
Urbanization and Sustainable Cities in Nigeria

Ebikabowei Biedomo Aduku ¹, Ifeoma Augusta Eboh ²,
Prisca Chibuzo Egbuchulam ³

Abstract

Rapid urbanization is on the increase especially in the developing countries and, the need for shaping sustainable cities continues to draw widespread recognition and has remained a major concern. Thus, urbanization and sustainable cities in Nigeria is examined using descriptive technique and came up with several lessons. Arable land is declining following fast increasing urban population growth. Arable land may not be capable of sustaining to meet the needs of the future generation, as the urban population continues to increase except appropriate policies are put in place to control it. Nitrous oxide emissions also rise at a faster rate, rising above the urban population growth. Such a trend means jeopardizing sustainable cities. Renewable energy consumption is falling while CO2 emissions are rising, which undermines sustainable city. Urbanization is fast increasing and cities are formed but the cities are not sustainable. We recommend infrastructural development in Peri-urban areas and rural areas. This will facilitate the urbanization process and city borders can be expanded and spread out to absorb neighbouring cities. In this way, urban population agglomerations will reduce and more arable land will be available. Also, the efficient use of renewable energy systems is recommended.

Keywords: Urbanization, sustainable Cities, Developing Economies, greenhouse emission, Climate Change

1. Introduction

The massive influx of people from the rural to the urban areas to overcome poverty, escape conflict or cope with economic and environmental shocks triggered a high-density in the urban environment. This imposes sustainable developmental challenges (Lucci, Mansour-Ille, Easton-Calabria & Cummings, 2016). The increase

¹Department of Economics, Nnamdi Azikwe University, Nigeria, ebiopportunity@gmail.com

²Department of Economics, Nnamdi Azikwe University, Nigeria,
augustaiifeomaebob@gmail.com

³Department of Political Science, University of Nigeria, Nigeria, Prisca Chibuzo Egbuchulam

in urban areas was initially centred in Europe and North America and was followed by larger megacities in Latin America, Asia and Africa (Vardoulakis and Kinney, 2019). The United Nation – UN (2014) projected that about 500 million people, comprising roughly 66% of the world population will dwell in urban areas by 2030.

The process of urbanization is associated with socio-economic activities that transform rural areas into urban settlements, while also shifting the spatial distribution of a population from rural to urban areas. It includes changes in dominant occupations, lifestyle, culture and behaviour, and transformation of demographic and social structures, especially in the urban areas. A major consequence of urbanization is a rise in land area and population size of urban settlements (UN, 2018). Urban living increases literacy rate, improves health conditions, provides easily accessible social and economic services and attracts chances for cultural and political participation (UN, 2014). Conversely, expansion in the urban areas causes rapid sprawl, pollution, inadequate housing, traffic congestion, slums, crime, and environmental degradation alongside production and consumption depletion. This is mostly linked to inadequate structures and inefficient urbanization policies. This mayhem is capable of impeding global prospects for sustainable cities.

A city is a permanent, self-sustaining concentration of people, government and services. It is the centre and melting pot for different categories of industries, government, religion, philosophy, education, etc. (City-Building, 2014). The interaction among players including planners, economists, governors, and builders among others commonly take place in cities. Cities play a key role in human development. Cities are the nucleus of knowledge, innovation and specialization of production of goods and services. Cities enhance innovative ideas. Cities concentrated by individuals create chances for them to interact and communicate, which facilitate creative thinking, technological inventions and knowledge diffusion. Cities promote trade activities. More choices of goods and services are available for consumers in Cities. They bring about changes and advancement in social, cultural, economic, technological and political activities. Cities are also the optimum solutions for global sustainability challenges in this epoch.

It is predicted that by 2030, there will be 41 megacities of 10 million dwellers or more. Urban areas are the home to the majority of the world population including 863 million slums dwellers. It will contribute about 75% of the global GDP, and cause approximately 75% of carbon emission from energy consumption. Approximately 2 billion tonnes of wastes are been generated by city dwellers in each year, dumping much of it in the rivers and terrestrial sites at the outskirts of cities. Notwithstanding, considering the innovation and opportunities that occur in cities, it is difficult to ignore the sustainability challenges caused by the prevalent city dwelling in the urban world (Acuto, Parnell, Seto & Contestabile, 2018).

Evans (2019) noted that cities become sustainable when the challenges confronting mankind are fixed. On this basis, nations have to monitor the rapid demographic shifts, reinvent their economies, tackle the growing inequalities, regulate unyielding infrastructures and buildings, curb the greenhouse gas emissions at a great rate and adopt the rapidly evolving technologies. Hence, the need for sustainable development is to achieve the basic human needs, while maintaining the core life-support systems in our environment (Mörtberg, Haas, Zetterberg, Franklin, Jonsson & Deal, 2013). Sustainable cities are the balance between human activities and the environment to create a form of human existence that is more ecologically responsible (Hatuka, Rosen-Zvi, Birnhack, Toch, & Zur, 2018).

