Incremental Construction for Sustainable Low-Income Housing Delivery in Developing Countries: a Case Study of Bayelsa State Nigeria

Eugene Ehimatie Atamewan*

Cross River University of Technology, Department of Architecture, Calabar, Nigeria

Remi Ebenezer Olagunju

Federal University of Technology, School of Environmental Technology, Department of Architecture, Minna, Nigeria

*Corresponding author: **geneatas@yahoo.com**

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This paper focused on the role of the low-income urban dwellers in attempting to solve their ever increasing and complicated housing problem which is a bye product of the enabling concept. Hence, this study was carried out with the main aim of determining the housing type and construction method suitable for the low-income urban dwellers in Bayelsa State Nigeria. This was achieved through appraisal of the physical characteristics of residential buildings occupied by the low-income earners in the study area. This will help to reduce the growth of urban sprawl in the city and reduce the housing deficit for the urban poor. The study employed mixed method approach of qualitative and quantitative with the former taken most of the study. Data were collected by in-depth interview, observation, and questionnaire administration using data presentation instruments (sketches and photographs) to enhance the data presentation. Content analysis was used to analyze the qualitative data, while the quantitative data collected was analyzed with both descriptive and inferential statistics. The findings revealed that the housing type suitable for the low-income is the non-conventional indigenous housing and development method of incremental housing construction. The recommendations included the adoption of incremental housing construction option, simple and less complicated building that satisfies the individual's spatial preferences and based on the principle of self-help construction and affordability as well as use of local construction methods.

Keywords: Affordability, Bayelsa State, Incremental housing, Low-income, Sustainability.

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Introduction

Governments of developing countries including Nigeria over the years and at various times have continuously embarked on some level of interventions in terms of policies, programs and implementation aimed at addressing the housing needs of their citizenry especially the low-income earners who form the bulk of the various urban populations. Although these interventions have not been substantially felt by the masses due to the enormous nature and magnitude of the housing problem, suffice to say that some of these actions have ameliorated the housing deficiencies to some extent.

Nigeria's housing deficit is currently about 1.7million housing units as at 2010 (FinMark, 2010). Therefore, it has become very indispensable more than ever before for the public sector to be more proactive in tackling the housing problems. This is due to the importance of housing to the wellbeing,

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social inclusion, and productivity level of the citizenry as well as the wealth of the nation. Housing, being a right of every one in any country, the responsibility of the government in providing adequate housing stocks qualitatively and quantitatively for the citizens must be fully discharged.

According to Jiboye (2011a), the inconsequential attainment recorded the by the Nigerian government in the provision of few housing stocks is not commensurate with the yearly budgetary allocation to the housing sector as most Nigerians remain increasingly homeless. This goes to show that the public sector housing intervention in Nigeria has been more of policy formulation than implementation and housing delivery.

Undoubtedly, the planning and implementations of the housing intervention programs in Nigeria has suffered from governments inconsistencies in policy formulation and weak managerial structure mainly due to centralization mechanism of decision making, execution as well as unwillingness of incumbent government to continue with good policies of the preceding governments (Jiboye, 2011b). Thus, there is the dire need to introduce a revolutionary change in the housing policies that will include full participation and involvement of all stakeholders namely the public, private sectors, donor agencies and the low-income individuals who are the direct beneficiaries of the product.

Nonetheless, it is pertinent to emphasize here that the major obstacle to housing ownership in Nigeria and other developing countries is affordability problem. This is compounded by high cost of building materials, land acquisition, inadequate housing finance and unrealistic housing standards (Atamewan and Tabuko, 2016). One major solution is the introduction of incremental housing techniques otherwise known as "low and upgradable" or "build as you earn" on self-help basis which is the focus of this article. Incremental housing construction method has as one of its advantage the opportunity of owing and living in one's house even when the building is not completed or still under construction. In other words, the housing construction is divided into different phases and the owner moves in as soon as one phase is completed. This process promotes housing delivery, reduces homelessness and enhances housing sustainability.

