

**EVALUATION OF THE LEVEL OF HEALTH, SAFETY AND ENVIRONMENT  
FACTORS COMPLIANCE IN MATERIAL SUPPLY CHAIN OF BUILDING  
CONSTRUCTIONS IN ABUJA, NIGERIA**

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**ABSTRACT**

The study aimed at identifying the level of health, safety, and environmental compliance as well as the challenges preventing effective safety compliance in the material supply chain in the construction industry. The study utilises purposive sampling to pick 22 construction sites for the investigation. 250 questionnaires were distributed among the construction professionals. The gathered data was analysed with the aid of frequency, percentages, mean index score, and ranking. The outcome of the study reveals a high level of health, safety, and environmental compliance among the construction professionals, with a mean index score of 2.6686. Also, the study findings showed that human error, stakeholder will, bribery, and corruption were the major challenges preventing effective compliance with health and safety practices in the building construction industry in Abuja. In conclusion, effective health and safety compliance is vital for the reduction of occupational hazards. The study suggested, among others, that the government, through her relevant agency checkmate, bribery and corruption in health and safety compliance in the industry.

**Keywords:** Abuja, Building construction, HSE, Human error, Materials, Supply chain.

**JEL Classifications:** K32, R41, N67, N77, L74

## **1. INTRODUCTION**

The art and science of creating things, systems, or organisations is collectively referred to as construction. Man has built many types of structures over the ages, including houses, offices, bridges, and so forth. There are several different types of building construction, from tall skyscrapers to buildings of average height. The construction project is a unit that consists of capital, people, and material resources that work together to ensure the project's success (Umar, 2023).

Construction materials are foundational elements that enables the execution of any construction project (Ifeanyi & Adindu, 2023). According to Patel and Vyas, (2011), acquisition of materials and equipment account for more than 70% of the total cost of executing a construction project. The transportation and handling of these materials and equipment is crucial to the execution and success of construction projects, as numerous supply chain procedures are carried out to guarantee that resources are available when required (Alumbugu et al., 2020). Ying et al., (2014) as cited by Ifeanyi and Adindu (2023) posits that transportation cost alone accounts for about 39% to 50% of the total logistics cost of a construction project. Materials are moved to, within and from the construction sites through different means of transportation. Though vital, the supply chain processes of these materials are not without challenges. These challenges are usually in the forms of accidents and exposure to hazards, which often results in physical and psychological damage to workers or in worse cases, death (Alumbugu et al., 2020).

The construction sector is considered to be one of the riskiest in the world due to the high frequency of accidents and illnesses on building sites. (Ahmed, 2019). It accounts for about 30% of fatalities linked to occupation hazards, accounting for 20.6% of fatal accidents in European Union (EU), 32.2% in Japan in 2020 and 17% in Australia between the years 2015 – 2019 (Adetunji et al., 2024). There are numerous variables that could lead to liability and fatalities in the construction industry. Some of the frequent causes of accidents in the building construction industry include disregard for health and safety regulations, improper construction methods, inadequate personal and workplace protective equipment, and violations of applicable regulations (Božena et al., 2022).

Many construction workers in Nigeria have died and some have lasting disabilities as a result of construction accidents (Agwu & Olele, 2014). Environmental health and safety (EHS) regulations, laws, rules, and policies were passed by the regulators and other stakeholders in order to decrease the incidence of occupational accidents in the industry. These regulations are intended to shield the environment, the health and safety of employees, and any threats (US, Department of health & human service, 2023). Occupational accidents continue to occur in the construction industry despite the governments and the Institute of Safety Professionals in Nigeria's (ISPON) efforts to raise safety awareness in the sector.

Studies have revealed that the construction sector actually has a low degree of compliance with health, safety, and environmental regulations, especially when it comes to the material supply chain (Adebisi et al., 2020; Abbaspour et al., 2012). Some of the obstacles preventing effective compliance with health, safety, and environmental regulations were inadequate funding, human error, a lack of a healthy and safety culture, a shortage of skilled H&S personnel, handling and external management, internal management, working conditions, and human and environmental factors (Ibukun et al., 2020; Emma-Ochu et al., 2021; Amoah & Mlenzana, 2022).

Additional obstacles impeding efficient adherence to health and safety regulations in the building construction sector encompass inadequate safety communication, insufficient

enforcement, and a deficient enforcement mechanism (Amoah & Mlenzana, 2022). Transportation of materials, as well as poor material handling have also been identified by Ibrahim et al., (2022) as major cause of construction accident in Nigeria. Abuja, Nigeria's capital, hosts a large number of Nigerian construction firms, such as Setraco Nigeria Ltd., Dantata and Sowoe Construction Company, and Dumez Nigeria Limited. It boasts of high number of construction projects and as such is continuously engaged in the material supply chain process.

In order to develop solution and strategies to improve the HSE in material supply chain, there is need to understand the current level of compliance to HSE regulations and challenges hindering its adoption or workers' adherence. This study therefore seeks to fill this gap by looking into the level of compliance of workers with safety and health in construction industry's material supply chain as well as identifying the obstacles or challenges limiting workers' adherence to health and safety regulations in material supply chain process of the construction industry.

