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Health and Safety Management Compliance in Construction Sites in Nairobi County, Kenya

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Abstract - Construction sites are generally hazardous work environments, to the public, workers on site and even to the environment. This is owed to precarious activities (at heights), the improper use and inconsistent maintenance of tools and equipment, perilous materials/chemicals that could result in injury and ailment to stakeholders. Further, vibrations, dust, effluent and sound emitted from activities on site could disturb the balance of the ecology around or manifest as a nuisance to the immediate communities. However, report has shown an increase in incidents related to health hazards in construction sites. The main objective of the study was assessment of health and safety management compliance in construction sites in Kenya. A case study of construction projects in Nairobi County. The study was guided by specific objectives which were to find out the factors influencing implementation of health and safety management on construction sites in Nairobi County and to establish the kinds and causes of accidents, injuries and ill health on construction sites in Nairobi County. The literature of the study was based on accident cessation theory, and stakeholders' theory and Herzberg's two factors Theory. A descriptive survey research design was applied for this study. The target population was all construction stakeholders clustered into skilled and unskilled labour, site supervisors and site managers. The study targeted at least 150 respondents. Data was obtained through review of relevant project documents, structured questionnaires and physical site observations. The data was analysed using descriptive statistics with the aid of Statistical Package for Social Sciences (SPSS). Factor analysis was also employed to analyse the patterns in the data. These results show that all the variables had a significant explanation power on health and safety in the workplace. All the variables explained up to 69%. The findings revealed that that falling objects , dust, broken glasses, collapse of earthworks, toxic and suffocation , fire and explosion and lack of safety wear have a positive relationship with occupation health safety OHS management both in the correlation and regression analysis results.

Key words: Causes of Accidents and Injuries, Compliance with Health and Safety requirements, Health and Safety Management.

1.0 INTRODUCTION

In many countries in the world, the construction industry plays a big role for development process which contributes towards the economic growth that generating additional demands for construction activities. The construction industry is among the top industries of any nation that contribute greatly to the survival and sustenance of economic and infrastructural development. The rapid development of construction activities derives from the economic development of any nation (Tanko *et al.,* 2020). Eze *et al.,* (2017) described the industry as the economic prime mover and the bedrock of the survival of economies. Despite the immense importance of the industry in bringing about rapid growth and development, its activities have been confirmed to contribute to a very high level of accidents and fatality relative to other industries (Chen *et al.,* 2020). Mwangi (2016) noted that the construction industry has a disproportionately high percentage of injuries and fatalities, accounting for almost 20% of the fatalities of all industrial workers but employing only 6-8% of the industrial work force. It is important to acknowledge the fact that the construction industry accounts for nearly 15 % of the workers compensation injuries.

Globally, occupational injuries, illness and even deaths are serious public health concerns. Everyone must work to earn a living. All of us must also work for economic development of our countries. This means that people spend most of their lifetimes working and in their work places, some five and others six days in a week. The work environment is therefore very important as it is the commonest setting in which occupational injuries, illness and even deaths occur. Yet, studies have shown that more than 90% of these injuries are preventable by the adoption of safety measures, appropriate and consistent use of PPE (Chepkener, 2013). In Malaysia, the Department of Occupational Safety and Health (DOSH, 2017) revealed that the highest number of occupational accidents by sector in 2017 is in construction industry, with 15 deaths from out of 70 (as in May 2017).

Adeogun and Okafor (2013) observed that in many African countries organizations should implement Organization Health and Safety (OHS) practices geared towards increasing the level of organizational commitment and motivation through reduced incidence at workplaces. In Africa and Nigeria in particular, the construction industry is listed as one of the fastest growing industry due to demand in real estate, housing and the provision of infrastructure in support of a growing population. (Manduku and Munjuri, 2017). A research report by Bank Audi Sal of Egypt released in 2016 on Egypt economic report, has indicated that construction sector

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accounted for 4-8% of GDP in the year 2015 while expanding by 9.7% from 7.4% in the previous financial year (Bailey & Soyoung, 2009).

