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Awareness of Health and Safety Practices Among Construction Workers: A Case Study of Ondo State, Nigeria

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Abstract: Over the years, the construction industry has been regarded as one of the major industries, having transcended to using modern techniques such as off-site construction. However, accidents still occur in the Nigerian construction industry due to the lack of intense adoption of off-site construction and also the lack of knowledge about health and safety (H&S) practices. Therefore, this study aimed to assess construction workers' awareness of health and safety (H&S) practices in Akure, Ondo State. To achieve this, a well-structured questionnaire was developed as a data collection tool to retrieve respondents' information on the construction workers' level of awareness about various H&S practices. One hundred and fifty questionnaires were administered to the non-professionals involved in construction activities in Akure, Ondo-State. However, 93 questionnaires were retrieved. Mean Score, frequency and percentage were used to analyse the retrieved data. The study revealed a high level of awareness of H&S measures, especially the use of safety boots, helmets, reflective clothing/vests, first aid and hand gloves. Therefore, imbuing positive attitudinal behaviour to H&S practices will reduce accidents, deaths and property damages on construction sites.

Keywords: Accidents; Attitudinal Behavior; Construction site; Health and Safety

1 INTRODUCTION

The construction industry is regarded as very significant in terms of its impact on the H&S of the workers and professionals on site (Foad, 2011). Construction is one of the important industries that employs a huge labour workforce, and a wide range of activities are involved in it. However, in recent times, off-site construction has gained rapid attention in the construction industry. In a bid for improvement in the construction industry, smart construction techniques such as off-site construction have gradually begun to take their place as a suitable alternative to on-site or conventional buildings with the introduction of technologies such as artificial intelligence, big data, virtual reality, internet of things, robotics amongst others (Jiang, Wang, and Xing, 2019). The increased attention on off-site construction over the last few decades towards achieving sustainability has been considered an effective alternative to conventional buildings and a means to achieving safety in construction (Murali and Sambath, 2020). The overall costs, materials waste, reduced impact on the environment, safety enablement, and the speed of construction have been indicated as the great benefits of adopting prefabrication in buildings (Schoenborn, 2016). Compared to other industries, construction workers have more fatalities, serious injuries, and poor health. Despite several attempts to raise the H&S standards of the Nigerian construction sector, the incidence of accidents on building sites—both reported and unreported—continues to rise. Accidents occur on building construction projects frequently due to two aspects, which are unsafe acts and unsafe conditions (Gyekye, 2006). These

accidents may be permanent (death) or temporary (injury) with no or little documentation about the incident. Because of their ignorance of safety procedures and lack of literacy, some workers are the trigger of some of the incidents that claim the lives of workers, while other workers are the victims of subpar worksite safety procedures implemented by construction corporations. Every successful project is critically hinged on the safety of the laborers in constructing construction sites. There is no comparison for the significance of safety in any type of building operation (Okolie, 2013).

Numerous health and safety hazards are associated with most construction activities, including working at heights, underground, in cramped areas, and near falling objects; carrying loads by hand; handling hazardous materials; using machinery and plants; being near fire; and being near live wires. Every day, many construction workers face a variety of hazards. These risks include working with various building materials and being exposed to inclement weather like rain and sunshine. However, in Nigeria, inasmuch as its construction industry is expanding rapidly, efforts to ensure better H&S procedures have not really impacted the construction processes. Within the industry, there is a lack of comprehensive enforcement of safety requirements. Therefore, every construction project must carefully monitor safety performance since achieving predetermined safety performance targets is just as important to the project's success as the building's quality, schedule, and budget. However, due to severe accidents and unfavorable working circumstances, the number of building workers who have died, become permanently disabled, or suffered catastrophic injuries has increased. According to Bennet (2002), everyone has an innate desire to feel safe, whether or not they are employed. This need exists both inside and outside of the workplace. In this situation, workers bear full responsibility for their actions as responsible adults for ensuring their own H&S in all social contexts. Due to the numerous methods, training, and processes used by employers, contractors, labor unions, and government agencies generally to guarantee adherence to safety regulations, occupational health now includes occupational safety and health. Since people are naturally concerned about their safety, the most important thing to do is to ensure that safety precautions are in place while using the equipment and the surrounding environment (Joseph, 2014).

