SUB-THEME: STEM and TVET for Economic Diversification and Human Resource Development

Effects of Low Income on the Standard and Quality of Residential Buildings in Kaduna State, Nigeria

Yayock, D. S[1]; Ayorinde, G. O[2]; D. Ibrahim3; C. O. Igwe[4] and A. B. Kagara[5]
Department of Industrial and Technology Education
Federal University of Technology Minna, Niger State, Nigeria

Abstract
This study examined low income and its effect on the standard and quality of residential building in Kaduna State, Nigeria. Two research questions were developed and answered while two null hypotheses were formulated and tested at 0.05 level of significance and 100 degrees of freedom. Descriptive survey research design was adopted for the study. The entire population of 2,019 respondents consisting of 1,435 registered residential buildings and 584 builders in Kaduna State were used for the study. A 24 item structured questionnaire developed from the literature reviewed for the study was used to collect data from the respondents. Each questionnaire was divided into two categories of; reasons for acquiring low quality materials and curtailing the difference between low income and the standard and quality of residential buildings in Kaduna State. The "reasons for acquiring low income materials" had a four (4) response options of Highly Often (HO), Often (O), Moderately Often (MO) and Not Often (NO). The "curtailing the difference between low income and the standard and quality of residential buildings" category also had 4 response options of High Agree (HA), Agree (A), Moderately Agree (MA) and Not Agree (NA). The questionnaire items were face validated by three experts. The 2,019 copies of the questionnaire were administered on the respondents with the help of two research assistants. 694 copies of the questionnaire administered were retrieved and analysed. Weighted mean, standard deviation and Improvement Need Index (INI) were used to answer the research questions while t-test statistic was used to test the null hypotheses 1 and 2 respectively. The findings of the study revealed that low income has effect on the standard and quality of residential buildings in Kaduna State, Nigeria. The findings on hypotheses1 and 2 revealed that there was no significance difference in the mean ratings of the respondents (Residential Building Clients and Builders) on all the items on reasons for acquiring low quality materials and ways of curtailing the difference between low in come and it's effects on the standard and quality of residential buildings in Kaduna State, Nigeria. It was therefore recommended that theministry of urban and town planning should organised orientation/seminar from time to time to brainwash the residential building client on what is required at each stage of the housing value chain, from foundation footing to roofing and finishing, and from engaging locals from the communities, to building and improving the standard and quality of their residential buildings so that it will to be safe, resilient and sustainable. There should be a provision for an effective loan scheme, partial upgrading, effective urban development policy, and improvement of sanitary conditions and enforcement of housing and building codes.

Keywords: Low Income, Quality and Standard, Residential Buildings

Introduction

Housing is basic to human life. It is a fundamental yardstick for estimating the quality of life of a nation's citizens. Almost every measure of human well-being is connected to housing, be it a measure of health, social, religious or economic factors (Ogbu, 2017). The indispensability of residential building to humankind makes housing problems a global challenge. The most pathetic feature of Nigeria society today is that a majority of its members are living in a state of destitution while the remaining relatively insignificant minority, are living in affluence, which result to many going on low quality buildings. The end users of low-income housing seldom make inputs at the pre-construction and construction stages of the project (Ogbu, 2017). They often have to live with whatever quality of housing is provided by the housing designers and contractors. In the attempts to reduce the cost of construction, the quality of low-income buildings may be compromised between the design and construction stages of procurement. The designers of the projects attempt to specify cheaper materials ostensibly to make for affordability, while the contractors carry out workmanship to increase their profit margin. Similarly, due to the excess demand for housing, these housing providers often give minimal attention to building quality with the notion that whatever is provided for the low-income group will be accepted. This concept has not held true in many cases, partly because residents' satisfaction with their housing is strongly correlated with the buildings' features. Low-income buildings are frequently defective as a result (Nyameka, *et al.* 2012). Consequently, unregulated building modifications, and sometimes, significant structural alterations have been carried out to improve the quality of low-income housing buildings in Nigeria (Kaduna State inclusive). This compounds the affordability problem by increasing the cost of maintenance of the buildings. These issues lower the public's perception of low-income housing (Ogbu, 2017). Despite this, the effects of building standard and quality on maintenance cost remain inadequately addressed.

