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Local building materials: affordable strategy for housing the Urban poor in Nigeria.

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Abstract

The rate of urbanization in Nigeria has witnessed tremendous increase in the last five decades. Census in the early Fifties showed that there were about 56 cities in the country and about 10.6 percent of the total population lived in these cities. This rose dramatically to 19.1 percent in 1963 and 24.5 percent in 1985. Today, the national population is estimated to be about 160 million with the urban population constituting about 60 percent. The phenomenal rise in population, number and size of our cities over the past few years have manifested in the acute shortage of dwelling units which resulted in overcrowding, high rents, poor urban living conditions, and low infrastructure services and indeed high crime rates. Various programs have been implemented to address housing problem. Despite all these interventions, Nigeria's housing problems still remain intractable. The paper recognizes that what Nigerians need to survive the wounds of near-homelessness include good governance, increased access to land, credit, affordable housing and environmentally sound and serviced human settlements. The paper examines the national housing need and housing provision, major constrain in delivery of low cost housing in Nigeria and conclude by recommending locally produced building materials and intermediate technology which can reduce construction cost by about 60 percent as an affordable strategy for construction of low cost housing in Nigeria.

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Keywords: Housing Need; Housing Provision; Housing Affordability.

1. Introduction.

Housing delivery is a highly contentious and politicised issue that is of great concern to administrators,

scholars and the public in Nigeria. In the last few decades, the influx of people into urban areas, the natural population increase and inadequate responses by the government have contributed to the worsening housing situation in the country, to the extent that economic development and the welfare of the citizens are adversely affected (1). These problems are more critical in the cities, where huge housing supply deficits, dilapidated housing conditions, high cost of housing as well as proliferation of slums and squatter settlements exist (2,3). As a result, a large majority of urban residents, particularly the low-income earners who constitute about 50 percent of Nigeria's 160 million people are forced to live in conditions that constitute an affront to human dignity (4).

In many developing countries, housing crisis is escalating unabated despite a number of new policies, programs and strategies being engaged in by public and private sectors in addressing this problem. The majority of those in need of housing in many less-developed nations in Africa, Asia and South America are in the low income cadre and some require special housing programs to be able to live in decent housing. Since market solutions and funds may not be suitable for housing this category of people and in view of the vital role housing plays in the socio-economic and political development of any nation; governments in these countries have over the years been engaged in public housing provision. In Nigeria however, from the debut efforts of the Lagos Executive Development Board (LEDB) in 1928 to date, public housing provision in this country has continued to lag behind the demand for housing, as almost 90 percent of the nation's housing stock is provided by the informal sector (5).

A number of challenges are militating against the provision of housing for the urban poor in Nigeria. These challenges include high rates of urbanization and population growth (6), absence of proper monitoring and evaluation of public housing policies and programs (1), lack of easy access to land and other housing inputs (5), cost of imported building materials (7) among others. As a result, public housing in Nigeria has been criticized for failing to generate tangible and sustainable housing production, distribution and acquisition mechanisms to meet increasing housing demand, particularly by low-income earners (8).

This paper focuses on the use of local building materials as an affordable strategy of housing the urban poor in Nigeria. The focus on urban area is based on the evidence that there is more severe housing problem in the urban areas than the rural areas both in their intensity and complexity.

2. Housing need in Nigeria.

Various governments in Nigeria have often expressed interest in housing provision for the masses. A review of past efforts indicates that the achievement level of the various national housing programmes was low. Rapid urban growth associated with accelerated tempo of socio-economic development has seriously aggravated the shortage of dwelling units, resulting in overcrowding, high rent, slum and squatter settlements which are visible features of urban centres throughout the country. Estimate and indicator of the magnitude of housing shortage vary. In summary, they all indicate massive shortages in total housing required. The total housing needs of the country in urban and rural areas were put to some 8 million units by the year 2000 by Federal Ministry of Works and Housing, and 12-14 million units in 2007 (9). A more recent estimate puts the figure even higher at 16-17 million units (10).