Furthermore, Hattingh (2003) observed that a positive mindset reflects safer behavior as many workplace mishaps, particularly those involving construction sites, are caused by employees who fail to follow safety protocols, work processes, and other regulations put in place to save their lives. It is imperative for laborers to acknowledge their significant contribution to the overall efficiency of any project they work on in the construction sector. Samuel (2014) argues that the issue with managing H&S in construction projects is not a lack of understanding about the significance of safety or the absence of a safety policy but rather a lack of implementation or poor worker behavior regarding safety practices. For companies, labor unions, governments, and environmental groups in general, workplace H&S have become critical to commercial success. In terms of H&S practice, the construction industry has performed incredibly low (Peter, 2016). This study, therefore, found it necessary to assess the level of awareness of construction workers of various H&S practices in Akure, Ondo state, Nigeria.

2 HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY

Construction industry workers are frequently exposed to serious risks and hazards due to tasks including working at heights, manoeuvring around moving machinery and on-the-move traffic, and interacting with both below- and above-ground utilities. Several of these problems are recognized and managed using project risk management techniques. The dangers associated with construction work actually exist in diverse and dynamic surroundings where each job offers a unique mixture of situational, individual, and task-specific risk variables (Roupa, Sotiropoulou, and Wozniak 2011).

Since projects in the construction industry can last anywhere from a week to several years, it is challenging to create and maintain workforce identities. The work itself is diverse, encompassing work on open-cut mines, roads, bridges, highways, tunnels, railway lines, commercial and residential buildings, and other structures. The construction business also functions as a contractor, where the principal project manager frequently uses subcontractors, who frequently provide around 90% of the construction workers on any particular project (Biggs, Sheahan and Dingsdag, 2005). Because they are required to work on various job tasks and with various work teams in shifting project environments, workers' exposure to risk is increased

by the transiency of the subcontractor workforce (Hoffmeister, Gibbons, Johnson, Cigularov, & Rosecrance, 2014).

Bhutto, Griffith, and Stephenson (2004), sees OHS as a delicate managerial responsibility that, in certain severe instances, distresses the existence of organizations. However, construction projects don't function freely in the society in which they are situated (Neale, 2013). Notwithstanding, several construction organizations have enriched their safety routine as a result of the introduction of new standards, rules, codes and laws.

Agwu (2012) noted that those in the building sector should see safety in construction as a strategic weapon for maximizing competitiveness and profitability rather than merely another step in the process of avoiding unneeded accidents or expenses. In line with this, Agwu (2012) projected "total safety management" as a performance-oriented approach to construction safety that provides a firm with a long-term reasonable advantage in the world market by creating a safe work atmosphere that is in line with peak performance and constant enhancement by means of the incorporation of all construction safety-related factors (intention, behaviour, culture, and process). However, the perspectives of the majority of companies and organizations in Nigeria indicate that the country's occupational H&S stage is still in its infancy because of employee and employer attitudes, a lack of safety culture, and the absence of enactment of OHS policies (Okafor, 2013). Furthermore, only major multinational corporations adhere to OHS regulations as established in their home nations (Okafor, 2013). The stages managers at each stage to establish an organizational environment where employees will be taught and motivated to conduct safe and productive construction projects should also be included in a typical effective safety management system (Olutuase, 2014).

3 RESEARCH METHOD

This study adopted a survey research approach with the help of a questionnaire survey comprising preformatted, well-structured questions bordering on various H&S practices for respondents to fill. The study was carried out in Akure, Ondo State, Nigeria, using construction workers such as masons, iron benders, electricians, carpenters, painters, plumbers and plant operators, among others. The construction workers were selected from 16 different construction sites. About 150 questionnaires were distributed to the participants in construction activities in Akure, Ondo State. After the distribution, a total of 93 questionnaires were retrieved and used for the study. All data collected from this survey were analysed using the SPSS software. This analysis was carried out using descriptive analysis: Mean Score (MS), frequency and percentage distributions.