Rapid urbanization especially in the developing countries is on the increase and, the need for shaping sustainable cities continues to draw widespread recognition and has remained a major concern. It is estimated that over half of the world population currently live in cities, estimated to be two-third in 2020. Of this, very small changes occurred in the urban population of developed countries, while large changes are witnessed in the urban population of developing countries. However, this does not mean that most of the population of developing countries will be living in cities but that urbanization does and will affect how household's straddle between cities and rural areas.

Urbanization comes with greater opportunities for economic growth and a higher standard of living in developing countries. It also increases the inter-relation between cities and health challenges. Though cities are sources of global greenhouse gas emission, accounting for about 80% of the world's CO₂ and, at the same time, they are the most vulnerable to climate risk. Yet, if properly designed towards sustainability, cities have possibilities to prevent and resolve climate issues and improve the standard of living of households since cities can move fast to implement locally viable solutions. Thus, the diffusion power of the urbanization process is vital for sustainable cities, as it affects the decision about local migration, natural resources use, production, and health among others.

The development of sustainable cities requires integrated interventions in sustainable planning, sustainable investment, and sustainable technologies. Sustainable cities cannot be achieved by one particular organization as it requires comprehensive and integrated knowledge (UNIDO, 2016). The need for improving our basic knowledge of urbanization and cities is because it can generate meaningful improvements in the living conditions for the present and future generation. At the Habitat III summit in Quito in October 2016, the UN's New Urban Agenda (NUA) strengthened the endorsement of the Sustainable Development Goal (to make cities inclusive, safe, resilient and sustainable) and the acknowledgement of the importance of localising all agreements on global sustainable development by nation-states on the centrality of cities. Since 2015, there have been series of international agreements on the need

to harness the capacity of cities to be innovative to achieve the global sustainable development agenda by 2030 (Acuto, Parnell, Seto and Contestabile, 2018). This paper aims to examine the relationship between urbanization and sustainable cities and provide lessons that will help to access and shape any urbanization process, practices, policy or trend towards city sustainability. This paper will have great policy implications and would be useful for urbanization and city planning and development authorities.

2. Conceptualization of A City, Sustainable City, and Urbanization

2.1 The Concept of a City

There is no generally accepted definition of the concept of a “city”. The United Nations (2014) defines a city as a continuous urban built up with less than 200m between construction and bringing together more than 10,000 inhabitants (United Nations, 2014). The United Nations Environment Programme (2013) described a city as a permanent settlement with a large population size, high density of population and social differences. Cities are regions in a particular country where a large number of people live and work. They are central points of government, commerce and transportation activities (United Nations Department of Economic & Social Affairs, 2016). As a centre for human and economic activities, cities incubate the development of innovation and knowledge expansion. Cities create opportunities for technological change which is executed through government machinery, groups or organizations who devise new ways to meet social needs in a better way than the existing solutions (Sahni & Aulakh, 2014).

Cities occupy 2% – 3% of the world's land and consume about 75% of its resources and produce a similar percentage of its waste (Lindfield & Steinberg, 2012). Resources like water, energy, food and other products are consumed within the confines of the city and released in the form of wastes (Guibrinet, 2013). Cities consume 67% – 76% of global energy use and remits between 71% – 76% of CO₂ emissions from the global final energy use. Cities give pressure to the ecosystem and expose it to degradation (Revi et al., 2014). They offer significant institutional and technical capacity to reduce the risk of environmental issues and increase sustainability. The disparity also exists in cities, whereby a certain population has greater access to resources. For example, inequality in standard of living; in most cases, municipal systems do offer urban residents with low-income. Residents rely on providers with high tariff for their water and electricity supply (Global Commission on the Economy & Climate, 2014).

2.2 Sustainable City

Sustainability means the ability of the natural environment to remain productive over time. It is defined as providing the present needs and, still, capable of

sustaining to meet the needs of the future generation. The sustainable city goes beyond building a 'green city' with fine buildings. A city is sustainable if it works on socio-economic and environmental levels for its present population without compromising the benefits for the future generation (Channell, Curmi, Lubin & Rai, 2018).