Low income housing is housing whose occupancy is reserved exclusively for those families or persons that are poor and cannot afford luxurious apartment because their income level is low. It is also defined as housing scheme whereby 20 to 40 % of the buildings units lease controlled and reside by individuals who earn very meagre wages (Evans and Evans, 2007). The name implies the buildings designed, constructed and intentioned for low-income populace who are in majority. It does not refer to low quality houses but healthy houses with good standards and at reasonably low costs (Jinadu, 2007).

However, Jinadu (2007) observed that the reality in Nigeria is that housing units produced under this scheme are often not accessible and affordable to the low-income groups due to stiff competition for the available houses among the low, medium and high income groups. Although low income housing is often linked with high crime rate due to the large population it attracts, the benefit of providing appropriate and cheap shelter for most individuals who would have been homeless outweighs this shortcoming.

Housing provision in Nigerian cities including Bayelsa urban centres is largely dominated by private ownership which accounts for over 90%. In developed entrepreneur nations, private building corporations are a key provider of housing unlike, Nigeria where dwelling units are largely produced by individuals and households (Ogu, 1996). It should be noted that housing solution through housing development and provisions would be hampered or inhibited by standards, policies and regulations that are unfavourable to the private individuals and sectors due to the high percentage of privately-constructed houses.

Survey has showed that over 70% of households in cities are low income and earns ₦216,000 per annum (based on national minimum wages of ₦18,000) or less, ₦70,000 (by definition of low income in Nigeria) and presently more than 90% of Nigerians who are the low-income find it

extremely difficult to own standard housing with all their earnings put together for a period of ten years (FGN, 2006; Awofeso, 2010). The implication is that the poor could only wish to own a house built at once to meet minimum standard and regulations.

In most developing countries, housing policies and practice does not consider the needs and right of the urban poor, hence the resultant effect of increased housing deficit, sub-standard and illegal settlement which is the only alternative left for the poor to have a roof over their heads (Gattoni, 2009). Studies (Ayoola and Amole, 2014) showed that the low-income group has preference for single bungalow building with many rooms, with service facilities such as bathrooms, toilets and cooking area located within or outside and at the back of the house. This implies that the housing type suitable and acceptable by the low-income urban dwellers is that whose design and construction is not expensive and sophisticated to build or maintain.

For sustainability of housing delivery, the design standards should be flexible, taking into account the changing needs of the users. The design process must be managed to strike a balance between the income level of the people and the option of standardized housing. A good housing development strategy should provide housing types choices for different income groups and encourage communal integration, promote cultural identities and lifestyle of the people.

On the use of building materials, the low-income prefers to use locally sourced traditional materials such as earth (mud). Several low-income studies by different researchers (Owoeye and Amole, 2012; Olotuah and Taiwo, 2013; Ayoola and Amole, 2014) found out that the low-income groups preferred to build with mud. Most time, the finish is done with sand-cement mortar and sometimes painted to look "modern". The preference for earth as a building material may be due to the fact that it is an indigenous material that has been used for building construction in Nigeria for some centuries. Also, earth is seen to be suitable for building in the tropical region like Nigeria in addition to cost effectiveness and availability (Olotuah and Taiwo, 2013).

According to FinMark (2010), the poor economic backgrounds of the low-income urban dwellers and their inability to access housing finance, has therefore necessitated the low-income urban dwellers in Bayelsa State to build their houses on incremental basis with duration of completion taking up to ten years.

All over the world, urbanization is a process and it is a common practice for cities to grow and expand and improve basic facilities as population increases. In the same vein, the low-income population in urban centres build houses according to their ability beginning with a room (Gattoni, 2009). Therefore, housing design standards should be flexible to allow for incremental housing construction, which is affordable and satisfies the socio-economic needs of the urban poor, at the same time reducing future cost and enhance land efficiency.

Incremental housing, also called core housing simply refers to a small unit or permanent structure that is incomplete with minimum livable space and facilities designed to be upgraded over time (Ikaputra 2008; Pandelaki and Shiozaki, 2010). It starts with a starter core shelter which may be a multi-purpose room with basic kitchen/bath facilities in which case the owners control the expansion based on needs and resources (Goethert, 2010). Accordingly, incremental housing must have the characteristics which include elements of self-build, improvement and end-user driven, which means the low-income owners must fully participate in all aspects of the construction.

