



**Manuscript Title**      Assessment of Basic Measures Instituted to Curtail the Spread of COVID-19 on Construction Sites in Lagos, Nigeria

**Authors**                 Oluseyi Julius Adebawale, Fredrick Simpeh, Patricia Omega Kukoyi and Justus Ngala Agumba

**Submitted Date**        11-Dec-2020 (1st Submission)

**Accepted Date**         5-Jul-2021

**DOI**                        <https://doi.org/10.21315/jcdc-12-20-0251>

EARLY VIEW

# Assessment of Basic Measures Instituted to Curtail the Spread of COVID-19 on Construction Sites in Lagos, Nigeria

Oluseyi Julius Adebawale<sup>1</sup>, Fredrick Simpeh<sup>2</sup>, Patricia Omega Kukoyi<sup>3</sup>, Justus Ngala Agumba<sup>4</sup>

<sup>1,4</sup>Department of Building Sciences, Tshwane University of Technology, South Africa

<sup>2</sup>Department of Quantity Surveying and Construction Management, University of the Free State, South Africa

<sup>3</sup>Department of Building, University of Lagos, Nigeria  
Corresponding author - adebowaleoluseyi@gmail.com

**ABSTRACT:** The COVID-19 pandemic has altered every industry's operations and safety requirements, including that of the construction industry. Different measures are thus required to mitigate the spread of the disease among construction site workers. This paper explores the basic measures construction organisations have instituted at construction project sites to curb the spread of the virus among construction site workers. A qualitative research method was adopted for the study, while data were collected through open-ended questions. Summative content analysis was employed to analyse the qualitative data and determine the frequency of keywords that were further translated to quantitative measurements. The study determined that construction organisations have largely instituted some basic measures to curb the spread of COVID-19 on sites, whereas most organisations were lacking in the area of social distancing. COVID-19 is still new; therefore, the body of knowledge is still at the infancy stage. To date, there is no evidence of empirical studies that addressed the compliance level of the Nigerian construction organisations with basic measures of curtailing the spread of COVID-19. Policymakers could adopt the interventions arising from this study to mitigate the spread of the virus.

**Keywords:** Construction site, COVID-19, Health and safety, Measures, Nigeria

## Introduction

The COVID-19 pandemic has had a disastrous effect, affecting both human lives and the economy of many countries (Harinarain, 2020). The pandemic is the most severe socioeconomic and health crisis the world has seen since World War II (Jallow et al. 2020). To mitigate the spread of the virus, the World Health Organisation (WHO) developed protocols and guidelines that are expected to be implemented worldwide. Due to the ease of transmission of the virus, many countries, including Nigeria, 'locked down' to allow them to prepare and put measures in place to curb the spread of the virus. Consequently, the activities of construction organisations in Nigeria were halted due to the lockdown imposed.

After months of lockdown, which had a significant impact on the Nigerian economy, the Nigerian government gradually began to ease the lockdown by allowing movement and operation in different sectors of the economy. However, the easing of the lockdown was premised on the government's resolve to implement essential measures to curtail the spread of the deadly virus that ravaged several countries worldwide. The quest to save humans from the pandemic has become a primary concern for countries around the world, including Nigeria. (Alozie et al. 2020). People all over the world are becoming more aware of the best practices during a pandemic as a result of the coronavirus pandemic. The pandemic has negatively affected all sectors of the economy, including the construction sector.

On the one hand, the construction industry makes a considerable contribution to the economic prosperity of many countries (Murie, 2007). According to the International Labour Organization (ILO), the construction industry accounts for around 10% of global GDP and employs about 7% of the global population. Construction contributed 513,692.43 million naira to Nigeria's economy in the second quarter of 2020. (Trading Economics, 2020). On the other hand, in many countries, the industry contributes considerably to worker accidents, injuries, and deaths. The dangers and risks that construction sites pose to workers' health and safety have been emphasised in several studies. (Hinze and Giang, 2008; Pinto et al., 2011; Abrey and Smallwood, 2014; Legg et al., 2015; Okoro et al., 2016; Okorie and Musonda 2018; Maiti and Choi, 2019). The COVID-19 pandemic will certainly aggravate construction site worker's exposure to risks and health and safety hazards.

The World Health Organization (WHO) has developed guidelines and strategies to combat the virus's spread, and governments all over the world have adopted or adapted some of the policies. However, it is unknown whether these procedures are being implemented on construction sites. A study conducted by Matecka et al. (2020) revealed that authorities' recommendations are not fully implemented. The lack of compliance is one of the causes of accidents and fatalities on-site and could militate against the effort made to curb the spread of the virus. Therefore, a study investigating measures instituted by construction organisations to help mitigate the spread of COVID-19 on-site is justifiable. The purpose of this study is to establish "what steps have Nigerian construction organisations implemented to control the spread of COVID-19 on their sites." Addressing this question will provide insight into areas in which construction organisations lack compliance with safety measures, which will further help policymakers take appropriate actions towards mitigating the spread of COVID-19.

Many research projects concerning COVID-19 have been conducted in different industries. However, there is a paucity of such studies in the Nigerian construction industry. Similarly, studies that address the Nigerian construction

organisations' basic measures to curb the spread of the COVID-19 pandemic are still lacking. Therefore, this research gap makes it essential to ascertain the compliance of construction organisations to measures instituted to curtail the spread of COVID-19 in Nigeria.

## **Literature Review**

### **COVID-19**

COVID-19 is believed to have originated in an animal host, such as bats, and is transmitted from person to person. COVID-19 has a higher transmission competence than other viruses such as Ebola, SARS-CoV, or MERS-CoV, which explains the growing number of confirmed cases worldwide. (Ohia et al., 2020). The disease spreads from one person to another through droplets from sneezing, coughing, and sweat of an infected person (WHO, 2020). Individuals can also be infected with the virus when their hands touch surfaces that contain the virus, and further touch their eyes, nose, or mouth with the contaminated hands (WHO, 2020).

