# Urbanization, housing, homelessness and climate change adaptation in Lagos, Nigeria: Lessons from Asia

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The phenomenon of climate change heralds distinctive challenges for sub-Saharan Africa's urban areas, with economic, social, and health impacts, and severe effects on housing and infrastructure. This study examined climate-change induced vulnerabilities including the urban housing crisis and homelessness in the context of Lagos mega-city, Nigeria, with a view to defining the potential lessons to learn from the Asian urban experience. The study conducted case-study analyses of Lagos and the Asian urban experience, highlighting the megacity-related vulnerabilities. It identified gender and aging as key factors in understanding vulnerability. Lessons from Asia relate to: the conscious policy-linkage of urban demographic expansion and economic growth; synergy between formal and informal sectors; urban densification through compact, mixed-land use development; broad-based urbanization; metropolitan expansion; pursuit of slum-free cities; prominence of housing in national policies; pro-poor financial frameworks; and extensive adoption of mitigation and adaptation strategies in the coastal conurbations. The paper concluded on the critical role of urban governance in reducing vulnerability, the need for greater multi-disciplinary stakeholders' collaboration and partnership, and the expediency of fitting adaptation strategies and resilience responses to specific needs, capacities and priorities of impact groups. These could enhance the transformation of mega-cities into more adaptable and resilient urban systems.

**Keywords**: *adaptation, climate-change, homelessness, urbanization, urban housing*

## 1. INTRODUCTION

Global population growth in the first few decades of the twenty-first century was anticipated to concentrate in the less developed Global South, including sub-Saharan Africa (Drakakis-Smith, 2000). Here, the urbanization profile features massive urban population inflows and natural population increases which out-pace urban infrastructure, systems, and services. The disturbing reality is that rapid rates of urban growth characterize the world's poorest countries and regions in which the pace of development has slowed dramatically or stopped; coupled with weak management (UN-HABITAT, 2011). Of Africa's one billion people, 40 per cent reside in urban areas; 60 per cent of these in slums and squatter settlements, as planning for services lags far behind the pace of urbanization, resulting in densely populated cities fraught with high poverty rates, weak infrastructure, and inadequate access to public services (UN-HABITAT, 2010a). With a largely poor population, the rapid urban growth has dire implications for housing provision for the low-income groups, homelessness, and the protection of the urban environment. In addition, these regions are experiencing distinctive impacts of climate change, such as pervading poverty, social vulnerabilities and economic inefficiencies. The phenomenon of climate change presents huge challenges for urban areas and their rising populations, especially in the developing regions of Asia, Latin America, and Africa, with impacts on social and physical infrastructure, including shelter (IPCC, 2007; OECD, 2009; Reed et al., 2013; While & Whitehead, 2013).

A substantial proportion of the world's population lives in 'mega-cities' – continuous urbanized areas with populations above 10 million people (Kraas, 2007). Table 1 shows the mega-cities of Africa and Asia in 1992, 1995 and 2007, with projections for 2015 and 2025. By the end of the twentieth Century, the world's 20 most populous cities switched from a Euro-American focus to a developing world bias within 20 years. By the year 2025, 61% of the world population will be urban, but most megacities will be in the 'south clusters' (UN-HABITAT, 2008). Megacities in developing nations are critical in terms of climate change, given their size, pace of growth, high population density, social inequality, and poverty (WWF, 2009). Africa is the world's second most populated region – after Asia (UN-HABITAT, 2014). The analysis of the urban experiences and adaptation responses of Asia's megacities such as Mumbai, Delhi, Shanghai, Kolkata, Dhaka, and Karachi, may therefore provide useful lessons for Africa's mega-cities such as

Table 1: Mega-cities in Africa & Asia – 1995, 2007, 2025

| Mega-city | Population 1995 000s* | Population Projection 2007* | World Rank 2007 | Population Projection 2025** | World Rank 2025 |
|---|---|---|---|---|---|
| Africa | | | | | |
| Lagos | 10287 | n.a. | | 15796 | 12 |
| Cairo | 9656 | 11893 | 15 | 15561 | 13 |
| Kinshasha | | | | 16762 | 11 |
| Asia | | | | | |
| Tokyo | 26836 | 35676 | 1 | 36400 | 1 |
| Mumbai | 15093 | 18978 | 5 | 26385 | 2 |
| Shangai | 15082 | 14987 | 7 | 19412 | 9 |
| Jakarta | 11500 | n.a. | | 12363 | 19 |
| Karachi | 9863 | 12130 | 12 | 19095 | 10 |
| Beijing | 12362 | 11106 | 16 | 14545 | 15 |
| Darka | 7832 | 13485 | 9 | 22015 | 4 |
| Calcutta | 11673 | 14787 | 8 | 20560 | 8 |
| Delhi | 9882 | 15926 | 6 | 22498 | 2 |
| Tianjin | 10687 | n.a | | n.a. | |
| Manila | 9280 | 11100 | 17 | n.a. | |
| Seoul | 11641 | n.a | | 14808 | 14 |
| Istanbul | 9316 | 10452 | 19 | 12102 | 20 |
| Lahore | 5085 | n.a. | | 10512 | 24 |
| Osaka | 10601 | 11294 | 14 | 11368 | 22 |
| Moscow | | 10452 | 18 | 10526 | 23 |
| Guanzhou | | | | 11835 | 21 |
| Shenzhen | | | | 10196 | 25 |
| Chennai | | | | 10129 | 26 |

Sources: *UNCHS (1996), pp.451-456; **UN-HABITAT (2008) – The World's Mega-cities, 2007 & 2025 (From UN Population Division, World Urbanization Prospects: The 2007 Revision)

Lagos and Cairo (Reed et al., 2013; UN-HABITAT, 2010c).

