



**SCHOOL OF ENVIRONMENTAL TECHNOLOGY,  
FEDERAL UNIVERSITY OF TECHNOLOGY**  
MINNA, NIGER STATE, NIGERIA

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R. E. Olagunju

B. J. Olawuyi

E. B. Ogunbode

**SETIC  
2020**  
INTERNATIONAL  
CONFERENCE

**BOOK OF PROCEEDINGS**

**MAIN THEME:**

Sustainable Housing And Land Management



**3RD -5TH MAY, 2021**



SCHOOL OF ENVIRONMENTAL TECHNOLOGY COMPLEX,  
FUT, MINNA, NIGER STATE, NIGERIA

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**School of Environmental  
Technology International  
Conference  
(SETIC 2020)**

**3RD - 5TH MAY, 2021**

**Federal University of Technology Minna, Niger  
State, Nigeria**

**CONFERENCE PROCEEDINGS**

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**ISBN 978-978-54580-8-4**

**Proceedings of  
The 3rd School of Environmental Technology International Conference  
(SETIC 2020)**

**Published by**

School of Environmental Technology,  
Federal University of Technology Minna.  
PMB 65, Minna,  
Niger State Nigeria.

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ISBN 978-978-54580-8-4

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## PREFACE

The School of Environmental Technology International Conference (SETIC 2020) is organised by School of Environmental Technology, Federal University of Technology Minna, Nigeria. In collaboration with Massey University New Zealand, Department of Civil Engineering Faculty of Civil Engineering and Built Environment Universiti Tun Hussein Onn Malaysia, Malaysia Centre For Professional Development and Industrial Project Development School of Professional and Continuing Education (SPACE) UTM-KL Malaysia, Global Academia, Department of Architecture, Faculty of Engineering and Architecture, Istanbul Gelisim University Istanbul Turkey, Sustainable Environmental and Technology (SET) Research Group, Department of Architecture, Universiti Sains Islam. The main theme for this year conference is “SUSTAINABLE HOUSING AND LAND MANAGEMENT”. This promotes and encourage innovative and novelty for policy issues for inclusive and sustainable housing, access to finance for housing and land development, sustainable building materials, building cost management, sustainable and resilient cities, geoinformatics for land management, rapid urbanization, sustainable land use and spatial planning, gender issues in access to land.

The responses from participants for this conference are overwhelming, well attended, and successful. The operation mode was Virtual for all participants who choose the oral presentation mode. While, Physical for all poster medium presenters. Our participants are from various Universities and other sector across the globe, from countries like United State for America (USA), Turkey, Malaysia, China, Saudi Arabia, Kenya, New Zealand just to mention a few. Hence, this conference provides a good platform for professionals, academicians and researchers to widen their knowledge and approach on latest advances in research and innovation. Papers presented in this conference cover a wide spectrum of science, engineering and social sciences.

Finally, a note of thanks must go to SETIC 2020 Local Organizing Committee (LOC) for their remarkable dedication in making this conference a success. We hope the event will prove to be an inspiring experience to all committee members and participants.

## ACKNOWLEDGEMENTS

The effort put together in achieving the success of SETIC 2020 is predicated on the feat of the first and second edition of School of Environmental Technology International Conference held in 2016 and 2018, respectively. The support and goodwill from Vice-Chancellor of Federal University of Technology, Dean School of Environmental Technology, Dr Dodo Y. A., Dr Moveh S. and many other highly motivated people are highly appreciated.

It is also my privilege and honour to welcome you all, on behalf of the Local Organizing Committee (LOC) to the 3rd edition of the Biennial School of Environmental International Conference (SETIC 2020). This Conference which was earlier schedule for 7th to 11 April, 2020 is holding now (3rd to 5th May, 2021) due to the challenges of COVID-19 Pandemic and the ASUU-FGN crisis which made our public Universities in Nigeria to be closed for about one year. We thank God for keeping us alive to witness the great SETIC2020 event, in an improved form exploiting the new-normal situation posed by the Pandemic for a hybrid (i.e. both physical and virtual) form of Conference participation.

