The Effect of Climate and Culture on Housing among Low Income Groups in Lagos, Nigeria

Akinwolemiwa feyikemi and Gwilliam Julie

Welsh School of Architecture, Cardiff University

Keywords: V.G.S Vertical Greening Systems, L.I.G: Low Income Groups, Housing, Climate change, Culture

Abstract

The Low Income Group (L.I.G) in Lagos, Nigeria represents about 70% of the 18million population of the state. They are an important part of the economic activities in the state, with the bulk of public transportation and informal trading being undertaken by these groups.

Housing, as the second most important human need after food has a profound influence on the health, efficiency, social behaviour, satisfaction and general welfare of the community. Thus, the provision of comfortable housing for the L.I.G has the potential to result in a significant benefit to the whole society as well as having a direct impact on the L.I.G. psyche.

This paper seeks to present a review of the current housing conditions of the L.I.G based on previous studies of the largest slum areas within the city. In particular the implication of having extended family members cohoused, a fundamental cultural phenomenon that typically leads to widespread overcrowding, is discussed. Further, a study of the potential effect of global warming on comfort conditions within the houses is discussed, also drawing from past studies.

Finally, the potential that Vertical Greening Systems might have in helping to upgrade present living conditions, especially in improving thermal comfort are analysed.

Considering the concept of sustainability, the built environment is responsible for almost 40% of the global emissions. What can be defined as sustainable or eco-architecture represents an attempt to respond to global environmental problems and to reduce environmental impacts due to building and housing industry which includes the exclusion of natural resources, the emission of CO2 and other greenhouse gases’, (Perini, 2011).

INTRODUCTION

Low income groups in Lagos, Nigeria (See Plate 2) represent about 70% of the total population in the city (Akinmoladun, 2004). UNDP (2008) estimates that 51% of men and 54% of women resident in Lagos survive on less than US$1 a day, with their average income being approximately N15, 000 a month (£55) (Aluko, 2004). These groups, also referred to as the ‘urban poor’, are further described by Olotuah, 2005 ‘These are the urban poor who are subjected to a life characterized by precarious conditions of lack of nutrition and health, little or no material possessions, substandard housing and a generally degraded environment. Their housing does not ensure dry shelter, safe water supply, drainage, sewerage and refuse disposal, as well as access roads. The houses constitute a health risk to its occupants’. 

LOCATION OF LOW INCOME GROUPS IN LAGOS


Plate 3: Location of Low income groups in Lagos Nigeria, Source: Lagos State Official Website; Accessed Feb 2013.
The typical occupation and economic importance of LIG in Lagos will now be discussed in order to place this paper in an appropriate context.


The Low income groups also known as the ‘Urban Poor’ largely secure their income through “informal sector employment”, especially in Home Based Enterprises, also known as Household enterprises or unincorporated enterprises. These enterprises are owned by households and can be distinguished from corporations and quasi-corporations on the basis of their legal status and the type of accounts they hold. They are usually run from their homes or within the vicinity, reducing associated costs such as transportation, rents (Lawanson, et al, 2012). Lagos State Government (2004) estimates that 50% - 75% of the population are employed within the informal sector. Only about 20% of them are employed in the formal sector, frequently this is due to lack of educational qualifications (HBEs) are important in times when formal wages diminish or cease and enterprises are started in the only place available (the home). According to Lawanson et al (2013). The advantages of HBEs for the low income groups include;

The ability to maintain an enterprise at little overhead cost

1. To make use of household resources, especially space and utility connections. Indeed, the home provides the ultimate environment for trading off resources between domestic and productive activities;
2. To make effective use of time and money particularly by avoiding travel to work;
3. To make effective use of social and human resources, particularly relatives and friends in the enterprises in exchange for small sums of money or benefits in kind; and to enable women to have productive work even in societies where their movement and social interaction are restricted”.

The interest in financial savings is increased among these groups due to the limited finances generated with theses economic activities.