Based on the analysis of the retrieved data, the majority of the respondents, 71 (76.3%), were male, while the others, 22 (23.7%), were female. This implies that a good number of the data analysed for this study were responses from the male gender. This depicts the typical nature of the construction industry having more male participants than female. On years of working experience, it was gathered that 51 (54.8%) had 0-5 years of experience, 19 (20.4%) 6-10 years, 9 (9.7%) Over 20 years, 8 (8.6%) 11-15 years and 6 (6.5%) 16-20 years of working experience. This means that all the respondents are experienced in construction work. Hence, were able to provide relevant data for the study. Based on data retrieved on the educational qualification, 1 (1.1%) never attended school. Others had the following qualifications: 2 (2.2%) primary school, 19 (20.4%), secondary school, 16 (17.2%) NCE, and 55 (59.1%) had other qualifications. This means that the majority (98.9%) of the respondents have a minimum of basic educational qualification, which was considered fit for the study. Also, the respondents are specialized in different trades which include bricklayers 15 (16.1%), carpenters 5 (5.4%), painters 8 (8.6%), bar benders 2 (2.2%), tilers 9 (9.7%), plumbers 10 (10.8%), mechanical installation 17 (18.3%), pop 3 (3.2%), electrician 12 (12.9%), roofer 5 (5.4%) and others 7 (7.5%). This implies that the respondents cut across different sections of construction work. Thus, were able to give useful information for the study.

4 FINDINGS AND DISCUSSION

This section entails the respondents' responses on the level of awareness of H&S in the study area. The mean score values for each variable vary from 1.00 – 5.00. Those variables above the average (3.00) are adjudged as acceptable, while those below are adjudged as rejected as it applies to each construct. The findings are presented in Table 1. The variable “Safety training” has the highest mean (M=4.33, SD=1.178) of all other variables, indicating that training of construction workers in terms of safety is very much important and is well known to the construction workers. This is followed by “Use of Goggle, Eye Glasses” (M=4.23, SD=1.879); “Use of Roof jacks” (M=4.20, SD=1.344); “Use of Hand gloves” (M=4.17, SD=1.084); “Limiting of crowd size”, (M=4.15, SD=1.304); “Safety signs” (M=4.12, SD=1.203); “Risk identification” (M=4.02, SD=1.268); “Ladder Scaffold platforms” (M=4.01, SD=1.174); “Keeping work place clean and clear of obstacles” (M=4.00, SD=1.130) while the variable “Use of reflective clothing/vests”, (M=4.00, SD=1.253) comes next in the order of precedence.

Furthermore, the variable, “Hoisting equipment” is ranked next with a mean value (M=3.97, SD=1.281), followed by the variable, “Use of Helmets ” with a mean (M=3.86, SD=1.329); “Use of Nose masks” with a mean (M=3.83, SD=1.249); “Use of safety belts” (M=3.70, SD=1.316) while “Wearing of Safety Boots” (M=3.69, SD=1.332) is the next ranked in that order. Also, the variable, “Use of First Aid kit in case of accident” has a mean value (M=3.68, SD=0.836), followed by “Wearing of Overall” with the mean (M=3.64, SD=1.379); “Use of Hearing protection” with mean (M=3.61, SD=1.387) and “Personal fall arrest system” with mean (M=3.60, SD=1.358). However, “Maintain accessible communication channels” is opined by the respondents to be the least H&S practice known to them. It has a mean value (M=3.55, SD=1.346).

