

Adaptability of COVID-19 Safety Guidelines in Building Construction Sites in Anambra State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author FOE initiated the idea, designed, carried out data acquisition and compiled the first draft of the manuscript. Author MIO managed the literature searches and proof reading while author DOF carried out the data collation and analysis. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The study evaluates how COVID-19 safety rules were applied in construction sites in Anambra state, Nigeria.

Study Design: The study being a survey research was effected through literature review, a well-structured questionnaire and interview.

Place and Duration of the Study: The study was conducted in Anambra State, Nigeria for a period of 6 months.

Methodology: Being a survey research, questionnaire containing information relating to COVID-19 guidelines were randomly administered to selected construction practitioners in Anambra State, Nigeria. Accordingly, a total of 84 questionnaires were administered while 81 copies were completed, returned and found useful. This corresponds to a response rate of 96%. The data were analyzed using Relative importance index and ranked appropriately.

Results: The study found out that maintaining stay at home policy if one is sick (0.827), use of face covering/face mask (0.793), placing wash stations or hand sanitizers in multiple locations at

construction sites (0.714), maintaining a daily attendance log for all staff and visitors (0.689) and use of provision of personal protective equipment (0.679) are the commonly used covid-19 safety guideline in the study area. The study also, observed that greater percent of the COVID-19 safety guidelines are rarely applied in the study area.

Conclusion: The study concluded by recommending that construction sites in the study area should integrate the recommended safety guidelines in its daily operations and/or activities despite the fact that such practices may attract extra cost and disrupt site activities were contacts are necessary as well as take more time to adjust to the new normal in construction.

Keywords: Covid-19; safety guideline; construction; construction industry; Anambra State.

1. INTRODUCTION

The COVID-19 outbreak (previously 2019-nCoV) was caused by the SARS-CoV-2 virus. This outbreak began in December 2019 in Wuhan city in Hubei province of China and spread immediately across the world [1]. Initially the epicenter of the outbreak was Wuhan in China but has since moved to New York in the United State of America. The first case of corona virus (COVID-19) disease in Nigeria was recorded in Lagos State, on the 27th of February 2020 since the outbreak in December 2019 in China [2]. Generally, corona virus is spread through respiratory droplets. Respiratory droplets may be produced through cough, sneeze, normal breath or conversation. These respiratory droplets may cause viral transmission from person to person when individuals are near one another. Also, it may land on clothing or other objects [3,4]. Also, it is possible for an individual to contract COVID-19 by first touching a surface or object that has the virus on it and then touching their own mouth, nose or possibly their eyes [3,4].

Conversely, the main determinant of a pandemic's severity is its associated mortality. This may be defined by case fatality ratio or excess mortality rate—key epidemiological parameters that may be available shortly after the emergence of a pandemic strain from investigations of initial outbreaks or from more routine surveillance data. The outbreak of COVID-19 disrupted economic activities globally and keep spreading on global scale [1]. Transportation of people and goods are been limited and even restricted among countries which further slowed down global economic activities. Most importantly, some panic among consumers and firms has distorted usual consumption patterns and created market anomalies. Global financial markets have also been responsive to the changes and global stock indices have plunged [5]. Furthermore, the fear

or anxiety (i.e. psychological effects) associated with this deadly virus is similar in with the reaction to biological and other terrorism threats and causes a high level of stress, often with longer-term consequences [6]. Consequently, a large number of people would feel at risk at the onset of a pandemic, even if their actual risk of dying from the disease is low [6]. Studies of the macroeconomic effects of the SARS epidemic in 2003 found significant effects on economies through large reductions in consumption of various goods and services, an increase in business operating costs, and re-evaluation of country risks reflected in increased risk premiums [1]. Others are direct and indirect economic costs of illness are often the subject of the health economics studies on the burden of disease, loss of future income due to death and disability, losses of time and income by careers and direct expenditure on medical care and supporting services are added to obtain the estimate of the economic costs associated with the disease [1].

In managing the pandemic, efforts must be geared towards limiting its spread, sustaining infrastructure, lessening the impact on the economy and the functioning of society, reducing of morbidity and mortality [5]. From a public health perspective, [5] opined that if we fail to protect human health, we are likely to fail in our goals of preserving societal function and mitigating the social and economic consequences of a severe pandemic. The health and safety requirements of any construction activity must also not be compromised at this time. Workers who believe that their employer provides a safe and healthy workplace are more likely to report for work during a pandemic. Clear communication promotes confidence in the employer's ability to protect workers and reduces absenteeism [7]. If an activity cannot be undertaken safely due to a lack of suitably qualified personnel being available or social

distancing being implemented, it should not take place. Therefore, construction sites operating during the COVID-19 pandemic need to ensure they are protecting their workforce and minimizing the risk of spread of infection. On this note, the study seeks to evaluate how COVID-19 safety rules are applied in construction sites at Anambra State, Nigeria with a view to minimizing the spread of this virus in and around the construction sites in the study area.

