

# Comparative Assessment of Fire Resistivity of Walling Materials in Onitsha Markets in Nigeria

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## Abstract

*Nigeria has been facing the problem of frequent fire outbreaks in markets and they are very regular in Onitsha markets in Anambra State. To minimise this problem, a research was conducted on the three major markets in Onitsha with the aim of comparatively assessing the fire resistivity of their walling materials, so as to generate guidelines for designing walls of market buildings in Nigeria. The research employed desktop study as the instrument for data collection. Hence, the data were analysed and checked via contents analyses technique, in order to validate the results. The findings showed the use of sandcrete blocks for the construction of walls of market buildings with the use of mortars as plasters; both sandcrete block walls and mortars can crack under the effect of fire and the paint on the walls are not fire resistant to increase the resistivity of the walls. Among the recommended guidelines are: metal wall panels are to preferably be adopted instead of sandcrete block walls for market designs because metals are very resistant to fire. In addition, fire resistant paint should be applied to all mortars used as wall plasters, in order to increase the resistivity of the market walls.*

**Keywords:** Designing walls, fire outbreaks, guidelines, markets, Nigeria

## INTRODUCTION

Worldwide, the significances of markets are very enormous. For example, Will pointed out that markets are arenas in which buyers and sellers can gather and interact or they are places where two or more parties can meet to engage in an economic transaction; the transaction may involve goods, services, information, currency, or any combination of these that pass from one party to another [1]. Therefore, it is important that markets in Nigeria and other parts of the world are free from fire outbreaks, in order to ensure continuous economic transactions. Over the years, Nigeria has been facing the problem of fire outbreaks [2]. There are frequent fire outbreaks in markets in Anambra State of Nigeria; thus, they are significantly rated very high. For example, on 9th November, 2022, there was fire outbreak that claimed the lives of people and more than 12 people sustained injuries at Onitsha drug market in Anambra State [3]. Similarly, on 28th November, 2022, fire outbreak occurred at Onitsha main market in Anambra State and razed two blocks of shops at the Kano Street section of the market; goods worth millions of Naira were destroyed [4].

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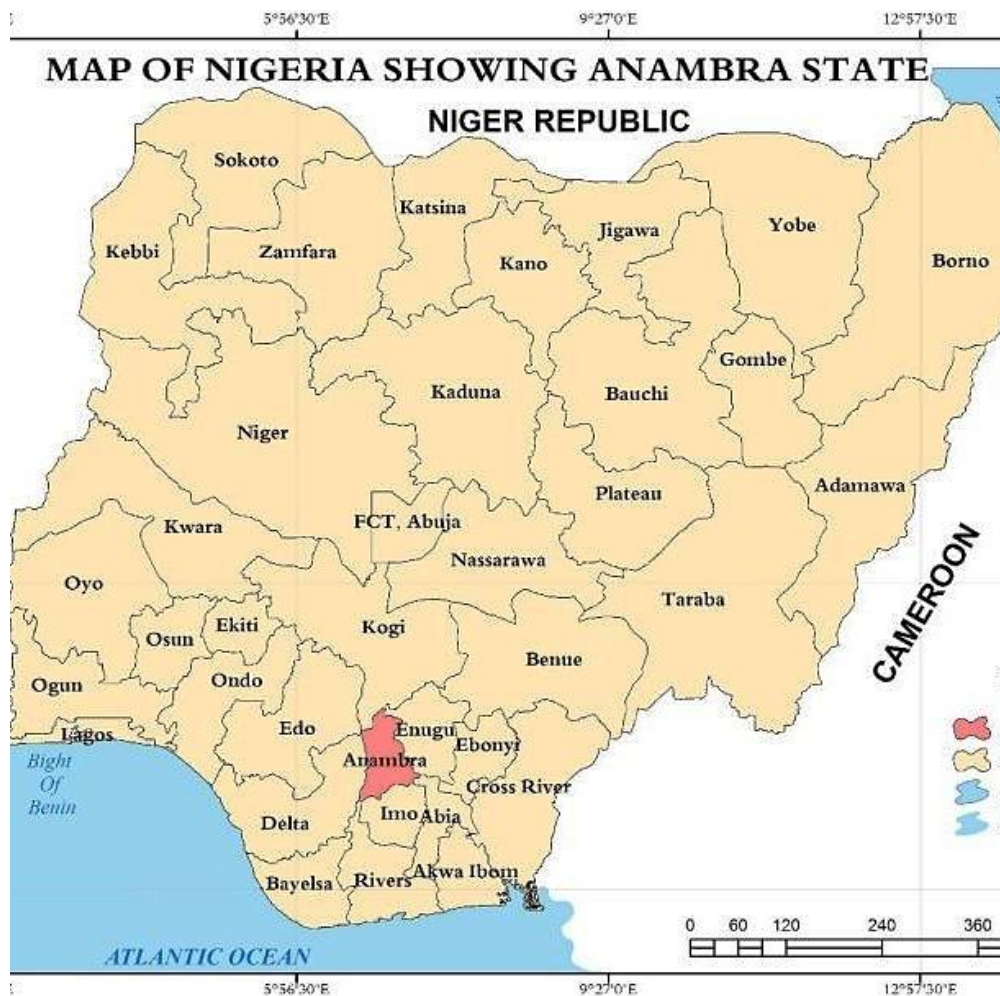
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To minimise this problem of frequent market fires in Anambra State, a research was conducted on the three major markets in Onitsha with the aim of comparatively assessing the fire resistivity of their walling materials, in order to generate guidelines for designing walls of market buildings in Nigeria. According to Wikipedia [5], Onitsha is a city that is located on the eastern bank of the Niger River, in Anambra State of Nigeria. Onitsha is a metropolitan city which is known for its river port and as an economic hub for commerce, industry and education. It hosts the Onitsha main