Table 1: Descriptive analysis result for the level of awareness of H&S practices

H&S practices	Mean score	Standard Deviation	Rank
Safety trainings	4.33	1.178	1
Use of Goggle, Eyeglasses	4.23	1.879	2
Use of Roof jacks	4.20	1.344	3
Use of Hand gloves	4.17	1.084	4
Limiting of crowd size	4.15	1.304	5
Safety signs	4.12	1.203	6
Risk identification	4.02	1.268	7
Ladder Scaffold platforms	4.01	1.174	8
Keeping workplace clean and clear of obstacles	4.00	1.130	9
Use of reflective clothing/vests	4.00	1.253	9
Hoisting equipment	3.97	1.281	11
Use of Helmets	3.86	1.329	12
Use of Nose masks	3.83	1.249	13
Use of safety belts	3.70	1.316	14
Wearing of Safety Boots	3.69	1.332	15
Use of First Aid kit in case of accident	3.68	0.836	16
Wearing of Overall	3.64	1.379	17
Use of Hearing protection	3.61	1.387	18
Personal fall arrest system	3.60	1.358	19
Maintain accessible communication channels	3.55	1.346	20

The findings of this study are consistent with Musonda & Smallwood (2008), who stated that H&S awareness needs to be raised, and the effect of H&S in construction needs to be praised. The use of hand gloves, in addition to other H&S practices, helps a lot to prevent accidents on site. The level of use of these H&S practices is very encouraging, given its impacts. Okafor (2013) presented a diverging opinion with this view by indicating that the perspectives of the majority of companies and organizations in Nigeria indicate that the country's occupational H&S stage is still in its infancy because of employee and employer attitudes, a lack of safety culture, and the absence of enactment of OHS policies. Nonetheless, its use is still paramount for the safety of the site.

Furthermore, Fung et al. (2005) stated that there has been a rise in safety and health awareness in the construction business because of the improvement in safety and health culture over the last several years. The use of safety belts and nose masks by the respondents is a good way to show this improvement and hence, reduce the rate of preventable accidents on construction sites. This is supported by Okoro et al. (2016), who indicated that the subsequent creation of methods encourages proactive behaviour, thus lowering the risk and accidents on construction sites. The use of safety belts, especially when operating on works at heights is a good measure of preventing these accidents on construction sites. However, the number of accidents experienced by workers when lifting objects in the construction industry is alarming. This is due to the absence of health and safety practices for construction workers. Olawale (2018) agrees with this by affirming that poor H&S practices characterize Nigeria's building industry. A more robust knowledge of these practices is much needed.

According to Tamene et al (2022), communication is key to facilitating a safer work environment in the construction industry. However, the major issue with H&S is in its enforcement. According to Al-Kaabi and Hadipriono (2003), 75% of construction companies that supply PPE have to make an effort to enforce it because of cultural or religious norms. This also reiterates the importance of communication in relating health and safety information to construction workers. Sometimes, many people on a particular construction site limit the area of space for machinery, equipment and workers. A safety practice of reducing the number of persons at a construction site at a particular time can help reduce accidents. According to Zhou et al. (2015), H&S management will not only address H&S issues but also improve overall adherence to the law. Therefore, good management is needed for H&S to thrive, especially in the number of persons present at sites. According to McGuinn et al (2022), employees and employers may alter their H&S habits if they wear hearing protection more often or after work-rest scheduling principles. Most times, machines are used for construction work, and these produce a lot of noise, hence necessitating the use of hearing aids. However, the use of these hearing aids and other safety equipment is important, though not well-known among the respondents.

Cleanliness is extremely important, especially in helping to maintain a safe work environment in the construction industry. Olutuase (2014) indicated that due to the inherent dangers and hazards present in every workplace environment, it is critical to provide construction workers with safe working conditions. However, this is not well experienced at construction sites in the study area, as many sites are still dirty and unkempt. Hence, site cleanliness is paramount as a critical H&S practice in construction (Tamene et al., 2022). These safety practices are not well complied with, especially in medium and/or small construction projects. Haupt and Smallwood (2005) discovered most typical problems with workers were never contacted about their health because of noncompliance with regulations and management safety. Corroborating this view, Windapo and Oladapo (2012) indicated that the absence of awareness and comprehension of OSH regulations in developing nations impedes compliance. This infers that safety can only be achieved optimally when adherence is top-notch.