The conference provides an international forum for researchers and professionals in the built environment and allied professions to address fundamental problems, challenges and prospects Sustainable Housing and Land Management. The conference is a platform where recognized best practices, theories and concepts are shared and discussed amongst academics, practitioners and researchers. This 2020 edition of SETIC has listed in the program a Round Table Talk on Housing Affordability beyond COVID-19 with selected Speakers from across the globe available to do justice on the topic of discussion.

Distinguished Conference participants, permit me to warmly welcome our Keynote and Guest Speakers:

- Prof. Ts. Dr. Mohd Hamdan Bin Ahmad, *Deputy Vice Chancellor (Development) Universiti Technology Malaysia (UTM)*;
- Assoc. Prof. Dr. James O.B. Rotimi, *Academic Dean Construction, School of Built Environment, College of Sciences, Massey University of New Zealand*;
- Assoc. Prof. Sr. Dr. Sarajul Fikri Mohammed, *General Manager, Centre for Professional Development and Industrial Project Development School of Professional and Continuing Education (SPACE), UTM-KL*.
- Prof. Ts. Dr. Zanaail Abidin Akasah, *Visiting Professor on Sustainable Solar Integrated Design Building Design, International Micro Emission University (IMEU)/HIMIN Ltd. China & Senior Research Fellow, The Architects Resourcery, Jos, Nigeria*;
- Ar. Dr. Elina Mohd Husini, *Department of Architecture, Faculty of Engineering & Built Environment, Universiti Sains Islam*;
- Asst. Prof. Dr. Yakubu Aminu Dodo, *Department of Architecture, Faculty of Engineering and Architecture Istanbul Gelisim University, Istanbul Turkey*

and the five Speakers for our Round Table Talk on Housing Affordability Beyond COVID-19

- Dr. Muhammad Mustapha Gambo, *Manager, Policy, Research and Partnerships, Shelter Afrique, Nairobi, Kenya*;
- Prof. Dr. Soumia Mounir, *Department of Architecture Ecole Nationale d'Architecture d'Agadir [The National School of Architecture of Agadir], Morocco*

- Dr. Said Alkali Kori, *General Manager, Projects and Portfolio management, Family Homes Fund, Federal Ministry of Finance, Abuja;*
- Ts. Dr. Sasitharan Nagapan, *Department of Civil Engineering, Faculty of Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia, Malaysia;*
- Dr. Mercy Nguavese Shenge, *AIA Assoc. Historic District Commissioner, City of Rockville, MD, USA.*

for accepting to share from their knowledge, wealth of experience and be available to interact with participants on varied issues on “**Sustaining Housing and Land Management**”.

As reflected on the Conference program, the Conference activities will be Virtual for power point presenters to run in four parallel sessions on the Zoon platform while the participants for Poster presentations (mostly Postgraduate students) are expected to have their Posters displayed in the Environmental Complex Building of the Federal University of Technology, Minna. With a total of One Hundred and One (101) articles captured in the Conference Proceedings covering the seven subthemes of the Conference, I have no doubt that we are all in for an impactful experience at SETIC2020 as we brainstorm, exchange ideas, share knowledge and participate in evolving more approach to sustainable housing and land management drives.

I implore us all to enjoy every moment of the deliberations and ensure we maximize the great opportunity offered by the Conference to network for better research and career development as we also make new friends.

I also on behalf of myself and the LOC express our appreciation to the Dean, School of Environmental Technology and the entire Staff of the School for giving us the opportunity to steer the ship for SETIC2020. To the Reviewers and various Committees that served with us, I say thank you for helping us through despite the pressure of work.

Thanks, and God bless you all.