**Figure 1.** Nigeria showing Anambra State as highlighted; its other 35 States and the Federal Capital Territory, Abuja.

{Source: ResearchGate, 2021 ([https://www.researchgate.net/figure/Map-of-Nigeria-Showing-Anambra-State-Source-Office-of-the-Surveyor-General-of-the\\_fig1\\_353439065](https://www.researchgate.net/figure/Map-of-Nigeria-Showing-Anambra-State-Source-Office-of-the-Surveyor-General-of-the_fig1_353439065))}.

market which is the largest market in Africa in terms of geographical size and volume of goods. Figure 1 shows Nigeria, revealing Anambra State as highlighted; its other 35 states and the Federal Capital Territory, Abuja.

## METHODS AND PROCEDURES

This research utilised descriptive survey method and generated qualitative data. From the information obtained from the National Population Commission (2022) and Nigeria High Commission (2022), it was opined that Nigeria is made up of 36 states and the Federal Capital Territory (FCT). The research considered comparative assessment of fire resistivity of walling materials in Onitsha markets because the city is known as an economic hub for commerce with previous cases of fire outbreaks [5]. According to Ou Travel and Tour [6], there are nine major markets in Onitsha; they are Onitsha main market at the foot of River Niger in Onitsha North, New tyre international market at Nkpor, Building material international market at Ogidi, Bridge head building material market at Fegge, Bakers and confectionery market at Ogidi, New motor parts international market at Nkpor, Machine parts market at Nkpor, Old motor parts (Mgbuka) market at Nkpor and Old motor parts (Mgbuka) market at Ugwuagba Obosi. Out of these nine markets, three markets: Old motor parts (Mgbuka) market, Onitsha main market and Building material international market were randomly selected for this study.

From the information obtained from Prashant and Supriya [7], Steve [8]; Suresh and Chandrashekara [9], in a research, 20% size of the sample of a population is a good recommended size of the sample. The three selected markets for this research are more than 20% of the size of the sample and these have made the sample size to be acceptable. The data of this research were gathered through desktop study; reviewed different literature, information from media and Internet search. The research data analyses were made and checked through contents analyses technique by comparing the extracted data with the raw desktop (secondary) data, in order to validate the results. The results of the analyses were used in generating the guidelines of this research.

## DATA PRESENTATION AND DISCUSSIONS

The walling materials that were found in Onitsha markets include sandcrete blocks, mortar and non-fire resistant paint. Table 1 shows the distribution of the different walling materials that were observed in Onitsha markets. Walls that are made up of sandcrete blocks and plastered with mortar were found in all the three markets and walls that were finished with non-fire resistant paint were found in Onitsha main market and building material international market.

**Table 1.** Distribution of Different Walling Materials as Observed in Onitsha Markets.

S.N.	Market	Walling Material
1	Old Motor Parts (Mgbuka) Market	Sandcrete Blocks and Mortar
2	Onitsha main market	Sandcrete Blocks, Mortar and Non-fire Resistant Paint
3	Building material international market	Sandcrete Blocks, Mortar and Non-fire Resistant Paint

Source: Reviewed Work, 2022.