This study is built upon 5 sections with the just concluded section being the introduction. Section 2 provides a brief review of past literature, section 3 presents the methodology adopted in the research, section 4 presents the result and discussion while the final section (section 5) presents the conclusion and recommendations.

## **2. LITERATURE REVIEW**

### **2.1. Theoretical Review**

The domino theory is among the theories that most effectively explains the reasons behind material movement accidents in the construction sector. The theory was created by Heinrich (1931) who states that human error accounts for 88% of accidents, hazardous environments account for 10%, and "acts of God" account for 2% of all incidents. Heinrich posits that a number of near misses and little occurrences at its base could potentially escalate to larger accidents or fatalities at the summit. According to the idea, there are roughly 300 near-misses and 30 minor injuries for every major injury or fatality. This ratio highlights the progression from less serious occurrences to more severe ones, similar to a chain reaction or falling dominos (Heinrich 1931). The theory argued that by addressing and reducing minor occurrences and near misses, one might interrupt the domino effect and prevent catastrophic outcomes. (Heinrich et al., 1980).

According to the theory, organisations such as construction industries can successfully lower the likelihood of more serious accidents by concentrating on locating and resolving the underlying causes of near misses and minor events. In addition to increasing workplace safety, this preventative strategy encourages a proactive safety culture in which risks are methodically recognised and managed before they become more serious.

Heinrich's hypothesis is criticised for relying too much on anecdotal evidence and for taking an oversimplified approach to accident causation, especially when it comes to emphasizing worker behaviour as the main contributing component at first. Systemic elements, organisational culture, and the leadership role in creating a safe work environment are now included in modern interpretations.

Another theory was the systems model theory which takes a different track when examining how people interact with their surroundings. A system model view sees harmony between man, machine, and environment, rather than a dangerous environment and a prone human population. The idea states that there is very little possibility of an accident occurring in normal

circumstances (Firenze, 1978). According to the current study's setting, there is a decreased risk of an accident occurring at work if all necessary health and safety precautions are taken.

The multiple causation model was another model developed by Petersen in 1971 as an improvement to Heinrich's domino theory (Taylor et al., 2004). Petersen developed a model based on management systems rather than individuals. As opposed to the domino's theory which tied accidents to a single cause, Petersen believed that several causes can result in an unsafe act, unsafe condition and the occurrence of an accident. It posits that in order to reduce accidents and risks, there is need to divert attention and tackle the underlying causes of the accident which could result from not just the individuals involved in the accident but the management as a whole. Unlike in the simplified domino theory, this theory posits that there are causes and sub-causes that contribute to an accident. Through identification of these multiple contributing causes of an accident, the unsafe acts and unsafe conditions should be prevented (Hosseinian & Torghabeh, 2012).

This study is built upon the multiple causation approach as it seeks to identify the contributing factors causing accidents in the material supply chain process. These causes could surface in two ways, namely; management neglect and unsafe act of workers in the supply chain process. In the material supply chain process, many individuals and processes come together to ensure swift movement or delivery of needed materials to and from sites. It is expected that management ensures that the staffs (for examples drivers) poses relevant skills or are properly trained for their duties, perform frequent facilities and vehicle maintenance, conduct periodic inspection of the supply chain components, develop and poses excellent emergency response plans, and ensure strict compliance with set rules and regulations.

## 2.2. Conceptual Framework

### 2.2.1. Health and Safety in the Nigerian Construction Industry

The construction industry faces a disproportionately high rate of fatalities compared to other sectors, with numerous minor accidents adding to its already daunting health and safety challenges (Guha et al., 2013). Safety hazards in construction are categorized into physical injuries, which can sometimes be fatal, and health hazards, which can lead to long-term sickness or death (Murie, 2007).

Over time, the construction industry has endeavoured to enhance its health and safety protocols, shifting focus from reactive safety measures to proactive improvements in safety performance (Datta, 2000). According to Hinze (2005), maintaining organisational readiness is crucial for effective safety practices, emphasizing the need for pre-emptive safety measures rather than relying solely on post-incident data for safety enhancements.

Farooqui et al. (2012) highlight positive strides in health and safety practices in developing countries. Despite advocacy for health and safety programs to enhance site operations (Adeniyi, 2001), McCann and Paine (2002) underscore the importance of fostering a safety culture beyond mere procedural guidelines. However, many construction workers remain unaware of existing safety protocols, often due to prioritisation of profit over site conditions and inadequate training (Guha et al., 2013).

Inadequate safety measures persist on construction sites, contributing to various injuries and fatalities. Workers frequently attribute accidents to their own negligence, perceiving construction work as inherently hazardous (Okolie and Okoye, 2013). Regulatory pressures from stakeholders have recently spurred construction companies to intensify their focus on safety practices (Okolie and Okoye, 2013).