At an average cost of 2.5 million naira per housing unit, Nigeria will require 35 trillion Naira to fund the housing deficit of 14 million housing units (11). A recent study based on the salary structure of public servants in Nigeria showed that no public servant in Nigeria below salary grade level 13 in the federal civil service and salary grade level 16 in the Imo state civil service can afford a property costing ₦4.75m on a 25 years mortgage at 6 percent if he devotes 50 percent of his salary per annum to housing (11). At 18 percent mortgage rate, only a federal permanent secretary or his equivalent on grade level 17 can afford the same house. This shows that in the absence of some assistance and affordable strategies, adequate housing is unaffordable to most law abiding Nigerians.

3. Efforts by the government to confront urban homelessness

Table 1 shows the targeted and constructed number of housing units in the different public housing programs

initiated between 1962 and 2010. It reveals that a total of 618,498 housing units were planned for production in the various public housing schemes across the country. However, around 85,812 housing units representing around 14 percent of the planned housing units were actually completed. This achievement level clearly shows that many of the public housing programs initiated by government within that period failed to meet the targeted number of housing units. The cumulative effect of this failure is that an estimated 75 percent of Nigeria's 60 million urban population live in slums, and not less than 700,000 housing units are required annually to improve on this appalling housing situation across the country (1, 6).

Table 1: Housing target and achievement in Nigeria (1960- 2010)

PERIOD	TARGET	ACHIEVEMENT
1962-1968	Construction of 61,000 housing units.	Only 500 units, less than 1 percent of the planned units were constructed.
1971-74	Construction of 59,000 'low-cost' housing units across the Federation.	7,080 housing units representing 12% of planned houses were actually built
1975- 1980	Construction of 202,000 low-cost housing units nationwide.	30,000 housing units representing less than 15 percent of planned houses were actually completed
1981- 1985	Construction of 160,000 housing units, for low-income people The second phase of the housing program set out to construct 20,000 housing units across the country	A total of 47,234 housing units representing about 23.6 percent of planned housing units were constructed in the first phase. The second phase was cut short by the military coup of 1983
1986-1999	Construction of 121,000 houses on Site- and-Services housing program	5,500 housing units (less than 5 percent) of planned houses were actually constructed.
1999-2010	Construction of about 10,271 housing units through the Public- Private Partnership (PPP) arrangements in different PPP housing schemes across the country. Construction of 500 housing units in the Presidential Mandate Housing Scheme in all 36 State capitals and Abuja.	- 2000 serviced plot through PPP site and service in Ikorodu, Lagos. -4,440 housing units completed in Abuja, Port Harcourt, Akure and Abeokuta, through PPP. -The Presidential Mandate Housing Scheme did not take off in many States. In Ogun State about 100 housing units representing 20 percent of the planned units were constructed.

Source: Compiled by the authors from various sources. (5, 6, 12, 13, 14, 15)

With respect to affordable housing provision, the (5) report on Nigeria noted that past public housing policies and programs in the country were aimed at enabling low-income earners gain access to decent housing at affordable cost. According to (16), the 2002 New National Housing and Urban Development Policy (NNHUDP) for instance, asserted that no Nigerian is expected to pay more than 20 percent of his or her monthly income on housing. But to the contrary, prior studies (8, 17, 18) have shown that the targeted population of many past public housing schemes in Nigeria did not benefit from such schemes. This was due to high cost of housing units provided. Consequently, several authors have contended that the constraints in accessing housing inputs (land, building materials and finance) as well as cost of providing infrastructure were partly responsible for the hike in the cost of public housing beyond the reach of an average Nigerian (5, 16, 19).

4. Major challenges in delivery of low-cost housing in Nigeria

There has been significant progress in the formulation and implementation of housing policies in the past

decades, many challenges still effectively hinder progress in housing development in developing countries, particularly for low income and other vulnerable groups. These constraints include but are not limited to:

4.1. Poor promotion of security of tenure.

Promoting security of tenure is a prerequisite for sustainable improvement of housing and environmental conditions. Squatter settlements upgrading projects need to be carried out addressing tenure issues to prevent/reduce evictions. Governments should focus on regularization schemes in order to provide incentives to families to invest in their homes and communities. Promoting security of tenure can also support better functioning of rental housing markets. There is no doubt that every effort should be made to make best use of existing housing stock and improve the quality of living in these settlements.