The coastal city of Lagos has experienced phenomenal demographic and spatial growth, attaining mega-city status in 2010. It has expanded from its original lagoon setting to cover a vast expanse of adjoining areas. The recent urban history of Lagos is however marked by massive infrastructure decay accentuated by increasingly adverse weather events, being part of the low-lying West African coast that is susceptible to flooding due to rising sea levels (UN-HABITAT, 2008). The social vulnerabilities of the mega-city become apparent in this context of infrastructural crisis. The mega-city's development requires innovative and sustainable urban interventions that may benefit from the Asian urban experience. The unique features of the Asian region, in terms of its size, population, economic dynamics, urban profiles, and vulnerabilities, especially of its coastal conurbations, have been subjects of review and assessment by various researchers and relevant agencies of the United Nations (Kumar, 2013). This suggests the possibility of garnering lessons for the benefit of other developing countries' cities, such as Lagos.

The purpose of this study is therefore to identify potential lessons from Asia's urban experience that may inform planning and policies related to urbanization, housing, and climate change adaptation in Lagos, Nigeria. Through a literature review, case-study analysis of Lagos, and desktop study of secondary data on urbanization in Asia, the paper examines mega-city related vulnerabilities and adaptation strategies. Following this introduction are three main sections: a literature review of the key concepts; summary of the research method, description of the study context (Lagos mega-city) and its analysis using an adapted analytical framework; and a discussion of lessons from Asia's urban experience, including the adaptation and mitigation responses. Conclusions are then drawn regarding reducing climate-change induced vulnerabilities and increasing resilience in the context of Lagos.

## 2. LITERATURE REVIEW

### 2.1 CLIMATE CHANGE IMPACT

Climate-change related disasters, such as typhoons, landslides, storms and floods have increased in frequency and intensity. These are compounded by urban growth, particularly in coastal settings, which expose greater numbers of populations and infrastructure to weather extremities. Mass migration from rural to urban areas puts great populations around the world at risk – since many major cities are located near coasts and fault lines - resulting in an urbanization of vulnerability and ensuing increase in urban disasters (Nicholls et al., 2007). Fourteen per cent of the urban population of developing countries live in the low-lying coastal zone. Also, the high level of urbanization in the coastal zone (54%) relative to the entire developing world (44 %) presents major challenges, given the low capacity and weak infrastructure to deal with rising sea levels (UN-HABITAT, 2009). According to CRED (2012), climate-related disasters which occurred in Asia in 2011 and made global headlines include: tsunami in Japan (March 2011); devastating floods in Thailand; and the tropical storm Sendong in the Philippines (December 2011). The year 2012 also witnessed landslide in Philippines; floods in Thailand, Indonesia, and Fiji; and avalanches in Afghanistan. Insight into these may be useful for Africa, where flooding is the most frequent climate-related natural disaster, with the highest mortality (UN-HABITAT, 2007; UN-HABITAT, 2014).

Nigeria in particular witnessed devastating floods in July/August 2012, which forced whole communities to evacuate homes in Lagos, Ibadan and other major cities, with thousands of buildings washed away, and hundreds of fatalities. August 2012 witnessed a similar trend, causing flood emergencies in many states. In order to better understand the impacts of climate-change, it is important to clarify few related concepts. The pliability of the terms vulnerability, resilience, adaptation and adaptive capacity, relative to climate-change, makes their conceptualization expedient (Hulme, 2009). The following sub-sections therefore review these concepts and the related issues of urban housing crisis and homelessness.

### 2.2 VULNERABILITY, RESILIENCE AND ADAPTATION

Climate change risks are a function of hazards, exposure and vulnerability to them, and adaptive capacity (social and economic). Hazards refer to the nature and severity of climate change and weather impacts of concern. Exposure implies whether and to what extent hazards have an impact on communities, ecosystems, and other assets. It may be measured in terms of the number of people or types of assets in hazard zones. Vulnerability indicates whether and to what degree the characteristics of a community or asset make it susceptible to the harmful effects of hazards. Adaptive capacity is the ability of communities and ecosystems to anticipate and/or respond to climatic changes in order to reduce vulnerability (Adger, 2006; McDaniels et al, 2008).

Vulnerability is often defined differently by the academia, disaster management agencies, and the climate change community (Villangran, 2006). Three factors are however commonly identified: the exposure to perturbation or external stresses, sensitivity to perturbation, and capacity to adapt to and/or cope with these (Adger, 2006). The origin of the vulnerability concept is traced to two distinct but overlapping research areas: (a) hazard research, and (b) poverty and development research (Hansjürgens et al., 2008). Researchers in developing countries generally find the hazard paradigm less appropriate, stressing the need to acknowledge the political-economic context more rigorously in analysing conditions that reduce the ability of people and places to respond to environmental threats. This 'livelihood approach' focuses on the assets and resources (physical, ecological, political, social, and financial) of individuals and households that can be used to deal and cope with a wide range of risks (Adger, 2006).

Resilience describes a system's capacity to absorb disturbance and reorganize while undergoing change in order to still retain essentially the same function, structure, and identity (Walker et al., 2004). It measures the change a system can undergo and still retain the same controls on function and structure; the degree to which it is capable of self-organization. Resilience may relate to an urban system as a whole or its specific components (Resilience Alliance, 2007). It is increasingly being linked in the literature with cities and climate change, through the growing usage of the terms: 'climate resilient' and 'resilient city' (Boyd et al., 2008). Enhancing resilience is a key objective for both adaptation (responding to the effects) and mitigation (reducing the causes) of the challenges of climate change. Current researches indicate that climate change-related shocks typically blend with other environmental, economic, and political stresses (De Sherbinin et al., 2007; Hardoy & Pandiella, 2009). Cities need to be resilient to present impacts and future threats of hazards, disasters, and social or political instability (Reed et al., 2013; Wamsler, 2008).

