

SIMILARITIES AND DIFFERENCES IN RESIDENTS' PERCEPTION OF HOUSING ADEQUACY AND RESIDENTIAL SATISFACTION

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Abstract

Housing adequacy and residential satisfaction are two concepts used to evaluate the extent to which housing schemes meet residents' needs and expectations. However, the differences and similarities in the way residents understand these concepts have not been properly articulated in the research literature. This study therefore investigated the differences and similarities in residents' perception of housing adequacy and residential satisfaction with a view to identifying the dimensions of housing adequacy and residential satisfaction evaluation; and the factors that influenced this. The data were derived from a questionnaire survey of 517 residents in public housing in Ogun State, Nigeria; and analyzed using descriptive statistical, factor and categorical regression analyses. The result shows that whereas the residents evaluated housing adequacy based on four key dimensions: ambient condition of interior spaces; security, utilities and neighbourhood facilities; social infrastructure and sizes of main activity areas, residential satisfaction was evaluated based on three dimensions: the physical, social and economic environment of the housing estates; size, type, location, appearance; privacy and security of the residences. Residential satisfaction, tenure and income emerged as the three strongest predictors of housing adequacy, while housing adequacy, employment status and sex of the respondents were the three strongest predictors of residential satisfaction. Age of the respondents was found to be the only predictor of both housing adequacy and residential satisfaction. The key implication of the study is that, in housing research, each of these two concepts can serve as a surrogate for each other. It also implies that to improve the living conditions of residents of public housing, housing policy makers and developers should pay sufficient attention to the needs of all categories of residents by making sure that the housing preferences of workers in the different sectors and age groups are properly incorporated into future housing projects.

Key words: housing adequacy, residential satisfaction, public housing, questionnaire survey, Ogun state

Introduction

Public housing projects across the world are developed for the main purpose of improving the living conditions of citizens in the different countries. In Nigeria for instance, the goal of the current housing policy is to ensure that all Nigerians own or have access to decent, safe and sanitary housing in a healthy environment with infrastructural services at affordable cost, and with secure tenure (National Housing Policy, 2012). In pursuant of this goal, governments at the federal and state levels in Nigeria have developed large-scale public housing for the citizens. In view of the fact that public housing schemes in Nigeria and other countries are implemented within the context of the existing housing policies, there is a need to examine how such housing schemes have achieved the goal of meeting housing needs of the target population.

In an attempt to investigate and understand how public housing schemes meet the expectations of end users; different types of evaluation of such projects have been carried out by researchers in the different countries. The review of literature shows that one of the most common approaches used by researchers to investigate and understand the performance of public housing schemes is the Post Occupancy Evaluation (POE) also known as building evaluation or building-in-use.

Housing adequacy and residential satisfaction are two concepts often used in the POE of housing projects. On the one hand, housing adequacy is seen as a measure of housing quality levels as explained by Lee *et al.* (2014). On the other hand Mohit *et al.* (2010) described residential satisfaction as a measure of the extent to which residents are satisfied with their current housing situations. The existing literature on post occupancy evaluation (POE) of mass housing projects is replete with studies on housing adequacy (see for example Ibem and Amole, 2011; Ibem *et al.*, 2012;

Eggers and Moumen, 2013; Lee *et al.*, 2014); residential satisfaction (see also Ukoha and Beamish, 1997; Salleh, 2008; Mohit and Azim, 2012; Salleh *et al.*, 2012; Ibem and Aduwo, 2013; Jansen, 2014) and the relationship between housing adequacy and residential satisfaction (see for examples Crull, 1996; Choudhury, 2005; Fauzi *et al.*, 2012; Ibem and Amole, 2013). From these studies, residents' evaluation of housing adequacy and residential satisfaction is understood to mean housing occupants' perception of how their current living conditions are sufficient in meeting their needs; and the extent to which they are happy with their housing situations, respectively. These studies also indicate that residents' perception of housing adequacy and residential satisfaction is influenced by a diversity of subjective and objective factors within and outside the housing domain.

Despite the insights gained from the existing studies, there are yet a number of gaps in the existing literature. Specifically, there is a lack of understanding of the similarities and differences in the way residents understand housing adequacy and residential satisfaction. This study argues that a better understanding of these issues can contribute to advancing teaching, learning, and research in housing studies. Therefore, the aim of this study was to investigate and understand the similarities and differences in the way residents understand housing adequacy and residential satisfaction in the context of public housing. The study sought to address two key research questions. These are:

- What are the similarities and differences in the way residents of public housing evaluate housing adequacy and residential satisfaction; and
- What factors influence how residents understand both housing adequacy and residential satisfaction in the context of public housing?

This study builds on existing POEs and contributes to the existing knowledge on the similarities and differences in the dimensions of housing adequacy and residential satisfaction evaluation by residents. It also provides a better understanding of the key variables that can influence how residents in public housing understand housing adequacy and residential satisfaction.

The remaining part of this paper proceeds as follows: Section 2 is the literature review. Section 3 presents the research design and methods and Section 4 is the presentation of result and discussion of findings. The paper ends with some concluding remarks.

Review of literature

Based on the aim and research questions of the study, the review of literature is focused on three main areas: (i) the concepts of housing adequacy and residential satisfaction (ii) theoretical and conceptual approaches to understanding how people perceive and evaluate their housing conditions; and (iii) the nexus between housing adequacy and residential satisfaction.

The Concepts of Housing Adequacy and Residential Satisfaction

Before delving into the concept of housing adequacy, it is important to establish from the existing literature what constitutes adequate housing. One of the comprehensive descriptions of what constitutes adequate housing in the literature was provided at the Second United Nations Conference on Human Settlements (Habitat II), Istanbul, 1996 known as the Istanbul Declaration and the Habitat Agenda. This declaration noted that adequate shelter means more than a roof over one's head. It further explained that adequate housing means:

“adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting; heating and ventilation; adequate basic infrastructure, such as water supply, sanitation and waste management facilities; suitable environmental and health related factors; and adequate and accessible location with regards to work and basic facilities: all of which should be at an affordable cost” (UN-HABITAT, 1996: Paragraph 60).