The new virus was first discovered in Wuhan, China, in December 2019, and the World Health Organization designated it a pandemic on March 11, 2020. (WHO, 2020). COVID-19 has a 2-14 day incubation period, with symptoms appearing within five days (CDC, 2019). Its symptoms vary from mild to severe illness. Symptoms may include fever, cough, fatigue, shortness of breath, headaches, and sore throat. Nigeria, one of the countries afflicted by COVID-19, reported its first case in February 2020, and the number of confirmed cases continues to rise. Nigeria had 62,964 confirmed cases and 1,146 deaths as of November 1, 2020, according to the National Center for Disease Control (NCDC). On the global stage, as of September 5 2020, WHO recorded confirmed cases of 26,415,380 COVID-19 infections and 870,286 deaths (WHO, 2020). Although the number of confirmed cases to deaths is low, there have been speculations that Africa will be highly affected by the disease at the end of the pandemic (Ohia et al., 2020). This notion may be due to the inadequate health systems on the African continent. Guner et al. (2020) affirmed that stopping the spread of the virus within communities will depend on the development of coordination mechanisms in all sectors of the economy.

### **COVID-19 and the Global Economy**

The spread of the new coronavirus has become one of the most challenging threats facing the global economy, resulting in disruptions to businesses, supply chains, and travel. During these difficult times, there has been pervasive fear of a new recession, which will inevitably result in the collapse of the economy. This anxiety has prompted the need for steps to be implemented to mitigate the pandemic's effect. (Jallow et al. 2020). COVID-19 led to the total lockdown of the Chinese economy, while the Chinese government enforced a stay-at-home order to curb the spread of the

disease (Temidayo et al. 2020). As a result of the impact of COVID-19, Nigeria and other oil-dependent economies experienced a downturn in global oil prices with a resultant effect on their economic wellbeing (Abubakar et al. 2020).

According to Gamil and Alhagar (2020), several studies have investigated how COVID-19 has influenced various sectors of the global economy. Fernandes (2020) investigated the impact of COVID-19 on the economy of 30 countries. The study reported the dwindling effect COVID-19 has on the gross domestic product (GDP) of countries. Supply chains, tourism, commerce, manufacturing industries, and transportation are the most affected due to restrictions by government authorities on movement from one place to another (Yadeta, 2020). Consequently, this has resulted in the loss of jobs and hardships in securing the daily needs of individuals. Yadeta (2020) opined that the construction industry would also experience similar hitches, such as shortfalls in labour and material supply.

### **Construction Health and Safety Issues**

In a study on work-related coronavirus transmission, Lan et al. (2020) discovered that construction workers were significantly at risk of early breakouts of the disease. This is because virus carriers who exhibit symptoms (symptomatic) or do not exhibit symptoms (asymptomatic) may continue to work and spread the disease. As a result, the WHO developed a set of measures to protect workers in the workplace (WHO, 2020). Rosemberg (2020) suggests the need to revise and develop policies and procedures to contain the spread of COVID-19 on construction sites and prevent future outbreaks of infectious diseases, hence enabling sufficient risk assessment as administrative measures. Such measures may include minimising the number of workers on-site at a given time, ensuring adequate and informed health and safety training, and improving workers' COVID-19 awareness. The essence of the social distancing (2m apart) measure in the workplace is to reduce the risk of inhaling the COVID-19 droplets, such as droplets from the mouth and nose of an infected person through sneezing, coughing, and speaking.

Employers are responsible for maintaining a healthy and safe workplace. Lan et al. (2020)'s study highlighted the significance of COVID-19 transmission at work. The study revealed that the majority of studies on COVID-19 occupational exposure focus on health care employees. In contrast, there is a dearth of studies on work-related risks among construction workers and the influence of COVID-19 on the construction industry. As the number of global cases increases, its impact on the construction industry is expected to change over time. Precautionary measures are the only approach to constrain the spread of the disease. Some of these measures are summarised in Table 1.

**Table 1: Measures to curtail the spread of COVID-19**

<b>Measure</b>	<b>Author</b>
Use of visual tools such as videos and signs to educate individuals, physical distancing of 2 meters, use of PPE, washing of hands with soap and water, rubbing of hands with alcohol-based hand sanitizers, and cleaning of surfaces with disinfectants	WHO (2020)
Full or partial closure of workplaces, reducing the number of visitors within confined places, restriction of gatherings, use of PPE, early quarantine, increasing the number of testing individuals, Good sanitation and hygiene, regular hand washing, avoid close contact at work, use of hand sanitizers, and avoid crowds.	Guner et al. (2020)
Staying indoors policy, social distancing, avoiding crowded spaces proper screening of workers, checking vital signs, sanitization, adequate ventilation, and use of PPE at work.	Temidayo et al. (2020)
Regular use of masks, regular washing of hands, good hygiene practices, sanitation, screening, social/physical distancing, avoiding social activities, and not touching one's face.	Lemke et al. (2020)
Social distancing, hand washing, stop all non-essential visitors, regularly clean common contact surfaces in reception, office, access control and delivery areas, reduce the number of people in attendance at site inductions and consider holding them outdoors wherever possible, wash or sanitise hands before and after using the facilities, hygiene, provide additional supervision to monitor and manage compliance	Construction Leadership Council, 2021; HM, Government (2020)

COVID-19 is an infectious virus that spreads rapidly through diverse human activities such as touching, sneezing, and coughing. According to published reports, the deadly virus outbreak claimed many lives and economically devastated numerous individuals and countries. Due to the virus's negative influence on the human race, the WHO implemented safety measures to mitigate the COVID-19's risk. The safety measures include, but are not limited to, a policy of staying indoors, maintaining physical distance, regularly washing hands, avoiding crowds, using face masks and hand sanitisers, and avoiding facial contact.