### 2.2.2. Challenges of the compliance to health safety

Human error is one of the major obstacles that researchers have found inhibiting health and safety compliance in the construction business, among other issues. Any action taken by a person on a building site that could cause an accident is considered a human error. Peng et al. (2021) state that environmental, individual, team, and social factors are thought to be indirect causes of human error. The scenario may determine if a factor contributes directly or indirectly to human mistake. Bribery and corruption are another difficulty for professionals in the construction industry.

In Nigeria, corruption has permeated numerous organisations, and for financial gain, health and safety inspectors frequently provide building companies a pass mark in exchange for money (Emma-Ochu, 2021). Inadequate funding makes it difficult for the building industry's material supply chain to comply with health and safety regulations. It is difficult to set aside money for essential safety activities, training, and equipment when safety budgets are inadequate (Damayanti & Handiyani, 2021). Safety department staffing levels are impacted by inadequate financing. An undermanned safety team might make it more difficult to manage and comply with safety regulations. Additionally, a lacklustre safety culture creates artificial barriers to health and safety compliance in the building sector. Ineffective organisational cultures promote a culture in which disregarding safe work standards is normal and hinder the organization's ability to address health and safety issues (Natalie & Charles, 2016). Organisations with a weak safety culture frequently have the same fundamental perspective on all processes and procedures.

### 2.3 Empirical Review

Adebiyi et al. (2020) conducted a study using content analysis to examine the impact of workers' knowledge and adherence to health and safety information on the safety of construction sites in Nigeria. Through a review of the literature, the study sought to determine the impact that workers' safety on construction sites is impacted by their understanding of and adherence to H&S regulations. The results of the study show that there was little compliance with this information. The outcome also showed that the degree of compliance was influenced by management commitment as well as a lack of oversight and enforcement. Workers' safety was greatly affected by H&S information compliance, as evidenced by a strong positive connection that was not statistically significant.

Emma-Ochu et al. (2021a) investigated the obstacles to health and safety compliance in South East Nigerian construction projects in a different study. In order to collect data on the obstacles to health and safety compliance in the construction sector in the states of Abia, Anambra, Imo, Enugu, and Ebonyi, a survey design is used. The study's conclusions are consistent with the research of Adebiyi et al. (2020), which found that the South East states' degree of adherence to current health and safety laws is low. In addition to the results, the highest-ranking difficulties to the level of compliance with health and safety regulations for construction projects were bribery and corruption, while the lowest ranking challenges were insufficient funds. According to the report suggestion, all parties involved in the construction sector in Nigeria ought to collaborate in order to establish legally-mandated health and safety protocols and plans that align with industry standards.

The studies by Abbaspour et al. (2012) attempted to model strategic management for the assessment of environmental, health, and safety performance. The contractor supplies tools and personnel to carry out work under the guidance, directives, and HSE-MS of the organisation, according to the two models their study produced. Additionally, the work, which is conducted

under its own HSE Management System, ensures that the system is operating correctly by giving the required guidance and oversight. The generated models, which are independent of processes, were able to compare several groups with a range of activities. Additionally, it has the ability to score the indicators according to the various significant and operational states of every indication.

In a study that was similar to this one, Emma-Ochu et al. (2021b) examined the health and safety compliance of construction projects in South East Nigeria. The study's objectives were to ascertain the extent to which South East Nigerian construction projects complied with health and safety laws and to develop action plans aimed at improving compliance. The results showed that there is a correlation between the degree of adherence to current health and safety rules in South East Nigerian construction projects. The study reveals that construction businesses in South East Nigeria have not yet completely recognised and implemented adequate health and safety standards and planning for construction projects. According to the study, assigning Health and Safety responsibilities that are constrained by local laws will greatly improve Health and Safety, and having practicable and required Health and Safety consultants for every project will help ensure a high degree of compliance in all states. To ascertain the efficacy of the Health, Safety, and Environmental (HSE) management system in oil projects by the measurement of anomaly reports.

Mirza & Izadshenasan (2019) surveyed 37 firms that were involved in the project for the establishment of installations in onshore Phase 19 South Pars using questionnaires. The study's findings show that, compared to organisations without certificates, those with certificates had an average occurrences rate that was lower for incident indicators. In addition, the companies without a certificate outperformed the companies with a certificate (with 937.8 abnormalities) in terms of the reported anomalies per million total man-hours worked (with 821.5 anomalies).

Okoye et al., (2016) analysed the level of knowledge and compliance of building construction workers with workplace health and safety regulations in the Anambra state. The purpose of the study was to ascertain how project performance is affected by health and safety knowledge and compliance, as well as how well-informed construction workers are about health and safety. The study's findings indicate that construction workers have low levels of awareness and compliance with regard to health and safety. The study found that there was little impact on project performance from construction compliance and health and safety expertise.

Nyabioge et al., (2018) investigated the effect of health and safety management on the success of construction projects in Nairobi County through survey research in a different study. Finding the variables impacting health and safety compliance in the construction sector was the aim of the study. The study's findings show that the majority of building sites in Kenya are managed by hand and need a lot of paperwork, with no clear site management system in place. The study recommended using drones, RFID technologies, and Oracle Prime Projects cloud service to keep an eye on construction site activity.