**Olawuyi, B.J. (PhD)**  
**Chairman, LOC**  
**SETIC2020**

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## POTENTIALS OF EFFECTIVE URBAN PLANNING AS TOOL FOR DISASTER RISK REDUCTION IN NIGERIA

Sanni, L. M. PhD, MNITP

Department of Urban and Regional Planning,  
sanni.lekan@futminna.edu.ng

### Abstract

*In the last couple of years, disaster occurrence, both natural and human-induced are increasing worldwide. The magnitude of these disasters and the severity of their impacts have become sources of concern to development analysts and disaster risk managers. This study highlights that unlike what obtains in many other parts of the world such as Europe, North America and South East Asia that are particularly ravaged by natural disasters such as landslides, earthquakes and hurricanes amongst others, the disasters commonly experienced in Nigeria as in many other sub-Saharan African countries, save for perennial flooding, are mostly human-induced disasters. In spite of the low frequency of natural disasters in the country the frequency and severity of human-induced disasters in recent times has become worrisome. This study therefore, emphasize that many of the this kind of disasters such as building collapse, fire outbreaks, pollution and epidemics occur in the country as a result of the inappropriate pattern and poor land-use planning and uncoordinated physical development activities, particularly in the urban areas. The paper therefore, highlights the relevance and utility of effective urban land-use planning and physical development tools such as land-use zoning, prevention of unwholesome and incompatible land-uses amongst others as veritable tools or measures for the prevention and minimization of human-induced disasters in the Nigeria.*

**Keywords:** Disaster, Effectiveness, Potentials, Risk reduction, Urban planning

### 1.0 Introduction

The magnitude and scale of disaster occurrence worldwide and associated losses in the last decade has become increasingly worrisome and of great concern to development planners. Several countries of the world had witnessed at least one major disaster or the other in the last couple of years. While some parts of the world, particularly South East Asia, Europe and North America had experienced strings of natural disasters such as hurricanes, typhoons, mudslides, earthquakes and flooding of varying magnitude, other parts of the world, particularly sub-Saharan Africa have had to contend with series of human-induced disasters (GFDRR, 2010). While the losses associated with many natural disasters can be greatly minimized with timely prediction, adaptation and proactive settlements relocation measures, those occasioned by human-induced disasters are somewhat entirely preventable where effective urban planning is institutionalized and entrenched. Unfortunately despite the relative low occurrence of natural disasters in Nigeria, save for occasional flooding, the country has had to contend with a multitude of human-induced disasters and calamities that are otherwise entirely preventable with effective urban development planning. These include building collapse, road traffic accidents, fire disasters, epidemics of several dimensions and flooding associated with poor urban planning and development (Ogundiya and Amzat, 2008).

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sanni.lekan@futminna.edu.ng

The types of human-induced disasters perennially experienced in Nigeria are to a large degree hardly experienced in many parts of the world where effective urban planning and development are institutionalized and entrenched. As a result, many of the cities and towns in such countries are relatively safe, secured and livable such that many have become comfort zones of some sorts to their residents and visitors alike. It is therefore, the opinion of this study that if

identified urban development planning measures and practices with disaster risk reduction (DRR) components are effectively institutionalized and entrenched in all parts of Nigeria, the large number of lives and property worth several billions of Naira annually lost to disasters would be saved.

## **2.0 Concept of Urban Planning**

Urban planning is increasingly becoming a dynamic profession, activity domain and branch of knowledge. As a result, the term urban planning has been given varying definitions and interpretations. It has also been given different names and appellations such as land-use planning, urban and regional planning, spatial planning, physical planning and town planning, just to mention a few. One of its earlier and most widely accepted definitions was offered by Kebble (1969) who described it as an activity concerned with the spatial ordering of land-use (both in the rural and urban settings) for the purpose of creating functionally efficient and aesthetically pleasing physical environment for living, working, circulation and recreation. Kebble (1969) further elaborated that urban planning is the art and science of ordering the use of land as well as siting of buildings and communication routes, amongst others, so as to secure maximum practicable degree of economy, convenience and beauty. Earlier in 1965, Davidoff and Reiner had defined planning as a set of procedures undertaken in making choices among alternatives and also in determining the future course of action. Patton and Reed (1988) described urban and regional planning as a discipline and profession concerned with forces that influence the quality of life from the neighbourhood down to the region, state and nation, employing systematic and creative approaches to address and resolve social, economic and physical problems of the neighbourhoods, localities, cities and the larger regions.