The state of OHS in Kenya, more so the construction industry, suffers the same fate as that of Nigeria. Buildings under construction have continued to collapse injuring and killing workers. Workers continue to suffer injuries and occupational diseases associated with exposure to a hazardous work environment, unawareness of health and safety regulations and unavailability of personal protective equipment. The menace has caused psychological trauma to victims and families as well as loss of earnings. Many workers have lost lives due to incidents in construction sites and some permanently crippled. Despite the steady growth in the construction sector in Kenya, the industry is accident prone (Nzuve, 2007). Kabubo (2014) in his study found out that Kenya still experiences a large number of fatalities (about 64 deaths per 100,000 construction workers per year). About 32% of all construction site accidents are as a result of falling from elevated levels and being hit by debris (Manduku and Munjuri, 2017).

A study by Kirombo (2012) revealed that, OSH compliance of the construction sites is an issue that ought to involve different types of stakeholders. These stakeholders include: Engineers, Architects, safety officers, contractors, drivers, and the government agencies. The Kenya Association of Building and Civil Engineering Contractors which is a body bringing together registered member building contractors should make the cue for its members to embrace health and safety matters by providing the relevant training and induction programs. Members could also be encouraged to seek ISO certification such as OHSAS – 18001, which is an Occupational Health and Safety Assessment series for health and management systems intended to help organizations control occupational health and safety risks in the work place. Another is ISO 9001:2008 Standard, which is a 3rd Party Certification on Quality Assurance through effective policies, practices and procedures and bench marking with best practice elsewhere. Making the 3rd Party Certification mandatory for registration as a contractor will give a positive boost to implementation of occupational safety and health in the construction industry (Kirombo, 2012).
Construction sites are generally hazardous work environments; to the public, workers on site and even to the environment. This is owed to precarious activities (at heights), the improper use and inconsistent maintenance of tools and equipment, perilous materials/chemicals that could result in injury and ailment to stakeholders. Further, vibrations, dust, effluent and sound emitted from activities on site could disturb the balance of the ecology around or manifest as a nuisance to the immediate communities. Consequently, the legal framework i.e. OSHA act, The Building Code and the provisions of the Environmental Management and Coordination Act prescribe certain precautions that could be applied to mitigate such hazards. However, report have shown an increase in incidents related to health hazards in construction sites. There is need to conduct a research to establish the level of health and safety management in construction sites in a Kenya so find out what are the key challenges and give recommendations for possible solutions.
The aim of this study was to assess the level of health and safety management compliance in construction sites in Kenya with a case study of selected construction projects in Nairobi County. Specifically, the study was guided by the following two specific objectives;

1. To find out the factors influencing implementation of health and safety management on construction sites in Nairobi County
2. To establish the kinds and causes of accidents, injuries and ill health on construction sites in Nairobi County

2.0 LITERATURE REVIEW

This study was guided by the Accident Cessation Theory, and stakeholders' theory.
The Accident Cessation Theory (ACT) was advanced by Herbert William Heinrich, a safety engineer and pioneer in the field of industrial accident safety, in 1932 (McKinnon, 2007). According to Heinrich, an "accident" is one factor in a sequence that may lead to an injury. The factors can be visualized as a series of dominoes standing on edge; when one falls, the linkage required for a chain reaction is completed. Each of the factors is dependent on the preceding factor.
The stakeholder theory research was proposed by Freeman, (1994). Freeman, (1994), opined that management of business with moral concerns demonstrates organization's culture in the running of the firms. It shows the involvement of specific matters and clusters influencing tasks on making decisions. Stakeholder theory thus reports ways the organization's micro and macro factors relating and the significant consequences of the organization's tasks carried out. It sought to optimize relations with stakeholders thereby improving efficiencies throughout the project and can also lead a business to a more engaged workforce. The theory assumes that people's involvement in projects work helps to achieve projects goals that fulfil the desires of the affected community. In brief, the stakeholders' theory recommends that it is vital that each organisation give significant consideration to everyone who is affected by organisational policies or decisions.