2. LITERATURE REVIEW

2.1 Construction Industry and Pandemic

Construction industry according to [8] may be viewed as that sector of the economy which, through planning, design, construction, maintenance and repair, and operation, transforms various resources into constructed facilities. It is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development [9,10]. The industry contributes significantly to the Gross Domestic Product (GDP) of any nation. In Nigeria for instance, the industry contributed about 4.13% to the total real GDP in the first quarter of 2016 [11]. Also, around the world the industry has fared well, both in job creation and socio-economic development of any nation.

A pandemic is a global disease outbreak and can be caused by a variety of agents, including influenza and viruses. During a pandemic, transmission can be anticipated in the workplace not only from patients to workers in healthcare settings, but also among co-workers and between members of the general public and workers in other types of workplaces [7]. To preserve as many lives as possible, it is essential to keep the healthcare system functioning and to deliver the best care possible [5]. Therefore, the primary strategies for combating influenza according to [5] are:

1. Vaccination,
2. Treatment of infected individuals and prophylaxis of exposed individuals with influenza antiviral medications, and
3. Implementation of infection control and social distancing measures.

From the foregoing, the first two (2) measures centers in vaccination (otherwise known as drugs) but the last centers on epidemic mitigation

may all be accomplished by focusing on the single goal of saving lives by reducing transmission (i.e. non-pharmaceutical intervention NPI). NPI help to reduce influenza transmission by reducing contact between sick persons and uninfected persons, thereby reducing the number of infected persons. Reducing the number of persons infected generally lessen the need for healthcare services and minimize the impact of a pandemic on the economy and society [5]. Other NPI measures according to [7] are consistently practice of social distancing, cover coughs and sneezes, maintain hand hygiene, clean surfaces frequently, and employer should ensure educate their workers to understand Covid-19 hygienic practices.

Generally, during pandemic, it appears that the healthcare market will see a surge in needed facilities and flexible alternatives. This occasions the need for structures or facilities. In-order to achieve this, modular construction could be a solution to this need for flexibility and quicker construction [12]. Project activities under this may give rise to a number of risks for community health and safety. The project would support the provision of health services to deter the COVID-19 outbreak through various health facilities. The requirement of labor will not be significant for refurbishment and renovation work and most the labors will be from local areas; hence labor influx will not pose a significant risk. However, the project often generates both non-hazardous and hazardous waste throughout the renovation and provision of medical service phases. The anticipated non-hazardous wastes would include construction material and debris, solid waste and waste water while hazardous waste may include medical wastes including syringe, used medical supplies, masks and used PPEs, unused/expired medicines, various disinfectant chemicals etc. If these wastes are not treated, stored, disposed properly it might have impact on human health and on the surrounding environment [13]. Therefore, a public interaction protocol, good practices, use of PPE, good hygiene protocol will have to be posted in various locations and people made aware of to contain and eradicate the likelihood of transmission [13].

In-order to help contain the spread of the COVID-19, [13] developed a Human and Occupational Resource Management Plan (including Code of Conduct). This plan requires that contractors to proportionate potential risks and impacts prior to

beginning of works at site. This plan will also include the assessment and required mitigation measure to ensure health and safety of the contractor's workers that may be exposed to health risks. Issues such as child labor in the supply chain, forced labor, gender and Gender-based violence (GBV) issues, occupational health and safety be addressed in the bidding and contract documents as well. Labors will need to work closely in the potential COVID-19 environment hence use of PPE (particularly facemask, gowns, gloves, hand washing soap and sanitizer) free of charge, training on their usage, procedure of entry and exit the health facilities, continuous monitoring of their health condition (especially symptoms of COVID-19) will need to be ensured [13]. No workers below the age of 18 will be assigned, given the hazardous nature of work [13].

Furthermore, [3] reported adherence to safety procedures is necessary as safety and health is our principle concern. Contractors and workers who do not comply with these procedures may be asked to leave the site and not permitted to return until the current situation is less acute. At the end of the day, risky behavior on the part of one put all of us in jeopardy. Prevention procedures should be based on health monitoring, social distancing, hand hygiene, cleaning and disinfecting as well as contractor and project specific procedures to prevent the transmission of COVID-19 among workers on a given project [3,4].