In addition, the UN-HABITAT (2006) report on national experiences with shelter delivery for the poorest groups also explained that what constitutes adequate housing varies from one country to another; and is influenced by some specific cultural, social, environmental and economic factors. This implies that adequate housing is a multi-dimensional concept describing housing condition that meets occupants' physiological, psychological, security and economic needs.

Following from the above, a number of conceptions of housing adequacy have been put forward by different authors. For instance, Onibokun (1985) conceived of housing adequacy as

encompassing the measure of structural and internal adequacies of dwelling units, availability of amenities, occupancy rate, neighbourhood conditions, and habitability of housing. McCray and Weber (1991) also viewed housing adequacy as a composite image of all the elements in ones housing condition necessary to support the least acceptable standard of living. Corroborating the assertion by the UN-HABITAT (2006), McCray and Weber further explained that residents' perception of housing adequacy is influenced by cultural background; housing norms; values; and the previous experience with the different residential features and norms. Morton *et al.* (2004) were of the view that housing adequacy represents an important aspect of housing quality measurement that deals with the assessment of interior and exterior structural conditions; heating; cooling; and sanitation systems; and residence size relative to users' space needs. Further, in the American Housing Survey, Eggers and Moumen (2013) also described housing adequacy as a situation where there is absence of any form of physical, spatial, and service abnormalities within the dwelling unit and its immediate surroundings. It was on this premise that Le *et al.* (2014) concluded that housing adequacy is an objective measurement of housing conditions.

From the foregoing, it is evident that the different conceptions of housing adequacy in the literature are closely related to the description of adequate housing as presented in the Istanbul Declaration and the Habitat Agenda 1996. The existing literature also indicates that housing adequacy is a measure of the extent to which housing is quantitatively and qualitatively sufficient in meeting residents' housing needs. This means that housing adequacy can be measured from two perspectives: the number of available housing units (housing stock); and the quality of the existing stock (see Aigbavboa, 2013). However, in the context of this study, the focus is on the latter, which deals with the level of sufficiency of housing attributes in relation to residents' needs.

Ibem *et al.* (2012) explained that the objective assessment of housing adequacy involves examination of the presence or absence of social infrastructure; housing services and management practices; and the physical and spatial characteristics of housing units. The implication of this is that qualitative housing adequacy can be objectively measured by assessing the following: (i) interior and exterior structural conditions (e.g. structural soundness of the houses, state of disrepair of building elements such as walls, windows, doors, roofs, floors and ceiling); (ii) spatial characteristics (e.g. sizes and layouts of interior spaces, the number of bedrooms, lighting and ventilation of interior spaces, security and privacy) of dwelling units; (iii) the availability of basic social amenities (e.g. good drinking water, power supply, sanitary services); and accessibility to neighbourhood infrastructure (e.g. educational, healthcare, recreational, shopping and other basic facilities).

Similarly, a survey of the existing literature reveals that several conceptions and definitions of residential satisfaction exist. For examples Kaitilla (1993) described residential satisfaction as household satisfaction with both the house as a distinct physical object and the surrounding neighbourhood environment. This view was collaborated by Hashim (2003) who asserted that residential satisfaction is a measure of residents' contentment with the quality of physical, spatial and social aspects of their housing situations. From another perspective, Galster (1987) described residential satisfaction as an assessment of the difference between households' actual and desired housing situations. Salleh (2008) noted that if the housing conditions are adequate in meeting residents' needs and expectations such assessment may indicate the absence of any complaints and a feeling of contentment. On the contrary, feelings of discontentment and disappointment may suffice if the quality of housing is perceived to be inadequate in meeting residents' expectations and aspirations (Mohit *et al.*, 2010).

From the review of literature presented in the preceding paragraphs, it can be inferred that residential satisfaction measures the extent to which housing occupants feel contented or happy with the quality of their housing conditions (housing units and the surrounding environment) and the extent to which their current housing situation meets their physical, economic, physiological and psychological needs. Therefore, from the definitions of housing adequacy and residential satisfaction identified in the existing literature, it can be concluded that whereas housing adequacy describes residents' perception of the sufficiency level of their current housing situation, residential satisfaction is an expression of the extent to which residents are happy with their present housing condition.

Housing adequacy and residential satisfaction: Theoretical clarifications

Again, the review of literature reveals that housing adequacy and residential satisfaction have been studied using different theoretical and conceptual models. Chief among these is the theory of Housing Adjustment by Morris and Winter (1975). This theory describes the way households assess their housing conditions as a complex process influenced by social context; dwelling units; and neighbourhood characteristics. In their seminal work on a theory of Family Housing Adjustment, Morris and Winter (1975) identified the two criteria used by families to judge their housing conditions to be family norms and cultural norms. The former describes the values (i.e. social, economic and psychological importance) families attach on their housing condition, while the latter represents housing needs derived from cultural standards against which housing conditions are judged. Housing related cultural norms are expressed in terms of housing norms (housing characteristics), which include housing space; tenure type; quality; and neighbourhood norms. According to Morris and Winter (1975), when a household's housing condition does not fit with both the family and cultural norms, housing deficit is said to exist. Housing deficit can manifest in the forms of housing inadequacies and dissatisfaction, and may lead to housing adjustment behaviours such as residential mobility; residential adaptation or family adaptation (Morris and Winter, 1975). The key implication of the theory of Family Housing Adjustment is that housing adequacy and residential satisfaction are simply the assessment of the extent to which households are experiencing deficiencies in housing quality standards; and their inability to derive full benefits and values expected from their present housing condition.

