



INCLUSIVE CITY GROWTH AND THE POOR:

POLICIES, CHALLENGES AND PROSPECTS

Volume One

Editors:

S.N. Zubairu
O.F. Adedayo

In loving memory of
Late Dr. Anthony Ikechukwu ANUNOBI
(1965-2017)

Publisher:
COMMUNITY PARTICIPATION RESEARCH GROUP (COPAREG)

*Inclusive City Growth and the Poor: Policies,
Challenges and Prospects*

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TRIBUTE

This book is dedicated to the memory of Late Dr. Anthony Ikechukwu ANUNOBI who dedicated his working life towards improving the quality of life of the poor.

He was a man that preached and ensured that everyone he had dealings with enjoyed inclusiveness. As a trained architect he ensured that he undertook designs that had minimum negative impact on the environment and the livelihood of the people within the community. He was a typical example of a detribalized individual as evident with the mix of friends and community services he rendered.

Late Dr. Anthony Ikechukwu Anunobi had always been passionate about community integration and inclusiveness which was demonstrated in his leadership style as the Head of Department of Architecture, Federal University of Technology Minna, Nigeria, while he held sway and even in the community. He never discriminated against anybody. He shared the philosophy of COPAREG *that everyone has a role in the community/city and should be involved in the planning process.*

Late Dr. Anunobi will be remembered for his contribution towards the growth of Architecture in Nigeria with his involvement in the training of over 1500 students and graduates who are practicing within and outside Nigeria. His contribution to the Community Participation Research Group (COPAREG) team is what led the team to produce the first Book in its many series of books and conferences to come by the group.

**INCLUSIVE CITY GROWTH AND
THE POOR:
Policies, Challenges and Prospects**

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CHAPTER 15

Creating Inclusive Cities through Effective Urban Planning-Driven Crime Reduction Measures in Nigeria

Lekan Mohammed Sanni

Introduction

For over two decades now, there has been a discernible feeling of fear, restiveness and apprehension among the vast majority of the citizenry in many parts of Nigeria. Many of the State capitals and other large towns and cities across the country are increasingly zooming into panic mode as a result of their relatively insecure conditions. From Maiduguri and Yola in the north-east, Kaduna and Kano in the north-west, Jos, Okene and Makurdi in the north-central and down to Warri, Port Harcourt and Calabar in the southern part, there is a general feeling of insecurity among residents (Achumba, Ighomereho & Akpor-Robaro; 2013 Adegoke, 2014). These same feelings are not entirely different from what many residents of Aba, Onitsha and Okigwe in the south-eastern section as well as those in Ibadan, Ife and Lagos in the western axis of the country experienced. Many of the towns and cities across the country are no longer the safe havens and comfort zones they used to be to their vast majority of residents (Ewetan & Urhie, 2014). The high and increasing rates of crime of varying dimensions, particularly heinous crimes such as armed robbery, kidnapping, ritual killings, assassination and sexual harassment, amongst several others, have made many of our towns and cities less livable and insecure (Chinwokwu, 2014; Shopeju, 2007). The situation is so bad that many Nigerians hardly sleep in their houses with both eyes closed (Azuatalam, 2007; Otudor, 2005). The level of insecurity in the country has become so deplorable to the extent that the United States of America and the United Kingdom have had causes in 2015 and 2016 to warn their nationals from travelling to some cities in Nigeria, notably some northern cities of Bauchi, Maiduguri, Yola, Gombe, Kaduna and Kano as a result of the state of insecurity in these places (Inyang, 2017).

The seeming rise in crime and criminal activities in many of the urban areas across the country has been attributed to several factors, many of which are

social and economic in nature. These include the unprecedented pattern of urbanization, widespread poverty, high population growth rates, widening inequality, rising youth unemployment, deplorable state of critical infrastructure and poor economic policies and programmes on the part of the government at all levels, amongst several others (Esiri, 2016; Badiora & Afon, 2013; UN-Habitat, 2008; Alemika & Chukwuma, 2005; Agbola, 2004; Moser, 2004, Igbinovia, 2003). However, the less emphasized reasons for the upsurge in crime in the developing countries, especially Nigeria, include poor urban planning, particularly physical development control (Sanni, 2017). The view has been emphasized by several studies (Alkimim *et al.*, 2013; Brown *et al.*, 2004; Jackson, 2004; Seymour *et al.*, 2010; Wyant, 2008) that the nature, design and development pattern of the neighbourhood's physical environment are as potent in promoting vulnerability and feeling of crime and insecurity are as real as the actual existence of crime itself.