Adaptation broadly refers to an action or combination of actions, options or strategies that can be designed and implemented to reduce the

vulnerability of an individual, household, population group, infrastructure, or system (e.g. urban area) to the adverse impacts of climate change (IPCC, 2007). These will either reduce exposure and sensitivity to impacts or increase adaptive capacity to cope with them. Components of adaptive capacity may include general developmental considerations relating to human development, poverty levels, and social capital and networks, as well as climate-specific strategies such as effective early warning systems for disasters and extreme events, sometimes at the local plan level (Baker et al., 2012). It is important to situate these conceptualizations of vulnerability, resilience and adaptation in the contexts of megacities, urban housing crisis and homelessness.

## 2.3 MEGA-CITY VULNERABILITIES

Mega-cities are conventionally defined by population size: usually a threshold of 10 million people. An alternative definition links population to functional primacy; while a third approach relates to the notion of 'global city' or 'world city' – the city's role and prominence in the global economic network (Beaverstock et al., 1998). These definitions however do not explicitly reveal the specific conditions of mega-cities relative to the production of and exposure to risks. An apt definition would integrate the elements of size/scale, speed, and complexity of change in the shaping of mega-city-specific vulnerabilities (Hansjurgens et al., 2008).

Although mega-city living potentially offers some benefits: economic opportunities, easier access to services, and rich cultural diversity, the urbanization process in the mega-cities of developing nations is producing urban forms and social concerns, which exclude marginalised populations from the benefits (Kraas, 2007). In contrast with the case when accelerated urbanization began in Western Europe and North America, the mega-city phenomenon in developing countries is most notable in those with the lowest levels of economic development. They host some of the poorest groups of people, living in high risk areas or crowded into peripheral slums (Davis, 2006; Douglas et al., 2008). The livelihoods of such groups are endangered by an informal legal status which impedes their labour, tenure and political rights. Poor living conditions affect their housing and health; and a dependence on the cash economy makes them extremely susceptible to financial crises (Rakodi & Lloyd-Jones, 2002). Most of the world's mega-cities are coastal and vulnerable to catastrophic flooding due to rising sea levels; hence they often present unique social vulnerabilities, relating to natural hazards, environmental degradation, inadequate housing, services, and infrastructure, and homelessness (UN-HABITAT, 2008).

## 2.4 CRISES OF URBAN HOUSING AND HOMELESSNESS

Climate change accentuates the burden on an already stressed urban management in an increasingly urbanized world, with multitudes sheltered in informal settlements, with crowded conditions, limited access to basic amenities, and in many cases, destitution and homelessness. In Nigeria for example, the housing crisis presents quantitative and qualitative dimensions, with profound impact on psychological, social, environmental and cultural aspects of life. Studies indicate that at least two-thirds of the dwelling units in the urban centres are substandard (Olukoju, 2003). The high level of poverty places the available housing stock out of the economic reach of most households; hence they are either homeless or resort to informal shelters on illegally-occupied land, thus heightening their vulnerability.

Homelessness may refer to: a special housing situation; the duration and frequency of living without shelter; being part of certain disadvantaged group of the population; a set of lifestyle questions; or the risk of becoming houseless (Speak, 2004). With reference to the United States, the homeless have been classified into three groups: 'teeterers', 'resistors' and 'accommodators', based on their characteristics, perceptions of their homelessness and durations (Hertzberg, 1992). 'Resistors' fight against homelessness and are only homeless for a few years; 'teeterers' are ambivalent to it while 'accommodators' have accepted it. These typologies may however be inappropriate for developing countries, where the perception of the homeless is vastly different, and often incorporates 'degrees of destitution' (Tipple & Speak, 2009). Speak (2004) classifies homelessness in developing countries, based on the degree of choice the homeless person or household can exercise over their situation, and the level of opportunity afforded them to improve their situation. Supplementation homelessness is a conscious, strategic, but temporary choice to be homeless, with intention to return to a normal situation. The 'survival homeless' learn to accept their situation, hoping for their shelter to be regularised and upgraded, or to obtain access to basic services. Crisis homelessness manifests as degrees of destitution, the worst being 'absolute homelessness', which includes perpetual rough street sleepers; these have the least control or choice (Pleace, 2000).

Secondary data from a survey of Itire community, Lagos reveal multi-dimensional characteristics, causes and consequences of homelessness (Jiboye, 2011). About a quarter (26%) stayed in makeshift sheds under bridges, 20% in

broken-down vehicles, 15% in abandoned buildings and in bus/taxi park sheds respectively, and 24% in temporary sheds. Two broad reasons given by respondents were: inability to afford decent shelter due to poor financial status and unemployment (47%) and histories of broken homes and divorced parents (53%). The challenge of homelessness in Lagos typically illustrates the problems of poverty which are predominant in urban areas of many developing countries, as consequences of rapid urbanization. Being essentially urban issues the resolution of these challenges may not be found outside of the broader view of urbanization and the contemporary issues associated with it.