What is clear from the above definitions is that urban planning is not only dynamic but is also seriously concerned about human welfare and the condition of the environment in which they live. It can thus be argued that both in orientation and practice, urban planning seeks to create the best possible environment for man's living and for carrying out his various social, economic and other activities. If this is so, then central to urban planning is man's utmost safety, comfort, convenience and wellbeing. In its core principles, urban planning is disaster-preventive and safety-enhancing. Urban planning is therefore, regarded as an art and science concerned not only in allocating appropriate spaces to various activities (land-use planning) but also recommending appropriate locations for these activities so as to derive the utmost practicable benefits from them both in the present and in the future. If the foregoing is valid about urban planning, then it is a veritable tool for disaster risk reduction (DRR) if effectively carried out. Given the emerging scale and magnitude of disaster occurrence in Nigeria, particularly those regarded as human-induced, urban planning can be adapted to minimize likely disaster risks in both the rural and urban areas long before they rear their ugly heads.

## **3.0 History of Urban Planning in Nigeria**

The emergence of modern urban and regional planning in Nigeria is intricately associated with colonialism. Although the various indigenous communities in different parts of the country through their *Obas*, *Obis* and Emirs as the case may be, had traditional methods of regulating land-uses and physical development in their areas prior to colonialism (Aluko, 2011), modern urban planning as it is practiced today emerged during the colonial period (Onifade, 2010). When Lagos became a British colony in 1861 there was the need to make its environment more conducive for the expatriate staff of the colonial government to live and work, particularly given the poor sanitary condition of the island then. As a result, the very first attempt made to regulate the physical development of the colony was in the form of enactment of the Town Improvement Ordinance in 1863. Although the coverage of the law was restricted to Lagos, its main focus was the regulation of physical development and urban sanitation (Oyesiku, 1997). Other ordinances also focusing on various aspects of urban development and control in the

Lagos area were to follow in 1904 (Cantonment Proclamation), 1917 (Township Ordinance) and 1928 (Lagos Town Planning Ordinance).

The very first urban planning legislation that covered the entire country was the 1917 Township Ordinance which was enacted following the amalgamation of the Southern and Northern Protectorates in 1914. The main focus of this Ordinance was to establish the broad principles of municipal responsibility which was graduated according to the importance of the community. Therefore, the Ordinance was to serve as the legal basis for the development of the towns for most parts of the colonial administration in Nigeria as it gave clear guidelines for the construction of buildings and control of physical development (Oyesiku, 1997). However, the 1946 Town and Country Planning Ordinance was actually the planning legislation that was later to define and shape physical development control and regulation in the country. For a very long time, the law therefore, had pervasive influence on the way and manner various urban planning activities were carried out and implemented in many parts of the country for the rest of the period of colonial administration and after. In fact, the law was in operation for over forty-six years as no any other major physical planning legislation with national coverage was promulgated until 1992. However, the fact that the 1946 Town and Country Planning Ordinance in its actual operation was selective and segregational in nature had been expressed as it focused mostly on the planning and development of colonial-established European Reservation Areas, while many parts of the native towns where the indigenous people lived were neglected and haphazardly developed (Oyesiku, 2007).