Pandelaki and Shiozaki (2010) summarized the features of incremental housing as follows:

a. The building should be planned to have the basic adequate functional space for the needed future expansion.

b. The construction of the building is not expected to be completely on self-help basis.

c. The primary purpose and condition for the incremental housing construction should be home ownership so as to encourage the required funds and labour for the phased extension.

d. The building should be constructed with cheap, dismountable and re-usable materials for easy expansion without wasting funds resource.

e. The incremental based house is expected to fit in to the local environmental conditions of the area.

f. The plot of land should be well-organized in order to accommodate the phased expansions as the need arises.

Methodology

This study employs the mixed-method approach (qualitative and quantitative). This is because of the advantages of greater confidence and provision of checks against the weak points of each approach obtainable with combined methods (Groat, 2002; Creswell, 2003). But the study is more of qualitative approach. The quantitative data provided this study with essential basic statistics, while qualitative data enriched the research discussion developing a better context for interpreting the results from statistical data.

The mixed method involves two phases of data collection and analysis. First, qualitative data was collected and analyzed, then followed by quantitative data collection and analysis. Thus, the quantitative data and results helped to interpret the qualitative findings (Creswell and Plano-Clark, 2007). Therefore, the study began with qualitative approach with conduct of open-ended interviews to collect detailed views from sampled respondents and proceeded with quantitative approach with a large survey to be able to generalize results to a larger population.

The data collected from the field were analysed using content analysis since the research method was majorly qualitative. Content analysis was carried out by critically analyzing the information collected from the respondents and the observation notes taken by the researcher during the field work. Thus, the main themes that formed the hub of the field work were identified (Kumar, 2011). Also, the analysis was done following the laid down format and procedures by combining two of the three ways used in communicating findings in qualitative research. The adopted ways were:

First was to Identify the main subject both from the observation notes and the interview responds from the field work; then translate them sometimes using the exact words of the respondent to emphasize their points.

Secondly, the main themes from the field work were quantified so as to give their occurrence and thus importance.

Quantitatively, about 1400 questionnaires were distributed to the low-income respondents across low-income residential neighbourhoods in Yenagoa, the state capital of Bayelsa State, Nigeria. The distribution and return of the questionnaires were made possible with the help of trained research assistants from the study areas who had to administer the questionnaires to the respondents and even translating in local dialect for those who could not understand the questions. The retrieved questionnaires were analyzed using descriptive statistics with the results presented in charts and tables.

Results

This section analyses the personal information and socio-economic characteristics of the respondents (household heads) in the housing units selected from the low-income residential neighbourhoods of the study areas of Ogbia, Sagbama and Yenagoa. These include their gender, age, marital status, nature of employment, income level, status and length of occupancy, number of rooms, number per household, and affordability level of the housing units among others.

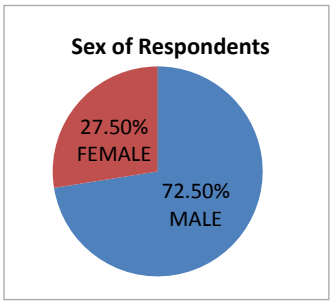


Fig. 1
Sex of respondents in the study areas. Source: author survey (2016)

Gender of the respondents. Gender of the respondents indicate 72.5% male and 27.5% female revealing that a total of 864 males to 430 females. The study indicates the predominance of male household heads over the females which is in line with

