

**POST-OCCUPANCY EVALUATION OF OUTDOOR
SPACES OF PUBLIC HOUSING ESTATES FOR HOUSING
SATISFACTION OF MIDDLE INCOME RESIDENTS IN ENUGU, NIGERIA**

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DEDICATION:

In loving memory of my Late parents: My father, *Chief* Joseph Obi Emereonyekwe, a colossus, whose early sojourn with the “white man” inspired him to pioneer the cradle of education in our entire community, a feat that earned him the title “**Ọchọ-Ụzọ**” “**The Pathfinder**”. He produced the first Ehime-Mbano graduate in the old Okigwe Division; My mother, *Ezinne* Alice Ihemmadu Obi, an Amazon, who taught me and my siblings the virtues of moral education. To my immediate family: My loving wife, and my children -my never ending love.

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ABSTRACT

In Public Housing Estates in Enugu, outdoor spaces within residential areas are not planned or designed with due considerations for the social, economic and cultural requirements of residents. This is always evident by the haphazard and chaotic nature of the residential outdoor spaces which are predominantly occupied by the middle income residents in the housing estates. No prior empirical studies have been carried out to determine such outdoor users' needs. Previous studies on Post Occupancy Evaluation of completed buildings focused on indoor spaces and the exterior envelop of the buildings, but paid no attention to the outdoor space needs of the residents. This encourages modification/re-adaptation of such outdoor spaces thus creating a gap that needs to be filled through a concerted research on the subject. There is no existing template for such outdoor space needs and their design, hence the need for the study. The aim of the study was to determine the post-occupancy conditions of outdoor spaces for the satisfaction of the middle-income residents of government housing schemes in Enugu Metropolis. The objectives include: i determination of the extent of modification/re-adaptation of outdoor spaces have taken place in the study area; ii the residents' level of satisfaction of the existing outdoor spaces in the study area iii the outdoor space-needs of the occupants in the study area and iv the mean functional space requirements m^2 for the outdoor activities taking place in the study area. m^2 for the outdoor activities of the residents. The study adopted the survey design. Personal observations and pretested questionnaire were used to generate the required data. The population of study consisted 4028 units in 10 estates that were purposively selected for the study. The 10 estates used for the study include: Greenland Phases I-III, Maryland Phase I, Ehocol Phase II, Trans Ekulu Phases I-VI, Riverside Phases I-II, Golf Course Phase I, Real Estate Uwani, Federal Housing Phases I-II, Ebano and Fidelity. Krejcie & Morgan established mathematical equation was applied to determine sample size of 421.houses for the survey.339 copies of questionnaires 81% were retrieved. The questionnaire was designed in 5-likert scale format. Determination of the validity of the instrument was done by a statistician and two research fellows in the Department of Architecture. Split-half test applied to determine the reliability of the instrument using Cronbach's Alpha method gave a value of 0.741 coefficients. The data were analyzed with PCA and ANOVA. The level of modification/re-adaptation of outdoor spaces in the study area was averagely high 77%. They include outdoor recreation 19.078%. outdoor games 14.377%, informal sector activities 10.340%, outdoor parking 4.815%, small scale formal enterprise 4.419, home base enterprise 4.252%, playground 4.219%, ramp for physically challenged people 4.206%, animal husbandry 3.731%, schools 3.472%, sanitation equipment 3.028%. The residents' outdoor space needs were equally high 76%. The mean outdoor space requirements were determined for 2bedroom bungalows 240.67 m^2 ; 2/3Bedroom Block of Flats 298 m^2 ; 3bedroom bungalows-311 m^2 ;4 bedroom bungalows 323 m^2 ; 4 bedroom Storied houses 400 m^2 ; and5 bedroom Storied houses 501 m^2 .

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

In Public Housing Estates in Enugu outdoor spaces within residential areas are not planned or designed with due considerations for the social, economic and cultural requirements of occupants. This is always evident by the haphazard and chaotic nature of the residential outdoor spaces, which are predominantly occupied by the middle income residents in the housing estates. Outdoor spaces refer to spaces, which can be in the form of courtyards, porches, sit-outs, patios, balconies, verandahs, walkways, outdoor steps, indoor-outdoor linkage, outdoor kitchens/dinning, children's playground and landscaping (Adegbenro, and Ogunsote, 2011). They are common appendages to a home, (Jones, et al, 2000). Outdoor spaces play crucial roles in the definition of individual and collective residential functions as posited by Okoye, (2011); whereby the overall compound provides outdoor spaces for socio-economic and cultural activities such as public reception, cooking, playing, poultry, and gardening. In hot humid tropical environments, greater percentage of residential satisfaction is derived from the outdoor spaces where several outdoor functional activities are carried out especially for the low and middle-income groups of residents due to restricted indoor spaces. Today, it is not certain if outdoor spaces were adequately provided for, and where they are provided, it has not been ascertained if they were given the required attention in their planning, design and maintenance capable of providing specific housing satisfaction of residents. There are so far no studies on the user outdoor needs and outdoor space requirements of residents especially as occasioned by today's climate change, which demands special attention on the outdoor spaces. Many studies, that focused on completed buildings have attempted to broaden the scope of post occupancy evaluation, by applying similar terms such as "building appraisal", "building evaluation", "building diagnosis", and "buildings in use" to discuss studies that focused on completed building projects but made no emphasis on outdoor space requirements. For example,

1. Preiser and Schramm, (1998) focused on evaluation process concerning building performance so as to integrate aesthetic factors with technical and economic values of the buildings.
2. Watt, (2007) also used “building pathology” as another aspect of building evaluation process dealing specifically with dilapidated building and its associated renovation works.
3. Vischer, (2002), used “Building Evaluation” in determining building defects and deficiencies and for formulating design and construction criteria, as well as identifying design errors and clarifying design objectives.

Other aspects of housing satisfaction studies dwelt on residents’ feelings about inadequate provision of their current residential environments to serve as basis for improvement of the existing situation by housing providers. (Michelson, 1977; Francescato et al. 1976). For example:

1. Abdul Aziz et al, (2012) stated that inadequate space provision in low-income housing units leads to extension of buildings to take up the surrounding outdoor spaces as vital part of the existing houses.
2. Odum, (2015), carried out a study to find out residents’ view about landscaping provision with the integration of naturalness within public housing in Enugu metropolis, and found that residents were not satisfied with the level of naturalness in the whole housing estate outdoor environment especially on landscaping and provision and green spaces.

Some studies focused more on building spaces (bedrooms, kitchens, and state and quality of materials), and neighborhood infrastructure (hospitals, schools, shops). For example,

1. Ibe and Aduwo, (2013), focused on building types, number of rooms, state of repairs, walling materials, building components, finishes and services
2. POE in Johannesburg Country Club estate by Emuze et al, (2013), in determining the level of satisfaction was centered on quality of indoor environment, covering quality of air, daylight, temperature, noise control, and thermal comfort.
3. Oladiran, (2013) carried out investigation survey of students’ hostels accommodation in University of Lagos South West Nigeria, which focused on building facilities such as toilets, bathrooms, bedrooms, reading rooms, kitchen, fixtures, laundry, meeting rooms, water,

electricity, natural lighting, indoor temperature, ventilation, cleaning, refuse disposal, sporting and mini-market.

In all these studies, no emphasis was made specifically on the user outdoor space need and requirements of residents as mentioned earlier, thus creating a gap that needs to be filled through a detailed research on outdoor spaces. (Bruning et al., 2004).

Consequently, no template has been developed in connection with user requirements within the residential environment, a situation that could only be resolved through a detailed research into ways and means of adapting outdoor spaces to user-needs. To date, there are no standards in the State that spell out specific detailed guideline on outdoor spaces in general except the Enugu State Planning Bye-laws that dealt on few items such as setbacks, plot coverage, zoning regulations and building lines. Also The Draft National Building Code of Nigeria promulgated in 2006 has not been passed into law, as such, Nigerian designers use American and British standards. For example, Regulation requires developers to use 33.3% of their total land area for construction in residential areas and 40% for commercial concerns. The conventional size of building popular within Nigeria occupies more than 33.3% of normal plot size (15x30m or 20m x 30m) Moreover, some other advanced states like Lagos allow up to 60% for residential and 70% for commercial.

This study has also observed increasing need of outdoor spaces in residential housing in Enugu, as evidenced by forced post-occupancy modification, re-adaptation and extension of existing buildings. The study having observed the disorderly and chaotic manner the existing housing units and their surrounding spaces are being re-planned, to their increasing use, intends to evolve a design template to make those spaces properly guided. This study is focused on the nature of outdoor spaces in relation to users' satisfaction through post-occupancy surveys targeted at the residents' of public houses in Enugu metropolis developed between 1963 and 2017. During the period of the surveys, (2012 and 2016), 4028 housing units specifically selected for this study from 10 estates occupied by the middle-income residents were identified for the purpose of this study.

1.2 STATEMENT OF PROBLEM

A common observed phenomenon in public housing estates in Enugu is the inadequacy of what appears as outdoor spaces within residential areas. This emanates from the fact that they are not planned or designed with due considerations for the socio-economic and cultural needs of the housing residents. Indeed, no prior empirical studies have been carried out to determine such users' needs. According to Ononugbo et al, (2010) urban estates in most Nigerian cities including Enugu City are in unsatisfactory conditions because dilapidated buildings with inadequate outdoor spaces plague their surroundings. The immediate consequences of this are increased residential dissatisfaction, which might have led to response-reactions of outdoor re-adaptation and modifications as observed by researchers. Post Occupancy Evaluation (POE) becomes necessary as a means of determining residents' level of satisfaction in the existing estates specifically on the quality and adequacy of the outdoor spaces. There are so far no studies on the user outdoor needs and outdoor space requirements of residents, which focused specifically on the outdoor spaces. Available studies focused more on the building envelop quality of materials, indoor air quality and recreational facilities. For instance, Adesoji, (2012), dwelt on visual quality, quality of estate roads, maintenance, structure, services, detailing and location quality; POE on Residential buildings of Public Housing Estates in Ogun State Nigeria, also on users' satisfaction by Ibem et al, (2013), focused on building types, number of rooms, state of repairs, walling materials, building components, finishes and services, POE in Johannesburg Country Club estate by Emuze et al, (2013), was centered on Indoor Environmental Quality (IEQ) covering air quality, day lighting, temperature, acoustic control, and thermal comfort. In all these studies, little emphasis was laid specifically on the user outdoor space needs and requirements of residents, thus creating a gap that need to be filled through a detailed research on the subject.

This poses enormous challenge what this study is set out to achieve. The outcome of this is capable of enhancing measures towards appropriate design and planning of outdoor spaces for overall housing satisfaction of middle-income residents of public housing estates in Nigeria.

1.3 AIM OF STUDY

The aim of the study was to evaluate the post-occupancy conditions of outdoor spaces for housing satisfaction of the middle-income residents of public housing estates in Enugu Metropolis.

1.4 OBJECTIVES OF STUDY

The specific objectives were:

To determine the extent of modification/re-adaptation of outdoor spaces in the studied housing estates

To determine the residents' level of satisfaction of the existing outdoor spaces in the study area

To determine the outdoor space-needs for the residents in the study area.

To determine the mean functional space requirements (m^2) for the outdoor activities of the residents in the study area.

1.5 RESEARCH QUESTIONS

1. What is the extent of modifications and re-adaptations of the outdoor spaces in the study area?
2. What is the residents' level of satisfaction of outdoor spaces with the existing outdoor spaces in the study area?
3. What is the residents' outdoor space needs in the study area?
4. What is the mean functional space requirement of the outdoor activities of the residents in the study area?

1.6 RESEARCH HYPOTHESES

The Null hypotheses and based on the topic and research questions are as follows:

Hypothesis One

Ho1: The extent of modifications and re-adaptations of the outdoor spaces in the studied housing estates is not significant.

Alternative Hypothesis

H1: The extent of modifications and re-adaptations of the outdoor spaces in the studied housing estates is significant

Hypothesis Two

Ho2: The residents' level of satisfaction of with existing outdoor spaces in the housing estates is not significant.

Alternative Hypothesis

H2: The residents' level of satisfaction of with existing outdoor spaces in the housing estates is significant

Hypotheses Three

Ho3: The residents' outdoor space needs in the housing estates cannot be significantly identified and classified.

Alternative Hypothesis

H3: The residents' outdoor space needs in the housing estates can be significantly identified and classified.

Hypotheses Four

Ho4: There is no significant variation in the mean functional space requirements (m²) of the outdoor activities of the residents in the housing estates.

Alternative Hypothesis

H4: There is a significant variation in the mean functional space requirements (m²) of the outdoor activities of the residents in the housing estates

1.7 SCOPE OF STUDY:

The scope of the study covered outdoor spaces of 4028 housing units of different prototypes built by State and Federal governments between 1963 to 2017. They include detached and semi-detached bungalows, storey buildings, and flats which were randomly selected and qualified for this study. The estates include Greenland Estate Phases I, II & III (2005-2006) Maryland Estate Phase I (2005-2006). Ehocol Estate Phase II, Republic Layout (1990). Trans Ekulu Housing Estate Phases I, II, III, IV, and V developed in old Anambra State (1979 – 1983); Trans Ekulu Housing Estate Phase VI (1987 - 1988); Riverside Housing Estate Phases I&II Abakpa Nike (1966 –1967) and Real Estate, Uwani (1963-1964). Others include Federal Housing Estate Phases I&II Trans Ekulu (1983-1984); Ebeano Housing Estate, (1999-2000), Golf Course Estate Phase I, GRA, (Year 2000). Consequently, 10 housing estates were selected out of 11 according to Polit and Hungler criteria, which stipulate that residents must live within a minimum of 10 years to justify satisfaction. Excluded were all “Sites and Service Housing Scheme” and all housing units built by individuals and private property developers, where both the design and the layouts of the housing units were not made in accordance with the approved prototypes. Therefore, Coal City Gardens Estate, GRA (2007-2012) was excluded from the list.

1.8 LIMITATIONS OF STUDY:

1. The number of housing units counted in the layout drawings obtained from government ministries and agencies were in variance with the number of the units counted physically on site. This is because some of the houses have been demolished, modified or converted to mixed uses in some areas. However, the researcher resolved this problem by personal observations and interactions with the residents who helped in identifying and marking out the affected buildings.

1.9 SIGNIFICANCE OF STUDY

There is need to enhance for the residents in the area a functional spaces within the building surroundings. The success of this study will;

1. Encourage future research on the subject matter.
2. Provide neat healthy outdoor spaces
3. Establish mean space requirements for outdoor activities of the housing residents.

4. Enhance advancement of knowledge by promotion of post-occupancy evaluations

1.10 JUSTIFICATION OF STUDY:

Post occupancy evaluation and modification if applied successfully will stand as a useful tool with which comfortable public residential estates are created for the residents of Enugu.. Generally, it is essential to undertake performance studies of occupied buildings and their outdoor spaces in view of the quest for more efficient housing being built in future to meet occupants' satisfaction.

1.11 AREA OF STUDY:

The study area is Enugu City, the capital of Enugu State.

1.11.1 Geographical Location of Enugu Metropolis

Enugu Metropolis lies between latitude $6^{\circ}, 23' N$ to $6^{\circ}, 38' N$ of Equator and longitudes $7^{\circ}, 26' E$ to $7^{\circ} 37' E$ of Greenwich Meridian. (Fig.1). It covers about 72.8 km^2 (Ofomata, 2002). Development westward is restricted by rugged scarp land, therefore urban expansion progresses southwards towards Agbani and eastwards towards Abakaliki, (Onokola, 1982).

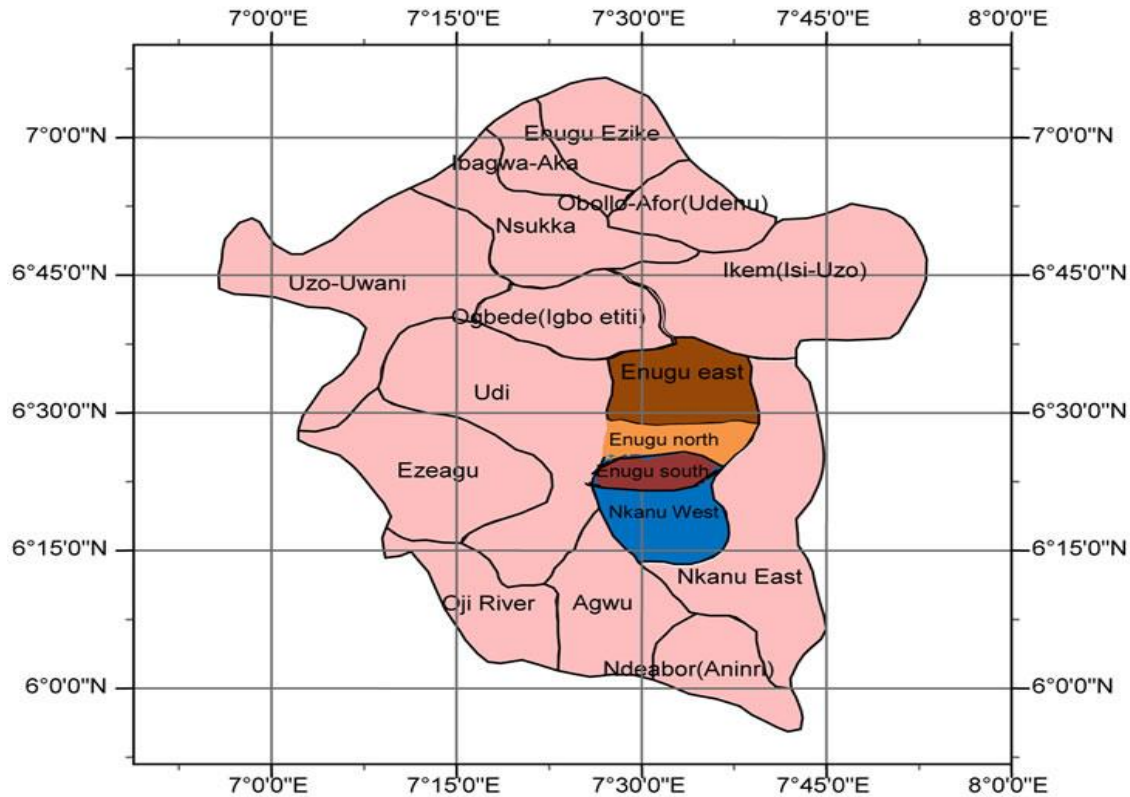


Fig.1: Enugu map with geographical coordinates

Source: Geographical Map of Nigeria. (2016)

1.11.2 Vegetation and Climates

Vegetation of Enugu Metropolis:

Rainforest vegetation is disappearing due to anthropogenic forces and occasional harmattan fires, which have devastated the trees. The trees have typical long and thick barks, which protect them from harsh conditions. Man and fire have devastated the trees such that they grow long taproots and thick bark to survive the hard conditions. The grasses especially the elephant grasses possess strength that withstand dry season fire. Enugu is known for thick forest growth with wild oil palm trees within the southern part of the city is giving way to savannah vegetation because of rural farming practices around the city. Thus, Enugu's tropical rainforest vegetation has been gradually reduced to derived Guinea Savanna due to anthropogenic activities

Climates:

Enugu metropolis has tropical savannah climate. The climate of Enugu metropolis is humid and this humidity is highest between March and November. Maximum wind speed recorded varies between 43 -78 km/h (Fig.2)

Rainfall

Annual rainfall varies between 100mm– 209mm with highest amount recorded between June and July, the wettest months. The lowest rain, falls around February during the dry season with a value as low as 3.1 mm (Table 1)

Temperature:

In Enugu city, the average annual temperature is 26.3°C. (Fig.3)

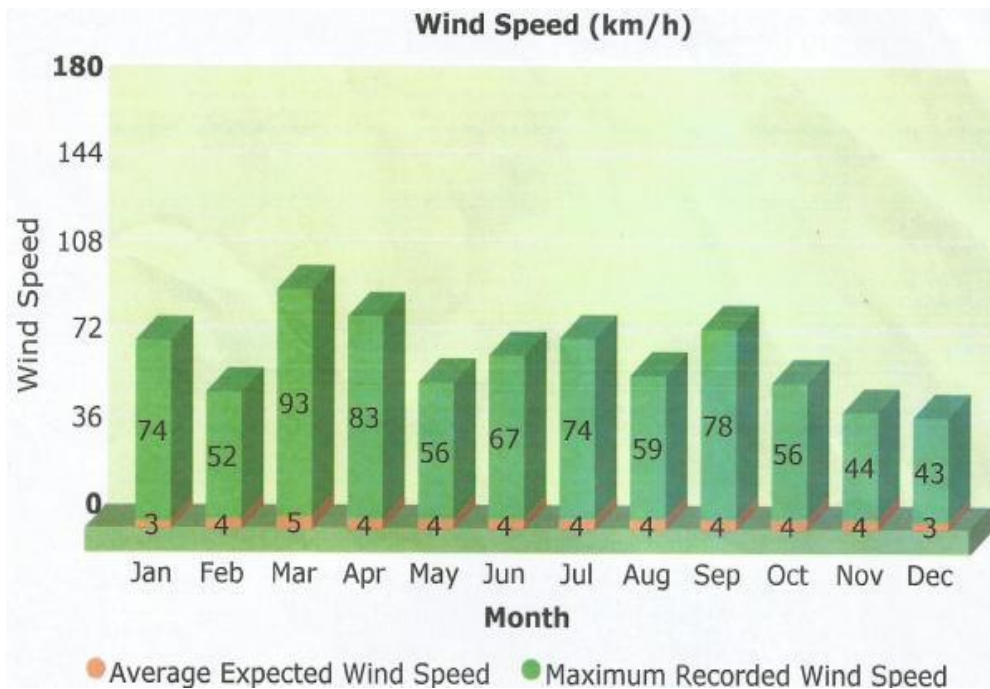


Fig.2 Graph of Average Wind Speed record for Enugu Metropolis.

Sources: Nigerian Meteorological Agency (NIMET), Abuja 2017

Table 1: Average Monthly Total Rainfall (mm) in Enugu between 2000 to 2015.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	0.5	0.5	0	181.5	89.7	279.4	508.3	359.1	317.5	318.8	2.3	25.8
2001	0	37.6	62.4	198.7	346.4	244.8	319.2	264.3	230.5	253.5	2.5	0.7
2002	0	0	111.5	200.9	192.4	354	313	149.3	249.7	105.3	28.8	0
2003	0	5.1	61.7	148.9	109.9	263.7	186.7	390	243.5	72.9	82.9	11.6
2004	38.8	0	9.7	144.5	211.2	140	216	187.2	331.9	181.6	0	0
2005	1.6	0	90.2	194.1	263.7	356.7	340.2	432.1	192.4	261.7	35	0
2006	0	26.7	48.6	160.9	277.2	289.6	368.3	268.4	176.3	303.4	0	0
2007	0	0	111.6	261.3	376.1	344.9	226.8	235	392.3	242.2	68.1	4.1
2008	0	6.1	25.8	161.1	188.7	285.9	259.2	96.2	256.6	217.4	0	0
2009	18.2	15.7	30	103.6	223.8	316.8	206.4	100.2	195.1	313.4	24.3	0
2010	32.4	0	32.3	202	357.5	206.1	298.5	331.8	339.7	226.5	0	0
2011	0	28	72.5	305.5	273.8	188.8	152	130.6	407.9	118.1	0	0
2012	0	46.5	10.4	159.1	219.7	296.4	263.3	121.6	270.7	332.5	0	0
2013	0	0	2.9	74	234.3	286.9	400.4	290.2	334.4	227.4	39.8	0
2014	1.2	0	37.0	221.3	292.4	301.3	338.7	206.9	411.1	304.6	3.2	0
2015	0.5	3.1	8.9	170.6	211.8	272.8	273.1	208.6	201.3	299.3	1.1	0

Source: Nigeria Meteorological Agency, Airport, Enugu, 2017.

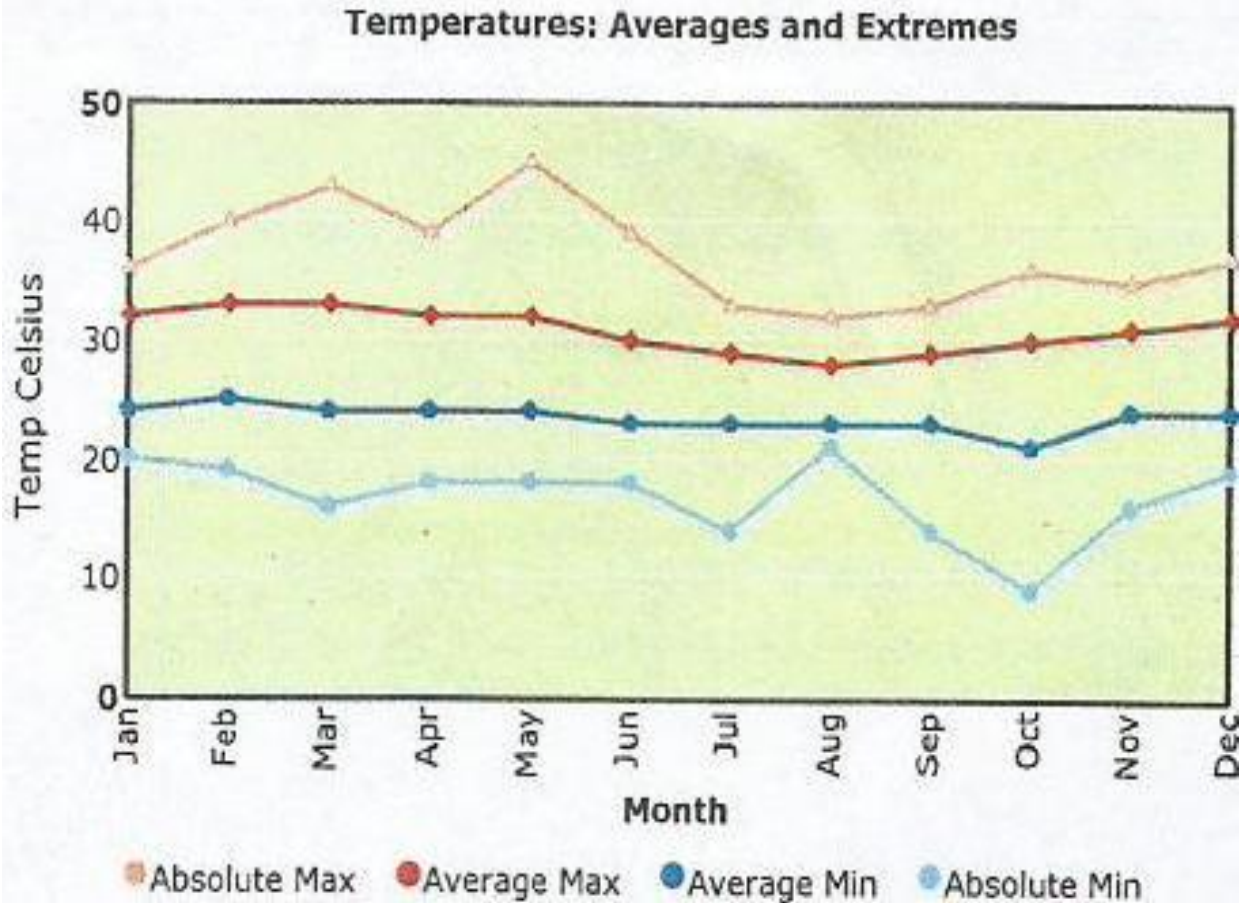


Fig.3 Average and Extreme Temperatures of Enugu Metropolis

Sources: Nigerian Meteorological Agency (NIMET), Abuja (2017)

Land Use Pattern in Enugu

The major land uses in the study area include mining, agriculture, commercial and residential. Residential land constitutes more than 50% of total land mass. Enugu metropolis constitutes about 20 residential neighborhoods that are classified into low, medium and high-density residential zones with specific housing types. Settlement in the city is usually laid out in distinct camps and residential quarters. In Enugu city, for example, residences are delineated into the Government Residential Area (GRA), which was a settlement base for the Europeans, Asata, Ogbete, Railway Quarters, Iva Valley, Colliery Camps (Coal Camps), Railway, China Town and Artisan Quarters. As population increased so was the increase of demand for housing. New lands were consequently created for housing in form of layouts. They include Ogui Urban, Ogui New

Layout, Obiagu, New Heaven layout, Awkunanaw, Uwani Layout, Achara Layout, and Independence Layout (Fig.4). Others include Abakpa, and Trans Ekulu. The study observed that GRA and Independence Layouts are of Low Density neighborhoods with plots sizes of 50mx100m for the High Income residents. Others are made of medium and high-density neighborhoods with plot sizes of about 15mx24m and setbacks between 2m and 3m for middle and Low Income residents (Egbenta, 2009). In the high-density residential areas, such as Ogui layout and Obiagu, tenements buildings are common.. Bungalows and duplexes are prevalent in the low-density residential areas while mixed uses are common in some other areas. There is concentration of commercial activities observed along major streets such as Kenyatta, Edozie, Agbani Road, Zik Avenue, Chime Avenue, Ogui Road, Obiagu Road, Abakpa Nike Road, Emene Road, Damija Road, Emene and Coal Camp.