Despite the criticisms relating to its operations however, the 1946 Town and Country Planning Ordinance laid the foundation for modern urban planning in Nigeria. Even the 1992 Urban and Regional Planning Law which succeeded it and was packaged by Nigerians to reflect the need and aspirations of the country drew widely from its contents and modalities. However, in spite of its wide reaching provisions, the 1992 Urban and Regional Planning Law has done little to stem the ugly face of cities and urban settlements and haphazard nature of physical development in the country. As at the end of the 2015 while no state in the country had fully implemented the Law, many others such as Edo, Benue, Ekiti, Enugu, Imo, Ondo, Plateau, Taraba and Yobe had only done so halfheartedly. As a result, particularly with the unprecedented trend of urbanization and high population growth rates in the country, urban planning cannot be said to have influenced the growth and development patterns of most urban areas in the country. There are series of urban planning issues and challenges confronting many parts of the country and which have therefore, deprived her off the benefits and potentials associated with modern urban planning. The next section of this paper focuses on some of these issues and challenges.

#### **4.0 Urban Planning Issues and Challenges in Nigeria**

Urban planning in Nigeria in the present circumstance cannot be regarded as effective and therefore, its full potentials as a tool for disaster risk reduction (DRR) is yet to be fully harnessed. If fully deployed and carried out by the most qualified and well trained practitioners, it has huge potentials in several respects to minimize the gamut of risks that triggered human-induced disasters in the country. The current challenges affecting urban planning in Nigeria are many and varied and include the following.

##### **4.1 Ineffective Urban Planning Administrative Framework**

The major planning legislation that is expected to drive urban planning administration in Nigeria is the 1992 Urban and Regional Planning Law. The law is not only comprehensive but also clearly defines the levels at which urban planning should be carried out in the country, while also assigning specific roles and responsibilities at these various levels. In addition to several other provisions bothering on land use regulation and development control, in specific

terms, the law made explicit provision for plan preparation and administration at the federal, state and local government levels. However, this crucial legislation which was expected to have far reaching impacts on urban planning administration in Nigeria is yet to be fully operationalized and implemented in several states and local government areas of the country. As a result, urban planning is still very weak and half-heartedly carried out in many states across the country (Aribigbola, 2008).

#### **4.2 Poor Urban Governance**

One of the glaring manifestations of the non-implementation of the 1992 Urban and Regional Planning Law in Nigeria is the poor structure of urban governance in the country (Aribigbola, 2013; Omar, 2013). In many states of the country it is sometimes difficult to tell which specific agency of government is in charge of urban management as there are multiple agencies with overlapping responsibilities and which are in many cases ineffectively carried out. For instance, some states have Ministries of Housing, Survey and Urban Planning alongside such agencies as Urban Development Boards and Housing Corporations with overlapping functions and responsibilities.

#### **4.3 Poor Urban Land-use Planning, Control and Management**

As a result of the weak administrative structure for urban planning in many states in Nigeria, land-use planning are not properly coordinated and controlled (Aribigbola, 2008; Dimuna, 2010; Olajuyigbe & Rotowa, 2011). It is no surprise that many urban areas in the country, including some state capitals, are without master plans and other physical development plans expected to guide their growth and development. In cases where such plans exists, they are sometimes either moribund or haphazardly implemented. As a result, many neighbourhoods of the cities and towns grow haphazardly on their own without any control. Risky and sensitive land-uses are in many cases not separated from other non-conforming uses, just as they are located in the most inappropriate parts of the cities where they will be less impactful.

#### **4.4 Poor Funding and Political Interference in Urban Planning Activities**

Urban planning is not given its pride of place and funding in many states in the country (Aribigbola, 2013a). In many cases, urban planning agencies lack crucial facilities and plans to work with as a result of paucity of funds. Perhaps one of the reasons why urban planning has been ineffective in Nigeria is the constant interference in urban planning and related activities by the political class (Aluko, 2011). Instances abound where development proposals earlier refused approvals by the relevant urban planning authorities were forced to grant same on the promptings and directives of highly placed and influential government officials. This is one of the several reasons why non-conforming land-uses are sited side-by-side in many places across the country.