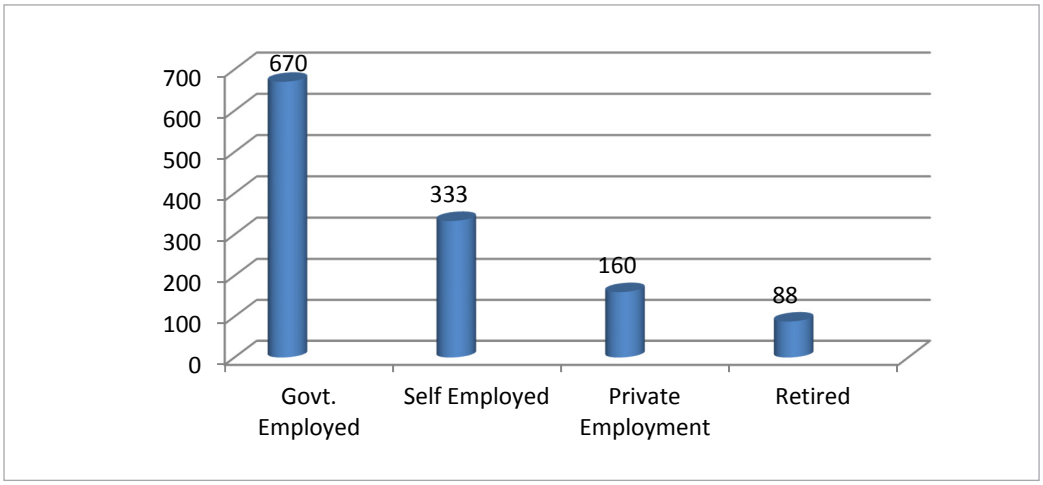


Fig. 2
Respondents nature of employment. Source: author survey (2016)

the traditional norms of an average African household where the male folks are regarded as the heads of the family.

Respondents nature of employment. The survey showed that respondents working with public (government) employment accounts for 51.8% which is the highest. This is followed by those on self-employment accounting for 25.7%. Next are those in private employment at 12.4%. Respondents who are retired account for 6.8%, while those unemployed stood at 2.5%.

Respondents average monthly income. Table 1 shows that majority of the respondents (36.6%) earns an average monthly income of between ₦31,000 and ₦50 000. The respondents who earn between ₦16 000 and ₦30 000 stood at 24.2%. This was closely followed by respondents who earn between ₦6 000 and ₦15 000 which is 22.5%. Those who earn between ₦51 000 and ₦70 000 were put at 11.2%. A small proportion of the respondents (5.5%) earns above ₦71 000.

	Percentage (%)	Frequency
31000 – 50000 Naira	36.6%	474
16000 – 30000 Naira	24.2%	313
6000 – 15000 Naira	22.5%	291
51000 – 70000 Naira	11.2%	145
71000 and above	5.5%	71
Total	100%	1294

Table 1
Respondents average monthly income. Source: Author's survey (2016)

Respondents length of occupancy. On the length of occupancy (duration) of the respondents in their respective housing units and the neighbourhood, the results show that a larger proportion (48.3%) had lived in their residence for between 6 and 10 years, while 24.2% of the respondents had lived for a period of 11-20 years. This is followed by 15.3% respondents who had lived for a period of over 20 years. The respondents who had lived in their residence for 2-5 years stood at 10.5% while the lowest percentage of 1.6% had lived for 0-1year as detailed in Fig. 3. The study suggests that very high proportion of the respondents had lived reasonable number of years in their various apartments and the neighbourhoods signifying that they are used to the environment and could therefore give useful information relevant to the study.

Respondents nature of occupancy (ownership). The study shows that a greater percentage of the respondents (64.3%) lives in rented housing units, 28.6% live in owner-occupied housing units while a few percentage of respondents (7.1%) live in family-owned housing units. This suggests that a greater proportion of the low-income urban dwellers are yet to own their houses signi-

Fig. 3

Respondents length of occupancy. Source: author's survey (2016)