2.2.1 Pillars of Sustainability and Sustainable Cities

Proper sustainable resource management can make cities to be sustainable. For example, arable land use, management of emission effects, energy management, and governance – city management laws and enforcement determines city sustainability. Sustainable resource management is grouped into different spares, called the pillars or issues of sustainability. The pillars have connected concepts that should guide our decisions and actions towards achieving sustainable cities. The concepts contained in the pillars of sustainability are to be applied to real-world situations to make cities sustainable. The pillars of sustainability are majorly four, which are social and economic sustainability, environmental management and efficient governance (World Economic and Social Survey, 2013). City sustainability fundamentally lies on these four issues. The four pillars are interconnected and must be pursued together and not in isolation to

Economic sustainability suggests an economic system that meets the current needs without compromising the needs for the future. The basic concepts contained in economic sustainability include productive growth, generation of decent employment opportunities, production and distribution, and technology and innovation. Economic activities in an economic system are production, distribution and consumption. Economic sustainability demands that policies and decisions should be taking equitably to ensure sustainable productivity growth, decent work opportunities etc. while considering the other sustainability pillars. Sustainability of these activities will sustain cities economically. Policy efforts are on the increase to ensure economic sustainability. Most of the concepts contained in economic sustainability are included in the Sustainable development goals, for example, goals 2, 7 and 8 (zero hunger, affordable and clean energy, and decent work and economic growth) to guarantee sustainable cities (Mensah, 2019; and World Economic and Social Survey, 2013).

Social sustainability implies empowerment, gender equality, equity, cultural identity, institutional quality, social stability among others that will bring about social development, which will cause city sustainability. It is a social arrangement that alleviates poverty without resulting in neither environmental destruction nor economic instability. In essence, the alleviation of poverty should be within the available environmental and economic resources capacity of society. This does not mean that the needs of everyone will be met, but that the enabling condition or social

environment should be created for the people to realize their desires and facilitate their pursuit to achieve social success. Here, social success entails that individuals are not in subjection into conditions that deter them to achieve their goals. The concepts contained in social sustainability include education and health, food and nutrition, water and sanitation, green energy access, green housing and building and transportation. These are basic social needs in city centres especially megacities to keep them existing. With the fast increasing urban population, these concepts are under treat. Social sustainability demands that policies and decisions should be taking equitably to ensure sustainability in education and health, food and nutrition, water and sanitation, green energy access among others while considering the other spares of sustainability. City sustainability relies on the sustainability of the concepts of social sustainability. Therefore, to achieve sustainable cities, the concepts of social sustainability have to be achieved and made sustainable. Efforts in this regard can be seen in the sustainable development goals², 3, 4, 5, 7 and 9 (zero hunger, good health and well-being, quality education, gender equality, affordable and clean energy and industry, innovation and infrastructure) (Mensah, 2019; and World Economic and Social Survey, 2013).

Environmental sustainability concerns the natural environment – how it should be kept productive and springy to be supportive of human existence at any time. It is about ecosystem quality and care for the natural environment. The natural resources have limits and, extracting from it beyond the limit and faster than it can regenerate will cause environmental issues that will cause environmental degradation. The increasing climate change – rising to sea level, increasing greenhouse gas concentration among others, for example, is a treat to city sustainability. Increase in cities and megacities have generated increase human social and economic activities, which, in addition to natural climate variability has to cause a treat to human life, animals, plant and the entire ecosystem. Management of the environment has become prominent in ensuring sustainable cities. The key concepts in environmental sustainability include forest and soil management, energy efficiency, water management, waste and recycling management and air quality conservation. According to this pillar, sustainability will be achieved if environmental sustainability concepts are addressed alongside the other pillars of sustainability. Proper management of the environment and the achievement of the concepts of environmental sustainability will bring about a sustainable environment, which is a requirement for city sustainability. To address the rising environmental challenges and ensure that cities are sustainable, the sustainable development goals 6, 7, 13, 14 and 15 (clean water and sanitation, affordable and clean energy, climate action, life below water and life on land) respectively are incorporated in the 2030 agenda of the General Assembly (Mensah, 2019; and World Economic and Social Survey, 2013).

Urban or efficient governance concerns planning and decentralization, strengthening of civil and political rights, inequality reduction among others. Efficient urban

governance is necessary for sustainable cities. Goal 16 (peace and justice and strong institutions) is closely related to this pillar of sustainability (Mensah, 2019).

2.2.2 Challenges of Building Sustainable Cities in Developing Countries

The challenges of building sustainable cities in developing countries can be grouped into social, economic and environmental challenges. The social challenges are housing challenges, water, inadequate/poor public infrastructure, poor institutional quality, and poor sanitation. The social challenges also include high urban poor vulnerable to diseases, increasing youth unemployment rate and a low sense of the city and social cohesion. Social challenges also are the increasing waste and inefficient recycling and waste management system, and changing consumption patterns. The economic challenges include economic diversification challenges, rising underemployment, as well as developmental challenges. Others include food challenges and low productivity base. As regards environmental challenges, developing countries are faced with the challenge of access to clean energy, and increasing use of “dirty” energy especially among poor households, and the challenge of increasing carbon emissions (World Economic and Social Survey, 2013).