Quality is a fundamental term in the construction industry (Nyameka, *et al.* 2012). The non-achievement of such a crucial aspect of construction can result in the failure of a construction project and in the dissatisfaction of clients and/or building occupants. Furthermore, the non-achievement of quality can result in delays in building projects and the need for rework, which can result in a significant financial loss. Quality focuses on eliminating defects and variations and seeks to avoid waste of time, materials, and financial resources due to rework. The physical condition of a building refers to the state of its fabric. A building is a composite of different elements and materials. The deterioration or damage of an element of a building will diminish its standard – regarding aesthetics, functionality, and value. Building maintenance, therefore, is an act directed at restoring the standard of a building, its component or element. Every maintenance activity will entail one form of impact or the other on the physical condition of the building. It is assumed that residents judge the adequacy or habitability of their buildings based on predefined standards of physical condition (Abdulkadir*et al.* 2018). Some studies evaluated cognitive responses to the physical conditions of buildings focusing on issues such as the perceived quality of the buildings and environmental quality (Nyameka, *et al.* 2012). Similarly, Mario (2010), described quality as the extent to which a product fulfils the requirements set for it, and 'architectonic quality' as an umbrella term, covering various aspects of quality such as aesthetic, functionality (building efficiency), symbolic and cultural value. In the low-income housing sense, a resident's perception of the quality of his/her building will be related to how 'fine' it is. Low-income earners are perceivably used to low standards and will ascribe a higher quality to inferior materials that can serve their purposes.

The purchase of poor-quality construction materials as a result of low income possibly affects the standard and quality of residential buildings. This is because the use of such materials causes building inadequacy and unexpected accidents. According to Alabi, *et al.* (2021), observed that building collapse is caused either by a natural factor or a man-made factor. The researcher further stated that developing nations suffer frequent collapse of buildings. For example, a country like Nigeria suffers periodic collapse of buildings predominantly caused by man-made factors. To buttress the above example, some studies were conducted few years ago by Kaduna State urban planning and development authority (Kasupda) to determine the key causes of building failure and collapse in Kaduna State. The findings attained showed that sub-standard building materials remained a major issue to building collapse/failure. The author added that low quality building materials intensify the cost of construction above the actual projected cost due to the loss of material during the implementation phase Alabi, *et al.* 2021. However, due to poor quality of residential building material purchase as a result of low income this call for improvement.

Improvement simply means a change for better, that is, progress in development. Alabi, *et al.* (2021) viewed improvement as an activity undertaken based on meeting the target objectives and satisfaction from lower achievement. With reference to this study, improvement connotes the performance gap to be filled by low income house owners in order to improve the standard and quality of their residential buildings. That is, this study collected information from the respondents through the use of questionnaire to determine the present low income residential building and the effects on the standard and quality of such buildings for improvement thereby, generating gaps that are to be filled by the findings of this study of low income and it's effect on the standard and quality of residential building in Kaduna State, Nigeria.

Statement of the Research Problem

Quality is the extent to which a residential building fulfils the requirements set for it, and 'architectonic quality' as an umbrella term, covering various aspects of quality such as aesthetic, functionality (building efficiency), symbolic and cultural value. Negligence of such a crucial aspect of construction can result in the failure of a construction project and in the dissatisfaction of clients and/or residential building occupants. In the low-income housing sense, a resident's perception of the quality of his/her building will be related to how 'fine' it is. Low-income earners are perceivably used to low standards and will ascribe a higher quality to inferior materials that can serve their purposes.

Despite the considerable modifications and revisions to the housing policy over the years, concerns related to quality, efficiency, effectiveness and sustainability of housing programmes still define and frame discussions (Nyameka et al. 2012). The challenges usually dominating the low-income residential housing sector include poor design of houses; houses that are environmentally unsound; houses that are not suitable to the local climate, and high maintenance costs. The residential building client therefore, required improvement because any improvement on the low income building will help improve the standard and quality of these structures in future. This study is therefore design to examine low income and it's effect on the standard and quality of residential buildings in Kaduna State, Nigeria.

Aim and Objectives of the Study

The main purpose of the study is to examine the effect of low income on the standard and quality of residential buildings in Kaduna State, Nigeria. Specifically, the study will sought to determine:

1. The effect of low income in acquiring materials for standard and quality residential building in Kaduna State, Nigeria.
2. The ways of curtailing the difference between and the low income and the standard and quality of residential buildings in Kaduna State, Nigeria.

Research Questions

The following research questions are raised to guide the study:

1. What are the reasons for acquiring low quality materials in residential buildings in Kaduna State, Nigeria?
2. What are the ways of curtailing the difference between low income and the standard and quality of residential buildings in Kaduna State, Nigeria?

