International Journal of Civil Engineering, Construction and Estate Management
Vol.6, No.2, pp.17-24, July 2018
Published by European Centre for Research Training and Development UK (www.eajournals.org)

INCESSANT COLLAPSE OF BUILDINGS IN NIGERIA: THE IMPLICATIONS FOR RELIGIOUS/ WORSHIP CENTRES

Arc. Emma Udomiaye Mnia, Ntaji Patrick and Ibok Unyime

Dept. of Arch.Tech, Akanu Ibiam Fed. Poly, Uwana-Nigeria.

ABSTRACT: *Building collapse is more common and devastating in developing world. In Nigeria, the trend is on the increase and religious houses/buildings are not left out. Buildings can be described as structural entities capable of securing self by transmitting load (dead load and live load) to the ground. A church building or religious buildings however are sacred places where believers interface with God. Paradoxically, church/religious buildings and pilgrimage sites are also now becoming places where people lose their lives as a result of accident and structural collapse. A building collapse occurs when part or whole body of a structure fails and suddenly gives way, the structure as a result of this failure, could not meet the purpose for which it was meant for. Assembly buildings (Religious buildings) account for 12.7% of building collapse in Nigeria. Most church building collapse are not often reported or recorded, except where the casualties is much and cannot be hidden from the government agencies. The Synagogue Church Building and Reigners Bible Church building collapse are recent incidents in Nigeria. The aim of this paper is to review the causes of building collapse and suggest ways of prevention as it concerns religious buildings.*

KEYWORD: Building, Structure, Religion, Foundation, Collapse

INTRODUCTION

Building collapse or failure is a common global phenomenon. For instance, the Rana Plaza Tragedy of 24th April, 2013 where a high rise garment factory collapsed in Dhaka, the capital of Bangladesh with over 200 casualties (Akinyemi, Dare, & Dabara, 2016). However, building collapse is more common and devastating in developing world. In Nigeria, the trend is on the increase and religious houses/building are not left out.

A building can be defined as an enclosure for spaces designed for specific use e.g. church service, control local climate, distribute services and evacuate waste (Fadamiro, 2002). Odulami (2002), added that, a building is that structure meant for human activities, which must be safe for the occupants. Moreover, buildings can be described as structural entities capable of securing self by transmitting load (dead load and live load) to the ground. A church building or religious buildings however are sacred places where believers interface with God. The prophet Isaiah (Isaiah 6:1) narrated his encounter with God by stating that in the year that king Uzziah died he saw the lord sitting on the throne, high and lifed up and the trail of his robe filled the temple (Hayford, 2009). Paradoxically, church/religious buildings and pilgrimage sites are also now becoming places where people lose their lives as a result of accident and structural collapse.

A building collapse occurs when part or whole body of structure fails and suddenly gives way, the structure as a result of this failure, could not meet the purpose for which it was meant for (Ayodeji, 2011). It is an extreme case of building failure: Failure in buildings is said to occur when there is a defect in one or more elements of the building caused by inability of the material

ISSN 2055-6578(Print), ISSN 2055-6586(online)

making up the components of such building elements to perform its original function effectively, which may lead to building collapse (Odulami, 2002). Failure in building could also be of two type: cosmeties and structural failure. The former occurs when something has been added to or subtracted from the buildings.

Review of the State and Severity of Church/Religious Building Collapse

As earlier discussed, excessive deflection resulting in serious damage to the building component could be referred to as failure, while sudden dislocation or giving way of a structure is classified as building collapse. According to Windapo and Rotimi (2012), assembly buildings (Religious buildings) account for 12.7% of building collapse in Nigeria. The year 2014 will go down in the annals of religious/church building history in Nigeria and South Africa as a gloomy year when a six floor guest house belonging to the Synagogue Church of All Nations (SCOAN) collapse at Ejigbo area of Lagos in Nigeria, killing at least 115 persons. The vast majority of casualties were from South Africa, but the nationalities of dozens of people remained unclear. In 2016, the Iron rafters carved in during the consecration service of the founder of the church, Apostle Akan weeks, as a bishop off Reigners Bible Church in Nigeria. At least 100 persons were killed by the collapse of the new church building (Fowode, 2017). It is important to note that most church building collapse are not often reported or recorded, except where the casualties is much and can not be hidden from the government agencies.