2.2.3 Opportunities for Building Sustainable Cities in Developing Countries

The building of sustainable cities will lead to investment in public infrastructure. It will improve transportation and strengthen the road connection between cities and rural areas. Sustainable city building offers universal access to affordable water and higher job chances, reduced slums and city centres and improved health and education facility. Economic opportunities associated with the building of sustainable cities are an increase in green industries and technological improvement. Sustainable city building also brings about structural and economic change and enhances regional economic and political corporation. Research and development, better agricultural production techniques, and modern storage facilities are also economic opportunities for building sustainable cities. Sustainable city building provides an opportunity for capacity development. It pave way for the development and use of renewable sources of energy as well as enhances green technology transfer (World Economic and Social Survey, 2013).

2.3 Urbanization

The concept of urbanization is viewed from different perspectives depending on the density of the population, the size of the population and cultural differences. Ojo, Barau & Pojwan (2017) defined urbanization as the alteration of traditional lifestyle to a civilized lifestyle. The United Nations (2014) viewed the process of urbanization as a population shift from a dispersed agrarian community to a large

population in a dense urban area dominated by industrial and service activities. Urbanization means the process of becoming urban, including the movement of people to the urban centres as well as the socio-economic and political activities in the urban areas. It is the increase in urban areas, urban population and processes in a country or a region within a country (Hussain & Imtiyaz, 2016). The urban population is a large and dense collection of people with a high level of human interaction and social complexities (Hussain & Imtiyaz, 2016). Urbanization contributes to sustainability by bringing significant transformations in the social, economic and environmental activities. It affects the use of resources effectively to preserve the natural ecosystem biodiversity and enhances land-use sustainability (United Nations Population Fund, 2016).

Urbanization is facilitated by industrialization, modernization, availability of employment opportunities and social factors. Industrialization, which is the increase in the number of industries (mostly situated in the urban areas) broadens employment opportunities. This causes an increase in migration of people from the rural area to the urban centres to search for better employment opportunities. Modernization comes with good communication, better infrastructures and advanced technology among others. Modernization is noticed first in urban areas, instigating rural dwellers to migrate to the urban centres. Thus, facilitating further urbanization. Social factors like the desire for status, better educational facilities better standard of living etc. in the urban areas are also motivating factors urbanization (Pawan, 2016).

2.3.1 The Urbanization Processes

The processes of urbanization can be grouped into three categories. These are economic growth and development, demographic changes and social transformation.

2.3.1.1 Economic growth and Development

Urban centres are the heart of production and distribution of goods and services as well as the process of exchange. Production industries are concentrated and centralized in urban centres with higher economies of scale. This makes economic growth and development in urban areas necessary and sufficient condition for urbanization. Mutually dependent economic change processes are crucial factors in urbanization, given the topography and natural resources. The level of urbanization differs across phases or levels of economic growth and development. The first form of human settlement was the hunter-gatherer pattern characterized by communal behaviour. At this phase, the level of urbanization was generally low. The second phase was agricultural subsistence before the emergence of industrialization following urbanization. Man's social evolution sprouted from urbanized societies, in which a majority of the people lives crowded together in towns and cities (Hussain & Imtiyaz, 2016).

Urbanization is associated with the level of economic growth and development. The levels of urbanization are over 70% in some of the member countries of the Organization for Economic Co-operation and Development. United Kingdom, Belgium, Iceland and Germany had more than 89% level of urbanization with GDP per capita of over \$40,000 in 2017. Most of the world's developing countries, on the other hand, have low levels of urbanization. For example, Burundi, Eritrea, Ethiopia, Malawi, Rwanda, and Uganda including some parts of Southeast Asia are below 25% urbanization with GDP per capita of less than \$1,000 (Hussain & Imtiyaz, 2016; and United Nations Population Fund, 2016).

2.3.1.2 Demographic Changes

Urbanization as a demographic process, first of all, is an increase in the proportion of the population living in urban places; and, secondly, is the growing concentration of people in the larger urban settlements. After the Second World War, in most countries, urbanization was a long-term continuous process. The urban population grew steadily as people migrated from the rural to urban areas and from smaller to larger urban settlements. The end of the process is an almost completely urbanized society where a great majority of the population lives in just a few large urban places. For example, the urbanization rate of Belgium reached 98%, whereas Israel, Japan and the Netherlands reached 91–92%. In 2018, the urbanization rates of Denmark, Sweden, among others have spread widely across the Western world and, since the 1950s; it has begun to take hold in Africa and Asia as well.