### **Research Methodology**

The study was aimed at determining the measures instituted on-site to help curb the spread of COVID 19. Therefore, a qualitative approach was deemed appropriate for the study. Polit and Beck (2017) explained that the qualitative research approach allows researchers to gather comprehensive views about a phenomenon under study. Mohajan (2018) also expressed that a qualitative research approach allows the researcher to explore the experiences of individuals to understand a complex phenomenon. There are several methods of collecting qualitative data, including face-to-face interviews, data gathering with open-ended questions, among others. For this study, open-ended questions were used as the instrument for data collection. Open-ended questions allow respondents to provide their experiences, understanding and perceptions about a phenomenon from their perspectives (Leedy and Ormrod, 2015). The Bureau of Public Procurement

(BPP) classified the Nigerian contractors into grades A, B, C, and D (BPP, 2012). This classification is based on the contractors' technical, financial, and general capacity to execute projects and other procurement activities (BPP, 2012). However, the target population for this study were grade B construction organisations operating in Lagos State, Nigeria. The participant organisations had ongoing construction projects, which their workers were executing.

A purposive sampling method was adopted for distributing the questionnaire to address the subject under investigation. This type of sampling is based on predefined criteria, which in this case are grade B registered contractors (Leedy and Ormrod, 2015). Among the selected organisations, respondents were further chosen based on their availability and willingness to participate in the study. A total of 22 questionnaires were distributed; however, only 13 were returned, with one being incomplete; hence, 12 questionnaires were considered useful for analysis. Samples between 8 and 16 are generally considered adequate for a qualitative study (Namey et al., 2016). A face-to-face interview was the initial plan for data collection. However, due to COVID-19 regulations, it was impossible to carry out a face-to-face interview. For qualitative studies, questionnaires are usually open-ended or semi-structured (Leedy and Ormrod, 2015). The research questions were emailed to the participants to complete and returned through the same medium. The open-ended questions allowed participants to express and clarify their opinions without any restriction.

Respondents were provided with a guide outlining the areas that researchers wished to investigate about the basic measures implemented by their organisations to contain the spread of COVID-19. The guide was divided into three sections. The first section obtained information on respondents and their organisations. The second section requested respondents to provide a brief overview of their current projects. In contrast, the final section sought to elicit information on specific basic measures implemented on-site by respondents' organisations to limit worker exposure to COVID19. These measures included personal protective equipment (PPE), COVID-19 awareness creation and information sharing, screening, hygiene and sanitation, material handling, site access, and social distancing.

One of the ways for analysing qualitative data is content analysis. For a long time, content analysis was thought to be concerned with the objective, systematic, and quantitative explanation of the manifest content of any communication. Furthermore, content analysis has come to mean interpretations of hidden content, which can be done in a conventional, directed, or summative manner. (Alok et al., 2014). Unlike conventional and directed analytical approaches, summative content analysis is concerned with counting and comparisons of keywords, which is further interpreted in relation to the study context (Hsieh and Shannon, 2005). This study employed

summative content analysis to study the basic measures instituted to curtail the spread of COVID-19 on construction sites in Lagos, Nigeria. Keywords and concepts in responses were counted, compared, interpreted, and presented. Content analysis is a research tool that focuses on meanings and is appropriate when a study contains a large amount of data rather than categories (Schutt, 2012). For this study, the data was analysed using Creswell's method (Creswell, 2014). The collected questionnaires were screened for analysis, and the responses were examined before being manually coded in an Excel spreadsheet. The frequency of keywords was determined, and essential content descriptions were presented.

### **Data Presentation**

The socio-demographic data of research participants is presented in Table 2. The study participants' organisations operate in building construction works and building and civil engineering works. The research finding revealed that construction organisations, which majorly operate in building construction works, constitute 58.3%, while those specialising in building and civil engineering works make up 41.7%. Additionally, the results showed that all the participating organisations were registered at the grade B level. According to BPP's classification of contractors in Nigeria, these organisations are relatively large and have a significant potential to deliver complex infrastructure in Nigeria. The entire study's participant population is composed of men. This finding is unsurprising, given the male predominance in the construction business. Additionally, a sizable majority of survey respondents (66.7%) were members of their respective professional organisations. A breakdown of respondents' membership in professional bodies in the construction industry revealed that 25.0% of respondents were members of the Nigerian Institute of Architects (NIA). Additionally, 16.7% were registered with the Council for the Regulation of Engineering in Nigeria (COREN), 8.3% with the Nigerian Institute of Building (NIOB), the Institute of Safety Professionals of Nigeria (ISPON), and the Nigerian Institute of Quantity Surveying (NIQS), and 33.3% were not registered with their professional bodies. According to the preceding analysis, a greater proportion of the survey participants are professionally knowledgeable. This finding is reinforced further when the respondents' levels of responsibility and years of experience in the construction industry are considered. The Chief Executive Officers (CEOs) constitute 25% of the study's participants. Project managers similarly represent 25%, health and safety officers (20%), and each site engineer, civil engineer, and quantity surveyor constitute 8.3% of the study's participants. 8.3% of the respondents did not indicate a position of responsibility. Concerning respondents' years of experience in the construction industry, the findings revealed that the majority (66.7%) of the respondents have been working in the construction industry for not less than 15 years, 8.3% have worked for 5 years, and 16.7% of the respondents have less than 5 years of experience in the construction industry. 8.3% of respondents did not indicate their years of experience. The respondents' average years of experience is 15.3 years. Consequently, it is

safe to infer that respondents had considerable experience in the industry, which may have aided in the collection of robust data.