Description of Outdoor Spaces in the Study Area

Observations were made from the ten (10) selected housing estates. The surveyed housing units were grouped into 2-bedroom, 3-bedroom, 4-bedroom, and 5-bedroom house types (detached, semi-detached, block of flats and storey houses). Outdoor spaces include car parking spaces, sidewalks, landscape elements, pedestrian access and walkways, spaces for water storage, garbage collection, small-scale poultry and crop gardens, domestic and pet animals. The outdoor spaces identified in the household units are similar according to prototypes, although in the upper middle class, the outdoor spaces are larger. Car parking spaces were converted to makeshift shops and mechanic workshops in some areas. Cars are also parked on the streets and any available spaces in some areas. In other areas, kitchens are converted to bedrooms in some buildings while cooking is done in improvised outdoor spaces in majority of the housing units including verandahs. No elaborate landscaping in majority of the housing units except few old economic trees. No well-defined waste disposal facilities observed in majority of the housing units. Outdoor meetings are done outside the compound in open spaces not properly designed. The most powerful arguments for providing outdoor spaces in residential estates is for recreation, social interaction, and economic purposes for residents

2.0 CHAPTER TWO

THEORETICAL AND CONCEPTUAL FRAMEWORK

THEORETICAL FRAMEWORK:

Post Occupancy Evaluation Theories; Housing Satisfaction Theories (Theories and Models); Housing Theories; Theories on Outdoor Spaces.

2.1 POST OCCUPANCY EVALUATION THEORIES

The first theory was formulated to help researchers to handle complex residential neighborhoods, and prepare the fundamental principles for the approach, while the second dwells mostly on ecological environments. They include:

1. Bronfenbrenner's approach (1976, 1979, and 1983) states that the ecological environment in of human habitation is perceived as an organized habitat and that the ecological study of human development stresses the value of the reciprocal connections and the mutual influences between people and the socio-cultural and physical environment in shaping human behavior and development. The Microsystem is a pattern of activities, roles and interpersonal relations, which a developing person experienced over time in a given setting, in connection with a defined physical and material characteristics' (Bronfenbrenner and Crouter, 1983, p. 380). It deals with a system of relationships between people and their immediate environment of activity: home, school, playing area and work place. Bronfenbrenner defines the setting, as a place with specific physical characteristics, where the partakers are direct involvement in specific activities with the same group of people and objects, for a defined and short period.

The Mesosystem is made up of interrelations between two or more settings, which one experiences at a particular period one's life, for example, the relationship between living conditions and the nature of the playground in the neighborhood; the peculiar play patterns between families of the neighborhood for children, or for adults, including work and social life. The Exosystem consists of a type of settings which do not engage the person as an active partaker, but in which events occur' (Bronfenbrenner, 1979, p. 25)

The Macrosystem includes the institutions of cultural and the sub-cultural settings in which one lives: including the socio-economic, educational, legal and political systems,

Benefits of POE include to identify and find solutions to problems in buildings, respond to user needs, improve space utilization, have better understanding of implication on a change to building, increase user satisfaction and long-term improvement in building performance, improvement in design quality benchmarking for shared learning resource, provides opportunity for improving effectiveness of building procurement. Each institution has access to knowledge gained from many building projects while information is made available to wider audience.

2. The naturalistic inquiry paradigm approach. This theory stipulates that the characteristics of any proposed evaluation approach should inculcate an open-ended approach; resident participation; an inclusive and focused approach; an inductive spatial definition; a multi-faceted methodological approach; the use of diverse units of analysis; and the case-study method of reporting. The two theories, which form the basis for any approach to post occupancy evaluation, provide the guidelines for dealing with deferent aspects of neighborhoods

2.1.1 Housing Satisfaction: Theories and Models.

1. Housing adjustment theory: The housing adjustment theory was proposed by Morris and Winter,(1978). It stipulates that if a household's current housing meets the norms, the household is likely to express a high level of satisfaction with the housing and the neighborhood. An incongruity between the actual housing situation and housing norms results in a housing deficit, which gives rise to residential dissatisfaction.

2. Expectancy-value model: In the expectancy-value model proposed by Rosenberg (cited in Francescato et al., 1989), evaluations are made to determine people's expectations or needs so that the evaluated object either improved or reduced the attainment of their objectives. Specifically, Morris and Winter (1978) (cited in Salleh, 2008), brought about the idea of "housing deficit as a tool for conceptualizing residential satisfaction

3. Discrepancy theory of satisfaction: "Expectancy Disconfirmation Paradigm" (Oliver, 1981), is product of discrepancy theory of satisfaction which states that, "If performance exceeds expectations, customers will be positively disconfirmed (satisfied)".On the other hand, "if

performance fails to meet expectations, customers will be negatively disconfirmed (dissatisfied)". Expectations of customers are dependent on their previous experience, from the products they bought including information from friends and associates as well as marketing information and advertising (Kotleretal, 1996). It is from the theory that Bruning et al, (2004), defined housing satisfaction as the gap that exists between residential needs/aspirations and the immediate value, such as neighbourhoods' safety, accessibility to areas of interest, and, the quality the immediate environment. It follows from the assertion that satisfaction by the occupants of any building should extend and close the gap beyond the building envelop by including the surrounding outdoor elements extending to the immediate neighbourhood. This is part of the target objectives envisaged to achieve in this research, to close the gap between the buildings envelop and the functional outdoor spaces used for socio-economic activities. Oliver, (1989) also proposed that expectations could be exceeded in two different ways:

(a) The level of performance is within a normal range (the product was better than expected).

(b) The level of performance is surprisingly positive (one would not expect that the product would have performed so well) and delightful. Other advocates of disconfirmation paradigm as measurements of satisfaction include Bearden and Teel, (1983); LaBabera and Marzursky, (1983); Patterson et al., (1997); Tse and Wilton, (1988).

4. Equity theory of satisfaction: the equity theory has also been applied to customer satisfaction. This theory states, "If individuals compare their input/output ratios with those of others, the consumer will be adjudged to be satisfied if the net gain is perceived to be fair". Parker and Mathews, (2001) in recent times observed a developing variance in the nature and meaning of satisfaction, adopted by many firms who use different reference points as a means of comparison of their customer satisfaction figures. They therefore developed, a number of methodologically harmonized national customer satisfaction indices (Hackl and Westlund, 2000). For example, the American Consumer Satisfaction Index (ACSI) and the European Customer Satisfaction Index (ECSI) are the two major customer satisfaction indices for the United States and the European countries respectively (Fig.4). Figure 5 presents the model used by ACSI to measure satisfaction with government agencies. In the ACSI model, customer expectations influence the evaluation of quality and forecast how well the product or service will perform. Perceived quality is the extent to which a product or service meets the customer

expectation and this will greatly influence customer satisfaction. Lastly, satisfaction has an inverse relationship to customer complaints, which is measured as the percentage of respondents who reported a problem with the measured product or service within a specified period.

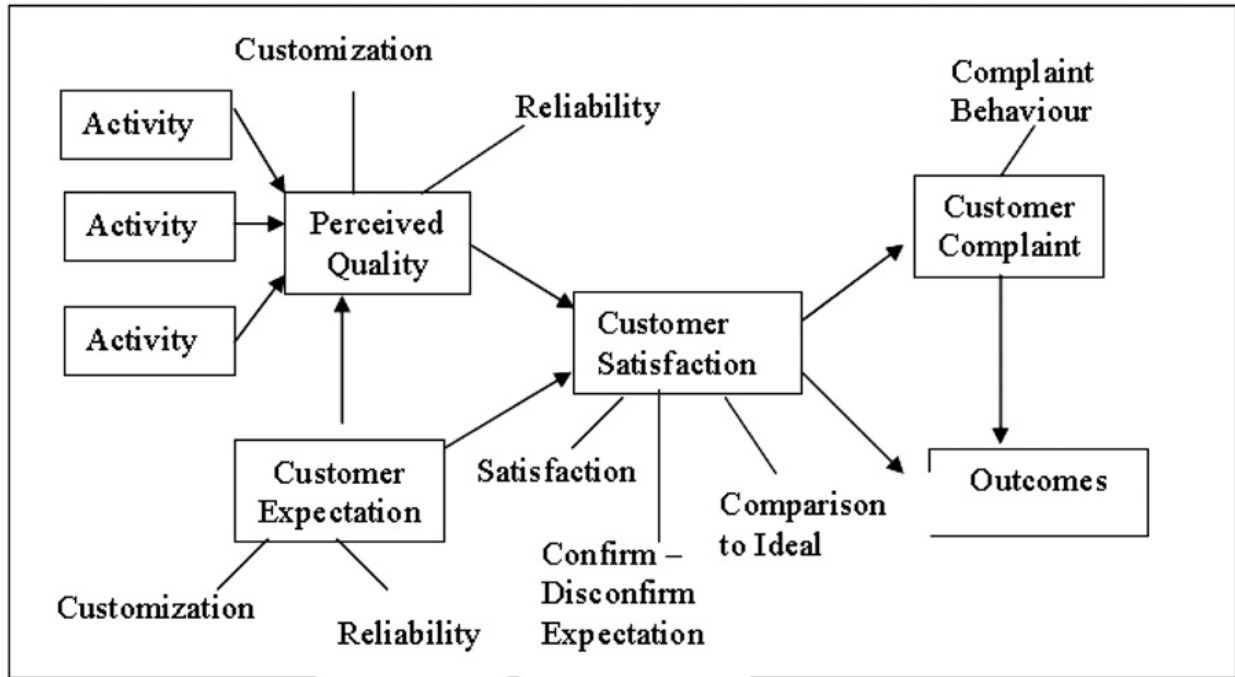


Figure 4: ACSI model for government agencies.

Source: The American Consumer Satisfaction Index (ACSI). The ACSI Model for Most Government Agencies <http://www.theacsi.org/government/govt-model.html> (2018)

Cooper, et al, (1991) stipulate that planning, conducting and applying phases are all common to each type of post occupancy reviews. The model is similar with the proposed guideline for POE for government and public buildings in Malaysia shown in Figure 5 (Nawawi and Khalil, 2008). The Malaysian model is made up of three phases namely; initial, process and recommendation phases of six stages as against the nine stages or procedures in that of Department of Public Works DPW, (2009) in Brisbane, Australia. The six sequential steps, which incorporate all the nine procedures of DPW (2009), are: identification of building parameters, evaluation of objectives, selection of planning approach, conduction of POE inspection, application of findings and actions in response to feedback. However, both activities implicated in both studies are similar. The proposed guideline was seen and taken by government for public buildings in Malaysia to be effective and relevant.

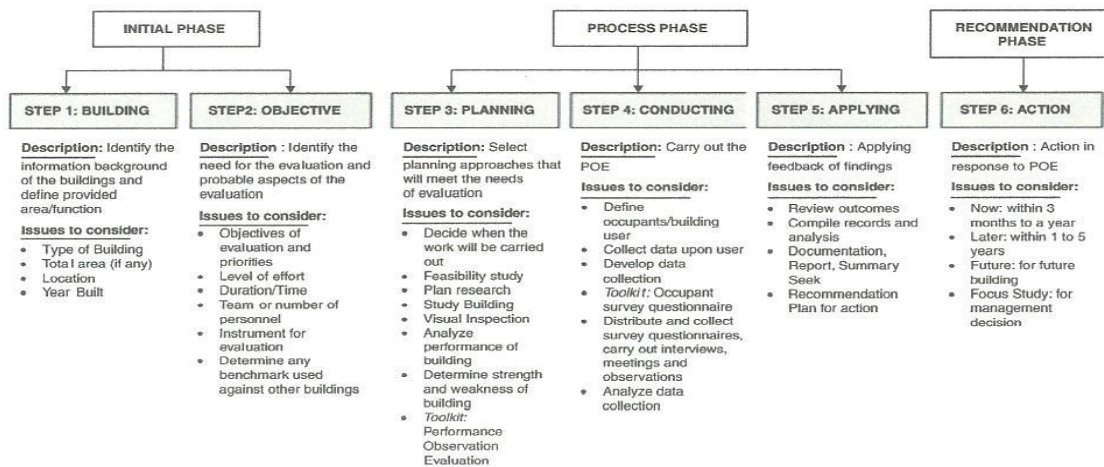


Figure 5: Proposed guidelines for POE for Government and Public Buildings in Malaysia

Source: Nawawi and Khalil (2008).

5. The stress-threshold model: Wolpert (1965); Brown and Moore (1970) stipulated that people do not leave their place of abode unless they experience residential stress. A similar model of residential mobility was developed to determine if residential satisfaction is significant to residence feeling and mobility. The model was tested with data from a study panel of Rhode Island residents. The results indicate that residential satisfaction is related to mobility.

2.2 HOUSING THEORIES

1. Defensible Space Theory: The defensible space theory of architect and city planner, Oscar Newman stated that defensible space is a residential environment whose building layout plans should be designed to function in such a way for residents themselves to become participants of their security provision. Defensible space functions through the following environmental design factors:

- (a) **Individuality:** Idea of making of one's home sacred.
- (b) **Natural Surveillance:** The idea of making an area's physical characteristics in such a way that enables residents see what is happening around them.
- (c) **Image:** The ability of design features to give sense of security.

(d) **Safe Adjoining Areas:** Proper design to enable surveillance of adjoining area.

2. Oscar Newman's Defensible Space Theory:

Oscar Newman's basic five principles of designing defensible spaces as quoted in Design Guidelines include:

To give different groups of residents, peculiar environments that are most suitable their ultimate utilization and control specific to ages, lifestyle, socio-economic activities, proclivities, background and demographic structure.

The territorial allocation of space in housing developments to be in line with the zonal influence of specific residents.

The indoor outdoor linkage of spaces and the location of buildings' fenestration should be done in such a way as to allow residents to naturally observe the exterior and interior public areas within their living environments and their specific place of abode.

The mixing up of dwelling units, their access points and facilities with streets network of the city should be in such a way as to link the streets within residents' area of abode.

Choosing forms of buildings that will remove segregation and allow other users to have sense of belonging with other groups without the feeling of class distinction.

Oscar Newman's defensible space theory greatly influenced city design from its emergence. It stipulates that to provide a defensible space community, it is necessary to divide residential areas into sub-divisions of smaller units of similar families in order to improve control. This is because responsibility for such area is more easily assumed in smaller units or families than is for larger community. Smaller units more often assume responsibility to the areas allotted to them, than in larger groups, because of the feeling of sense of ownership to protection of property. Most often, when larger groups share community space, it is difficult for an individual to assume personal control over the area. Sometimes, an agreement over its sole control, management and uses often leads to dispute (Newman O, 1973)

2.3 THEORIES ON OUTDOOR SPACES:

Ulrich, 2006 posits that exposure to outdoor space and nature allows greater daylight and reduction of stress, depression and pain. It follows that appropriate design of outdoors is very influential in healthcare provisions

- 1. Person-environment fit and universal design theory**
2. The assessment and usage of the environment is necessary for incorporation of outdoors as a welcome idea in housing satisfaction. It implies that the relationship between a person and the environment has to be considered in residential design. The relationship between the person and the outdoor environment is often referred to as the person-environment fit (Iwarsson & Ståhl, 2003). The person-environment fit is illustrated in the ecological model (Lawton, 1986) where it described the relationship between people's competence (e.g., functional capacity) and the demands of the environment (e.g. environmental barriers). The relationship between these two factors influences people's satisfaction and emotional attitudes, which results in different adaptive behaviors. For example, if competence is too low in relation to outdoor environmental pressure, it results in a negative effect and maladaptive behavior.

This chapter has the intent of contributing to the understanding of outdoor spaces in long-term residential facilities, initiating standards for outdoor space, propagating more people's awareness of outdoor benefits, and initiating a good outdoor design in long-term outdoor living.

First, this review examines theoretical and conceptual work of environment-behavior, attraction for nature, and nature's beneficial effects for residents in long-term outdoor living.

Second, the empirical research findings in relation to nature benefits are grouped into subsections addressing housing satisfaction. Solidification and clarification of the key findings will elucidate the current argument in support of the benefit of outdoor spaces. Third, access barriers are subject of detailed discussion as they bring about the most significant challenge to garden provision and usage. Fourth, both the empirical and descriptive literature is being utilized to highlight major design template. (Detweiler et al., 2012; Kaplan, 1995

The first two theories include:

1. **Attention restoration theory and stress recovery theory (Kaplan 1995).** They state that environmental features can improve and provide exceptional positive stimulation, thereby reducing negative psychological stress.
2. **The final relevant theory.**
3. **The supportive garden theory** provides a descriptive approach to creation of a stress-reduced environment for older adults.
4. Kaplan (1995) developed **attention restoration theory**
In attention restoration theory, as described in a review by Berto (2014), humans are attracted and show appreciation and attentiveness towards natural elements. Kaplan (1995) defines four restorative qualities to **attention restoration theory**: being away, fascination, extent, and compatibility, as integral to the ability to restore attention. The first quality, being away, implies leaving one's usual environment either physically or psychologically (Kaplan, 1995). This is possible through unique environments and stimulation or through means of reduction of the amount of evaluable, stimulation (Diaz Moore, 2007). The second, fascination, involves visual appreciation through variation and contrast in abstract features (e.g. colour, size), or through introduction of "soft' fascination" of natural elements (e.g. clouds, wind-swept tree branches), providing patterns and uniformity invoking observer's interest and feeling (Kaplan, 1995). The third, extent, requires a sense of expansive perception often within a small space.

2.4 Missing Gap on Theoretical Framework

The main missing gap is that outdoor spaces include green spaces, open amenity and recreational spaces, residential gardens, patios, and balconies, private, community or neighborhood within a residential area or neighborhood. This gap is yet to be filled by existing theories.

2.5 CONCEPTUAL FRAMEWORK

Definition of Post Occupancy Evaluation (POE), Definition of Housing Satisfaction, Definition of housing, Definition of outdoor Spaces, Concept of Post Occupancy Evaluation (POE), Concept of Housing Satisfaction, Concept of housing, Concept of Housing Design Concept of outdoor Spaces

2.5.1 Definition of Post Occupancy Evaluation (POE)

According to Watson, (2003), POE assesses how well buildings relate with users' needs, and adopts ways for improvement of building design, performance and fitness for a purpose POE that aims at improvement of the built environment. Performance evaluation standards can be both explicit and implicit.

2.5.2: Definition of Housing Satisfaction:

Ogu (2002), who stated that housing satisfaction, is often employed to evaluate how residents perceive satisfaction from their place of residency and the environment. For a house to be habitable according to Onibokun, (1974), it must be influenced by both the engineering elements, as well as by social, behavioral, cultural and other elements in the entire social-environmental setting. Thus, a dwelling that is adequate from the engineering or from the design point of view may not be adequate or satisfactory from the inhabitants' point of view. Onibokun, (1974). As means of assessing residents' filling of inadequacies in their current housing environment to direct prospective developers effective means to improve existing situation (Michelson, 1977; Francescato et al. 1976).

Measurement of housing attributes have been a significant matter in most of the models adopted for residential satisfaction in most of the past studies (Aigbavboa and Thwala 2011b), and it is done in accordance with objective and subjective criteria. (Francescato 2002; Weidemann and Anderson 1989). These have also been adopted in the present study through the evaluation of the physical (outdoor attributes) and social factors (demographic characteristics) which determine residential satisfaction. Objective measures refer to the actual measurements of quantities of attributes, while subjective measures perceptions, emotions, and intentions towards the housing attributes. The objective measures of the attributes of housing have been proved weaker predictors than the subjective measures (Francescato et al, 1989).

2.5.3 Definition of housing

Akinbode, (2000); Onokerhoraye, (1984) Goss, (1988), also defined housing as an expression of people's way of life. It implies from the above assertions that housing has evolved beyond its

former basic function of sheltering humans from inclement weather (rain, sun, cold, wind) and wide animals, through the evolution of man but presently extends its function to include provision of privacy, security, comfort, social interactions with neighbors and the immediate community. Consequently, man's living environment grow in line with his social and psychological needs continue to change, including other facilities such as outdoor spaces that make living more meaningful. (Ibagere, 2002). The city should strive to provide and maintain adequate and balanced outdoor space and recreational facilities for the benefit of obtaining a healthy community for the future.

2.5.4 Definition of outdoor Spaces

Outdoor spaces refer to spaces, which can be in the form of courtyards, porches, sit-outs, patios, balconies, verandahs, walkways, outdoor steps, indoor-outdoor linkage, outdoor kitchens/dinning, children's playground and landscaping (Adegbenro, and Ogunsote, 2011).

. 2.5.5 Concept of Post Occupancy Evaluation (POE)

Preiser and Vischer, (2004) views post occupancy evaluation as a procedure for determining whether or not design decision made by architects and planners are actually providing the performance expected by the end-users. Preiser et al (1998) posit that POE is a systematic way of evaluating the gap between the actual performances of buildings with their outdoor surroundings.

including provision of usable open spaces in new estates for multi-family developments

2.5.6 Concept of Housing Satisfaction

Oluwaye et al, (2011) see housing to include shelter and the environment embracing the entire infrastructures that are vital to contribute a conducive living. Housing in another vein have been seen to embrace all the characteristics of a house (indoor environment and outdoor environment) and the neighborhood (Moloughney, 2004; Eke; 2004). This is similar to an earlier position of Hwang et al, (1999) who defined housing as encompassing the entire four major elements- houses, home, neighborhood and the community, which are critical to the overall well-being of individuals, families and their household

2.5.7 Concept of Housing

In general terms, researchers have recognized this vital role of housing on the subject in fulfilling the psychological aspects of safety, protection from adverse effect of weather and the socio-economic needs of neighborhood facilities for family gatherings, and communal engagements.

2.5.8 Concept of Housing Design

Housing encompasses buildings, shelters or dwellings and outdoor spaces where people live and make a living. It follows that any housing design process for lodging or a home for healthy living must have adequate light, air, and be surrounded with adequate neat and healthy environment including spaces for pedestrian and vehicular circulation, places for leisure, meeting, walking and playground, as well as adequate scenic view with the neighborhood and the outside world. This implies that satisfaction, preferences and rejections are useful socio-economic variables, which can be used to investigate user assessment of the built environments as posited by Varady, (2004). It is the art of design in this context that enables designers to personalize housing typology to suit a particular class of the residents,- low-income, middle income and high income groups of residents. Ganju et al, (2006) stated that housing design should inculcate the following factors on outdoor spaces that enable the family to interact with one another:

1. Availability of adequate spaces for leisure, playing, meeting, and strolling
2. The surroundings.
3. A symbol of identity and pride.

Group Interaction: This is in connection with provision of spaces around houses for group interaction, which relates to outdoor spaces that support group meetings and entertainment activities.

Climate modification: This involves the protection of the residents from harsh weather conditions such as rain, wind, sun and letting in the positive effects of sun.

Estate Services: They include facilities for waste disposal and water supply.

Neighborhood Infrastructure: They are made up pedestrian and vehicular circulation, adequate security provision and availability communal facilities.

Cost Effectiveness: Design proposal should put into consideration, the overall cost of the housing projects to make the houses affordable to the target population. However, the designers of housing from the forgoing are enjoined to put into consideration in their design the wishes and aspirations of the housing residents both low and high-income groups in order to promote both their social, economic and well-being.

2.5.9 Concept of Outdoor Spaces.

Bungalows and rentable flats dominate most of the public housing models, which are usually arranged in open spaces, with facilities to meet residents' needs. Sometimes, these housing models remained incomplete due to lack or inadequate outdoor spaces or sometimes without outdoor facilities. This often results in strict individuality among estate residents, a problem that needs to be addressed through investigative survey by researchers. Outdoor spaces between houses if properly designed are likely to promote social activities in neighborhoods. Various studies on urban design indicate general decline of social life in housing estates. Ononugbo et al, (2010) stated that dilapidated buildings with inadequate outdoor spaces plague most Nigerian cities including Enugu City. This research generally focuses on the quality and adequacy of outdoor residential spaces.

2.6.0 HOUSING CLASSIFICATION IN NIGERIA

According to estimates, the average yearly salary in Nigeria is N 658,324 with the maximum of N5, 000,000 and the minimum of N37, 000. This study focuses on the Middle Income Group of residents.. (www.freeplace.org/order).

2.6.1 The low-Income Group of Residents

The low-income group is defined as all wage earners and self-employed people whose annual income is from Two Hundred and Twenty-Six thousand, Eight Hundred Thousand Naira to Three hundred and Sixty-Three Thousand Seven Hundred and Ninety-Four Naira (N226,800 - N363, 794.) within the civil service structure. (The Federal Civil Service Commission of Nigeria FCSC, 2017)

2.6.2 The Middle- Income Group of Residents

Both low and middle-income groups are the major targets in Nigeria for various governments mass housing program. The African Development Bank (AfDB) defined the middle-income group as workers with annual income exceeding **Seven Hundred and Eighty Thousand, Five Hundred and One Naira to One Million, Three Hundred and Twenty-Three Thousand, Six Hundred and Thirty-Five Thousand Naira. (N780, 501.00-N1, 323,635,000**

- a. The Floating Class is a group with a per capital consumption level of N700 to N1400 per/day.
- b. The Lower-middle Class is a group that has per capital consumption level of N1400 to N3500/day.
- c. The Upper-middle Class is a group that has per capital consumption level of N3500 to N7000/day. (AfDB 2011) .

2.7.0 SOCIO-ECONOMIC FACTORS AFFECTING HOUSING SATISFACTION

The socio-economic factors that affect housing provision in Nigeria include income, population, gender, educational status and family size. They are significant because they affect housing quality in Nigeria; especially among the low-income housing residents. Overcrowding, environmental degradation and encroachment into open spaces are basic challenges facing housing provision. Social-economic factors such as income, population, educational status, household size are major determinant factors affecting middle-income residents who resort to modification of plots allocated to them means of public housing. Various governments' intervention to address the growing housing needs of the housing sector has not yielded much expected result. This is largely due to the socio-economic and environmental factors that pose serious challenges both to government and to target population who may not be satisfied with their individual choices and personal preferences. (Awotona, 1987, Ukoha and Beamish 1996; Fatoye and Odusami, 2009, Ibem and Amole, 2010). The socio-economic factors that can affect housing provision are summarized below.

Family Size: This deals with the availability of adequate spaces to accommodate extended family members to perform their domestic and social duties such as cooking, dining, sleeping,

bathing, entertaining, meetings, recreation and leisure. These activities require both indoor and outdoor spaces to function. For any family size to function there is need for adequate spaces appropriated for specific activities, which are relevant to the occupants' lifestyle (Jiboye and Ogunshaki, 2010).

Family Structure: Family structure may embrace members of the extended family system, such as nephews, nieces, cousins, grandparents etc. Polygamy is prevalent in the northern part of Nigeria and this will be determinant factor to housing provision. Age and sex are other factors that need to be considered in family structure when designing a family compound.

Income Generation: Income earnings by an individual are a determinant factor for housing affordability in terms of housing quality and size of outdoor spaces

Education Status: Education background determines one's choice of residence due to exposure, taste and class distinction, which are significant in his sense of choice.

2.7.1 Identified gaps in Conceptual Framework

1. Increasing usable outdoor spaces around buildings are lacking in areas such as backyard, for individual units or a shared courtyard area, rooftop space, deck or porch, balcony and front yard. No detailed research has been carried effectively in this area

2. Furthermore, for research on outdoor spaces to be beneficial for the actual users, there is need for provision of models and tools that facilitate the use of evidence in participatory design processes

3.0 CHAPTER THREE:

LITERATURE REVIEW

3.1.0 Post Occupancy Evaluation, Housing Satisfaction and Outdoor Spaces

In the literature review, emphasis was broadly laid on Post Occupancy Evaluation (POE), Housing satisfaction and Outdoor Spaces. It covered the overall scope of environmental quality issues and their policy implications on dwelling units: The socio-economic factors affecting the residents were also covered. They include the following:

Aziza, et al, (2012) studied the value of outdoor spaces in residential flats and found out that due to inadequate indoor spaces of low-cost housing leads to extension of socio- economic activities to the outdoors. They found out provision outdoor spaces have not been adequately incorporated in design. Data for the study was obtained from field observations in various low cost flats. The study concluded that outdoor spaces are important for different socio-economic activities.

Aziz, and Ahmad, (2017) on their study titled “Flat Layouts and Children Outdoor Activities” researched on Malaysia’s urban fringe, where residential development still has space for future expansion. “Walk up flats” are low-cost residential buildings used to solve housing shortages for the increasing population of the urban poor. In this housing type, standardization and spatial efficiency were used to minimize the indoor space, and extending social activities to the outdoor spaces, which became utilized as children’s playground. The methodology involved “comparative observational study” which was used to determine the differences in children outdoor activities near their homes.

Gray, (2013) in his study, titled: “An investigation into the provision of outdoor space for medium density housing” established that a large backyard, called the ‘quarter acre dream’, has been very popular in housing development in New Zealand. It provides different housing types, outdoor space for leisure and recreation. The research focused on medium density housing developments in Albany found out that, generally, the current provision of outdoor spaces is useful. Private, communal and public outdoor spaces were considered important for residents and are used for a range of recreational and social activities. Consequently, each type of outdoor

space is meant for different activity and requirements. The result indicates high level satisfaction with their outdoor spaces.

Zhang, & Lawson, (2009), examined the usefulness of outdoor spaces for social activities in high-density residential accommodation. The study surveyed activities in outdoor spaces around three high-density residential neighbourhoods in Brisbane. Results showed that the nature of outdoor space activity in residential neighbourhoods is different from the nature of general outdoor space activity in the urban setting. This is in line with current theories concerning activities in public space which stipulates that some environmental factors such as relationship between buildings and their outdoor spaces significantly impact on the level of social activities

Chombart de, and Aba-Ghazze, (1999) on their study titled “Factors Affecting the Perception and Use of Outdoor Spaces” at the University of Jordan focused on the study of outdoor spaces at the University of Jordan located in Amman, the capital of Jordan. The objective was to assess user perceptions and patterns of outdoor space use. A qualitative approach was applied to gain knowledge of human-environment relationships. A qualitative data was obtained from a visit to an outdoor campus area to determine whether there is significance difference existing among 140 participants including students, faculty, and administrative staff who made a series of choices concerning outdoor spaces that they visited. The methodology used include personal interviews, covering 10 open spaces, which were recorded and tested for physical features that related to outdoor space. Findings revealed that outdoor spaces between university buildings are significant in student’s everyday life.