During the 18th century, 3% of the global population lived in cities. Then, at the turn of the 20th century, it increased to 15% (UNDESA, 2014). The United Nations estimated that from 2008 – 2018, the level of urbanization at the global scale was 55%. Meanwhile, it is predicted that by 2050, about 86% of the developed world and 64% of developing countries will reside in urban areas. It was also predicted that about 1.1 billion new urbanites of the global population growth will reside in cities from 2017 – 2030 (Chaolin, 2019). Countries in Asia and Africa have the fastest economic growth in the world. This has attracted a population shift from the rural to the urban areas. The high agglomeration of people in the urban centres has become a puzzle to unravel, as it causes several hitches for the developing nations (UNDESA, 2014).

2.3.1.3 Social Transformation

Urbanization as a process of social transformation is connected with the exhibition of original values and patterns of behaviour alongside suburbanization. Suburban improves welfare in residential, commercial, industrial and entertainment areas. The social transition process changes an agricultural nation into an industrial and city-centred country (Gu, 2019). The rapid urbanization process provides the global

economy with advanced manufacturing. It facilitates market expansion as well as the creation of new markets. It also offers services like transport, banking, labour and insurance etc.

2.3.2 The Pattern of Urbanisation in Nigeria

Urbanization in Nigeria begins with growth in Peri-urban areas, defined as areas bordered around a city or town. Transition to urban centre occurs with increasing migration of people from the villages to Peri-urban areas, usually with undeveloped infrastructure. Housing gap in urban areas, housing cost and overcrowding among others are reasons for the migration of people to Peri-urban areas. The migration is with the hope of securing a better standard of living by staying close to the urban areas. Peri-urban area growth put such areas on increasing need for housing, water supply, hospitals, etc. They are made available faster in the Peri-urban area compared to the urban areas by either the private sector, the government or through private-public partnership (PPP) because Peri-urban areas in most cases have land capable of being ploughed and use for basic services of housing, road constructions, the building of hospitals, etc. Development most likely easily takes place in Peri-urban areas. The provision of these basic amenities (the development) attracts industrialization and further migration of people to these areas, and, therefore, a further need for basic amenities. This pattern leads to a gradual transition of Peri-urban areas to urban areas.

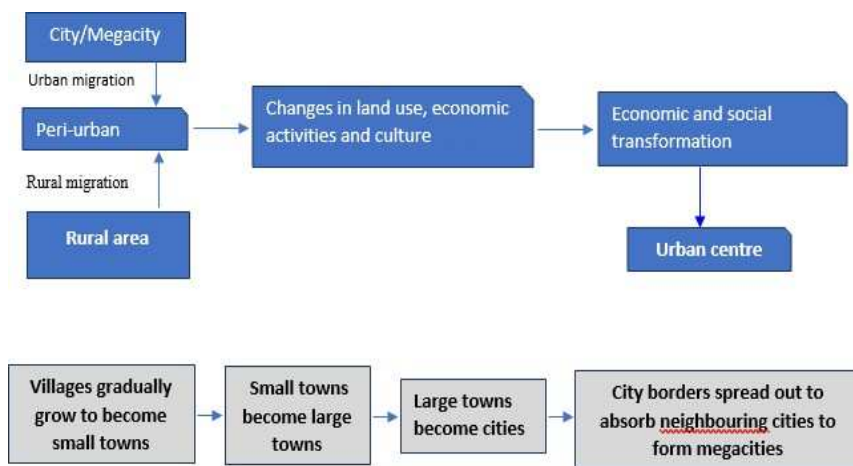


Figure 1 Pattern of urbanization in Nigeria

As shown in figure 1, people move from megacities and rural areas to Peri-urban areas, which results in growth in the size of Peri-urban population and changes in Peri-urban areas. These changes instigate other changes in land use and socio-economic activities. The changes in land use and socio-economic activities cause gradual and significant economic and social transformations that transit the Peri-

urban area to the urban centre. This pattern of urbanization can be found in Ogun state, especially the parts of the state that are bordered around Lagos.

2.3.4 The Trend of Urbanisation in Nigeria

Most of the increase in the overall trend in Nigeria's population growth is taking place in urban areas. Table 1 below summarizes the trend of urbanization in Nigeria from 1971 – 2020.

