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Building Collapse in Nsukka Urban: Exploring the Causes in Nsukka Urban

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Abstract:

Building collapse has become a recurrent and alarming issue in many urban centers across Nigeria, with Nsukka urban in Enugu State witnessing a noticeable rise in such incidents. The objective of this research work is to find out the factual causes of building collapses in Nsukka. The data used for this research work were gathered through questionnaires, which were randomly administered to the professional Estate Surveyors and Valuers, Architects, Town planners, Quantity Surveyors, Engineers (structural and civil), building contractors and landlords and from documented materials from authors who have written on building collapse. The findings of this research work reveal that the use of unqualified contractors and poor supervision services contribute immensely to building collapses (ie engineering factors). Besides, lack of enforcement of building codes by the relevant town planning officials (government policies), the type of composition components, economic factors and political policies also contribute to building collapse.The study recommended that qualified professionals in all aspects of building should be employed during building construction in order to appreciate and enjoy the structure fully, without much fear of collapse.

Keywords: Building Collapse, Causes and Nsukka Urban.

Introduction

The frequency of building collapses occurrence in Nigeria as a whole in the recent past is so alarming. In fact, it has become major issue that borders the development of the country, as the frequency their occurrences and magnitude of the losses being recorded in terms of lives and properties are becoming worrisome. As a matter of fact, the spate and frequency of occurrences have become a great concern not only to the government but to all well meaning Nigeria, and most especially the stakeholders in the building industry in the country as the rate of the incidents are becoming very alarming. For instance, in the last quarter of 2011, there was a catastrophic collapse of a five-storey hospital building under construction in Pape Abuja that led to loss of lives and sustained injuries. Again, in the last quarter of 2014, there was also a catastrophic collapse of a

three-storey building, still under construction in Nsukka-Central in Nsukka Local Government Area that claimed lives of some workers and loss of properties. Also, in the last of quarters of 2016 and 2017, a two storey building collapsed at Aku-Road and St. Theresa's Road respectively, all in Nsukka-central, in Nsukka Local Government Area in Enugu state, Nigeria. As a result, a high level of skills is needed in designing and constructing buildings from the building team as well as competence and craft man ship. The architects, the engineers or contractors (structural, mechanical and electrical), and the local authority are involved in the team.

Statement of Problem

Building collapse in the Nsukka-central in Enugu state, Nigeria in its entirety is badly neglected by scholars of building technology. Their interest on building technology centers more on cost effect of building materials, painting, designs and so forth. Yet, building collapse has not been given adequate attention.

Research Question

- What are the major causes of building collapse in Nsukka Local Government Area of Enugu state and Nigeria at large?

Research Objective

- The major aim of this research work is to examine the causes of building collapse in Nsukka urban.

Conceptual Review

Concept of Building Collapse

Building collapse is a catastrophic failure of a structure wherein it loses its stability and load-bearing capacity, often resulting in partial or total destruction. It is a serious concern in the fields of civil engineering, urban planning, and public safety. A collapse can happen during construction, occupancy, or renovation, and it typically results in the loss of lives, property, and resources. The phenomenon highlights the need for stringent building codes, professional ethics, and quality control. According to Levy and Salvadori (2002), building collapse reflects either a failure in design, materials, construction or maintenance or sometimes a combination of all.

One of the primary causes of building collapse is flawed structural design. If a structure is not engineered correctly to distribute loads, it becomes vulnerable to stresses that exceed its capacity. Misjudgments in load calculations, foundation sizing, and reinforcement detailing can all contribute to failure. Feld and Carper (1997) discuss numerous examples where improper design led to tragic failures, stressing the importance of compliance with structural design codes. For instance, underestimating wind or seismic loads in high-rise buildings can result in lateral instability and eventual collapse.

Even a well-designed building can collapse if inferior materials are used or if construction techniques are substandard. Poor quality concrete, corroded steel reinforcement, or defective construction joints can compromise structural integrity. In developing countries, the use of substandard materials is a significant problem due to cost-cutting and corruption (Ghosh, 2014). Additionally, deviation from the architect's or engineer's specifications during construction—whether deliberate or accidental—has often led to fatal consequences.

Another major factor contributing to building collapse is foundation failure, often due to poor geotechnical assessment. If a building's foundation is not designed based on accurate soil tests, it may settle unevenly or sink, leading to structural damage. Differential settlement, soil liquefaction during earthquakes, and erosion can weaken the base of a structure. The Ronan Point collapse in London in 1968 demonstrated how a localized explosion could initiate a chain reaction in a poorly

connected prefabricated building, where inadequate anchoring and weak joints were aggravated by foundation limitations (Levy &Salvadori, 2002).