Studies have emphasised the importance of local assessments of vulnerability in capturing the diversity in social, economic, and natural environments of communities (Acosta-Michlik et al., 2008). These would help to identify areas that are most vulnerable and find answers to questions about who and what are vulnerable, to what are they vulnerable, how vulnerable they are, the causes of their vulnerability, and responses or strategies that may be adopted to lessen vulnerability. Such questions are explored in this analysis of the case study of Lagos mega-city.

## 3. RESEARCH METHOD AND ANALYSIS

This research used the case-study method. Primary data were obtained from field observation and semi-structured interviews with key informants in some vulnerable communities in Lagos. Secondary data drew from relevant reports and documents (global, regional, and state) and literature relating to climate change, vulnerability, resilience, and adaptation strategies. The secondary data analysis of urbanization in Asia made specific references to those countries (and their cities) such as China (North East Asia); Bangladesh, India, Nepal and Sri Lanka (South Asia); and Indonesia and Thailand (South-East Asia), whose social, economic and environmental challenges appeared representative of other developing countries, and which could therefore offer lessons for Lagos mega-city in terms of both successes and failures. The specific objective was to highlight those programs and policies with potential benefits. First, the case-study context (Lagos) is described briefly from a historical and urban developmental perspective. An adapted framework is then used in the vulnerability analysis of the mega-city, thus providing the basis for examining Asia's urbanization experiences, characteristics, and adaptation and mitigation responses, with a view to highlighting pertinent lessons.

### 3.1 CASE-STUDY CONTEXT: LAGOS

The coastal city of Lagos, situated within 6°23'N and 6°41'N (lat.) and 2°42'E and 3°42E (long.), is Nigeria's most rapidly urbanising and populous conurbation (See Figure 1). Its growth has been phenomenal, demographically and spatially: from a population of about 25,000 in 1866, to 300,000 in 1950, 665,000 by 1963, and over ten million in 2010, thus attaining the status of a mega-city. Although population figures are widely disputed, 12.4 million was projected by 2015 (UN-HABITAT, 2010b). Spatially, the sprawling city has expanded from its original lagoon setting to engulf a vast expanse of surrounding areas including more than 100 slums. There has been deterioration in the condition of the city since the post-independence euphoria of the early 1960s, through the tortuous era of the 1990s up to its present transitional state. The history of Lagos in the closing decades of the 20th century was marked by severe deterioration in quality of life: proliferation of slums; environmental degradation; congested roads; flooding; and poor sewerage network (George, 2010).

Lagos has undergone a series of urban evolutionary phases. The first, the colonial phase was characterized by 'incomplete modernity' due to the inherited bifurcated systems of urban administration. The second phase – the post-colonial metropolis – evidenced initial optimism, with subsequent descent into despair, as the unstable urban system deteriorated under the combined pressures of political instability, accelerated rates of migration, and disrupting effects of oil wealth, worsened by the 1967-70 civil war. Lagos, which at independence was the leading industrial centre of Nigeria, from the mid-1970s onwards suffered severe decline. The third phase saw a chain of military regimes, interspersed with the global recession of the early 1980s, leading to a virtual break-down in the public realm, pervasive political and economic crisis, and massive infrastructural collapse. The metropolis largely expanded independently of the efforts of city planners. About 70 per cent of the population live in slums, especially in the oldest settled areas of mainland Lagos and in marshy lagoon areas (Gandy, 2006).


Figure 1: Map of Nigeria showing Lagos State

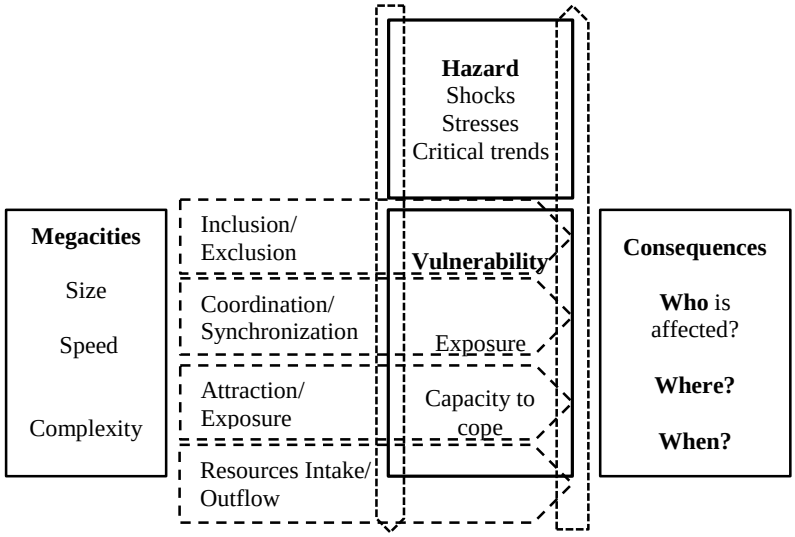


Figure 2: Framework for vulnerability analysis in megacities
(Adapted from Hansjürgens et al., 2008)

The Nigerian coast – of which Lagos is a part – is one of the low-lying coasts in West Africa which are experiencing adverse weather events with increasing frequency and severe flooding due to rising sea levels (UN-HABITAT, 2008). The physical and social impacts include damage to housing and infrastructure, homelessness and lack of basic services. Despite the environmental challenge of flooding, aggravated by inadequate refuse and sewerage systems, and weak urban management, the vulnerability of the urban poor is yet to receive adequate attention in urban design and planning. This is reflected in the often negative reactive responses of governments such as the forceful evictions and clearance of vulnerable coastal communities (Ilesanmi et al., 2011). The summary of the qualitative data on Lagos depict it as a largely spontaneous evolution of un-coordinated, incremental assemblage of structures which gradually sprawled. It is in this context of social and infrastructural crisis accentuated by the effects of climate change that the social vulnerabilities of the mega-city become highly visible.