Informal sector employment is a necessity survival strategy especially in many countries that lack social safety nets such as unemployment insurance and effective pension schemes (Yasmeen, 2001). Commercial activities are very strong in the city and are carried out at both formal and informal levels (Abiodun, 1993). Typical informal sector employment is found in Lagos for the LIG with examples illustrated in Plate 5 & 6 below. Such work is irregular, in micro-enterprises and is typically low paid. Through such enterprises, the Lagos
LIG, organize savings and loans group so as to gather investments in housing and business and produce and sell goods and services to each other and the bulk of the population within the city. It can be seen therefore that the LIG supports the city as a whole, through activities including: hawking, selling of cooked food, raw farm produce and other minor household items.

Plate 5: informal sector employment i.e. hawking Source: Lawanson et al, 2012: Accessed May 2013

Plate 6; informal sector employment i.e. fish mongers Source: Lawanson et al, 2012: Accessed May 2013

In the study carried out by Lawanson and Olanrewaju in 2012, among 31 selected neighbourhoods with 394 respondents in 16 local government areas that make up the Lagos Metropolis, The survey intended to critically examine the phenomenon of Home based enterprise in selected low income enterprise The results revealed a number of trends common with most low income neighbourhoods . Data was obtained by the administration of structured questionnaires and analysis was done by both parametric and non-parametric methods.

Random sampling of 394 home based enterprises was carried out; the results have been broken down into subtopics to give an overall view of these neighbourhoods. The study took a total of 3 months, and it cut across a number of Low income group areas. Thus, a wide range of responses was gotten, and an opportunity for comparison was available.
Households of approximately 7-9 made up about 15.91% of respondents. The highest number of occupants was 4-6 people. Larger households of more than 10 people comprised of 3.78% of all the respondents and were particularly evident in neighbourhoods like Ajegunle (the largest slum area in Lagos) and Mushin. This result is evident in most low income households within the state, overcrowding in houses are very common.
<table>
<thead>
<tr>
<th>Variable</th>
<th>N=354</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly income from home enterprise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ N7,500</td>
<td>97</td>
<td>24.64</td>
</tr>
<tr>
<td>N7,500 - N15,000</td>
<td>115</td>
<td>29.21</td>
</tr>
<tr>
<td>N15,000 - N30,000</td>
<td>94</td>
<td>23.59</td>
</tr>
<tr>
<td>N30,000 - N60,000</td>
<td>61</td>
<td>15.43</td>
</tr>
<tr>
<td>≥ N60,000</td>
<td>27</td>
<td>6.85</td>
</tr>
<tr>
<td>Monthly income from other sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ N7,500</td>
<td>51</td>
<td>12.95</td>
</tr>
<tr>
<td>N7,500 - N15,000</td>
<td>60</td>
<td>15.24</td>
</tr>
<tr>
<td>N15,000 - N30,000</td>
<td>51</td>
<td>12.95</td>
</tr>
<tr>
<td>N30,000 - N60,000</td>
<td>21</td>
<td>5.33</td>
</tr>
<tr>
<td>≥ N60,000</td>
<td>10</td>
<td>2.54</td>
</tr>
<tr>
<td>Other income source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office Job</td>
<td>82</td>
<td>20.83</td>
</tr>
<tr>
<td>Inheritance</td>
<td>38</td>
<td>9.65</td>
</tr>
<tr>
<td>Rent</td>
<td>17</td>
<td>4.32</td>
</tr>
<tr>
<td>Income from Abroad</td>
<td>65</td>
<td>16.51</td>
</tr>
<tr>
<td>Cooperatives/Thrift</td>
<td>98</td>
<td>24.89</td>
</tr>
<tr>
<td>Other family income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>272</td>
<td>69.06</td>
</tr>
<tr>
<td>Children</td>
<td>69</td>
<td>17.53</td>
</tr>
<tr>
<td>Relatives</td>
<td>53</td>
<td>13.46</td>
</tr>
<tr>
<td>Possession of assets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>213</td>
<td>53.79</td>
</tr>
<tr>
<td>House</td>
<td>210</td>
<td>53.03</td>
</tr>
<tr>
<td>Car</td>
<td>119</td>
<td>30.05</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>41</td>
<td>10.35</td>
</tr>
<tr>
<td>Generator</td>
<td>257</td>
<td>64.89</td>
</tr>
<tr>
<td>Possession of household items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioner</td>
<td>14</td>
<td>3.53</td>
</tr>
<tr>
<td>Electric Cooker</td>
<td>123</td>
<td>31.05</td>
</tr>
<tr>
<td>Deep Freezer</td>
<td>182</td>
<td>45.96</td>
</tr>
<tr>
<td>DVD Player</td>
<td>335</td>
<td>84.60</td>
</tr>
</tbody>
</table>

