidents and this is brought by unsafe acts which include operating machinery without authority, failure to comply to safety procedures, use of improper methods. It was also seen that employees not wearing PPE contributes to accidents occurring at Earthwave Construction Company.

Since the implementation and maintenance of the Occupational Health and Safety Management System (OHSMS) at the Construction Company there has been an increase in the number of workplace incidents. The increase in the number of workplace incidents is brought about by the existence of procedure which advocates for reporting and investigation all workplace incidents and accidents.

It was found that not all the employees are subjected to health surveillances at the organization, number and quality of PPE is inadequate for all the employees and not all occupation health and safety incident are reported and investigated leaving the system with a gap thus similar types of accidents will continuously occur. However, the organization dwells more on administrative controls such as trainings and informing employees of the existing hazards in the workplace to reduce accidents.

6.2 Recommendations

- Top management must invest in a safe and health working environment that fully complies with the existing legislation in the country thus reducing the causes and number of accidents.
- Employees need to undergo behavior-based trainings and disciplinary action must be taken to those who practice unsafe behaviors.
- Top management must issue quality and adequate Personal Protective Equipment (PPE) to employees and promoting mandatory use.
- Top management and workers must conduct a gap analysis to identify where the existing Occupational Health Safety Management System (OHSMS) is failing.

- All stakeholders must promote the hierarchy of controls of hazards to reduce workplace accidents.

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APPENDICES

Appendix 1: DEDUCING SAMPLE SIZE

The formula for the sample size: is n = N/1 + N(e)2. (1)

Where: n = sample size to be studied N = population size e = margin of error.

Using the above formula, the sample size for this study is:

n = 109/1 + 109 (0.05) 2

n = 109/1.2725

n = 85.31

n = 85

Using the above formula, the required sample for this study is 85 people

APPENDIX 2: RESEARCH QUESTIONNAIRE

QUESTIONNARE.

My name is Munashe T Chinyowa a student studying B.Sc. in safety, health, and environmental management at Bindura University of Science Education. I am currently assessing the causes of accidents amongst construction employees. A case study of Earthwave Construction Pvt.Kindly, assist by going through this questionnaire and providing the required information. The information provided by the respondents is for academic purposes and your views shall remain confidential and anonymous. Thank you in advance for your co-operation.

INSTRUCTIONS TO PARTICIPANTS

- *Tick on the appropriate answer and fill wherever possible.*
- *Do not write your name on any part of the paper.*

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

i) Gender

Male ☐ Female ☐

ii) Work Experience

0-10years ☐

☐

10-20 years

20-30 years ☐

31 and above ☐

iii) Profession

Brick Layer ☐

Machinery Workshop Supervisor ☐

SHEQ officer ☐

HR officer ☐

Carpenter ☐

Electrician ☐

Machinery Operator ☐

Tiler ☐

Section B: Cause of workplace accidents.

i) Have you ever been involved in an accident before?

Yes ☐ No ☐

ii) If Yes on (i) was the accident preventable?

Yes ☐ No ☐

iii) Do you report all the accidents in that you might be involved or not?

Yes ☐ No ☐

iv) From the table below tick where applicable the causal factors that lead to an accident workplace.

	Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
Factors particular to individual(Human Behaviour)				
Conditions of site				
Falling Hazards				
Poor Working Conditions				
Hit by falling Tools and Equipment a				
Trenching and Excavation Hazards				
Accidents caused by scaffold				
Construction Vehicle Accidents				

Stepladder Misuse				
Electrocutions and Power Tool Accidents				
Slips and Trips				
Improper design				
Appropriate personal safety procedures were not specified				
Not adhering to safety regulations				
Lack of appreciation after the completion of the job				
No safety engineer on the side				
No monitoring of workers adherence to wearing of safety items				
Tasks not being given to competent individuals				
The worker was suffering from health problems				
Unavailability of safety items on site				
Absence or lack of weekly safety meetings				
Worker not wearing personal protective equipment.				
Physical fatigue caused the accident				

SECTION C: Applicability of the Accident Investigation Procedure.