Fig 1 photo of collapse Reigners Bible Church Building

However, the geographical spread of building collapse suggest a high prevalence in the southern part of Nigeria with 81.6% of reported case in Lagos only, 8.8% in Abuja, 6.5% South-South, 5.5% in the South East and 4.4% in both the north Western and North central state (Abimbola & Rotimi, 2012).

Historically, King Solomon took seven years to build a temple or a house of God. Jerusalem was filled with more than 180,000 busy workers (30,000 Isrealites and 150,000 canacanites) who built the temple. The temple stood for 400 years before it was destroyed in 586 BC (Hayford, 2009). It is interested to note that this magnificent structure built by king Solomon never collapse as result of construction inadequacies, but was deliberately destroyed by human beings. Lisbon was struck by a devastating earthquake in 1755; coincidentally it was 'All Saints

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Day', all churches at Lisbon were filled with worshipers. 15,000 people lost their lives and thirty churches were destroyed (Ortlund & Hughes, 2005). Again, the destruction of churches at Lisbon was not due to construction errors but natural factors. Globally, causes of building collapse are traceable to many factors. Table 1 below is a selected list of religious building collapse across the world.

List of Selected Collapsed Church/Religious Buildings across the Globe

Date	*Name*	*Location*	*Type*	*Casualties*
226BC	Colossus of Rhodes	City of Rhodes	Statue	0
27 AD	Fidenae amphitheater	Italia	Amphitheatre	20,000 +
140 AD	Upper tier collapse of The circus maximus.	Rome, Italia	Amphitheatre	-13,000
558 AD	Dome of hagia Sophia	Constantinople	Church	0
1284	Choir of Beauvais Cathedral	Beauvais, France	Church	0
1382	Bell tower of St. Mary Church	Stralsund, hanseatic league (now Germany)	Church	0
1500	Malmesbury abbey	Malmesbury, England	Church	0
1549	Lincoln Cathedral	Lincoln, England	Church	0
1573	Tower of Beauvais Cathedral	Beauvais, France	Church	N/A
1647	Tower of St. Marine-Kriche	Stralsund, duchy of Pomerania (now in Germany)	Church	
1666	St. Peters Church, Riga	Riga, Sweden (now in Latvia)	Church	

Source: Wikipedia.com

In 11th September 2015, At least 87 pilgrims were killed and 184 were injured in Mecca during Hajj when a construction crane crashed into the Mosque. In addition, 719 pilgrims died and about 800 got injured during a stampede at the Hajj in Mecca, a week after the crane collapse (Mathebula & Smallwood, 2017) (The Guardiam, 2015)

Causes Of Building Collapse In Nigeria

There are many factors (natural and man-made) that are responsible for building collapse. From our earlier discussion, natural phenomenon may be attributable to earthquakes (as the case of Lisbon in 1755) and typhoons. While man-made phenomenon consists of disaster which may be as a result of man's negligence in areas such as building design, quality of building materials, poor workmanship, the use of unskilled labour and non compliance with construction regulation/by-laws.

Poor Quality of Materials and Inadequate Structural design

The use of poor quality materials is said to be 10%contributory factor to building collapse cases in Nigeria (Oyewande, 1992). According to coroner's report on SCOAN building collapse as publishe by Wikipedia.org.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Three government agencies; the Nigeria Building and Road Research institute (NBBRI), the Council for the Regulation of Engineering in Nigeria (COREN) and the Building Collapse Prevention Guild (BCPG) examined the site and found among others; inadequate beams of 750mm by 225mm (should have been 900mm by 300mm)

- Inadequately reinforced columns. 10 x 20 bars was used instead of 12 x 25 bars or 20 x 20mm bars.
- Failure to introduce rigid zones for bracing the structure and did not design the frames as an unbraced structure.
- Failure to provide movement joint
- Use of under signed beams.

Fadamiro (2002), added that design deficiencies also come under calculation errors, bearing support problems, secondary stresses, elastic cracking, and temperature/shrinkage problems.

Changes and alterations

Changes and alterations in existing building contribute substantially to building structural failure. Sudden change in use or errors in assumed loading in building often lead to the crushing and collapse of concrete column and footing or other foundation members. According to Ayodeji (2011), the most common form of foundation failure occurs due to abnormal loading situations especially in structure being converted to new use or having additional floors. Creating additional rooms on suspended floors, changing the use of building, for example Converting residential to mini-factory whereby heavy duty equipment are placed on suspended floors (Ayodeji, 2011). Also creating vibrations on suspended floors by breaking of slabs, exposing old foundation to flood and erosion may lead to structural failure.