### 3.2 ANALYTICAL FRAMEWORK

Following Hansjürgens et al. (2008), this study used a framework for vulnerability analysis, which relates hazards (shocks, stresses and critical trends) and vulnerability, with the unique mega-city conditions of size, speed of change and complexity (see Figure 2). These mega-city characteristics are moderated by four types of critical processes which influence the exposure to and capacity to cope with hazards, of specific social groups in different settings. These four vital processes are: Inclusion/exclusion of citizens; coordination/ synchronization; attraction/ exposure; and resources intake/outflow.

The following key findings derived from the analysis of the Lagos case study based on this framework:

*Inclusion/exclusion of citizens*: slum dwellers and squatters who represent the majority of the city's inhabitants have relatively little entitlement to resources of public infrastructure, legal rights, tenure security to land and housing; or to participate in the decisions affecting their urban existence. Their shelters are at the risk of sudden demolition and are generally ill-equipped to cope with natural hazards. Low-income people for whom social housing schemes were initially designed have been marginalized and excluded. The State's housing agency is focused primarily on housing provision for the medium and high-income earners, leaving the low-income to the vagaries of risk-prone squatting or homelessness.

*Coordination/synchronization*: Lagos has borne the brunt of political rivalry and lack of coordination between the federal and state governments, for example, with respect to securing the fast-receding Atlantic coastline, and the polluting effects of abandoned ship wreckages on the seashore. Despite the efforts of National and State Emergency Relief Agencies, rescue plans during past cases of environmental emergencies such as floods and infernos, did not demonstrate coordinated and optimally efficient, horizontally integrated strategies between the relevant agencies.

*Attraction/exposure*: large rural populations that migrate into endangered, flood-prone coastal settlements due to inaccessibility to land in better locations become exposed and vulnerable. Lagos is yet to adequately develop the infrastructure to withstand extreme weather conditions. Poor urban planning, implementation and governance challenges contribute to making the poor and disadvantaged dwellers in urban slums and squatter settlement to be most at risk.

*Resources intake/outflow*: three valid cases are: (1) the large volume of pollutants and industrial wastes discharged into the Lagos lagoon from the adjoining Industrial zones such as the Apapa Industrial Estate; (2) the inadequate sewage discharge and disposal systems for majority of the urban informal settlements; and (3) pressure on land resulting in extensive reclamation works which invariably deplete the fauna, flora, and agricultural land-uses.

In terms of the 'who', 'where' and 'when' of vulnerability, it was discover from the field studies and semi-structured interviews that the homeless and low-income majority, particularly the frail elderly, disabled, women and street children were most vulnerable to urban shocks. These were located in the slums and squatter settlements in the city-core, but particularly in the coastal peripheries, and were most prone to climate-change induced floods and related hazards. A key finding was the identification of gender and aging as critical factors in understanding climate change vulnerability.

The above vulnerability analysis highlights the inter-connected nature of the key challenges facing Lagos mega-city. First, the physical and locational challenge of the mega-city's coastal context makes it highly vulnerable to climate-change induced hazards. Second, its historical antecedents as Nigeria's first and former Capital city and a subsisting primate city and economic hub, intensified its phenomenal growth in demographic and spatial terms. Third, the socio-economic development of Lagos has resulted in a large, informal sector population and economy whose potential remains largely untapped. Moreover, the city's political history had been characterized by weak urban management and unstable governance structures. Interconnected with these is the urbanization phenomenon which has accentuated the mega-city's massive infrastructure deficit and decay, environmental degradation, proliferation of slums and squatter populations, unstable urban systems, severe housing crisis, and homelessness. The uncoordinated urbanization and lack of appropriate planning strategies or negative, reactive responses in many cases, have reinforced the urgent need for innovative solutions that would help to reverse the downward spiral. Lagos requires multi-dimensional interventions that relate to: location, socio-economic development, the informal sector, urban governance and management, and climate-change adaptation and resilience. The next section therefore explores the case of Asia with a view to learning from its urbanization experiences, characteristics, and adaptation responses, highlighting issues with potential benefits to Lagos.

## 4. THE ASIAN URBAN EXPERIENCE

### 4.1 OVERVIEW OF URBANIZATION AND VULNERABILITY IN ASIA

With the Lagos case-study as background, the key question is: What lessons can be learnt from Asia's urbanization trends and the mitigation/adaptation strategies? This is premised on these broad criteria: the region's size, population, and urban profiles; its unique urban vulnerabilities and economic dynamics. By 2050, the urban population of the developing world will be 5.3 billion, with Asia hosting 63 per cent (3.3 billion), relative to Africa's 1.2 billion (UN-HABITAT, 2008). Asia's urbanisation level increased from 31.5 per cent (1990) to 42.5 per cent (2010) (UN-HABITAT, 2010c). Asia as part of the Asia-Pacific region is a vast geographical expanse, with 60% of the world's population, five of the eight most populous countries in the world (Kumar, 2013), 30% of the global land mass and a diversity of societies, cultures, economies, and human settlements. The four geographic sub-regions – East and North-East Asia (ANEA), South-East Asia (SEA), South and South-West Asia (SSWA), and North and Central Asia (NCA) – vary in economic development and natural environment, spanning low-, lower-middle, upper-middle and high-income economies; and various climatic zones and urbanization profiles (Dahiya, 2012).