The construction industry is more sensitive than other industries as a result of its uniqueness and significant complexities. Moreover, construction sites are considered to be dynamic and volatile (Alshemimry, 2016). If HS in construction sites are not under control, this will lead to unmanaged adverse conditions that may cause extreme injuries and potentially death (Lingard, 2013). Insufficient protection, the collapse of scaffolding and incorrect utilization of tools are all considered potential hazards. Also, accidents involving falling are the most frequent. This often occurs when the worker slips or steps backwards onto an unprotected open-sided slab while concentrating on his/her job. The absence of personal protection equipment (PPE) and uncovered holes is considered unsafe construction conditions. These conditions violate workplace safety standards. Moreover, falling from ladders is often caused by

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imbalance, cluttered surroundings and the excessive weight of the worker (Jha, 2011). Workers are expected to work at great heights with heavy machinery and mostly with dangerous building materials.

The major causes of accidents such as falling from a height, being hit by a moving vehicle, and falling objects are: (1) inappropriate methods used to move materials; (2) insufficient instructions and training by management given to workers; (3) absence of cooperation among workers; (4) absence of housekeeping standards; (5) management failure in securing safety measures at heights; (6) inadequate project planning that leads to insufficient materials storage; (7) improper provision of instructions regarding working at heights; (8) lack of caution signs; (9) absence of planning and supervision; and (10) absence of barriers (Essays, UK, 2013).
On a construction site, workers are commonly expected to work at great heights. Scaffolding should be stable and safe. Qualified inspectors should regularly inspect scaffolding to see that it is stable and safe and ensure that scaffolding is securely installed.

The main hazards associated with working at height are people and objects falling onto people below. Falls from height have been viewed as the one of the most frequent killers of the workers on construction sites. Statistics indicate that nearly 1,000 construction workers are killed each year at their work places. Of these, one-third or over 300 deaths are a result of construction site falls (ILO, 2005). The study from different countries for example, New Zealand, indicates that, falls from heights are the leading cause of occupational injuries on construction sites (Bentley et al., 2006). In China‟s construction industry, falls account for approximately 51% of injuries (Yung, 2009). In Hong Kong, work-related falls from heights represented more than 47% of all fatal incidents (Chan et al., 2008). Chi and Wu (1997) reported that more than 30% of fatalities in Taiwan can be attributed to falls. As a result, falls are the most costly occupational hazard in many countries. Common construction site falls include roof-related falls, crane falls, scaffolding falls, elevator shaft falls, falls resulting from holes in flooring, and falling objects.
Dust is a common hazard on roads and building works at many sites. The health risks associated with a dusty jobs depend on the type of dust (physical, chemical and mineralogical), which will determine its toxicological properties, and hence the resulting health effect; and the exposure, which determines the dose. If dust is released into the atmosphere, there is a good chance that someone will be exposed to it and inhale it. If the dust is harmful, there is a chance that someone will suffer an adverse health effect, which may range from some minor impairment to irreversible disease and even life-threatening conditions (Huges and Ferrett, 2011).

Construction activities are unique since they occur in different applications based on the type of construction project. Nonetheless, recent studies have revealed that the majority of construction accidents can be narrowed down to three major sources: (1) failure to identify unsafe conditions before or after work starts; (2) performing construction activities even though conditions may be unsafe; (3) Not following or ignoring safety rules (Baumgartner, 2017). Scaffolding is a type of construction equipment used frequently on site. However, this equipment contributes too many fatal/non-fatal injuries. There are several reasons behind these incidences, such as weak planking, weak joint attachments which lead to collapse, proximity to power lines that leads to electric shock, changes in environmental conditions such as very high temperatures and extreme winds and finally, the absence of fall protection equipment (Chopra and Nocerino, 2018).