Foundation failure

A building structure can collapse if constructed on faulty or under designed foundation (Fadamiro, 2002). Foundation of a building is that part of walls, piers or column in direct contact with and transmitting load to the ground. Building foundation failure can be caused by construction of foundation on poor load bearing sub-soil, building not uniformly loaded, soil erosion, uneven earth movement and poor foundation construction. In addition, proximity of trees and shrubs to building can result to foundation failure due to their physical presence and strength (Marshal, Worthing, & Heath, 2003) . As the trees grows the radius of the root system increases and the individual roots grow in size. This, in time, can lead to the displacement of the surrounding sub-soil, upwards and outwards pressure on foundations and walls in the vicinity of the root and even growth through underground walls of softer /weaker materials as show in figure 1

ISSN 2055-6578(Print), ISSN 2055-6586(online)

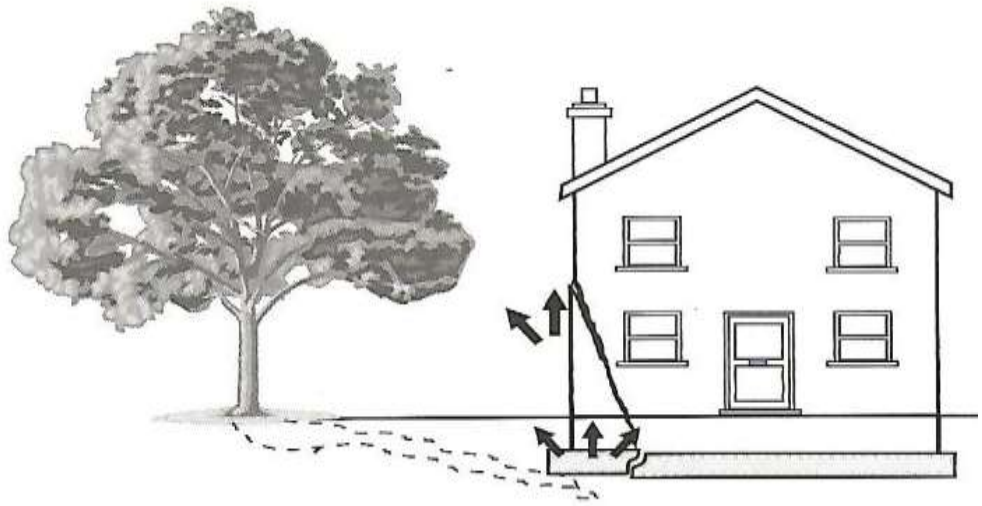

Fig. 1 -Root growth expands. It applies pressure upwards and outwards on sub-soil and building

Faulty Construction

Previous studies have shown that faulty construction methodology contributed up to 40% in buildings structural failures, hence building collapse occurrences (Olagunju, Aremu, & Ogundele, 2013). In several occasion contractors fail to build in accordance with plans and specifications. Most religious organization make use of direct labor, volunteers and allows religious sentiments to influence the choice of contractors. Consequently, instruction and monitoring of construction materials and actual construction is poor. Moreover, Mix ratio by the engineers and the incompetence of supervisors (which in most cases are church leader or committee chairman) may aid the contributors to carry out some of their evil that often lead to incessant building collapse. A study carried out by Mathebula and Small wood (2017) revealed that most churches undertake to build the structures without complying with the bye laws or regulations, used unqualified worker and the volunteers are not even trained in hazard identification and risk management. Somehow, there is this belief among believers that God will always protect the people and the building regardless of their poor workmanship or input.

Poor Maintenance

Poor building maintenance or lack of maintenance culture can result to weakening of the building structure. It is worse when unplanned maintenance approach is the culture or practice of the building owner. However, Deterioration in building starts from the time they are completed through the operational phase. The phenomenon of deterioration in building, is unavoidable, nevertheless, the rate at which building deteriorate can be controlled or reduced through proper building maintenance practice.