Lemke et al., (2021) investigated long-haul truck drivers' compliance with hours-of-service regulations and safety results in a different study. Their investigation's goals were to find variables linked to health and safety compliance and quantify the importance of compliance in terms of the safety risk associated with sleep. The study found that longer daily work hours, a higher frequency of working at a rapid pace, more miles driven per week, shorter sleep length, and lower sleep quality were all substantially correlated with higher scores on the Health and Safety composite variable.

Ližbetin & Stopková (2021) conducted a study on safety compliance with reference to cargo security in the road freight transport industry. The study concentrated on how road drivers perceived their level of awareness regarding secure cargo as well as the regulatory framework that governs safety problems in the Czech Republic. The investigation found that the business does not adequately secure the load.

Madueme et al (2022) conducted a study appraising the health and safety practices in privately owned small and medium sized construction firms in Nigeria. The study adopted a quantitative research design while questionnaires were used as instrument for data collection. The study adopted a convenience sampling method in selecting construction professionals. The study revealed that the level of compliance or adoption of health and safety regulations was poor in privately owned small and medium scale construction industries. The study further discovered that lack of adequate monitoring system, lack of adequate government HSE policies, poor communication were major challenges facing the adoption and adherence to health and safety protocols. The study recommended that more attention should be diverted to ensuring adequate health and safety in the construction industries.

Oyiborhoro et al. (2023) evaluated the HSE practices on construction sites in Port Harcourt Local Government Area of Rivers state, Nigeria. The study adopted a descriptive research design and focused on site managers. Questionnaire was adopted as a research instrument and they were administered to 120 site managers. The study was analysed using mean statistics. The study revealed that there was availability of safety gadget and resources on site as result showed that regular safety signs are placed on site when working, workers put on required PPEs before commencement of job, emergency medical response team are readily available on site. The study recommended that safety seminars should be regularly conducted in order to ensure improved safety awareness and adherence to global HSE practices.

Adetunji et al. (2024) investigated the approaches that can be implemented to improve Occupational Health and Safety of the Nigerian Construction Industry. The study adopted a quantitative research design with focus on construction professionals in Federal Capital Territory, Abuja, Nigeria. structured questionnaires were administered to several construction professionals ranging from Architects, Quantity surveyors, Engineers and builders. Data collected was analysed using percentages, Exploratory factor and confirmatory factor analyses. The study identified the establishment of Nigerian Construction Industry Development Board, enhanced collaboration between stakeholders and professional of the construction industry, enhanced monitoring system as well as adoption of technological innovations on health and safety. The study recommended enhanced collaboration and participation of stakeholders within the construction industry in order to curtail the menace of construction accidents.

#### 2.4. Gaps in the Literature

While most of the studies reviewed have focused on construction health and safety practices, their focus has mostly been on onsite hazards with little attention to the supply chain process. This study however focuses on the whole material supply chain process which is vital before, during and even after the commencement of any construction project. This study looks at the level of compliance of workers during the process of acquisition and movement of materials to site, movement of materials within sites as well as movement after completion of the construction project.

### 3. METHODOLOGY

The foregoing study on the evaluation of the level of compliance of health, safety, and environment in the material supply chain of building constructions in Abuja utilised a survey

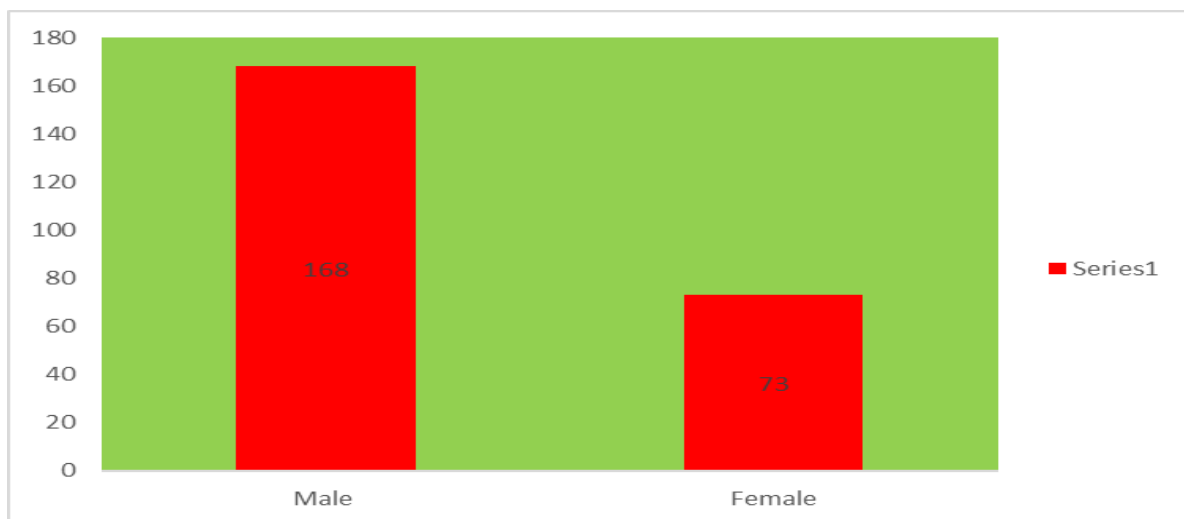
to administer 250 questionnaires to professionals (specifically surveyors, civil engineers, project managers, contractors, builders, architects, and supervisors) across twenty building construction sites in Abuja. Purposive sampling was used to choose the Abuja metropolitan area for the study due to the massive increase in building construction projects. The questionnaires used consist of three sections: the first section comprises socio-demographic features of the construction workers in Abuja; the second section comprises the level of compliance with health, safety, and the environment; and the last section consists of the challenges preventing compliance with health, safety, and the environment in the material supply chain in the industry. Information was gathered on a five-point Likert scale, where 1- represented strongly disagreed and 5- represented strongly agreed. Out of the 250 questionnaires administered, only 241 was correctly filled and returned for analysis. The gathered data was analysed with the aid of percentages, frequency, mean index score as well as rankings. In measuring level of compliance and compliance challenges, items with mean values less than 2.5 were regarded as low, items with value of 2.5 were regarded as medium while those above 2.5 were regarded as high.