The challenge of rising criminality and insecurity in the country is also not been helped by the seemingly poor performance and ineffectiveness of the police, the body statutorily charged with maintenance of law and order (Alemika, 2013; Chinwokwu, 2013). Several authors (Alemika, 2013; Chinwokwu, 2013; Olatunbosun & Oluduro, 2012; Adebayo & Ojo, 2009) have described the Nigeria Police Force has incapable of addressing the challenge of rising criminality and insecurity in the country as the agency is plagued with several problems including poor training, poor welfare package, inadequate manpower, corruption and poor operational logistics, amongst others. As a result of the seemingly ineffectiveness of the police, several state governments across the country have had to form police/military joint patrol teams which daily traverse the nooks and crannies of the cities, particularly the state capitals, in attempts to maintain law and order and ward of criminal elements. Aside this, many neighbourhoods and households are also deploying unconventional security measures in their areas and homes, including erection of neighbourhood gates, formation of vigilante groups and installation of all manners of iron barricades and fences around their houses respectively (Agbola, 1997, Sanni, 2017).

It is therefore, acknowledged that to create inclusive cities where the poor and the privileged, the strong and the weak in the society can live comfortably, peacefully and happily, requires a collective approach. Enthroning inclusive city growth devoid of threats to lives and property of residents is a collaborative project between the government, groups,

communities and individuals. It requires a redirection of policy initiatives and pragmatic social, economic and physical planning on the part of government, particularly at the state and local government levels and a behavioral shift on the part of the citizenry, who are the ultimate beneficiaries of a better planned, developed and sustained environment. It is against this background that this study examines the role effective urban planning can play not only in reducing crime and criminal opportunities but also in achieving a sustainable and inclusive city growth in Nigeria.

Urbanization, Crime and Crime Prevention

There is no way the menace of crime and criminality will be discussed, particularly in the developing countries today without an ample reference to the impacts of urbanization. While no single factor can be regarded as been responsible for the rising crime trend worldwide, particularly in the developing countries, the influence of unprecedented pattern of urbanization and high population growth rates has been described as very strong (Albert, 1994; Ceccato & Wilhelmsson, 2012; Kamalipour *et al.*, 2014; Marzbali *et al.*, 2012; UN-Habitat, 2007). Many of the urban areas, especially in the developing countries are hotbeds of criminality. The International Centre for the Prevention of Crime (ICPC) (2014) reported that at least two thirds of the inhabitants of cities across the world had been victims of crimes at least once in a five year period.

In Nigeria, the rate of crime occurrence, particularly in the urban centres is increasingly alarming. In the two decades, violent crimes, particularly murder, armed robbery, rape, kidnapping, cultism and lately acts of terrorism have been on the increase and has therefore, made the country apparently insecure (Chinwokwu, 2014; Shopeju, 2007). For instance, the National Bureau of Statistics (2012; 2016) reported amongst others that cases of murder, assault and rape/indecent assault across the country rose from 2063, 13790 and 416 in 2009 to 2861, 16487 and 1788 in 2013 respectively. Cases of kidnapping across the country also rose to an alarming 574 in 2013 from less than 200 in 2009. The cities are particularly the domains of crime and insecurity in many countries. This is perhaps due to the intense level of social and economic interactions that takes place at the city level (Ceccato & Wilhelmsson, 2012). It is therefore, believed that cities cannot aim to be socially sustainable without paying considerable interest and attention to the security of citizens, although it will be extremely difficult to create a totally crime-free environment.

The impacts of urban crime and insecurity are said to be multifaceted and multidimensional (UN-Habitat, 2008). Aside the resultant injury, death and

trauma, crime and insecurity impede foreign investments, contribute to capital flight and brain drain as well as hinder or discourage international tourism. Increasing levels of urban crime and insecurity threatens and sometimes destabilizes social stability and are increasingly becoming major obstacles to development (Fajnzyber *et al.*, 2002). Crime prevalence seriously undermines urban social coherence by eroding residents' sense of safety and security (Onoge, 1988). There is a sort of agreement among urban sociologists that crime impedes development (Ayres, 1998; Glasson & Cozens, 2011; Moser & Holland, 1997). In Nigeria, as in many other parts of the developing world, the upsurge in crime rates has become a major development challenge. It has become sources of serious personal sufferings and huge material loss to many individuals and groups and has therefore, placed enormous burden on the urban social fabrics (Agbola, 1997). It discourages both local and foreign investments, lowers the quality of life, destroys human and social capital, as well as damages relationship between citizens and the states, and has the potential of undermining democracy, rule of law and the ability of the country to promote development (Adebayo, 2013).