Hadavi et al (2013) asserted that daily contact with nature is essential for psychological restoration. Their study focused on the essential qualities of nature at close proximity to urban neighborhoods. The study conducted in the Logan Square Neighborhood in Chicago, ILinois involved 53 individuals. The research instrument was a set of 93 photos arranged in columns, involving different commonly used landscape design elements and urban outdoor scenes. Participants selected their preferred scenes and grouped them on meaningful bases. The findings indicated evidence of participants’ preferences for small outdoor green spaces that used for both social activities and practice of horticulture

Odum, (2015) focused on the assessment of residents' satisfaction with the integration of natural environment in the public housing designs in Enugu, Nigeria. Findings showed that residents were not satisfied with overall housing estate environment in terms of green space provision, with landscape elements in their housing units.

Lindgren, (2010) examined the study of outdoor green spaces and found that they are an important part of the urban green structure. Two empirical studies were conducted using interviews as the main method of collecting data. Also he made case study of three rental and multi-family housing areas, 27 residents and 13 housing staff were interviewed on their experience of the maintenance of outdoor green space and their views on maintenance provision respectively. Telephone survey involving 30 housing companies, housing their staff that was asked on how they organized maintenance of outdoor green spaces and what motivated their choices. The case study identified several benefits of outdoor green spaces that are well maintained

Thompson, (2013) examined relationships between attributes of outdoor environments and levels of activities attached to them. The study was divided into three parts namely: examining theories, research methods, and findings that contribute to understanding the relationship between physical activities and the planning and design of outdoor spaces. It considered concepts, methods and evidence relevant to adults', older adults' and children's activities and identified those that appear to offer greatest significance for future research

Makaremi, et al, (2012) observed that the rapid increase in urban population in the tropical cities should require creating more outdoor spaces for leisure and recreation activities of residents. They observed that the thermal conditions and the thermal sensation of residents have not been fully explored in outdoor environments of hot and humid climate. This fact elucidates the need for considering human thermal comfort in outdoor spaces with such climates. Consequently, in their research, a quantitative field study was applied to investigate outdoor thermal comfort conditions in hot and humid tropical climate of Malaysia. Thermal conditions of outdoor spaces were evaluated based upon the measurement of major climatic parameters, while the thermal perception of subjects was captured simultaneously using a questionnaire survey. The study concentrated on the shaded outdoor spaces. Furthermore, it is demonstrated that plants and vegetation surfaces, shade structures, characteristics of areas and design of built environment

were substantially influential in contributing towards thermally comfortable outdoor environments.

Ford,(2000) stated that gates and fences, sidewalks and driveways and parking lots are ordinary features that have an important architectural impact, influencing how a building relates to the outdoor spaces around it. He focused on the neglected spaces between buildings. He focused on the spaces between buildings in order to determine the relationship of buildings to one another and how their means of access and boundaries affect residents. He argued that life on the street is defined and guided by the nature of the surrounding buildings and that a residential neighborhood with front porches, small lawns or gardens, and houses with lots of windows and architectural details attracts a walkable surrounding.

Madanipour, (2003) stated that public and private spaces of the city, affects individuals' mental health, regulates their behavior, and superimposes a long-lasting structure onto human societies. The investigation was conducted along three scales: spatial scale (body, home, neighborhood, city), emphasizing the degrees of exclusivity and openness (from the most private to the most public), and modes of social encounter and association with space (personal, inter-personal, impersonal). In writing the book, Madanipour drew upon his many years of research into cities, as well as teaching and professional practice in architecture, urban design and planning.

Sanei, et al, (2017) stated that, to create serious relationship between people and the city, open spaces are attractive points, which still need to effectively designed and managed. They used descriptive-analytic and library research method for data collection. The aim of their paper was to review urban public outdoor spaces and sustainability relationships and, as the result, reached conclusion for designing sustainable urban public outdoor spaces.

Kennedy, et al, (2015) explored private residents' experiences of privacy and comfort and their perceptions of how well their apartment dwelling modulated the external environment. The research was done in subtropical conditions through analysis of 636 survey responses and 24 interviews with residents of MSAB in inner urban neighborhoods of Brisbane, Australia. The findings showed that the availability of natural ventilation and outdoor private living spaces play important roles in resident perceptions of livability in the subtropics where the climate is not conducive all year round. Residents valued choice with regard to climate control methods in their

apartments. These findings provided a unique evidence base for reducing the environmental impact of MSAB and increasing the acceptability of apartment living, through incorporating outdoor residential attributes positioned around climate-responsive architecture

Kilnarová and Wittmann (2017) studied the characteristics of open spaces between residential buildings focusing on spatial arrangement and accessibility of these spaces, the type and height of surrounding buildings, the quantity and character of greenery, and the characteristics influence on the quality of outdoor environment. The paper analyzed the impact of the open spaces between residential buildings. They carried out case studies in the cities of Brno, Czech Republic and Vienna, Austria. The findings show that life of local residents and the characteristics of the open spaces between residential buildings influence the ecological stability of the area and its hygienic qualities. The research methodology includes field observation, questionnaire survey, statistical analyses, used to assess specific indicators of sustainability within a scale from 0 to 10 points. Two forms of residential urban structures in the City of Brno in the Czech Republic were selected for the analysis: the closed courtyards in the urban block from the 19th century and the outdoor open spaces in the housing estates constructed under socialism in the 20th century. A complementary case study in Vienna indicated that inhabitants of a housing estate in Vienna, as well as inhabitants of housing estates in Brno, highly appreciate the meaning of large green open spaces between buildings. They concluded that the character of open spaces can have a significant impact on the quality of outdoor environment, the quality of life and therefore on the sustainable development of the area.

Huang, (2006) investigated the relationship between the courtyard design of high-rise housing complexes and the residents' social interaction in Taipei, Taiwan. Behavioral observation was applied to three housing projects, reflecting three levels of real estate value. The observation lasted for 21 days for each project. The total number of observations were 32,476 including 15,532 males and 16,955 females. Only 5074 people, (15.63%) of the total observed residents, have social interaction with others. The findings reflect the idea of social withdrawal among the residents

Madanipour, (1996) carried out analysis of open space design process and the nature of its residential space. He examined major issues involving the nature and scope of open space design

and convincingly argued for a better understanding of urban design and urban space by focusing more on the interrelationship between the urban development process and residents' daily life.

Ononugbo, et al, (2010) in their work aimed to determine whether income, education, gender, family size, and constraints like high cost of building materials, high house rents, etc. are the factors that contributed to the Enugu low-income residents' decision to dwell in slums. They carried out a survey design using constructed questionnaires, oral interviews with policymakers, professionals, bankers, and contractors. The conclusions from the data collected from the study revealed that low-income groups could not afford rent for a house in the city due to their low monthly salary (contributed by their educational background), large family size and strict government rules on land/housing. Most of the cities in the developing countries have inadequate affordable housing and their residential environments are commonly characterized as slums with inadequate outdoor spaces. Data for the study were statistically treated using the Two-Way Analysis of Variance (ANOVA) for the dependent variable, which was their decision to live in slums, a logistic multiple regression models, were applied to test this variable because of the binary variables and to determine if significant differences occurred at alpha level of ($\alpha \leq 0.05$) or less. The conclusions were that the data collected from the study revealed that low-income groups could not afford rent for a house in the city due to their low monthly salary, large family size and strict government rules on land/housing, which pushed them to dwell in slums where there were no infrastructural services, no running clean water, no garbage pickups, and sewage services and inadequate outdoor spaces

Adegbenro and Ogunsote, (2011) were of the view that, the northern part of Nigeria, which houses the savannah zone have evidences of low quality design and planning of houses, relative to environmental influences, like weather and regular seasons. The zone covers a large portion of the country and consists of towns like Sokoto, Yelwa, Kano, Gusau, Maiduguri, Yola, Ibi, Potiskum, Minna, Bida, Abuja, Zaria, etc. It has been observed that the weather condition in this part of the country is prone to dry and hot climate from early February to June. This period gives residents in the area serious challenges of living amid extreme dryness and exhaustive heat as from midday to midnight throughout the period. It needs therefore the refreshing coolness and surrounding outdoor spaces. These spaces refer to outdoor openings, which might be in form of

courtyards and also verandahs or balconies. These spaces should be well shaded from intense sunlight and heat, and from the driving force of rain.

Atolagbe, and Olorunfemi, (2012) carried a survey of residential houses, to evaluate residents' inputs to qualitative and nature-sensitive outdoor housing environments in Ogbomosho. Three relative objects of the built environment used for the study include: the provision of open space of not less than the 3.0, 1.5 and 3.0 meters, recommended setbacks at the front, to the property fence and to the next neighbors' outer wall, respectively; the documentation of evidence of residents' attempt for landscaping the area; general nature-friendliness of residential area. The results showed that open space, landscaping elements and general nature-friendliness of residential environments are significantly better in the lower density residential zones of the city.

Ekhaese and Adeboye, (2014) on their work titled: "Cultural Characteristics of the Residents in Benin stated that the domestic architecture of a traditional settlement is greatly influenced by the socio-economic and socio-cultural characteristics of its residents. They examined the effects of socio-economic and socio-cultural characteristics as factors that partly determine the elements of domestic architecture of a palace in Benin. The study employed the use of questionnaire administered to residents across the variables of domestic architecture of a cross-section of the city. Descriptive frequency tables were used to analyze the data collected from the residential zones in Benin. The research was able to corrolate the theory that socio-economic and socio-cultural factors are some of the determinant factors influencing domestic architecture of a palace.

Salleh, (2008) asserted that residential and neighborhood satisfaction is an important indicator of housing quality and condition, which affects individuals' quality of life. The study investigated the factors, such as dwelling units, housing services, outdoor recreation, and neighborhood facilities, which affect individuals' satisfaction in private low-cost housing in Malaysia using a case study of Penang and Terengganu. The data were obtained from random samples of 795 households living in low-cost housing projects developed by private housing developers in Penang and Terengganu. Descriptive and factor analyses were applied to the data. The findings of the study indicate that neighborhoods factors are dominant factors that determine the levels of residential satisfaction. The contributing factors for the low levels of satisfaction with these facilities and environment were implicated to include, poor public transportation and lack of outdoor children playgrounds, community halls, car parks, security and disability facilities. As

private developers rely on profit oriented criterion, less attention was given to the provision of neighborhood and outdoor facilities and environment.

Al-Momani, (2010), studied public housing in Lagos with the following objectives: to appraise the physical characteristics of residential buildings in an estates; to examine the socio-economic characteristics of the residents; to determine the relative levels of residents' satisfaction; and to determine the relationship between the physical characteristics and residents' satisfaction. The methodology involved an expert rating appraisal conducted by four Evaluators and a survey of residents' satisfaction. Ten performance criteria were developed and used in assessing the characteristics of the residential environments. Data relating to residents' satisfaction were obtained by means of structured questionnaire administered on a systematic sample of 806 household heads, from a sampling frame of 8060 housing units. The quantitative data were analyzed using descriptive and inferential statistics. The study revealed a gap in quality between the medium- and low-income estates..

Toyobo et al. (2011) in the study of the correlates of socio-economic characteristics of housing quality in Ogbomosho Township, Oyo State, Nigeria, examined the socio-economic characteristics of residents' types of houses, outdoor facilities and condition of buildings. The study showed inadequate provision of some outdoor recreation facilities, pipe-borne water, erratic power supply, poor solid waste management and presences of substandard houses in the study area. The study thus concluded that, there is urgent need for enforcement of planning regulations to improve the housing quality and facilities in the study area.

Puziah, (2013) carried out a study aimed to determine the overall residential satisfaction among students living off-campus, as one of the major elements or attributes of their quality of life. The survey utilized a stratified sample of individuals with a self-reported questionnaire, which was administered to 341 non-resident students, in seven groups of in the city of Shah Alam. He applied a Factor Analysis to reduce the data and to determine the relationships between various factors and the level of the students' residential satisfaction. The results showed a degree of satisfaction with each level of the residential environment, namely; outdoor spaces, neighborhood and city).

Ibem et al (2013) carried out a study aimed to investigate the level of housing adequacy on residents in public housing with a view to identifying how government and construction professionals can provide adequate housing facilities for residents. The study was based on field surveys involving 517 respondents selected from nine public housing estates constructed between 2003 and 2010 in Ogun State Southwest Nigeria. They adopted structured questionnaire as instrument for data collection which they administered to the through visits to the housing estates. 33 variables obtained from the review of literature were used in measuring housing adequacy. Descriptive statistics and factor analyses were used to analyze the data. The study revealed that residents perceived their housing situation as being inadequate. They evaluated housing adequacy was based on: ambient condition of interiors spaces, security, utilities and outdoor facilities and social infrastructure. The implication is that the concept of housing adequacy can be used to examine occupants' housing preferences on their standard of living.

Mohit, et al, (2009) assessed residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. The study provided an assessment of residential satisfaction of newly designed public low-cost housing residents of Kuala Lumpur, Malaysia, with forty-five variables grouped into five components – dwelling unit features, dwelling unit support services, public facilities, social environment and outdoor facilities. Findings from the study indicate that the residents are moderately satisfied with dwelling unit support services, followed by public and outdoor facilities than dwelling unit features and social environment, which have higher percentage of respondents with low level of satisfaction.

Oladapo and Adebayo, (2014) in their study, examined the effects of outdoor facilities on residents' satisfaction in Osogbo focusing on Isale-Odo and Alekuwodo areas with a view to explaining the importance and adequacy of these facilities in the housing units. The study administered structured questionnaires on 250 residents from each of the selected areas using stratified random sampling. Data collected were analyzed through frequency distribution and relative satisfaction index method to ascertain the extent by which residents are satisfied with the state of the facilities provided within the residential neighborhoods. The study found that residents in Alekuwodo are more satisfied with their outdoor facilities based on the facilities provided but not so in Isale Osun. Total rehabilitation of areas with substandard housing and lack

of outdoor facilities by the concerned government were recommended in order to improve and promote neighborhood health and prospects

Cooper, et al, (1991) stated that the major objectives of the 1991 study of Canadian nonprofit housing cooperatives were to investigate the ability of people with disabilities, to manage important features of their outdoor spatial environment and the effect on their quality of life. The research was concerned specifically with relationships among control, built form, social organization, and perceived quality of life focusing on residents' assessments. Data were gathered through site visits, interviews, and a mail survey. Results showed that those residents who felt they could influence their co-operative the most and those who found that the co-operative form of social organization made the most difference to their housing satisfaction. Their residential quality of life was rated the highest. That is, residents' perceived social control over their residential environment was more important than their perceived physical control in explaining perceived quality of life.

Said et al, (2014), viewed that a house should no longer be seen as a basic shelter but be seen now as a status symbol and which stands as an asset to the owner because of its value for security, privacy, neighborhood and social relations, services, and control over the outdoor environment. These additional features have influenced housing users' expectations, which in turn have prompted developers to address as a matter of urgency to ensure that housing needs of all Malaysian could be met. The study enlightened developers to be conscious of how market needs of Malaysian housing users especially in Johor Bahru differ in choice of houses. Two objectives were proposed for the research. The first objective was to identify the housing outdoor environment preference among housing users, adopting a qualitative exploration of a housing environment with applicable variables from previous researchers as secondary sources. Themes from the qualitative data were then developed into an instrument so that the preference on housing outdoor environment by housing residents can be identified. The second objective centered on measure of the preference on general housing environment quality by housing consumers using the analytic hierarchy process (AHP) collected using a quantitative approach.

Yuliastuti and Widiastomo (2015) carried a research aimed to measure the satisfaction level of the residents in Sendangmulyo housing in order to determine the basis for improved social housing policy in the future. The results of the research showed that the average level of

residents' satisfaction, with satisfaction index score of 58.1% was high. The high satisfaction level was influenced by the quality of community relationship with an index of 73.4%, and a lower index that was influenced by the quality of the outdoor environment facilities at 49.8%. They concluded that the good neighborly relations and outdoor social activities that still exist in the neighborhood was the reason for the high quality of community relations.

3.2 SUMMARY OF THE LITERATURE REVIEW

Public housing is characterized by standardization coupled with indoor and outdoor spatial inadequacy. Inadequate spaces for socio-economic activities have led more activities taking place outdoors. From the studies, it is established that the physical characteristics of residential buildings have a significant influence on occupants' satisfaction especially with their outdoor residential spaces. The importance of providing outdoor spaces was to ensure that the housing needs of residents are achieved. The study identified several benefits of outdoor green spaces and suggested that plants and vegetation surfaces, shade structures, were substantially influential in contributing towards comfortable outdoor environments. . Emphasis was made on outdoor green spaces as missing gaps. The findings showed that the availability of outdoor spaces play important roles in residents' outdoor living. Outdoor and indoor space needs should be treated in isolation design and planning. The study also emphasized on Human- environment relationship for both social and health benefits in the area of psychological restoration by nature.

Post occupancy evaluation on residents' satisfaction with their dwellings and residential environment have been extended to include physical characteristics such as visual quality, quality of estate roads, maintenance, drainage, services and location quality, which researchers found to be very essential in planning and design. . It is necessary to extend our knowledge to outdoor living component of the housing unit hence the need for this study.

3.3 Gaps in the literature

Having reviewed various literatures on outdoor spaces globally, nationally and locally, the following may be deduced as gaps:

- I. The researcher could not find any work directly carried out on outdoor spaces in Enugu Nigeria but carried out the study to develop template for the design of the outdoor space needs and requirements for residents of public housing estates in Enugu.
2. From the literature reviewed, no work on outdoor spaces incorporated the perception of sense of community and social life. Social life studies have been mostly conducted in the built environment discipline focusing on city centers; while sense of community studies was mostly the target of sociologists and psychologists focusing on neighborhoods. As a result, the role of the built environment on the sense of community and social life of neighborhoods is considered as a missing gap in the literature
3. The Link between physical activities and outdoor space needs as they affect adults, older adults and children's activities have not been fully researched on in Enugu, the study area.
4. The health benefits of outdoor greenery or gardens on mental health and overall well-being of residents' have not been fully explored.

4.0 CHAPTER FOUR

RESEARCH METHODS AND PROCEDURES.

4.10 SOURCES OF DATA:

The data used in this study were collected from primary and secondary sources but mostly from secondary sources. Data on residents' perception on outdoor space satisfaction was collected from primary sources.

4.11 Secondary Sources

Secondary data was sourced from official documents and Case Study.

Official Documents:

Data from official documents include layout plans and location maps of public housing estates built from 1976 to 2017. Sources are from the Enugu State Housing Development Corporation (ESHDC) and Federal Ministry of Lands, Housing and Urban Development (FMLHUD) in Enugu

Case Study:

Data from Case Study include existing outdoor spaces taken from books and the Internet. (**Appendix III**)

4.12 Primary Sources:

Data from primary sources were collected from the following instruments:

Questionnaires: A well-structured questionnaire was administered to a selected target population, which were the representatives of each household in the estates and who were believed to be the head of the family units at the time of the study. The primary data was structured to obtain information from the residents' opinion on the socio-economic and cultural variables and other factors affecting their housing satisfaction. This was used to test the first, second and the third hypothesis.

Personal observations: After the administration of the questionnaires, personal observations were made of the general outlook of the estates' buildings and their outdoor surroundings as well as

measured drawings taken within the sampled housing units. Inah et al, (2016), Ibem et al, (2012).
(Appendix IV)

4.13 Validity and Reliability of the Questionnaire

Test of Validity: The questionnaire used in this study was read and inspected by my supervisor and two research fellows in my faculty. They inspected copies of the questionnaire in order to ascertain the coverage of the work. A copy was also sent to a statistician in order to assess the interpretability of the work as well as the possibility of analyzing it. The advice from the statistician lead to the collapsing of a 10-point numerical scale to a 5-Likert format for easy of interpretation. With regard to coverage, my supervisor returned the questionnaire after eliminating some ambiguous items in the coverage and the corrected version was ascertained as adequate for the study.

Test of Reliability: A pilot study was conducted. 20 questionnaires were administered and tested for internal consistencies of responses using a measure of reliability called Cronbach's alpha.

The formula is as follows:

$$\alpha = \frac{k}{1 + (k-1) \text{ (cov/var)}}$$

$$1 + (k-1) \text{ (cov/var)}$$

Where K = Number of items on the survey

Cov = Average inter-item covariance

Var = Average item variance

1 = Constant

Ideally, in order to obtain a good estimate of the reliability of a survey, the items were split into two groups and then compared as if they were two separate administrations of the same survey. This is called split-half test. This test is used instead of test –retest technique to avoid bias. The result of the test shows that the Crabach's alpha coefficient for each of the split halves 1 & 2 are **0.858** and **0.842** respectively, and the correlation is **0.741**. Therefore, the instrument was reliable for the study.

4.30 SAMPLING FRAME AND SAMPLING PROCEDURES

4.31 Sample Frame and Sample Size

The sample frame for the questionnaire distribution was obtained through the population of all the housing units of public housing estates built by Federal and State governments in Enugu. Between 1963 and 2017 (Table 2). The total population of study consisted of **4118** housing units (Sample Frame) in the 11 existing estates, out of which 4028 units in 10 estates (4118- Coal City Gardens 7 A&B ; 60 units +30 units = **90 units**) 4118 units-90units = **4028 units** were purposively selected to exclude estates with non-prototype housing units and estates that have been in existence for less than 10 years. In this study, data collected through structured questionnaire, were grouped and reduced to numbers and further configured for statistical analysis (Cooper and Schindler, 2006). Adeboye, (2015); Akinluyi, (2013)

Table 2. Study Population:

S/No	ESTATES	HOUSING UNITS	YEAR DEVELOPED
1. A	Greenland Estate Phase I: 2 BRM Semi-detached Bungalows	20	2005/2006
B	Greenland Estate Phase II: 3 BRM Semi-detached Bungalows	20	2005/2006
C	Greenland Estate Phase III: 2 BRM Semi-detached Bungalows	22	2005/2006
D	Greenland Estate Phase III: 3 BRM Semi-detached Bungalows	20	2005/2006
2.A.	Maryland Estate Phase I: 2 BRM Block of Flats	324	2005/2006
B	Maryland Estate Phase I: 3 BRM Block of Flats	60	2005/2006
3. A	Ehocol Estate Phase II, Republic Layout: 2 BRM Semi-detached Bungalows	27	1990

B	Ehocol Estate Phase II, Republic Layout: 3 BRM Semi-detached Bungalows	20	1990
4. A	Trans Ekulu Housing Estate Phase I: 2 BRM Semi-detached Bungalows	87	1977
B	Trans Ekulu Housing Estate Phase I: 3 BRM Semi-detached Bungalows	96	1977
C	Trans Ekulu Housing Estate Phase II: 4 BRM Semi-detached Storied House with 2 BRM BQ	222	1979/1980
D	Trans Ekulu Housing Estate Phase III: 5 BRM Storied House with 2BRM BQ	327	1979/1980
E	Trans Ekulu Housing Estate Phase IV: 2 BRM Block of Flats	51	1980/1981
F	Trans Ekulu Housing Estate Phase IV: 2 BRM Semi-detached Bungalows	12	1980/1981
G	Trans Ekulu Housing Estate Phase IV: 4 BRM Semi-detached Bungalows	23	1980/1981
H	Trans Ekulu Housing Estate Phase IV: 4 BRM Storied House with 2BRM BQ	118	1980/1981
I	Trans Ekulu Housing Estate Phase V: 2 BRM Bungalows	19	1980/1981
J	Trans Ekulu Housing Estate Phase V: 3 BRM Bungalows	31	1980/1981
K	Trans Ekulu Housing Estate Phase V: 4 BRM Storied House with BQ	111	1980/1981
L	Trans Ekulu Housing Estate Phase VI: 2 BRM Semi-detached Bungalows	358	1987/1988
M	Trans Ekulu Housing Estate Phase: 3 BRM detached Bungalows	100	1987/1988

N	Trans Ekulu Housing Estate Phase VI: 4 BRM Detached Bungalows	81	1987/1988
P	Trans Ekulu Housing Estate Phase VI: 5 BRM Storied houses	120	1987/1988
5. A	Riverside Housing Estate Phase I&II: 2 BRM Detached Bungalows	160	1966/1967
B	Riverside Housing Estate Phase I&II: 3 BRM Detached Bungalows	102	1966/1967
C	Riverside Housing Estate Phase I&II: 3 BRM Storied Houses	77	1966/1967
D	Riverside Housing Estate Phase I&II: 4BRM Storied Houses	70	1966/1967
6.	Golf Course Estate Phase I, GRA: 5BRM Detached Storied Houses	182	2000
7. A	Coal City Gardens Estate, GRA: 5BRM Detached Storied Houses	60	2007/2012
B	Coal City Gardens Estate, GRA: 6BRM detached Storied Houses with 2BRM BQ	30	2007/2012
8.	Real Estate Uwani: 3BRM Block of Flats with BQs	108	1963/1964
9.A	Federal Housing Estate Phases I&II: 2BRM Bungalows	500	1983/1984
B	Federal Housing Estate Phases I&II: 3BRM Bungalows	500	1983/1984
10.	Ebeano Housing Estate, Chime Ave./Bisala Rd: 5BRM Duplex	40	1999
11.	Fidelity Housing Estate by EbeanoTunel by Old Trade Fair: 5BRM Duplex	20	1999
	TOTAL	4118 (N=4118)	

Source: Enugu State Housing Development Corporation. (ESHDC) Federal Ministry of Land, Housing and Urban Development. (FMLHUD)

The total population of housing units from the 10 estates used for the survey was represented in Table 3. The table indicates that Federal housing estate Phases 1& 11 has the highest number of housing units (500 units 2-Bedrooms) and (500 units 3-Bedrooms)bungalows respectively followed in descending order by Trans Ekulu Housing Estate Phase VI: 2 BRM Semi-detached Bungalows (358), Trans Ekulu Housing Estate Phase III (327units) and Maryland housing estate (324 units) etc. The total number of housing units in Table 3 constituted the sample frame of the study (4028).

Table 3. Sample Frame of Study Population

S/No	ESTATES	HOUSING UNITS	YEAR DEVELOPED
1. A	Greenland Estate Phase I: 2 BRM Semi-detached Bungalows	20	2005/2006
B	Greenland Estate Phase II: 3 BRM Semi-detached Bungalows	20	2005/2006
C	Greenland Estate Phase III: 2 BRM Semi-detached Bungalows	22	2005/2006
D	Greenland Estate Phase III: 3 BRM Semi-detached Bungalows	20	2005/2006
2.A	Maryland Estate Phase I: 2 BRM Block of Flats	324	2005/2006
B	Maryland Estate Phase I: 3 BRM Block of Flats	60	2005/2006
3. A	Ehocol Estate Phase II, Republic Layout: 2 BRM Semi-detached Bungalows	27	1990
B	Ehocol Estate Phase II, Republic Layout: 3 BRM Semi-detached Bungalows	20	1990
4. A	Trans Ekulu Housing Estate Phase I: 2 BRM Semi-detached Bungalows	87	1977

B	Trans Ekulu Housing Estate Phase I: 3 BRM Semi-detached Bungalows	96	1977
C	Trans Ekulu Housing Estate Phase II: 4 BRM Semi-detached Storied House with 2 BRM BQ	222	1979/1980
D	Trans Ekulu Housing Estate Phase III: 5 BRM Storied House with 2BRM BQ	327	1979/1980
E	Trans Ekulu Housing Estate Phase IV: 2 BRM Block of Flats	51	1980/1981
F	Trans Ekulu Housing Estate Phase IV: 2 BRM Semi-detached Bungalows	12	1980/1981
G	Trans Ekulu Housing Estate Phase IV: 4 BRM Semi-detached Bungalows	23	1980/1981
H	Trans Ekulu Housing Estate Phase IV: 4 BRM Storied House with 2BRM BQ	118	1980/1981
I	Trans Ekulu Housing Estate Phase V: 2 BRM Bungalows	19	1980/1981
J	Trans Ekulu Housing Estate Phase V: 3 BRM Bungalows	31	1980/1981
K	Trans Ekulu Housing Estate Phase V: 4 BRM Storied House with BQ	111	1980/1981
L	Trans Ekulu Housing Estate Phase VI: 2 BRM Semi-detached Bungalows	358	1987/1988
M	Trans Ekulu Housing Estate Phase: 3 BRM detached Bungalows	100	1987/1988
N	Trans Ekulu Housing Estate Phase VI: 4 BRM Detached Bungalows	81	1987/1988

P	Trans Ekulu Housing Estate Phase VI: 5 BRM Storied houses	120	1987/1988
5. A	Riverside Housing Estate Phase I&II: 2 BRM Detached Bungalows	160	1966/1967
B	Riverside Housing Estate Phase I&II: 3 BRM Detached Bungalows	102	1966/1967
C	Riverside Housing Estate Phase I&II: 3 BRM Storied Houses	77	1966/1967
D	Riverside Housing Estate Phase I&II: 4BRM Storied Houses	70	1966/1967
6.	Golf Course Estate Phase I, GRA: 5BRM Detached Storied Houses	182	2000
7.	Real Estate Uwani: 3BRMBlock of Flats with BQs	108	1963/1964
8.A	Federal Housing Estate Phases I&II: 2BRM Bungalows	500	1983/1984
B	Federal Housing Estate Phases I&II: 3BRM Bungalows	500	1983/1984
9.	Ebeano Housing Estate, Chime Ave./Bisala Rd: 5BRM Duplex	40	1999
10.	Fidelity Housing Estate by EbeanoTunnel by Old Trade Fair: 5BRM Duplex	20	1999
	TOTAL	4028 (N=4028)	

Summary of Sample Frame of Study Population: Floating class=1580, Lower-Middle Income Class=1134, Upper- Middle Class=1314, Total= (N=4028)

Source: Enugu State Housing Development Corporation (ESHDC). Federal Ministry of Lands, Housing and Urban Development (FMLHUD). Author's Field Survey

4.32 Sample Size:

The sample size of the population was determined using

1. Krejcie and Morgan, (1970), formula. This formula is given as:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1)} + \frac{X^2 P(1-P)}{d^2}$$
 Where:

S= required sample size

X^2 = the table value chi-square for one degree of freedom at the desired confidence level =3.841

N= the population size

P= the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

d= the degree of accuracy expressed as a proportion (0.05)

A sample used in this study was based on this formula, thus:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1)} + \frac{X^2 P(1-P)}{d^2}$$

$$S = \frac{3.841 \times 4028 \times 0.5(1-0.5)}{0.05^2(4028-1)} + \frac{3.841 \times 0.5(1-0.5)}{0.05^2}$$

$$S = \frac{3.841 \times 4028 \times 0.5 \times 0.5}{0.0025 \times 4027} + \frac{3.841 \times 0.5 \times 0.5}{0.0025}$$

$$S = \frac{3867.887}{11.02775} = 350.7412664 = 351. \text{ Approx.}$$

S=351 (Sample Size)

The above formula produced a sample population of 351 housing units. An attrition of 20% was added which gave sample size of 421 to compensate for loss of questionnaire and none responses. In order to determine an adequate sample size, the values of significance level and estimated variance have to be pre-determined.