Related to the theory of housing adjustment are the conceptual approaches used to explain how residents' evaluate their housing conditions. Galster (1987:540) identified the two approaches to understanding residential satisfaction to be the purposive approach and the actual-aspiration gap approach. Galster (1985) noted that in the former approach, people are seen to have goals and objectives designed to assist them achieve such goals. Consequently, they tend to evaluate their housing condition based on how they see it help in facilitating the achievement of set goals. This means that people judge their housing situations based on how they perceive their homes to be important in helping them to achieve their individual or family goals. Therefore, the extent to which one's housing condition is seen as playing a facilitating role in the achievement of one's goal in life is a measure of the extent to which his/her housing is sufficient; and the level of happiness one expresses with his/her current housing situation.

In the latter approach, Galster (1987) also made it clear that, people consciously construct a reference quality that they consider "an ideal standard" of what their housing situation should be. The ideal standard is most often a product of socio-economic status; needs; experiences, expectations; and aspirations. Hence, people tend to evaluate their housing conditions based on the "ideal standard" which they have already created a mental picture of, and aspire to have. Again, if the current situation is perceived to be a par with the mentally constructed ideal standard; meaning that there is no difference between the actual and aspired housing conditions, then there is adequate housing or satisfactory housing condition. The actual-aspiration gap approach is consistent with Morris and Winter's (1975) proposition as previously highlighted. In this case, the family and cultural norms represent the "aspired" or "ideal" housing condition that people always want to have at any point in time in their lifecycle.

It is evident from the foregoing review that the existing theoretical and conceptual approaches to studying how residents evaluate the adequacy of and satisfaction with their housing conditions are generally based on human-environment interactions. The theory of Housing Adjustment and Galster's conceptions really help to explain that people generally evaluate their housing conditions based on their experiences and interactions with their current housing situations. This means that people do not just make reference to their needs; ideals; values; aspirations; and expectations in a vacuum when it comes to evaluating their housing situations; rather their assessment is usually a product of the levels of interactions with the prevailing housing condition and other intervening context factors. Put succinctly, residents' evaluation of their housing condition is influenced by a gamut of factors, including the perceived quality and performance of housing characteristics (subjective assessment); and the actual quality and performance of their housing condition in meeting their needs and expectations (objective assessment). According to Francescato *et al.* (1989), the objective assessments of the attributes of housing are weaker predictors than the subjective assessments. Hence, the latter was adopted in the current study.

The nexus between housing adequacy and residential satisfaction

Before reviewing literature on the nexus between housing adequacy and residential satisfaction, it is also important to identify the common research platform for conducting studies on housing adequacy and residential satisfaction. Generally speaking, Post Occupancy Evaluation (POE) has been identified as one of the key approaches engaged by researchers in the different disciplines to explore housing adequacy and residential satisfaction. By way of definition, POE has been defined as a systematic process which gauges users' satisfaction with and importance of designed and built environment (Preiser, 2002), while Stevenson (2008) conceived of POE as a systematic collection and evaluation of information about the performance of a building in use. Furthermore Ornstein (2005) noted that POE is a set of methods and techniques applied during use of the built environment to evaluate building and environment performance from the perspectives of specialists and that of the users. In the context of public housing, Kaitilla (1993) noted that "*POE offers the most reliable and effective method in measuring design criteria and ensuring that household satisfaction is achieved, and if not, measures are taken to address the situation in subsequent designs*" (pg.528). It was on the basis of these submissions that Ornstein (2005) concluded that POE provides a better understanding of users' needs; expectations; and their responses to building and its surrounding environment. This means that POEs are essential for providing feedback to housing policy makers; providers; administrators; and managers on the current housing conditions of residents; and thus help to narrow the gap between users' needs and expectations; and the activities of built environment professionals (Ornstein 2005).

In POE, two of the constructs that have often been used by to investigate and understand the performance of housing projects in meeting users' needs and their attitude towards housing are housing adequacy and residential satisfaction. Although the existing studies (Crull, 1996; Fauzi *et al.*, 2012) suggest that there is a link between these two concepts, there are very few attempts to investigate and establish this using empirical data, especially in developing countries.

From the definitions of housing adequacy by Ibem and Amole (2011); Eggers and Moumen (2013); and Lee *et al.* (2014), it is understood that housing adequacy is a measure of the sufficiency of housing characteristics in meeting users' needs; expectations and aspirations. Linking this to residential satisfaction, Choudhury (2005) was of the view that when people evaluate the extent to which they are satisfied with their housing conditions, they are merely expressing the degree at which they perceived their housing conditions to be adequate in meeting their housing needs, expectations and aspirations. Furthermore, other studies (Kaitilla, 1993; Mohit and Azim, 2012; Salleh, *et al.*, 2012; Ibem and Aduwo, 2013; Aigbavboa, 2013) have also described residential satisfaction as a measure of the extent to which people are contented with how which their current housing condition. In deed authors (Ibem *et al.*, 2012; Mohit *et al.*, 2010; Aigbavboa, 2013) have argued that housing adequacy and satisfaction assessment involve residents' perception of the objective characteristics of dwelling units; neighbourhood conditions (socio-economic, physical); and housing management practices. These authors cited earlier have also shown that residents' personal profiles such as age; sex; income; marital status; educational background; length of stay in the residence; income; education; and tenure status can influence their evaluation of housing adequacy and residential satisfaction.

Regarding the dimensions of housing adequacy and residential satisfaction evaluation by housing occupants; it is observed that very few studies have been conducted on this aspect housing research. Among the few existing studies on this, is a survey by Ibem *et al.* (2012) involving 156 household heads in incrementally constructed low-income public housing in Ogun State, Nigeria. That study reveals that the residents understood housing adequacy from three main perspectives: the design of the housing units, availability of social infrastructure and adequacy of management practice in the housing estate. Another study involving 452 households heads in public housing also in Ogun State, Nigeria by Ibem and Aduwo (2013) shows that the residents evaluated residential satisfaction based on seven dimensions: (i) neighbourhood facilities; (ii) management of the housing estates; (iii) sizes of dwelling units; (iv) type and location of residences in the housing estates; (v) housing services; (vi) housing unit characteristics; and (vii) social environment of the housing estates.