The most worrisome dimension of current urban crime occurrence is that studies (Schneider, 2007; UN-Habitat, 2007; Sanni, 2017) have reported that the poor segments of the society are particularly more vulnerable to crime and criminality than the rich and privileged. This is because even within the city crime prevalence has a spatial dimension. This is because while high levels of crime are reported in some sections or neighbourhoods of the cities, the pattern is entirely different in some others. Crime occurred more frequently in the distressed and disadvantaged areas or neighbourhoods of the cities with a high concentration of poverty, unemployment and minority population (Ackerman, 1998; Anselin, 2000; Kershaw & Tseloni, 2005). The situation is such that in many cities of the developing countries, including Nigeria, many neighbourhoods are stigmatized and dreaded due to their relatively insecure conditions. The roles of urban morphology, socio-economic and environmental conditions of the city in crime occurrence and pattern of vulnerability have also been emphasized by some studies (Kamalipour *et al.*, 2014; Marzbali *et al.*, 2012). Therefore, the peculiar conditions and circumstances of the poor communities and neighbourhoods of the cities should be paid deserved attention as part of the campaign for creating inclusive and sustainable city growth across the world.

The need for new and innovative approaches to crime prevention and management, particularly in the urban centres considered more vulnerable, is increasingly being stressed by development analysts, security managers and experts as well as many international bodies. Crime prevention has become an increasingly significant component of many strategies directed at ensuring and promoting public safety and security (United Nations Office on Drugs and Crime (UNODC) (2010). The UNODC observed that different types of crime prevention methods have been developed worldwide and these include crime prevention through social development, community or locally-based crime prevention, situational crime prevention and crime prevention through environmental design, amongst others. Several other forms of urban planning interventions, including slum upgrading, urban renewal and enthroning inclusive city growth process can be encouraged to provide urban safety, particularly for the poor.

In Nigeria, several measures and strategies have been evolved at various levels of governments, communities and individual households to address the increasing challenge of crime and insecurity but not much success had been recorded (Alemika & Chukwuma, 2005). Apart from the occasional deployment of armed soldiers to several parts of the country considered volatile by the federal government, many state governments across the country have formed military/police joint patrol teams which daily patrol the various neighbourhoods of the cities and other identified crime hotspots. Closed circuit television (CCTV) cameras have also been installed in some strategic locations in some parts of the country, notably Abuja and Lagos to monitor movements and activities around. There is also the formation of paramilitary security patrol agencies by some state governments for the purpose of surveillance and information gathering. A typical example is that of Lagos State called "neighbourhood watch".

Various communities and neighbourhoods across many cities in Nigeria are increasingly organizing themselves into vigilante groups to keep watch over their areas, especially at night, while also prohibiting the movement of persons and vehicles within certain hours of the night. Some have also installed gates which are firmly locked at certain hours of the night at all entry points into their streets and neighbourhoods in attempts at limiting both pedestrian and vehicular movements. At the household level, some are increasingly adapting the design of their houses in such a way that intruders would not be able to gain easy entry, while many others are erecting fences around their houses (Abodunrin, 2004; Adigun & Adedibu, 2013; Afon, 2001; Agbola, 1997; Agbola, 2002). Others, especially the affluent and well-placed are increasingly installing CCTV in their houses and engaging the services of private security guards to keep watch. Some others keep

weird looking security dogs, while yet others resort to unconventional means such as charms to ward off people with criminal intents from their homes.

Concept of Inclusive city

The concept of inclusive city was borne out of the apparent neglect, marginalization and exclusion of the poor urban residents, who despite being in the majority, hardly enjoy the benefits of city living in terms of provision of the basic needs and services, including security. Cities are the hubs of several social and economic activities and their importance to national development in many countries has been stressed by several studies (UN-Habitat, 2011). They are the engines of economic growth (Colenbrander, 2016). Crucial to national economic development in many countries are the roles played by many stakeholders both in the formal and informal sectors. The increasing contributions of the informal sector to national economic development in many developing countries have particularly been acknowledged by several studies (Amin, 2002; Blades, Ferreira & Lugo, 2011; Benjamin *et al.*, 2014). However, despite the growing relevance of the informal sector in many countries, the major players in this sector who are in most cases at the lowest rung of the economic ladder are often marginalized as they are mostly excluded from enjoying the benefits city life offers. According to the World Bank, more than half of the world population lives in cities, a proportion expected to rise to 70% by 2050. It is therefore, expected that the cities as they grow, provide as much opportunities as possible to all residents, particularly the poor who are in the majority. The principle behind inclusive city growth is that the poor segments of the cities be involved in all the facet of city governance and their needs and welfare should not only be protected by the multitude of social, economic, spatial and environmental policies and regulations but be accorded priority attention.

The inclusive city is therefore, one that places enormous value on all residents, irrespective of class. It is a city where both the rich and the poor are not only seen as critical stakeholders but also have their needs and welfare, including security, genuinely addressed. In inclusive cities, meeting the basic needs and services of all, including those at the lowest rung of the socio-economic ladder, are central to the governance structure. In inclusive cities, both the poor and the privileged have access to affordable housing and basic services such as water and sanitation, sustainable transportation system and enhanced security. The planning and provision of public spaces for both social and economic uses in inclusive

cities are not discriminatory. The spatial and land-use planning instrumentalities and other forms of physical planning make ample provision for the needs of the poor segments of the society in cities regarded as inclusive the same manner the interests of the rich are addressed. The neighbourhoods and localities where the poor and marginalized lived in the cities enjoy as much benefits of planning and effective management as those of the rich. Of concern in inclusive cities are the social and economic conditions of all, particularly their security, such that no any class of residents suffers from any form of molestation, threat, discrimination, marginalization and exclusion, particularly in the use of public spaces.