In summary, the minimum recommended procedures to be practiced at all active construction sites according to [3,4,13] are:

1. Practice social distancing by maintaining a minimum 6-foot distance from others.
2. Preclude gatherings of any size, and anytime two or more people must meet, ensure minimum 6-foot separation. If process requires/has no alternative, provide suitable personal protective equipment (PPE), limit interaction to the minimum time required to perform the given task, and comply to the maximum extent.
3. Provide PPE such as gloves, goggles, face shields, face coverings, and face masks as appropriate for the activity being performed.
4. The owner/contractor should designate a site-specific COVID-19 Supervisor to enforce this guidance. A designated

COVID-19 Supervisor should be present on the construction site at all times during construction activities. The COVID-19 Supervisor can be an onsite worker who is designated to carry this role.

5. Identify "choke points" and "high-risk areas" where workers are forced to stand together, such as hallways, hoists and elevators, break areas, and buses, and control them so social distancing is maintained.
6. Minimize interactions when picking up or delivering equipment or materials to ensure minimum 6-foot separation.
7. Stagger the trades as necessary to reduce density and maintain minimum 6-foot separation social distancing.
8. Discourage workers from using other workers' phones, desks, offices, tools, and equipment. If necessary, clean and disinfect them before and after use.
9. Post in areas visible to all workers the required hygienic practices, including: not touching face with unwashed hands or with gloves; washing hands often with soap and water for at least 20 seconds; use of hand sanitizer with at least 60% alcohol; cleaning AND disinfecting frequently touched objects and surfaces such as workstations, keyboards, telephones, handrails, machines, shared tools, elevator control buttons, and doorknobs; and covering the mouth and nose when coughing or sneezing, as well as other hygienic recommendations by the CDC.
10. Use cloth face coverings in accordance
11. Place wash stations or hand sanitizers in multiple locations to encourage hand hygiene.
12. Require anyone on the project to stay home if they are sick, except to get medical care.
13. Have employees inform their supervisor if they have a sick family member at home with COVID-19.

3. METHODOLOGY

This study was carried out in Anambra State, Nigeria, using a survey method. The name Anambra was derived from the Anambra River (Omambala) which flows through the area and is a tributary of the River Niger. Anambra State is a south-eastern state and one of the 36 states of Nigeria. Its bounded by Delta State to the west, Imo State and Rivers State to the south, Enugu

State to the east, and Kogi State to the north (see Fig. 1). There are twenty-one (21) local government areas in Anambra State and 4 major urban centres as Onitsha, Nnewi, Awka and Ekwulobia (see Fig. 2). Anambra is the eighth-most populated state in the Federal Republic of

Nigeria and the second-most densely populated state in Nigeria after Lagos State [14]. It has an estimated average density of 1,500–2,000 persons per square kilometre and over 60% of its people lives in urban areas. It is one of the most urbanized states in Nigeria [14].