Table 1 Trend of urbanisation in Nigeria

	1971 – 1980	1981 – 1990	1991 – 2000	2001 – 2010	2011 – 2020
Urban population (% of the total population)	20.0209	26.1009	32.5009	39.5561	48.2307
Population in the largest city (% of urban population)	16.5408	16.3991	17.1889	16.1344	14.0953
Population in urban agglomerations of more than 1 million	5864359	10506127	21311433	21311433	29760392

Source: Computed by the authors using World Development Indicators (WDI)

Since 1971 – 2020, the Urban population (% of the total population) of Nigeria has been on the increase. Between 1971 – 1980, the average Urban population (% of the total population) was 20.02%. It increases by 6.08% (increasing to 26.10) between 1981 – 1990. It further increases to 32.50% and 39.55% in 1991 – 2000 and 2001 – 2010 respectively. About 8.67% growth was recorded between 2011 – 2020. The population in the largest city (% of urban population) showed fluctuating growth rate over the years. Between 1971 – 1980, the rate was 16.54%. It decreases slightly to 16.40% between 1981 – 1990 before another increase of 0.8% (17.19%) was recorded between 1991 – 2000. The population in the largest city (% of urban population) reduced from 17.19% between 1991 – 2000 to 16.13% and 14.10% between 2001 – 2010 and 2011 – 2020 respectively. This fluctuating trend can be attributed to the migration of people from the megacities to neighbouring cities due to overcrowding, housing challenges and housing cost among other reasons as well as the migration of people from the cities to megacities. The Population in urban agglomerations of more than 1 million was 5864359 and 10506127 between 1971 – 1980 and 1981 – 1990. Between 1991 – 2000, 2001 – 2010 and 2011 – 2020 was 21311433, 21311433 and 29760392 respectively.

3. The Implications of Urbanization For Sustainable Cities in Nigeria

3.1 Urbanisation and Arable Land in Nigeria

Urbanization and arable land showed an inverse relationship. Figure two below shows the relationship between the urban population (% of the total population) and Arable land (% of land area).

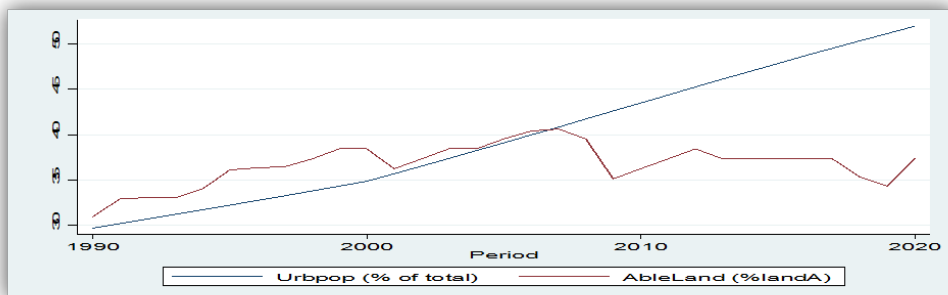


Figure 2 Urban population (% of the total population) and Arable land (% of land area)

Urban population (% of the total population) showed continues to increase while arable land (% of land area) showed a declining trend. In the 1990s to the mid-2000, was above the urban population. This indicates enough arable land (% of land area) in the city between 1990 – mid-2000. It also means that cities were sustainable during the period. From late 2000 – 2020, the trend for arable land continues to decline below the urban population, while the urban population shows a steady increase. This means that arable land is a shortfall of the urban population. The increasing urban population puts pressure on arable land. There is clear evidence that arable land may not be capable of sustaining to meet the needs of the future generation. Based on this evidence, we say that city sustainability is jeopardized.

3.2 Urban Population (% of Total Population) and Nitrous Oxide Emissions (% Change from 1990) in Nigeria

Figure 3 below shows the relationship between the urban population and change in nitrous oxide emissions.

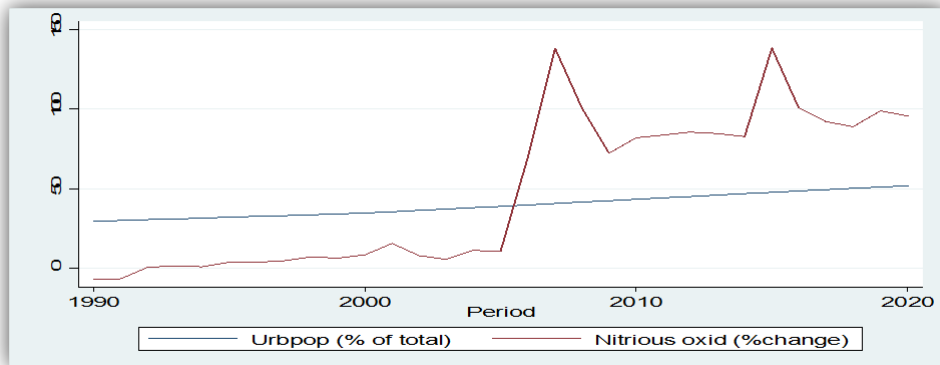


Figure 3 Urban population (% of the total population) and nitrous oxide emissions (% change from 1990)

From the 1990s to mid-2000, nitrous oxide emissions were low compared to the urban population (% of the total population). However, as the urban population continues to rise, nitrous oxide emissions also rise at a faster rate, rising above the urban population growth. The fast-rising nitrous oxide emissions mean city sustainability is at risk.