Urban Planning and Inclusive City Growth

Urban planning, which is also sometimes called physical planning or spatial planning is by orientation inclusive-driven. It is inclusive because it is non-discriminatory and seeks the comfort, safety, security and wellbeing of the vast majority. Urban planning has been given varied definitions over the years. However, one of the most outstanding was offered by Kebble (1969) who defined it "as an activity concerned with the spatial ordering of land-use both in the rural and urban settings for the purpose of creating functionally efficient and aesthetically pleasing physical environment for living, working, circulation and recreation". Perhaps to further emphasize the inclusive nature of urban planning, Losch (1954) as amplified by Adedibu (1995) described it as an art and science concerned with the balanced opportunities between various sections of the population, and the space available with a view to matching suitable locations with the right events. Physical planning focuses on the safety, security and overall wellbeing of the vast majority, if not all. As a result, opportunities and spaces are created for virtually every lawful and acceptable activity (land-use) of man and in such manner as to enthrone harmony and cohesion.

Spatial planning very much recognized the diversity in the nature of humankind and that their needs and aspirations vary from place to place and are based on different socio-economic standing or status. Therefore, while different sizes of spaces may be earmarked for different activities and groups, it nonetheless caters for the needs of all. In all aspects of spatial planning, particularly land-use planning, facilities provision planning, housing and transportation planning, sufficient spaces are allocated to all in accordance with needs. Spatial planning caters for both the poor and the rich and that is perhaps the reason for earmarking different plot sizes to different needs and based on the principle of affordability. For instance in residential land-use development planning, while size of plots may vary

and are classified based on income or density, every segment of the society are nonetheless allocated spaces. Although the poor in the society may have suffered in the allocation of spaces and provision of facilities in many urban areas, it is not the wish of spatial planning that it is so. There are many principles of spatial planning that are inclusivity compliance.

Spatial planning therefore, as part of measures at driving inclusive growth, allocates spaces both in the rural and urban settings for all lawful social, economic and other needs of mankind, the same way all categories of income are catered for. The principle of public participation is also increasingly gaining prominence in the planning environment, where all segments of the society are not only consulted before development projects and facilities are initiated and embarked upon but have also become crucial stakeholders in their implementation, monitoring and management. Another crucial principle that enthrone inclusive growth is what is regarded as advocacy planning, where planning practitioners can legitimately advocate and champion the rights of the underprivileged or poor segment of the society in the provision of facilities where and when such are not addressed.

Crime Reduction-Driven Physical Planning as Tool for Inclusivity

Physical planning has developed various instruments and design tools not only to ensure safety and security of residents of the various settlements, particularly those living in the urban areas, but also to facilitate inclusive growth. Where these tools and instruments are effectively deployed they have the capabilities to reduce opportunities for criminal activities. These tools include the following:

Crime prevention through environmental design(CPTED):
CPTED has emerged as a design concept adapted and used in the built environment, particularly by architects and physical planners to prevent or minimize opportunities for criminal activities, particularly within residential and commercial areas of the city (Crowe & Zahm, 1994). This concept recognizes the risk of crime within the residential and other neighbourhoods of the city and therefore, evolves design initiatives to reduce such risk. It is concerned about evolving safer and secure designs of both the neighbourhoods and other components of it, including accessibility and buildings. The concept involves the examination of crime problems in a place and the manner in which the various characteristics of the environment promote criminal

opportunities and thereby adapt the design of the building, its site and general location to minimize such risks (Zahm, 2007).

Land-use Zoning: Physical planning as part of measures aimed at ensuring safety, security and inclusiveness often zones the various areas of the city for different uses. This way, activities that are conflicting and likely to impact negatively on others are clearly separated. As a result, while some areas of the cities are designated as solely residential, others have specific uses assigned to them, including open spaces as buffer zones between those with conflicting impacts.

Physical Development Control: As part of measures of promoting safety, comfort, convenience and security of occupants and users of buildings, physical planning where effectively entrenched and institutionalized have several regulations, building codes, byelaws and building construction development control apparatuses which ensure that appropriate spaces are provided for different components and activities within and between buildings. These include appropriate setbacks between buildings and between buildings and roads and all forms of accessibility. This is in addition to regulating spaces for other uses within buildings such as conveniences and open spaces, including density control measures.