3.0 METHODOLOGY

The research was conducted in various construction sites in Nairobi Kenya. Construction workers involved in road construction projects, buildings, water supply and waste water works were targeted. A descriptive survey research design was used in the study where information was obtained from a sample of people or entities who respond to a series of questions. This research design was selected because it gives an accurate account of the characteristics, abilities, opinions and attitudes of a particular group. The target population was various construction stakeholders clustered into skilled and unskilled labour, site supervisors and site managers. The construction sites were identified from the registered companies underrating projects in Nairobi. According to NCA and Nairobi City County, companies under NCA1-2 have about 50 ongoing projects within Nairobi. This was the target population for the research.
The researcher used the purposive type of sampling to select the respondents based on their involvement in construction activities. The purposive type of sampling is adequate where the target population is heterogeneous hence making it difficult for the researcher to be specific (Kothari, 2013). Hence through purposive sampling the researcher targeted specifically workers involved in concreting and installation of reinforcement steel bars at the construction sites. The study targeted at least 150 respondents, 50 from each of the three clusters.
Data was obtained through review of relevant project documents, structured questionnaires and physical site observations. A structured research questionnaire was developed based on the specified objectives of the study.
Reliability test used is the Cronbach's coefficient alpha. In particular Cronbach reliability value of 0.7 was considered adequate. Pilot study for this study was conducted for 10% of the sample. This value was determined to be 10% of 150 individuals =15 individuals. Construct and content validity was tested for the research tool.
Data was analysed using descriptive statistics and presented using statistical tools such as mean as a measure of central tendency, frequencies and percentages, since they are very useful for showing and summarizing data when any complex models are needed. Statistical Package for Social Sciences (SPSS) version 20.0 package aided the descriptive analysis.
The Regression Model below was used to estimate the relationship between the dependent and independent variables.

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \text{.....(equation 1.)}$$

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4.0 FINDINGS OF THE STUDY

4.1 Response Rate

Table 1 presents the results on the response rate of the respondents. The results show that out of 130 questioners were recovered from respondents representing 86.67%. The results also show that 20 of the questionnaire were never returned representing 13.33%.

Table 1. Response Rate

Response rate	Frequency	Percentage
Responded	130	86.67
Did not Respond	20	13.33
Total	150	100

4.2 Results on Factors Influencing Implementation of Health and Safety and Causes Causes of Accidents in Constructions projects.

Table 2, presents the results on the factors influencing implementation of health and safety measure In Constructions Site. To get information on the first independent variable, several statements regarding factors influencing implementation of health and safety measure in constructions site were asked and the respondents required providing feedback in likert scale of 1 to 5. 1= being Strongly disagree, 25 being Disagree, 35 being Moderately agree, 4 being Agree = 3, 5= being Strongly Agree=5. The results show that, "The management supports implementation of health and safety measures in the organization" (mean=4.1846 and Standard Deviation = 0.95467). "Workers are trained on health and safety measures in the organization" (mean 4.0692 and Standard Deviation = 1.00532). "There is a budget for health and safety support in the company" (mean 3.5154 and Standard Deviation = 1.47976). "The firm invests in safety inspections and safety meetings" (mean 4.1846 and Standard Deviation =.89603). "The firm invests safety promotion in the workplace by the printing of pamphlets and posters, Production of safety advertising boards and banners" (4.1923 and Standard Deviation = 1.07181). "Safety requirements by the governing bodies have made the company comply to health and safety measures" (mean 4.2538 and Standard Deviation = 0.88319. "Recklessness has caused increase in injuries" (mean 4.1154 and Standard Deviation = 1.09002) and "Some injuries are due to the nature of the site" (mean= 4.2231 and Standard Deviation = 0.85604). These results show that on average the response rate was above the sect threshold mean value of 3 which implies that the majority of the respondents were in agreement on the various contracts.

Table 2. Factors Influencing Implementation of Health And Safety Measure In Constructions Site