From the preceding review of literature, it is possible to draw some inferences on the possible relationship between housing adequacy and residential satisfaction. First is that residents' evaluation of housing adequacy and residential satisfaction involves the assessment of the performance of housing conditions in meeting their current needs, expectations and aspirations after and /or during a

consumption experience. Second is that housing adequacy and residential satisfaction can be used in housing quality assessment from end-users' perspective. Third is that both concepts involve subjective and objective assessment of housing quality parameters. As Aigbavboa and Thwala (2013) rightly explained, on the one hand, objective measures refer to the actual measurements, such as the presence; the lack of or quantities of attributes. On the other hand subjective measures refer to perceptions; emotions; attitudes; and intentions towards the housing attributes. Lastly, the existing studies also show that housing adequacy and satisfaction assessment involves a number of interacting variables related to the residents' personal profiles; dwelling units; and neighbourhood conditions; and housing management practices.

It is also obvious from the review of literature that extensive research work has been done on how residents evaluate their housing conditions. However, there is a dearth of empirical studies on the similarities and differences in the way residents understand adequacy of their housing situation and the extent to which they are satisfied with it. Therefore, the current study was an attempt to bridge this research gap.

In achieving this goal a conceptual framework of this study was developed (Figure 1). The framework suggests that both housing adequacy and residential satisfaction are components of POE that measures the extent to which housing projects meet users' needs and expectations. The two concepts involve the subjective assessment of the objective characteristics of housing conditions by the residents using parameters and criteria established by experts. This subjective assessment, which is as a result of the interaction between the socio-economic characteristics of residents with the objective housing attributes, is used in predicting how housing conditions meet residents' needs (see as explained in Francescato *et al.*, 1989). Figure 1 also shows that although there could be differences in the dimensions of assessment of housing adequacy and residential satisfaction by residents; and the factors influencing this; a combination of the different dimensions of evaluation helps to explain how residents perceive the sufficiency of their housing condition; and the extent to which they are contented or happy with it. The framework (Figure 1) proposes that whereas housing adequacy measures the sufficiency of housing attributes, residential satisfaction measures the extent to which residents are happy with their housing attributes. This implies that both concepts measure how the current housing situation (objective housing characteristics) generally meets residents' needs and expectations. Therefore, the findings of studies on housing adequacy and residential satisfaction provide feedback into housing policy formulation; the conception; development; and management of housing projects, which are all important in determining the objective characteristics of public housing.

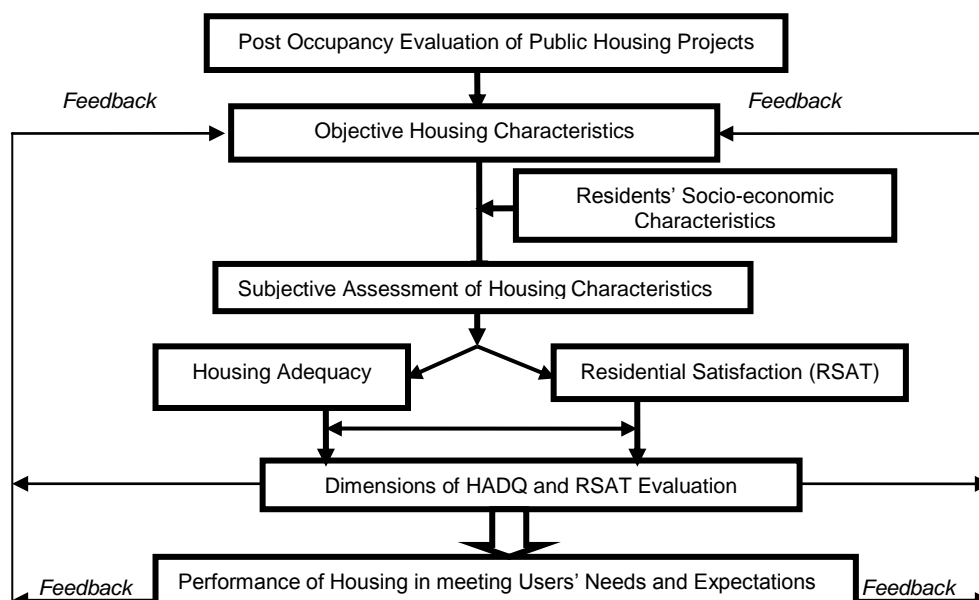


Figure 1: Conceptual Framework of the Study

Research methods

The data used in this paper was taken from a larger study conducted to evaluate public housing in Ogun State southwest Nigeria. A cross-sectional survey of households in nine of the twelve public housing estates constructed between 2003 and 2010 was conducted in the study area. At the time of the survey 1,411 housing units were identified, but only 709 representing around 50.3% of the completed housing units were occupied in four urban areas of including Abeokuta (the State capital), Ijebu-Ode, Ota, Agbara and Ibafo. In determining the sample size, no specific formula was adopted. This was because of the number of sample needed for the data analysis and the nature of analyses involved. According to Israel (1992), if descriptive statistics (e.g. mean and frequencies) are to be used, then any sample size will suffice. Israel further explained that a good size sample of between 200 and 500 is needed for analysis of covariance and multiple regression analyses; meaning that a sample size should be appropriate for the analysis that is planned. In view of this, coupled with the need to select the housing estates in such a way that housing units for the low, medium and high income people were included in the sample, stratified sampling technique was employed in selecting 670 housing units representing about 95% of the occupied number housing units identified. This translated to 670 households selected for the survey.

The survey took place between December 2009 and February 2010. A total of 670 questionnaires were administered by hand to one adult family member found in each housing unit by the researchers and four trained field assistants. However, 517 valid questionnaires representing about 77% of the administered questionnaires were retrieved. The questionnaire instrument used was designed by the researchers based on the findings from the review of literature. A total of 33 objective housing attributes comprising housing units attributes (sizes, ventilation and lighting of interior spaces; security, privacy) availability of good drinking water; electricity; sanitation; and access to neighbourhood facilities and good management practice in the housing estates were used to collect data on housing adequacy. The respondents were specifically asked to rate the level of adequacy of each of the 33 housing attributes using a five-point Likert scale ranging from 1 for "Very Inadequate", 3 for "Neither Inadequate nor Adequate" to 5 for 'Very Adequate'. Similarly, 31 housing attributes from the aforementioned key housing sub-components were also used to measure residential satisfaction. The respondents were also asked to rate the level of satisfaction with their housing situations based on a five-point Likert scale ranging from 1 for "Very Unsatisfied", 3 for "Neither Satisfied nor Dissatisfied" to 5 for 'Very Satisfied'. Data on the personal profiles of those encountered in the survey were also collected using the questionnaire.