3.3 Population in the largest city (% of Urban Population), Renewable Energy Consumption (% of Total Final Energy Consumption) and CO2 Emissions

Table 2 reports the average population in the largest city (% of urban population), renewable energy consumption (% of total final energy consumption) and co2 emissions.

Table 2 Population in the largest city (% of urban population), renewable energy consumption (% of total final energy consumption) and CO2 emissions

	1991 – 2000	2001 – 2010	2011 – 2020
Population in the largest city (% of urban population)	17.18894	16.13441	14.09531
Renewable energy consumption (% of total final energy consumption)	86.70715	85.56051	86.40364
CO2 Emissions	0.401854	0.677141	0.58322

Source: Computed by the authors using World Development Indicators (WDI)

The average population in the largest city decline from 17.18% between 1991 – 2000 to 16.13% between 2001 – 2010, and decline further to 14.09% between 2011 – 2020. This shows the migration of people from the largest cities to Peri-urban areas/cities. Renewable energy consumption (% of total final energy consumption) also shows a decline. It declined from 86.71% between 1991 – 2000 to 85.56% and

86.40% between 2001 – 2010 and 2011 – 2020 respectively. There is also increasing CO₂ emissions. The falling renewable energy consumption and the increasing CO₂ emissions poses threat to a sustainable city. Table 2 shows that a sustainable city is not yet most likely in Nigeria.

4. Conclusions

Urbanization and sustainable cities in Nigeria have been examined and came up with several lessons. Urban population is increasing fast, while the population in largest city is rising and falling, caused by migration of people from the megacities to neighbouring cities due to overcrowding, housing challenges and housing cost among other reasons. Arable land is declining. Arable land may not be capable of sustaining to meet the needs of the future generation, as the urban population continues to increase except appropriate policies are put in place to control it. Nitrous oxide emissions also rise at a faster rate, rising above the urban population growth. Such a trend means jeopardizing sustainable cities. Renewable energy consumption is falling while CO₂ emissions are rising, which undermines sustainable city. On the bases of the above, we conclude that urbanization is fast increasing and cities are formed but the cities are not sustainable. We recommend infrastructural development in Peri-urban areas and rural areas. This will facilitate the urbanization process and city borders can be expanded and spread out to absorb neighbouring cities. In this way, urban population agglomerations will reduce and more arable land will be available. Also, the efficient use of renewable energy systems is recommended.

References:

- Acuto, M., Parnell, S., Seto, K. C., & Contestabile, M. (2018). Science and the Future of Cities, Report of the International Expert Panel on Science and the Future of Cities; London and Melbourne. Available at: <http://www.nature.com/authors/policies/index.html>
- Avicedo, W. (2013). Analyzing Land-use Change in urban environments. The U. S. Geological Survey's (USGS), Urban Dynamic Research (UDR). Available at: <http://www.usgs.gov/>
- Cohen, B. (2015). Urbanization, City Growth, and the New United Nations Development Agenda". Cornerstone, The Official Journal of the World Coal Industry 3 (2): 4–7
- Channell, J., Curmi, E., Lubin, D., & Rai, V. (2018). Sustainable Cities: Beacons of light against the shadows of unplanned urbanization. Citi GPS: Global Perspectives & Solutions. Available at: www.citi.com/citigps