Significance Level: The statistical level of significance was fixed at alpha = .05.

Alpha is the probability of wrongly rejecting the null hypothesis, thus committing Type 1 error. Assigning a less stringent alpha would increase the risk of false rejection. (Eagle, 1999). However, if the alpha is too conservative, evidence from the findings might fail to reject the null hypothesis in the presence of substantial population effect. Therefore, setting the alpha at .05 is considered the most conventional level of significance, which is normally used in most research work. (Ary, et al., 1996).

Stratified Sampling:

In this study, the number of respondents for each estate (stratum) is determined by proportional allocation using the formula: $N_h = \left(\frac{N_n}{N}\right) n$

N_h = Proportional allocation

N_n=Sample Population

N= Research Population = **4028**

n= Sample Size =**421**

e.g. /No 2.B Maryland Estate, Phase1; 3BRM Block of Flats, $N_n = 60$, $N_h = 60/4028 \times 421 = 6$.Approx.

A breakdown of sample population (Table 4) is as follows:

1. Greenland Housing Estates, Phase 1-111 = total of 8 housing units (1.9%)
2. Maryland Housing Estate (Block of Flats) = total of 40 block of flats (9.5%)
3. Ehocol Housing Estate Phase 11 = total of 5 housing units (1.2%)
4. Trans Ekulu Housing Estates Phases 1-VI = total of 185 housing units (44%)
5. Riverside Housing Estates Phases 1&11 = total of 43 housing units (10.2%)
6. Golf Course Estate Phase I =total of 19 housing units (4.5%)
7. Real Estate Uwani: (3BRM Block of Flats) = total of 11housing units (2.6%)

8. Federal Housing Estate Phases I&II: = 104 housing units (24.7%)

9. Ebeano Housing Estate = total of 4 housing units (0.94%)

10. Fidelity Housing Estate = total of 2 housing units (0.46%)

Table 4. Distribution of Sample Population and Sample Size according to Estates

S/No	ESTATES	Sample Population	Sample Size
1.A	Greenland Estate Phase I: 2 BRM Semi-detached Bungalows	20	2
B	Greenland Estate Phase II: 3 BRM Semi-detached Bungalows	20	2
C	Greenland Estate Phase III:2 BRM Semi-detached Bungalows	22	2
D	Greenland Estate Phase III: 3 BRM Semi-detached Bungalows	20	2
2.A	Maryland Estate Phase I: 2 BRM Block of Flats	324	34
B	Maryland Estate Phase I: 3 BRM Block of Flats	60	6
3. A	Ehocol Estate Phase II, Republic Layout: 2 BRM Semi-detached Bungalows	27	3
B	Ehocol Estate Phase II, Republic Layout: 3 BRM Semi-detached Bungalows	20	2
4. A	Trans Ekulu Housing Estate Phase I: 2 BRM Semi-detached Bungalows	87	9
B	Trans Ekulu Housing Estate Phase I: 3 BRM Semi-detached Bungalows	96	10
C	Trans Ekulu Housing Estate Phase II: 4 BRM Semi-detached Storied House with 2 BRM BQ	222	23

D	Trans Ekulu Housing Estate Phase III: 5 BRM Storied House with 2BRM BQ	327	34
E	Trans Ekulu Housing Estate Phase IV: 2 BRM Block of Flats	51	5
F	Trans Ekulu Housing Estate Phase IV: 2 BRM Semi-detached Bungalows	12	1
G	Trans Ekulu Housing Estate Phase IV: 4 BRM Semi-detached Bungalows	23	2
H	Trans Ekulu Housing Estate Phase IV: 4 BRM Storied House with 2BRM BQ	118	13
I	Trans Ekulu Housing Estate Phase V: 2 BRM Bungalows	19	2
J	Trans Ekulu Housing Estate Phase V: 3 BRM Bungalows	31	3
K	Trans Ekulu Housing Estate Phase V: 4 BRM Storied House with BQ	111	12
L	Trans Ekulu Housing Estate Phase VI: 2 BRM Semi-detached Bungalows	358	38
M	Trans Ekulu Housing Estate Phase: 3 BRM detached Bungalows	100	11
N	Trans Ekulu Housing Estate Phase VI: 4 BRM Detached Bungalows	81	9
P	Trans Ekulu Housing Estate Phase VI: 5 BRM Storied houses	120	13
5. A	Riverside Housing Estate Phase I&II: 2 BRM Detached Bungalows	160	17
B	Riverside Housing Estate Phase I&II: 3 BRM Detached Bungalows	102	11

C	Riverside Housing Estate Phase I&II: 3 BRM Storied Houses	77	8
D	Riverside Housing Estate Phase I&II: 4BRM Storied Houses	70	7
6.	Golf Course Estate Phase I, GRA: 5BRM Detached Storied Houses	182	19
7	Real Estate Uwani: 3BRM Block of Flats with BQs	108	11
8.A	Federal Housing Estate Phases I&II: 2BRM Bungalows	500	52
B	Federal Housing Estate Phases I&II: 3BRM Bungalows	500	52
9	Ebeano Housing Estate, Chime Ave./Bisala Rd: 5BRM Duplex	40	4
10.	Fidelity Housing Estate by Ebeano Tunel by Old Trade Fair: 5BRM Duplex	20	2
	TOTAL	4028 (N=4028)	421 (n=421)

N= Sample Population = 4028; n=Sample Size=421 (Total number of Housing units that received the distributed questionnaire)

Source: Author's Fieldwork Calculation.

Table : Classification of Estates According to Income Class**5a Floating Class**

S/No	ESTATES	Nn	Nh
I	Greenland Estate Phase I: 2 BRM Semi-detached Bungalows	20	2
II	Greenland Estate Phase III:2 BRM Semi-detached Bungalows	22	2
III	Maryland Estate Phase I: 2 BRM Block of Flats	324	34
IV	Ehocol Estate Phase II, Republic Layout: 2 BRM Semi-detached Bungalows	27	3
V	Trans Ekulu Housing Estate Phase I: 2 BRM Semi-detached Bungalows	87	9
VI	Trans Ekulu Housing Estate Phase IV: 2 BRM Block of Flats	51	5
VII	Trans Ekulu Housing Estate Phase IV: 2 BRM Semi-detached Bungalows	12	1
VIII	Trans Ekulu Housing Estate Phase V: 2 BRM Bungalows	19	2
IX	Trans Ekulu Housing Estate Phase VI: 2 BRM Semi-detached Bungalows	358	38
X	Riverside Housing Estate Phase I&II: 2 BRM Detached Bungalows	160	17
XII	Federal Housing Estate Phases I&II: 2BRM Bungalows	500	52
	TOTAL	1580	165

5b. The Lower-Middle Class

S/No	ESTATES	Nn	Nh
I	Greenland Estate Phase II: 3 BRM Semi-detached Bungalows	20	2
II	Greenland Estate Phase III: 3 BRM Semi-detached Bungalows	20	2
III	Maryland Estate Phase I: 3 BRM Block of Flats	60	6
IV	Ehocol Estate Phase II, Republic Layout: 3 BRM Semi-detached Bungalows	20	2
V	Trans Ekulu Housing Estate Phase I: 3 BRM Semi-detached Bungalows	96	10
VI	Trans Ekulu Housing Estate Phase V: 3 BRM Bungalows	31	3
VII	Trans Ekulu Housing Estate Phase: 3 BRM detached Bungalows	100	11
VIII	Riverside Housing Estate Phase I&II: 3 BRM Storied Houses	77	8
IX	Real Estate Uwani: 3BRMBlock of Flats with BQs	108	11
X	Federal Housing Estate Phases I&II: 3BRM Bungalows	500	52
XI	Riverside Housing Estate Phase I&II: 3 BRM Detached Bungalows	102	11
	TOTAL	1134	118

5.c The Upper-Middle Income class

S/No	ESTATES	Nn	Nh
I	Trans Ekulu Housing Estate Phase II: 4 BRM Semi-detached Storied House with 2 BRM BQ	222	23
II	Trans Ekulu Housing Estate Phase III: 5 BRM Storied House with 2BRM BQ	327	34
III	Trans Ekulu Housing Estate Phase IV: 4 BRM Semi-detached Bungalows	23	2
IV	Trans Ekulu Housing Estate Phase IV: 4 BRM Storied House with 2BRM BQ	118	13
V	Trans Ekulu Housing Estate Phase V: 4 BRM Storied House with BQ	111	12
VI	Trans Ekulu Housing Estate Phase VI: 4 BRM Detached Bungalows	81	9
VII	Trans Ekulu Housing Estate Phase VI: 5 BRM Storied houses	120	13
VIII	Riverside Housing Estate Phase I&II: 4BRM Storied Houses	70	7
IX	Golf Course Estate Phase I, GRA: 5BRM Detached Storied Houses	182	19
X	Ebeano Housing Estate, Chime Ave./Bisala Rd: 5BRM Duplex	40	4
XI	Fidelity Housing Estate by EbeanoTunel by Old Trade Fair: 5BRM Duplex	20	2
	TOTAL	1314	138

Summary of Sample Size: Floating Class=165, Lower-Middle Income Class=118 Upper Middle Income Class= 138 Total = 4028, n=421

Source: Author's Field Survey and Calculation.

Table 6: Housing Types:

S/N	TYPE OF FACILITY						
1	2BRM	3BRM	4BRM	5BRM			
	N n	N n	N n	N n			
2	20 2	20 2	222 23	327 34			
3	22 2	20 2	23 2	120 13			
4	12 1	60 6	118 13	182 19			
5	27 3	20 2	111 12	40 4			
6	87 9	96 10	81 70	20 2			
7	51 5	31 3	70 7				
8	19 2	100 11					
9	358 38	102 11					
10	160 17	77 8					
TOTAL	500 52 324 34 1580 165	108 11 500 52 1134 118	625 67	689 72			

Table.7: Summary of Housing Types

S/No	HOUSING UNITS	N	n
I	Total 2 Bedroom Housing Units	1580	165
II	Total 3 Bedroom Housing Units	1134	118
III	Total 4 Bedroom Housing Units	625	66
IV	Total 5 Bedroom Housing Units	689	72
	GRAND TOTAL	4028	421

Source: Fieldwork and Calculations 2012

Sampling Procedures

Purposive and Stratified sampling technique were employed in this study to select the housing units from the estates within the scope of the study.

Greenland Housing Estates, Maryland Housing Estate ,Ehocol Housing Estate Trans Ekulu Housing Estates, Riverside Housing Estates, Golf Course Estate, Real Estate Uwani, Federal Housing Estate, Ebeano Housing Estate and Fidelity Housing Estate. This method was chosen in order to select unbiased representatives of the estates that have all parameters for accurate sampling. (See Table 4) The stratified sampling technique was used to select the respondents that were drawn in each of the ten selected estates. This method was adopted, in order to give each estate, a representative of a housing unit of the population the equal chance of being selected in the sample.

Application of Stratified sampling in the chosen ten housing Estates.

The application of stratified sampling technique for the ten selected estates is as follows:

The ten public housing estates that make up the sample population were first stratified into three strata using the existing neighborhood densities namely, High, Low, and Medium density neighbourhoods (See Table 8)

Table.8: Residential Densities in Enugu

High Density	Medium Density	Low Density
Abakpa	Achara layout	Aria
Asata	Awkunawnaw	City layout
Asata camp	Idaw river	G.R.A
Iva valley	Maryland	Independence
Ogbete	New era	Republic
Ogui	New haven	River side
Ogui new layout	Secretariat quarters	Tinkers corner
Uwani	Udi siding	Transekulu

Source: Field Survey, 2019

Table 9: Residential Densities in Enugu within the Scope of Study

High Density	Medium Density	Low Density
Abakpa	Maryland	G.R.A
Uwani	New haven	Independence
		Republic
		River side
		Transekulu

Source: Field Survey, 2019

Afterwards, the name of each housing units (plot/ block of flats) under the estates was written in a piece of paper and was placed inside a container provided for each estate and shuffled. Then applying random sampling, one building unit (plot or block of flat) was selected without replacement from each of the estate. Applying this method, 421 plots and block of flats were selected without replacement.

Questionnaires distribution

421 questionnaires with 119 questions were administered to the residents of public housing estates in Enugu metropolis. These are Greenland Housing Estates, Maryland Housing Estate ,Ehocol Housing Estate Trans Ekulu Housing Estates, Riverside Housing Estates, Golf Course Estate, Real Estate Uwani, Federal Housing Estate, Ebeano Housing Estate and Fidelity Housing Estate.

Principial Component Analysis PCA and Analysis of variance ANOVA were used to analyze the data at 0.05 and 0.01 significant levels respectively using descriptive statistics (Salleh, 2008, Ibem et al, 2013). The Research Method involved the procedure for gathering information and analyzing the data.

4.3.3 Instrument of Data Collection and Analysis

The primary instrument of data collection was the structured questionnaire Inah et al, (2014), Ibem et al, (2013) eliciting data on outdoor spaces for functional activities of residents in the public housing estates in Enugu Metropolis. The Statistical Program for Social Sciences (SPSS)-Version 20 software was used, (Akinluyi, 2013), to analyze the responses from the Questionnair

5.0 CHAPTER FIVE:

DATA PRESENTATION, ANALYSIS, RESULTS AND DISCUSSIONS

5.10 Data from primary and secondary sources:

5.11 Section A: Secondary Data:

The Floating Class.

1. Greenland Estate Phase I: (RCC) Trans- Ekulu: 2-Bedroom Semi-Detached Bungalows.
2. Riverside Housing Estate, Abakpa Nike:2 Bedroom Bungalows
3. Federal Housing Estate, Trans Ekulu: 2Bedroom Semi-Detached Bungalows
4. Trans Ekulu Phase IV: 2- Bedroom Detached Bungalow.
5. Federal Housing Estate Phase1, Abakpa Nike: 2-Bedroom Detached Bungalows

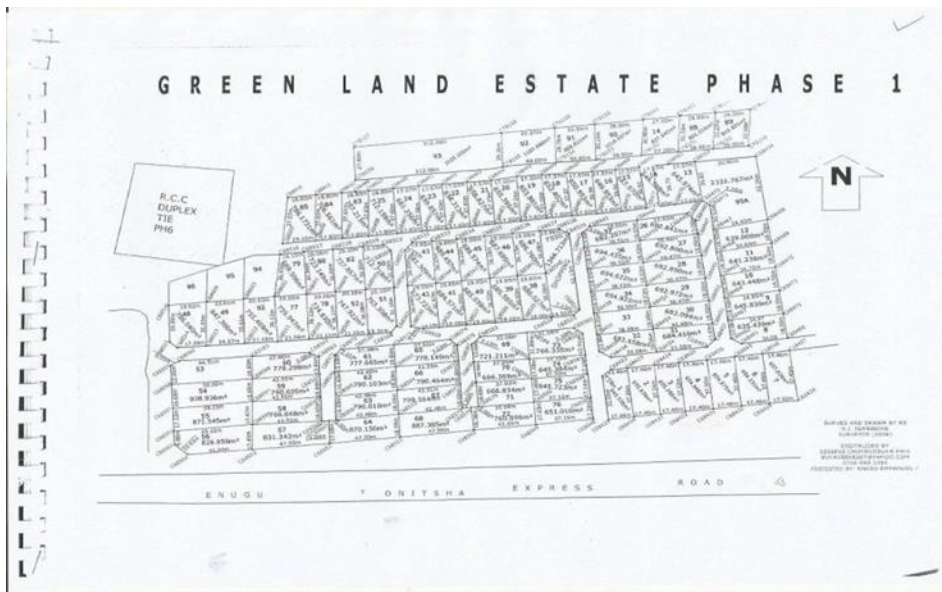


Fig. 6: Layout Plan of Greenland Estate Phase I.

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

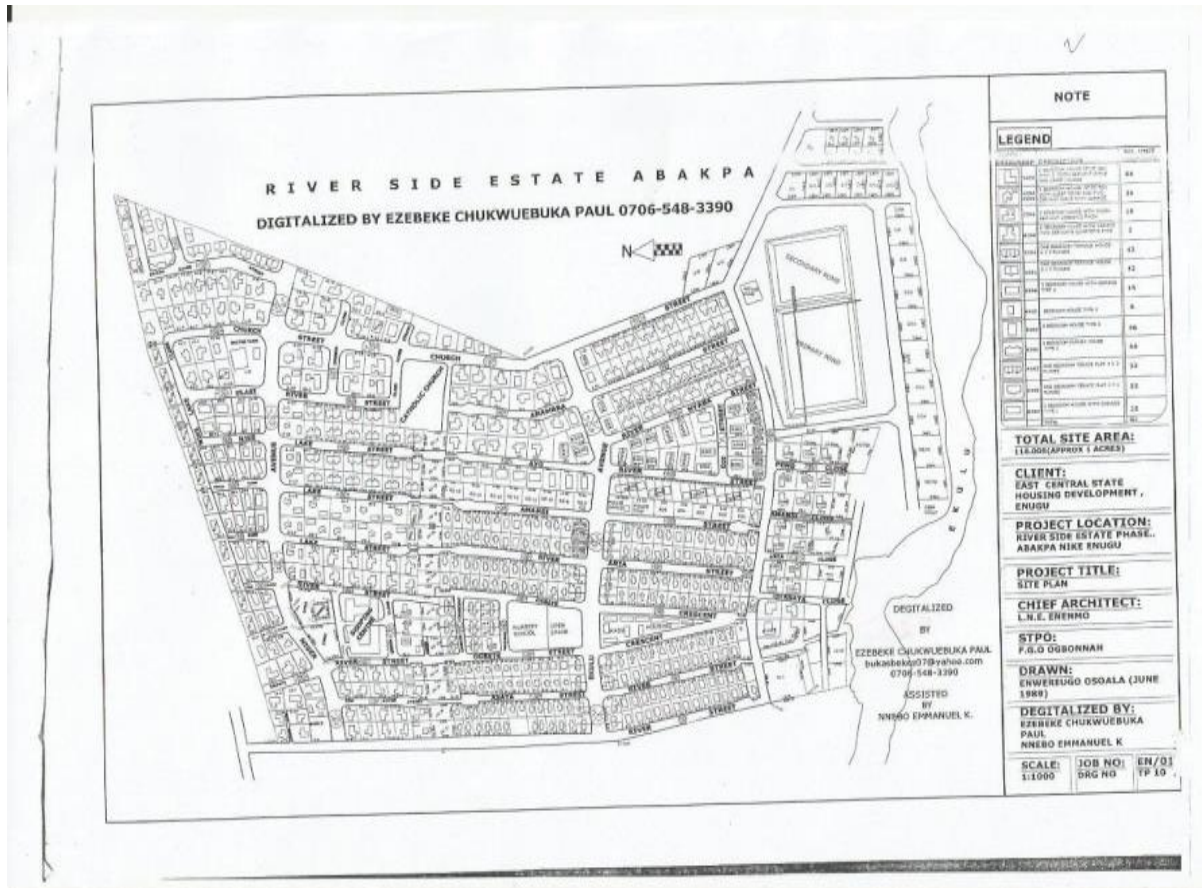


Fig.7: Layout Plan of Riverside Housing Estate, Phase I & II:

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

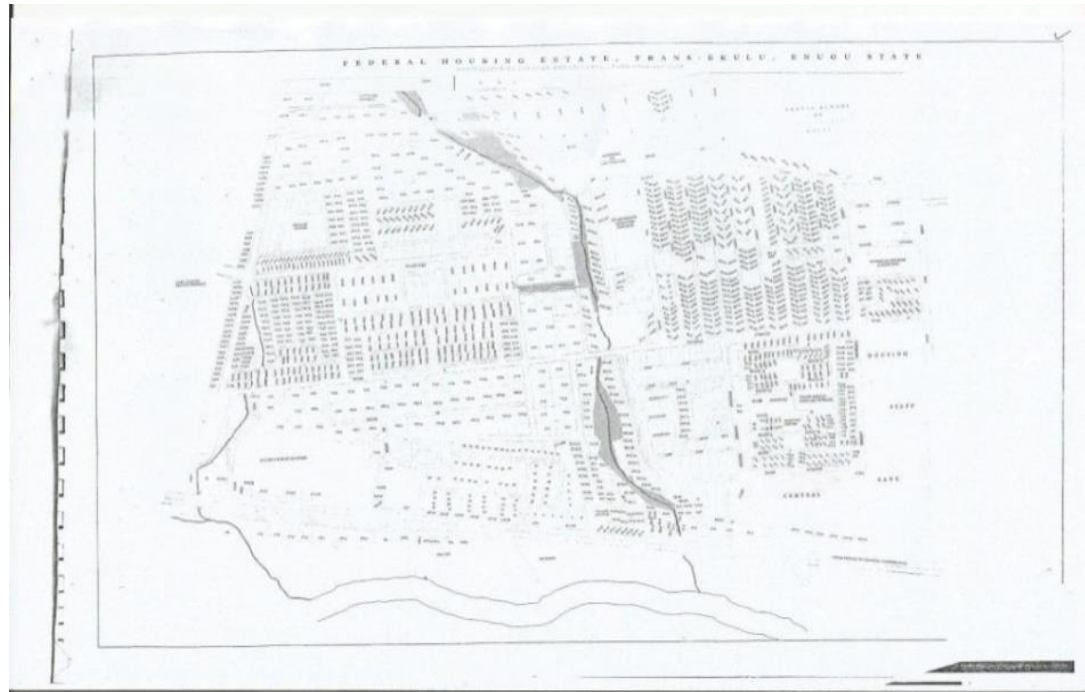


Fig 8: Layout Plan of Federal Housing Estate, Trans Ekulu

Source: Enugu State Housing Development Cooperation (ESHDC) 2012)

Lower- Middle Income Class:

Abakpa Nike 3-Bedroom Storied House,

Trans-Ekulu Phase V 3-Bedroom Bungalow: .

Trans Ekulu Phase II: 3-Bedroom Semi-Detached Storied House with attached Boys Quarters

Federal Housing Estate, Phase I & II Abakpa Nike 3Bedroom Bungalows

Trans Ekulu, Phase VI Greenland Estate Phase 11(RCC Dork Yard) 3-Bedroom Bungalows

Trans Ekulu, Phase VI Greenland Estate Phase 111 (RCC Dork Yard) 3-Bedroom Bungalows

Real Estate, Uwani

Maryland Housing Estate, Phase I (Enugu South) 3Bedroom Block of Flats

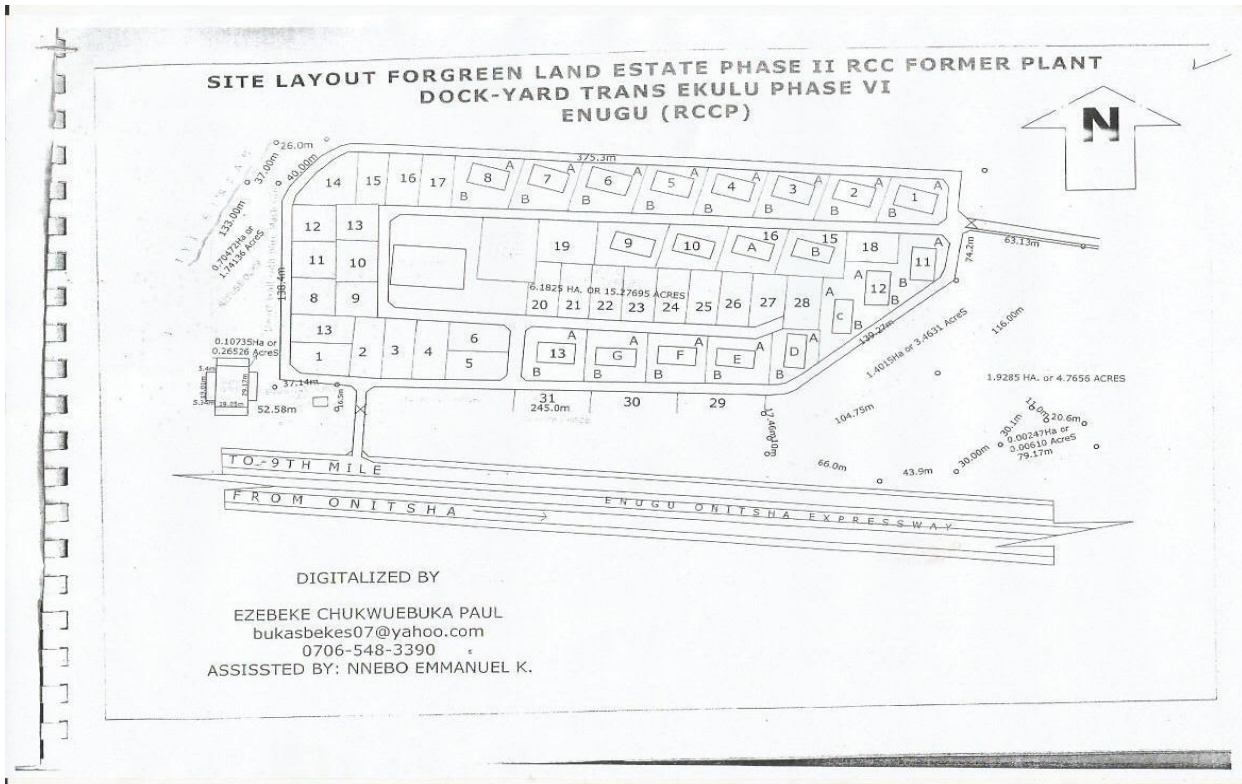


Fig.9: Layout Plan of Trans Ekulu Phase VI: Greenland Estate, Phase II, (RCC Dock Yard)

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

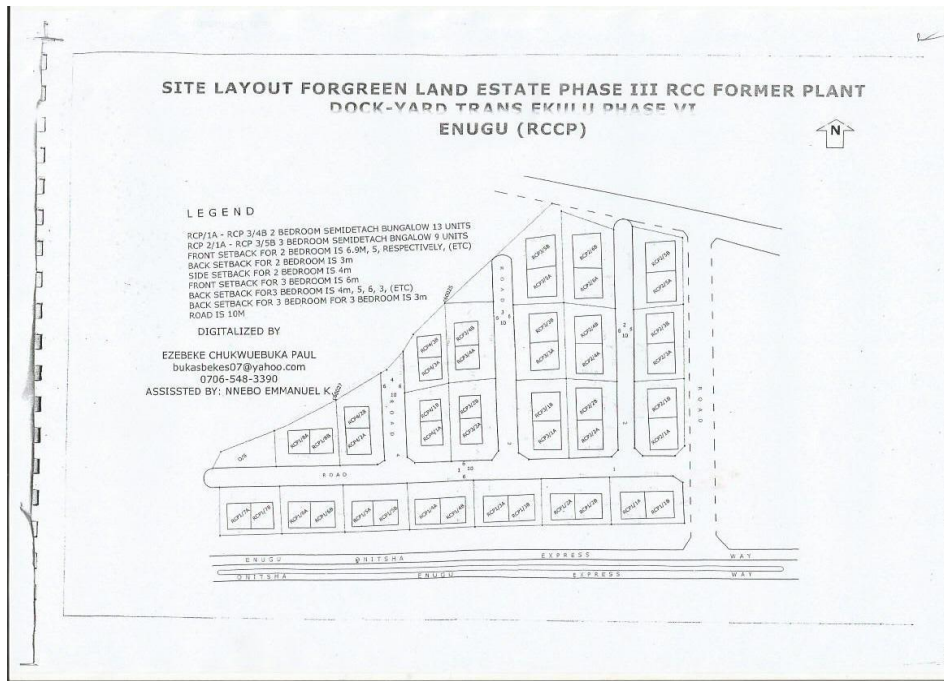


Fig.10: Trans Ekulu, Phase VI Greenland Estate Phase 111 (RCC Dork Yard) 3-Bedroom Bungalows