Research Hypotheses

The following null hypotheses are formulated and will be tested at 0.05 level of significant:

HO1: There is no significance difference between the mean response of builders and clients regarding the reason for acquiring low quality materials during residential building constructions in Kaduna State, Nigeria.

HO2: There is no significant difference between the mean response of builders and clients as regard ways of curtailing the difference between low income and the standard and the quality of residential building in Kaduna State, Nigeria.

Methodology

A descriptive survey research design was adopted for this study. The study was conducted in Kaduna State, Nigeria. The geographical coordinates of Kaduna State are Latitude 10.609319; Longitude 7.429504 and is located in the Cities place category with the gps coordinates of 10° 36' 33.5484" N and 7° 25' 46.2144" E; sharing boundaries with Zamfara, Kastina and Kano to the North, Bauchi and Pateau to the east, Nassarawa to the south, and Niger and FCT to the west. The targeted population for this study was 22,523 respondents consisting of 21, 340 registered residential buidings and 1,183 builders in all the three senatorial district in Kaduna State, Nigeria. Therefore, the sampled population for the study was 2,019 respondent comprising of 1,435 registered residential buildings and 584 buiders, drawn through the adoption of a multi-stage sampling technique (purposive sampling technique and Yaro Yamane formula for finite population respectively). Purposive sampling technique was used to select three local governments each from the three senatorial district in Kaduna State, Nigeria. The three local government in each of the three senatorial district include: Zaria, SabonGari and Makarfi local government from Kaduna North Senatorial district; similarly, Kaduna north, Kaduna south and Chikun local government from Kaduna Central Senatorial district; Kaura, Sanga and Kagarko from Kaduan South Senatorial district. High numbers of newly constructed residential buildings with total negligence to standard and quality necessitate the choice of Kaduna State for the study. While, registered residential building in each of the three senatorial district were sampled out with the used of Yaro Yamane Formula for a finite population given as $n = N/1 + N(e)^2$ in Abdulkadir, et al. (2018) and because

of the small number of registered residential buildings and builders, the entire population was used for the study; hence the were not sampled.

A structured questionaire titled: Low Income, Standard and Quality of Residential Buildings (LISQRB) was developed by the researchers and validated by three experts was used for the data collected for the study. All sections of research questions were structured so that respondents expresssed their opinion on a four-point rating scale of: Highly Often (HO) = 3.50 – 4.00; Often (O) = 2.50 – 3.49; Moderately Often (MO) = 1.50 – 2.49 and Not Often (NO) = 0.05 – 1.49 respectively for research question one (1). Whereas the rating scale for research question two (2) was: Highly Agree (HA) = 3.50 – 4.00; Agree (A) = 2.50 – 3.49; Moderately Agree (MA) = 1.50 – 2.49 and Not Agree (NA) = 0.05 – 1.49. Mean and standard deviation were the statistical tools used to analyze the data for answering research question; while t-test and was used to test the null hypotheses and 1 and 2 respectively at 0.05 level of significant.

Result

What are the reasons for acquiring low quality materials in low income residential building in Kaduna State, Nigeria.

Table 1: Mean and standard deviation of respondents on the reasons for acquiring low quality materials for residential buildings in Kaduna State, Nigeria N= 2,019

S/N	Items	Mean	Sd	Decision
1	Lack of sufficient finance.	3.62	0.49	Highly Often
2	Use of unskilled labour.	3.62	0.49	Highly Often
3	Increase in Final Cost of Building Products.	3.65	0.48	Highly Often
4	Lack of client commitment toward quality achievement.	3.64	0.50	Highly Often
5	The allocation of projects to unqualified and unmotivated contractors.	1.65	2.04	Moderately Often
6	Purchase of poor-quality construction materials.	3.62	0.50	Highly Often
7	Relatively small sizes of houses.	2.55	1.84	Often
8	Poor building standards in terms of inadequate sound attenuation/heat insulation.	3.63	0.48	Highly Often
9	Lack of basic urban design amenities.	3.67	0.48	Highly Often
10	Inadequate supply of services.	1.61	1.98	Moderately Often
11	Fluctuation in Cost of Construction.	3.71	0.46	Highly Often
12	Substandard quality of workmanship.	1.64	1.99	Moderately Often
		3.05	**0.97**	**Often**

Note: N= Number of Respondent, SD= Standard Deviation

Table 1 present the mean responses of the respondents on the 12 items on the reasons for acquiring low quality materials for residential buildings with grand mean of 3.05 which implies that the reasons for acquiring inferior materials for residential buildings are often in Kaduna State. Ten (10) out of the 12 standard deviation of the items ranges from 0.46 – 1.84 this shows that the respondents were not too far from the mean and were close to one another in their responses. However, two standard deviation items ranges from 1.98 – 1.99 this shows that the respondent were too far from the mean and were not close to one another in their responses. This closeness of the responses adds value to the reliability of the mean.