- Chaolin, G. U.(2019). Urbanization: Processes and driving forces. *Science China Earth Sciences* 62: 1-10.
- City-Building. (2014). City Function/ Hooks. Available at: <https://citybuildingcrashcourse.wordpress.com/2014/09/04/types-of-city-hooks/>
- Dodman, D., & Satterthwaite, D. (2009). Institutional Capacity, Climate Change Adaptation and the Urban Poor. *IDS Bulletin* 39(4): 67 – 74.
- Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., & Estrada, Y.O. (2016). European Union (EU) and United Nations Human Settlements Programme – UN-HABITAT (2016). *The State of European Cities: Cities leading the way to a better future.*
- Evans, J. (2019). Governing Cities for Sustainability: A Research Agenda and Invitation. *Frontiers in Sustainable Cities* 1(2): 1-4.
- Genova, R.C., Girma, B., Kissel, E.S. Levy, A.N., MacCracken, S., Mastrandrea, P.R., & White, L. L. (2014). *The New Climate Economy Report: Better Growth, Better Climate.* Washington, D. C.: Cambridge University Press.
- Guibrunet, L. (2013). Sustainable Resources for Sustainable Cities Symposium: A Discussion Document. Bartlett University College London. Available at: <https://www.bartlett.ucl.ac.uk/sustainable/latest/activities/symposium-series/symposium-2013/documents-Sustainable-Resources-for-Sustainable-Cities-ExecutiveASummary.pdf>
- Hatuka, T., Rosen-Zvi, I., Birnhack, M., Toch, E., & Zur, H. (2018): The Political Premises of Contemporary Urban Concepts: The Global City, the Sustainable City, the Resilient City, the Creative City, and the Smart City, *Planning Theory & Practice* 19(2): 160 – 179.
- Hussain, M., & Imtiyaz, I. (2016). Social Impact of Urbanization on the Institution of Family in Kashmir: A Study of Srinagar City. *International Journal of Recent Scientific Research*, 24 (1): 109.
- Li, X., Li, X., Woetzel, J., Zhang, G., & Zhang, Y. (2014). *The China Urban Sustainability Index 2013.* Beijing: The Urban China Initiative.
- Lindfield, M., & Steinberg, F. (2012). *Green Cities.* Philippines: Asian Development Bank.
- Lucci, P., Mansour-Ille, D., Easton-Calabria, E., & Cummings, C. (2016). Sustainable cities: Internal migration, jobs and the 2030 Agenda for Sustainable Development. ODI briefing. Available at: <https://www.odi.org/publications/10576>
- Mensah, J. (2019), Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review, *Cogent Social Sciences*, 5: 1.
- Mörtberg, U., Haas, J., Zetterberg, A., Franklin, J.P., Jonsson, D., & Deal, B. (2013). Urban Ecosystems and Sustainable Urban Development: Analysing and assessing interacting systems in the Stockholm region. *Urban Ecosystem* 7 (16): 763–782

- Ojo, S.S., Barau, D.T., & Pojwan, M.A. (2017). Urbanization and Urban Growth: Challenges and Prospects for National Development. *Journal of Humanities and Social Policy* 3(1): 65 - 71.
- Pawan, P. (2016). Urbanization and Its Causes and Effects: A Review. *International Journal of Research and Scientific Innovation (IJRSI)*, III (IX),111.
- Porio, E. (2014). Sustainable development goals and quality of life targets: insights from metro manila. *Curr. Social. Monogr.* 63: 244–260.
- Ranhagen, U., & Groth, K. (2012). *The Symbiocity Approach: A Conceptual Framework for Sustainable Urban Development*. Stockholm: SKL International
- Revi, A., Satterthwaite, D.E., Aragón-Durand, F., Corfee-Morlot, J., Kiunsi, R.P.R., Pelling, M., Sahni, S., & Aulakh, R.S (2014). Planning for Low Carbon Cities in India. Available at: <https://doi.org/10.1177/0975425314521535>
- Roberts, D.C., & Solecki, W. (2014). In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Field, C.B., Barros, V.R.,
- Simon, D. (2016). *Rethinking Sustainable Cities: Accessible, green and fair*. Policy press
- Smith, E. R. (2013). City: A guidebook for the urban age. *Geography* 98 (1): 50-53.
- United Nation. (2019). *World Urbanization Prospects: The 2018 Revision*. Department of Economic and Social Affairs Population Division.
- United Nations. (2014). *World Urbanization Prospects, the 2014 Revision*, Available at <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:World+Urbanization+Prospects>
- UN-DESA (2016). *The World's Cities in 2016*. Available at: <http://www.un.org/en/development/desa/population/publications/pdf/urbanization/the-worlds-cities-in-2016-data-booklet.pdf>
- United Nations Industrial Development Organization. (2016). *Sustainable Cities: Hubs of Innovation, Low Carbon Industrialization and Climate Action*. Available at: <https://www.unido.org>
- United Nations Population Fund. (2016). *Urbanization*. Available at: <http://www.unfpa.org/urbanization>
- United Nations. (2018). *Sustainable Development Goal 6. Synthesis Report 2018 on Water and Sanitation*; available at <http://www.unwater.org/publications/highlights-sdg-6-synthesis-report-2018-on-water-and-sanitation-2>
- United Nations. (2015). *World urbanization prospects: The 2014 revision*. New York: United Nations. Available at: <http://esa.un.org/unpd/wup/Publications/Files/>
- United Nations. (2015). *Sustainable Development Goal*. Available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals>.

- United Nations Environmental Programme. (2013). Integrating the Environment in Urban Planning and Management. Nairobi: UNON Publishing Services Section.
- United Nations Human Settlements Programme – UN-HABITAT (2011). The Economic Role of Cities. The Global Urban Economic Dialogue Series.
- Vardoulakis, S., & Kinney, P. (2019). Grand Challenges in Sustainable Cities and Health. *Frontiers in Sustainable Cities* 1(7)1-5. Available at: <https://doi:10.3389/frsc.2019.00007>
- World Economic and Social Survey (2013), Towards sustainable cities. Available at: https://www.un.org/en/development/desa/policy/wess/wess_current/wess2013/Chapter3.pdf