4.1 Implications of the Findings

As important as safety is in the construction sector, H&S is still lacking in many construction sites. However, H&S practices in the construction industry are well known by construction workers, according to the respondents to this study. This is very encouraging as safety is always the first construction plan before the commencement of any construction activity. This shows an above-average responsiveness to all concerns regarding safety by construction workers. However, the implementation of these safety practices poses a major problem. Such lackadaisical attitude towards the implementation of H&S is portrayed by the lack of compliance with safety rules on construction sites, explaining the many accidents and mishaps experienced at construction sites. Even when off-site construction is being advocated but less implemented in Nigeria, the attitude to safety is still paramount to achieving a safe working environment for all construction workers. Hence, a proactive step is needed for much more awareness of H&S by construction workers at construction sites, but most importantly, a more intense positive attitude towards a viable implementation plan is very necessary.

5 CONCLUSION AND RECOMMENDATION

This study on the level of awareness of construction workers on H&S practices reveals an encouraging awareness level among the workforce adopted for the study. This insight, derived from a thorough survey and analysis, underscores the construction sector's burgeoning commitment to ensuring the well-being of its labour force. The evidence presented demonstrates a notable recognition of various safety practices, with safety training emerging as a paramount concern among construction workers. This prioritisation of training, alongside protective gear such as goggles, gloves, and safety signs, reflects a proactive stance toward accident prevention and risk mitigation. Moreover, the study highlights a significant room for improvement in communication and enforcement of safety protocols. The low ranking of accessible communication channels as a known H&S practice points to a critical area for development. Enhanced communication strategies and stringent enforcement of safety standards are crucial for fostering a culture of safety that permeates every level of construction operations.

Therefore, this study recommends a multifaceted approach to bolstering health and safety in the construction industry, even with the filtering of off-site construction. Firstly, there should be an intensified effort towards comprehensive safety training programs that are not only accessible but also mandatory for all construction workers, irrespective of their role or level of experience. This training can border on the use of off-site construction technologies and software to curtail and drastically minimize risks of workplace hazards. Such programmes should be designed to address the specific needs and risks associated with various construction activities, thereby ensuring that workers are well-equipped to navigate the hazards of their work environment. Secondly, construction firms and stakeholders must strengthen their commitment to enforcing safety regulations. This entails not only the provision of necessary safety equipment and gear but also the implementation of strict compliance measures. Regular safety audits and penalties for non-compliance could serve as effective deterrents against negligence and reinforce the seriousness of safety protocols. Thirdly, fostering a culture of open communication and feedback within construction sites can significantly enhance safety outcomes. Encouraging workers to report unsafe conditions, share safety concerns, and participate in safety planning processes can lead to more effective identification and mitigation of risks. Moreover, establishing clear and accessible communication channels will ensure that safety information is disseminated promptly and efficiently, thus promoting a proactive safety culture.

References

- Al-Kaabi, N., & Hadipriono, F. (2003). Construction safety performance in the United Arab Emirates. *Civil Engineering and Environmental Systems*, 20(3), 197-212.
- Bennet, D. 2002. Health and Safety Management Systems. Liability or Asset Pub Healthcare Institute.
- Bhutto, K.; Griffith, A.; Stephenson, P. 2004. Evaluation of quality, health and safety and environment management systems and their implementation in contracting organisations, in Proc of the International Construction Research Conference of the Royal Institute of Chartered Surveyors (COBRA 2004). Leeds Metropolitan University, Leeds, 7–8 September, 2004.
- Foad, M. A. 2011. Improving safety performance in construction projects in Libya (case study : In tripoli city) (Master Degree in Civil Engineering), Diponeger University, Tripoli City.
- Fung, I., Tam, C., Tung, K. & Man, A., 2005. Safety cultural divergences among management, supervisory and worker groups in Hong Kong construction industry. *International Journal of Project Management*, 23(7), p. 504–512.
- Gyekye, S. A. 2006. Workers perception of workplace safety: An african perspective. *International Journal of Occupational Safety and Ergonomics (JOSE)* 12(1): 31-42.
- Hattingh, S. 2003. Occupational health: management and practice for health practitioners. Juta. Cape Town.
- Haupt, T. and Smallwood, J. 2005. The need for construction health and safety (H&S) and the Construction Regulations: engineers' perceptions. *Journal of the South African Institution of Civil Engineering= Joernaal van die Suid-Afrikaanse Instituut van Siviele Ingenieurswese*, 47(2), 2-8.