Human error and negligence are critical contributors to building failures. From corrupt contractors cutting corners to lax oversight by regulatory bodies, the role of human decisions in structural disasters cannot be overstated. Often, illegal modifications such as adding extra floors or removing load-bearing walls occur without the necessary structural assessments. Regulatory failures, where building inspections are skipped or poorly executed, further increase the risk. The collapse of the Champlain Towers South in Florida in 2021 is a modern example of the consequences of ignored warnings and delayed maintenance (NIST, 2023).

Causes of Building Collapse

Building collapse is a catastrophic event that results in the failure of a structure to maintain its integrity and load-bearing capacity. It often leads to significant loss of life and property and is a topic of serious concern in civil engineering, architecture, urban planning, and public safety. Understanding the root causes of building collapse is crucial for developing strategies for prevention, enhancing construction practices, and formulating effective building codes. While the causes may vary depending on geographical, economic, and structural contexts, several key factors are universally recognized as leading contributors to such failures.

1. Structural Design Deficiencies

One of the primary causes of building collapse is poor structural design. Buildings must be designed to withstand various loads, including dead loads (weight of the structure itself), live loads (occupants and furniture), and environmental loads such as wind, snow, and seismic activity. Design errors often stem from incorrect load calculations, oversight of environmental conditions, or misjudged material properties. A notable example is the 1981 Hyatt Regency walkway collapse in Kansas City, which occurred due to a change in the rod support system that doubled the load on certain connections (Marshall, 1982). According to Feld and Carper (1997), design flaws account for a significant proportion of structural failures globally and highlight the importance of comprehensive analysis and peer review in the design process.

2. Substandard Construction Practices

Even a perfectly designed building can fail if construction practices are not properly executed. Substandard workmanship, often resulting from unskilled labor, poor supervision, and inadequate quality control, can compromise structural integrity. Examples include improper concrete curing, inadequate reinforcement placement, or insufficient compaction of soil under foundations. According to Ghosh (2014), the failure to adhere strictly to engineering drawings and specifications during construction is a widespread issue, especially in regions with weak regulatory oversight. The use of shortcuts or disregard for best practices can create weak points in the structure, making it prone to failure under stress.

3. Use of Inferior or Inappropriate Building Materials

The choice and quality of construction materials play a critical role in the durability and strength of a building. Using substandard materials, such as low-grade steel, adulterated cement, or poor-quality aggregates, drastically reduces the structural capacity of a building. In many cases, this stems from cost-cutting measures or corruption within the supply chain. The collapse of the Sampoong Department Store in Seoul (1995), which killed over 500 people, was linked to the use of low-quality concrete and changes to the original building design that were not structurally feasible (Kim & Kim, 2001). The incident underscored how the use of inappropriate materials, combined with poor design changes, can have catastrophic outcomes.

4. Foundation Failures and Geotechnical Issues

The foundation of a building transfers its load to the ground, and any issue with the foundation can lead to instability. Differential settlement (when different parts of the foundation settle at different rates), inadequate soil bearing capacity, water infiltration, or nearby excavation activities can cause the foundation to shift or sink, compromising the entire structure. Inadequate geotechnical investigation is often to blame, especially when soil characteristics are not thoroughly analyzed. For example, the collapse of several buildings during the 2010 Haiti earthquake was partly due to construction on unsuitable soil without proper foundation reinforcement (Bilham, 2010). Soil liquefaction during seismic events is another common cause of foundation failure.

5. Overloading and Unauthorized Modifications

Many buildings collapse because they are subjected to loads beyond their design capacity. This includes the addition of extra floors, installation of heavy machinery, or overcrowding during events. Overloading can cause beams and columns to bend or buckle, eventually leading to structural failure. In developing countries, unauthorized modifications without consulting structural engineers are common, especially in residential and commercial buildings. The 2013 Rana Plaza collapse in Bangladesh, which resulted in over 1,100 deaths, was attributed to illegal construction of additional floors and overloading of the structure (Ahmed, 2013). The building was originally intended for commercial use but was later altered to house heavy garment factory equipment.

6. Natural Disasters and Environmental Factors

Earthquakes, floods, hurricanes, and other natural disasters often act as triggers for building collapse, particularly when structures are not designed to resist such forces. In seismic zones, buildings need to incorporate earthquake-resistant design features such as flexible joints, reinforced shear walls, and base isolators. Many collapses during the 2008 Sichuan earthquake in China were attributed to poor seismic design, especially in school buildings. Floods can erode foundations, while hurricanes can impose high lateral wind loads. According to the American Society of Civil Engineers (ASCE, 2017), many structures that collapse during disasters were already vulnerable due to a lack of adherence to hazard-resistant building codes.