The data was analysed using SPSS software package Version 20. Three main types of analyses were conducted. The first was descriptive statistics (percentages and mean values) which produced proportions and percentages of the demographics of the respondents, mean adequacy scores (MAS) for the 33 housing attributes used in measuring housing adequacy and mean satisfaction scores (MSS) for the 31 housing attributes used in measuring residential satisfaction. In the context of this study, MAS represents the average adequacy score on each of the 33 housing attributes used in assessing housing adequacy by the 517 respondents. In the same vein, MSS is the average satisfaction score on each of the 31 housing attributes used in assessing residential satisfaction by all the 517 respondents. In interpreting the MAS and MSS, values between 1.0 and 2.9 were considered to be within the region of inadequacy and dissatisfaction, respectively, while values between 3.01 and 5.0 were in the region of adequacy and satisfaction. Value 3.0 is the neutral point describing neither inadequate/dissatisfaction nor adequate/satisfaction conditions. Similar interpretation was adopted in previous studies (e.g. Salleh, 2008; Ibem and Aduwo, 2013). The second type of analysis conducted was exploratory factor analysis with principal component methods. Responses by the 517 respondents on the 33 and 31 housing attributes used in measuring housing adequacy and residential satisfaction, respectively, were subjected to factor analysis. Specifically, the exploratory factor analysis was used to identify the key dimensions of housing adequacy and residential satisfaction evaluation by the respondents. It was also used as a means of dealing with the multi-collinearity issue that may arise due to intracorrelations among the 33 and 31 housing attributes used in measuring housing adequacy and residential satisfaction, respectively.

The third type of analysis conducted was multivariate statistical analysis. The Categorical Regression Analysis with optimal scaling technique also known as CATREG in SPSS was used to explore the variance explained by R^2 ; and in identifying the predictors of both housing adequacy and residential satisfaction in the survey. In carrying out this particular analysis, mean adequacy score (MAS) described earlier was the dependent variable, while ten variables comprising nine items related to the socio-economic characteristics of the respondents and one housing related variable: mean

satisfaction score (MSS) were the independent variables. Also in determining the predictors of residential satisfaction, MSS was the dependent variable, while the nine variables related to the residents' socio-economic characteristics and one housing related variable: MAS were the independent variables. CATREG analysis was used in this study because of its advantages over general linear models (GLMs) in the analysis of nominal, ordinal and numerical data (Ibem and Aduwo, 2013) and the fact that it can be run with small samples and with least assumptions as explained by Shrestha (2009) in an empirical study on the use of categorical regression models with optimal scaling for predicting indoor air pollution concentrations inside kitchens in Nepalese households.

To ensure validity and reliability of findings of the study, the questionnaire instrument used to gather data for the study was pre-tested. Feedback from the exercise was incorporated into the final version of the questionnaire that was administered to the residents. Cronbach alpha coefficient test was also conducted on all the 33 and 31 variables used to assess housing adequacy and residential satisfaction, respectively. The test result showed Cronbach alpha values of 0.89 for housing adequacy and 0.89 for residential satisfaction. Comparatively, these values are more than 0.7 recommended by Pallant (2011); meaning that the scale of measurement used in the questionnaire instrument was reasonably reliable in measuring the two constructs investigated in the survey.

In adopting this research method, the authors are not ignorant of the obvious limitations. The first limitation is that our survey data were drawn from residents of public housing constructed between 2003 and 2010; and thus the findings may not necessarily apply to other contexts; and public housing constructed before 2003 and after 2010 in the study area. The second limitation is that, the variables investigated in the survey are not exhaustive as several other variables were not included in the current research.

Result

Demographics of the respondents

The demographic profiles of the respondents in the survey show that 64% and 36% of the residents encountered in the research were males and females, respectively. The result also shows that about 96 % of them had tertiary education and a majority of them were between 31years and 59 years. Also around 63% were low-income earners, while 33% and 62% were renters and owner-occupiers, respectively. Further, around 79% of the respondents were found to have lived in their residences for between 1year and 3 years; while 71% had household size of four persons and above. Similarly, 58% were public sector workers. This result suggests that the respondents are conversant with their housing conditions; and thus are qualified to provide reliable data on the adequacy levels of, and satisfaction with their current housing situations.

Evaluation of housing adequacy

Result of the analysis of the respondents' perception of housing adequacy showed overall mean adequacy score (MAS) of 2.80; suggesting that the respondents felt that their current housing situation in all the nine housing estates was not sufficient in meeting their needs, expectations and aspirations. Table 1 shows the MAS for each of the 33 housing attributes used to examine housing adequacy in the survey. It is evident from the second column of Table 1 that the most adequate housing attribute as identified by the respondents was privacy in the residences with MAS of 3.9, followed by the sizes of bedrooms with MAS of 3.8, while the least adequate housing attribute was availability of recreational/sporting facilities in the housing estates with MAS of 1.5. Notably, the average sizes of bedrooms identified in the different housing typologies sampled was 13.0sqm.

Result of the exploratory factor analysis using the variable Principal Normalization method with the criteria for convergence set at 0.00001 also revealed the four factors with eigenvalues greater than one which accounted for around 51.1% of total variance across the 33 housing attributes used in measuring housing adequacy. These represent the key dimensions the residents responded to in their evaluation of housing adequacy in the survey. Examination of data in Table 1 reveals that ambient condition of interior spaces and adequacy of security, utilities and neighbourhood facilities appeared as the first dimension residents responded to, and this explains around 27.7% of the total variance across all 33 variables investigated. Next was adequacy of social infrastructure explaining

around 11.8% of the total variance; followed by adequacy of privacy and size of sleeping area explaining around 6.8% of the total variance across the 33 attributes. The last dimension was the sizes of living and dining spaces explaining around 4.8% of the variance.