#### **4.5 Widespread Growth of Slums and Informal Settlements**

There is no any other manifestation of the ineffectiveness of urban planning in the country than the multitude and growing number of slums and informal settlements in the country. Not only are many neighbourhoods not planned, their development are also not properly controlled leading to the development of all manners of structures and contraptions that expose residents to various health risks and other challenges. This also explains why unlike many other parts of the world, Nigeria is more exposed to human-induced hazards and disasters. Many of the fire disasters, building collapse, epidemics and other forms of disasters are more widespread in such places that are improperly planned and developed.

#### **4.6 Poor Urban Transportation and Traffic Planning and Management**

Urban transportation and traffic planning and management in most cities of Nigeria has been regarded has very poor. Several studies (Oni, 2004; Asenime, 2009; Atubi, 2010; Moses, 2011; Solanke, 2013) have catalogued the numerous challenges of urban transportation and traffic

planning and management in Nigeria. These include poor quality of road network, poor road infrastructure, poor maintenance, insufficient investment in modern transport modes and intractable traffic congestion, particularly as a result of urban expansion and increased population. Others are noise and air pollution, increasing rate of road traffic accidents, elongated travel time and poor traffic law enforcement and management amongst several others. Almost all these urban transportation challenges can be attributed to poor urban planning and management.

#### **4.7 Poor Waste and Environmental Management**

Another manifestation of poor urban and environmental planning and management in Nigeria with serious implications on disaster occurrence is the almost intractable challenges of poor municipal waste management system. A whole range of challenges has been identified in the waste management stream in the country, from poor waste storage attitude to ineffective waste collection, transportation and disposal methods (Abdullahi *et al.*, 2014; Amuda, *et al.* 2014; Gana and Ngoro, 2014). Instances abound where the outbreaks of diseases and epidemics in the country are attributable to the poor waste management system.

#### **5.0 Concept of Disaster Risk Reduction (DRR)**

The concept of disaster risk reduction (DRR) emerged as a result of the increasing trend of disasters worldwide and the severity of their impacts. In most of the definitions of the concept of DRR, emphasis is placed on two major strategic approaches. These are outright prevention of disasters and where such is not attainable, efforts and activities should be employed to minimize their impacts. One of the most embracing definitions of DRR was offered by the United Nations International Strategy for Disaster Reduction UNISDR (2009) as the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

DRR is the systematic development and application of policies, strategies and practices to avoid or limit the adverse effects of hazards. The fact that virtually all individuals and communities are vulnerable to hazards that leads to disasters in varying forms have been expressed and so do the fact that they possess intrinsic capacities to reduce the vulnerability (Ginige *et al.*, 2009). Vulnerability is described as the physical, social, economic and environmental characteristics, conditions and circumstances of a community, system or asset which increases its susceptibility to the damaging impacts of hazards (UNISDR, 2010). It is therefore, believed by the advocates of DRR that policies, actions and activities can be put in place well in advance of hazards occurrence so as to lessen or mitigate their impacts where they cannot be entirely prevented. DRR therefore, seeks to create the consciousness of likely hazard risks in all development activities and factor this consciousness into its planning and implementation. In the face of massive challenges posed by unprecedented pattern of urbanization, huge population growth, technological innovations, climate change and inappropriate development measures, it becomes extremely important to enthrone all possible risk reduction measures so as to make the world a safer place for the human race by putting in place measures to check disasters before their occurrence. Urban planning and management where effective has inbuilt disaster preventive attributes and has become a veritable tool in DRR in many parts of the world.