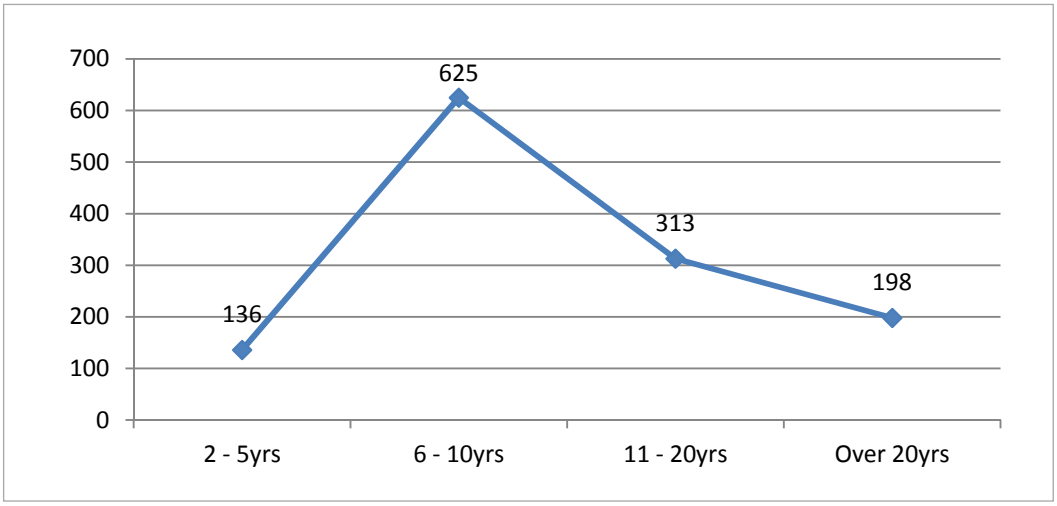
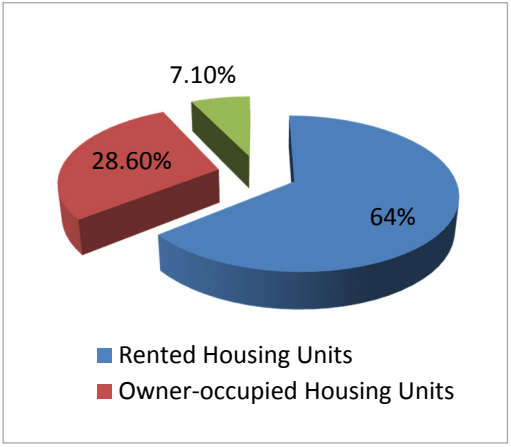


Fig. 4

Respondents nature of occupancy. Source: author's survey (2016)

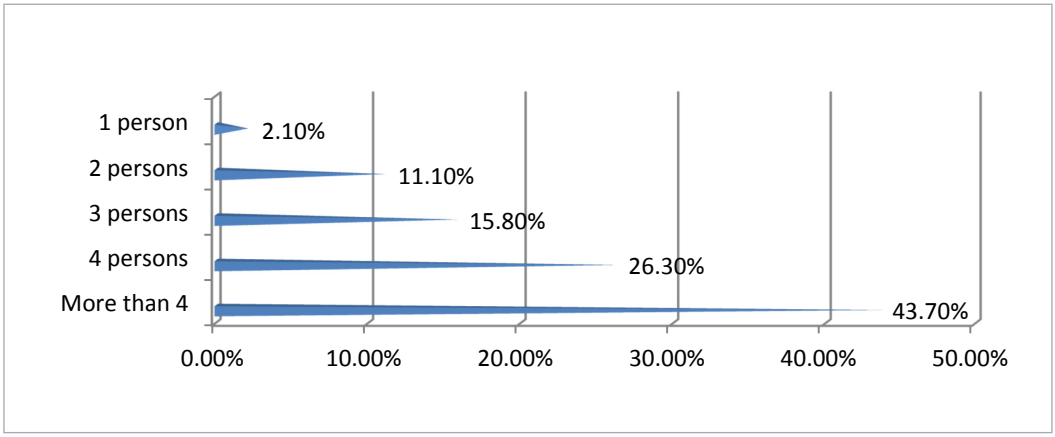


fying that home ownership was still very low in the urban centers of the state and this is in line with previous findings (Larenwaju, 2012; Ibem, 2011; Ogunleye, 2013), which assert that greater proportion of the low-income earners in most cities of developing nations live in rented accommodation.