**Table 2: The demographic details of the participants**

Interviewee	Type of organisation	Gender	Position	Years of Experience	Registration
Participant 1	Building Construction works	Male	Project Manager	20 years	NIA
Participant 2	Building and Civil Engineering works	Male	Site Engineer	18 years	NIOB
Participant 3	Building Construction works	Male	CEO	17 years	NIA
Participant 4	Building Construction works	Male	Civil Engineer	4 years	N/A
Participant 5	Building and Civil Engineering works	Male	Project Manager	15 years	COREN
Participant 6	Building and Civil Engineering works	Male	Health and Safety Officer	16 years	ISPON
Participant 7	Building Construction works	Male	N/A	NA	N/A
Participant 8	Building Construction works	Male	CEO	30 years	NIA
Participant 9	Building and Civil Engineering works	Male	CEO	18 years	COREN
Participant 10	Building Construction works	Male	Project manager	21	NIQS
Participant 11	N/A	Male	Health and Safety Officer	2	N/A
Participant 12	Building Construction works	Male	QS	5	N/A

Table 3 reveals the nature of the projects in which participants organisations were presently involved during the data collection exercise. 50% of the participants indicated that their organisations were involved in the construction of new houses. The organisations that currently undertake road

construction constitute 16.7%, while those engaged in warehouse construction similarly represent 16.7%. Only one organisation was involved in renovation and maintenance work, which was also the case with the organisation involved in constructing offices. Most of the organisations represented in this study were engaged in building new houses.

**Table 3: Overview of current project**

<b>Current project</b>	<b>Frequency</b>	<b>Percentage</b>
Renovation and Maintenance	1	8.3
Construction of new houses	6	50.0
Bridge and road construction	2	16.7
Construction of warehouse	2	16.7
Construction of offices	1	8.3
<b>Total</b>	<b>12</b>	<b>100</b>

### **COVID-19 Health and Safety Measures Instituted On-site**

Besides the general safety measures, respondents were required to state the COVID-19 PPE-related measures, which their organisations have instituted on-site to prevent exposing their workers to the novel virus. Table 4 reveals that 36.8% of the participants' organisations provided their workers with face masks, 26.3% provided hand gloves, 21.1% offered alcohol-based sanitisers, and 15.8% provided face shields.

**Table 4: Personal Protective Equipment**

<b>PPE Provision</b>	<b>Frequency</b>	<b>% of respondent</b>
Face Mask	7	36.8
Hand gloves	5	26.3
Face shield	3	15.8
Alcohol-based sanitizer	4	21.1
<b>Total</b>	<b>19</b>	<b>100</b>

Additionally, this study views knowledge and information sharing as critical components in containing the spread of the virus during a pandemic. Towards this end, the mediums of information dissemination in the respondents' organisations were appraised. As shown in Table 5, 50% of the participants' organisations engaged their employees in frequent awareness talks. Other means of creating awareness and information sharing, which the organisations less practised, include sticker, induction, toolbox talks, COVID-19 posters, video, newsletter and bulleting, and phone reminders. Each of these measures was adopted by 7.1% of the organisations that are represented in this study.

**Table 5: Creating awareness**

<b>Approach</b>	<b>Frequency</b>	<b>%</b>
Awareness meeting	7	50
Sticker	1	7.1
Induction	1	7.1
Toolbox talks	1	7.1
COVID-19 posters	1	7.1
Video	1	7.1
Newsletter and bulleting	1	7.1
Phone reminders	1	7.1
<b>Total</b>	<b>14</b>	<b>100</b>

In terms of hygiene and sanitation, each participant indicated that their organisations undertake daily screening exercises before anyone is granted access into the organisation's premises. This initiative will aid in preventing individuals suspected of having any of the COVID-19 symptoms from entering the organisation. Table 6 reveals that hand washing and sanitising were practised by 75% of the participants' organisations. 16.7% of organisations disinfect regularly touched surfaces, and 8.3% fumigate their environments to ensure good hygiene and sanitation.

**Table 6: Hygiene and sanitization**

<b>Approach</b>	<b>Frequency</b>	<b>Percentage</b>
Hand washing and sanitizing	9	75.0
Fumigation	1	8.3
Disinfection of regularly touched surfaces	2	16.7
<b>Total</b>	<b>12</b>	<b>100</b>

A common means through which COVID-19 can spread is through contacts. Indeed, the system of handling materials and equipment on construction sites is critical during the outbreak of the pandemic. The data gathered revealed that some organisations have ensured that specific measures were introduced to prevent workers' contact with materials on site. Besides, the organisations have adopted varied approaches in restricting access and providing security on their sites. Most of the organisations have developed their internal mechanism in handling access and security matters. An important measure that continues to reverberate during the outbreak of the novel virus is social distancing. The study demonstrates that the majority of participants' construction firms have struggled to comply with social distancing.

## **Discussion of Findings**

This section discusses the findings of basic measures that have been instituted by construction organisations towards curbing the spread of COVID-19 on site.

### **Personal Protective Equipment**

Face masks, hand gloves, alcohol-based sanitisers, and face shields are the top four PPE-related procedures that participants' construction firms implemented on their job sites. The findings revealed that each of the research participants' organisations implemented at least one fundamental PPE measure. However, each construction organisation is expected to implement these essential measures fully. However, no construction organisation implemented all the basic measures identified in this study. This practice is inconsistent with both the Nigerian special presidential task force on COVID-19 Nigeria (NCDC, 2020) and WHO guidelines, which stipulate that workers' protection should be ensured in the workplace (WHO, 2020). It, therefore, poses a severe threat in the form of the vulnerability of construction workers to contacting the virus. Contrastingly, according to Simpeh and Amoah (2021), South African construction organisations provided these basic PPEs to site workers based on risk assessment and further ensured that the PPEs were always used correctly, maintained, and replaced when necessary. According to the Construction Leadership Council (CLC) (2021), where workers are unable to wear respiratory protective equipment, their employer should provide them with face coverings that should be worn at all times in enclosed spaces, where social distancing is not always possible, and where they come into contact with others they do not normally meet.