Figure 2: Summary of result of the financial study of Low income groups in Lagos by Lawanson et al, 2012, accessed January 2014

From the table above, the major variables tested here are possession of basic assets i.e. car, motorcycle, ownership of land or house. Data was also gathered on the number of additional income earners in the family as well as number of streams of income. Incomes from home enterprise and other sources are also gathered. It is revealed that about 49% of the respondents rely solely on their home enterprises. The modal monthly income from home enterprises is N7, 500 – N15, 000 (£29-£48). This accounts for about 29.21% of respondents. With 53.85% of respondents earn less than N15, 000 (£48) monthly from their home enterprise, while 24.64% earn below the national minimum wage of N7, 500 (£29), this category of people automatically fall under the ‘absolute poor’ category. In Lagos, the average earning for a single adult is 48 pounds per month (N15, 000). (Lawanson et al.2012).

It can be seen that the principal needs for the LIG in Lagos therefore survival, from day to day. The L.I.G are limited in their financial capabilities and, therefore any opportunity for improved environment must be designed to have low initial costs as well as a clear or even obvious pay back in both financial and environmental performance terms.

**Current Climate Comfort and Culture:Effect on Low income Groups in Lagos, Nigeria**

Further challenges associated with the housing environment for LIG in Lagos is provided by the tropical climate, the housing morphology and cultural considerations. These will now be discussed in turn.
**Climatic Considerations:**

The climate is characterized by high ambient temperatures and solar radiation, a combination of these and other factors often cause thermal discomfort in buildings. (Ojebode and Gidado, 2012). Ojo et al (2000) also emphasized that Lagos State, which consists of large areas of lowlands is very vulnerable to the impacts of climate change and sea level rise. This is due to the State characterized by low lying areas, most of which are below 41m

In the context of climate change, defined by the IPCC (2007) as a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period typically decades or longer, such challenges as are presented by the climate are set to increase. Studies have shown that climate change will be global, likewise its impacts, but the biting effects will be felt more by the developing countries, especially those in Africa, due to their low level of coping capabilities (Nwafor 2007; Jagtap 2007 cited in Odjugo, 2010). Nigeria is one of such developing countries.

For Lagos the climate challenges are further exacerbated by the existing, and likely worsening urban heat island effect. UHI phenomenon can cause air temperature in the cities to be 2-5°C higher than those in the surrounding rural areas mainly caused by the amount of artificial surfaces (high albedo) compared with natural land cover (Taha, 1997 cited in Perini, 2011). Lagos lies on the gulf of Guinea, along the Bight of Benin Lagos state has a land area of about 356,861 Hectares (3568.6km²) representing only 0.4% of Nigeria’s land area, (Lagos State Government Official Website) 17% of the total land area consists of lagoons, creeks and waterways (Balogun, Odumosi and Ojo 1999), cited in Ilesanmi (2010, p.10). Thus, the effect of UHI is enormously felt with overheating due to overpopulation on a small area of land.