Design of Master plans: As part of measures of ensuring sustainable urban growth, physical development planning relies on the formulation and implementation of urban master plans, in addition to other types of physical development plans that may be formulated from time to time, to regulate physical development of the cities. With these physical development plans, haphazard development, overcrowding and obnoxious land uses which create criminal opportunities within the neighbourhoods are prevented and the urban areas become more secured and livable for all segments of the people. Where master plans are evolved and faithfully monitored and implemented it has a capacity to reduce criminal activities and insecurity.

Urban Renewal Programmes and Slum Upgrading: Many blighted areas or neighbourhoods of the cities and those regarded as slums where most of the urban poor are resident are known to be hotbeds of criminal activities and other social misdemeanor, including prostitution and drug related violence. Urban planning measures such as periodic urban renewal programmes are sometimes embarked upon to revitalize these areas and breathe fresh lease of life into them. Under

these renewal programmes, dilapidated buildings and structures which sometimes serves as hideouts to criminal elements are restored, roads are repaired and new ones constructed and other essential facilities such as street lights, drainage system and safe drinking water supply are provided to improve the quality of life of the residents. These measures also go a long way in improving the psyche of the residents, in addition to giving them a sense of belonging and inclusiveness.

Conclusion

In conclusion, it is evident that the creation of inclusive city growth and development anywhere in the world, particularly in the developing countries where urbanization has become a defining phenomenon and where majority of the people are ravaged by poverty, exclusion and marginalization, entails a multiplicity of measures, many of which are social, economic, spatial and environmental in nature. It also include evolving measures and strategies that will lead to the improvement in the quality of life of residents, particularly the poor who are mostly marginalized and discriminated against, by many government policies and regulations. Attempts at evolving inclusive city growth would be fruitless as long as the vast majority of the residents feel unsafe, insecure and unable to pursue their legitimate means of livelihood in any section of the city they choose to live. Urban planning measures where effectively carried out and implemented, aside aiding inclusive growth also have the capabilities to minimize opportunities for criminal and violent conducts and activities, which have becomes the bane of many urban areas, particularly in the developing countries.

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CHAPTER 23

Critique of Energy Poverty Measurement and Metrics: The Way Forward

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Introduction

Energy poverty and fuel poverty are sometimes used interchangeably by some authors, some scholars consider energy poverty as an idea highlighting energy problems in developing countries, while fuel poverty is seen to be prevalent in the Organization for Economic Cooperation and Development (OECD) countries (Schuessler, 2014). British definition of fuel poverty from 2000/2001 is expressed as “adequate standard warmth” or not being able “to keep a home warm at reasonable cost” (Schuessler, 2014). Boardman (2009) offered a broader definition according to which a household is energy poor if it cannot attain adequate energy services for less than 10 percent of its net income. Simply said, energy poverty is a term used to describe poverty that exists as a result of lack of access and consumption of energy services

Access to energy is germane to the overall development of a nation. Energy access is at the core of many global development challenges, including education, food security, climate change, health, inequality and poverty (Nussbaumer et al., 2011). Najam et al., (2003) pointed out that for one to enjoy qualitative living standard, healthcare service, adequate shelter, employment, education and water access, energy is essential. Although energy itself is not a basic requirement of man; it is a requisite tool for the achievement of man’s basic needs. The nexus between energy poverty and the millennium development goals have been emphasised and discussed exhaustively in literatures (Modi et al., 2005 and Nussbaumer et al., 2011) Existing actions developed in respect to energy poverty eradication is not all encompassing both in scale, pace and indicators, it is in view of this trend that (IEA, UNDP and UNIDO 2010) posited that if the current trend continues, more people will fall into the energy poverty cadre (without access to modern energy). Redirecting the energy poverty pathway requires concerted effort and global political commitment that goes beyond mere abstraction and set out actions and associated benchmarks (Bazilian et al.

2010). In the last two decades, the international community has put forth a goal of providing universal access to modern energy services, but this effort may be hampered due to current lack of quality data.

In view of the burgeoning arguments on the importance of energy access to various aspect of social, economic and environmental development, there is need for the development of effective methodologies and indicators for the monitoring and reporting of progress towards energy poverty eradication especially in the developing countries. This study therefore reviews specific metrics and analysed the strength and weakness of some methodological models of energy poverty developed by scholars and international organizations.

Energy Poverty Measurement

A fundamental question that must be answered when it comes to energy poverty measurement is “What are we to measure?” It is important to know that scholars have agreed that measuring energy poverty should reflect the level of energy services enjoyed by households, business (Lauren, 2017) and other public community institution such as schools, health centres and civic centres. This agreement is reflected in the goal of UN secretary general Advisory Group on Energy and Climate Change (AGECC) “a basic minimum threshold of modern energy services for both consumption and productive uses”. AGECC (2010) further suggested that the modern energy services must be reliable affordable, sustainable and free from green house gases.