#### 4. RESULTS AND DISCUSSION

##### 4.1 Socioeconomic features

The analysis of the gender of the respondent in Figure 1 reveals that 168 construction professions were male and only 73 of them were female. The study outcome is not in line with the outcome of Ohida et al. (2022), who concluded that men dominate the construction industry in Minna. This outcome is a revelation that women play a significant role in construction professionals, unlike Minna.

Figure 1: Gender

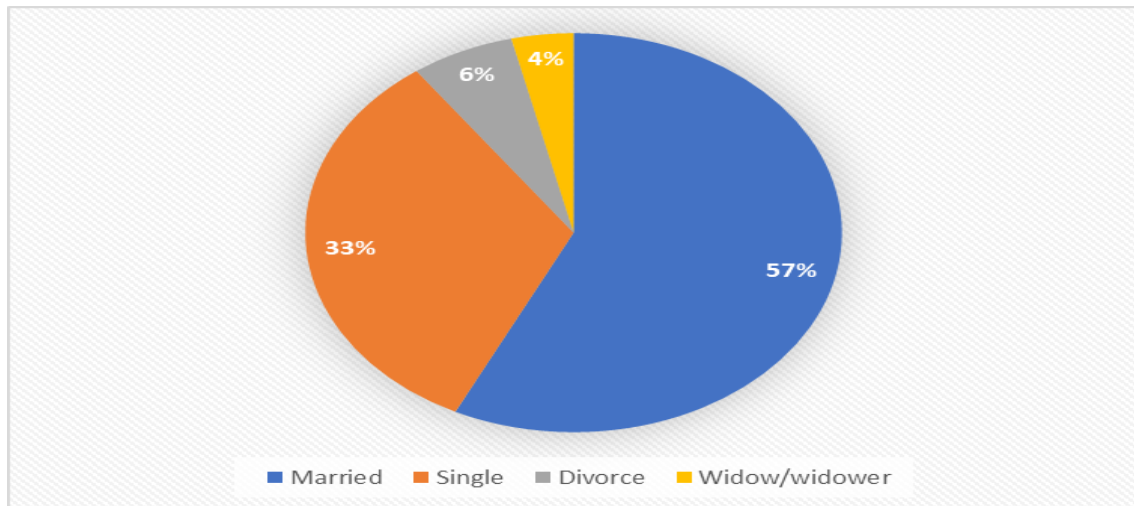


Source: Authors' survey (2024)

Figure 2 reveals the marital status of the construction professionals. From the analysis, more than half of the respondents were married. 33% of the construction professionals were still single, about 6% of them are divorced and only 4% of them were widow/widower. The outcome of the analysis in Figure 2 is a revelation that more than half of the surveyed professionals were married which means that they are responsible and has the tendency of remaining stable in the field over a period of time.



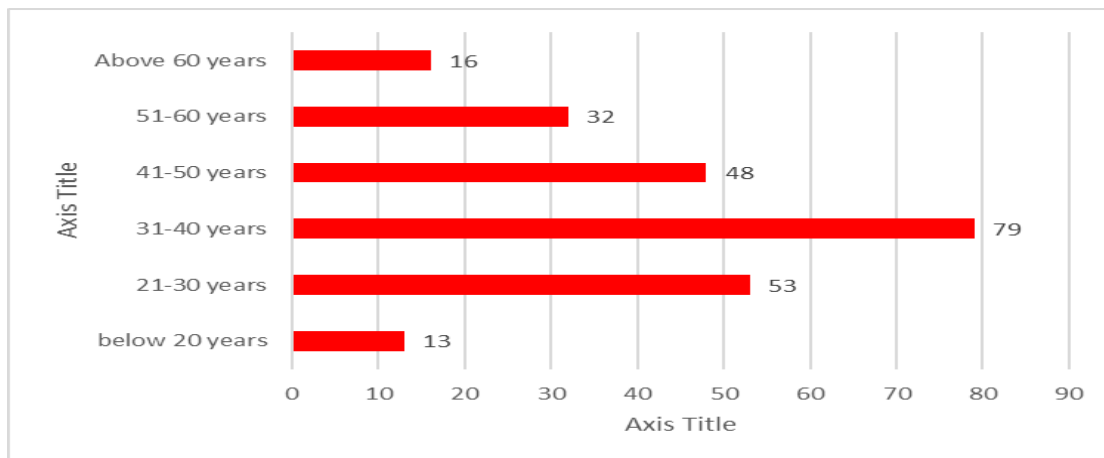
Figure 2: Marital status



Source: Authors' survey (2024)

