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Developing a Model for Improving Housing Conditions in Urban Slums in Nigeria: A study of five selected Slum Neighbourhoods in Umuahia.

[1]Iwuagwu, Ben Ugochukwu.
[1]*Dept of Architecture, Abia State University, Uturu, Nigeria.*

ABSTRACT: *Slums accommodate the majority of the population of urban centres in developing countries and it is estimated to be home to over 800million people. Slum development is caused by urbanhousing problem, rapid urbanization and the inability of government to supply affordable housing to her citizens. In Nigeria, the urban housing problem basically relates to quantitative and qualitative inadequacy, with the former speeding up the later. This research studies five selected slum neighbourhoods in Umuahia with the aim of developing a model for improving housing conditions in the urban slums in Umuahia. The objectives of the study are: to investigate the types of building structures in the study area identified as slum; to identify the type of building materials used in housing construction in the study area identified as slums; to determine the residents satisfaction with their housing condition in the study area identified as slum. Mixed research approach (Quantitative and qualitative) were adopted in this study. Copies of questionnaire were administered to sample size of 350 respondents drawn using stratified systematic random sampling technique from the five selected slum neighbourhoods in Umuahia. The data collected were analysed using ''C-NIKBRAN Data Memory Analyzer''. The Composite Evaluation of the Present Prevailing Housing Condition in urban slum of Abia State established that the average acceptability ratio, PR (field) obtained from* $\sum AR_U$ *is 0.4885 while* PR^+ *(model) obtained from* $\sum AR_U$ *is 0.4953. Housing Condition* $\boldsymbol{(HC) = -\ 0.0025(M^4 + S^4 + R^4) + 0.0289(M^3 + S^3 + R^3) - 0.1122(M^2 + S^2 + R^2) + 0.1628\ (M + S + R) + 0.3175 \times 100}$*. This is the model establishing the present prevailing housing condition in urban slums in Umuahia. Any modification on the variables (Building material and building structure) will significantly change the housing condition and residents' satisfaction. It concludes by urging Nigerian Government to encourage use of alternative building materials such as earth block for internal and external walling of buildings for cost reduction in the study area considering the present economic recession in the country, as earth has be found to be available in the study area, cheaper, environmentally friendly and capable of reducing the cost of walling, plastering and painting to over 70 percent in comparison with contemporary building materials.*

KEYWORDS: *slum development, affordable housing, alternative building materials, earth blocks.*

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I. INTRODUCTION

The incidence of over population in urban centres has created severe housing problem, resulting in overcrowding, inadequate dwellings and in a situation in which 60 percent of urban population in Nigeria can be said to be ''houseless persons'' [1].Housing problem is one of the challenges facing the world today and this is more critical in Less Developed Countries (LDCs) such as Nigeria, Kenya and India where slums have grown as a seemingly inevitable part of urban living. In urban centres of Nigeria, slums have reached an alarming state, as almost 75 percent of the urban dwellers live in slums and in conditions that are degrading of human dignity [2].

[3] Asserts that much can and must be done to improve the living conditions of nearly one billion slum dwellers alive today.Strategies tried to reduce and transform slums in different countries, with varying degrees of success, include a combination of slum removal, slum relocation, slum improvement, urban planning with city wide infrastructure development, and public housing projects [4]. These strategies at various times had been applied for slum improvements in the study area and Nigeria at large. Notwithstanding the application of these strategies in the study area, slums continue to grow; there is therefore a need to develop a model through which housing conditions in the study area could be improved.

STATEMENT OF THE PROBLEM

Urban centres of Nigeria, seem to be growing rapidly and planned housing no longer accommodates the growing urban population. Inadequate housing supply by the government and public private partnership (PPP) and cost of imported building materials in the study area affected rental value by increasing the rent value

of the available housing stock beyond the reach of the urban poor. This is the primary reason why the urban poor seek refuge in the slums of the study area, hoping to move out when things improve.

From the existing literature, in most cases the slum dwellers are ejected and their property which are described as illegal structures are demolished. The several demolition exercises in Abuja, Umuahia and that of the entire Maroko settlements in 1991 are typical examples. Ejection of squatters and demolition of the illegal structures generate social, economic and political problems with their attendant security implications [5]. This act tends to portray government as insensitive to the plight of the citizenry.Having reviewed literature in slums, it is clear that a model so far has not been developed to address the housing conditions in urban slum. It is this gap in literature that this research is out to fill.