Asia is the most vulnerable region in the world in terms of land mass, populations and GDP to one meter of sea level rise (Anthoff et al., 2006). The high level of vulnerability is influenced by factors of exposure and sensitivity: topography, high concentrations of populations in low-lying, coastal areas and river basins; economic dependence on natural resources; extreme climate sensitivity of key crops; and limited capacity to respond to and be prepared for climate change impacts. Added to the more gradual impacts of greenhouse gas (GHG) emissions, are significant impacts related to higher temperatures; storm surges and sea level rise; changing precipitation patterns; glacial retreat and alteration of water cycles of glacier-fed river basins; damages to agriculture and water supply due to drought, saltwater intrusion, and sea spray; and damages to communities and infrastructure from coastal inundation and erosion. In extreme cases, residents have been relocated from low-lying islands (USAID/RDMA, 2010). It may be therefore justifiable and expedient to examine some of the main features of urbanization in Asia, in order to derive reasonable lessons for emerging mega-cities in Africa, such as Lagos.

### 4.2 LESSONS FROM THE ASIAN EXPERIENCE

Despite the economic, political, social and cultural diversity of Asia's developing countries, many of them face similar challenges of poverty alleviation, sustainable urban development, increased urbanization, environmental degradation, and frequency of natural disasters (USAID/RDMA, 2010). Climate change constitutes an additional stressor on livelihoods, ecosystems, and infrastructure, which places large populations and key sectors at risk, and warrants interventions that support climate-change adaptation. Based on a review of secondary data in relevant documents (Dahiya, 2012; Kumar, 2013; UN-HABITAT, 2009, 2010b, 2010c; World bank, 2010), the challenges, responses, and lessons derivable from the Asian experience are discussed under seven sub-headings, namely: Urban demographic expansion and economic growth; the informal sector; metropolitan expansion and urban governance structures; high population density; the challenge of slums; housing models; and coastal conurbations.

#### 4.2.1 Urban demographic expansion and economic growth

Asia's high scale of urban demographic expansion is attributed to a shift in national policies that directly linked urbanization and economic growth. As many Asian countries explicitly or implicitly promoted urbanization through infrastructure investments, their cities became recognised more as 'engines of economic growth', attracting financial aid by national governments and international agencies for 'city development strategies' such as 'Kuala Lumpur City Plan 2020' (UN-HABITAT, 2010b: 93). Asian economic growth is led by highly productive cities: just over 40% of the urban population contributes over 80% of GDP. The main economic drivers identified are: export-led growth; urban infrastructure and services which facilitate higher productivity and attract foreign direct investment (FDI); investment in and competition among cities; cities' connectivity to markets; and innovative business practices (UN-HABITAT, 2010c: 79-86). Some Asian cities designate economic zones and infrastructural investments as the key drivers of growth e.g. Bangkok's transport connectivity (UN-HABITAT, 2008). Asia is also diversifying beyond being 'factory of the world' into the emerging global 'knowledge economy' through innovative knowledge hubs and international financial centres (UN-HABITAT, 2010c: 93-99). Lagos, as the economic hub of Nigeria, could learn from this model of a conscious policy-linkage of urbanization and economic growth. Whereas the need to improve quality-of-life is a vital city growth factor in many

African cities, this does not negate the demand for massive investment in urban infrastructure and services and the potential for proactive City Development Plans, especially in Lagos, a primate city in Nigeria – the largest economy in Africa (The Economist, 2014).

### 4.2.2 Informal sector

Asian urban economies promote some degree of synergy between the formal and informal sectors: cities simultaneously host well-developed manufacturing and services formal sectors, and dominant informal economies which provide basic livelihoods to residents (UN-HABITAT, 2010c: 87-92). Kumar (2013) suggests that although informality as a way of life has been interwoven with the urban fabric for centuries in Asia, many governments are ignoring its relevance and importance in policy praxis. The sector however complements the role of the city governments by facilitating civic facilities in those areas of the cities that face deficiencies or neglect from the formal system, such as solid waste management, water supply, sanitation and transport (Kumar, 2013). Asia also offers some lessons on the benefits of citizen participation in urban governance, namely: sustainability, bottom-up monitoring, and cost sharing. Jakarta, Delhi, Hyderabad and other Asian cities display an array of participatory programmes, where non-governmental organisations (NGOs), community-based organizations (CBOs), and city agencies engage in partnerships for poverty alleviation, housing and primary health care for women and children (UN-HABITAT, 2010c). In the Lagos context, the informal sector, which is dominant among the most vulnerable groups, represents a huge social capital waiting to be harnessed through participatory means.

### 4.2.3 Metropolitan expansion and urban governance structures

In much of Asia, urban populations are shifting to suburban satellite towns linked by commuter networks. This trend of metropolitan expansion is prevalent in India's New Delhi and Mumbai, where ring towns or "bedroom communities" formed around the cities. In China, urban growth patterns have produced "city regions" along the eastern coastal belt, which accommodates much of its recent economic growth. The Asian response is to encourage broad-based urbanization rather than concentrating in few cities. This consists of a hierarchy of small- and medium-sized towns, metropolitan cities, and mega-cities/meta-cities, which constitute 49%, 11%, 29% and 11% of urban population respectively. Small-sized and medium-sized towns serve the roles of: local 'economic growth centres'; 'bridges' between rural and urban areas; headquarters for district and sub-district administrations; and temporary 'stepping-stones' for rural migrants (UN-HABITAT, 2010c: 8). Metropolitan cities (1-10 million populations) also pose unique challenges to urban planning. Asia's proportion of the world's mega-cities increased from 4 out of 10 in 1990, to 12 out of 21 in 2010, including seven of the 10 most populous cities, topped by Tokyo, Delhi and Mumbai, each with a population over 20 million (UN-HABITAT, 2010b).