4.2. Inadequate supply of affordable land.

Land has been described as the fulcrum of all types of development in any society, the constrain poses by its inaccessibility has reduced the provision of affordable housing for about 70 percent of whom live below the poverty line. Lack of adequate land for urban development particularly for low-income housing is perhaps the single most important impediment in achieving the goal of shelter for all. Scarcity of land leads to escalating land prices, overcrowding of existing neighbourhoods, illegal invasion of vacant land and growth of squatter settlements. This trend can only be reversed by the provision of adequate and affordable land for low-income housing.

4.3. Poor Infrastructure and services.

Financing and facilitating infrastructure to meet basic needs of many urban communities have been difficult for the majority of governments and local authorities. This is, in most cases, due to the high standards that make provision of infrastructure very costly. Too often, infrastructural services are unnecessarily subsidized and frequently the subsidies are wrongly directed. As public authorities have not been able, in general, to provide infrastructure to the growing number of urban communities, individual households, community groups and informal enterprises have increasingly taken over this task.

4.4. Utilization of local building materials and technologies.

Building materials often constitute the single largest input to housing construction in most developing country cities particularly in Africa. In Nigeria according to (1) Building materials have been established to account for more than half of total housing expenditure. However, the high cost of materials for building houses is a serious challenge militating against delivery of decent mass housing. Other challenges with building materials arise because most housing developers insist on the use of conventional building materials and technologies. These standards and regulations prevent the use of readily available local building materials and also the use of cost effective and environmentally friendly construction technologies. The costs of imported materials are very expensive when converted to the value of local currency at such ridiculous exchange rates. It is no wonder that most housing units produced by the Public Private Partnership (PPP) mass housing come at prices beyond the affordability limit of the target population. It is estimated that the cost of building materials alone can take up to 70 percent of a standard low-income formal housing unit. Many African countries, despite the fact that they are endowed with abundant natural resources that can meet their need for building materials production, depend largely on imported building materials and technologies. While considerable research is conducted in some countries on local building materials, only few of these research initiatives have succeeded in disseminating findings to the potential users.

4.5. Adjusting standards for building and land subdivision.

In many countries, standards for building and land subdivisions do not consider affordability issues and have a

general nature. Standard subdivisions are often based on regulations of the pre-independence periods prescribing large plots and banning building next to plot boundaries. This results in large plot sizes and high infrastructure costs. Building standards are also high urging and encouraging needy groups to get involved in informal building activities. These regulations and standards should be adjusted also in consideration of affordability criteria.

5. Local building materials/African architecture as alternative

The architecture of Africa has been seen and labelled international. The definition of architecture as the art and science of building has over the years seen a lot of reforms to include usability, acceptability and comfortability. That African architecture does not have documented scientific approach to its design and construction does not mean that it fails to satisfy these conditions. A building system proven to satisfy thermal comfort, aesthetics and sustainability and being a major part of the daily life of its occupants cannot be anything short of architecture. African traditional architecture is essentially sustainable and had evolved culturally to suit the people. Usually, earth, timber, straw, stone/rock and thatch were constructed together with the simplest of tools and methods to build simple, liveable dwellings. Although globalization has relegated them as being 'primitive', this 'primitive' classification comes partially from the building materials and their relatively low technological uses when compared to present day western (Architectural) construction techniques which result in skyscrapers. Present interpretations of sustainability have given them a new status as likely technologies for the contemporary world. Along with the others that have been re-devised, earth has of late gained acknowledgement as a suitable technology for contemporary buildings. Africa as a tropical continent between the Atlantic (west) and Indian (east) oceans has an over 5000 years old recorded history that shows buildings and monuments made of numerous natural materials available in abundance in its geographical landscape. Looking into history particularly on the African continent; Egypt, Nigeria, Kenya, Mali etc, we hear and sometimes carry out studies on the New Gourna Village by Hassan Fathi, the Ancient Kano and Zaria cities by the indigenous craftsmen, the Great Mosque of Djenné directed by Ismaila Traoré, and a few other examples. These buildings have lasted for over one hundred (100) years at the least and have proved themselves to be outstanding works of architecture that have not only stood the taste of time but are cheap, comfortable with little or no carbon footprint. Having such immense potential, traditional African architecture particularly building with adobe bricks is worth looking into.