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

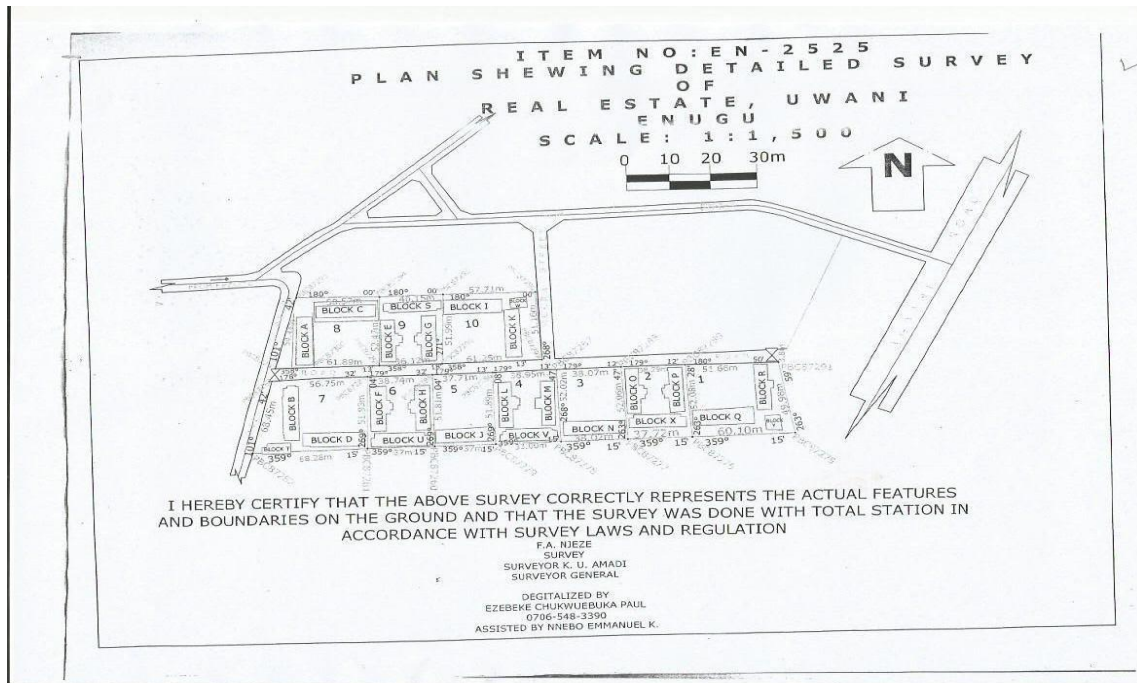


Fig. 11: Layout of Real Estate, Uwani

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

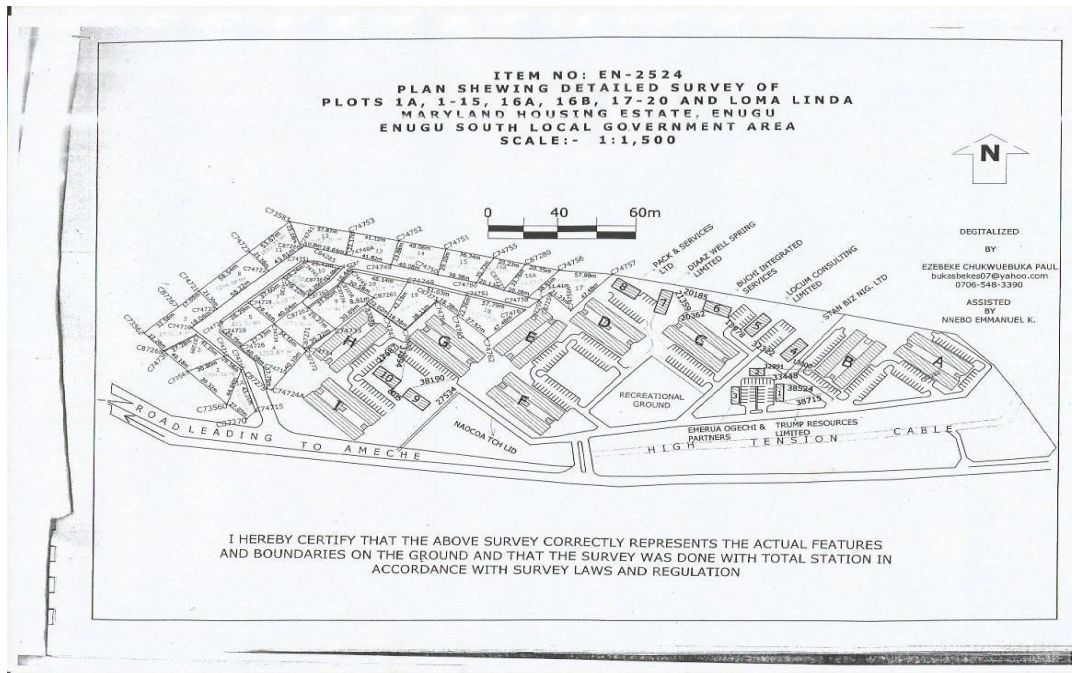


Fig.12: Layout of the Maryland Housing Estate Loma Linda, Maryland.

Source: Enugu State Housing Development Cooperation (ESHDC) 2012

Upper Middle Class.

Trans Ekulu Phase VI – 4 Bedroom Semi-detached Bungalows

Trans Ekulu Phase V – 5 Bedroom Storey House with Boysquater:

Trans Ekulu Phase VI – 4 Bedroom Storey House:

Ebeano Housing Estate: 4 Bedroom Duplex:

Trans-Ekulu Phase VI: 5 Bedroom storied House with 2 Bedroom Boys Quarter

(No Layout Drawings available)

5.12 Case Study

Data from case study include existing outdoor spaces (case study from books and the internet) Porches, sit-outs, patios, decks, balconies, verandahs, walkways, outdoor steps, outdoor kitchens/dinning, children's playground and landscaping. (<http://www.homedit.com>)

The porch, sit-out, patio, decks, verandahs and balconies are common appendages to home design. In this case study, both back yard and front yard landscaping styles have been identified. They include decorative gardens of varying sizes, as well as beautiful pool structures and storage sheds (**Appendix III**)

Porch: A porch is a roofed structure attached to the house, often at a point of entrance projecting in front of the entrance or building in general. It may have a concrete floor, wooden floor or a brick or ceramic floor. Porches and sit-outs provide a measure of shelter in hot weather. The structure is external to the walls of the building but it may be enclosed in certain types of frames including walls, columns or screens, extending from the main structure. Http

Plate 1:Covered entrance porch



Source: [Http://homedit.com](http://homedit.com) 2014

Patios: A patio according to Merriam-Webster's Learner's Dictionary is as a paved outdoor area adjoining a house, generally used for dining or recreation or an inner courtyard. Patios are one of the most important aspects of outdoor spaces. They are essentially open air structures, sometimes with incorporated rudimentary sun screens or baffles. The addition of patio to a house provides residents with an extra room in the house to relax or entertain guests. Patios tend to be best for backyard because they take up little room and are perfect outdoor extensions of a small house. Larger spaces offer more room for activities such as dining, entertaining as well as outdoor kitchen. Common materials employed when building a patio include concrete, stone, bricks, tiles or cobbles. Patios are often decorated with plants and outdoor furniture.

Plate 2: Umbrella covered backyard patio



Source: [Http://www.homedit.com](http://www.homedit.com) 2014

Varandahs. A veranda is a roofed platform along the outside of a house. It levels with the ground floor and often extends across both the front and the sides of the structure. It can be partly enclosed by a railing.

Plate 3: Covered Varandah



Source: [Http://www.homedit.com](http://www.homedit.com) 2014

Walkways: Webster's Dictionary defines a walkway as "a passage or path for walking along, esp. a raised passageway connecting different sections of a building or a wide path in a park or garden." **homedit.com**

Plate 4: Mediterranean Walkway.



Source: [Http://www.homedit.com](http://www.homedit.com) 2014

Balcony: A balcony is a platform on the outside of a building, enclosed by walls or balustrades, supported by columns or console brackets. The platform projects from the wall of a building, usually above the ground floor. Balconies are typically small and are not used as social spaces or for entertainment purposes. They are most often structural adjuncts to the house. A balcony combines some of the features of both porch and patio. It has an open air feeling of a patio

Plate 5: Balcony with metal railings.



Source: [Http://www.homdit.com](http://www.homdit.com) 2014

Outdoor Kitchen: A room or place equipped for outdoor cooking and dining

Plate 6: Outdoor kitchen and dining



Source: [Http://www.homdit.com](http://www.homdit.com) 2014

Sit-outs: Sit-outs are outdoor rooms in the building used for resting, reading, sleeping, holding household meetings and even entertaining guest or visitors. They take advantage of prevailing breezes, sun shading. Sit-outs need natural lighting, made to keep the rain off and need to be screened from mosquito bites during hot nights.

Plate 7: Covered sit-outs



Source: [Http://www.homdit.com](http://www.homdit.com) 2014

Decks: A deck is defined as any flat surface that can be walked on e.g. a balcony, a porch, a raised patio or a flat rooftop. A deck is a flat, usually roofless platform adjoining a house. Decks are typically made of lumber or concrete and are elevated from the ground. It can include spaces for dining as well as seating. A railing generally encloses decks. In some cases, decks can also be covered by a canopy or pergola.

Landscape Elements: Landscape design generally means “the arrangement of earth and the objects upon it for man’s use and enjoyment involving the conservation of the existing landscape and modification of the landscape elements such as vegetation, water bodies and landform to obtain an aesthetically pleasing environment (David, 2009). In this study, the researcher tried to capture areas where plants and land have been utilized to crate pleasant views and to improve microclimate. (See Appendix 111)

Plate 8: Landscaped Garden



Source: [Http://www.homdit.com](http://www.homdit.com) 2014

5.13 Data from Primary Sources

1. Questionnaire Responses. This research was carried out in the ten (10) public housing estates in Enugu for the middle-income residents grouped in different phases and zones and classified into **The Floating class, Lower-Middle Income, and Upper-Middle Income** classes of residents. The research was conducted by **probability random- sampling technique** as indicated in chapter 4 of this study. The primary instrument of data collection was the administration of the structured questionnaire eliciting data on outdoor spaces and functional activities of the residential buildings by the middle- income residents, embracing their socio-economic characteristics and housing attributes and their ratings on the levels of housing satisfaction. The information derived from the questionnaire was backed up by personal field observation of the variables within the survey population. The houses designed as prototypes are the 2-bedroom, 3-bedroom, 4-bedroom and 5-bedrom bungalows spread into detached and semi-

detached typologies. Others include the 2-bedroom, 3-bedroom block of flats as well as 4-bedroom and 5-bedroom detached and semi-detached storied houses. 421 questionnaires containing **119** questions were distributed. **339** copies were returned, showing a response rate of **81%**. The summary of the data from the returned questionnaires are thus presented and discussed below (**See Table 10**)

Table 10: Questionnaire Responses

S/N	HOUSING ESTATES	COPIES OF ISSUED QUESTIONNAIRE	RETURNED QUESTIONNAIRE	PERCENTAGE RESPONSE
1	Greenland Estate	8	8	100%
2	Maryland Estate	40	31	77%
3	Ehocol Estate	5	5	100%
4	Trans Ekulu (Housing Estate)	185	152	82%
5	Riverside Estate	43	33	76%
6	Golf Course Estate	19	19	100%
7	Real Estate, Uwani	11	9	81%
8	Federal Housing	104	76	73%
9	Ebeano Housing	4	4	100%
10	Fidelity Housing	2	2	100%
	Total	421	339	81%

Source: Obi, N.I (Questionnaire Responses); 2012

Part A: Demographic characteristics of respondents.

Frequencies & Frequency Tables (See Appendix I)

Part B- Socio-economic Characteristics of Residents (See Appendix I)

Summary of Demographic Characteristics Residents

Of the number 339, most 193 (56.9%) are mainly adults of 41-50 years of age followed in descending order by those between 51- 60 years of age 75 (21.9%), while the youthful age of 31-40 years are 32 (9.4%) in number. The rest 61years and above are 40 (11.8%) in number **(Table 11)**.

Gender distribution: The study examined 421 people in the estates with 339 returned responses. The characteristics of the respondents were analyzed below: For gender, the married males and their spouses and single males were 313 in number, (142 husbands with 142 wives and 30 single men); bringing generally the ratio of male to female respondents as 50.7% (172) of male to female 49.3% (168), though the married males are men living with their spouses at the time of the survey because the married men are regarded as heads of their household units. The issue of age within the family structure has implication to the design of outdoor spaces of the housing units such as children's play area, adult play or resting place etc. **(Table 11)**

Educational Attainment: shows that a total number of about 82% are graduates of tertiary education, while the remaining 18% are primary and secondary school children living with their parents in the housing estates. **(Fig.24)**

Duration of Residency: The question to address the duration of residency is to ascertain the respondents' perception of satisfaction with their outdoor surroundings. From the findings, majority have lived up to 10 years corresponding to 59.9% (203) while about 28.7% (98) have lived in the estates for up to 5 years. The remaining 23 (6.9%) and 15 (4.5%) only lived 20 years and more respectively. **(Table 11 & Fig.22)**. The assessment of the residents' housing satisfaction should be drawn from the majority because of their long period of residency.

Part B. Socio-Economic Characteristics:

Residency Status: The result revealed that majority (90%) (305) respondents are rent paying residents as against 10% (34) who are owner-occupiers. **(Table 11 & Fig.21)**. This could be explained from the fact that within the period between 1976 and 2017 (40 years) most original owner-occupiers have built their own individual houses and left the public estates under review.

Annual Income: Although the respondents were not eager to disclose their exact income status, the result shows that the majority 88% (298) were within the Floating class and lower-middle income earners, as against 12% (41) who fall within the upper-middle income earners. **(Fig.23)**

Educational Qualification: Also, a reasonable number 58% (197) of the respondents had tertiary education made up 42.3% (143) Bachelor's degree holders and 18.5% (63) Master's Degree holders, while 6.7% (23) is of HND and 4.7% (16) PhD holders. This is an indication that majority of the respondents are literate **(Fig.24)**

Family Size: The result also shows that 54.2% majority of the household size of 4-6 people as against 20.6% for 1-3 people and 25.1% of 7 people and above. This is an indication that the average family is made of the father and mother with between 2-4 children. **(Fig.25)**

Family Structure: On the average nuclear and extended family, members constitute a huge number of 73% (247) as against family and none family members as 14.8 % (50) and nuclear family members only 12.2%. (42).**(Fig.26)**

Nature of Employment:

It was also observed that all the adult respondents were employed: 53.4% were employed in the public sector (Civil Service), 26.4% reported as working in the private sector while 17.2% are self-employed and 5% reported as retirees. **(Fig.27)** The result clearly shows that majorities of the respondents were middle aged; graduates of tertiary education and middle-income public sector civil servants. **(See Appendix I)**

Table 11: Summary of Demographic Characteristics of Respondents

S/N	General information (Biodata)		Frequency (No)	Total Responses (No)	Percentages (%)
1	Gender	Male	313	339	92.5%
		Female	26		7.5%
2	Age	31-40 years	32	339	9.4%
		41-50 years	193		56.9%
		51-60 years	75		21.9%
		61 years and above	40		11.8%
3	Marital Status	Married	285	339	83.7%
		Separated	6		1.7%
		Divorced	4		1.3%
		Widowed	22		6.6%
		Single	23		6.7%
4	Status Residency	Rent paying	305	339	89.9%
		Tenancy			
		Owner occupier	34		10.1%
5	Length of tenancy	Less than one year	15	339	4.5%
		1-5 years	98		28.7%
		Up to 10 years	203		59.9%
		U to 20 years	13		3.9%
		More than 20 years	10		3.0%

5.14 TEST OF HYPOTHESES

Hypothesis one

Ho: The extent of modification and adaptation in the housing estate is not significant

Results:

The result of the hypothesis shows that the extent of modification and adaptation in the studied housing estate is significantly classified into 12 components (factors).

Component one:

Component one loaded significantly on 10 factors. These are in descending order: provision of outdoor bike racks (0.850), provision of outdoor garden sprinkler (0.835), creating space for volleyball (0.833), creating space for swimming pool (0.719) and outdoor water fountain (0.790). Others are: creating space for table tennis games (0.776) creating space for basket ball games (0.714), attaching covered walkway (0.634), creating space for outdoor recreation (0.541) and outdoor garden light (0.507). It has Eigen value of 7.592 and explained variance of 14.599%. The component is an index for measuring outdoor space modification/adaptation for **outdoor games**. The defining variable is the provision of outdoor bike racks (See Table11)

Table 11: Component One OUTDOOR GAMES

S/NO	FACTORS	
1	Provision of outdoor bike racks	0.850
2	Provision of outdoor garden sprinkler in compound	0.835
3	Creating space for volley ball in the compound	0.833
4	Creating space for swimming pool in compound	0.794
5	Outdoor water fountains in compound	0.790
6	Creating spaces for table tennis games in compound	0.776
7	Creating spaces for basketball game in compound	0.714
8	Attaching covered walkway	0.634
9	Creating space for outdoor recreation	0.541
10	Outdoor garden lights	0.507

Source: Field Survey, 2018.

Component Two: INFORMAL SECTOR ACTIVITIES

Component two loaded significantly on 7 factors. These are in descending order: creating space for selling of GSM cards (0.879), creating space for grinding mill (0.834), creating space for sell of kerosene (0.821), and creating space for gas refilling (0.722). Others are: creating space for watch repairing (0.619) and creating space for mending of shoes (0.544). It has Eigen value of 5.461 and explained variance of 10.501%. The component is an index for measuring outdoor space modification/adaptation for **informal sector activities**. The defining variable is the creating of outdoor space for selling of GSM cards. (See table 12)

Table 12: Component Two INFORMAL SECTOR ACTIVITIES

S/NO	FACTORS	
1	Creating space for sale of GSM cards in compound	0.879
2	Creating space for grinding mill in compound	0.834
3	Creating space for sale of Kerosene in compound	0.821
4	Creating space for photocopying in compound	0.786
5	Creating space for Gas refilling in compound	0.722
6	Creating space for watch repairing in compound	0.619
7	Creating space for mending shoes in compound	0.544

Source: Field Survey, 2018.

Component Three

Component three loaded significantly on 8 factors. These are in descending order: making flowerbed around house (0.788), Grassing/landscaping (0.785), creating space for additional car parking (0.731), reconstructing drainage channel (0.653), and grassing/landscaping of compound (0.640). Others are creating space for outdoor resting (0.597), gardening for orchards (0.585) and planting trees and herbs as shield from neighbourhood (0.576). It has Eigen value of 5.405 and explained variance of 10.395%. The component is an index for measuring outdoor space modification/adaptation for **landscaping**. The defining variable is making flowerbed around house. (See Table 13)

Table 13: Component Three: LANDSCAPING

S/NO	FACTORS	
1	Making flowerbed around house.	0.788
2	Grassing/landscaping	0.785
3	Creating space for additional car parking	0.731
4	Reconstructing drainage channel	0.653
5	Gassing/landscaping of compound	0.640
6	Creating space for outdoor resting	0.597
7	Gardening for orchard	0.585
8	Planting trees and herbs as shield from neighborhoods	0.576

Component four

Component four loaded significantly on 6 factors. These are in descending order: building gate house (0.799), converting carport for other purpose (0.687), converting space for gatehouse (0.657), converting gatehouse for other activities (0.656), making own entrance porch (0.542), and creating space for generator house (0.527). It has Eigen value of 4.386 and explained variance of 8.435%. The component is an index for measuring outdoor space modification\adaptation for **ancillary structures**. The defining variable is building gate house (See Table 14)

Table 14: Component Four ANCILLARY STRUCTURES

S/NO	FACTORS	
1	Building gatehouse	0.799
2	Converting car pot for other purposes	0.687
3	Creating space for gatehouse	0.657
4	Converting your gatehouse for other activities	0.656
5	Making own entrance porch	0.542
6	Creating space for generator house	0.527

Source: Field Survey, 2018.

Component Five

Component five loaded significantly on 7 factors. These are in descending order: converting sit out for other purposes (0.792), creating space for garbage (0.735), creating space for sewing of clothes (0.702), creating space for mending of shoes (0.564), creating space for small scale shopping (0.535) and providing hedges around house (0.502). It has Eigen value of 4.304 and explained variance of 8.277%. The component is an index for measuring outdoor spaces modification/adaptation for **illegal outdoor space conversion**. The defining variable is converting sit-outs for other purposes. (See Table 15)

Table 15: Component Five ILLEGAL OUTDOOR SPACE CONVERSION

S/NO	FACTORS	
1	Converting sit-outs for other purposes	0.790
2	Creating space for garbage collection	0.735
3	Creating space for sewing of clothes	0.702
4	Creating space for water storage	0.624
5	Creating space for mending shoes	0.564
6	Creating space for small scale shopping	0.535
7	Providing hedges around house	0.502

Source: Field Survey, 2018.

Component Six

Component six loaded significantly on 3 factors. These are on descending order: converting a bungalow to storey building (0.729), extending of roof to have additional outdoor space (0.594), and creating a space for outdoor cooking (0.585). It has Eigen values of 2.794 and explained variance of 5.374%. The component is on index for measuring outdoor space modification/adaptation for **illegal change of use**. The defining variable is converting bungalow to storey building. (See Table 16)

Table 16: Component Six: ILLEGAL CHANGE OF USE

S/NO	FACTORS	
1	Converting a bungalow to storey building	0.729
2	Extending of roof to have additional outdoor space	0.594
3	Creating space for outdoor cooking	0.585

Source: Field Survey, 2018.

Component Seven

Component seven loaded significantly on 2 factors. These are in descending order: provision of outdoor lighting (0.761) and provision of outdoor garden lights (0.582). It has Eigen value of 1.832 and explained variance of 3.522%. The component is an index for measuring outdoor space modification/adaptation for **outdoor lighting**. The defining variable is provision of outdoor lighting. (See Table 17)

Table 17: Component Seven: OUTDOOR LIGHTING

S/NO	FACTORS	
1	Provision of outdoor lighting	0.761
2	Provision of outdoor garden lights	0.582

Source: Field Survey, 2018.

Component Eight

Component eight is loaded significantly on 2 factors. These are in descending order: creating space for selling water (0.724), and creating space for security house (0.587). It has Eigen value of 1.794 and explained variance of 3.450%. The component is an index for measuring outdoor space modification/adaptation for **water storage**. The defining factor variable is creating space for selling of water. (See Table 18)

Table 18: Component Eight: WATER STORAGE

S/NO	FACTORS	
1	Creating space for selling of water	0.724
2	Creating space for security house	0.587

Source: Field Survey, 2018.

Component Nine

Component nine loaded significantly on 2 factors. These are in descending order: provision of shade from weather (0.718) and provision of outdoor signage (0.548). It has Eigen value of 1.752 and explained variance of 3.370%. The component is an index for measuring outdoor space modification and adaptation for **outdoor weather protection**. The defining factor variable is Provision of shade from weather. (See Table 19)

Table 19: Component Nine: OUTDOOR WEATHER PROTECTION

S/NO	FACTORS	
1	Provision of shade from weather	0.716
2	Provision of outdoor signage	0.548

Source: Field Survey, 2018.

Component Ten

Component ten loaded significantly on 1 factor. This is screening balconies and verandahs (0.801). It has Eigen value of 1.664 and explained variance of 3.200%. The component is an index for measuring outdoors space modification/adaptation for **screening balconies/verandah**. The defining factor variable is outdoor screening of balconies and verandah (See Table 20)

Table 20: Component Ten: SCREENING BALCONIES/VERANDAHS

S/NO	FACTORS	
1	Outdoor screening of balconies and verandah	0.801

Source: Field Survey, 2018.

Component Eleven

Component eleven loaded significantly on 1 factor. This is resurfacing compound with cement screed and interlocking stones (0.748). It has Eigen value of 1.616 and explained variance of 3.108%. The component is an index for measuring outdoor space modification and adaptation for **outdoor floor finishes**. The defining factor variable is resurfacing compound with cement screed/interlocking stones (See Table 21)

Table 21: Component Eleven: OUTDOOR FLOOR FINISHES

S/NO	FACTORS	
1	Resurfacing compound with cement screed/interlocking stones	0.748

Source: Field Survey, 2018.

Component Twelve

Component twelve also loaded significantly on 1 factor. This is provision of outdoor steps (90.525). It has Eigen value of 1.381 and explained variance of 2.655%. The component is an index for measuring outdoor space modification and adaptation for **outdoor steps**. The defining factor variable is provision of outdoor steps (See Table 22)

Table 22: Component Twelve: OUTDOOR STEPS

S/NO	FACTORS	
1	Provision of outdoor steps	0.525

Source: Field Survey, 2018.

Summary

In overall, the 12 significant components cumulatively accounted for **76.887%** of the modification and adaptation of outdoor spaces. The factor that had the highest modification of the outdoor spaces was **outdoor games** (14.599%). It was followed in descending order by: **informal sector activities** (10.501%), **landscaping** (10.395%), **ancillary structures** (8.435%), **illegal outdoor space conversion** (8.277%), **illegal change of use** (5.374%), **outdoor lighting** (3.522%), **water storage** (3.450%), **screening of balconies/verandah** (3.200%), **outdoor floor finishes** (3.108%) and **outdoor steps** (2.655%). This implies that the twelve aforementioned factors are the outdoor space modification and adaptation found in the housing estates (see table 23 below). The detail of these results is in Appendix II

TABLE 23: EXTENT OF MODIFICATION AND ADAPTATION OF OUTDOOR SPACES IN THE STUDIED HOUSING ESTATE

Component	Modified Outdoor Spaces	Factors	Factor Loading	Eigen Value	Percentage Variance
1	OUTDOOR GAMES			7.592	14.599
		Provision of outdoor bike racks	0.850		
		Provision of outdoor garden sprinkler in compound	0.835		
		Creating space for volley ball in the compound	0.833		
		Creating space for swimming pool in compound	0.794		

		Outdoor water fountains in compound	0.790		
		Creating spaces for table tennis games in compound	0.776		
		Creating spaces for basketball game in compound	0.714		
		Attaching covered walkway	0.634		
		Creating space for outdoor recreation	0.541		
		Outdoor garden lights	0.507		
2	INFORMAL SECTOR ACTIVITIES			5.461	10.501
		Creating space for sale of GMS cards in compound	0.879		
		Creating space for grinding mill in compound	0.834		
		Creating space for sale of Kerosene in compound	0.821		
		Creating space for photocopying in compound	0.786		

		Creating space for Gas refilling in compound	0.722		
		Creating space for watch repairing in compound	0.619		
		Creating space for mending shoes in compound	0.544		
3	LANDSCAPING			5.405	10.395
		Making flowerbed around house.	0.788		
		Grassing/handicapping	0.785		
		Creating space for additional car parking	0.731		
		Reconstructing drainage channel	0.653		
		Gassing/handicapping of compound	0.640		
		Creating space for outdoor resting	0.597		

		Gardening for orchard	0.585		
		Planting trees and herbs as shield from neighborhoods	0.576		
4	ANCILLARY STRUCTURES			4.386	8.435
		Building gatehouse	0.799		
		Converting car pot for other purposes	0.687		
		Creating space for gatehouse	0.657		
		Converting your gatehouse for other activities	0.656		
		Making own entrance porch	0.542		
		Creating space for generator house	0.527		
5	ILLEGAL OUTDOOR SPACE CONVERSION			4.304	8.277

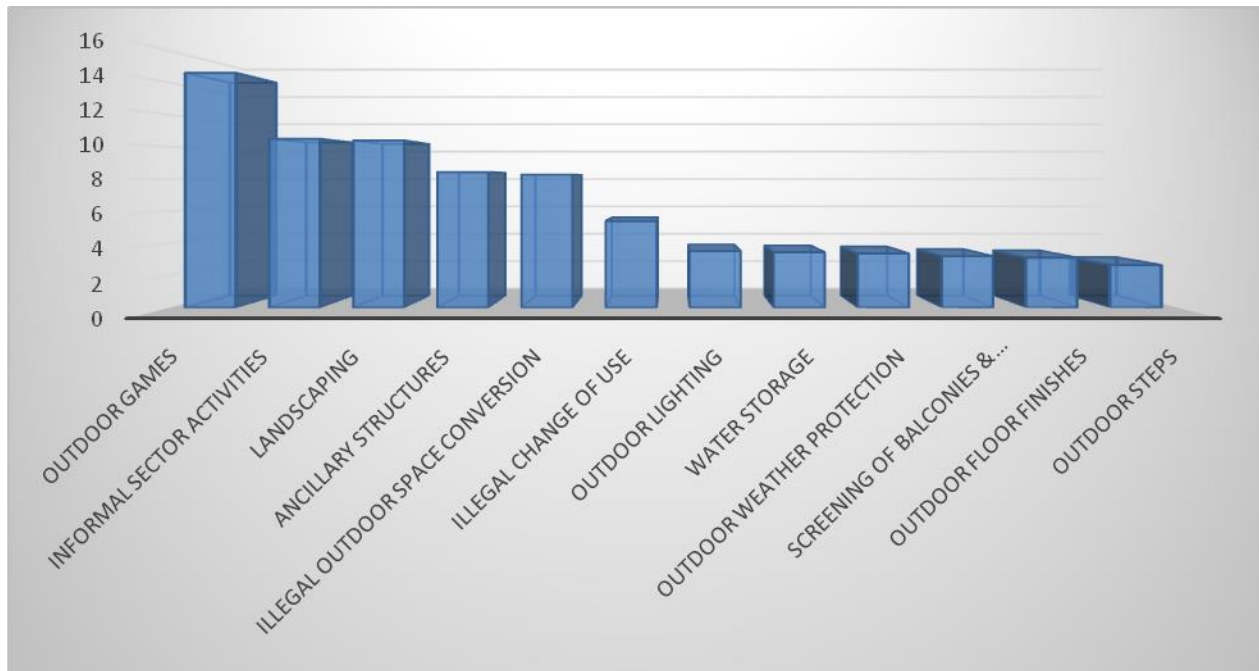
		Converting sit-outs for other purposes	0.790		
		Creating space for garbage collection	0.735		
		Creating space for sewing of clothes	0.702		
		Creating space for water storage	0.624		
		Creating space for mending shoes	0.564		
		Creating space for small scale shopping	0.535		
		Providing hedges around house	0.502		
6	ILLEGAL CHANGE OF USE			2.974	5.374
		Converting a bungalow to storey building	0.729		
		Extending of roof to have additional outdoor space	0.594		

		Creating space for outdoor cooking	0.585		
7	OUTDOOR LIGHTING			1.832	3.522
		Provision of outdoor lighting	0.761		
		Provision of outdoor garden lights	0.582		
8	WATER STORAGE			1.794	3.450
		Creating space for selling water	0.724		
		Creating space for security house	0.587		
9	OUTDOOR WEATHER PROTECTION			1.752	3.370
		Provision of shade from weather	0.716		

		Provision of outdoor signage	0.548		
10	SCREENING OF BALCONIES AND VERANDAH	Screening balconies/verandahs	0.801	1.644	3.200
11	OUTDOOR FLOOR FINISHES			1.616	3.108
		Resurfacing compound with cement screed/interlocking stones	0.748		
12	OUTDOOR STEPS			1.381	2.655
		Provision of outdoor steps	0.525		
Cumulative Variance (Total)					76.887%

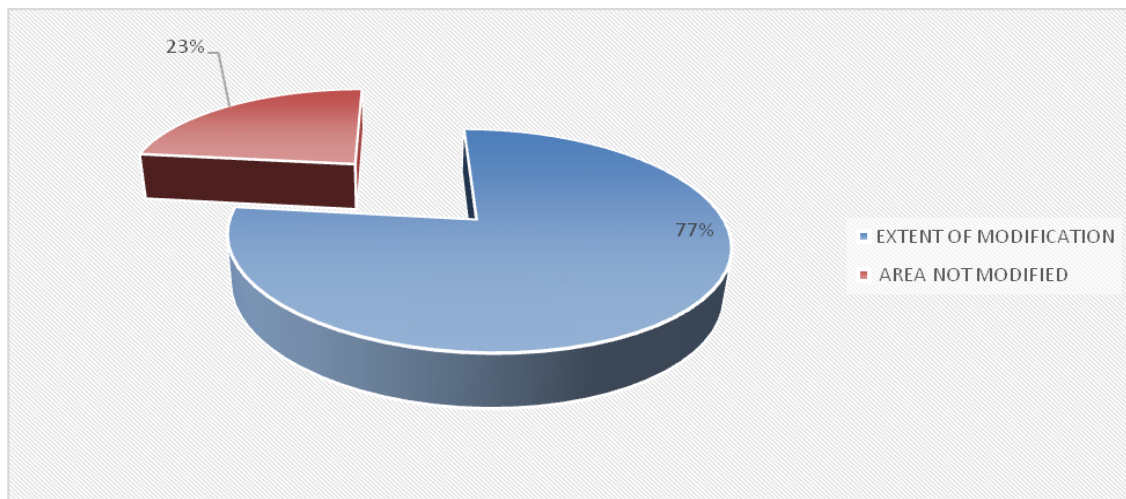
Source: Field Survey, 2018.