### **Information Sharing**

Construction organisations have deployed several ways to share COVID-19 related information with their workers. The organisations have primarily adopted the use of awareness meetings to educate their employees about COVID-19. Additionally, organisations use stickers, induction, toolbox talks, COVID-19 posters, videos, newsletters, and bulletins to disseminate information. The predominance of awareness meetings as a means of sharing COVID-19 information may be related to the fact that construction organisations consider the method more feasible in terms of timeliness and cost-effectiveness. It is also noteworthy that none of the organisations has failed to adopt a COVID-19-related information-sharing mechanism. Some organisations embraced daily awareness meetings and training on COVID-19 to ensure that their workers do not miss out on important information regarding COVID-19. Kukoyi and Adebowale (2021) indicate the need for training and re-training of construction professionals on health and safety. The special presidential task force on COVID-19 convenes every day at the Presidential Villa to disseminate vital information that helped prevent the novel virus's spread. At the same time, the National Center for Disease Control also frequently shared COVID-19 updates on its website. Construction

companies should not presume that their employees are aware of important information posted on these platforms. As a result, the daily awareness discussions by Participants 7, 8, and 9 can be described as an excellent course of action in COVID-19-related information sharing.

Similarly, some construction organisations (Participants 1, 3, 4, and 6) used awareness meetings. Also, two organisations (Participants 1 and 3) have introduced posters and stickers to teach their employees about COVID-19. According to Participant 3, frequent reminders about COVID-19 were sent to workers' phones. It is observable that some organisations have appointed site supervisors and safety officers to enforce COVID-19 rules. However, Maecka et al. (2020) discovered that the government's COVID-19 protocols were not being properly implemented. The scholars (2020) further opined that some construction organisations needed to change the structure of their enforcement personnel to ensure compliance with essential COVID-19 guidelines. However, because safety officers were typically deployed as compliance officers, it is crucial to implement various technological advancements to improve health and safety on job sites (Akinlolu et al. 2020; Jallow et al. 2020). Construction organisations in Nigeria are cognizant of the importance of COVID-19 awareness campaigns, as shown by the findings of this study. These practices are largely consistent with Rosemberg's (2020) submission on the significance of COVID-19 awareness in all organisational settings.

Furthermore, the conclusion corroborates the findings of a study conducted in China on the awareness of construction industry practitioners regarding COVID-19. According to the survey, most construction workers are knowledgeable about COVID-19 and are generally optimistic about the pandemic's eradication (Zheng et al. 2020). However, Matovu et al. (2021) discovered that awareness of COVID-19 prevention strategies differs in Uganda. They reported less understanding of the importance of avoiding unwashed hands touching the mouth, eyes, and nose, as well as sneezing through a bent elbow. Participant 5 did not specify the way by which his organisation shares information. This omission could suggest that the organisation did not prioritise awareness campaigns and information sharing to limit the spread of the novel virus.

### **Screening**

The organisations represented by Participants 1, 2, 8, and 11 reported their belief that their firms had a culture of inspecting critical signs before granting access to their construction sites. While this may be a practical step toward restricting the spread of COVID-19, the participants did not specify the type of signs that were inspected prior to personnel and visitors entering their site. It can only be assumed that some of the basic COVID-19 safety checks, especially those captured in this study, were considered by the organisations. However, Participants 3 and 4 provided more detailed information, stating

that their organisations checked body temperatures before allowing access to their construction sites. WHO (2020) mandates that all organisations take the body temperature of their personnel and visitors before admitting them onto the organisation's premises. This measure is also consistent with the NCDC's (2020) guidelines.

Checking the body temperature is critical, as Chang et al. (2020) highlight that while a body temperature of 37.5 °C is regarded normal, a body temperature more than this limit warrants additional research to identify the concerned person's status. According to CLC (2021), sick workers should be reported to their manager or supervisor. They should return home immediately and prevent such workers from touching anything on the construction site. This precautionary measure implies that these participants' organisations in undertaking body temperature checks will be able to identify workers or visitors who may be carriers of the novel virus. Four of the participants (Participants 5, 6, 7 and 12) indicated that their organisations use thermometers to determine body temperature. The use of a non-contact forehead thermometer is considered to be effective for the early detection of COVID-19 (Ebeid et al., 2020).

Consequently, adopting this medical equipment will assist the organisations to detect individuals with temperature-related symptoms of the virus. It is instructive that Participant 9's organisation was more committed to monitoring their employees' temperatures in the mornings and the evenings. The mandatory self-assessment checklist is a viable initiative to determine the COVID-19 status of workers. However, measures need to be put in place to ensure that workers honestly inform their organisations of their actual state of health. A similar study conducted in South Africa by Simpeh and Amoah (2021) indicated that a few construction organisations did not have a formal screening scheme. However, every organisation represented in this study has demonstrated the capacity to screen workers and visitors as required by COVID-19 safety regulations.

### **Hygiene and Sanitation**

Several organisations have taken to hand washing to reduce the risk of COVID-19 spread. This observation was underscored by Participants 1, 2, 3, 8, and 9, who identified hand washing and the use of hand sanitisers as steps their organisations have implemented to ensure hygiene and housekeeping in their organisations. Matovu et al. (2021) reported a high compliance rate with regular hand washing with soap and running water. In contrast, compliance with applying an alcohol-based hand-sanitiser is relatively low in Uganda. Frequent handwashing and healthy hygiene measures are consistent with Lemke et al. (2020) and WHO (2020), which prescribed regular handwashing and good hygiene practices.

As part of the strategy to prevent the spread of COVID-19, governments and organisations in many countries are taking the initiative of fumigating public places as a means of disinfecting and making such environments safe (Business Day, 2020; Naijasurf, 2020). Fumigation of the environment at workplaces and worship centres was also part of the guidelines provided by the Nigerian government to ensure environmental safety and prevent the spread of COVID-19 (Federal Ministry of Education, 2020). An essential measure to maintain good hygiene is disinfection of regular touch surfaces, which was undertaken by the organisations of Participants 7 and 10.