Result 2

What are the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria.

Table 2

Mean and standard deviation of respondents on the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna state, Nigeria.

N= 2,019

S/N	Items	Mean	Sd	Decision
1	Ability to Purchase quality construction materials.	3.62	0.49	Highly Agree
2	Inspections to residential building during the construction phase.	1.62	2.09	Moderately Agree
3	Ensure project monitoring by ministry of housing.	1.65	2.08	Moderately Agree
4	Ensure registration with a quality assurance body by the Constractors.	3.64	0.50	Highly Agree
5	Need to engender a culture of excellence related to quality on residential building.	1.65	2.08	Moderately Agree
6	External/Internal ceiling finishes/decoration internally.	3.62	0.50	Highly Agree
7	External/internal wall finishes/decoration.	2.50	0.94	Agree
8	allocation of projects to qualified contractors	3.63	0.48	Highly Agree
9	Ability to set up qaulity control on building material by the government.	3.67	0.48	Highly Agree
10	Training and education on low-income house building standards.	3.61	0.48	Highly Agree
11	Reduction in land acquisition and titling.	3.71	0.46	Highly Agree
12	Adquate security of building material during construction phase.	3.64	0.49	Highly Agree
		3.04	**0.92**	Agree

Note: N= Number of Respondent, SD= Standard Deviation

Table 2 shows the mean responses of the respondents on the 12 items on the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State with a grand mean of 3.04 which implies that the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria, agree. Nine (9) items out of 12 standard deviation of the items ranges from 0.46 – 0.94 this signified that the nine (9) respondents were not too far from the mean and were close to one another in their responses. However, three (3) standard deviation items ranges from 2.08 – 2.09 this shows that the respondent were too far from the mean and were not close to one another in their responses. This uncloseness of the responses adds value to the reliability of the mean.

Hypothesis

HO1: There is no significant difference between the mean response of builders and clients regarding the reasons for acquiring low quality materials during residential building construction in Kaduna State, Nigeria

The result of independent sample t-test mean ratings of the respondents on builders and clients as regarding the reason for acquiring inferior materials during residential building construction is presented in table 3. Levene test of homogeneity of variances for the data was .138 (and since the value is greater than the significant level of ($P< 0.05$) the assumption of homogeneity of variance was met. Therefore, t-test could be employed for the analysis.

Table 3

t-test of mean rating of respondents on response of builders and clients as regarding the reasons for acquiring low quality materials during residential building construction in Kaduna State, Nigeria.

Groups	N	df	Mean	Sd		p	Remark
							Kaduna State Nigeria
Builders	584	2,017	69.12	14.46			
Clients	1,435		74.59	11.83	-1.298	0.644	Often

Significant at P>0.05

Table 3 shows the analysis of independent sample t-test of mean achievement scores of Builders and Clients on causes of low income in standard and quality residential building. It revealed that the calculated t-value = -1.298, df = 2,017, p=0.644 indicating p> 0.05. Hence, hypothesis two was retained. This means, there was no significant difference in the mean achievement scores of Builders and clients on the reasons for acquiring low quality materials during residential building construction in Kaduna State.

HO_2: There is no significant difference between the mean response of builders and clients as regard ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria (P<.05).

The result of the t-test mean ratings of the respondents of builders and clients as regard ways of curtailing the difference between low income and the standard and quality of residential buildings in Kaduna State is presented in table 4. Levene test of homogeneity of variances for the data was .138 (and since the value is greater than the significant level of (P< 0.05) the assumption of homogeneity of variance was met. Therefore, t-test could be employed for the analysis.

Table 4

t-test of mean rating of respondents on response of builders and clients as regard ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria

Groups	N	df	Mean	Sd	t-value	P	Remark
Builders	584	2,017	79.12	14.46			
Clients	1,435		75.69	12.83	-1.398	0.864	Agree

Significant at P>0.05

Table 4 shows the analysis of independent sample t-test of mean achievement scores of Builders and Clients on ways of curtailing the difference between low income and the standard and quality of residential buildings. It revealed that the calculated t-value = -1.392, df = 2,017, p=0.864 indicating p> 0.05. Hence, hypothesis two was retained. This mean, there was no significant difference in the mean achievement scores of Builders and clients on ways of curtailing the

difference between low income and the standard and quality of residential buildings in Kaduna State, Nigeria.