STUDY AREA

This study focuses on developing a model for improving housing conditions in urban slums in Nigeria. The urban centres covered is Umuahia of Abia State Nigeria. Five slum neighbourhoods were selected from Umuahia urban, the slum neighbourhoods are Ngbuka, Church road, Down below, Umueze and Ngwa road Umuahia.

TYPES OF BUILDING STRUCTURES IN THE STUDY AREA.

According to [6] housing provision in slums is characterized by a proliferation of substandard and unplanned structures, which are built of diverse materials that are of low standard. Structures in slums are small in sizes, made of low quality materials like- polythene sheet, straws, used corrugated iron roofing sheet among others [7]. Structures found in the study area were block buildings, mud buildings, timber buildings and zinc buildings. Responses from the respondents and physical observation show that 67.4 percent of structures in the slums are block buildings, 17.3 percent mud building, 7.5 percent timber building and 7.8 percent zinc building. Block building has higher percentage, even though over 90 percent of the block building structures is aged and dilapidated. This corroborates the findings of [7].

TYPES OF BUILDING MATERIAL USED IN HOUSING CONSTRUCTION IN THE STUDY AREA

Materials have always been the cornerstone of structural quality and durability of a structure. Types of materials and how they are used is fundamental in attaining structural quality and durability of housing structure. The application of building materials may be seen from different perspectives. These perspectives according to [8] are materials for basic structure, protective and decorative finishes and fixtures/fittings.

[9]Observed that most of urban slum inhabitants in use materials that are in vogue in rural areas where they migrated. This according to him explains the widespread use of sus-standard materials such as unprocessed timber, iron roofing sheet and polythene. Different types of building materials were used in housing construction in the study area, ranging from block, mud, timber, aluminium, zinc, thatch, tiles and glass. Research findings and Physical observation show that all the slum inhabitants are not poor, as such some of the structures found in the slum neighbourhoods are permanent structures. It was observed that 53.4 percent of respondents in Umuahia used sub-standard materials because of poverty. The result of this study is in line with previous research by [8].

RESIDENTS' SATISFACTION WITH THEIR HOUSING CONDITION IN THE STUDY AREA.

Findings from the research generally show that the residents are not satisfied with their present housing condition in the slum of Umuahia, Abia State and seek housing improvement in their various neighbourhoods, hence this study to produce a model for improving housing condition in the urban slums in Nigeria. This dissatisfaction is the single significant factor that leads to the housing modification going on haphazardly across the length and breadth of the slum neighbourhoods in Umuahia. The result of this study is in line with previous research by [10],[11].

ADVANTAGES OF EARTH AS A BUILDING MATERIALS

Affordability. Because of high cost of these imported building materials, the low income earners find it difficult to construct their own houses. The availability and affordability of earth gives the low income earners the opportunity to construct their own houses.

Energy Efficient. Environmental protective measures ensure reduction of operational energy in construction. The building sectors consume more than one third of the world's energy, and contribute to global warming. A traditional building of earth emits fewer greenhouse gases, consumes less energy, and maintains a high level of thermal comfort, regardless of prevailing solar radiation outside

Reusability: Reusability is a function of the age and durability of a material. Very durable materials such as earth has many useful years of service left when the building in which they are installed is decommissioned, and may be easily extracted and reinstalled in a new site.

Other advantages include: Biodegradability and Availability.

II. RESEARCH METHODOLOGY

This study was done by carrying out a physical appraisal of the types of building structures in the study area, the types of building materials used in housing construction in the study area and determined the residents' satisfaction (Acceptability Ratio) with their housing condition.A set of 350 questionnaires were prepared and 70 copies were randomly administered across each of the five selected slum neighbourhoods in the study area. Out of the 350 copies of questionnaire successfully administered, 307 questionnaires were retrieved, as the slum inhabitants finds it difficult to accept or return copies of questionnaire claiming we are government agents

Derivation of the Present Prevailing Housing Condition in urban slums of Abia State. (UMUAHIA SLUMS)