With the globalisation-induced restructuring of urban territorial space, some mega-cities are evolving into mega urban regions and urban corridors or 'Extended Metropolitan Regions' (EMR) (Ginsburg et al., 1991). These generate the positive outcomes of agglomeration economies as well as negative externalities such as high real estate prices, traffic congestion, and poor environmental quality, which call for innovative approaches to planning and governance (Laquian, 2005). In countries with urban primacy, such as Indonesia, the trend has been to promote the growth of intermediate cities (with populations of 500,000-1 million) as mechanisms of population redistribution and regional development to slow down metropolitan growth, direct migrants away from primate cities, and promote spatial integration via a more dispersed population (UN-HABITAT, 2008). It is important that future satellite cities around Lagos should evolve out of broader structural and governance considerations as in Asia.

### 4.2.4 High population density

Asian cities exhibit the highest population densities globally, ranging from 10,000-20,000 per sq.km: twice that of Latin American cities, thrice that of European cities and 10 times that of US cities (UN-HABITAT, 2010c). Although not uniform throughout, the high density is accounted for in the many skyscrapers and high-rise residential blocks, myriads of older low-rise, high-density residential layouts, transport modes, planning rules and regulations, and peripheral developments. Asia has endeavoured to maximize its urban spatial morphology through compact, mixed-land use development. Many residential areas accommodate additional commercial land-uses, either in the form of dedicated spaces, commercial use of ground floor of residential buildings, or the typology of shop-houses (UN-HABITAT, 2010c).

Table 2: Slum population in Asia, 2010 (Projections)

| Region | Urban Population (1000s) | Slum Population (1000s) | % of Urban Population in Slums |
|---|---|---|---|
| Eastern Asia | 671 795 | 189 621 | 28.2 |
| Southern Asia | 545 766 | 190 748 | 35.0 |
| South Eastern Asia | 286 579 | 88 912 | 31.0 |
| Western Asia | 145 164 | 35 713 | 24.6 |
| Asia (Total) | 1 649 304 | 504 994 | 30.6 |

(Source: Adapted from UN-HABITAT 2010c:124)

#### 4.2.5 Challenge of slums

Asian cities are home to a slum population of more than 500 million with two-thirds of this total residing in the five most populous Asian countries (UN-HABITAT, 2010c). They display a paradoxical co-existence of economic growth and contexts of poverty. On the one hand, the emerging economies of India and China are projected to represent 50 per cent of global GDP in the next decade. On the other hand, Asia is also home to the majority of the world's poorest people. Slum concentrations in Asia range between 24 and 35 per cent in Western and Southern Asia (see Table 2). The high concentration in Southern Asia is due to: limited investment in the housing sector, poverty, and instability. Bangladesh and Nepal have the highest slum prevalence (69 and 68%,); while Malaysia and Thailand in Southeast Asia have the lowest – less than 10 per cent – due to their more equitable housing policies, significant economic growth, and advancing technology (UN-HABITAT, 2010c: 126). These accentuate the need for differentiated policy focus on local conditions in Asian cities. Despite this challenge, Asia has led in achieving the 2020 slum target relating to the reduction of extreme poverty, under the Millennium Development Goals (MDGs), by significantly improving the lives of 172 million slum dwellers through various policies and programmes (Dahiya, 2012). Five complementary approaches used were: awareness and advocacy; long-term political commitment; policy reforms and institutional strengthening; proper implementation and monitoring; and scaling up successful local projects (UN-HABITAT, 2010b).

#### 4.2.6 Housing models

Dahiya (2012) notes the prominent role of housing in national policies of many Asian countries in their spirited pursuit of slum-free cities. Five main institutional models are identified: (i) public housing policies and projects; (ii) public-private partnerships to stimulate affordable housing construction (iii) "enabling" public sector housing delivery for low-income groups; (iv) support to rental housing, and; (v) the 'people's process' of housing and urban upgrading, including the many innovative, pro-poor alternatives for housing, infrastructure and community development finance. These are useful models in the diversification of housing solutions, which can be adapted in the context of Lagos mega-city. In addition, various housing options given to the urban poor by informal markets to suit their incomes, though not ideal, should be supported rather than harassed, as they play positive socio-economic roles.

#### 4.2.7 Coastal conurbations

Asia has a prominent phenomenon of coastal conurbations: Cities located near the sea, along a river bank or in a delta tend to be the largest. Thirteen of the world's mega-cities are coastal cities, while fourteen of the 19 largest cities are port cities (UN-HABITAT, 2008:140). The dominance of port cities is greatest in Asia: 17 of the 20 largest cities are either coastal, on a river bank or a delta (Balk et al., 2008). Asian mega-cities are particularly vulnerable, due to the lack of infrastructure to withstand the impacts. The urban poor who tend to live in hazardous locations, are most vulnerable in the event of sea level rise, as their housing is often of a non-durable nature and their settlements lack adequate drainage, embankments and other infrastructure, accentuating the challenge of 'eco-refugees'. Some cities are however proactively developing mitigation, adaptation and flood protection strategies (Dahiya, 2012).