Figure 13: Modified Outdoor Spaces in the Studied Housing Estates



Source: Field Survey, 2018.

Figure 14: Extent of Modification and Adaptation of Outdoor Spaces in the Studied Housing Estate



Source: Field Survey, 2018.

HYPOTHESIS TWO

Ho: The residents' level of satisfaction with existing outdoor spaces in the housing estates is not significant.

Results:

The results of the hypothesis show that the residents' level of satisfaction of the outdoor spaces is significant and classified into twelve components.

Component One loaded significantly on 7 factors. These are in descending order: provision of outdoor bike racks (0.804), creating space for volley ball (0.796), provision of outdoor garden sprinkler (0.751), provision of outdoor water fountains (0.708), creating space for table-tennis games in the compound (0.707), creating space for basketball game in the compound (0.662) and creating own swimming pool (0.662). It has Eigen value of 6.555 and explained variance of 12.606%. The component is an index for measuring the residents' level of satisfaction of the existing outdoor space modification for **outdoor games**. The defining factor variable is Provision of outdoor bike racks (See Table 24)

Table24 : Component One: OUTDOOR GAMES

S/NO	FACTORS	
1	Provision of outdoor bike racks	0.804
2	Creating space for volley ball.	0.796
3	Provision of outdoor garden sprinkler	0.751
4	Provision of outdoor water fountains	0.708
5	Creating space for table-tennis games in the compound	0.707
6	Creating space for basketball game in the compound	0.662
7	Creating own swimming pool	0.662

Source: Field Survey, 2018.

Component Two loaded significantly on 9 Factors. These are in descending order: creating space for additional car parking (0.835), grassing/landscaping (0.668), creating for garbage collection (0.658), creating space for outdoor recreation (0.651) and reconstruction of drainage channels (0.647). Others are grassing/landscaping in the compound (0.616), making flowerbed around the house (0.585), creating space for water storage (0.583) and gardening for orchards (0.579). It has Eigen value of 6.314 and explained variance of 12.143%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **Outdoor Sanitation**. The defining factor variable is creating space for additional car parking (See Table 25)

Table 25: Component Two: OUTDOOR SANITATION

S/NO	FACTORS	
1	Creating space for additional car parking	0.835
2	Grassing/Landscaping	0.668
3	Creating for garbage collection	0.658
4	Creating space for outdoor recreation	0.651
5	Reconstruction drainage channels	0.647
6	Grassing/landscaping in the compound	0.616
7	Making flowerbed around the house	0.585
8	Creating space for water storage	0.583
9	Gardening for orchards	0.579

Source: Field Survey, 2018.

Component Three loaded significantly loaded on 5 factors. These are in descending order: creating spaces for grinding mill (0.894), creating spaces for selling kerosene (0.797), creating spaces for typing pool (0.756), creating spaces for gas refilling (0.731) and creating spaces for water repairs (0.504). It has Eigen Value of 4.773 and explained variance of 9.179%. The

component is an index for measuring the residents' level of satisfaction of existing outdoor space modification for **Informal sector activity**. The defining factor variable is creating spaces for grinding mill (See Table 26)

Table 26: Component Three: INFORMAL SECTOR ACTIVITIES

S/NO	FACTORS	
1	Creating spaces for grinding mill	0.894
2	Creating spaces for selling kerosene	0.797
3	Creating spaces for typing pool	0.756
4	Creating spaces for gas refilling	0.731
5	Creating spaces for water repairs	0.504

Source: Field Survey, 2018.

Component Four loaded significantly on 4 Factors. These are in descending order: planting trees and herbs as shield from neighborhood (0.803), providing hedges around house (0.777), increasing perimeter fence height for privacy and residents (0.758) and extending eaves of building to protect exposed balconies/verandahs (0.587).). It has Eigen Value of 3.435 and explained variance of 6.605%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **Outdoor security**. The defining factor variable is planting trees and herbs as shield from neighborhood (See Table 27)

Table 27: Component Four: OUTDOOR SECURITY

S/NO	FACTORS	
1	Planting trees and herbs as shield from neighborhood	0.803
2	Providing hedges around house	0.777
3	Increasing perimeter fence height for privacy and residents	0.758
4	Extending caves of building to protect exposed balconies/verandahs	0.587

Source: Field Survey, 2018.

Component Five loaded significantly on 4 factors. These are on descending order: converting gate house for other purpose activities (0.692) making own entrance porch (0.654), converting car pot for other purposes (0.575) and building gate house (0.548). It has Eigen Value of 3.292 and explained variance of 6.330%. The component is an index for measuring the resident’s level of satisfaction existing outdoor space modification for **Ancillary structures**. The defining factor variable is converting gate house for other activities. (See Table 28)

Table 28: Component Five: ANCILLARY STRUCTURES

S/NO	FACTORS	
1	Converting gate house for other activities	0.692
2	Making own entrance porch	0.654
3	Converting car pot for other purposes	0.575
4	Building gate house	0.548

Source: Field Survey, 2019.

Component Six loaded significantly on 3 Factors. These are on descending order: creating space for gate house creating space for security house (0.814), creating space for selling of water (0.691) and creating space for gate house (0.657). It has Eigen Value of 2,766 and explained variance of 5.319%. The component is an index for measuring the resident’s level of satisfaction of existing outdoor spaces for **Illegal outdoor space conversion**. The defining factor variable is Creating space for security house (See Table 29)

Table 29: Component Six: ILLEGAL OUTDOOR SPACE CONVERSION

S/NO	FACTORS	
1	Creating space for security house	0.814
2	Creating space for selling water	0.691
3	Creating space for gate house	0.657

Source: Field Survey, 2018.

Component Seven loaded significantly on 3 Factors. These are on descending order: screening balconies/Verandahs (0.563), creating space for outdoor resting (0.536), provision of shades from weather (0.532). It has Eigen Value of 2.612 and explained variance of 5.024%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **outdoor recreation**

The defining factor variable is screening balconies/Verandahs. (See Table 30)

Table 30: Component Seven: OUTDOOR RECREATIONS

S/NO	FACTORS	
1	Screening balconies/Verandahs	0.563
2	Creating space for outdoor resting	0.536
3	Provision of shades from weather	0.532

Source: Field Survey, 2018.

Component Eight loaded significantly on 2 Factors: These are in descending order: creating space for small shopping (0.814) and creating space for sewing clothes (0.563). It has Eigen Value of 2.5 a62 and explained variance of 4.927%%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **informal sector activity**. The defining factor variable is creating space for small shopping (See Table 31)

Table 31: Component Eight: HOME BASED ENTERPRISES

S/NO	FACTORS	
1	Creating space for small shopping	0.814
2	Creating space for sewing clothes	0.563

Source: Field Survey, 2019.

Component Nine loaded significantly on 1 factor. This is erecting pet house (0.739)

It has Eigen Value of 2.146 and explained variance of 4.127%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **Erecting pet house**. The defining factor variable is erecting pet house (See Table 32)

Table 32: Component Nine: ERECTING PET HOUSE

S/NO	FACTORS	
1	Erecting pet house	0.739

Source: Field Survey, 2018.

Component Ten loaded significantly on 2 factors. These are in descending order: provision of outdoor lighting (0.728), provision of outdoor steps (0.552). It has Eigen Value of 2.126 and explained variance of 4.088%. The component is an index for measuring the resident's level of satisfaction of existing outdoor space modification for **outdoor lighting** The defining factor variable is provision of outdoor lighting (See Table 33)

Table 33: Component Ten: OUTDOOR LIGHTING

S/NO	FACTORS	
1	Provision of outdoor lighting	0.728
2	Provision of outdoor steps	0.552

Source: Field Survey, 2018.

Component Eleven loaded significantly on 1 Factor. This is Converting the entire bungalow to storey building thereby reducing outdoor space (0.676). It has Eigen Value of 1.809 and explained variance of 3.479%. The component is an index for measuring the residents' level of satisfaction of existing outdoor space modification for **illegal conversion**. The defining factor variable is converting entire bungalow to storey building thereby reducing outdoor space. (See Table 34)

Table 34: Component Eleven BUILDING CONVERSION

S/NO	FACTORS	
1	Converting the entire bungalow to storey building thereby reducing outdoor space.	0.676

Source: Field Survey, 2018.

Component Twelve loaded significantly on 1 factor. These are Grassing/landscaping in the compound (0.571) and Creating space for selling of GMS Cards (0.536) It has Eigen Value of 1.474 and explained variance of 2.385%. The component is an index for measuring the residents' level of satisfaction of existing outdoor space modification for **Landscaping**. The defining factor variable is Grassing/landscaping in the compound (See Table 35)

Table 35: Component Twelve: LANDSCAPING

S/NO	FACTORS	
	Grassing/landscaping in the compound	0.571
2	Creating space for selling of GMS Cards	0.536

Source: Field Survey, 2018.

Summary:

In overall, the 12 significant components cumulatively accounted for **76.662%** of the residents' level of satisfaction of the existing outdoor space modification and adaptation in the study area. The factor that had the highest level of satisfaction of the outdoor spaces is **outdoor games (12.606%)**. It was followed in descending order by **outdoor sanitation (12.143%)**, **informal sector activities (9.179%)**, **outdoor security (6.605%)**, **ancillary structures (6.330%)** and **building conversion (5.319%)**. Others are **outdoor recreation (5.024%)**, **home base enterprises (4.927%)**, **erecting pet house (4.127%)**, **outdoor lighting (4.088%)**, **building conversion (3.479%)** and **landscaping (2.835%)**. This is an implication that the residents were highly satisfied with their modification and adaptation of their outdoor spaces of the housing estates. (See Table 36 below).

Table 36: Residents' level of satisfaction of the outdoor spaces in the study area.

Component	Modified Outdoor Spaces	Factors	Factor Loading	Eigen Value	Percentage Variance
1	OUTDOOR GAMES			6.555	12.606
		Provision of outdoor bike racks	0.804		
		Creating space for volley ball.	0.796		
		Provision of outdoor garden sprinkler	0.751		
		Provision of outdoor water fountains	0.708		
		Creating space for table-tennis games in the compound	0.707		
		Creating space for basketball game in the compound	0.662		
		Creating own swimming pool	0.662		
2	OUTDOOR SANITATION			6.314	12.143

		Creating space for additional car parking	0.835		
		Grassing/Landscaping	0.668		
		Creating for garbage collection	0.658		
		Creating space for outdoor recreation	0.651		
		Reconstruction drainage channels	0.647		
		Grassing/landscaping in the compound	0.616		
		Making flowerbed around the house	0.585		
		Creating space for water storage	0.583		
		Gardening for orchards	0.579		
3	INFORMAL SECTOR ACTIVITIES			4.773	9.179
		Creating spaces for grinding mill	0.894		
		Creating spaces for selling kerosene	0.797		

		Creating spaces for typing pool	0.756		
		Creating spaces for gas refilling	0.731		
		Creating spaces for water repairs	0.504		
4	OUTDOOR SECURITY			3.435	6.605
		Planting trees and herbs as shield from neighborhood	0.803		
		Providing hedges around house	0.777		
		Increasing perimeter fence height for privacy and residents	0.758		
		Extending eaves of building to protect exposed balconies/verandahs	0.587		
5	ANCILLARY STRUCTURES			3.292	6.330
		Converting gate house for other purpose activities	0.692		

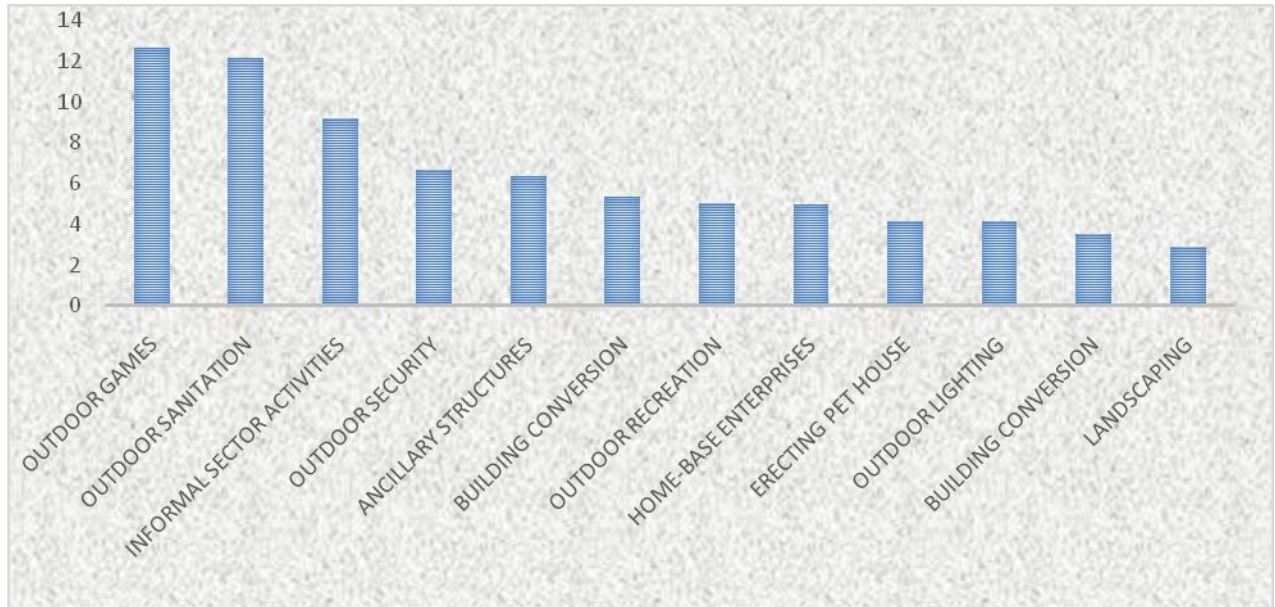
		Making own entrance porch	0.654		
		Converting car pot for other purposes	0.575		
		Building gate house	0.548		
6	ILLEGAL SPACE CONVERSION			2.766	5.319
		Creating space for security house	0.814		
		Creating space for selling water	0.691		
		Creating space for gate house	0.657		
7	OUTDOOR RECREATION			2.612	5.024
		Screening balconies/Verandahs	0.563		
		Creating space for outdoor resting	0.536		
		Provision of shades from weather	0.532		

8	HOME BASE ENTERPRISES			2.562	4.927
		Creating space for small shopping	0.814		
		Creating space for sewing clothes	0.563		
9	ERECTING PET HOUSE			2.146	4.127
		Erecting pet house	0.739		
10	OUTDOOR LIGHTING			2.126	4.088
		Provision of outdoor lighting	0.728		
		Provision of outdoor steps	0.552		

11	BUILDING CONVERSION			1.809	3.479
		Converting the entire bungalow to storey building thereby reducing outdoor space.	0.676		
12	LANDSCAPING			1.474	2.835
		Grassing/landscaping in the compound	0.571		
		Creating space for selling of GMS Cards	0.536		
Cumulative Variance					76.622

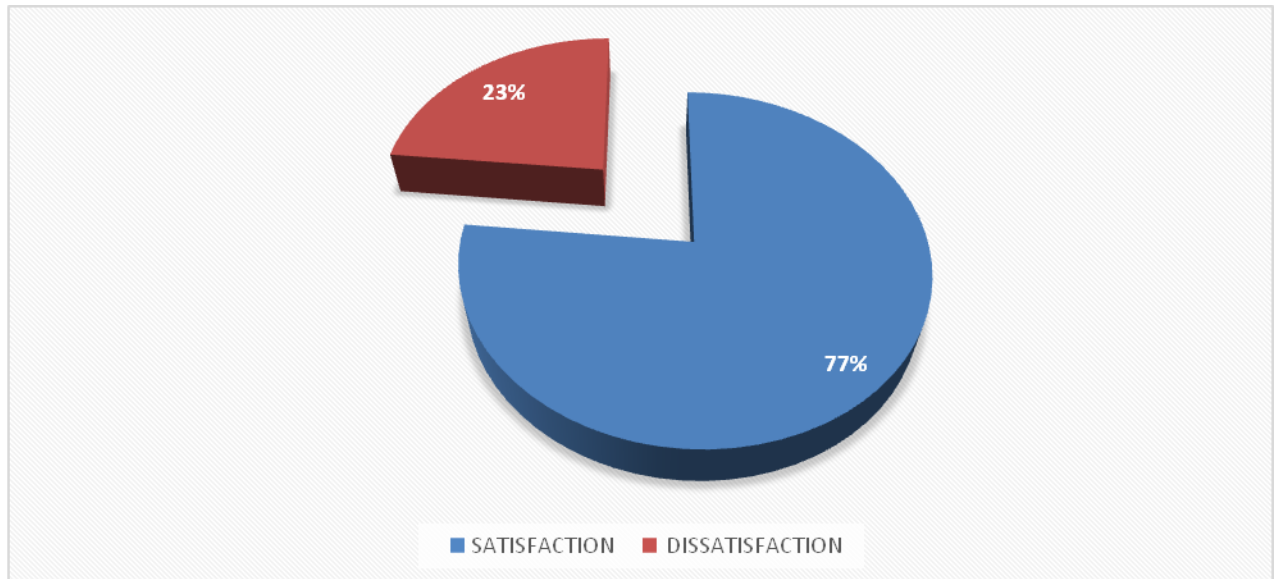
Source: Field Survey, 2018.

Figure 15: Resident's Level of Satisfaction of the Outdoor Spaces in the Study Area.



Source: Field Survey, 2018.

Figure 16: Level of Satisfaction of the Outdoor Spaces in the Study Area.



Source: Field Survey, 2018.

HYPOTHESIS THREE

Ho: The residents' outdoor space needs in the housing estates cannot be significantly identified and classified

Results:

The result of the hypothesis significantly identified and classified the residents' outdoor space needs in the housing estates into 11 components.

Component One

Component One loaded significantly on 17 factors. These are in descending order: space for gardening/tree planting (0.831), space for flowerbeds (0.825), space for small scale gardening (0.778), space for outdoor relaxation (0.768), space for outdoor cooking/dinning (0.735) and space for entertainment of guest (0.702). Others are space for garbage collection and disposal(0.697), space for spreading of clothes (0.681), space for outdoor family meeting(0.680), space for walkways (0.671), space for patio and terrace (0.660) and space for outdoor washing/laundry (0.646), These include also space for walking/strolling (0.646), space for walking/strolling (0.615), space for water storage (0.528), space for delivery access (0.522), space for entrance porch (0.522) and space for outdoor resting (0.506). It has Eigen value of 11.256 and explained variance of 19.078%. The component is an index for measuring the residents' outdoor space needs for **outdoor recreation**. The defining factor variable is space for gardening/tree planting (See Table 37)

Table 37: Component One: OUTDOOR RECREATION

S/NO	FACTORS	
1	Space for gardening/tree planting	0.831
2	Space for flowerbeds	0.825
3	Space for small scale gardening	0.778
4	Space for outdoor relaxation	0.768
5	Space for outdoor cooking/dinning	0.735
6	Space for entertainment of guest	0.702
7	Space for garbage collection and disposal	0.697
8	Space for spreading of clothes	0.681
9	Space for outdoor family meeting	0.680
10	Space for walkways	0.671
11	Space for patio and terrace	0.660
12	Space for outdoor washing/laundry	0.646
13	Space for walking/strolling	0.615
14	Space for water storage	0.528
15	Space for delivery access	0.522
16	Space for entrance porch	0.522
17	Space for outdoor resting	0.506

Source: Field Survey, 2018.

Component Two loaded significantly on 15 factors. These are in descending order: space for jogging (0.857), space for strolling (0.802), space for open swimming pool (0.765), space for playing basket ball in compound (0.719), space for gymnasium (0.715) and space for walking (0.686). Others are: space for volley ball (0.656), space for snooker board games (0.649), space for playing by children (0.594), space for playing by adults (0.542), space for children play area (0.541), space for fire protection gadget (0.533), space for outdoor resting (0.513), space for playing table tennis in compound (0.510) and space for tennis ball (0.510). It has Eigen value of 8.483 and explained variance of 14.377%. The component is an index for measuring the residents' outdoor space needs for **outdoor games**. The defining factor variable is Space for jogging (See Table 38)

Table 38: Component Two: OUTDOOR GAMES

S/NO	FACTORS	
1	Space for jogging	0.857
2	Space for strolling	0.802
3	Space for open swimming pool	0.765
4	Space for playing basket ball in compound	0.719
5	Space for gymnasium	0.715
6	Space for walking	0.686
7	Space for volley ball	0.656
8	Space for snooker board games	0.649
9	Space for playing by children	0.594
10	Space for playing by adults	0.542
11	Space for children play area	0.541
12	Space for fire protection gadget	0.533
13	Space for outdoor resting	0.513
14	Space for playing table tennis in compound	0.510
15	Space for tennis ball	0.510

Source: Field Survey, 2018

Component Three loaded significantly on 7 factors. These are in descending order: space for watch repairing (0.824), space for mending shoes (0.804), space for selling gsm cards (0.737), space for grinding mill (0.699), space for gas refilling (0.676), space for photocopying (0.629) and space for sewing clothes (0.577). It has Eigen Value of 6.100 and explained variance of 10,340%. The component is an index for measuring the residents' outdoor space needs for **Informal sector activities**. The defining factor variable is Space for watch repairing (See Table 39)

Table 39: Component Three: INFORMAL SECTOR ACTIVITIES

S/NO	FACTORS	
1	Space for watch repairing	0.824
2	Space for mending shoes	0.804
3	Space for selling GSM Cards	0.737
4	Space for grinding mill	0.699
5	Space for gas refilling	0.676
6	Space for photocopying	0.629
7	Space for sewing clothes	0.577

Source: Field Survey, 2018.

Component Four loaded significantly on 3 factors. These are in descending order: Space for car parking (0.700), Space for playing table tennis in compound (0.638), Space for water storage (0.529). It has Eigen value of 2.841 and explained variance of 4.815%. The component is an index for measuring the residents' outdoor space needs for **outdoor parking**. The defining factor variable is Space for car parking (See Table 40)

Table 40: Component Four: OUTDOOR PARKING

S/NO	FACTORS	
1	Space for car parking	0.700
2	Space for playing table tennis in compound	0.638
3	Space for water storage	0.529

Source: Field Survey, 2018.

Component Five loaded significantly on 2 factors. These are in descending order: Space for outdoor small scale shopping (0.750) and Space for poultry house (0.734). It has Eigen value of 2.607 and explained variance of 4.419%. The component is an index for measuring the residents' outdoor space needs for **Small scale formal enterprise**. The defining factor variable is Space for outdoor small scale shopping (See Table 41)

Table 41: Component Five: SMALL SCALE FORMAL ENTERPRISE

S/NO	FACTORS	
1	Space for outdoor small scale shopping	0.750
2	Space for poultry house	0.734

Source: Field Survey, 2019.

Component Six loaded significantly on 2 factors. These are in descending order: Space for baking garri (0.833) and Space for baking beans/akara balls (0.719). It has Eigen value of 2.509 and explained variance of 4.252%. The component is an index for measuring the residents' outdoor space needs for **Home base enterprise**. The defining factor variable is Space for baking garri. (See Table 42)

Table 42: Component Six: HOME BASE ENTERPRISE

S/NO	FACTORS	
1	Space for baking garri	0.833
2	Space for baking beans/akara balls	0.719

Source: Field Survey, 2018.

Component Seven loaded significantly on 2 factors. These are in descending order: Space for giving children lessons (0.701) and Space for tiding bicycle by children (0.543). It has Eigen value of 2.489 and explained variance of 4.219%. The component is an index for measuring the residents' outdoor space needs for **playground**. The defining factor variable is Space for giving children lessons. (See Table 43)

Table 43: Component Seven: PLAYGROUND

S/NO	FACTORS	
1	Space for giving children lessons	0.701
2	Space for tiding bicycle by children.	0.543

Source: Field Survey, 2018.

Component Eight loaded significantly on 1 factor. This is space for ramp for disabled people (0.810). It has Eigen value of 2.482 and explained variance of 4.206%. The component is an index for measuring the residents' outdoor space needs for **ramp for disabled people**. The defining factor variable is Space for ramp for disabled people (See Table 44)

Table 44: Component Eight: RAMP FOR PHYSICALLY CHALLENGED PEOPLE.

S/NO	FACTORS	
1	Space for ramp for Physically challenged people.	0.810

Source: Field Survey, 2018.

Component Nine significantly loaded on 2 factors. These are in descending order: space for house for domestic pets (0.794) and Space for house for tending to pets (0.626). It has Eigen value of 2.201 and explained variance of 3.731%. The component is an index for measuring the residents' outdoor space needs for **Animal husbandry**. The defining factor variable is space for house for domestic pets (See Table 45)

Table 45: Component Nine: ANIMAL HUSBANDARY

S/NO	FACTORS	
1	Space for house for domestic pets	0.794
2	Space for house for fending to pets	0.626

Source: Field Survey, 2018.

Component Ten

Component Ten significantly loaded on 2 factors. These are in descending order: Space for reading by children (0.751) and Space for tending to kids (0.638). It has Eigen value of 2.049 and explained variance of 3.472%. The component is an index for measuring the residents' outdoor space needs for **Schools**. The defining factor variable is space for reading by children (See Table 46)

Table 46: Component Ten: SCHOOLS

S/NO	FACTORS	
1	Space for reading by children	0.751
2	Space for tending to kids	0.638

Component Eleven

Component Eleven significantly loaded on 2 factors. These in descending order: Space for Cleaning compound (-0.554) and Space for children play area (0.506). It has Eigen value of

1.786 and explained variance of 3.028%. The component is an index for measuring the residents' outdoor space needs for **Sanitation Equipment**. The defining factor variable is space for cleaning compound (See Table 47)

Table 47: Component Eleven: SANITATION EQUIPMENT

S/NO	FACTORS	
1	Space for cleaning compound	-0.554
2	Space for children play area	0.506

Source: Field Survey, 2018.

Summary

In overall, the 11 components cumulatively accounted for **75.937%** of the residents' outdoor space needs. The factor that had the highest residents' outdoor space needs was outdoor recreation (19.078%). It was followed in descending order by outdoor games (14.377%), informal sector activities (10.340%), outdoor parking (4.815%), small scale formal enterprise (4.419, home base enterprise (4.252%), play ground (4.219%), ramp for physically challenged people (4.206%), animal husbandry (3.731%), schools (3.472%), sanitation equipment (3.028%). This implies that the eleven aforementioned factors represent the outdoor space needs of the residents of the public housing estates in Enugu Metropolis (See Table 48 below).