1 Does the company have an accident investigation procedure/process?

Yes ☐ No ☐ Not Aware ☐

2 Has the accident investigation procedure been communicated to you and your other colleagues?

Yes ☐ No ☐

3 Have you been involved in the accident investigation process?

Yes ☐ No ☐

4 If **yes** (iii) how effective is the accident investigation process in identifying causes of accidents?

Yes ☐ No ☐

5 Is the accident investigation process done with the involvement of other employees?

Yes ☐ No ☐

6 Does the accident investigation collect and classify causal factor data?

Yes ☐ No ☐

7 Do the accident investigators have adequate competency to investigate incidents and accidents?

Yes ☐ No ☐

8 Does the accident investigation procedure state the causal analysis, using root cause analysis?

Yes ☐ No ☐

Appendix 3 (Anova Analysis)

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
Individual Factors (Human Behaviour)	Between Groups	.082	3	.027	.479	.698
	Within Groups	4.624	81	.057		
	Total	4.706	84			
Site Conditions	Between Groups	.056	3	.019	.064	.978
	Within Groups	23.591	81	.291		
	Total	23.647	84			
Falling Hazards	Between Groups	.149	3	.050	.739	.532
	Within Groups	5.428	81	.067		
	Total	5.576	84			
Unsafe Working Conditions	Between Groups	.000	3	.000	.	.
	Within Groups	.000	81	.000		
	Total	.000	84			
Struck by Tools, Equipment and falling	Between Groups	2.889	3	.963	4.169	.008
	Within Groups	18.711	81	.231		
	Total	21.600	84			
Trenching and Excavation Hazards	Between Groups	1.404	3	.468	2.156	.100
	Within Groups	17.584	81	.217		
	Total	18.988	84			
Scaffolding Accidents	Between Groups	1.439	3	.480	.853	.469
	Within Groups	45.550	81	.562		
	Total	46.988	84			
Construction Vehicle Accidents	Between Groups	.715	3	.238	.424	.737
	Within Groups	45.591	81	.563		
	Total	46.306	84			
Stepladder Misuse	Between Groups	.260	3	.087	.781	.508
	Within Groups	8.987	81	.111		
	Total	9.247	84			
Electrocutions and Power Tool Accidents	Between Groups	2.054	3	.685	2.078	.110
	Within Groups	26.699	81	.330		

	Total	28.753	84			
Slips and Trips	Between Groups	.546	3	.182	.479	.698
	Within Groups	30.748	81	.380		
	Total	31.294	84			
Improper design	Between Groups	3.385	3	1.128	2.233	.091
	Within Groups	40.921	81	.505		
	Total	44.306	84			
Appropriate personal safety procedures were not specified	Between Groups	.803	3	.268	.780	.509
	Within Groups	27.786	81	.343		
	Total	28.588	84			
Safety regulations were not followed	Between Groups	.325	3	.108	1.440	.237
	Within Groups	6.098	81	.075		
	Total	6.424	84			
Lack of appreciation after the completion of the job	Between Groups	1.482	3	.494	1.097	.355
	Within Groups	36.471	81	.450		
	Total	37.953	84			
Lack of supervision and control on worker's adherence to wearing safety items	Between Groups	.635	3	.212	.530	.663
	Within Groups	32.376	81	.400		
	Total	33.012	84			
The worker was suffering from health problems	Between Groups	.283	3	.094	.257	.856
	Within Groups	29.764	81	.367		
	Total	30.047	84			
Safety items were not available at the site	Between Groups	.769	3	.256	.604	.614
	Within Groups	34.407	81	.425		
	Total	35.176	84			
Absence or lack of weekly safety meetings	Between Groups	2.103	3	.701	2.079	.109
	Within Groups	27.309	81	.337		
	Total	29.412	84			
Worker not wearing personal protective equipment.	Between Groups	1.742	3	.581	4.947	.003
	Within Groups	9.506	81	.117		
	Total	11.247	84			
Physical fatigue caused the accident	Between Groups	2.078	3	.693	1.736	.166
	Within Groups	32.322	81	.399		
	Total	34.400	84			

Appendix 4 Correlation Analysis.

Correlations

		Do you report all the accidents in that you might be involved or not	Accidents involving personal injuries or material/equipment damage are investigated in our workplace.
Do you report all the accidents in that you might be involved or not	Pearson Correlation	1	.215*
	Sig. (2-tailed)		.048
	N	85	85
Accidents involving personal injuries or material/equipment damage are investigated in our workplace.	Pearson Correlation	.215*	1
	Sig. (2-tailed)	.048	
	N	85	85

*. Correlation is significant at the 0.05 level (2-tailed).