Respondents household size. The study shows that 43.7% of respondents claimed that their household size was more than four persons, 26.3% had 4 persons, 15.8% had 3 persons, 11.1% had 2 persons while 2.1% had 1 person. This suggests that there is a predominance of household with more than 4 persons in the study areas; this may be due to the fact that most respondents are married and have children / other dependents living with them. It is pertinent to state that the percentage is highest in Yenagoa. This may not be unconnected with the fact that it is the capital city with its attendant problem of high cost of accommodation, high population and high low-income earners. The implication here is that people in the study areas especially Yenagoa suffer from high occupancy rate (overcrowding) in which case adults of different sex not married may be living together in the same

Fig. 5

Respondents household size. Source: author's survey (2016)



room which in turn promotes immorality, early marriages, increased rate of disease and other social problems. This study agrees with earlier findings of Ede et al. (2007) which showed that Yenagoa had a high occupancy rate as with many urban centers in Nigeria.

Respondents affordability of the housing units. The respondents were also asked to evaluate the cost of acquiring or renting their housing units. The evaluation indices were from very unaffordable, unaffordable, affordable to very affordable. Greater proportion of the respondents 71.4% indicated that cost was unaffordable. This was followed by 13.7% respondents who agreed the cost of housing was very unaffordable, this was closely followed by 14.9% respondents who claimed that the cost of housing was affordable while very affordable had 0% respondent. This is an indication that the low-income urban dwellers and in the study areas see the cost of acquiring and or renting their housing units as generally unaffordable.

Discussion

From the results above, it can be deduced that a higher percentage of the respondents are male (household heads), employed in the public sector and their income level suggests that majority of the respondents are low-income earners. This is not quite surprising as the neighbourhood sampled were already seen to exhibit the characteristics of low-income environment. The results further suggest that greater proportions of the respondents are in privately rented housing units. Also, the results revealed that the household size for most of the respondents were large with over six persons per household irrespective of the size of the housing unit. This suggests a high rate of overcrowding in the neighbourhoods. In addition, the results also show that majority of the respondents find the cost of their housing unit very unaffordable. This goes to show that the cost of accommodation is far beyond the reach of the low-income urban dwellers. This may be due to the fact that the there are few housing units(shortage of housing units) compared with the population explosion in the study areas, high cost of building materials, high cost of building construction owing to high cost of lands, land filling due to its swampy nature.

Housing affordability. Most of the respondents interviewed claimed that costs of constructing houses are too expensive. They opined that meeting very essential needs in the family was not easy and therefore the question of standard completed house does not even arise. A respondent queried: “who says my house is not standard. Am I complaining? As you can see, I am okay with this house for now. When condition of my pocket improves, the house will imp rove too.” They posited that they can only build what they can afford. Some respondents claimed that cost of building material and land for building is beyond their reach. This suggests that housing affordability is still a serious hindrance towards house ownership in this part of the world.

Housing types and development method suitable for low-income urban dwellers. This study reveals respondents’ preference for a housing proposal that is based on the principle of affordable standards and cultural identity. The respondents asserted that they enjoy building their own houses their own way based on the principle of self-help in which case the buildings must be simple and less sophisticated in construction. The building also should satisfy the individual’s spatial preferences. One respondent said: ”they(government) should allow us to build the kind of house we want, not the type they will tell you to put dining here, room there, no place to feel our kind of culture and free yourself; those kind of houses are for the big men and oyinbo (white) people”. The implication here is that the respondents do not favour the current conventional housing types of either one storey or multi-storey designs with WC and large spaces that are only affordable by a few high income earners in the society because these does not apply to the ways of living of the low-income groups who are in the majority. Government and agencies should therefore permit housing types such as tenement (with many rooms) that develops and improves over time with outdoor sanitary facilities and kitchen which are suitable and affordable since they suit the ways of living of the low-income households.

The study showed that the most respondents prefer to build their houses on incremental level, that is, step by step method. This is also called starter house, phased-development or core housing which is

a step-by-step housing construction method which is an integral urban development process. Most of the respondents posited that it was unfair to compel everybody to follow one pattern of housing standard claiming that "all fingers are not the same, so the government should know that not everybody can afford to build their house at once". Incremental housing construction is an affordable and flexible way by which low-income households can own their houses gradually since they cannot afford to build their houses instantly. Professionals have argued that building types that are practicable for low-income households are those that can be extendable over time as the owner wishes. This implies that the best housing construction option for the low-income household is the "house that develops or extends as the income of the owner improves", which means that one first constructs a room or two rooms and occupies the house before it is fully completed (Nnaggenda-Musana, 2008).