**Housing morphology among low income groups**

Housing reflects the cultural, social and economic stance of any given society (Olukayode, 2003 et al cited in Gambo, 2012) the quote by Mandelker cited in Akinmoladun, 2004 explains housing as, “being more than physical structures: housing has become a subject of highly charged emotional content: a matter of strong feeling. It is the symbol of status, of achievement, of social acceptance. It seems to control, in large measure the way in which the individual, the family perceives him/itself and is perceived by others”. It encompasses the totality of the environment and infrastructure which provide human comfort, enhance people’s health and productivity as well as enable them to sustain their psycho-social or psycho-pathological balance in the environment where they find themselves (Afolayan, 2007). Quality housing is one of the litmus test of a developed society. This is because a house goes beyond provision of mere shelter; it is a place where people recuperate, rest and bond with family. Despite the acknowledged importance of housing to man, there are several housing problems throughout the world, and particularly in developing nations. These problems are both qualitative and quantitative in nature, manifesting in different shades of societal ills and decadence (Dogan, 2009 cited in Aduwo, 2011).

The most popular form of Urban Housing for the LIG in Lagos is the double banked Apartment block with rooms or flats on two sides opening to a common corridor leading to a stairwell. The corridor is generally narrow with poor lighting and ventilation. Cross ventilation is difficult to achieve within the flat because the door to the corridor is always
locked for reason of security and windows do not open, also for security reasons. (Olusanya, 2012). This is also called ‘Brazilian style housing’ or the more informal term called ‘face me I face you’. It is not unusual to find an average of 6 people in an 18m² space. This is partly due to profit maximization by the Landlords or accommodating friends and relatives, thus leading to overcrowding in these houses.

The floor plan above shows the typical Layout of Low income houses on a standard Plot of Land (18mx34m). The long narrow corridor is usually poorly lighted; the bathroom and Pit Latrine can be shared by almost 50 people in extreme cases. Absence of cross ventilation causes overheating and great discomfort, while, mechanical cooling devices are usually inefficient due to poor electricity supply .The corrugated roofing sheets are cheap to install, , but also contribute directly to overheating in the interior spaces, as heat gain is directly and efficiently conducted to the interior space. The buildings are usually built with concrete block work or wood for the extremely poor. The concrete block walls absorb heat during the day, leading to overheating in interior spaces through the latter part of the day and

Figure 3: Morphology of low income housing in Lagos by olusanya, 2012, accessed January 2014
through the night. With increase in temperature due to global warming, the existing discomfort in interior spaces will only worsen.

Thus, any means of achieving thermal comfort that are both environmentally friendly and financially saving will be of immense help to these groups. VGS has the potential to relieve the financial stress of attaining thermal comfort among these groups. This is due to non-demand for electricity by this system it is ideal to ensure that the dwellings they can afford are as comfortable as possible without stress on their meagre finance. By comfort, it means upgrading the slums to provide an environment where recuperation is efficient.

**Cultural considerations**

Cultural considerations in housing is a broad topic, however, two aspects of culture affect housing that are discussed in this paper are:

1. Communal living which often includes extended family members and friends. This is often due to the culture of a sense of community and belonging often associated with the average Nigerian.
2. Deliberate overcrowding my landlords to maximize profit for rents.

As analysed by Ahianba and Dimuna, 2008, the implications of overcrowding, coupled with the global warming effects are discussed below:

This arises from over population and insufficient accommodation. In Lagos, it is not unusual for a household to consist of external family members. This is due to the close family unit that characterizes a typical Nigerian. Thus, houses designed to accommodate 4 people may in actuality accommodate up to 10 people in certain cases leading to overcrowding. Overcrowding is a problem that has social and health effects.