The analysis in Figure 3 reveals the age of the professionals. From the analysis, 79 of the professionals were in the age of 31 and 40 years, about 53 of them are in their early age of 21 and 30 years, and 48 professionals were in the age of 41 and 50 years. Also, Figure 3 point that 32 professionals said they are in the late age of 51 and 60 years, 16 professionals were above 60 years and only 13 of them were less than 20 years.

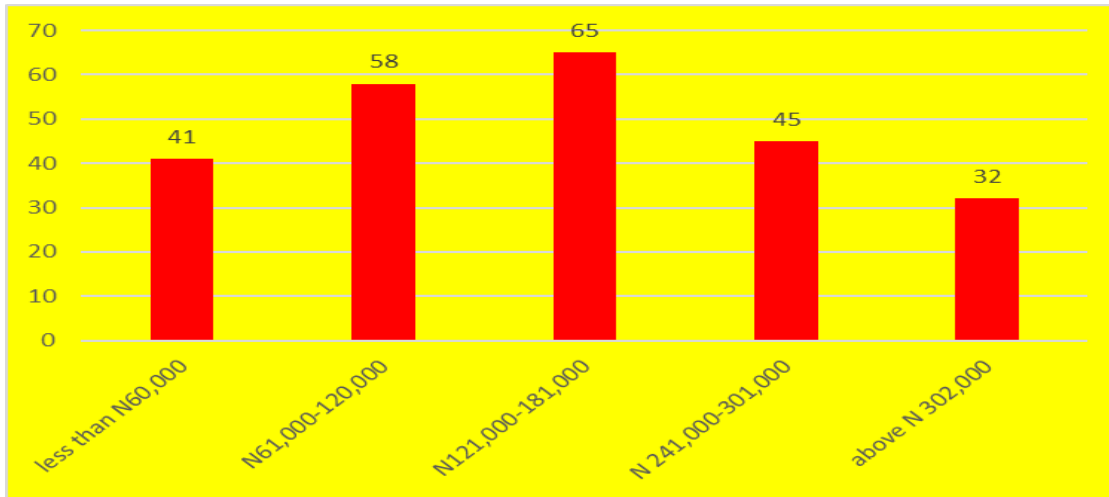
Figure 3: Age of the Professionals



Source: Authors' survey (2024)

The Figure 4 shows the monthly income earned by the professionals. From the analysis, majority of the respondents earned between ₦ 121,000 to ₦ 181,000 per month, about 58 respondents said they earned around ₦61,000 and ₦120,000 monthly, and only 45 respondents earned about ₦241,000 to ₦ 301,000 in a month. In addition to the findings, 41 respondents earned less than ₦60,000 monthly and only 32 of them earned above ₦ 302,000 on monthly basis. This is an indication that majority of the professionals earn above minimum wage of N30, 000 which should be a motivation for improved dedication to work and a deterrence to bribery collection which was identified as a challenge further ahead in this study.

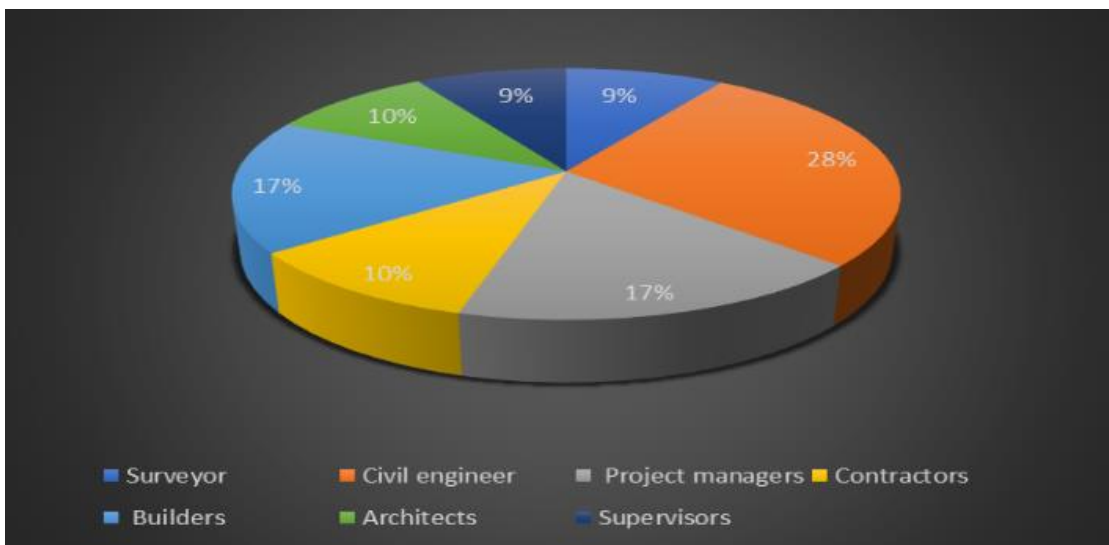
Figure 4: Monthly Income Earned



Source: Authors' survey (2024)

The Figure 5 reveals the analysis of the professionals working in the building construction industry in Abuja. From the result, 28% of the respondents were civil engineers, 17% of them each were project managers and project supervisors. Also, Figure 5 showed that 10% of them each were contractors and architects, and 9% of the respondents each were supervisors and builders.