The fact that energy poverty can be seen through the lens of energy services such as lighting, cooking, space heating, cooling, refrigerating, processing, mechanical power and communication is an indication that people do not consume energy directly, but needs energy in virtually every aspect of human endeavour to alleviate poverty and economic development (Lauren, 2017). The agreement of scholars in principle that energy poverty is lack of energy services, does not translate to easy measurement of energy poverty. This is because energy poverty cannot be measured in one unit.

Measuring energy poverty is a difficult task. It is a private condition, being confined to the home, it varies over time and by place, and it is a multi-dimensional concept that is culturally sensitive (Simcock et al., 2016). The choice of measurement approach is also contingent on whether energy poverty incidence is to be measured at the pan- European, national or regional level for monitoring and benchmarking purposes, or whether a finer grained dataset is needed to identify energy poor households at the

local scale for policy delivery. It is further shaped by the availability of data and resources to undertake additional empirical research, and prevailing policy priorities in terms of social groups considered most in need/deserving of support.

Energy Poverty Metrics

Over the years, quite a number of metrics and methodologies have been developed both within and outside the energy sector (Nussbaumer et al., 2011) from which ample knowledge on energy poverty measurement can be drawn when developing a new metric to measure energy poverty. Energy poverty metrics are either *uni or multidimensional*; that is single indicator base metric or multiple indicator base metric.

The single indicator based metric of energy poverty metric provides an unbiased, powerful message that is easy to interpret in relation to one specific dimension or variable of study. Single indicators are straightforward to handle (Nussbaumer et al., 2011). However, studies have shown that single indicator only provide a narrow picture of the subject matter (energy poverty). Modi et al (2005) argued that single indicators are usually not suitable for less tangible issues such as poverty and sustainable development; it is perhaps appropriate in some cases e.g measurement of economic activities with GDP. Energy poverty like general poverty is a complex issue that is multi-dimensional in its true nature. To get a better understanding of energy poverty, there is need for a holistic framework that can capture various elements. However, using large number of indicators to evaluate changes has not proven to be an easy task.

Composite indices are single value derived from number of variables; on the premise of an existing model that seeks to present an aggregated value of a concept (Bazillian et al., 2010). Composite indices are widely used as an alternative to uni-dimensional (single indicator). The need for aggregated information for easy and convenient analysis underscores the use of composite indices. Composite indices are easier to interpret than trends in a number of separate variables. Composite indices have proven to be more convenient and easy in monitoring and reporting performance especially between countries. If evaluated with the same methodology at regular time intervals, they provide information on changes across different units and time, thereby allowing trends to be identified (Bazillian et al., 2010). The composite indices is not without weakness or drawback; which include reduction of variables to a single measure by combining variables. When the analysis is simplistic or poorly constructed, composite indices can be misleading in terms of policy. Saisana and Tarantola, (2002) provide

a detail analysis of merit and demerit of composite indices in the measurement of phenomenon.

Several studies have highlighted the lack of theoretical underpinning of a number of composite indices (OECD, 2003; Munda and Nardo, 2005), focusing on issues related to the aggregation model and/or the weightings in particular. However, many believe that composite indices provide a useful statistical summary of particular issues. Sharpe (2004) analysis of the non aggregators and aggregators suggested that the former claims that aggregation and weighting is arbitrary, while the latter point to the potential to attract media and policy makers. Example of the common composite indices metric of energy poverty is the Multi-dimensional energy poverty index (MEPI), The Total Energy Access (TEA) and Multi-tier Energy Poverty Measurement approach.

Energy Poverty Measurement Approach

Several methodologies (MEPI, EDI, TEA) have been developed for the measurement of energy poverty in developed and developing countries. Eight types of metrics can be distinguished that are typically discussed in the context of energy poverty measurement (Pachauri and Spreng 2011 and Khandker, Barnes and Samad 2010). Five of the metrics actually reflect an (absolute) energy poverty concept that is desired in the context of this study. The minimum energy consumption threshold approach as proposed by Modi et al. (2005) and the UN Secretary-General Advisory Group on Energy and Climate Change (UN-AGECC 2010), second, an income-invariant energy demand approach introduced in Barnes, Khandker & Samad (2011), third the Multidimensional Energy Poverty Index (MEPI) by Nussbaumer, Bazilian & Modi (2012), fourth the Total Energy Access (TEA) standard presented in Practical Action (2012) and fifth the multi-tier energy poverty measurement approach by Nicolina Angelou (2014) for Energy Sector Management Assistance Programme (ESMAP). Therefore, this study undertakes a review of the strength and weakness of the five highlighted methodologies below;

- I. Energy poverty line approach,
- II. Estimate of minimum energy require to satisfy basic human needs
- III. Multi-dimensional Energy Poverty Index (MEPI)
- IV. Total Access Standard (TEA)
- V. Multi-Tier Energy Poverty Metrics (MTEP)