### 4.3 ADAPTATION AND MITIGATION RESPONSES

Due to Asia's vastness and diversity in terms of population, size, climate and economic development, the effects of and responses to climate change – both in cities and in countries – vary widely. UN-HABITAT (2010c), USAID/RDMA (2010) and World Bank (2010) examine Asia's mitigation and adaptation responses in much detail. They recommend mainstreaming climate change issues in city planning; as well as specific 'no-regrets' or 'win-win' options – measures whose implementation is beneficial even if the magnitude and timing of climate change is different than expected. Asian cities are collaborating on various

platforms such as the Asian Cities Climate Change Resileince Network (ACCCRN) to synthesize various aspects of the city-specific implications of climate change, to share best practices and to partner with expert agencies on current know-how. Aware of the urban implications of climate change, many governments at the city level opt for policy responses to transforming the urban landscape based on green thinking and resilience thinking (Brown et al., 2012; Kumar, 2013; Reed et al., 2013). These seemed to be much lacking in the evaluation of the African Adaptation Programme (Kumamoto & Mills, 2012).

Adaptations are either measures to reduce exposure and/or sensitivity or measures to increase adaptive capacity. Exposure-reducing options include: land use zoning, use restrictions and relocation policies; selection of climate-resilient crop and tree varieties; rainwater harvesting; natural floodplains for water storage; energy efficiency in buildings; water management; and climate-proofing infrastructure through building designs, selection of construction materials, and elevated structures. Adaptive-capacity-enhacing options include: promoting economic development, diversified livelihoods, and strengthening disaster risk management capacities of communities and civil societies for quicker recovery. Others are: improved management of public services; revised and better enforced building standards; improved methods and materials for low-income housing; implementing community-based early warning systems and disaster preparedness; and building multiple support systems (Brown et al, 2012; Reed et al, 2013).

The case of Dhaka could be considered in terms of flood protection measures for climate change adaptation. This capital of Bangladesh and the world's fastest growing mega-city grows at an annual rate of 4.4 per cent. Due to its location on a deltaic plain, the city – particularly the lowest-lying part, Dhaka East – is highly prone to flooding and associated risks, which are expected to increase with climate change impacts, high urbanization rate, and human-induced environmental disasters (Gianoli et al., 2012). After the catastrophic floods of 1987/88, the Bangladesh government initiated a Flood Action Plan (FAP) with proposals to protect Dhaka East from flooding, using embankments, flood walls, raised roads, canal improvement, regulators and pumping stations. The chief lesson learnt from the FAP implementation is that technical solutions must be in sync with developmental realities, such as the city's growing slum population.

Mitigating longer term impacts of climate change through the reduction of greenhouse gas emissions particularly in the larger polluting countries of China, India, Japan and the Republic of Korea, takes a varied forms. These include: adopting cleaner fuels and alternative power generation sources; and reducing industrial, domestic and public transport demand for fossil fuels. Other measures include: solar panels, improved building insulation, sustainable building design, construction, and energy use, bio-gas, industrial ecology and methane capture from solid waste dumping sites (UN-HABITAT, 2010c:189-191).

Climate change impacts are additional stressors on urban infrastructure that is already overtaxed due to increasing populations. Poor slum-dwellers tend to be most vulnerable as their locational exposure is accentuated by the low quality of housing and services. Apart from mitigating the possibility of global climate change itself, cities can act to prevent the deleterious effects of disasters. With growing climate-induced hazards, cities face dire environmental challenges, to which urban design and planning could respond with innovative solutions in the forms of: land-use planning; disaster- preparedness; disaster- resistant construction; effective infrastructure; and other appropriate mitigation and adaptation measures.

## 5. CONCLUSIONS

This paper examined climate-change induced vulnerabilities including the urban housing crisis and homelessness in the context of Lagos mega-city, Nigeria, with a view to learning from Asia's urban experiences. It was based on a review of literature and case-study analyses. The Lagos case-study revealed that despite the exponential population growth and dearth of infrastructure, the largely informal populace seem to have invented ingenious alternative systems with which to deal with some challenges of urbanisation. The lessons from Asia's experience include the following: (i) conscious policy-linkage of urban demographic expansion and economic growth; (ii) the synergy between the formal and informal sectors; (iii) urban densification through compact, mixed-land use development; (iv) broad-based urbanization through a hierarchy of centres ranging from small-sized towns to EMRs; (v) metropolitan expansion aimed at population redistribution; (vi) passionate pursuit of slum-free cities; (vii) prominence of housing in national policies; (viii) pro-poor financial frameworks; and (ix) extensive experiences at developing mitigation and adaptation strategies in the coastal conurbations.

The inherent resilience that has enabled some Asian mega-cities to thrive in the face of adversity is another vital lesson. The high resilience is perhaps due to their high levels of informality and social capital. Resolving challenges of megacities may therefore hinge on the appreciation of the human scale, and governance approaches which avoid

reactionary policies such as demolitions, repressive regulation of informal activities and displacement of poor people by 'mega-projects'. It is imperative that the diversity and human scale of megacities be appropriated by fitting mitigation and adaptation strategies and resilience practices to the specific needs, capacities and priorities of impact groups; and empowering vulnerable groups with climate-resilient livelihoods. Urban governance – in formal and informal modes – plays a crucial role in reducing vulnerability and increasing adaption to risks.

Beyond the analysis of individual case-studies, collaboration and partnership are essential to urban resilience and sustainability. In responding to climate change, holistic, integrated responses are required amongst stakeholders – communities, NGOs, researchers, practitioners, professionals, and policy-makers – to think and act innovatively, and to embed resilience principles into the design, construction and management of urban areas. Further research should ensure that efforts to promote resilience do not reinforce existing inequities or create new ones. This infers a better appreciation of the multi-disciplinary nature of the issues involved. Multi-disciplinary and trans-disciplinary frameworks for research efforts must be intensified in the search for a more adaptable, resilient, and sustainable urban future.

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