### Old Motor Parts (Mgbuka) Market

According to Dunn [10–13], walls of buildings that are made up of sandcrete blocks can crack under the influence of fire, especially when they contain embedded conduits and there is a possibility of fire spread. However, sandcrete blocks were used for the construction of ‘Old motor parts (Mgbuka)’ market. Figure 2 shows the burnt and collapsed sandcrete block walls in ‘Old motor parts (Mgbuka)’ market. In most cases, mortar is fire resistant to some extent as the constituent materials (usually a mix of clay, cement, lime and sand) are resistant to fire and heat but drastic increase in temperature can cause mortar to crack and expand [14, 15]. Yet, there is no fire resistant paint on the walls in this market to increase the resistivity of the walls.

### Onitsha Main Market

It was observed that sandcrete blocks are among the materials that were used for the construction of the walls of Onitsha main market and this type of wall can crack under the influence of fire, especially when there are embedded conduits and thus, there is a possibility of fire spread. This is contrary to the information obtained from Building and Construction Authority (2017) [7] and Quarles (2013) that stated that materials for designing buildings against fire outbreaks should be able to resist surface flame spread. In contrary to the immediate above statement, the use of mortar for the plastering of the walls of this market can crack under the effect of fire, and the paint on the walls are not fire resistant to increase the resistivity of the walls. Figure 3 shows sandcrete block walls that are plastered with mortar, and without fire resistant paint in Onitsha main market.

### Building Material International Market

Similarly, it was observed that sandcrete blocks are among the materials that were used for the construction of the walls of Building material international market and this type of wall can crack under the influence of fire, especially when there are embedded conduits and thus, there is a possibility of fire spread. The use of mortar for the plastering of the walls of this market can crack under the influence of fire, and the paint on the walls are not fire resistant to increase the resistivity of the walls. Figure 4 shows sandcrete block walls that are plastered with mortar, and without fire resistant paint in Building material international market.



**Figure 2.** Old Motor Parts (Mgbuka) Market showing Burnt and Collapsed Sandcrete Block Walls.

{Source: Premium Times, 2020 (<https://www.premiumtimesng.com/regional/ssouth-east/372244-one-dead-in-anambra-spare-parts-market-fire.html>)}.



**Figure 3.** Onitsha Main Market showing Sandcrete Block Walls that are Plastered with Mortar and without Fire Resistant Paint.

{Source: HumAngleMedia, 2021 (<https://humanglemedia.com/onitsha-main-market-under-threat-of-insurgency/>)}.



**Figure 4.** Building Material International Market showing Sandcrete Block Walls that are Plastered with Mortar, and without Fire Resistant Paint.

{Source: Sun Nigeria, 2019 (<https://www.sunnewsonline.com/excitement-as-obiano-launches-anambra-biggest-building-materials-market/>)}

## CONCLUSION AND RECOMMENDATIONS

This research comparatively overviewed the assessment of fire resistivity of walling materials in Onitsha markets in Anambra State of Nigeria as a result of the problem of frequent fire outbreaks in Nigerian markets and it served as an avenue to generate guidelines for designing walls of market buildings in Nigeria. The research findings showed the use of sandcrete blocks for the construction of walls of market buildings with the use of mortar as plaster; both sandcrete block walls and mortar can crack under the influence of fire, and the paint on the walls are not fire resistant to increase the resistivity of the walls. Having considered these findings, the following guidelines are therefore recommended for designing walls of market buildings in Nigeria:

### Guidelines for Designing Walls of Market Buildings in Nigeria

- i. Sandcrete blocks should not be used as design specifications for the construction of market buildings because they can crack under the influence of fire.
- ii. Metal wall panels are to preferably be adopted instead of sandcrete block walls for market designs because metals are very resistant to fire.
- iii. Alternatively, brick walls are to be adopted instead of sandcrete block walls for market designs because bricks are resistant to fire.
- iv. Fire resistant paint should be applied to all mortars used as wall plasters, in order to increase the resistivity of the market walls.

This research only considered the walling design of market buildings without considering the design of other parts of the market buildings and this is a gap in knowledge. Therefore, in subsequent research of this kind, this gap should be filled.

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