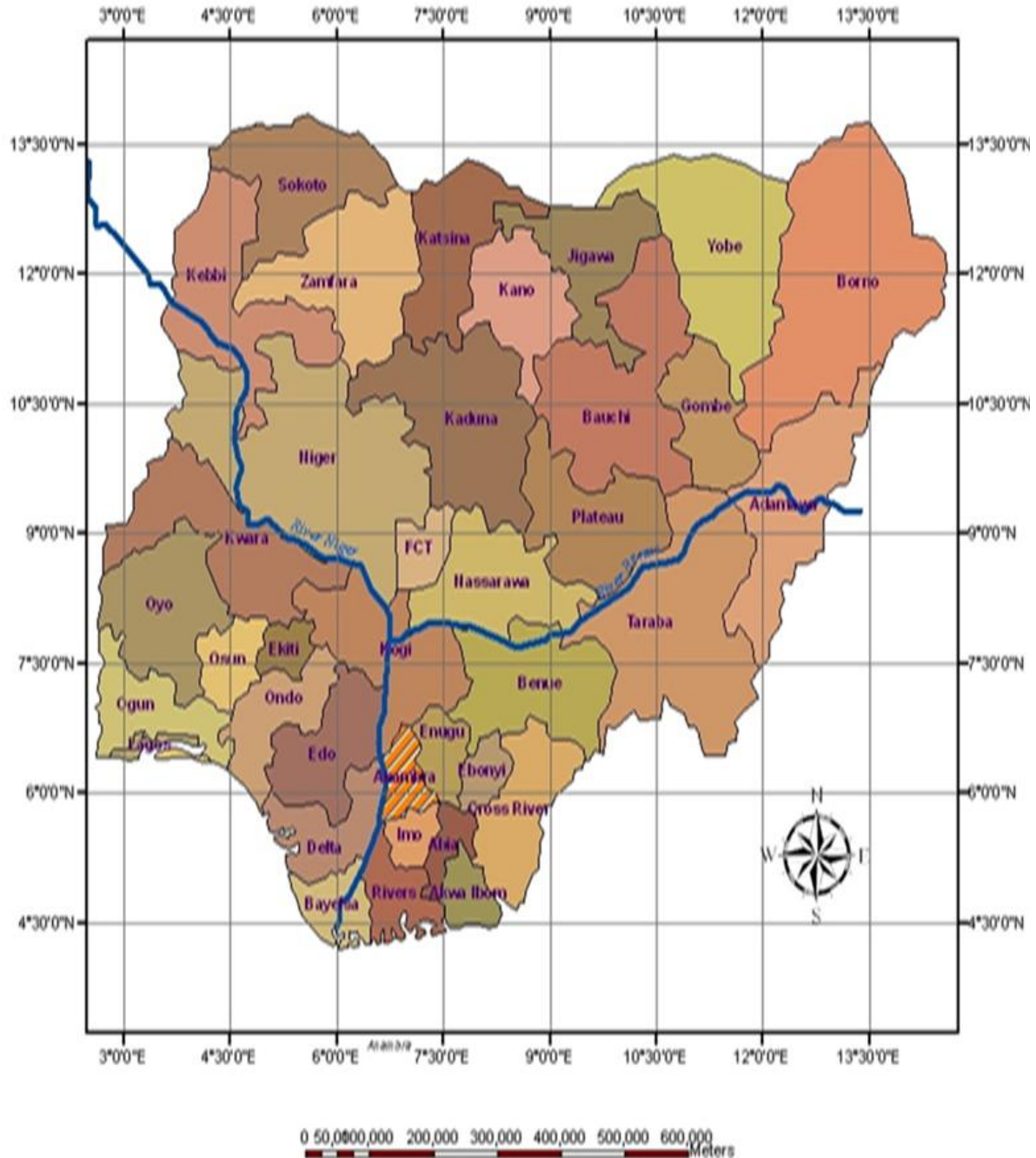


Fig. 1. Map of Nigeria showing Anambra State
 Source: [15]



Fig. 2. Map of Anambra State showing the local government areas
 Source: [15]

Table 1. Population distribution

S/NO	Professionals	Population size	Sample size
1	Architects	15	12
2	Builders	34	27
3	Quantity Surveyors	25	20
4	Structural Engineers	32	25
	Total	105	84

The population of this study constitutes of fully registered professionals particularly Architects, Builders, Structural Engineers and Quantity Surveyor, residing and practicing in the study area. The population of these professionals as obtained from the various secretariats in the state is 105 (see Table 1).

Taro Yamani sample size method was employed to determine the appropriate sample size for this study. Taro's formula is represented as:

$$i.e. n = \frac{N}{1+N(e)^2}$$

Where "n" is the sample size, "N" is the population (105) and "e" is the level of confidence (95%). Thus, the sample size

$$n = \frac{105}{1 + 105 (0.05)^2} = 84$$

Being a survey research, data were collected through structured questionnaire administered to the selected respondents or their representatives. While, tables, mean score and relative important index (RII) were used for data analysis and presentation. RII was computed using:

$$RII = \frac{\sum Fx}{A * N}$$

Where:

- ∑Fx = Weight given to each statement by respondents and ranges 1 – 5
- A = Higher Response Integer
- N = Total Number of Respondents

4. RESULTS AND DISCUSSION

Information regarding questionnaire distribution and percentage response is shown in Table 2.

Accordingly, a total of 84 questionnaires were administered and only 81 questionnaires were completed, returned and found useful. This corresponds to response rate of 96.43%.