Undue Interference of Leaders/committee members on Church/Religious building works

Sometimes the client or religious leader makes serious changes and variations at advanced stage of construction with the contractor without seeking building consultants' advice. And the consultant overlooks or fails to challenge the situation due to fear of 'spiritual authority'.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Effects Of Building Collapse

Loss of human life has become a common report of most of the collapse building incidents in Nigeria. A study by Arayela and Adam (2001), about two hundred and seventeen (217) people were reported dead with many injured from only fifteen selected cases of building collapse between 1974 and 2001.Victims could be bread winners, taking care of large family members, thereby leading to psychological trauma.

Moreover, apart from loss of life, there also lose of Materials and Capital Investments. When building collapse, components and materials are damaged beyond re-use (Areyela & Adam, 2001). Capital investments are not recoverable, leading to bankruptcy and high economic implications to the nation's economy (Olagunju, Aremu, & Ogundele, 2013). Other implications or effects includes;

- Loss of reputation and integrity of the religious organization.
- Court litigations, claims and counter claims. For instance, A South African widow sued the Nigerian's spiritual leader TB Joshua 18 million for gross negligence. In court papers she launched damaging criticisms on the church and the Nigerian authorities for their failure to administer strict construction guidelines (Sunday Times, 2016) (Daily Trust, 25th Feb,2016).
- Loss of church or religious members

RECOMMENDATIONS

According to Vitruvius, there are three simple rules of architecture – utility, strength and beauty (Farah, 2009). Rose (2001) stated that there are three natural laws of Catholic building construction: 1. A Catholic Church must have verticality, 2. A Catholic Church must have permanence, and 3. A Catholic Church iconography. It is true that the three laws are vital, permanence is more relevant to the discussion. The relevance of permanence is based upon the idea that, "the church, is a building that will serve generation after generation, transcending time and culture, must be constructed of durable materials" (Rose, 2001). Once a master builder has laid a foundation on the rock and built a strong edifice, that edifice will stand for all time as seen from the temple that was built by King Solomon. Yet a number of ecclesiological studies do not focus on the health and safety management of the pilgrims or worshipers (Mathebula & Smallwood, 2017) . From the foregoing analysis and discussion, the following recommendations should be taking into consideration by all the stakeholders in building

Industry including religious leaders in Nigeria. These include,

- ❖ Religious or Faith-based organisations should have a Health and Safety Committee that would oversee the health and safety of their congregants, plants and buildings/auditorium.
- ❖ Religious or Faith-based organisations should do risk assessments periodically on existing worship centres or buildings.
- ❖ The government should appoint building inspectors to monitor the health and safety of faith-based structures especially centres used for camping and conferences.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

- Urban or Town development agencies at various levels of government (commission, Board, Authority) should enforce control of building works(churches and mosque inclusive) in their localities as laid down in urban and regional planning decree 88, of 1992 and as in section 13 of National Building Code 2006.

- All the professional bodies associated with the building industry in Nigeria, such as Nigerian Institute of Architects (NIA), Architect Registration Council of Nigeria (ARCON) and Nigerian Society of Engineers (NSE) as well as Council of Registered Engineers (COREN) should find a way of curbing, if not to stop quarks operations in building industry.

- Workmen with the appropriate training should be employed for building works especially those working on the structural members, instead of always depending on unskilled church volunteers.

- The design team in any building work should be very careful when selecting supplier of building materials i.e. nominated supplier. Materials supplied to site by such should also be checked and vetted appropriately in conformance to the contract specification. The religious leaders should avoid undue interference and spiritualizing the selection of contractors and construction process.

- Religious leaders should undergo training in health and safety.

CONCLUSION

No one deserves to die on a spiritual journey, so we must be able to balance spiritualism with earthly reality. God is a God of order and principles. This was demonstrated when Noah constructed the Ark, to avoid collapse he was given the design and specifications which he obeyed to the latter. It is a fact that Nigeria has witnessed collapsed buildings in various dimensions, either those under construction or those already in existences. Religious buildings should be a safe haven for the collective good of the congregants. This simply means that

when faith based organisations erect building for the purpose of worship; the buildings should be compliant with all construction regulations. By taking short cuts and having a form of beliefs that negate construction principles /ethics; religious organizations are exposing their members to major hazards and danger. As discussed above, building collapse are more as a result of poor workmanship as well as the failure of church authorities to comply with construction regulations and bye-laws. The collapse of these buildings produces more causalities due to huge number of people who attend the services and some incidence are neither reported nor recorded. Religious leaders should look at the scope of their responsibilities as far as for the health and safety of their church members is concerned. The clergy, religious and laity should ensure that the structures that are constructed for religious purposes are safe and durable. The government has a role to play by ensuring that all building plans tendered by any developer for approval must comply with the Nigeria's new building code and local bye laws and regulations. Finally, with regards to safety, nobody works alone. It is a joint responsibility. Hence, all parties should be held accountable right from the Church/Religious head to the regulators who should have taken reasonable steps to give professional advice and where need be, exercise their right to serve enforcement notices before a catastrophic incident happens.