7. Negligence and Regulatory Failures

Negligence—whether by engineers, contractors, building owners, or regulators—is a leading underlying cause of many collapses. This includes ignoring structural warnings, failing to maintain the building, or skipping mandatory inspections. In some cases, corruption allows unqualified contractors to secure construction projects or for buildings to be approved without proper checks. The 2021 Surfside condominium collapse in Florida highlighted how long-ignored structural damage and delayed maintenance can lead to tragedy (NIST, 2023). When regulatory bodies fail to enforce codes or allow non-compliant structures to be built, the risk of collapse increases significantly.

Methodology

Nsukka town is in Nsukka L.G.A of Enugu state, Nigeria. It is the headquarters of Nsukka L.G.A. The town is situated some sixty-five kilometers to the North of Enugu, the administrative headquarters of the state. Nsukka town is located approximately on the latitude 7 degree North and longitude 7 ½ degree East. It lies in the transitional zone between the rainforest of southern Nigeria. It has a mixed vegetation of grassland and rainforest (Eze, 1998). Nsukka is bounded on the North by ObukpaAsadu and the South by leija and Obimo, on the East by Ede-Oballa and Eha-Alumona and on the West by Edem-Ani and Aro-Uno. The people of Nsukka live in a scattered home steads. Nsukka has three main quarters namely; Mkpunano, Nru and Ihe/Owerre, in their order of seniority.This study adopted a surveys research style which operates on the basis of statistical sampling; only extremely rarely are full population surveys possible, practicable or desirable. This style employs the principles of statistical sampling to secure a representative sampling for economy

and speed. This style allowed samples to be surveyed through questionnaires,that is by introducing the questionnaires to the respondents for them to answer or fill in the structured questions contained in it.The estimated figure of the population of Nsukka according to 2006 census is 99,608. The research population comprised all the Engineers (structural and civil), Building Contractors, Architects, Estate Surveyors and Valuers and Town Planners in Nsukka L.G.A who are involved in planning and construction of buildings.

This study adopted cluster sampling technique with multi stage selection. This technique involves breaking down the population into sub-groups and a sample taken from only a portion of the sub-groups at a time until all the groups have been sampled. Nsukka L.G.A has three main quarters namely: Mkpunano, Nru and Ihe/Owerre, in their order of seniority. In each of these three quarters, the purposive sampling method was used to select only the respondents needed for the study. Purposive sampling technique was employed to enable the researcher select and interview the Engineers (structural and civil), Building contractors, Architects, Estate Surveyors and Valuers and Town Planners who resides in the area sampled.This study adopted questionnaire and works of some authors whose work are related to the topic as the research instruments.This study adopted parametric statistical tool for data analysis. This tool allowed random distribution for data set and also for the data collected to be analyzed and conclusion drawn from the analysis. The conclusion drawn was based on the reasons gotten from the data analysis.

Analysis

What are the causes of building collapse in Nsukka Local Government Area of Enugu state, Nigeria?

From the data gathered from our respondents, the causes of building failure or collapse include among others environmental changes like deforestation, natural and man-made hazards like placing extra ordinary loads on the building that is beyond its capacity, improper presentation and interpretation in the design as well as bad design, faulty construction and foundation failures. Also, the use of unqualified contractors and poor supervision services contribute immensely to building collapses (ie engineering factors). Besides, lack of enforcement of building codes by the relevant town planning officials (government policies), the type of composition components, economic factors and political policies also contribute to building collapse. In order to control the incessant building collapse in Nsukka L.G.A and Nigeria at large, the aforementioned factors that lead to building collapses should be tackled by taking precaution of them.

Conclusion

Building collapse in Nsukka urban poses a serious threat to lives, properties, and public confidence in the construction industry. This study has revealed that poor workmanship, substandard materials, lack of professional oversight, and weak regulatory enforcement are key contributors. Addressing these challenges requires a collaborative approach involving government agencies, construction professionals, and the public. Effective policy implementation, regular training, and strict adherence to building standards are essential. Stakeholders must prioritize safety and accountability at all stages of construction.

Recommendations

1. Qualified professionals in all aspects of building should be employed during building construction in order to appreciate and enjoy the structure fully, without much fear of collapse.

2. Government agencies, particularly town planning and building control departments, should rigorously enforce building codes and standards to ensure compliance from design through to construction.
3. Builders and contractors should be mandated to use only tested and approved construction materials. Regulatory bodies should conduct regular checks to curb the use of substandard materials.

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