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- Jiang Y., Zhao D., Wang D., & Xing Y. 2019. Sustainable performance of buildings through modular prefabrication in the construction phase: a comparative study. *Sustainability*, 11,5658.
- Joseph, O. A. 2014. Knowledge, Attitude and Compliance with Occupational Health and Safety Practices among Pipeline Products and Marketing Company (PPMC) Staff in Lagos, *Merit Research Journal of Medicine and Medical Sciences*, 2(8): 158-173.
- Kotze, A. 2002. *Occupational Health for the Nurses and other Health Workers*.3rd ed. Cape Town. : Juta & Co.
- McGuinn, P., Buggy, C., Drummond, A., & Sripaiboonkij, P. 2022. Is personal discomfort a main factor in driving employees' wearing of hearing protectors in a mine setting? *Safety and Health at Work*, 13, S142. <https://doi.org/10.1016/j.shaw.2021.12.1195>
- Murali, K & Sambath, K. 2020. Sustainable performance criteria for prefabrication construction system. *International journal of scientific and research publications*, 10(4): 455-458.
- Okeola, O. 2009. Occupational health and safety (OHS) assessment in the construction industry. 1st Annual Civil Engineering Conference, Physical Planning Unit, University of Ilorin, Nigeria, 236-246.
- Okolie, K. C. 2013. Appraising The Influence Of Cultural Determinants Of Construction Workers Safety Perception and Behaviour In Nigeria *International Journal of Engineering and Medical Science Research* 1: 11-24.
- Okoro, C., Musonda, I., & Agumba, J. 2016. Safety performance evaluation of construction workers in Gauteng, South Africa. *University of Johannesburg Content*, 1-13.
- Olawale O.O. 2018. Health and Safety Management Practices in the Building Construction Industry in Akure, Nigeria. *American Journal of Engineering and Technology Management*, 3(1), 23. <https://doi.org/10.11648/j.ajetm.20180301.12>
- Olutuase, S. O. 2014. A study of safety management in the Nigerian construction industry.
- Oswald, D., Sherratt, F. & Smith, S. 2013. Exploring factors affecting unsafe behaviours in construction. *Proceedings of the 29th Annual ARCOM conference*, Reading, 341.
- Peter Uchenna Okoye, J. U. 2016. Building Construction Workers Health and Safety Knowledge and Compliance on Site. *Journal of Safety Engineering*, 17-26.
- Samuel, O. O. 2014. A Study of Safety Management in the Nigerian Construction Industry. *IOSR Journal of Business and Management*, 16(3): 1-10.
- Schoenborn J.M. 2016. A case study approach to identifying the constraints and barriers to design innovation for modular construction. Master's Thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- Tamene, A., Habte, A., Endale, F., & Gizachew, A. 2022. A qualitative study of factors influencing unsafe work behaviors among environmental service workers: perspectives of workers, and safety managers: the case of government hospitals in Addis Ababa, Ethiopia. *Environmental Health Insights*, 16, 11786302221109357.
- Windapo, A., and Oladapo, A. 2012. Determinants of construction firms' compliance with health and safety regulations in South Africa. In Smith, D.D (Ed) *Procs 28th Annual ARCOM conference*, 3-5 September 2012, Edinburgh, UK. Association of Research in Construction Management, 433-444.
- Zhou, Z., Goh, Y. M., & Li, Q. 2015. Overview and analysis of safety management studies in the construction industry. *Safety science*, 72, 337-350.