Oginni et al. (2020) opined that the response of the Nigerian government to the COVID-19 outbreak has been relatively prompt. As part of the measures to curb the spread of COVID-19, the Nigerian government instructed every organisation to disinfect their work environments and regularly touched surfaces. However, the finding from this study reveals that only Participant 4's organisation disinfects their work environment, while two other organisations represented by Participants 7 and 10 disinfect regularly touched surfaces. This result is in accordance with the stipulated guidelines by the presidential task force on COVID-19. However, Participants 6 and 11 did not indicate any measures instituted by their organisations to ensure good hygiene on their construction sites. This omission suggests that the organisations have less consideration for hygiene and sanitation.

### **Material Handling**

This survey reveals that some organisations have adopted measures to prevent their workers from coming into contact with construction materials. These organisations have primarily introduced the use of hand gloves. Undoubtedly, wearing hand gloves can prevent direct hand contact with construction materials, tools, and equipment. The results indicate that Participants 2, 3, 6 and 8 have resorted to using PPEs, such as hand gloves to handle materials on sites. Although this is a positive initiative to reduce the spread of COVID-19 on construction sites, the extent of workers' compliance could not be ascertained. Similarly, organisations represented by Participants 4 and 9 ensure that materials, tools, and equipment are disinfected before they are delivered to the site. This measure is geared towards preventing the possibility of receiving infected materials into the organisations. Another organisation delegated responsibility for receiving items on-site to a few of its employees. These staff would have received the necessary training to manage construction materials on their sites appropriately. Despite the high procurement costs, an organisation has chosen to use locally sourced materials in its construction activities. It must be noted that this measure does not guarantee safety concerning COVID-19 infection but would significantly lower the risk of infection. This is because Nigeria has one of the lowest rates of COVID-19 infection in the world, and sourcing locally made material will provide additional protection from COVID-19 infections. Unfortunately, not every construction material can be locally sourced.

The field survey suggests that the organisations' material handling practices are generally noteworthy, as most of them have implemented reasonable material management procedures on their construction sites. This contrasts with the organisation represented by Participant 10, which has demonstrated a nonchalant attitude toward handling their materials. Similar to the findings of this study, most of the construction organisations in South Africa have imbibed COVID-19 compliance material management systems. In contrast, only a few organisations had not implemented such procedures during the pandemic outbreak (Simpeh and Amoah, 2021). In essence, the material management system, which the organisation has always been using before the pandemic, was not reviewed to capture the reality of the pandemic. Consequently, this leaves the safety of the workers to chance as their vulnerability to infection increases.

### **Site Access**

The participants in this study mostly responded to the inquiry on access to construction sites from the perspective of site visitors. The survey reveals that most construction companies allowed visitors to their sites while adhering to COVID-19 safety guidelines. However, one organisation has established a policy that forbids visitors from entering their premises. In contrast to the preceding, an organisation does not impose any restrictions on visitors. This study showed that Participants 1, 3, 5, 7, 8, and 12 allowed visitors into their organisations. However, each organisation had its unique approach to visitors. For instance, Participant 1 stated that visitors were only allowed into their organisation by invitation, and such visitors were expected to follow their safety requirements.

Similarly, Participants 3 and 8 declared that only visitors with a specific purpose for visiting the firm's construction site were permitted to do so. The organisation determines whether the purpose of the visit is important by applying specific criteria or checklist items established by the organisation. In addition, Participant 5's organisation has created a more robust mechanism that would stop the virus from spreading through site visits. This system includes some steps that would dissuade people who do not have a convincing reason for visiting the firm. Some construction organisations conducted inductions in Nigeria. This is contrary to the report of a study conducted in the United Kingdom. The study reported that inductions were challenging to manage with the pandemic and lockdown as it involves drugs and alcohol tests (Jallow et al. 2020). An organisation represented by Participant 2 refused visitors entry but instead choose to adopt online meetings should there be a need to attend to visitors. This method would considerably reduce congestion on site and mitigate the chances of COVID-19 infection.

Some organisations resulted in the use of security officers to ensure that access to their site is secured from unauthorised visitors. Where people are prone to resist protocol to get their way, the use of security personnel to regulate access to the site may be more effective. During the onset of the COVID-19 outbreak in the Philippines, for example, Quezon and Ibanez (2021) reported noncompliance with health regulations on construction sites. It is alarming to discover that an organisation did not implement any access restrictions during such a crucial period. In contrast to other organisations, Participant 10 stated that their firm did not impose any restrictions on visitors to their construction sites. This development is a major source of concern since it puts personnel in danger of virus infection.

### **Social Distancing**

The findings reveal that social distancing as one of the essential measures to curb the spread of COVID-19 is a significant challenge for most of the construction organisations that are represented in the study. Eight of the construction organisations did not observe social distancing, while only four organisations abided by social distancing guidelines. Social distancing (2m apart) measure in the workplace is to reduce the risk of inhaling the COVID-19 droplets, such as droplets from the mouth and nose of an infected person through sneezing, coughing, and speaking. CLC (2021) recommended that construction workers maintain a distance of 1m when a 2m distance is not viable. The social distancing measure is consistent with the guidelines provided by Lemke et al. (2020) and WHO (2020), which prescribe the need for physical distancing between people to prevent the spread of COVID-19.

Representatives of organisations that found social distancing challenging to implement and consequently were unable to comply with the measure have thus reported. Participants 6, 8, 11, and 12, on the other hand, complied with the social distancing measures. Only four construction companies, accounting for 33.3 %, observe social distancing guidelines on their project sites. This study has shown that when it comes to social distance, the safety of workers is left to chance in the majority of the organisations that participated in the survey, as the organisations have largely compromised on social distancing measures aimed at containing the spread of COVID-19. The finding is consistent with the study conducted by Jaja et al. (2020). They maintain that social distancing guidelines are not observed in many parts of South Africa; hence a spike in the infection rates in some provinces. The study reported that 80% of all infections in the region in the Eastern Cape Province resulted from non-adherence to social distancing policy.