Table 1: Housing adequacy evaluation by the respondents

Dimensions of Evaluation	MAS	Factor Loading	Eigenvalue	Percentage of Variance	Percentage Cumulative
1: Ambient condition of interiors and adequacy of security, utilities and neighbourhood facilities			9.130	27.70	27.70
Natural Lighting in Living and Dining Spaces	3.47	.671			
Natural Lighting in Bedrooms	3.60	.635			
Natural Lighting in Kitchen	3.64	.504			
Fresh air in Living and Dining spaces	3.50	.653			
Circulation of fresh air in bedrooms	3.58	.619			
Level of thermal Comfort in the Residence	3.21	.569			
Protection against Noise Pollution	3.30	.454			
Protection against Dampness in the Building	3.13	.479			
Protection against insects and dangerous animals	3.10	.566			
Security Measures in the Residence	3.01	.657			
Fire Safety measures in the Residence	2.68	.595			
Power Supply	2.42	.625			
Potable Water Supply	2.24	.615			
Sanitary/ Drainage Facilities in the Residence	2.85	.454			
Refuse Disposal facilities in the Estate	2.04	.633			
Parking Spaces provided in the Estate	2.67	.612			
Open Spaces and Green Areas in the Estate	2.15	.593			
Shopping Facilities in the Housing Estate	1.61	.607			
Accessibility to Public Transport Service	2.80	.487			
External Lighting in the Housing Estate	2.60	.630			
Road Network within the Estate	2.69	.671			
Communal Activities within the Estate	2.65	.470			
Management and Maintenance of Facilities in the Estate	2.41	.718			
2: Social Infrastructure			3.906	11.84	39.54
Educational Facilities in the Estate	1.61	.618			
Recreational/ Sporting facilities in the Estate	1.47	.598			
Play Ground for Children in the Estate	1.85	.568			
Medical and Health Care facilities in the Estate		.515			
3: Sizes of sleeping area in the residence			2.246	6.81	46.35
Sizes of Bedrooms in the dwelling units	3.80	.463			
4: Size of Living and Dining Spaces			1.566	4.75	51.10
Sizes of Living and Dining Spaces	3.57	.472			
Attributes not loaded on any factor					
Places of Worship in the Estate	2.77	-			
Number of Bedrooms	2.99	-			
Sizes of Cooking and Storage Spaces	3.36	-			
Privacy of Residence	3.89	-			

As noted earlier, the Categorical Regression Analysis (CATREG) was used to identify which of the selected independent variables (sex, age, marital status, income, highest educational qualification, length of residence, household size, tenure, employment status and mean satisfaction score) are significant predictors of the dependent variable (housing adequacy). The result in Table 2 shows that five variables: age; marital status; income; tenure mean satisfaction score appeared as significant predictors of housing adequacy in the housing estates sampled. Based on this result, the study further investigated the perception of housing adequacy across the different groups. It was found that greater proportion (43%) of those who indicated that their housing condition was adequate were within the age group of between 18 years and 30 years, followed by 38% of those of 60 years and above and those between ages 46 years and 59 years, respectively. Similarly, greater proportions of those who felt that their housing situations were adequate were in marriage relationship; middle and high income earners and owner occupiers.

Table 2: Predictors of housing adequacy

Variables	Standardized Coefficients		df	F	p
	Beta	Estimate of Std. Error			

Respondents' Sex	.037	.024	1	2.325	.128
Age of Respondents	.083	.028	2	8.883	.000*
Marital Status	.068	.023	2	8.809	.000*
Average Monthly Income	-.094	.033	3	8.269	.000*
Highest Educational Qualification	.032	.022	2	2.043	.131
Length of Stay in the residence	.008	.028	1	.090	.764
Household Size	-.028	.026	1	1.193	.275
Tenure Type	.119	.029	1	16.585	.000*
Employment Status	.033	.030	1	1.248	.264
Mean Satisfaction Score	.766	.020	1	1412.898	.000*
Dependent Variable: Mean Adequacy Scores					

* Significant predictors

The beta weights also presented in Table 2 reveal that the three strongest predictors of housing adequacy were mean satisfaction score (i.e. residential satisfaction); tenure; and income. A combination of these five independent variables significantly predicted housing adequacy in the survey with $F(15, 24) = 76.974$, $P < 0.000$. The R^2 value (0.697) of the model indicates that around 70% of the variance in housing adequacy is explained by our regression model.

Evaluation of residential satisfaction

Result of the descriptive statistics also revealed overall mean satisfaction score (MSS) of 2.9. Again, this suggests that the residents also felt discontented or were not happy with their current housing conditions in all the nine housing estates investigated. This means that their housing condition in the estates is deficient in meeting residents' needs, expectations and aspirations. The result in Table 3 however shows that as it is true with housing adequacy, the level of privacy in the residences has the highest MSS of around 3.9; suggesting that the residents were most happy with the level of privacy in their dwelling units. This is followed by sizes of bedrooms in the dwelling units with MSS of 3.8 and sizes of living and dining spaces (3.7). The attribute with the least MSS was the proximity of residence to shopping facilities; suggesting that the residents were least happy with the distance between their homes and the nearest shopping facilities.