Table 48: The residents' outdoor space needs in the housing estates

Component	Modified Outdoor Spaces	Factors	Factor Loading	Eigen Value	Percentage Variance
1	OUTDOOR RECREATION			11.256	19.078
		Space for gardening/tree planting	0.831		
		Space for flowerbeds	0.825		
		Space for small scale gardening	0.778		
		Space for outdoor relaxation	0.768		
		Space for outdoor cooking/dinning	0.735		
		Space for entertainment of guest	0.702		
		Space for garbage collection and disposal	0.697		
		Space for spreading of clothes	0.681		
		Space for outdoor family meeting	0.680		
		Space for walkways	0.671		

		Space for patio and terrace	0.660		
		Space for outdoor washing/laundry	0.646		
		Space for walking/strolling	0.615		
		Space for water storage	0.528		
		Space for delivery access	0.522		
		Space for entrance porch	0.522		
		Space for outdoor resting	0.506		
2	OUTDOOR GAMES			8.483	14.377
		Space for jogging	0.857		
		Space for strolling	0.802		
		Space for open swimming pool	0.765		
		Space for playing basket ball in compound	0.719		
		Space for gymnasium	0.715		
		Space for walking	0.686		
		Space for volley ball	0.656		

		Space for snooker board games	0.649		
		Space for playing by children	0.594		
		Space for playing by adults	0.542		
		Space for children play area	0.541		
		Space for fire protection gadget	0.533		
		Space for outdoor resting	0.513		
		Space for playing table tennis in compound	0.510		
		Space for tennis ball	0.510		
3	INFORMAL SECTOR ACTIVITIES			6.100	10.340
		Space for watch repairing	0.824		
		Space for mending shoes	0.804		
		Space for selling GSM Cards	0.737		

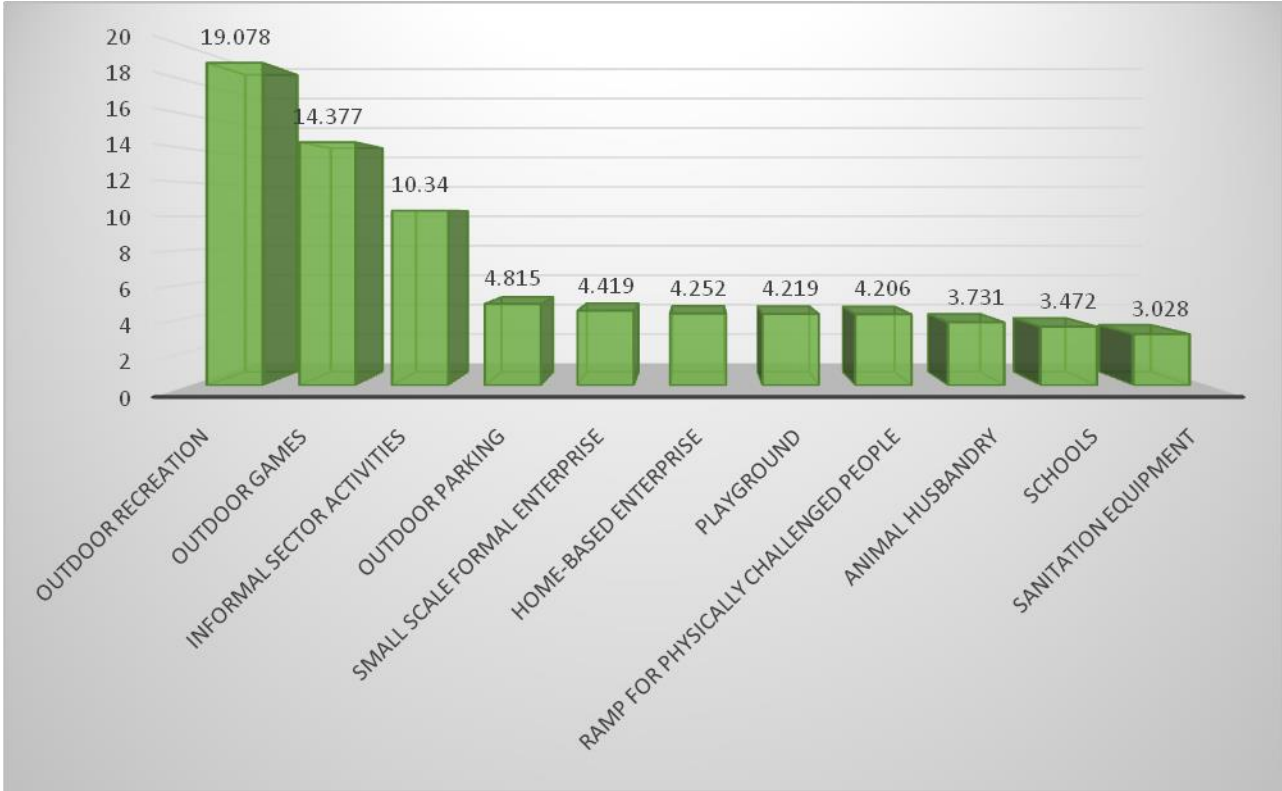
		Space for grinding mill	0.699		
		Space for gas refilling	0.676		
		Space for photocopying	0.629		
		Space for sewing clothes	0.577		
4	OUTDOOR PARKING			2.841	4.815
		Space for car parking	0.700		
		Space for playing table tennis in compound	0.638		
		Space for water storage	0.529		
5	SMALL SCALE FORMAL ENTERPRISE			2.607	4.419
		Space for outdoor small scale shopping	0.750		
		Space for poultry house	0.734		
6	HOME BASE ENTERPRISE			2.509	4.252

		Space for baking garri	0.833		
		Space for baking beans/akara balls	0.719		
7	CHILDREN'S PLAY GROUND			2.489	4.219
		Space for giving children lessons	0.701		
		Space for tiding bicycle by children.	0.543		
8	RAMP FOR PHYSICALLY CHALLENGED PEOPLE.			2.482	4.206
		Space for ramp for disabled people.	0.810		
9	ANIMAL HUSBANDARY			2.201	3.731

		Space for house for domestic pets	0.794		
		Space for house for fending to pets	0.626		
10	SCHOOLS			2.049	3.472
		Space for reading by children	0.751		
		Space for tending to kids	0.638		
11	SANITATION EQUIPMENT			1.786	3.028
		Space for Cleaning compound	-0.554		
		Space for children play area	0.506		
Cumulative Variance (Total)					75.937%

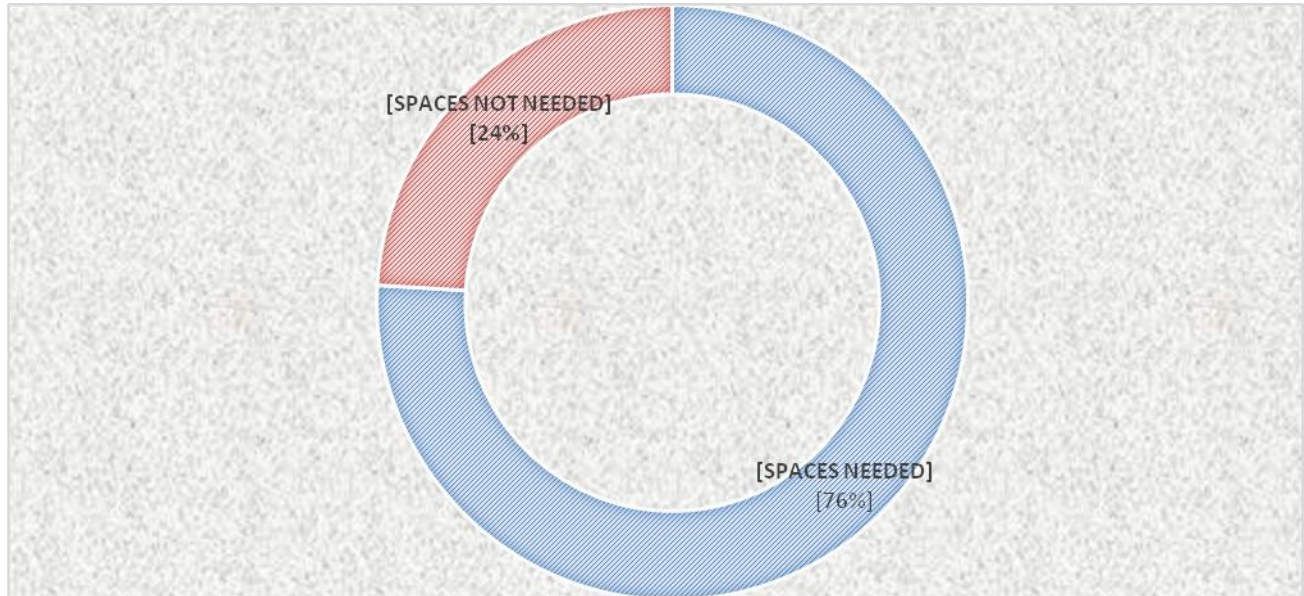
Source: Field Survey, 2018.

Figure 17: Residents' Outdoor Space Needs in The Housing Estates



Source: Field Survey, 2018.

Figure 18: Extent of Outdoor Space Needs in the Housing Estates



Source: Field Survey, 2018.

Hypothesis Four

Ho: There is no significant variation in the mean functional space requirements (m^2) of the outdoor space activities in the public housing estates in Enugu metropolis.

The mean functional space requirements of the middle-income resident (Objective four)

Table 49: Samples of Measured Existing Plots in the Study Area: Empirical Study.

S/N	HOUSE TYPE	PLOT COVERAGE	BUILT UP AREA	PERCENTAGE COVER	OUTDOOR SPACE (m ²)	MEAN (AVERAGE OUTDOOR SPACE) (m ²)	REMARKS
1	2BRM Semi – detached bungalow Greenhouse Estate.						
	Plot I	25m x 11m 275m ²	90.0m ²	33%	184.25m ²		
	Plot II	28mx15m 420m ²	134.4m ²	32%	285.6m ²		
	Plot III	30m x 15m 450m ²	162.0m ²	36%	288.9m ²		
	Plot IV	30m x 16m 480m ²	177.6m ²	37%	302.4m ²		
	Plot V	28m x 15m 420m ²	142.8m ²	34%	277.2m ²		
	Plot VI	29m x 15m 435m ²	134.5m ²	31%	139.5m ²		
	Plot VII	30m x 15m 450m ²	157.5m ²	35%	300.1m ²		
	Plot VIII	31m x 16 m	168.64m ²	34%	327.36m ²		

		496m ²					
	Plot IX	33m x 15m 495m ²	163.35m ²	33%	331.65m ²		
	Plot X	32 x 16m 512m ²	184.32m ²	36%	497.68m ²		
	Mean					279.5 m ²	
2	Green land Estate Phase 2 BRM Semi-detached Bungalow						
	Plot I	30 x 15m 450m ²	148.5m ²	33%	301.50m ²		
	Plot II	33 x 14m 462m ²	166.32m ²	36%	295.68 m ²		
	Plot III	30 x 14m 420m ²	130.2m ²	31%	289.8m ²		
	Plot IV	31m x 16n 496m ²	163.68m ²	33%	256.32 m ²		
	Plot V	33m x 14m 462m ²	152.46m ²	34%	309.54 m ²		
	Plot VI	32m x 14m 448m ²	152.32m ²	34%	295.68 m ²		
	Plot VII	33m x 14m 448m ²	152.32m ²	35%	302.25 m ²		

	Plot VIII	31m x 15m 465m ²	162.75m ²	31%	351.9 m ²		
	Plot IX	30m x 17m 510m ²	158.10m ²	33%	311.55 m ²		
	Plot X	31m x 15m 465m ²	153.45m ²	33%	301.50 m ²		
	Mean					331.14m ²	
3	2 BRM Bungalow Federal Housing Phase 1						
	Plot I	22m X 17m 374m ²	138.38m ²	37%	256.6 m ²		
	Plot II	29m X 15m 375m ²	131.25m ²	35%	243.75m ²		
	Plot III	28m x 16m 416m ²	137.28m ²	33%	278.72m ²		
	Plot IV	23m x 15m 345m ²	124.20m ²	36%	220.8m ²		
	Plot V	23 x 16m 368m ²	110.4m ²	30%	257.60m ²		
	Plot VI	22 x 18m 396m ²	134.64m ²	34%	112.70m ²		

	Plot VII	23 x 14m 322m ²	112.7m ²	35%	223.74 m ²		
	Plot IX	26m x 15m 390m ²	106.26 m ²	33%	249.60 m ²		
	Plot X	29 x 14m 406m ²	125.86m ²	36%	280.14 m ²		
	Mean					238.50 m ²	
4	2BRM semi-bungalow T/EKULU						
	Plot I	25mx 11M 275m ²	107.25m ²	39%	167.75 m ²		
	Plot II	28 x11m 286m ²	102.96m ²	36%	133.03 m ²		
	Plot III	26 x 13m 338m ²	104.78m ²	31%	233.22 m ²		
	Plot IV	25 x 12m 300m ²	105.0m ²	35%	195.0 m ²		
	Plot V	28 x 11m 308m ²	104.72m ²	34%	203.28 m ²		
	Plot VI	26m x 14m 364m ²	138.32m ²	38%	225.68 m ²		

	Plot VII	25 x 13m 325m ²	110.50m ²	34%	214.5 m ²		
	Plot VIII	26 x 14m 350m ²	120.12m ²	33%	243.88 m ²		
	Plot IX	23m x 14m 322m ²	126.00m ²	36%	223.00 m ²		
	Plot X	25 x 11m 275m ²	119.4m ²	37	202.86 m ²		
	Mean					226.921m ²	
5	2 BRM Semi-detached Bungalow Ahocol Estate Republic layout						
	Plot I	28m x 16m 448m ²	143.36m ²	32%	304.64m ²		
	Plot II	29m x 16m 464m ²	180.96m ²	39%	223.04m ²		
	Plot III	29m x 15m 435m ²	160.95m ²	37%	274.05m ²		
	Plot IV	30m x 13m 390m ²	136.5m ²	35%	288m ²		
	Plot V	30m x 15m 450m ²	162m ²	36%	281.4m ²		

	Plot VI	30m x 16m 420m ²	138.6m ²	33%	278.4m ²		
	Plot VII	29 x 15m 435m ²	156.6m ²	36%	282.24m ²		
	Plot VIII	28 x 16m 448m ²	165.76m ²	37%	304.64		
	Plot IX	28 x 16m 448m ²	143.36m ²	32%	304.64m ²		
	Plot X	30 x 14m 420m ²	142.8 m ²	34%	227.2 m ²		
	Mean					269.271 m ²	
6	2 BRM Semi-detached bungalow T/EKULU phase						
	Plot I	26m x 17m 42m ²	176.8m ²	40%	265.2m ²		
	Plot II	26m x 17m 442m ²	167.96m ²	38%	274.4m ²		
	Plot III	28m x 16m 448m ²	163.54m ²	37%	278.4m ²		
	Plot IV	29m x 12m 348m ²	143.36m ²	32%	304.64m ²		

	Plot V	28m x 15m 420m ²	121.8m ²	35%	226.2m ²		
	Plot VI	29, x 17m 493m ²	138.6m ²	33%	281.4m ²		
	Plot VII	30m x 12m 360m ²	132.41m ²	37%	310.59m ²		
	Plot VIII	31m x 14m 434m ²	118.8m ²	33%	241.2m ²		
	Plot IX	28m x 18m 504m ²	147.56m ²	33%	286.44m ²		
	Plot x	26m x 17m 442m ²	176.4m ²	34%	327.6m ²		
	Mean					279.58 m ²	
7	2 BRM Bungalow River side housing Estate phase I&II						
	Plot I	26m x12m 312m ²	106m ²	34%	206.0m ²		
	Plot II	26m x 13m 338m ²	111.54m ²	33%	226.46m ²		
	Plot III	27m x 12m 324m ²	106.92m ²	33%	217.08m ²		

	Plot IV	28m x 11m 308m ²	104.72m ²	34%	219.28m ²		
	Plot V	29m x 13m 338m ²	108.16m ²	32%	219.84m ²		
	Plot VI	26m x 13m 338m ²	104.78m ²	31%	233.22m ²		
	Plot VII	27m x 12m 324m ²	110.16m ²	34%	213.84m ²		
	Plot VIII	28m x 14m 392m ²	125.44m ²	32%	266.56m ²		
	Plot IX	29m x 12m 348m ²	114.84m ²	33%	233.16m ²		
	Plot X	29m x 13m377m ²	128.18m ²	34%	248.82m ²		
	Mean					229.37 m ²	
8	2 BRM Bungalow T/EKULU Phase I						
	Plot I	28 x 15 420m ²	138.6m ²	33%	281.4m ²		
	Plot II	29 x 14 406m ²	138.04m ²	34%	267.96m ²		
	Plot III	29 x 15 435m ²	143.55m ²	33%	291.45m ²		

	Plot IV	30 x 14 420	134.4m ²	32%	285.6m ²		
	Plot V	28 x 15 420	142.8m ²	34%	277.20m ²		
	Plot VI	29 x 14 406m ²	138.04m ²	34%	267.96m ²		
	Plot VII	28m x 15m 420m ²	138.60m ²	33%	281.40m ²		
	Plot VIII	29 x 14 406	142.10m ²	35%	263.9m ²		
	Plot IX	29 x 13 377	120.64m ²	32%	256.36m ²		
	Plot X	29 x 15 435m ²	156.6m ²	36%	278.40m ²		
	Mean				275.16m ²		
9	2 BRM Semi-detached Bungalow Federal Housing Abakpa						
	Plot I	30m x 15m 450m	149m ²	33%	301m ²		
	Plot II	30m x 15 450m ²	149m ²	33%	301m ²		
	Plot III	30m x 15 450m ²	153m ²	34%	297m ²		

	Plot IV	13mx15m 465m ²	153.5m ²	33%	311.5m ²		
	Plot V	30mx16m 480m ²	163.2m ²	34%	316.8m ²		
	Plot VI	31mx15m 465m ²	162.75m ²	35%	302.25m ²		
	Plot VII	32mx15m 512m ²	168.96m ²	33%	343.04m ²		
	Plot VIII	30mx15m 450m ²	144m ²	32%	304m ²		
	Plot IX	35mx14m 490m ²	176.4m ²	36%	313.6m ²		
	Plot X	32m x16m 512m ²	194m ²	38%	317.44m ²		
	Mean					311.9m ²	
10	2 BRM/3 BRM Block of Flats and Mansionettes in Real Estate, Uwani (SITE 1)	Total Area 4500m ²	Total (3 Nos) 2511m ²	56%	1989m ²		
	Block I				663m ²		
	Block II				663m ²		
	Block III				663m ²		
	Mean					663m ²	

	2 BRM/3 BRM Block of Flats and Mansionettes in Real Estate, Uwani (SITE 2)	4565m ²	Total 3 Nos2511 m ²	56%	2,054m ²		
	Block I				684.6m ²		
	Block II				684.6m ²		
	Block III				684.6m ²		
	Mean					685m ²	
11	3 BRM bungalow: river side Estate Phase II						
	Plot I	22m x 20m 440m ²	132m ²	30%	308m ²		
	Plot II	24m x 20 480m ²	158.4m ²	33%	321.6m ²		
	Plot III	24m x 20 480m ²	158.4m ²	33%	332.64m ²		
	Plot IV	24m x 21 501m ²	171.36m ²	34%	294.8m ²		
	Plot V	22m x 20m 440m ²	145.2m ²	33%	299.52m ²		
	Plot VI	26m x 18m 468m ²	168.48m ²	36%	312 m ²		

	Plot VII	24m x 20m 480m ²	168.00m ²	35%	339.02m ²		
	Plot VIII	23m x 22m 506m ²	166.98m ²	33%	295.68m ²		
	Plot IX	22m x 22m 462m ²	166.32m ²	36%	321.6m ²		
	Plot X	24m x 20m 480m ²	158.4m ²	33%	321.6m ²		
	Mean					314.65m ²	
12	3 BRM Block of flats Maryland Estate Ekulu phase I						
	Block I		185m ²		315m ²		
	Block II		185m ²		315m ²		
	Block III		185m ²		315m ²		
	Block IV		185m ²		315m ²		
	Block V		185m ²		315m ²		
	Block VI		185m ²		315m ²		
	Block VII		185m ²		315m ²		
	Block VIII		185m ²		315m ²		
	Block IX		185m ²		315m ²		
	Block X		185m ²		315m ²		
	Mean					315m ²	

13	3 BRM block of flats Trans Ekulu phase						
	Block I	24m x 18m 432m ²	212m ²	49%	220m ²		
	Block II	24m x 18m 432m ²	212m ²	49%	220m ²		
	Block III	24m x 18m 432m ²	199m ²	46%	233m ²		
	Block IV	24m x 18m 432m ²	207.36m ²	48%	224.64m ²		
	Block V	24m x 18m 432m ²	211.68m ²	49%	220.32m ²		
	Block VI	24m x 18m 432m ²	203.04m ²	47%	220.96m ²		
	Block VII	24m x 18m 432m ²	194.40m ²	45%	237.60m ²		
	Block VIII	24m x 18m 432m ²	211.68m ²	49%	224.64m ²		
	Block IX	24m x 18m 432m ²	190.08m ²	44%	241.92m ²		
	Block X	24m x 18m 432m ²	207.36m ²	48%	224.64m ²		
	Mean					227.57m ²	

14	3c BRM of flats, Maryland						
	Block I	30m x 18m 540m ²	183.6m ²	34%	356.4m ²		
	Block II	30m x 18m 540m ²	194.4m ²	36%	345.6m ²		
	Block III	30m x 18m 540m ²	178.2m ²	33%	361.8m ²		
	Block IV	30m x 18m 540m ²	183.6m ²	34%	356.4m ²		
	Block V	30m x 18m 540m ²	194.4m ²	36%	345.6m ²		
	Block VI	30m x 18m 540m ²	194.4m ²	36%	334.8m ²		
	Block VII	30m x 18m 540m ²	205.2m ²	38%	356.6m ²		
	Block VIII	30m x 18m 540m ²	183.6m ²	34%	351.0m ²		
	Block IX	30m x 18m 540m ²	183.6m ²	34%	345.6m ²		
	Block X	30m x 18m 540m ²	187.0m ²	35%	356.6m ²		
	Mean					351.04m ²	

15	3 BRM detached bungalow T/Ekulu phase II						
	Plot I	25m x 21m 525m ²	210m ²	40%	322m ²		
	Plot II	25m x 21m 525m ²	225.5m ²	41%	324.50m ²		
	Plot III	25m x 21m 525m ²	245.7m ²	45%	300.3m ²		
	Plot IV	25m x 21m 525m ²	231.0 m ²	44%	294m ²		
	Plot V	25m x 21m 525m ²	208.0m ²	40%	312m ²		
	Plot VI	25m x 21m 525m ²	210m ²	40%	315m ²		
	Plot VII	25m x 21m 525m ²	218.4m ²	42%	301 ²		
	Plot VIII	25m x 21m 525m ²	199.26m ²	41%	286.74m ²		
	Plot IX	25m x 21m 525m ²	200m ²	40%	300m ²		
	Plot X	25m x 21m 525m ²	202m ²	39%	317.2m ²		
	Mean					307.33m ²	

16	4 BRM detached storied house: Ebeano housing Estate						
	Plot I	36m x 25m 900m ²	462m ²	51%	438m ²		
	Plot II	30m x 30m 900 ²	450m ²	50%	450n ²		
	Plot III	36m x 25m 900m ²	468m ²	52%	432m ²		
	Plot IV	30m x 28m 840m ²	428.4m ²	52%	411.6m ²		
	Plot V	36m x 25m 900m ²	450m ²	49%	459m ²		
	Plot VI	33m x 28m 924m ²	432m ²	49%	471.24m ²		
	Plot VII	36 x 25m 900m ²	423.36m ²	50%	450m ²		
	Plot VIII	36 x 25m 900m ²	459m ²	48%	468m ²		
	Plot IX	36 x 24m 864m ²	432m ²	49%	440.64m ²		
	Plot X	30m x 24m 900m ²	441m ²	51%	441m ²		
	Mean					446.1m ²	

17	4 BRM semi-detached storied house with B.Q T/Ekulu phase II						
	Plot I	35m x 28m 980m ²	450m ²	46%	530m ²		
	Plot II	35m x 28m 980m ²	450m ²	46%	530m ²		
	Plot III	35m x 28m 945m ²	441m ²	45%	539m ²		
	Plot IV	35m x 27m 945m ²	444.2m ²	47%	500.8m ²		
	Plot V	35m x 26m 936m ²	411.84m ²	44%	524.3m ²		
	Plot VI	34m x 28m 952m ²	437.9m ²	46%	514.1m ²		
	Plot VII	35m x 28m 980m ²	470.4m ²	48%	509.6m ²		
	Plot VIII	34m x 29m 986m ²	433.8m ²	44%	552.16m ²		
	Plot IX	35m x 27m 945m ²	434.7m ²	46%	510.3m ²		
	Plot X	35m x 27m 945m ²	434.7m ²	46%	510.3m ²		
	Mean					527.1m ²	

18	4 BRM semi-detached bungalow phase II /Ekulu phase VI						
	Plot I	28 x 22 616m ²	236.4m ²	40%	308m ²		
	Plot II	28 x 20 560m ²	245m ²	45%	317.5m ²		
	Plot III	28 x 21 588	270.5m ²	46%	342.2m ²		
	Plot IV	29 x 20 580m ²	237.8m ²	41%	302.4m ²		
	Plot V	30 x 18 540m ²	235.2m ²	44%	352.8m ²		
	Plot VI	28 x 21 588m ²	224m ²	40%	366m ²		
	Plot VII	28 x 20 560m ²	287.1m ²	40%	350m ²		
	Plot VIII	29 x 22 638m ²	266.8m ²	45%	313.2m ²		
	Plot IX	29 x 20 580m ²	241.m ²	46%	346.9m ²		
	Plot X	28 x 21 588m ²	237.6m ²	41%	369.6m ²		
	Mean					336.95m ²	

19	4 BRM detached storied home: fidelity Estate by Ebeano Tunel						
	Plot I	22m x 19m 418m ²	213m ²	49%	213.1m ²		
	Plot II	22m x 21m 462m ²	462m ²	49%	235.6m ²		
	Plot III	20m x 20m 400m ²	400m ²	48%	208m ²		
	Plot IV	22m x 21m 462m ²	462m ²	49%	235.6m ²		
	Plot V	20m x 20m 400m ²	400m ²	47%	212m ²		
	Plot VI	22m x 19m 418m ²	418m ²	45%	229.9m ²		
	Plot VII	22m x 19m 418m ²	418m ²	46%	225.7m ²		
	Plot VIII	23m x 18m 437m ²	437m ²	43%	249.1m ²		
	Plot IX	24m x 18m 432m ²	432m ²	46%	246.24m ²		
	Plot X	32m x 19m 418m ²	418m ²	49%	213.2m ²		
	Mean					226.8m ²	

20	4 BRM detached bungalow. T/Ekulu phase VI						
	Plot I	28m x 20m 418m ²	205m ²	40%	394m ²		
	Plot II	28m x 20m 418m ²	171m ²	41%	247m ²		
	Plot III	28m x 21m 588m ²	270m ²	46%	318m ²		
	Plot IV	29m x 20m 580m ²	255m ²	44%	242m ²		
	Plot V	28m x 20m 418m ²	176m ²	42%	222m ²		
	Plot VI	28m x 20m 418m ²	196m ²	47%	331m ²		
	Plot VII	29 x 19m 551m ²	220m ²	40%	324m ²		
	Plot VIII	30 x 18m 588m ²	216m ²	40%	341m ²		
	Plot IX	28 x 21m 588m ²	247m ²	42%	339m ²		
	Plot X	28 x 22m 616m ²	277m ²	55%	325m ²		
	Mean					308.3m ²	

21	5 BRM detached storied house with 2 BRM. T/Ekulu phase III						
	Plot I	30m x 29m 870m ²	400.2m ²	48%	469.8m ²		
	Plot II	30 x 30m 900m ²	414m ²	46%	486m ²		
	Plot III	30 x 29m ² 870m ²	400.2m ²	46%	469.8m ²		
	Plot IV	30 x 28m 840m ²	394.8m ²	47%	445.2m ²		
	Plot V	30 x 29m 870m ²	391.5m ²	45%	478.5m ²		
	Plot VI	30 x 29m 840m ²	403.2m ²	48%	436.8m ²		
	Plot VII	30 x 28m 840m ²	386.4m ²	46%	453.6m ²		
	Plot VIII	30 x 29m 870m ²	432m ²	47%	461.1m ²		
	Plot IX	30 x 30m 900m ²	396m ²	48%	468m ²		
	Plot X	30 x 30m 900m ²	408.9m ²	44%	504m ²		
	Mean					422m ²	

22	5 BRM detached storied house with 2 BRM BQ. T/Ekulu phase VI						
	Plot I	36 x 28m 1008m ²	423.4m ²	42%	584.6m ²		
	Plot II	36 x 29m 1044m ²	469.8m ²	45%	574.2m ²		
	Plot III	36 x 27 974m ²	49.71m ²	46%	523.9m ²		
	Plot IV	30 x 29m 870m ²	382.8m ²	44%	487.2m ²		
	Plot V	31 x 29m 899m ²	377.6m ²	42%	521.4m ²		
	Plot VI	36 x 28m 1008m ²	473.8m ²	47%	534.2m ²		
	Plot VII	36m x 27 972m ²	388.8m ²	40%	583.2m ²		
	Plot VIII	35 x 29 1015n ²	416.2m ²	41%	598.8m ²		
	Plot IX	36 x 27m 972m ²	447.1m ²	465	524.9m ²		
	Plot X	36 x 28m 1008m ²	473.8m ²	47%	534.2m ²		
	Mean					546.76m ²	

23	5 BRM detached stored Golf course Estate phase I						
	Plot I	31m x 30m 930m ²	372m ²	37%	558m ²		
	Plot II	30m x 30m 900m ²	324m ²	36%	576m ²		
	Plot III	31m x 29m 899m ²	323.6m ²	365	575, ²		
	Plot IV	30 x 29m 870m ²	304.5m ²	35%	565.5m ²		
	Plot V	30m x 30m 900m ²	333m ²	37%	567m ²		
	Plot VI	30 x 31m 930m ²	334.8m ²	36%	595m ²		
	Plot VII	30 x 30m 900m ²	351m ²	37%	549m ²		
	Plot VIII	31 x 29m 899m ²	314.6m ²	35%	584m ²		
	Plot IX	31 x 28m 868m ²	338.5m ²	39%	529.5m ²		
	Plot X	31 x 28 868m ²	303.8m ²	35%	564.2m ²		
	Mean					566.4m ²	

24	5 BRM detached storied housing Estate, Ebeano Housing Estate: Chime Ave/Bisala Rd.						
	Plot I	37m x 24m 888m ²	426m ²	48%	452m ²		
	Plot II	36m x 25m 900m ²	432m ²	48%	468m ²		
	Plot III	37m x 25m 926m ²	434.7m ²	47%	490.3m ²		
	Plot IV	36m x 24m 864m ²	397.4m ²	46%	446.56m ²		
	Plot V	37m x 25m 925m ²	444m ²	48%	481m ²		
	Plot VI	38m x 22m 836m ²	392.9m ²	47%	443.1m ²		
	Plot VII	36m x 26m 936m ²	439.9m ²	48%	496.1m ²		
	Plot VIII	37m x 24m 888m ²	435.1m ²	49%	452.9m ²		
	Plot IX	37m x 25m 925m ²	425.5m ²	46%	499.5m ²		
	Plot X	36 x 24m 864m ²	423.4m ²	49%	440.6m ²		
	Mean					467m ²	

25	5 BRM detached storied house. Fidelity housing Estate: old trade						
	Plot I	30 x 28m 864m ²	396m ²	46%	468m ²		
	Plot II	30 x 30m 900m ²	432m ²	48%	468m ²		
	Plot III	31 x 28m 868m ²	417.6m ²	48%	452.4m ²		
	Plot IV	31 x 29 930m ²	399.6m ²	46%	468.3m ²		
	Plot V	30 x 30m 900m ²	427.8m ²	46%	502.2m ²		
	Plot VI	30 x 28m 840m ²	423m ²	47%	477m ²		
	Plot VII	32 x 20 896m ²	403.2m ²	48%	436.8m ²		
	Plot VIII	30 x 30m 900m ²	412.2m ²	46%	483.8m ²		
	Plot IX	30 x 29m 870m ²	414m ²	46%	486m ²		
	Plot X	30 x 29m 870m ²	417.6m ²	48%	452.4m ²		
	Mean					469.5m ²	

Source: Field Survey, 2012.