Discussion of Findings

The findings in table 1 relating to research question 1 showed that respondents agree with all the items on the reasons for acquiring low quality materials during residential building construction in Kaduna State, Nigeria, (10) out of the 12 standard deviation of the items ranges from 0.46 – 1.84 this showed that the respondents were not too far from the mean and were close to one another in their responses. However, two standard deviation items (no. 10 and 12) ranges from 1.98 – 1.99 this showed that the respondent were too far from the mean and were not close to one another in their responses. The finding showed that the reason for acquiring low quality material during residential building construction are often. This is in conformity with the views of Mario (2010) who asserted that the allocation of projects to unqualified and unmotivated contractors, poor building standards in terms of inadequate sound attenuation/heat insulation, increase in final cost of building products and lack of basic urban design amenities are they possible causes of low quality residential building. Corroborating this finding Abdulkadir, (2018) pointed out that through this lack of clients' commitment toward quality achievement purchase of poor-quality construction materials, Substandard quality of workmanship and use of unskilled labour chosen among others. The finding in Table 2 related to research question 2 revealed that respondents agree that with all the items on the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria, 10 items out of 12 standard deviation of the items ranges from 0.46 – 0.94 this signified that the nine (9) respondents were not too far from the mean and were close to one another in their responses. However, three (3) standard deviation items (no. 2,3 and 5) ranges from 2.08 – 2.09 this showed that the respondents were too far from the mean and were not close to one another in their responses. The findings showed that low income residential buildings need to have a high quality control on building materials by the government, Inspections on residential building during the construction phase, ensure project monitoring by ministry of housing and Ability to Purchase quality construction materials. This finding corroborate with the views of Abdukaldir, (2018) who stated that there should be registration with a quality assurance body by the constractors, allocation of projects to qualified contractors at all times among others.

The findings also revealed the Need to engender a culture of excellence related to quality on residential building. It also agreed on the ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State, Nigeria.Therefore, for standard and quality on residential building residential building, the client must ensure Adequate acquisition and security of building material during construction phase.

Conclusion

The study is determined to examine low income and it's effect on the standard and quality of residential buildings in Kaduna State, Nigeria. The finding of the study serves as the basis for making the following conclusion: that the above mentioned ways of curtailing the difference between low income and the standard and quality of residential building in Kaduna State highly agree by both builders and residential owners (clients) for a good standard and high quality of residential buildings in Kaduna State.

Recommendations

Bases on the findings and implication of the study, the following recommendation were made:

1. Kaduna State Government, through ministry of urban and town planning should organised orientation/seminar from time to time to brainwash the residential building client on what is required at each stage of the housing value chain, from foundation footing, (substructure), through the main building (super structure) and to the covering (superimposed structure) and to the finishing.
2. The Kaduna state government should setup a provision for an effective loan scheme, partial upgrading, effective urban development policy, and improvement of sanitary conditions and enforcement of housing and building codes. Above all, building materials should be subsidies by the government to encourage standard, quality and afforble residential buildings.

References

Abdulkadir, M., Ma'aji, S.A., Okwori R.O., and Salami, K.A. (2018). Entrepreneurial Marketing and Communication Skills Needed by Self-Employed Motor Vehicle Mechanics in the North Central States of Nigeria. *International Journal of Industrial Technology, Engineering, Science and Education (IJITESED).*Vol. 1 No: 1, ISSN: 2682-6569.

Alabi, B., and Fapohunda, J. (2021). Effects of Increase in the Cost of Building Materials on the Delivery of Affordable Housing in South Africa. Sustainability 13, 1772. https:// doi.org / 10.339 0/su13041772.

Mario B. (2010). Reading Measuring Instruments.*A Journal for the History and Philosophy of Science,* Vol. 4, No. 1 (2010) 85-93. DOI: 10.4245/sponge.v4i1.11725. Published online at jps.library.utoronto.ca/index.php/SpontaneousGenerations.ISSN 1913 0465

Nyameka, Z., John, S. & Fidelis, E. (2012). Perceptions of the Quality of Low - Income Houses in South Africa: Defects and their Causes.Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth 6031, South Africa, Fax: +27 41 504 2345.

Ogbu, C. P. (2017). Building Quality Condition and Maintenance Cost: The Case of Public Low Income Housing in Abia State, Nigeria . Department of Quantity Surveying, University of Benin, Nigeria. *JCBM (2017) 1(2). 24-34.*