Table 3: Residential Satisfaction evaluation by the Respondents

Dimensions of Evaluation	MSS	Factor Loading	Eigenvalue	% of Variance	Percentage Cumulative
F 1: Physical, Social and Economic Environment of Housing Estates		-	8.93	29.80	29.80
Noise in the Housing Estate	3.45	.487			
Water Supply and Sanitary Services	2.44	.671			
Electrical Services	2.46	.634			
Proximity to Recreation / Sporting Facilities	1.90	.587			
Proximity to Public Infrastructure and Urban Services	2.59	.566			
Proximity to Shopping Facilities	1.86	.523			
Proximity to Place of Work	3.14	.515			
Proximity to Medical and Health Care Facilities	2.00	.540			
Proximity to Children's School	2.41	.464			
Proximity to the nearest Market	2.12	.587			
Prices of goods and services in the Housing Estate	1.90	.567			
Business and Job opportunities within and around the Estate	2.00	.468			
Communal Activities in the Housing Estates	2.72	.522			
Design of Residence in relation to residents' culture	3.19	.675			
Rules and regulations in the Housing Estates	3.28	.658			
Management and Maintenance facilities in the estate	2.53	.726			
Cleanliness of the Housing Estate	2.90	.681			
F2: Size, Type Location, Appearance and privacy of residence			4.18	14.47	44.29
Sizes of Living and Dining Spaces	3.65	.609			
Sizes of Bedrooms in the house	3.79	.583			
Number of Bedrooms in the Residence	3.01	.452			
Sizes of Cooking and Storage Spaces	3.39	.574			
Type of Residence	3.39	.634			
Bath and Toilet facilities in the Residence	3.23	.646			
Building materials used in the construction of house	3.02	.501			
Location of residence in the housing estate	3.43	.595			
External appearance of residence	3.25	.623			
Natural lighting and air circulation in Living and Bed rooms	3.33	.729			
Level of Privacy in the residence	3.89	.528			

F3: Security			2.054	6.67	50.96
Security of life and property in the housing estates	3.38	.487			
Level of crime and anti-social activities in the Estate	3.41	.529			
Variable not Loaded on any of the Factors					
Cost of Acquiring/ Rentage of Residence	3.37	-			

Total variance explained = 51.0%

In addition, result of the exploratory factor analysis of the 31 housing attributes used to measure residential satisfaction in the survey also shows that three factors accounted for around 51% of the variance across the 31 attributes investigated. Table 3 reveals that the first factor which accounted for around 30% of the variance in the data was the physical, social and economic conditions of the housing estates with 17 factors loaded on it. Next was size, type; location, appearance and privacy of residence explaining around 15 percent of the total variance across the 31 attributes; while the last was security of lives and property, which accounted around 7% of the variance across the 31 housing attributes. These represent the three key dimensions from which the resident evaluated their levels of contentment of happiness with the housing conditions in the nine public housing estates sampled.

The study also investigated the predictors of residential satisfaction among the respondents using CATREG analysis. The demographic characteristics of respondents: sex; age; marital status; income; educational attainment; length of residence; household size; tenure; employment; and mean adequacy score (MAS) (independent variables) were regressed on mean satisfaction score (dependent variable). The result (Table 4) reveals that the five variables, namely, sex; age; educational attainment; employment; and housing adequacy appeared as the predictors of residential satisfaction in the housing estates sampled. The beta weights also presented in Table 4 reveal that the three strongest predictors of residential satisfaction in the order of importance were housing adequacy; employment; and sex. A combination of these five independent variables significantly predicted residential satisfaction in the survey with $F(10, 35) = 30.563$, $P < 0.000$. The R^2 value (0.690) of the model indicates that 69% of the variance in residential satisfaction is explained by the regression model. Based on this result, the study further investigated the perception of residential satisfaction across the different groups. It was found that around 47% of those who indicated that they were happy with their current housing condition were public sector workers; and 44% of those who were 60 years and above. In fact, the result shows that satisfaction with housing conditions increases with age amongst the respondents.

Table 4: Predictors of Residential Satisfaction

Variables	Standardized Coefficients		df	F	p
	Beta	Estimate of Std. Error			
Respondent's Sex	.065	.029	1	5.069	.025*
Age of Respondents	.054	.028	2	3.693	.026*
Marital Status	.038	.023	2	2.833	.060
Average Monthly Income	.033	.068	1	.241	.623
Highest Educational Qualification	.063	.029	2	4.659	.010*
Length of stay in the residence	-.003	.026	1	.010	.921
Household Size	.033	.031	1	1.113	.292
Tenure Type	-.007	.030	1	.062	.804
Employment Status	-.072	.025	1	8.403	.004*
Mean Adequacy Scores	.821	.022	23	1383.750	.000*

Dependent Variable: Mean Satisfaction Score

* Significant predictors

Discussion

As noted earlier, two research questions were stated in this study; and from the result, two key related issues were identified and brought forward for discussion. The first issue is related to the research question on the similarities and differences in the way the resident's encountered in the survey evaluated housing adequacy and residential satisfaction. The second one is concerned with the factors that influenced how the residents evaluated housing adequacy and residential satisfaction.

First, from the result on housing adequacy and residential satisfaction assessments as seen in the overall mean scores of 2.8 and 2.9, respectively, it is evident that the respondents generally felt that their housing situation was not sufficient in meeting their current needs and expectations; and consequently, they were not contented or happy with their current housing conditions in the estates.

This implies that the quality of housing in the estates is not up to the desired or expected standard in meeting the residents' housing needs. This result contradicts the findings of previous studies by Ibem *et al.*, (2012) and Ibem and Amole (2013) on the adequacy of, and satisfaction with core housing in the study area. Further, it was found that the level of privacy in the residences has the highest MAS and MSS; and thus was perceived by the residents as the most adequate and satisfactory housing attribute. This is followed by the sizes of bedrooms. This means that the design and construction of the dwelling units meet residents' need for privacy and that bedroom size of 13.0sqm provides a sufficient sleeping area for the residents. In the same vein, the data in Table 1 show that the residents felt that the majority of the housing unit attributes were the most sufficient and satisfactory, while neighbourhood facilities were the least sufficient and satisfactory housing components in the estates. Although Jansen (2014) indicated that people living in poor and inadequate housing conditions can be satisfied with their housing situation by lowering their aspirations, this result shows that in the context of public housing, when residents perceive their housing condition as insufficient in meeting their needs, expectations and aspirations, it is most likely that they would express happiness or contentment with such housing situation. The implication of this is that inadequate housing condition can result to dissatisfaction with one's housing situation. This result appears to be in support of previous studies (Crull, 1996; Choudhury, 2005; Fauzi *et al.*, 2012; Ibem and Amole, 2013) suggesting that there is a direct relationship between housing adequacy and residential satisfaction. This is indeed one area in which the way residents' perceive housing adequacy is similar to the way they evaluate residential satisfaction.