Statement		SD	D	MA	A	SA	Mean	Std
The management supports implementation of health and safety measures in the organization	Frequency	2	9	10	51	58	4.1846	0.95467
	Percent	1.5	6.9	7.7	39.2	44.6		
Workers are trained on health and safety measures in the organization	Frequency	4	7	16	52	51	4.0692	1.00532
	Percent	3.1	5.4	12.3	40	39.2		
There is a budget for health and safety support in the company	Frequency	24	10	14	39	43	3.5154	1.47976
	Percent	18.5	7.7	10.8	30	33.1		
The firm invests in safety inspections and safety meetings	Frequency	1	7	15	51	56	4.1846	0.89603
	Percent	0.8	5.4	11.5	39.2	43.1		
The firm invests safety promotion in the workplace by the printing of pamphlets and posters, production of safety advertising boards and banners	Frequency	5	9	7	44	65	4.1923	1.07181
	Percent	3.8	6.9	5.4	33.8	50		
Safety requirements by the governing bodies have made the company comply to health and safety measures	Frequency	3	1	17	48	61	4.2538	0.88319
	Percent	2.3	0.8	13.1	36.9	46.9		
Recklessness has caused increase in injuries	Frequency	5	9	13	42	61	4.1154	1.09002
	Percent	3.8	6.9	10	32.3	46.9		
Some injuries are due to the nature of the site	Frequency	2	1	21	48	58	4.2231	0.85604
	Percent	1.5	0.8	16.2	36.9	44.6		

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Table 3, presents the results on the Causes of Accidents, Injuries and ill Health. The results were measured with a Likert scale of: Very Frequent = VF, Frequent =F, Moderate =MF, Rarely happen = R, and Never = N
To get information on the first independent variable, several statements regarding stakeholder consultation were asked and the respondents required providing feedback in likert scale of 1 to 5. Very frequent being = 5, frequent being =4), Moderate happen being =3, rarely happen being= 2 never happen being =1. The results show that, "Falling objects as a common cause of causes of accidents, injuries and ill health" (mean 4.1308 and standard deviation = 0.95144), "Dust" (mean 4.0231 and standard deviation = 0.99973). "Broken glasses as a common cause of causes of accidents, injuries and ill health" (3.4154 and standard deviation = 1.45626). "Collapse of earthworks as a common cause of causes of accidents, injuries and ill health" (mean 4.0923 and standard deviation = 0.91876). "Toxic and suffocation as a common cause of causes of accidents, injuries and ill health" (mean 4.1231 and standard deviation = 1.09272). "Fire and explosion as a common cause of causes of accidents, injuries and ill health" (mean 4.1769 and standard deviation = 0.91893) and "Lack of safety wear as a common cause of causes of accidents, injuries and ill health" (mean 4.0385 and standard deviation =1.11650). These results show that on average the response rate was above the sect threshold mean value of 3.

Table 3. Causes of Accidents, Injuries and ill Health

Statement	N	R	MF	F	VF	Mean	Std
Falling objects as a common cause of causes of accidents, injuries and ill health	2 1.5	7 5.4	18 13.8	48 36.9	55 42.3	4.1308	0.95144
Dust as a common cause of causes of accidents, injuries and ill health	4 3.1	6 4.6	21 16.2	51 39.2	48 36.9	4.0231	0.99973
Broken glasses as a common cause of causes of accidents, injuries and ill health	24 18.5	11 8.5	20 15.4	37 28.5	38 29.2	3.4154	1.45626
Collapse of earthworks as a common cause of causes of accidents, injuries and ill health	1 0.8	7 5.4	22 16.9	49 37.7	51 39.2	4.0923	0.91876
Toxic and suffocation as a common cause of causes of accidents, injuries and ill health	5 3.8	9 6.9	13 10	41 31.5	62 47.7	4.1231	1.09272
Fire and explosion as a common cause of causes of accidents, injuries and ill health	3 2.3	2 1.5	21 16.2	47 36.2	57 43.8	4.1769	0.91893
Lack of safety wear as a common cause of causes of accidents, injuries and ill health	5 3.8	10 7.7	18 13.8	39 30	58 44.6	4.0385	1.11650

Table 4., presents the results on the Occupation Health Safety OHS Management. To get information on the first independent variable, several statements regarding Occupation Health Safety OHS Management were asked and the respondents required providing feedback in likert scale of 1 to 5. 1 = strongly disagree, 2= disagree, 3= moderately agree, 4= being agree, 5 being strongly agree. The results show that, "Implementation of OHS has reduced number of accidents (mean 4.1692 and standard deviation=1.06486). "Implementation of OHS has reduced fatalities" (mean3.6846 and standard deviation=1.17490. Implementation of OHS has reduced medical cost (mean 4.0385 and standard deviation=1.15741 and "Implementation of OHS has increased effectiveness and efficiency" (mean 4.1462 and standard deviation=1.28263" (mean 3.53 and standard deviation = 1.429). These results show that on average the response rate was above the sect threshold mean value of 3.