Asbell observed in 1975 that ‘Crowding is a specific happening, clinically observable and definable. In simplified terms crowding occurs when organisms are brought together in such a manner and numbers as to produce physical reactions of stress. Important among these reactions is steeped up activity of the adrenal glands. When these reactions too stress are wide spread and sustained, they are followed by physical weakening, sometimes rage and violence of extreme passivity, a rise in sexual aberrations and a breakdown of orderly group behaviour. What may follow is a tidal wave of deaths, ending when the population is no longer crowded’. Overcrowding is a norm in low income housing.

Furthermore, the wider implications of overcrowding are numerous, ranging from non-compliance, with building laws to substandard housing conditions. Below are a summary of the implications of overcrowding on a low income residence.

1. **Noncompliance with building Bye-Laws and Regulations**

The Consequences of non-compliance with building bye-laws and regulations are already manifesting and are being felt in our urban centres.

The town planning requirements for 3m setback in between houses and 6-9m setback from roads have been grossly flaunted. The danger in violation of setback standards is that in the case of fire outbreak, it is difficult for fire vehicles and men to gain easy access to the building. This could result in deaths and loss of valued properties. Another related problem is the issue of density. The acceptable site coverage is 50% for residential buildings in high
density area and 33% for low density areas, but these are not complied with especially in high
density areas where greedy developers built as much 70% of the site. The consequences are
overcrowding and inadequate parking spaces (Ahianba and Dimuna, 2008)

Urban poverty finds expression in an environment characterized by high densities of
buildings, the crowding of large numbers of people into those buildings, lack of space for
open air living between houses, poor health, substandard housing, and acute environmental
and sanitary problems (Olotoah, 2009). Asojo, 2010 stated that Squatting is a major problem
in most African Urban Centres where the rate of migration far exceeds states
resources for public housing construction.

2. Poor ventilation
Izomoh and Olomu in 2005 noted that most residential buildings have been planned, designed
and constructed with little or no consideration for the following:

- Thermal comfort through the process of cross ventilation
- Reduction of the entry of rain and moisture into the buildings which results in
  breeding of various kinds of fungi that contaminates food items and cause
  breathing problems
- Outdoor living possibility within the compounds in the urban area.

As a result of poor ventilation in most buildings, people sleep outside with their mats for
fresh air especially when the weather is extremely hot. The reason for this is because their
houses are either not cross ventilated or are blocked by another house or fence due to
improper planning of the environment. (Ahianba and Dimuna, 2008)

**Thermal Comfort Considerations**

The overcrowding, non compliance with building codes and poor ventilation conspire in the
LIG housing to produce intense overheating. This in turn results in widespread thermal
discomfort: resulting in the following implications for LIG occupants:

- **Physiological Impacts of Overheating**
  - Excessive sweating, dizziness, Breathing difficulties, Stroke are just some of the
    physical manifestations of overcrowding and overheating of interior spaces. According to
    Ahianba (2008), the lifespan of anyone exposed to excessive heat for too long is shortened. It
    also has adverse effect on the skin, internal organs and physical well-being which may
    include their fertility. Resorting to the use of mechanical cooling devices to achieve
    comfortable interiors has resulted into huge amount of money being spent on the erratic
    power supply that is a norm in Lagos state. Acquiring Generators as an alternative has now
    resorted to being a necessity. Thus, their meagre income is further depleted by powering the
    generator and also contributing to global warming.

- **Psychological impacts**
  - Poor Concentration, irritability, Aggressiveness are some of the psychological
    manifestations of overcrowding. The Norm is to have an average of 4 -6 occupants in a
    12sqm room. This results in a feeling of helplessness, lack of privacy and general discomfort.
    Indoor air quality is severely compromised. (Ahianba and Dimuna, 2008)

- **Mental impact**
Sleeplessness is a challenge among the low income group, due to a combination of overheating, overcrowding and general discomfort. This affects mental productivity especially among school children. The bulk of this group operate public transportation systems in which alertness is a key requirement for a safe operation, however, accidents are not uncommon due to the appalling conditions majority of the public transportation workers live in.