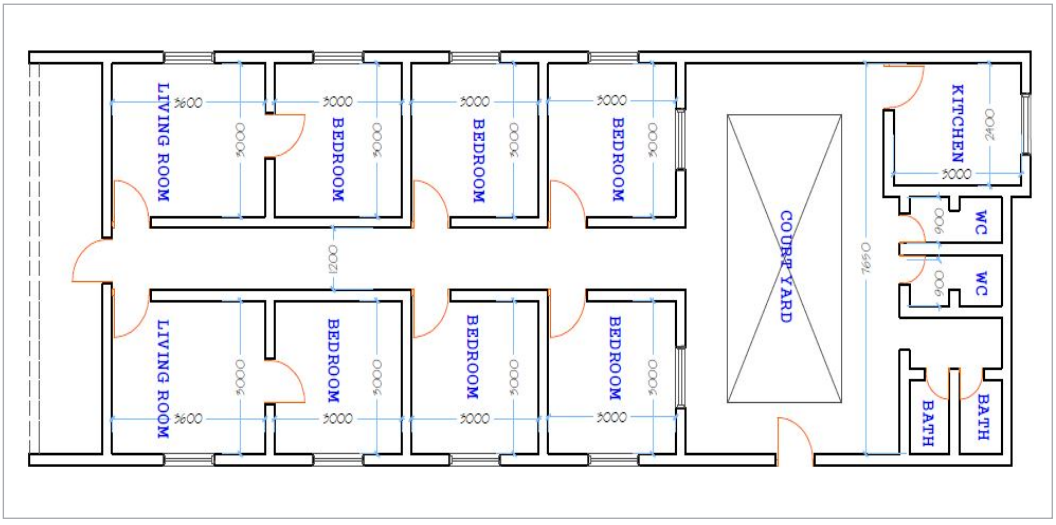
The study also showed that conventional house type that the current building regulations and standards support is foreign building materials. Most respondents claimed that these preferred materials are very expensive. They opined that in the past centuries, virtually every adult family male could afford to build his house because the building materials were locally sourced. The preference of modern or foreign building materials over the local/traditional materials found almost in every area of the country is an indication that people in this part of the world do not value their own nature-given resources. Hence, the researcher is advocating the use of earth and its associated products (bricks, stabilized earth) for low-income housing construction. The implication here is that housing deficit will be on the increase instead of decreasing because imported building materials are very expensive and make housing construction unaffordable to the low-income urban dwellers.

This study also shows that most of the low-income households make use of outdoor spaces (**Fig. 7, 8**). The outdoor spaces in the low-income neighborhoods of Bayelsa State accommodate the sanitary facilities such as toilets and bathrooms. The study revealed that sanitary facilities in the neighbourhood are usually shared by different households of the same building or sometimes of different buildings and are located separately from the main house(s). This reasons given by respondents showed that the low-income urban households cannot afford or maintain waterborne toilets individually simply because there is no money or potable water supply in their neighbourhoods. As one respondent queried: "we don't even have water to drink or cook, then who is talking about water for flushing toilets". Also, where an individual household can manage to have a waterborne toilet, it is being shared amongst members of the same household.

On the other hand, kitchens have been seen in this study to be either detached from or attached to the main housing units as another outdoor space (**Fig. 7, 8**). The respondents claimed that this has been the way of living by majority of the low-income urban dwellers and it should be encouraged