Table 4. Occupation Health Safety OHS Management

Statement	SD	D	MA	A	SA	**Mean**	**Std**
Implementation of OHS has reduced number of accidents	3 2.3	12 9.2	10 7.7	40 30.8	65 50	4.1692	1.06486
Implementation of OHS has reduced fatalities	9 6.9	11 8.5	29 22.3	44 33.8	37 28.5	3.6846	1.17490
Implementation of OHS has reduced medical cost	9 6.9	6 4.6	12 9.2	47 36.2	56 43.1	4.0385	1.15741
Implementation of OHS has increased effectiveness and efficiency	12 9.2	7 5.4	5 3.8	32 24.6	74 56.9	4.1462	1.28263

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4.3 Factor Analysis

4.3.1 Factors Influencing Implementation of Health And Safety Measure in Constructions Site

Extraction Method: Principal Component Analysis.
The result of factors influencing implementation in table 5 shows that the 8 items were sorted and clustered into two components with eigenvalues exceeding 1.0. For factors influencing implementation, the first two factors had eigenvalue of 4.430 and 1.154 respectively. The two factors identified in this study cumulatively explained 69.807 % of the total variance. Individually, the first factor explained 35.932 % and the second factor explained 33.875 %. The implication was that the variable could be split into two components and used as independent variables during the regression step. The two dimensions are subsets for factors influencing implementation.

Table 5. Total Variance Explained

Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
4.430	55.381	55.381	4.430	55.381	55.381	2.875	35.932	35.932
1.154	14.426	69.807	1.154	14.426	69.807	2.710	33.875	69.807

Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization, a. Rotation converged in 3 iterations.
Table 6, presents the results on the common classification and assessment of Eigen values loading of the constructs; The idea of components to reduce the number factors on which the variables under investigation have high loadings. Component loading does not actually change anything but makes the interpretation of the analysis easier. On the statemeneta that “Workers are trained on health and safety measures in the organization” .678, The firm invests in safety inspections and safety meetings .767, Some injuries are due to the nature of the site .816, Safety requirements by the governing bodies have made the company comply to health and safety measures 0.830, The management supports implementation of health and safety measures in the organization 0.653, There is a budget for health and safety support in the company 0.660, The firm invests safety promotion in the workplace by the printing of pamphlets and posters, production of safety advertising boards and banners 0.913 and Recklessness has caused increase in injuries 0.928.

Table 6. Component Matrix

Component	**1**	**2**
Workers are trained on health and safety measures in the organization		.678
The firm invests in safety inspections and safety meetings		.767
Some injuries are due to the nature of the site		.816
Safety requirements by the governing bodies have made the company comply to health and safety measures		.830
The management supports implementation of health and safety measures in the organization	.653	
There is a budget for health and safety support in the company	.660	
The firm invests safety promotion in the workplace by the printing of pamphlets and posters, production of safety advertising boards and banners	.913	
Recklessness has caused increase in injuries	.928	

4.3.2 Causes of Accidents, Injuries and ill Health

The result of factors causes of accidents, injuries and ill health in table 7 shows that the 7 items were sorted and clustered into one component with eigenvalues exceeding 1.0. For Causes of Accidents, Injuries and ill Health, the first one factors had eigenvalue of

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3.677 respectively. The one factors identified in this study cumulatively explained 52.525 % of the total variance. The implication was that the variable could be consolidated into one component and used as independent variables during the regression step.

Table 7. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.677	52.525	52.525	3.677	52.525	52.525

Extraction Method: Principal Component Analysis.