Its indigenous architectural practice had been shaped by ideologies of sustainability though according to (20) it was done in ignorance. Developed from naturally existing materials and cyclical possibilities of their regeneration, they impacted on the judicious use of earth's resources in the construction of its villages and hamlets, the cities and urban centres as well as the temples, tombs, monuments and religious edifices. Predictably, earth/mud/adobe has been one of its most important and chief building material combined with timber (mostly from palm trunks), palm/coconut/grass thatch and straw bales as roofing; all materials abundantly available in the settlements. In entirety, Africa's traditional architecture made certain that its use of the resources neither diminished their availability, nor adversely affected the ecological balance upon which it relied on as an agrarian society.

The introduction of modern technologies such as the concrete blocks and slabs during the industrial periods had relegated traditional components and methods to the background and it became the goal of those in the wattle- and-daub houses to remake them with the new trend material; concrete blocks, in spite of the obvious truth that they did not present the same kind of thermal comfort. The native dwellers thus replaced their comfortable, low- cost and sustainable houses with the modern opposite which were the current fashion and expressed advancement, modernity and a show of affluence and status in the social hierarchy. Recently, amidst these unsustainable practices earth construction has received greater attention as a building material that can be very affordable and still deliver the same modern needs (21).

6. Compressed earth blocks (CEBs): The recreation of earth building methods.

Lately, the ushering of CEBs has caught the interest of many architects searching for sustainable building

technology, and has committed them to the task of building with earth as a modern material. A few fascinating projects have come in place from urban houses to tourist hotels. Nonetheless, the technology that has become widespread in the new system of re-invented buildings is the Compressed Earth Blocks that makes unbaked earth blocks. Unlike the native adobe block, which is a mixture of earth, water and distinct cultural additives moulded to desired shape with the hand, the compressed earth block is supplemented in very small amounts (in most cases less than 10 percent) with either cement or lime component in its blending process. The blend is not worked to achieve a plastic state, but simply blended until the cement/lime and earth are thoroughly mixed. Afterwards, the mixture either machine pressed or placed in a mould and compacted with a high level of pressure applied through a hand-operated machine. After aeration, the CEBs gain a high compressive strength appropriate generally for three floors constructions but higher potentials can also be attained for up to five floors constructions (22). These blocks (CEBs) can be left un-plastered, covered with plaster or can be coated with watered earth (muddy plastic mixture), sometimes added with natural colouring. Its facades in comparison to the contemporary urban houses offer a feeling of a cooler interior and the inside temperature is lower than many cement block houses.

7. Advantages of CEBs & other traditional building materials.

It is a generally held view that, in tropical countries, traditional houses are more sympathetic to the prevailing climate and provide comfortable interiors. A typical traditional building of earth, maintains a high level of internal thermal comfort, regardless of prevailing solar radiation outside. Greenhouse gases are solely responsible for climate change and its associated effects in the world today. The built environment makes substantial contributions to the degradation of our environment. “Buildings including construction, operations and deconstruction impacts, use approximately 15 percent of the world’s fresh water resources; 40 percent of the world’s energy; producing about 23-40 percent of the world’s greenhouse gas emissions”.

Sustainable architecture in a broad perspective consists of buildings designed, built, renovated, operated, or reused in an energy efficient and economic manner. Sustainable building can also be viewed as “the combination of building design and construction that examines all aspects of the building process that will affect and be affected by the environment” (23). “The goal of sustainable design is to find architectural solutions that guarantee the well-being and coexistence of these three constituent groups – inorganic elements, living organisms and humans”. From the above, it is obvious that the aim and purpose of sustainable architecture is to construct greener and better functioning buildings that acts in response to the resources consumed and emission/pollution produced, during a building’s lifecycle with a view to reducing its impact on the natural environment.