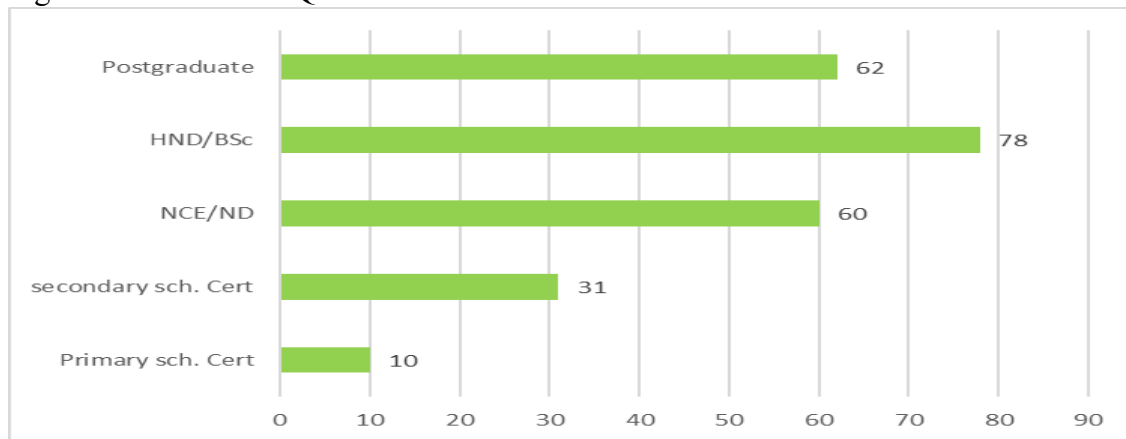
Figure 5: Construction Professionals



Source: Authors' survey (2024)

The analysis in Figure 6 reveals that 78 respondents had Higher National Diploma (HND) or Bachelor of Science (BSc), about 62 respondents had postgraduate certificate, and 60 respondents had National Certificate in Education or National Diploma. Also, about 31 respondents had secondary school certificate and only 10 of them had primary school certificate. This outcome is a revelation that the construction professionals were well educated since majority of them had HND/BSc certificate and they have a better understanding of the questions asked in the research.

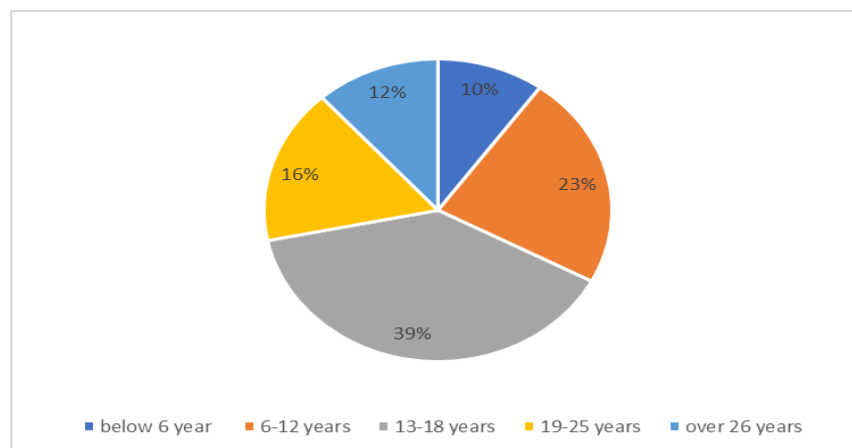
Figure 6: Educational Qualification



Sources: Authors’ survey (2024)

The analysis of the working experience shown in Figure 7 indicate that 39% of the respondents had between 12 to 18 years of working, 23% of the respondents had 6 to 12years working experience in the construction industry, and only 16% of them had between 19 and 25 years’ experience. Similarly, 12% of the professionals had over 26 years’ experience and only 10% of them had less than 6 year working experience.

Figure 7: Working Experience



Source: Authors’ Survey (2024)

#### 4.2 Level of Health, Safety and Environmental Compliance

The analysis of the level of health, safety and environmental compliance on material supply chain in the construction industry is shown in Table 1. From the analysis, variable drivers training and qualification (M= 2.1413), hours of service (M=1.8654), and level of threats preparedness (M=2.3501) has low compliance rate. This is in line with the findings of Lemke et al. (2021) who also identified low level of compliance with hour of service for drivers which result in stress and health issues. Also, level of load securement in transport vehicles (M= 3.2024), route planning (M= 2.7532), and facilities and vehicle maintenance (M= 3.8610) has high level of compliance rate. These however disagree with the findings of Ližbetin & Stopková (2021).