The Energy Poverty Line

This measurement approach is deduced from the conventional income or expenditure poverty measure. Energy poverty is determined by estimating

energy use as a function of income or expenditure and by estimating the average level of energy use that correspond to the amount of expenditure or income specified by the official income or expenditure poverty line (Pachauri, and Spreng, 2003). Although this approach to energy poverty measurement is easy to compute and useful in determining headcount of energy poverty, it is often criticized on the grounds that it only provides a single energy or fuel poverty line and does not provide an insight by way of suggesting the factors responsible for the low spend or low consumption by households (Jain, *et al.*, 2015). The energy poverty line approach does not consider the efficiency of the energy consumed by the households or enterprise; hence, the approach is considered too narrow to present the multiple dimensions of energy poverty.

Minimum Energy Require to Satisfy Basic Needs

The minimum energy requirement approach was developed by Modi *et al.*, 2005 in collaboration with AGECC. This approach to energy poverty measurement uses estimate to determine the amount of energy required to satisfy basic need (Pachauri & Spreng, 2003; Practical Action, 2010). Unlike the energy poverty line approach, two (2) energy poverty line must be exceeded; the first is the minimum amount of final energy used in form of modern fuel and second is the minimum amount of electricity for all other services excluding heating and mobility (Jain, *et al.*, 2015). This is in response to the criticism of the energy poverty line approach, which is silent on the efficiency of the energy use.

The energy poverty line and minimum energy required estimate approach are uni-dimensional and normative in nature. Ascertaining the minimum level of energy required for basic needs is the problem with setting the normative threshold, which is usually due to the significant inter-country and regional differences in cooking practices and heating requirement (Jain, *et al.*, 2015). Khandker, *et al.*, (2010) argued that energy requirement and consumption is location specific which is due to difference in climatic condition and cultural practices. The minimum needs for physical quantities of energy (for specific tasks) are chosen somewhat arbitrarily. In the opinion of Nussbaumer *et.al*, (2011), modern energy services have a higher service quality, hence it reduce household expenditure and increase resource efficiency simultaneously. It therefore implies that as technology improves in energy wise, these metrics (and thresholds) require to be updated constantly and often lose their utility over time.

In the bid to overcome the drawback of these two approaches, Khandker, *et al.*, (2010) empirically determine an energy poverty threshold based on

estimation of final and end-use energy consumption. The threshold is defined as the income decile where energy consumption is significantly different from the consumption in the first decile. In this approach, the threshold represents the point at which energy demand becomes insensitive to income changes as threshold below the point can only consume a bare minimum of energy (Jain, *et al.*, 2015). This metric provides the basic understanding of the difference that exist between income and energy poverty. Nonetheless, it is often criticized for not providing insight into the factors that keep households from meeting the threshold energy consumption. Furthermore, the approach fails to highlight that energy consumption is elastic even among the poor (Bensch, 2013).

Multi-Dimensional Energy Poverty Index

The availability of datasets that provide necessary data for both the developed and developing countries coincided with the notion of poverty as a multidimensional phenomenon (Deaton, 2010). Multi-dimensional Energy Poverty Index (MEPI) is a child of the Multi-dimensional Poverty Index (MPI) and it was presented by Nussbaumer, (2012). This approach proposes dual cut-off instead of a single poverty cut-off to define threshold in two steps; weight is attached to each sub-dimensions so that the final headcount of energy poverty that is defined incorporates the importance that is attached to all each dimension. The authors were of the opinion that attainment in all the six sub-dimensions are important and are expressed as dummy equalling one (Jain, *et al.*, 2015).

MEPI has been criticized on the basis that the proxies used in defining energy access quality in this approach are not robust enough. Jain, *et al.*, (2015) argued that possession or mere consumption of a quantum of these assets does not translate to energy access for households. Just like It was noted by Kandeh Yumkella, the then Director-General of the UN Industrial Development Organization, and UN Secretary-General Ban Ki-moon's that "*the provision of one light to poor people does nothing more than shine a light on poverty*". Therefore, it can be said that energy access transcends mere possession of modern energy assets and consumption of small quantum of energy. Fuel stacking which is a common phenomenon especially in developing countries is not fully accounted for or penalized.

Total Energy Access Standard (TEA)

In the light of the criticism of MEPI, an alternative multi-dimensional approach was developed by the Practical Action (PA, 2012) in United Kingdom (UK). This approach was developed in cooperation with the International Energy Agency (IEA), World Bank, The Global Alliance for

clean cooking stoves and the National Development Cooperation Agencies. This approach is called the Total Energy Access Standard (TEA). The TEA correspond to the headcount ratio of energy poverty, the major point of departure from MEPI is in intensity as it considers the intensity of deprivation as irrelevant. Even with the numerous dimensions captured in the TEA, some areas exist with intractable field data and some areas exist where the definition is just to define the absolute bare minimum threshold of energy consumption.