#### **6.0 Disaster Occurrence and Management in Nigeria**

Nigeria has had her fair share of both natural and human-induced disasters, particularly in the last two decades. While many countries in Europe, North America and the South-east Asia usually ravaged by several natural hazards, including typhoons, hurricanes, mudslides and

earthquakes, amongst others had been able to emplace effective preparedness and mitigation measures, same cannot be said of many countries in the developing world, including Nigeria. In many of these countries, timely prediction, early warning system, population relocation and disaster resilient urban planning and construction amongst several contemporary DRR measures have tremendously reduced the negative impacts of disasters. Unfortunately, Nigeria with little vulnerabilities to natural disasters has been ravaged by many unfortunate and often preventable man-made disasters, the type many developed countries have been able to tame with their pattern of effective urban planning, development and management. Safe for the perennial flooding (now increasingly associated with the effect of climate change) usually recorded in many parts of the country, Nigeria has not witnessed so many natural hazards that could have assumed the dimension of disasters.

Several kinds of human-induced disasters are on the rise in Nigeria spite of the institution of multiplicity of disaster risk management agencies and measures at various levels. The increasing incidences of human-induced disasters in Nigeria have been attributed to the impacts of unprecedented pattern of urbanization and high population growth rates and the increasingly deteriorating pattern of physical development planning and management. For instance, several deaths are recorded annually as a result of building failure and collapse attributable to the poorly regulated building construction process in the country. Akinyemi *et al.* (2016) compiled a list of 34 building collapse incidences said to have occurred between 1995 and 2015, 63% of which was reported to have occurred in Lagos alone. In addition to a gale of building collapse incidences in major cities of the country other major types of perennial human-induced disasters in the country attributable to poor planning and management include:

- 1. Fire disasters, especially in major markets across the country:** Major market fire incidences have been reported across the country, including the Balogun Market, Lagos in 2015, Onitsha Market of 2019, Sabon Gari Market, Kano resulting in the destruction of about 3,800 shops and goods worth over 2 trillion Naira. This Day, a popular national tabloid of 13<sup>th</sup> May, 2016 reported that in a space of three months, 10 major markets across the country went down with goods and property worth trillions of naira. Several other fire outbreaks have been recorded in many residential and commercial areas across the country, owing largely to unwholesome practices and poor physical development. Popoola *et al.* (2016) also reported that about 5,127 persons have died between 1998 and 2013 across the country as a result of different fire disasters
- 2. Road traffic accidents:** As a result of the several challenges affecting transportation and traffic management in the country earlier highlighted in this paper several lives are daily lost to road traffic accidents across the country. According to statistics obtained from the websites of the Federal Road Safety Commission (2017) a total of 110,471 lives were lost to various road traffic accidents across the country between 2000 and 2017, while a total of 487,265 victims sustained varying degrees of injuries within the same timeframe. Many of these road traffic crashes are preventable where good quality of road network exists and effective transportation and traffic management system are in place.
- 3. Infectious diseases outbreaks:** The connection between poor solid waste and environmental management and disease outbreaks has been highlighted by several studies (Modebe *et al.*, 2009; Nwogwugwu and Ishola, 2019). As a result of the poor and ineffective solid waste management system in the country, many communities, particularly in slum settlements and poor neighbourhoods of the cities are often exposed to all manner of infectious diseases.
- 4. Dam failures:** The country has also recorded significant incidences of dam collapse or failures, particularly in the northern part of the country. These failures have caused loss of several lives and property worth several billions of Naira. Lukman *et al.* (2010) and

Ezugwu (2013) among other studies have listed some dam failures in Nigeria that resulted in several deaths, displacement of thousands of people and destruction of properties to include the August 30<sup>th</sup>, 1980 Ojirami Dam failure; the Shiroro Dam failure of 1999 and September, 2003; the Tiga (Niger State) and Challawa (Jigawa State) Dams failure of August; and the Gusau Dam failure of September, 2006.