Table 1: Level of Health & Safety Compliance

S/n	Criterion	Mean	Comment
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1	Drivers training and qualification	2.1413	low compliance
2	Facilities and Vehicle maintenance	3.8610	high compliance
3	Periodic inspection of supply chain Components	2.5070	moderate
4	Level of load securement in transport Vehicle	3.2024	high compliance
5	Route planning	2.7532	high compliance
6	Hours of service	1.8654	low compliance
7	Level of threats preparedness	2.3501	low compliance
Mean Average		2.6689	high compliance

Source: Authors' Survey (2024)

Summarily, the analysis in Table 1 reveals that there is moderate compliance level for periodic inspection of supply chain component (M= 2.5070). It can be concluded in the analysis in Table 1 that the overall compliance to health, safety and environment in the materials supply chain in the construction industry in Abuja is quite high with a mean index score of 2.6689.

### 4.3 Barriers mitigating against compliance to health, safety and environment in construction industry

The analysis in Table 2 indicates the challenges to compliance to health, safety and environmental compliance in the construction industry. From the analysis, human errors were ranked as 1<sup>st</sup> in term of the challenges. Human error is a significant challenge in maintaining health and safety compliance. Even well-trained and motivated individuals can make errors. The human factor can sometime occur due to deliberate or undeliberate violations. Stakeholders will be another challenge to health and safety compliance which is ranked 2<sup>nd</sup>. However, the willingness/unwillingness of the stakeholders to comply to certain standard to reduce occupational hazard vary between individual stakeholders. Most stakeholders only implement safety compliance they deem important while ignoring the ones they believe are less important.

Another challenge preventing safety and health compliance in the industry is bribery and corruptions which was ranked 3<sup>rd</sup>. Bribery and corruption has high costs both in terms of lives lost and financial resources wasted (Emma-Ochu, 2021). Lack of safety culture is ranked 4<sup>th</sup> and poor working condition is ranked 5<sup>th</sup>. According to Martinelli (2017), a poor safety culture can have several negative effects on a business. In the construction industry, poor working condition and lack of safety culture may result in increased injuries and deaths among employees, higher costs, damaged reputation and legal issues. Again, clarity in safety communication is ranked 6<sup>th</sup> while enforcement of safety & health compliance was ranked 7<sup>th</sup>. Other challenges recorded in Table 2 includes poor framework for risk detection (ranked = 8<sup>th</sup>), lack of funds allocated to H & S program (ranked= 9<sup>th</sup>), insufficient health & safety training (ranked=10<sup>th</sup>), and overlooking of health & safety compliance in material supply (ranked=11<sup>th</sup>).

Table 2: Challenges Limiting Compliance to Health, Safety and Environment in Construction Industry Material Supply Chain

S/n	Criterion	Mean	Rank
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1	Human errors	4.3258	1 <sup>st</sup>
2	Poor working conditions	3.6716	5 <sup>th</sup>
3	Lack of safety culture	3.8401	4 <sup>th</sup>
4	Stakeholders will	4.1512	2 <sup>nd</sup>
5	Insufficient health & safety training	3.0132	10 <sup>th</sup>
6	Overlooking of health & safety compliance in material supply	2.7776	11 <sup>th</sup>
7	Clarity in safety communication	3.5625	6 <sup>th</sup>
8	Poor framework for risk detection	2.3227	8 <sup>th</sup>
9	Bribery & corruptions	3.9674	3 <sup>rd</sup>
10	Enforcement of safety & health Compliance	3.4076	7 <sup>th</sup>
11	Lack of funds allocated to H & S program	3.2583	9 <sup>th</sup>

Source: Authors' survey (2024)

## 5. CONCLUSION AND RECOMMENDATIONS

The present study is an evaluation of the level of compliance with health, safety, and the environment in the material supply chain of building construction in Abuja. The purpose of the study was to identify the level of health, safety, and environmental compliance and the challenges to compliance experienced by construction professionals. The study concluded that there is a high compliance with health, safety, and the environment in the material supply chain in the construction industry. The study identified human errors, stakeholder will, bribery, and corruption as the major challenges preventing effective compliance with health, safety, and the environment in the materials supply chain in the building construction industry in Abuja. The study suggests that the government, through her relevant agency checkmate, workers engaged in bribery and corruption in health and safety compliance in the industry. In order to minimize human error, construction industries should be mandated by the government to provide safety awareness programs through training of workers. This should not be limited to new workers but rather, periodic safety and health training and enlightenment programs should be conducted for both old and new staffs at regular intervals. Strict onsite supervision and safety enforcement should be practiced to ensure compliance with safety standards. Safety – driven technological innovations such as Building Information Modelling, use of drones, intelligent and smart sensing system should be adopted within sites. Again, stakeholders should take major initiatives to ensure health, safety, and environmental compliance. This will assist the industry in developing strategies to reduce occupational hazards.

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