7.1. Economic Implication

The use of local materials and building methods will cut costs to its barest minimum. The impact of green technology on the state of economy observed from the standpoints of cost saving/effectiveness is immense. Household revenue in terms of disposable income increases as housing expenses reduce. Maintenance cost and general bills are minimized. Percentage of house ownership will increase as well as optimization of the national domestic economic performances. Entrepreneurship and multiple employments will result as well as improvements of occupational and institutional productivity, while poverty alleviation is enhanced.

7.2. Socio-cultural Implication

Improvising green technology in buildings in Africa would lead to an improvement in the overall quality of life. Its occupants admire the insulating property of mud for the comfort of living in a natural, eco-friendly building. Available, affordable, organic and safe buildings, which take care of basic infrastructural needs, like clean water, solar powered (energy)-electricity, and safe environment are what society requires for sustainability. Change in cultural value system is observed in the sense that the shared practice of indigenous potentials is given an expression, which is approved and rewarded accordingly. It is an added value for the cultural system as people

become proud of their culture. This will find further expression in the people's satisfaction with their met needs. It revitalizes indigenous practices. Awareness is enhanced as society advances in profitable adventures bringing about productivity through green- indigenous technology. It spurs morale and creativity, while ensued healthy competition results in a revolution.

7.3. Environmental Implication

Environmental protective measures ensure reduction of operational energy in construction. Green developments' eco-friendliness, climate responsiveness and organic protective measures safeguard as well as minimize environmental impact of hazards. Healthy in-door and out-door environment is secured. The thermal insulation, energy saving of green buildings and green roof's ozone pollution reduction capacities all reduces negative environmental impact. Extensive use of recycled materials help conserve, restores, and preserves the ecosystem. Green buildings' waste management ensures resources and energy efficiency. The proximity of materials saves cost and reduces pollution by fuel burning through transportation.

8. Recommendations.

Nigeria has been experiencing a very high rate of population growth and urban expansion. This has posed serious problems for physical and socio-economic development because of the inability of existing institutions and mechanisms to cope with emerging challenges. Thus, over-crowding of the living space, poor sanitation, decaying infrastructure, growing rate of unemployment and under-employment, inadequate and overstretched community and social services are some of the indicators of the problems as they affect urban development. The implication of all these is that the urban poor are displaced and deprived access from decent and affordable housing, thereby rendering most of them "homeless".

Consequently, we need to return to local building materials and technologies to house our citizens, especially the urban poor, like the late Hassan Fathy who being innovative re-invented a number of traditional technologies to cater to the modern housing requirements. The re-invention should not be on the material alone, but the methods in which the material and its products are utilized for creating architectural splendour in structures. Really, these innovations are important in that collectively, they have evolved a methodology to architecture that is supported on the vernacular and traditions of the African building custom.

Government should encourage the use of local building material for construction so as to reduce building cost by using them in government projects instead of using the imported building materials. This has been successfully done in countries like Tanzania, and Sweden. Entrepreneurs wishing to go into the production of local building material should be encouraged through tax relief and incentives. Government should not be engage on direct housing construction and should allocate land to individuals and allow them construct their own home. Direct housing construction by the government is costly; still the quality of the houses is in doubt.

9. Conclusion.

This paper has examined the national housing need, the national housing provision and the major constrains in delivery of low cost housing in Nigeria. The paper recognizes the problem of inadequate housing as a critical challenge to sustainable urban growth and cities' development. It underscored the fact that urbanization process is irreversible in Nigeria; rather than allowing it to degenerate into a developmental predicament; it must of necessity be turned into opportunities for growth and development.

Findings show that since independence in 1960, governments in Nigeria have demonstrated commitment to addressing the housing problem in several ways. But due to cost of imported building materials, political and organizational challenges, public housing agencies have so far provided insufficient number of poor quality and unaffordable housing units in the country. The paper notes that despite several efforts towards ensuring adequate housing to the people, the poor urban dwellers are still deprived access to decent and affordable shelter. It is therefore expected that the findings and recommendations emanating from the study have advanced our

understanding of the challenges and solutions to construction of affordable housing for the urban poor in Nigeria. The adoption of the various recommendations made above, housing problem in Nigeria could be successfully tackled.