ISSN 2055-6578(Print), ISSN 2055-6586(online)

REFERENCES

Abimbola, O. W., & Rotimi, J. O. (2012). Contemporary Issues in Building Collapse and Its Implications for Sustainable Development. Retrieved from mdpi-Journal of Buildings. ISSN 2075-5309: http://www.mdpi.com/journal/buildings

Akinyemi, A. P., Dare, G. M., & Dabara, D. I. (2016). Building Collapse in Nigeria: Issues and Challenges. Internatinal Journal of Arts & Sciences. ISSN 1943-6114 Vol.09(11), 99-108.

Areyela, O., & Adam, J. (2001). Building Disaster and Failure in Nigeria : Causes and Remedies . Journals of the Association of Architectural Educators (AARCHES), Vol.1 (6). Sept.

Ayodeji, E. O. (2011). An Examination of the Causes and Effects of Building Collapse in Nigeria. Retrieved from Researchgate: http://www.researchgate.net/publication. [Accessed: 04-10-17]

Daily Trust. (25th Feb,2016). South African minors sue T.B Joshua over collapsed building. by Yahaya Ibrahim.Lagos.

Fadamiro, S. (2002). An Assessment of Building Regulations and Standards and the implications for Building Collapse in Nigeria. In D. Ogunsemi, Building Collapse : Causes , Prevention and Remedies (pp. 28-39). Akure: The Nigeria Inst. of Building .

Farah, J. (2009). The Implications of the Second Vatican Council on historic American Catholic Architecture.dissertation. USA.

Fowode, K. (2017). Church Building Collapse a Clarion Call For Duty Holders. Retrieved from Safetyrecord: http://www.safetyrecord.com/01/church. [Accessed : 24-10-17]

Hayford, J. (2009). New Spirit Filled Life Bible . Wellington.New Zealand: Thomas Nelson Pub.

Marshal, D., Worthing, D., & Heath, R. (2003). Understanding Housing Defects. London: EG Books.

Mathebula, A., & Smallwood, J. (2017). Religious Building Collapse :The Heavy Price of Short Cuts in Place of Worship and Pilgrimage Site Construction. Elsevier.Procedia Engineering, 919-929 htpp://www. Sciencedirect.com/science/article/ [Accessed : 24 - 10- 20117].

Odulami, A. (2002). Building Material Specifications and Enforcement on Site. In D. Ogunsemi, Building Collapse : Causes , Prevention and Remedies (pp. 22-27). Akure: The Nigeria Inst. of Building.

Olagunju, R., Aremu, S., & Ogundele, J. (2013). Incessant Collapse of Bildings in Nigeria : An Architect's View. Retrieved from Civil and Environmental Resarch. ISSN 2225-0514: http://www.iiste.org

Ortlund, R., & Hughes, I. (2005). God Saves Sinners. Llinois,USA: Crossway Books.

Oyewande, B. (1992). A Research for Quantity in the Construction I. Builders Magazine.

Rose, M. (2001). Ugly as sin: Why They Changed Our Churches from Sacred Places to Meeting Spaces and how we can Change Them Back. New York, USA: Sophia Institute Press.

Sunday Times. (2016). SA family sues TB Joshua for millions. by Monica Laganparsad.South Africa.

The Guardiam. (2015). Timeline of tragedies during hajj pilgrimage in Mecca. Retrieved from Thr Guardian online: https://www.theguardian.com/world/2015/sep/24/timeline [Accessed :24-10-17]

Yeang, K. (1999). The Green Skyscraper :The Basis for Designing Sustainable Intensive Building ISBN -B . 9783791319933. London: Prestal Verlang.

ISSN 2055-6578(Print), ISSN 2055-6586(online)