It was also found out that whereas the greater percentage of those who evaluated their housing situation to be sufficient were the younger people within the age group of between 18 years and 30 years, followed by those of 60 years and above. This shows that more younger people than the elderly felt that their housing condition in the estates was sufficient. On the contrary, the highest proportion of those who were happy with their housing condition were residents of age 60 years and above; meaning that more elderly than the younger residents were satisfied with their present housing situation. This result clearly shows that even within the same sample and housing conditions, the various age groupings can perceive housing adequacy and residential satisfaction differently. Similarly, the result also shows that respondents in the survey evaluated housing adequacy based on four key dimensions, while residential satisfaction was evaluated from three key dimensions. In fact, the result reveals that in the evaluation of housing adequacy, the residents tended to view social infrastructure and the size of main activity areas in the residences as distinct components. This is contrary to the result of the evaluation of residential satisfaction, where security of lives and property was seen as one of the key components of residential satisfaction evaluation. The emphasis on security of lives and property is understandable going by the fact that the need for security is universal as Zabairu (2002) explained in her conceptual paper on housing concept and design in a developing economy: the Nigerian housing problem. Based on this result, it can be inferred that in the context of public housing, residents understand housing adequacy and residential satisfaction from different perspectives; meaning that there are differences in the dimensions of evaluation of these two concepts by housing occupants. The difference in the number of dimensions of evaluation notwithstanding, a critical examination of the dimensions extracted from the exploratory factor analysis reveals that in both cases, the first dimensions are closely related in content as emphasis is on the physical and socio-economic characteristics of the housing estates, while the third and fourth dimensions of evaluation of housing adequacy are incorporated in the second dimension of evaluation of residential satisfaction. This is an indication of some sorts of similarities in the dimensions of evaluation of the two concepts by the residents; and can be attributed to the similarities in the housing characteristics in the nine estates sampled.

The second research question deals with the factors that influenced the residents' evaluation of housing adequacy and residential satisfaction. The CATREG analyses show some interesting results. Specifically, our survey data indicate that five variables emerged as significant predictors of both housing adequacy and residential satisfaction. Of these, the three strongest predictors of housing adequacy were residential satisfaction; tenure; and income, respectively, while the three strongest predictors of residential satisfaction were housing adequacy, residents' employment status and sex, respectively. Although this result supports the finding of previous studies (including Lu, 1999; 2002; Ibem and Amole, 2013) suggesting that age and gender are significant predictors of residential satisfaction; it however shows that there is a difference in the factors that explain both housing adequacy and residential satisfaction. In contrast, the following were observed: (i) age was the only predictor of both housing adequacy and residential satisfaction; (ii) residential satisfaction was the

strongest predictor of housing adequacy; and (iii) housing adequacy emerged as the strongest predictor of residential satisfaction. All these are clear indications that in the context of public housing, the age and level of happiness of the residents with their housing condition can help explain how housing occupants can perceive the sufficiency of their housing situations. In the same vein, our survey data indicate that the age of the residents and their perception of sufficiency of their housing condition can also explain the extent to which housing occupants are happy with their housing situation. This is yet another pointer to the fact that there are similarities and differences in the factors that influence residents' perception of housing adequacy and residential satisfaction.

Conclusions

This study investigated and analyzed the similarities and differences in the way residents' evaluate housing adequacy and residential satisfaction using data obtained in a survey involving 517 adult residents in nine public housing estates in urban areas of Ogun State Southwest Nigeria. Based on the result, the following conclusions can be made. First is that there are obvious differences in how residents of public housing evaluate housing adequacy and residential satisfaction. These are seen in the way different age groups perceived the two concepts; dimensions of evaluation; and the factors that influenced residents' perception of these two concepts. In terms of similarities, the residents' age and their perception of the objective characteristics of housing are the two variables that can simultaneously explain differences in the perception of housing adequacy and residential satisfaction amongst the residents in public housing.

The second conclusion is that the factors that determine how residents evaluate the adequacy of their housing situation are residential satisfaction, their sex; employment status; educational attainment; and the level of contentment with their housing situation, while the factors that can explain how residents perceive satisfaction with their housing condition are their tenure; income; and marital status; and the level of sufficiency of the housing characteristics.

Findings of this study have implications for housing policy formulation; research; and provision in two key areas. First is that, in housing evaluation research, housing adequacy and residential satisfaction can be used as a substitute or surrogate for each other. This means that either of these two concepts can produce similar result upon which informed conclusions on issues such as housing quality; residents' quality of life; housing adjustment behaviour; success of housing projects; performance of housing providers and managers in meeting the needs of users can be made. Therefore, this study has shown that housing researchers can also evaluate mass housing schemes based on residents' perception of housing adequacy as against residential satisfaction, which has been predominantly used for this purposes across the world.

Second is that to ensure improved living conditions of residents of public housing, especially low- and middle-income earners; housing policy makers and developers in Nigeria and other developing countries, should pay sufficient attention to the needs of all categories of age groups when it comes to the location of mass housing projects close to where there is easy access to basic social amenities; the spatial characteristics of housing units; security of lives and property in the residences. A situation where the majority of residents who felt that their housing conditions was sufficient were the younger people and those who expressed happiness with their housing conditions in public housing in the study were mainly public sector workers and those of 60 years and above should be addressed by making sure that the housing preferences of workers in both the public and private sectors of the economy and the different age groupings are properly incorporated into future housing projects.

In all, based on the evidence from this study, our survey data can be considered to have provided empirical support to the basic assumption in the existing literature and the conceptual framework of the study that although there is a strong relationship between housing adequacy and residential satisfaction, similarities and differences exist in the way residents understand these two concepts.

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