Table 8, presents the results on the common classification and assessment of Eigen values loading of the constructs; The idea of components to reduce the number factors on which the variables under investigation have high loadings. The loading factors were fund to be, “Falling objects” 0.694, “Dust” 0.552, “broken glasses” 0.709, “Collapse of earthworks” 0.584, “Toxic and suffocation” 0.857, “Fire and explosion” 0.788 and “Lack of safety wear” 0.832.

Table 8. Component Matrix

Component	**1**
Falling objects	.694
Dust	.552
Broken glasses	.709
Collapse of earthworks	.584
Toxic and suffocation	.857
Fire and explosion	.788
Lack of safety wear	.832

4.3.3 Occupation Health Safety OHS Management

The result of occupation health safety OHS Management shows that the 4 items were sorted and clustered into one component with eigenvalues exceeding 1.0. For occupation health safety OHS Management, the first one factor had eigenvalue of 3.273 respectively. The one factor identified in this study cumulatively explained 81.830 % of the total variance. The implication was that the variable could be consolidated into one component and used as independent variables during the regression step.

Table 9. Total Variance Explained

Componen t	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.273	81.830	81.830	3.273	81.830	81.830

Table 10., presents the results on the common classification and assessment of Eigen values loading of the constructs; The idea of components to reduce the number factors on which the variables under investigation have high loadings. “Implementation of OHS has reduced number of accidents” 0.926, “Implementation of OHS has reduced fatalities” 0.874, “Implementation of OHS has reduced medical cost” 0.895 and “Implementation of OHS has increased effectiveness and efficiency 0.922”.

Table 10. Component Matrix

Components	**1**
Implementation of OHS has reduced number of accidents	0.926
Implementation of OHS has reduced fatalities	0.874

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Implementation of OHS has reduced medical cost	0.895
Implementation of OHS has increased effectiveness and efficiency	0.922

4.4 Correlation Results between factors influencing H&S, Causes of accidents and H&F management in Construction sites.

From table 11., it can be observed that the correlation between the causes variables and the dependent variable was high and positive at 0.807**, 0.709** and 0.696** for Factors, Causes of ill health and Technology Respectively. The implication was that the high correlation between independent variables and OHS was high for further analysis and good. The interpretation was also that the level of multicollinearity between the independent variable was below 0.85 or 85%.

Table 11. Correlation Matrix

Pearson Correlation p-value		OHS managements	Factors	Causes
OHS Managements	Pearson Correlation	1		
	p-value			
Factors	Pearson Correlation	0.807**	1	
	P-value	0.000		
Causes	Pearson Correlation	0.709**	0.784**	1
	p-value	0.000	0.000	
	N	130	130	130

4.5 Regression Analysis of the study variables

Table 12., presents the fitting statistics results for the study variables from the results it was observed that the explanatory power of the study variables was R Square 0.695 and Adjusted R Square 0.688 respectively. The interpretation was that all the variables are statistically significant. The results also show that up to 69.5% of the variation in compliance can be attributed to the three independent variables considered.

Table 12. Model Summary

R	R Square	Adjusted R Square	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
0.834	0.695	0.688	0.695	95.838	3	126	0.000	1.945

Table 13, presents the ANOVA results for the study variables from the results it was observed that the ANOVA value has a F – statistic value of 95.838 with an associated p-value of 0.000. The interpretation was that all the variables are statistically significant and relevant. Thus all the were relevant and were retained for regression level.

Table 13: Analysis of variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	100.418	3	33.473	95.838	.000[b]
	Residual	44.007	126	.349		
	Total	144.425	129			

From table 14, the regression coefficient of Factors Influencing Implementation was found to be 0.829. This value shows that holding other variables in the model constant, an increase in Factors Influencing Implementation by one-unit causes OHS safety compliance by 0.829 units. The value of the coefficient is also positive. The positive effect shows that there is a positive relationship

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between Factors Influencing Implementation. The variable was also found to be influential variable on the OHS safety compliance. The regression coefficient of causes of accidents, injuries and ill health was found to be 0.033. This value shows that holding other variables in the model constant, an increase in causes of accidents, injuries and ill health by one unit causes the OHS safety compliance to increase by 0.033 units. The value of the coefficient is also positive. The positive effect shows that there is a positive relationship between causes of accidents, injuries and ill health and OHS safety compliance. The variable was also found to be influential variable on the OHS safety compliance.