Table 1: Assessment of types of Building Materials (BLOCK)

s/n	weeks	∑QD (Total number of questionnaires distributed)	∑QR (Total number of questionnaires returned)	∑QNR (Total number of questionnaires not returned)	RRQ (Respondent response quotient)	$\sum R_M$(Total response on assessment of all the listed building materials)	$\sum R_B$ (Total response on assessment of block as a building materials)	ORI_B (Observability ratio for block usage)	AR_M (Acceptability ratio on types of building materials)
1	1	70	62	08	0.8857	62	39	0.6290	0.5571
2	2	70	58	12	0.8286	58	41	0.7069	0.5857
3	3	70	64	06	0.9143	64	35	0.5469	0.5000
4	4	70	61	09	0.8714	61	39	0.6393	0.5571
5	5	70	62	08	0.8857	62	39	0.6290	0.5571

Source: [12].

Table 2: Assessment of types of Structure (BLOCK BUILDING)

s/n	weeks	∑QD (Total number of questionnaires distributed)	∑QR (Total number of questionnaires returned)	∑QNR (Total number of questionnaires not returned)	RRQ (Respondent response quotient)	$\sum R_{TS}$(Total responses on assessment of all the listed types of building structures)	$\sum R_{BB}$ (Total responses on assessment of block structures)	ORI_{BB} (Observability ratio for block building structures)	AR_{TS}(Acceptability ratio on types of building structures)
1	1	70	62	08	0.8857	62	43	0.6935	0.6142
2	2	70	58	12	0.8286	58	40	0.6897	0.5715
3	3	70	64	06	0.9143	64	38	0.5938	0.5429
4	4	70	61	09	0.8714	61	43	0.7049	0.6142
5	5	70	62	08	0.8857	62	43	0.6935	0.6142

Source: [12].

Table 3: Residents Satisfaction

s/n	weeks	∑QD (Total number of questionnaires distributed)	∑QR (Total number of questionnaires returned)	∑QNR(Total number of questionnaires not returned)	$\sum PR_S$ (Total points associated with resident satisfaction)	RRQ (Respondent response quotient)	$\sum RU_{RS}$ (Total respondents accepting residential satisfaction)	Y (Product of $\sum PR_S$ and ∑QR)	ORS_I (Observability ratio for residents satisfaction)	AR_{RS} (Acceptability ratio on residents satisfaction)
1	1	70	62	08	22	0.8857	546	1364	0.4003	0.3545
2	2	70	58	12	22	0.8286	449	1276	0.3519	0.2916
3	3	70	64	06	22	0.9143	488	1408	0.3466	0.3169
4	4	70	61	09	22	0.8714	481	1342	0.3584	0.3123
5	5	70	62	08	22	0.8857	520	1364	0.3812	0.3376

Source: [12].

Table 4: Composite Evaluation of Acceptability Ratios and Observed Indices for types of building materials, types of structures and resident satisfaction.

s/n	weeks	ORI_B (x) (Observability ratio for block usage)	ORI_{BB} (x)(Observability ratio for block building structures)	$ORS_I(\alpha)$ (Observability ratio for residents satisfaction)	$\sum AR_U$ (Field) (Total acceptability ratio for Umuahia slum as obtained from field)	$\sum AR_U$(Model) (Total acceptability ratio for Umuahia slum as obtained from derived model)	Dv (%) (Deviation of predicted values from field work value)	Cf (%) (Correction factor to predicted values)
1	1	0.6290	0.6935	0.4003	0.5086	0.4994	- 1.81	+ 1.81
2	2	0.7069	0.6897	0.3519	0.4829	0.4986	+3.25	- 3.25
3	3	0.5469	0.5938	0.3466	0.4533	0.4844	+6.86	-6.86
4	4	0.6393	0.7049	0.3584	0.4945	0.4966	+0.42	- 0.42
5	5	0.6290	0.6935	0.3812	0.5030	0.4977	-1.05	+1.05

Source: [12].