Table 2. Distribution of questionnaire and percentage response

Questionnaires	Frequency	Percentage (%)
Number of questionnaires returned	81	96.43
Number of questionnaires not returned	3	3.57
TOTAL	84	100

Table 3. Respondents' perception on the application of COVID-19 safety rules guidelines in construction sites

Covid-19 safety rules	Frequency of occurrence					$(\sum F)$	$\sum Fx$	Mean	RII	Ranking
	5	4	3	2	1					
Maintain stay at home policy if one is sick	48	14	8	4	7	81	335	4.136	0.827	1 st
Use of face covering/face mask	38	18	16	2	7	81	321	3.963	0.793	2 nd
Place wash station or hand sanitizers in multiple locations at construction sites	30	18	16	2	15	81	289	3.568	0.714	3 rd
Maintain a daily attendance LOG for all staff and visitors	30	16	14	2	19	81	279	3.444	0.689	4 th
Provision of personal Protective equipment	22	26	8	12	13	81	275	3.395	0.679	5 th
Workers to report to supervisor if they have a sick family member at home with Covid-a-19	22	14	28	6	11	81	273	3.370	0.674	6 th
Practising social distancing	14	24	26	8	9	81	269	3.320	0.664	7 th
Discouraged workers from using other workers phones, tools and equipment	26	14	14	10	17	81	265	3.272	0.654	8 th
Post in areas visible to all workers the required hygienic practices	14	18	26	10	13	81	253	3.123	0.625	9 th
Stagger the traits as necessary to reduce density	12	18	28	14	9	81	253	3.123	0.625	9 th
Identification and decongesting choke point/high risk areas at sites	22	16	22	16	5	81	236	2.914	0.583	11 th
Cleaning and disinfecting frequently touched places	20	16	12	12	21	81	237	2.926	0.585	12 th
Designation of site based Covid-19 supervisors	8	14	14	12	33	81	195	2.407	0.481	13 th

5 – 1 (Very significant to Least)

The response in Table 3 disclosed that the mostly used COVID-19 safety guidelines in construction sites in the study area are: Maintaining stay at home policy if one is sick (0.827), Use of face covering/face mask (0.793), Placement of wash station or hand sanitizers in multiple locations at construction sites (0.714), Maintaining a daily attendance LOG for all staff and visitors (0.689) and use of Provision of personal Protective equipment (0.679). Also the response in Table 3 disclosed that Designation of site based COVID-19 supervisors (0.481), Cleaning and dis-infecting frequently touched places (0.585) and Identification and decongesting choke point/high risk areas at sites (0.583) ranked lowest in terms of COVID-19 safety rules application in the state.

Considering the Mean scores of the responses in Table 3, it indicates that aside, Designation of site based COVID-19 supervisors (2.407), Identification and decongesting choke point/high risk areas at sites (2.914) and Cleaning and dis-infecting frequently touched places (2.926) the other variables have a mean score equal or above 3.000. Therefore, the applications of those safety guidelines are termed to be quite to be significant in the study area.

In order to validate the response in Table 3, the research interviewed some notable stakeholder in this field of study. The outcome of the interview supports in the findings in Table 3 and gave reasons why Maintaining stay at home policy if one is sick, use of cloth face covering, Place wash station or hand sanitizers in multiple locations at construction sites, maintaining a daily attendance log for all staff and visitors and use of Provision of personal Protective equipment ranked most as this were normal health and safety practice earlier observed in construction sites within the study area coupled with the recent awareness as regard to the use of face mask, hand washing and stay at home order by federal and state government agencies and other parastatals.

While seeking to find out why the need to provide Designated site based Covid-19 supervisors, Identification and decongesting choke point/high risk areas at sites, and Cleaning as well as dis-infecting frequently touched places ranked lowest, this response were attributed to the fact that such practices are newly introduced and which will involve extra cost, disrupt the site activities were contacts are necessary as well as take more time to become fully adjusted to this new rules.

5. CONCLUSION

The need to make adequate provisions for managing the global pandemic in places where traffic congests is very vital for curtailing the pandemic. Construction sites in Anambra state as one of such places therefore need to integrate the recommended safety guidelines in its operations as well as in its everyday activities. The principal measures adopted in construction sites in the state align with the normal COVID-19 health and safety measures such as maintaining stay at home policy if one is sick, use of face covering/face mask, placement of wash station or hand sanitizers in multiple locations at construction sites, maintaining a daily attendance log for all staff and visitors and provision of personal protective equipment. However, measures such as provision of designated site based COVID-19 supervisors, identification and decongesting choke point/high risk areas at sites, and cleaning as well as dis-infecting frequently touched place are rarely observed in sites in the study area. Therefore, the study concluded by recommending that construction sites in the study area should integrate the recommended safety guidelines in its daily operations and/or activities despite the fact that such practices may attract extra cost, disrupt the site activities were contacts are necessary as well as take more time to adjust to new normal in construction.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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