Jain, et al., 2015 argued that even though TEA is dimensionally extensive, it has a binary view of energy access. Identifying the intensity of energy provided by a device can be difficult, as it involves on field measurement and mapping, however, TEA provides an avenue for classifying energy users on spectrum of energy access beyond defining who is in the lowest tier of energy access. Jain et al., (2015) also pointed out that TEA provides a binary view of energy access, even though it provides an extensive dimension of energy access. This implies that TEA measures energy access in terms of "having access" or "not having access" even though it captures several dimensions of energy poverty.

Multi-Tier Energy Poverty Index

The recent attempt at understanding the subtle difference in energy poverty is that of the Global Tracking Framework (GTF). The aim is to develop a multidimensional approach for measurement of energy poverty. They combined multi-dimensionality of energy poverty with multi-tiers. This implies that all the facet of the community is captured in terms of the households or community energy access, productive energy access for agricultural processing and enterprises for economic activities. The multi-tier energy poverty measurement approach was developed by Nicolina Angelou who is an Energy economist for Energy Sector management Assistance Programme (ESMAP) in 2014. This method of energy poverty measures energy poverty based on energy access as a continuum of improvement, based on the performance of the energy supply which includes; Capacity, Duration/Availability, Reliability, Quality, Affordability, Legality, Convenience, and Health & Safety. It is a composite energy poverty approach and it is expressed mathematically as $\Sigma(P_i \times K)$. The multi-tier energy captures all the dimensions of energy poverty from different tiers of the community. Multi-tier framework does not only measure the consumption of energy services, but also measures the quality, reliability, affordability, safety and adequacy of energy access. The method has been applied by ESMAP in five countries namely; DRC, Uganda, India, Ethiopia, and Malawi and has since been completed. The

multi-dimensionality and the composite measurement approach of the multi-tier energy poverty measurement approach is a good improvement to the existing multidimensional energy poverty measurement approach.

In the submission of Bensch (2014), he argued that MEPI and TEA are two composite indices which deliver quite distinct results mainly depending on normative judgment inherent in the two indices. MEPI allows for a certain degree of deprivation (e.g. a household maybe energy non-poor even without having neither a fridge nor a television set), while the TEA is far more restrictive in that everybody is considered energy poor who is deprived in any of the six sub-dimensions of the TEA. The multi-tier framework underlying *Beyond Connections* will prove to be a tool for measuring and goal setting, investment prioritization, and tracking progress. It will help us capture the multiple modes of delivering energy access from grid to off-grid and to the range of cooking methods and fuels. It will also help reflect the contributions of various programs, agencies, and national governments toward achieving the sustainable energy for all (SE4All) goals.

Summary

Going by the foregoing analysis, it can be observed that a giant stride has been made towards the development and application of energy poverty metrics for better and efficient estimation of energy poverty in both developed and developing countries, especially in the last two decades. However, energy poverty measurement metrics and methodologies have been criticized on several grounds. Some of the critical criticisms of the metrics are: inability of the methods to capture the efficiency of the energy options (cleanliness), climatic variation, over-reliance on indicators of energy poverty that preclude energy access, the binary nature of energy access measurement, intractable field data and lack of absolute bare minimum energy threshold for energy consumption. The metrics have also failed to capture the quality and efficiency of energy access which is an important indicator of energy access.

Conclusion and Recommendation

Having critically analysed the strength and weakness of the five identified energy poverty metrics, the study concluded that energy poverty metrics are defective on several grounds depending on the conceptualization. Therefore, in order to develop a more effective and generally acceptable metric for energy poverty measurement, the critical criticisms of the metrics must be addressed. Attention must be paid to the efficiency of the type of energy consumed, the socio-economic and climatic determinant of

energy poverty must be accounted for, energy access must be seen as a continuum and not binary access, and data required must not be intractable. Even more important is the fact that attention must not be focused on issues that preclude energy access alone, issues on the quality, duration, affordability and efficiency of access must also be incorporated into the energy poverty metrics. This will help to account for the multi-dimensionality of energy poverty from all tiers of the community fabric.

To make sure that tomorrow's cities provide opportunities and better living conditions for all, it is essential to understand that the concept of inclusive cities involves a complex web of multiple spatial, social and economic factors. Inclusive cities requires the provision of necessities such as housing, water, sanitation and energy at affordable prices for all asundry. Therefore, effective estimation of energy poverty is germane to the eradication of energy poverty and consequently to the attainment of the inclusive city goals. The study therefore recommends that consistent measurement frameworks and regular data collection systems on energy poverty should be developed. Metrics used for designing and evaluating energy access programmes should be widened. Indicators that adequately assess needs and describe living conditions of targeted beneficiaries are required.

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