References.

- [1] Federal Republic of Nigeria, National Housing Policy, Federal Government Press, Lagos, 1991.
- [2] UN-HABITAT, Public-Private Partnerships in enabling shelter strategies, United Nations HABITAT information Services. Nairobi, 2006b
- [3] UN-HABITAT, National experiences with shelter delivery for the poorest groups, United Nations HABITAT information Services, Nairobi, 2006d.
- [4] United Nations Population Funds, State of the world population 2007, The United Nations, New York, 2007.
- [5] UN-HABITAT, National Trends in Housing Production Practices Volume 4, United Nations Centre for Human Settlements, Nairobi, 2006.
- [6] A. Olotuah, Housing Development and Environmental Degeneration in Nigeria, *The Built & Human Environment Review* 3 (2010) 42-48.
- [7] B.U. Iwuagwu, N. Eme-anele, Earth construction technology and design: A positive solution to mass housing in Africa, *International journal of scientific innovations and sustainable development*, 2(2012) 89-92.
- [8] A. Olotuah, S.A. Bobadoye, Sustainable Housing Provision for the Urban Poor: A Review of Public Sector Intervention in Nigeria, *The Built & Human Environment Review* 2 (2009) 51-63.
- [9] A. Akeju, Challenges to providing affordable housing in Nigeria, Paper presented at the 2nd emerging urban Africa international conference on urban housing finance in Nigeria, held at shehu yar'adua centre Abuja, October 17-19, 2007.
- [10] A. Aribigbola, O. Iranlowo, Site and services as a strategy for achieving adequate housing in Nigeria in the 21st century, *International journal of humanities and social science* 2 (2012) 126-132.
- [11] J. Onyike, An assessment of affordability of housing by public servants in Owerri, Nigeria, *Journal of land use and development studies*, 3(2007) 21-34.
- [12] I. Mustapha, Overview of Housing and Urban Development Programme Since Independence, *Housing Today-Journal of the Association of Housing Corporations of Nigeria*, 1 (2002) 28-30.
- [13] J. Ajanlekoko, Appraisal of the National Housing Policy, *Housing Today-Journal of the Association of Housing Corporations of Nigeria*, 1 (2002) 13-20.
- [14] O. Kayode, Basis Issues in Housing Development, FemoBless Publishers, Ondo, 2001.
- [15] I. Ali, The National Housing Programme-The Way Forward, *Housing Today- Journal of the Association of Housing Corporations of Nigeria* 11 (1996) 16-19.
- [16] A. Aribigbola, Housing Policy Formulation in Developing Countries: Evidences of Programme Implementation from Akure, Ondo State Nigeria, *Journal of Human Ecology* 23(2008) 125-134.
- [17] A. Awotona, Nigerian Government Participation in Housing: 1970-1980, *Habitat International* 14 (1990) 17-40.
- [18] E. Ibem, An Assessment of the Role of Government Agencies in Public-Private Partnerships (PPPs) in Housing Delivery in Nigeria, *Journal of Construction in Developing Countries*, 15 (2010): 23- 48.
- [19] U. Ikejiofor, The God that Failed: A Critique of Public Housing in Nigeria 1975- 1995, *Habitat International*, 23(1999) 177-188.
- [20] E. Opaluwa, O. Paul, C. Osasona, Sustainability in traditional African architecture: a springboard for sustainable urban cities, Paper presented at the Sustainable Futures conference: Architecture and Urbanism in the Global South, Kampala, Uganda, 27 – 30 June 2012.
- [21] R. Dayaratne, Reinventing traditional technologies for sustainability: contemporary earth architecture of Sri Lanka, *Journal of Green building* 5 (2011) 22-33.
- [22] M. Satprem, Seminar on earth architecture at Alliance Française De Colombo, conducted by Auroville Building Center, India, 1999.
- [23] G. Z. M. Poveda, Sustainability as Driver of Architectural Practices: San Francisco federal building case, Paper presentation at the 26th Conference on Passive and Low Energy Architecture, Quebec City, Canada, 2009.