### **Conclusion**

The outbreak of the COVID-19 pandemic has forced organisations and nations of the world to intensify their search for public health safety measures. Measures to mitigate the adverse effect of the novel virus were primarily introduced and circulated by relevant bodies such as the WHO. This study

examined seven basic pertinent steps to preventing the spread of COVID-19, based on some of these measures. The basic steps, including the use of PPE, information sharing and awareness, screening, hygiene and sanitation, material handling, site access, and social distancing, were appraised to ascertain the preparedness of contractors to curtail the spread of COVID-19 in Lagos, Nigeria. The study determined that the organisations provided at least one basic PPE related measure or the other to their workers. However, a few construction firms failed in the provision of some of the recommended measures.

In terms of information sharing, holding awareness meetings with their workers was the most preferred approach among the organisations surveyed. Workers and visitors were screened, and the organisations have largely imbibed good hygiene culture as required by COVID-19 safety regulations. In contrast, construction organisations have largely compromised on social distancing measures. Some organisations believe that the steps do not apply to them, while others believe that physical separation is challenging to implement. Only four organisations were observed to comply with social distancing guidelines. As a result, this study emphasises the importance of personal protective equipment (PPE) and adherence to social distancing requirements for construction firms. Furthermore, government officials must conduct frequent inspections of construction sites to ensure compliance with the COVID-19 laws. This study has revealed areas where construction organisations have failed to comply with safety measures. These identified shortcomings in the application of safety standards will aid policymakers in taking appropriate action to address these crucial areas in order to prevent the spread of COVID-19.

Concerning the study sample, the study participants were limited to group B registered contractors in Lagos State. Hence, this limitation makes the study's findings unsuitable for the generality of construction organisations in Lagos state, Nigeria. However, the research provides valuable information regarding measures instituted by the group B construction organisations to curtail the spread of COVID-19. COVID-19 is still new; therefore, the body of knowledge is still at the infancy stage. To date, there is no evidence of empirical studies that have addressed the compliance level of the Nigerian construction organisations with basic measures of curtailing the spread of COVID-19. Further studies which investigate more measures other than those addressed in this study are required. Some of these measures could include risk assessment, policy and guidelines, audit and inspection, reporting and record-keeping. Related research projects outside the scope of this study in terms of contractors' representation - group A, C, and D registered contractors in Lagos State, and geographical location - contractors outside of Lagos State are also required. These will provide comparative assessments across different studies.

## References

- Abrey M, Smallwood JJ. 2014. The effects of unsatisfactory working conditions on productivity in the construction industry. *Procedia Engineering*, 85 (2014):3–9.
- Abubakar, S., Eru, E.J. and Okoye, O.J., 2020. Implications of the Covid-19 Global Oil Crash on the Nigerian Oil-Based Economy: The Punitive Cost for Non-Diversification and the Way Out. *IOSR Journal of Business and Management (IOSR-JBM)*, 22(6), 62-73.
- Alok, S., Raveendran, J. and Shaheen, M., 2014. Conflict management strategies used by Indian software companies: A summative content analysis. *IUP Journal of Soft Skills*, 8(4), p.47.
- Akinlolu, M., Haupt, T. C., Edwards, D.J and Simpeh, F (2020): A bibliometric review of the status and emerging research trends in construction safety management technologies, *International Journal of Construction Management*, DOI: 10.1080/15623599.2020.1819584.
- Business Day, 2020. COVID-19: group writes NPA, calls for fumigation of ports to prevent spread. *Business Day*. Available at: <https://businessday.ng/maritime/article/covid-19-groupwrites-npa-calls-for-fumigation-of-ports-to-prevent-spread/>. Accessed August 13, 2020.
- Chang, M.C., Park, Y.K., Kim, B.O. and Park, D., 2020. Risk factors for disease progression in COVID-19 patients. *BMC Infectious Diseases*, 20(1), pp.1-6.
- Construction Leadership Council (2021). Available at: <https://www.constructionleadershipcouncil.co.uk/wpcontent/uploads/2021/01/Site-Operating-Procedures-Version-7.pdf>. Accessed April 9, 2021.
- Creswell, J. W. (2014), *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 4th ed. Los Angeles: Sage.
- Ebeid, A.G., Selem, E. and Abd El-kader, S.M., 2020, October. Early Detection of COVID-19 Using a Non-contact Forehead Thermometer. In *International Conference on Advanced Intelligent Systems and Informatics* (pp. 314-323). Springer, Cham.
- Federal Ministry of Education, 2020. Guidelines for Schools and Learning Facilities Reopening after COVID-19 Pandemic Closures. Available at: <https://education.gov.ng/covid-19-guidelines-for-safe-reopening-of-schools-learning-facilities/#1>. Accessed August 17, 2020.
- Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy Available at SSRN 3557504
- Gamil, Y., Alhagar A. (2020).The impact of pandemic crisis on the survival of construction industry: A case of COVID-19. *Mediterranean Journal of Social Sciences* 11(4), 122-128.
- Guner, H. R., Hasanoglu, I., Aktas, F. (2020). Prevention and control measures in community. *Turkish Journal of Medical Sciences*. 50, 571-577.
- Harinarain N. 2020. Despair during the COVID-19 lockdown for the South African Construction Industry. *Journal of Construction*, 13(1):52–63.
- Hinze J, Giang G. 2008. Factors associated with construction worker eye injuries. *Safety Science*, 46(4):634–645.
- HM, Government (2020). Working safely during COVID-19 in construction and