Fig. 7

Floor plan of building with attached kitchen and toilet/bath



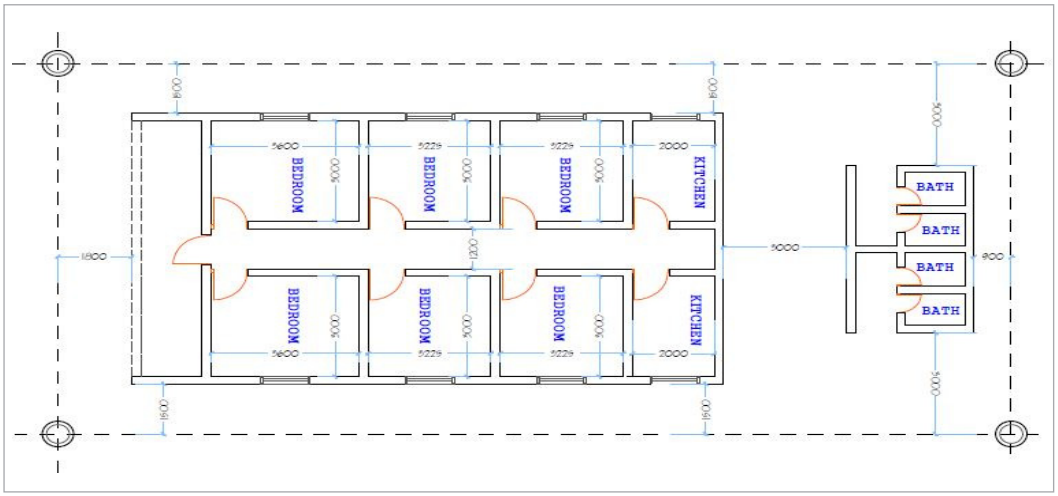


Fig. 8

Floor plan of building with detached toilet/ bath

by professionals, agencies and government. One respondent just laughed and said, "these people, so they want us to cook inside the house with firewood when they know that we cannot buy gas or kerosene to cook our food. We use firewood and saw dust and we don't want smoke inside the house." The implication therefore is that in the design of low-income houses, the local conditions and ways of living of the residents including the extensive provision of outdoor spaces for interactions, socialization and other outdoor activities should be considered while also improving their housing standards.

Conclusions

The study has revealed that self-help and incremental construction methods were the choice of the low-income urban dwellers in Bayelsa State. Thus they prefer to begin with a starter unit and progresses as income flows in. It was also discovered that the low-income urban dwellers in Bayelsa State had preference for local indigenous building materials as against the convectional building materials which they claimed were unaffordable. Most of the low-income had preference for an indigenous housing type where some of the services spaces (especially kitchen, toilet and bath place) are either attached or detached completely from the main building (**Fig. 7, 8**). Furthermore, it was revealed that the low-income neighbourhood in Bayelsa urban centers lacked access to housing fund due to inadequate collateral security as requirement for accessing such housing finance; therefore, they relied on personal savings to carry out housing construction. The study recommends as follows:

1 Incremental Design and Construction. Low-income households should be allowed to build and own their houses gradually since they cannot afford to build their houses instantly. This method provides secure title, affordability and maximum flexibility in housing decisions.

2 This study recommends a new housing proposal that is based on the principle of affordable standards and cultural identity. Simple and less complicated building that satisfies the individual's spatial preferences and based on the principle of self-help construction should be encouraged and permitted. With outdoor sanitary facilities and kitchen as against the preference for the conventional housing types as in **fig. 8**.

3 In the design of low-income houses, the local conditions and ways of living of the residents including the location of some functional and service spaces outside the main housing unit should be considered while at the same time improving their housing standards.

4 Use of Local Building Materials. The study recommends that the use of local/traditional materials should be promoted. This is because apart from the cost effectiveness, they are suitable to the local climatic conditions and are easy to maintain too.

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About the authors

EUGENE EHIMATIE ATAMEWAN

Lecturer

Cross River University of Technology, Department of Architecture

Main research area

Sustainable Housing and Building Maintenance & Management

Address

Cross River University of Technology, Department of Architecture, Calabar, Nigeria
E-mail: geneatas@yahoo.com

REMI EBENEZER OLAGUNJU

Assoc. Professor

Department of Architecture, School of Environmental Technology

Main research area

Sustainable Housing and Building Maintenance & Management

Address

Federal University of Technology, Minna, Nigeria
Tel: +2347065003865
E-mail: olagunju@futminna.edu.ng