It is therefore argued here that one of the major challenges of low income housing is overheating (implication of climate change and global warming) and overcrowding. Currently, the challenge afforded by the former, is frequently addressed through the use of mechanical cooling and ventilation, although this is significantly limited due to financial affordability as well as occupants sleeping outdoors, where their personal security is at risk. It si argued here that Vertical Greening Systems, present apotential opportunity, providing passive cooling that might be embraced among these groups if this potential benefits can be evaluated and well presented This is due to the numerous benefits associated with it ranging from vertical farming, aesthetics, enhancing thermal comfort etc. The VGS system can be seen as an aspect of urban renewal for existing houses. VGS is also known for its ability to enhance thermal comfort interior spaces. This is due to the transpiration of plants used in these systems.

**Future Climate Comfort and Culture**

Climate change is a continuous phenomenon. Countries like the UK are beginning to ensure strict protocols in the built environment so ensure reduction in carbon emissions. Kyoto agreement was signed in parts of Asia to ensure reduction in the contribution of global warming; however, decisive actions like these haven’t been recorded in Nigeria. Therefore, urban heat island effect is becoming more prominent in commercial centres like Lagos; the implication is overheating in interior spaces leading to discomfort. The rural-urban migration which sees extended family members of Low income groups relocating to the city for perceived greener pastures does not seem to be abating . It is estimated that an average of 606 people enters Lagos per minute (Akinmoladun, 2004).

The challenge of coping with climate change is to develop sustainable means of responding to it. It is suggested that Vertical Greening systems, may present one such solution. Through the provision of passive thermal comfort improvement, they reduce reliance on energy and economically intensive mechanical cooling; which in the context of developing countries, including Nigeria, where the electricity supply in the country is insufficient and the use of generators is widespread; this would not only contribute to climate change mitigation , but also reduce localised airborne pollution and related health and comfort impacts.

**Vertical Greening Systems**
Vertical Greening Systems (VGS) are also referred to as Living Wall systems. Green walls and vertical gardens are external or internal vertical greening elements that support a cover of vegetation which is rooted either in stacked pots or growing mats. (Dunnet and Kingsbury, 2004, cited in Perini, 2011). They could either be in the interior or exterior facades of buildings. Vertical green is the result of greening vertical surfaces with plants that may be rooted: into the ground; in the wall material itself; or in modular panels attached to the façade (Perini, 2011). Vegetation can be seen as an additive (construction) material to increase the multi functionality of facades of buildings. Vertical green, also commonly referred to as vertical garden is a descriptive term that is used to refer to all forms of vegetated wall surfaces (Ottele et al, 2011).

**Conclusion/ future research.**

Low income groups in Lagos survive on less than a dollar a day, (United Nations, 2010). Their average income is about N15, 000 a month (£58) (Aluko, 2004). Therefore the potential of VGS systems to offer financial savings from electricity bills will be of particular interest to this group.

The effect of climate change is continually being felt in the world. The means of coping with it is a challenge. Europe has adopted retrofit means of insulating houses thus reducing their energy loads for heating and cooling. , Kyoto protocols are being signed. However, in Nigeria, they have been no recorded action to protect houses from rising temperatures. This is mostly felt by low income groups who don’t have the luxury of affording mechanical cooling devices. Electricity supply is also unstable, leading to general discomfort in houses. VGS has the potential to reduce indoor temperatures however; there is a dearth of research on VGS in tropical Africa. The potentials these systems offer in reducing indoor and surrounding environmental temperatures in Lagos will be the subject of further work for the author over the next 2 years. This future study will also consider the financial impact of VGS on thermal comfort and slum upgrading. This will be evaluated through field work including measurement and user acceptability evaluation of the L.I.G groups towards these systems.
References

10. Ilesanmi, A.O (2010), The Legacy and Challenge of Public Housing Provision in Lagos, Nigeria