- other outdoor work, COVID-19 secure guidance for employers, employees and the self-employed. Available at: <https://assets.publishing.service.gov.uk/media/5eb961bfe90e070834b6675f/working-safely->. Accessed April 9, 2020.
- Hsieh H F and Shannon S E (2005), "Three Approaches to Qualitative Content Analysis", *Qualitative Health Research*, Vol. 15, No. 9, pp. 1277-1288.
- International Labour Organisation (2015), *Global estimates of modern slavery: forced labour and forced marriage*. ILO.
- Jaja IF, Anyanwu MU & Iwu CJ (2020) Social distancing: how religion, culture and burial ceremony undermine the effort to curb COVID-19 in South Africa, *Emerging Microbes & Infections*, 9:1, <https://doi.org/10.1080/22221751.2020.1769501>
- Jallow, H., Renukappa, S. and Suresh, S., 2020. The impact of COVID-19 outbreak on United Kingdom infrastructure sector. *Smart and Sustainable Built Environment*, DOI 10.1108/SASBE-05-2020-0068
- Kukoyi, P.O. and Adebawale, O.J., 2021. Impediments to Construction Safety Improvement. *Journal of Engineering, Project & Production Management*, 11(3).
- Lan F-Y, Wei C-F, Hsu Y-T, Christiani DC, Kales SN (2020) Work-related COVID-19 transmission in six Asian countries/areas: A follow up study. *PLoS ONE* 15(5): e0233588. <https://doi.org/10.1371/journal.pone.0233588>
- Leedy P D, Ormrod J E. 2015. *Practical Research: Planning and Design*. Global edition. Pearson education limited, Harlow, UK.
- Legg SJ, Olsen KB, Laird IS, Hasle P. 2015. Managing safety in small and medium enterprises. *Safety Science*, 71: 189–196.
- Lemke MK, Apostolopoulos Y, Sönmez S. 2020. A novel COVID-19 based truck driver syndemic? Implications for public health, safety, and vital supply chains. *American Journal of Industrial Medicine*. 2020(63):659–662.
- Matovu, J.K., Kabwama, S.N., Ssekamatte, T., Ssenkusu, J. and Wanyenze, R.K., 2021. COVID-19 Awareness, Adoption of COVID-19 Preventive Measures, and Effects of COVID-19 Lockdown Among Adolescent Boys and Young Men in Kampala, Uganda. *Journal of Community Health*, pp.1-12.
- Małecka M, Ogrodzińska K, Salczyńska G, Ciepiela O. 2020. Laboratory work safety rules and guidelines during COVID-19 pandemic in Polish clinical laboratories – do our laboratories work according to a recent IFCC Taskforce Recommendations? *Clinical Chemistry and Laboratory Medicine*, Ahead of print, PP.1-4
- Mohajan HK. 2018. Qualitative Research Methodology in Social Sciences and Related Subjects. *Journal of Economic Development, Environment and People*, 7(1): 23-48.
- Murie, F. (2007), *Building Safety: An International Perspective*. *International Journal of Occupational and Environmental Health*, Vol. 13, No. 1, pp.5-11.
- Naijasurf, 2020. COVID-19: house of Reps want fumigation of schools before re-opening. Naijasurf. Available at: <https://naijasurf.com.ng/2020/05/25/covid-19-house-of-reps-want-fumigationof-schools->

- before-re-opening/. Accessed August 13, 2020.
- Namey, E., G. Guest, K. McKenna, and M. Chen. 2016. "Evaluating Bang for the Buck: A Cost-effectiveness Comparison between Individual Interviews and Focus Groups Based on Thematic Saturation Levels." *American Journal of Evaluation* 37 (3): 425–440. doi:10.1177/1098214016630406.
- Oginni, O.A., Amiola, A., Adelola, A. and Uchendu, U., 2020. A commentary on the Nigerian response to the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(5), 553-556.
- Ohia, C., Bakarey, A. S., Ahmad, T. (2020). COVID-10 and Nigeria: putting the realities in context. *International Journal of Infectious Diseases* 95, 279-281
- Okoro C, Musonda I, Agumba J. 2016. Safety performance evaluation of construction workers in Gauteng, South Africa. *Journal of Construction*, 9(2):1–6.
- Pinto A, Nunes IL, Ribeiro RA. 2011. Occupational risk assessment in construction industry – Overview and reflection. *Safety Science*, 49(5):616–624.
- Polit, F.P, and Beck, C.T. (2017), *Nursing research: generating and assessing evidence for nursing practice*. Wolters Kluwer, Philadelphia, New York, 10th ed.
- Quezon, E.T. and Ibanez, A., 2021. Analysis of influential factors affecting workers' productivity on highway construction projects during Covid-19 pandemic in Cagayan Valley Region, Philippines. *Global Journal of Engineering and Technology Advances*, 6(02), pp.074-089.
- Rosemberg, MA. 2020. Health and safety considerations for hotel cleaners during Covid-19. *Occup Med*. 70(5):382–383.
- Simeh, F. and Amoah, C. (2021): Assessment of measures instituted to curb the spread of COVID-19 on construction site, *International Journal of Construction Management*, DOI:10.1080/15623599.2021.1874678
- Schutt, R.K. 2012, *Investigating the Social World, The Process and Practice of Research*, Seventh Edition. Boston. SAGE Publications.
- Temidayo O. Osunsanmi , Clinton O. Aigbavboa , Ayodeji Oke & Michael Ebie Onyia (2020): Making a case for smart buildings in preventing coronavirus: focus on maintenance management challenges, *International Journal of Construction Management*, DOI: 10.1080/15623599.2020.1842960
- The Bureau of Public Procurement (2012). <https://www.vanguardngr.com/2012/02/bpp-to-classify-contractors-according-to-capacity/>. Trading Economics (2020) Nigeria GDP From Construction. <https://tradingeconomics.com/nigeria/gdp-from-construction>. [Accessed on 30 August 2020].
- World Health Organization (WHO). 2020. Q&A on coronaviruses (COVID-19). Available at: <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>. [Accessed on 19 March 2020].
- World Health Organization (WHO). (2020c). WHO Coronaviruses Disease (COVID-19) Dashboard. Available at: <https://covid19.who.int/> [Accessed on 19 March 2020]

Yadeta, A. (2020) Analysis of the Global Impact of the Pandemic (COVID-19) on Construction Industry: A Cross-Sectional Study: Research Proposal DOI: 10.13140/RG.2.2.14499.07200

Zheng, L., Chen, K. and Ma, L., 2020. Knowledge, attitudes, and practices towards COVID-19 among construction industry practitioners in China. *Frontiers in public health*, 8, p.981.