5. **Overcrowding and stampedes:** Ineffective crowd control and management are also known to have resulted in the deaths of a sizeable number of people, while scores sustained varying degrees of injuries and deformations. Notable of these kinds of disasters was the 2014 Nigerian Immigration Service recruitment exercises which took place across the 36 states and Abuja. A casualty figure of between 16 and 24 deaths were reported to have been recorded.
6. **Pipelines vandalism and explosion:** Notable instances of oil pipelines explosion include the Jesse, Delta State incidence of 18th October, 1998 which claimed 1,082 lives (Environmental Rights Action, 1998); Atlas Creek Island (near Lagos) pipeline explosion of 12<sup>th</sup> May, 2006. Over 150 deaths were reported. Other common instances of such pipelines vandalism resulting in multiple deaths include Abule Egba, Lagos which occurred in December, 2006 and over 500 deaths recorded (Ogundiya and Amzat, 2008).
7. **Bomb explosions:** Aside numerous bomb explosion incidences with substantial human and material losses attributable to the terrorist activities of the insurgent group *Boko Haram*, a major bomb explosion with devastating effects occurred at the Nigerian Military Cantonment in Ikeja, Lagos on January 27, 2002 leaving 800 military and civilian casualties and thousands others homeless (Popoola *et al.*, 2016).
8. **Urban flooding:** Although flooding is often categorized as a natural hazard, majority of urban flooding in Nigeria can largely be attributed to poor land-use planning and management and poor physical development regulations (Adeleye *et al.*, 2019). It is common place in Nigeria to see settlements or residential neighbourhoods either located on floodplains or lacking required drainage channels, thus making them very vulnerable to flooding, especially during the peak periods of the raining season. In many cities across the country a large number of the drainage channels are known to have been blocked by improperly disposed solid waste materials (Folorunsho and Awosika 2001; Ologunorisa, 2004; Magami *et al.*, 2014), particularly in the unplanned and poorly developed high-density and crowded neighbourhoods of the cities. The 2012 flooding incidence across the country was particularly historical and widespread as it was one of the worst in the country's history in terms of human and material losses with 363 people killed, 5,851 injured, 3,891,314 affected, and 3,871,531 displaced (GFDRR, 2013).

## 7.0 Urban Planning Measures With Disaster Risks Deterrence Elements

Urban planning and management measures with DRR elements can be mainstreamed and institutionalized into the development process as a way of addressing the several challenges identified, particularly those associated with various development activities. These measures are classified into both structural and non-structural in nature. According to the UNISDR (2010) structural measures are any physical construction to reduce or avoid the impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resistance in structures or systems. Non-structural measures are those not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through policies and laws, public awareness raising, training and education. The range of DRR measures and activities embedded under urban planning and management includes:

- i. Land-use planning and management

- ii. Land-use zoning
- iii. Physical development control mechanism
- iv. Promulgation of planning laws and regulations
- v. Evolvement of planning standards and building codes
- vi. Public participation in the planning process
- vii. Resettlement planning
- viii. Disaster resistance engineering construction works
- ix. Development of green city
- x. Smart urban transportation planning and management

## 8.0 Conclusion

In conclusion, it is apt to emphasize that as a result of the frequency of occurrence and severity of impacts of both natural and human-induced disasters concern worldwide is now increasingly shifting from disaster risk management to disaster risk reduction (DRR). While the former focuses on managing the risk of disasters and dealing with their impacts after their occurrence the latter is geared at building consciousness about risks associated with development activities and mainstreaming that consciousness into the development process so as to lessen such risks. Urban planning through its various measures, some of which have been highlighted in this study, where effectively instituted, has the potential to severely minimize if not entirely remove the development-related risks that triggers disaster events, particularly human-induced disasters. It is therefore, recommended that governments at all levels, particularly through their appropriate and relevant agencies saddled with physical development control activities begins to be proactive such that activities, conditions and circumstances that triggers the various human-induced disasters can be nipped in the bud before they manifests into disasters. This, in essence, is the main thrust of disaster risk reduction (DRR). It is further recommended that the appropriate physical development control agencies be staffed with qualified and well trained professionals while also providing them with all necessary tools and facilities with which to effectively carry out their activities.

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