Table 14. Regression Analysis

Variables	Beta	Std. Error	t-statistic	Sig.
(Constant)	1.184	0.318		
Factors Influencing Implementation OHS	0.829	0.238	3.486	0.001
Accidents, injuries and ill health	0.033	0.230	0.024	0.144

4.6 Observation

Table 15 presents the results during the field visit. The results show that that majority of the precautions were considered to a significant level. Barriers are used to protect falls from heights yes 53.3 % No 46.7 %, danger zone is indicated by signs 52.3% No 47.7%, There is sufficient light in the working areas yes 54.6 % No 45.4%, ladders are in a horizontal position hanging on brackets yes 48.5% No 51.5%, site are well protected and no entry of unauthorised persons 46.2% No 53.8%, personal protective equipment; gloves, ear protection, respiratory protection, helmets, safety boots and safety goggles Yes 50.8% No 49.2%.

This chapter set to investigate the effect of health and safety management compliance in construction sites in Nairobi County Kenya. The chapter starts by presenting demographic information about the characteristics of the respondents. The chapter also presents the results on normality, heteroskedasticity, autocorrelation, and multicollinearity test. From the correlation matrix, the results show that the independent variables have a strong correlation with the OHS safety compliance. The last section presents the regression results and shows the improvement in OHS safety compliance.

Table 15. Observation element

Observation element	Yes%	No%
Barriers are used to protect falls from heights	53.3	46.7
Danger zone is indicated by signs	52.3	47.7
There is sufficient light in the working areas	54.6	45.4
Ladders are in a horizontal position hanging on brackets	48.5	51.5
Sites are well protected and no entry of unauthorized persons	46.2	53.8
Personal Protective Equipment; Gloves, Ear protection, Respiratory protection, Helmets, Safety boots and Safety goggles	50.8	49.2

4.7 Summary of findings

The constructs of factors influencing implementation of health and safety measure in constructions site were found to influence occupation health safety OHS management since their descriptive values had values greater values with a mean value above 3 on the Likert scale. This show that, management supports, Workers are trained, budget support in the company, firm invests in safety inspections and safety meetings, printing of pamphlets and posters, production of safety advertising boards and banners, governing regulation in health and safety measures has caused increase positive relationship with occupation health safety OHS Management both in the correlation and regression analysis results. This implied that the enhancement of the factors influencing implementation of health and safety measure in constructions site improves occupation health safety OHS Management.

The constructs on causes of accidents, injuries and ill health were found to influence occupation health safety OHS management

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since their descriptive values had values greater values with a mean value above 3 on the Likert scale. This show that Falling objects , Dust, Broken glasses, Collapse of earthworks, Toxic and suffocation , Fire and explosion and Lack of safety wear were found to have a positive relationship with occupation health safety OHS management both in the correlation and regression analysis results. This implied that the enhancement of the causes of accidents, injuries and ill health improves occupation health safety OHS management.

5.0 CONCLUSIONS

The study concluded that the factors identified to be influencing implementation of health and safety measure in constructions site have influence on occupation health safety OHS Management in Nairobi sub-county. Based on the findings, the study conclude that, factors such as management supports, Workers are trained, budget support in the company, firm invests in safety inspections and safety meetings, printing of pamphlets and posters, production of safety advertising boards and banners, governing regulation in health and safety measures have affected occupation health safety OHS Management among construction companies in Kenya.
The study further noted that causes of accidents, injuries and ill health have influence on occupation health safety OHS management in Nairobi County. The based on the findings that, falling objects, dust, broken glasses, collapse of earthworks, toxic and suffocation, Fire and explosion and Lack of safety wear had a positive influence on OHS Management was a supportive indication that an increase in causes of accidents, injuries and ill health increases which in turn enhances the occupation health safety OHS Management. This study therefore concluded that causes of accidents, injuries and ill health were an influential variable.

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