Total = 2.4423 ; 2.4767
Average = 0.4885 ; 0.4953

MODEL FORMULATION

$PR = f(\sum x, \sum \text{ɤ}, \sum \alpha)$……..……..equation 1
Based on the foregoing, a composite mapping of PR with $\sum x$, $\sum \text{ɤ}$, and $\sum \alpha$ gives that
$PR = A(\sum x^n + \sum \text{ɤ}^n + \sum \alpha^n) - B(\sum x^{n-1} + \sum \text{ɤ}^{n-1} + \sum \alpha^{n-1}) - C(\sum x^{n-2} + \sum \text{ɤ}^{n-2} + \sum \alpha^{n-2}) - D(\sum x^{n-3} + \sum \text{ɤ}^{n-3} + \sum \alpha^{n-3}) +$
E……..equation 2

Introducing the values of A, B, C, D, E and n into equation 5
Where A= 0.0012; B = 0.0142; C= 0.0603; D = 0.1103; E = 0.632 and n = 4
$PR = 0.0012(\sum x^4 + \sum \text{ɤ}^4 + \sum \alpha^4) - 0.0142(\sum x^3 + \sum \text{ɤ}^3 + \sum \alpha^3) + 0.0603(\sum x^2 + \sum \text{ɤ}^2 + \sum \alpha^2) - 0.1103(\sum x + \sum \text{ɤ} + \sum \alpha) +$
0.632……. equation 3

Equation 3 is the Prevalency Ratio. It is a simplified model framework for the prevailing housing condition in urban slums of Umuahia at the present. On multiplying equation 2 by 100%, PR becomes PI which is the Prevalency Index and a measure of the housing condition (HC) in slums of Umuahia at the present.

$PI = [0.0012(\sum x^4 + \sum \text{ɤ}^4 + \sum \alpha^4) - 0.0142(\sum x^3 + \sum \text{ɤ}^3 + \sum \alpha^3) + 0.0603(\sum x^2 + \sum \text{ɤ}^2 + \sum \alpha^2) - 0.1103(\sum x + \sum \text{ɤ} + \sum \alpha) +$
0.632] x 100 %..... equation 4

PI = HC……...equation 5

$HC = [0.0012(\sum x^4 + \sum \text{ɤ}^4 + \sum \alpha^4) - 0.0142(\sum x^3 + \sum \text{ɤ}^3 + \sum \alpha^3) + 0.0603(\sum x^2 + \sum \text{ɤ}^2 + \sum \alpha^2) - 0.1103(\sum x + \sum \text{ɤ} + \sum \alpha) +$
0.632] x 100 %..... equation 6
For further simplification, let: $\sum x = M$; $\sum \text{ɤ} = S$; and $\sum \alpha = R$…….... equation 7
M = Building Structure Assessment,
S = Building Materials Assessment, and
R = Resident Satisfaction Assessment.
Substituting equation 7 into equation 6 reduces it to;
$HC = [0.0012(m^4 + S^4 + R^4) - 0.0142(m^3 + S^3 + R^3) + 0.0603(m^2 + S^2 + R^2) - 0.1103$
(m + S+R) + 0.632] x 100 %.....equation 8.

III. CONCLUSION.

This research, therefore, established that the major types of structure prevalent in the study area are block, timber and corrugated iron roofing sheet structures. The study observed that the occupancy ratio in the study area is very high and also established that the slum inhabitants in the are not satisfied with their present housing condition and ascertained that dissatisfaction with their present housing condition was the single significant factor that led to housing modification going on haphazardly across the length and breadth of the slum neighbourhoods. The research established that the average acceptability ratio, PR (field) obtained from $\sum AR_U$is 0.4885 while PR (model) obtained from ½ $\sum AR_U$ is 0.4953. This implies that PI = HC = 49.53 percent and a clear indication that the present prevailing housing condition in slums of Umuahia is approximately 50 percent.

IV. RECOMMENDATION

The model developed for improving housing condition in the urban slums of Nigeria should be used in future housing improvements in the study area. Government should encourage use of alternative building materials such as earth block for cost reduction in the study area as Earth block has be found to be available, cheaper, environmentally friendly and reduces the cost of walling, plastering and painting to over 50 percent [13].Government should encourage "self-help" and "community-help" practices by organizing building construction workshops to educate slum inhabitants on the need of the practices. The slum inhabitants should also stop the harmful practices such as building on top of drainage, disposing refuse in the drainage and all sorts of illegal developments that characterize their neighbourhoods as slum.

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