Table 50: Average Measured Outdoor Spaces:

Average measured outdoor spaces for Two Bedroom (2 BRM) Bungalows	Size in m ²
2BRM Semi-detached bungalow Greenland Estate.	279.5 m ²
2 BRM Semi-detached Bungalow Green land Estate Phase	331.14m ²
2 BRM Bungalow Federal Housing Phase 1	238.50 m ²
2BRM semi-bungalow T/Ekulu	226.921m ²
2 BRM Semi-detached Bungalow Ahocol Estate Republic layout	269.271 m ²
2 BRM Semi-detached bungalow T/ekulu phase	279.58 m ²
2 BRM Bungalow River side housing Estate phase I&II	229.37 m ²
2 BRM Bungalow T/ekulu Phase I	275.16m ²
2 BRM Semi-detached Bungalow Federal Housing Abakpa	311.9m ²
	240. 674m ²

Average measured outdoor spaces for Two Bedroom/Three Bedroom (2 BRM/3BRM) Block of Flats	Size in m ²
2 BRM /3 BRM Block of Flats and Mansionettes in Real Estate Uwani (Site 1)	663m ²
2 BRM/3 BRM Block of Flats and Mansionettes in Real Estate, Uwani (SITE 2)	685m ²
	674m ²

Average measured outdoor spaces for Three Bedroom (3 BRM) Block of Flats	Size in m ²
3 BRM Block of flats Maryland Estate Ekulu phase I	315m ²
3 BRM block of flats Trans Ekulu phase	227.57m ²
3BRM block of flats, Maryland	351.04m ²
	298 m ²

Average measured outdoor spaces for Three Bedroom (3 BRM) Block Bungalows	Size in m ²
3 BRM bungalow: River side Estate Phase II	314.65m ²
3 BRM detached bungalow T/Ekulu phase II	307.33m ²
	311m ²

Average measured outdoor spaces for Four Bedroom (4 BRM) Bungalows	Size in m ²
4 BRM semi-detached bungalow phase II /Ekulu phase	336.95m ²
4 BRM detached bungalow. T/Ekulu phase VI	308.3m ²
	323 m ²

Average measured outdoor spaces for Four Bedroom (4 BRM) Storied Houses	Size in m ²
4 BRM detached storied house: Ebeano housing Estate	446.1m ²
4 BRM semi-detached storied house with B.Q T/Ekulu phase II	527.1m ²
4 BRM detached storied house: Fidelity Estate by EbeanoTunel	226.8m ²
	400 m ²
Average measured outdoor spaces for Five Bedroom (5 BRM) Storied Houses with 2 BRM. BQ.	Size in m ²
5 BRM detached storied house with 2 BRM. BQ. T/Ekulu phase III	422m ²
5 BRM detached storied house with 2 BRM BQ. T/Ekulu phase VI	546.76m ²
	484 m ²

Average measured outdoor spaces for Five Bedroom (5 BRM) Storied Houses	Size in m ²
5 BRM detached storied Golf course Estate phase I	566.4m ²
5 BRM detached storied housing Estate, Ebeano Housing Estate: Chime Ave/Bisala Rd	467m ²
5 BRM detached storied house. Fidelity housing Estate: old trade	469.5m ²
	501 m ²

Source: Field Survey, 2018

Results

The average functional space requirement (m²) from the empirical study carried out on the modified outdoor spaces of the existing buildings in the estates that gave the residents satisfaction has been determined for each prototype building. (See Table 63.)

Mean Variation of Outdoor Space Activities (Objective Four)

1. The result of the hypothesis suggests that there was a significant variation in the mean functional space requirement (m²) of the outdoor activities in the public housing estate at 0.01 (See Table 51)

Table 51: The ANOVA Results for Mean Variation of Outdoor Space Activities

OUTDOOR SPACE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2511124.065	4	627781.016	145.733	.000
Within Groups	1038169.548	241	4307.757		
Total	3549293.613	245			

Source: ANOVA Analysis, 2018

2. Furthermore, the ANOVA output on the multiple comparison results indicates that it was only the mean variation in functional space requirement for outdoor activities between 3-bedroom and 2-bedroom prototype in the housing estates that were not significant. Others showed strong significant variation (See table 52)

Table 52: ANOVA Post Hoc Tests Results for Multiple Comparisons of Mean Variation of Outdoor Spaces.

Dependent Variable: OUTDOOR SPACE

(I) BUILDING PROTOTYPE	(J) BUILDING PROTOTYPE	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2 SEMI- DETACHED BUNGALOW	2 BEDROOM 2 BRM/3 BRM BLOCK OF FLATS	-405.30077*	27.66401	.000	-491.1769	-319.4246
	3 BRM BUNGALOW	-34.44717	11.55392	.067	-70.3135	1.4192
	4 BRM DETACHED STORIED HOUSE	-99.54237*	11.55392	.000	-135.4087	-63.6760
	5 BRM DETACHED STORIED HOUSE	-234.83261*	11.62976	.000	-270.9344	-198.7308
2 BLOCK OF FLATS	2 BRM/3 BRM 2 BEDROOM OF BUNGALOW SEMI- DETACHED	405.30077*	27.66401	.000	319.4246	491.1769
	3 BRM BUNGALOW	370.85360*	28.35692	.000	282.8265	458.8807
	4 BRM DETACHED STORIED HOUSE	305.75840*	28.35692	.000	217.7313	393.7855
	5 BRM DETACHED STORIED HOUSE	170.46816*	28.38790	.000	82.3449	258.5915
3 BUNGALOW	2 BRM/3 BRM 2 BEDROOM BLOCK OF FLATS SEMI- DETACHED	34.44717	11.55392	.067	-1.4192	70.3135
	2 BRM/3 BRM BLOCK OF FLATS	-370.85360*	28.35692	.000	-458.8807	-282.8265
	4 BRM DETACHED STORIED HOUSE	-65.09520*	13.12670	.000	-105.8438	-24.3466
	5 BRM DETACHED STORIED HOUSE	-200.38544*	13.19350	.000	-241.3414	-159.4294
4 DETACHED STORIED HOUSE	2 BRM/3 BRM 2 BEDROOM BLOCK OF FLATS SEMI- DETACHED	99.54237*	11.55392	.000	63.6760	135.4087
	2 BRM/3 BRM BLOCK OF FLATS	-305.75840*	28.35692	.000	-393.7855	-217.7313
	3 BRM BUNGALOW	65.09520*	13.12670	.000	24.3466	105.8438
	5 BRM DETACHED STORIED HOUSE	-135.29024*	13.19350	.000	-176.2462	-94.3342
5 DETACHED STORIED HOUSE	2 BRM/3 BRM 2 BEDROOM BLOCK OF FLATS SEMI- DETACHED	234.83261*	11.62976	.000	198.7308	270.9344
	2 BRM/3 BRM BLOCK OF FLATS	-170.46816*	28.38790	.000	-258.5915	-82.3449
	3 BRM BUNGALOW	200.38544*	13.19350	.000	159.4294	241.3414
	4 BRM DETACHED STORIED HOUSE	135.29024*	13.19350	.000	94.3342	176.2462

*. The mean difference is significant at the 0.05 level.

Source: Field Survey, 2018.

Table 53: ANOVA Homogeneous Subsets for Outdoor Space Activities

OUTDOOR SPACE

BUILDING PROTOTYPE	N	Subset for alpha = 0.05			
		1	2	3	4
2 BEDROOM SEMI-DETACHED BUNGALOW	91	268.4992			
3 BRM BUNGALOW	50	302.9464			
4 BRM DETACHED STORIED HOUSE	50		368.0416		
5 BRM DETACHED STORIED HOUSE	49			503.3318	
2 BRM/3 BRM BLOCK OF FLATS	6				673.8000
Sig.		.577	1.000	1.000	1.000

Source: Field Survey, 2018.

5.15 DISCUSSION

1. The extent of modification and adaptation of outdoor spaces (Objective One).

The result of Hypothesis One shows that the 12 types of outdoor space modification and adaptation found in the housing estate are: **outdoor games, informal sector activities, landscaping, ancillary structures, illegal outdoor space conversion, illegal change of use, outdoor lighting, water storage, screening of balconies/verandah, outdoor floor finishes and outdoor steps.** This represents **76.887%** of the extent of the outdoor modification that have taken place in the housing estates. This indicates that there is high level of outdoor space

modification and adaptation. This may indicate the inadequacy of outdoor provision in the original planning and design of the housing units of the estates. The implications of the result with respect to each of the identified 12 factors are as follows: -

Outdoor games: Modification and adaptation in the housing estates. It constitutes 14.599% of total outdoor space modification found in the study area. This is the most dominant outdoor space modification. The modification and adaptation were necessitated because there are no designated open space provisions for outdoor games such as **volleyball, bicycle riding, table tennis, basket ball games** for small-scale exercise by individuals in most of the housing units and block of flats. Sometimes, children of housing units are found playing on streets and estate roads or on any available spaces in their private housing units.

Informal sector activities: Modification and adaptation found in the public housing estates. It constitutes 10.501% of the total outdoor space modification. This is the second most dominant outdoor space modification. The purpose of modification by the residents is to create space for their informal sector activities, which were not in the original plan and design of their housing estates for instance, **sale of GMS cards, grinding mill, photocopying, sale of kerosene and gas refilling** are activities that are essential for everyday use. Spaces for these activities are necessary especially in the block of flats.

Landscaping: Modification and adaption, constitute 10.395% of total outdoor space modification found in the housing estates. This is the third most dominant outdoor space modification. Inarticulate landscaping are common occurrences observed in most public housing units built for public servants. This is because they are mainly rentable units. Tenants are not eager of landscaping a place that is not designated for their permanent use. Landscape modifications include **gardening for orchard, planting of trees and herbs**.

Ancillary structures: They represent 8.345% of the total outdoor space modification found in the housing estates. This is the fourth most dominant outdoor space modification. Building gatehouse and generator house, **converting car pot for other purposes and converting gatehouse for other activities and building own entrance porches**. It is the provision of inadequate indoor spaces that forces life to spill outdoors for residents of housing estates in the study area.

Illegal outdoor space conversion: The residents' modification constituting 8.277% of the total outdoor space modification found in the housing estates is the fifth most dominant outdoor space modification. It is common to observe makeshift temporary sheds attached to main buildings. In some areas, sit-outs were converted to storage spaces for empty crates of drinks. Most often, any available spaces in front yard and backyard were used for garbage collection and water storage. Occasionally, self-employed residents created spaces for small-scale shopping and household services such as mending of shoes. This is because such items were not considered, nor residents consulted during the design and planning of the estates.

Illegal change of use: This constitutes 5.514% of the total outdoor space modification found in the public housing estates in Enugu metropolis. It is the sixth most dominant outdoor space modification. Due to economic hardship, most owner-occupier residents sell their allocations to prospective buyers who later convert the original design for example, from a bungalow to storey building. Other changes may occur due to improved salary earnings. For example, extending of roof to have additional outdoor space, may serve for outdoor cooking, or as a shed for general storage.

Outdoor lighting: Modification and adaption found in the public housing estates in Enugu metropolis constitute 3.522% of the total outdoor space modification and adaptation. This is the seventh most dominant outdoor space modification. This took the form of garden lights, security lights at the gates, and perimeter fence lights. It involved marking out spaces in design for unobstructed cable routes, either overhead or underground.

Water storage: Modification and adaption, which constitute 3.450% of the total outdoor space modification found in the public housing estates in the metropolis is the eighth most dominant outdoor space modification. Water shortages from mains supply are common in Enugu Metropolis especially in the newly built estates. This is because borehole water provision is not advisable because of the established contamination with coal and lead. This has led to dependence on water supply from "Ninth Mile" designated area by majority of residents in Enugu city. The resultant effect of this is the need for water storage from water vendors and for rainwater harvesting. Creation of space for this particular commodity becomes a necessity.

Screening of balconies/verandah: Modification and adaptation found in public housing estates in Enugu metropolis represents 3.370% of the total outdoor space modification. This is the ninth most dominant outdoor space modification. Privacy and individual life consciousness is a culture that is predominant in the society, and as such, communal life and neighbourhood interaction are lacking in the residential estates. Balconies and verandahs are often used for tending to kids, reading, resting and spreading of clothes. Screenings were therefore done for privacy.

Outdoor weather protection: Modification and adaptation which constitute 3.200% of the total outdoor space modification found in the public housing estates is the tenth most dominant outdoor space modification. Thus modifications were done on balconies, verandahs and sit-outs. Balconies and sit-outs were observed covered with tarpaulins, translucent roofing sheets and other waterproof materials as additional protection from weather elements.

Outdoor floor finishes: Modification and adaptation constitute 3.108% of the total outdoor space modification found in the public housing estates in Enugu metropolis. This is the eleventh most dominant outdoor space modification. Resurfacing compound with cement screed/interlocking stones are modifications that were done in almost all the estates surveyed.

Outdoor steps: Modification and adaptation found in public housing estates in Enugu metropolis constitute 1.381% of the total outdoor space modification. This is the least dominant outdoor space modification. Modifications were observed around entrance porches or on a slope terrain. They also act as connection between indoor-outdoor linkages. Sometimes new steps are constructed in the estate outdoor terrain mostly on block of flats where new footpaths or pedestrian access is introduced.

In overall, the outdoor space modification and adaptation for outdoor games (14.599%) was the most dominant in public housing estates in Enugu metropolis. It was followed in descending order by outdoor space modification and adaptation for informal sector activities (10.50%), landscaping (10.395%), ancillary structures (8.345%), illegal outdoor space conversion (8.271%), illegal, change of use (5.374%), outdoor lighting (3.522% and water storage (3.450%) are screening of balconies/verandah (3.570%) outdoor weather protection (3.200%), outdoor floor finishes (3.105% and outdoor steps (1.381%). The aforementioned 12 types of outdoor space modifications cumulatively accounted for (76.887%) of modification and adaptation found in the

public housing estates (See figure 28). This implies that 76.90% of outdoor spaces in public housing estates have been modified and adapted by the residents to meet their outdoor space needs. In addition, it indicates that there is high level of outdoor space modification and adaptation in the public housing estates in Enugu metropolis. This suggests that the outdoor space provision in the original design and plan of the public housing estates did not meet the needs of the residents. **These findings have answered research Question One.**

2. The residents level of satisfaction of existing outdoor spaces (Objective Two).

The result of the second hypothesis significantly classified resident's level of satisfaction of each of the existing outdoor spaces of public housing estates in Enugu metropolis. These are **outdoors games, outdoor sanitation, informal sector activities, outdoor security, ancillary structures, illegal outdoor space conversion, erecting pet houses, building conversion, outdoor lighting, illegal conversion, outdoor lighting and landscaping.** They accounted for 76.887% of residents' level of satisfaction of outdoor space modification. This implies that the residents were highly satisfied with their modification and adaptation of outdoor spaces carried out in their various housing estates. This outcome could be accounted for various reasons;

First, the outdoor space provision on the original design and planning was inadequate for the residents who were not consulted at design stage to consider demographic factors such as family size, number of vehicles per family and education status. This has led the residents to adapt and modify any available space to achieve satisfaction.

Second, outdoor activities were found to be popular among residents of public housing estates in Enugu metropolis. Outdoor space modification encourages them to sell small-scale enterprise; play games, modify the existing structures for various activities without much restriction. The implication of this result with respect to the residents' level of satisfaction for each of the existing 12 outdoor modifications and adaptations found in the public housing estates are as follows:

Outdoor games: The residents' level of satisfaction with outdoor games modification was the highest (12.143%). This is an indication that the residents were satisfied with modification and the provision of facilities for outdoor games that was not initially provided. Open spaces,

especially within the upper income class and block of flats residencies could now be used for volleyball, table tennis, basketball, playground and few swimming pools.

Outdoor sanitation: The residents satisfaction level with their outdoor space modification and adaptation for outdoor sanitation was second highest (**12.143%**) with public housing estates. Almost every household was conscious of sanitation measures. In every household, spaces were created for garbage collection and water storage, while efforts were made to plant flowers, gardening for orchard (cashew, guava, oranges, and pears) and general grassing with landscape elements as well as cleaning of outdoor spaces.

Informal sector activities. The residents' satisfaction level with their outdoor space modification and adaptation for outdoor sanitation was third highest (9.179%) among the twelve identified factors in the housing estates. Satisfaction with informal sector activities was highly significant judging from the number of places in the estates where **grinding mill, selling of kerosene and gas refilling were recorded.**

Outdoor Security: The residents' level of satisfaction with their outdoor space modification and adaptation for outdoor security was 6.605% representing fourth highest among the other twelve factors. Security consciousness is taken serious in every public part of the housing estates. Personal security measures were carried out in many housing units surveyed to compliment for the general security in the study area. Many housing residents increased fence heights while in others trees, herbs and hedges were provided as shield for security.

Ancillary Structures: The residents were satisfied with their outdoor space modification and adaptation for ancillary structures. The satisfaction level was **6.530%** thus representing the fifth highest among other twelve factors. Ancillary structures such as gatehouse, entrance porches, and generator houses were not provided for in the original design. Residents derived satisfaction from the modification and addition of these structures because of their importance in their everyday life.

Illegal Outdoor Space Conversion: The residents were also satisfied with their outdoor space modification and adaptation for illegal conversion in public housing estates in Enugu metropolis. Their satisfaction level was 5.319%, which represents the sixth highest among the other twelve factors. Conversion observed include; converting gatehouse for sell of sachet water, GSM cards and minor provision items. In some areas, entrance porches were converted as security posts.

Outdoor Recreation: The residents' level of satisfaction with their outdoor space modification and adaptation for recreation was 5.024%. This was the seventh highest among other twelve factors in the public housing estates. Outdoor recreation takes the form of sleeping, walking and resting under protected structures during hot weather. most often balconies, verandahs/sit outs, and covered patios provide suitable spaces for this purpose.

Home based enterprises: The residents showed a significant level of satisfaction with outdoor space modification and adaptation for home based enterprises. Their level of satisfaction was 4.252%, which represents the eighth highest among the twelve factors. Provisions of spaces for small scale shopping, sewing or mending clothes and shoes gives satisfaction to residents because they reduce the cost and risk of the travelling to long distances to obtain such services.

Erecting pet houses: The residents showed a significant level of satisfaction with outdoor space modification and adaptation for erecting pet house. Their level of satisfaction was 4.127%, which is the ninth highest among the twelve factors found in the public housing estates. Erecting pet houses was a modification that was put in place mainly by those who use dogs for security reasons.

Outdoor lighting: The residents' level of satisfaction with their outdoor space modification and adaptation for outdoor lighting was significant at 4.088% This represents the tenth highest residents' level of satisfaction among the twelve identified factors in the public housing estates. Residents were satisfied with the provision and modification of outdoor lighting such as garden lights, security lights and perimeter fence lights because of the importance attached to security at night.

Building Conversion: The residents' level of satisfaction with their outdoor space modification and adaptation for building conversion was 3.479%. This represents the elventh highest residents' level of satisfaction among the twelve identified factors in the public housing estates. Converting a bungalow to storey building is a very common modification that gives satisfaction to a building owner. This is because more indoor spaces are being provided thereby creating more spaces for storage to reduce congested outdoor spaces. It also promotes status symbol for the owner or yields more revenue in case of renting. However, this type of modification sometimes creates conflicts with neighbours due to the impacts during construction and expansions.

Landscaping: The residents' level of satisfaction with their outdoor space modification and adaptation for landscaping was 2.385%. This represents the lowest level of residents' satisfaction among the twelve identified factors in the public housing estates. Modification in form of grassing, provision of outdoor elements, planting of flowers, trees and orchards gave satisfaction to the residents because of health benefits, beautification of the surroundings and aesthetic values.

In overall, the residents' level of satisfaction with their outdoor space modification and adaptation for outdoor games was the highest among the twelve identified factors in the public housing estates in Enugu metropolis. This implies that the space for outdoor games was the most desired among residents of public housing estates. This was followed in descending order by outdoor sanitation, informal sector activities, outdoor security, ancillary structures and building conversion. Others are outdoor recreation, home base enterprises, erecting pet house, outdoor lighting, building conversion and landscaping. This is an indication that the residents were highly satisfied with their modification and adaptation of their outdoor spaces of the housing estates in Enugu metropolis. *The findings have answered research Question Two.*

3. Determination of outdoor space needs for the residents of the housing estates

(Objective No. 3).

The Result of Hypothesis three identified and classified the resident's outdoor space needs in the housing into 11 factors.

The eleven factors account for **75.937%** of the residents' outdoor space needs. These are spaces for **outdoor recreation, outdoor games, informal sector activities, outdoor parking, small-scale formal enterprises, home based enterprise, children's playground, ramp for physically challenged people, animal husbandry, schools and sanitation equipment,**

This implies that the eleven factors strongly represent the outdoor space needs of the housing estates. It also shows that the existing outdoor spaces did not meet the space needs of the housing estates on the original planning and design of the outdoors of the housing units in the various estates. These could be explained by the following reasons: -

First, being a government housing estate, it was done on profit oriented criterion and consequently, most of the housing units were designed based on existing standards, (for example, plot size) which did not put into consideration the essential outdoor space needs of the prospective owners.

Second, creating outdoor spaces for leisure, recreation and green spaces and facilities for neighborhoods' interaction was not fully considered in the original design of the estate housing units. The implications of this with respect to each of the eleven factors are as follows:

Outdoor recreation: This is the residents most needed outdoor space in the public housing estate in Enugu metropolis. It represents 19.078% of total outdoor space requirement that will meet the needs of the residents. Outdoor space needs is highly significant for recreation. The most essential aspects of this item include relaxation, entertainment of guests, outdoor family meeting, washing/laundry, walking/strolling and outdoor resting among others. The above-mentioned factors are very essential in everyday socio/cultural needs of residents as custom demands.

Outdoor games: This is the second most required outdoor space by the residents to meet their needs. It represents 14.377% of total residents outdoor space needs on the public housing estate. The demand for outdoor games is high, about 14.377% significant. This is because outside recreation, the demand for outdoor games is deemed necessary because the residents' interests (especially the youth) on jogging, strolling, swimming, playing basketball, volleyball, snooker board games, playing table tennis and gymnasium was high. For the adults, there is high demand for spaces for walking, resting, while children's love for playground is inevitable.

Informal sector activities: Outdoor space for informal sector activities is the third most required space by the residents to meet their needs. It represents 10.34% of total residents outdoor space need in the public housing estates. These include desires to have spaces for items such as watch and shoe repairs and sewing or mending of clothes. Other items on high demand for spaces include selling of GSM cards, grinding mill, gas refilling and photocopying. Outdoor space needs for these items was deemed a necessity.

Outdoor parking: This is the fourth most important outdoor space needs in the public housing estates. It represents 4.815% of the resident total outdoor space requirement. Parking spaces have

been an object of conflict in block of flats and shared outdoor spaces. The demand for parking needs is bound to be high in view of the fact that many households own one or two cars per family.

Small-scale formal enterprises: Outdoor space for small-scale formal enterprise is the fifth most needed space to meet the needs of the residents of the public housing estates. This accounts for 4.41% of the resident total outdoor requirement. The demand for outdoor space needs for this item in the estate cannot be overlooked because it reduces the stress of going to market for purchase of household needs such as bread, soft drinks, other provisions and poultry products.

Home based enterprise: The outdoor space for home-based-enterprise is the sixth most needed space to meet the needs of the residents of the public housing estates in Enugu metropolis. It accounts for 4.252% of the resident total outdoor space requirement. These include baking of garri and akara balls. The need for spaces for these items is necessary because they serve as common food items for low-income earners such as site workers and artisans residing within or around the housing estates.

Children's playground: The outdoor space for children's playground is the seventh most needed space by the residents of the public housing estate. It represents 4.219% of the resident total outdoor space requirement. Children of estate residents lack playgrounds because they were not provided in their respective housing units. This is the reason some are always seen playing football on streets and estate roads. Space need for these items is very essential.

Ramp for physically challenged people: Space needs for ramping for physically challenged people especially around block of flats cannot be overlooked because they move on wheel chairs, and as such it is deemed necessary especially on areas with uneven terrain.

Animal husbandry: The outdoor space for animal husbandry is the ninth most needed space by the residents of the public housing estates. It accounts for 3.731% of the residents total outdoor space requirement. Domestic animals such as dogs are valued for security. Space need for these animals is very essential.

Schools: The outdoor space for school is the tenth most needed space by the residents of the public housing estates. This represents 3.472% of the resident total outdoor space requirement.

Schools are in form of Nursery and Daycare. There is usually high patronage for these activities for residents of estates hence the need of adequate space provision is very crucial.

Sanitation equipment: The outdoor space for keeping sanitation facilities is the least needed space in the public housing estates. It represents 3.028% of the residents total outdoor space requirement. Sanitation equipment is significant. This includes space for storage of brooms, rakes, shovels, knives, cutlasses and hoes.

In overall, the outdoor space need for recreation activities is the most required by the residents of the public housing estate in Enugu. It was followed in the descending order by outdoor space needs for games, informal sector activities, parking, small-scale formal enterprises and children's playground. Others are outdoor space needs for building ramp for physically challenge people, animal husbandry; schools and sanitation equipment (see figure 29). A comparison of this result with result of hypothesis one and two confirm that the above-mentioned factors are indeed the outdoor space needs of the residents of public housing estates. Furthermore, the above-mentioned eleven factors, which commutatively accounted for **75.95%** of the outdoor space, needs indicate that the factors are very strong outdoor space requirement to meet the needs of the residents of the public housing estates in Enugu metropolis. This outcome is a confirmation of the earlier findings in this study that the outdoor space in the original design and plan of the public housing estates do not have the needs of the residents. **The findings have answered the research question number three.**

4. Mean functional space requirements (m²) of the outdoor space activities in the public housing estates in Enugu metropolis. (Objective four).

First, the average functional space requirements (m²) were determined from the empirical study carried out on the modified outdoor spaces of the existing units in the estates gave the residents satisfaction because they highly exceeded the space allocations in the original design.

Second, the mean variations in functional space requirements for outdoor activities were significant except mean variation between 3-bedroom and 2-bedroom prototypes in the housing estates. The implication is that there exists variation in the functional space requirements for outdoor activities in the public housing estates in Enugu metropolis. **The findings have answered the research question four.**

5.16 SECTION B: PERSONAL OBSERVATION AND STILL PHOTOGRAPHS OF THE ESTATES:

The observations were made from selected housing units in all the ten (10) housing estates spread into thirty-four (34) phases that make up the area. Field observation involved the use of still photographs, which gave an idea of the current state of the outdoor activities in the residences of the estates. In addition, site plans and floor plans of some of the housing units were sketched and measured in order to articulate some of the data collected. This is combined with the layout plans from secondary data. There were remarkable re-modifications in some areas. The building typologies were similar in outlook because they were designed as prototypes. Parking spaces are converted to makeshift stores and mechanic workshops and crop gardening. The floor plans of some of the prototype designs of the housing estates were reproduced in addition to the layout plans that cover the ten (10) housing estates. Some of the observations shown below and in the appendix. (Appendix IV)

Personal Observation and Photographs

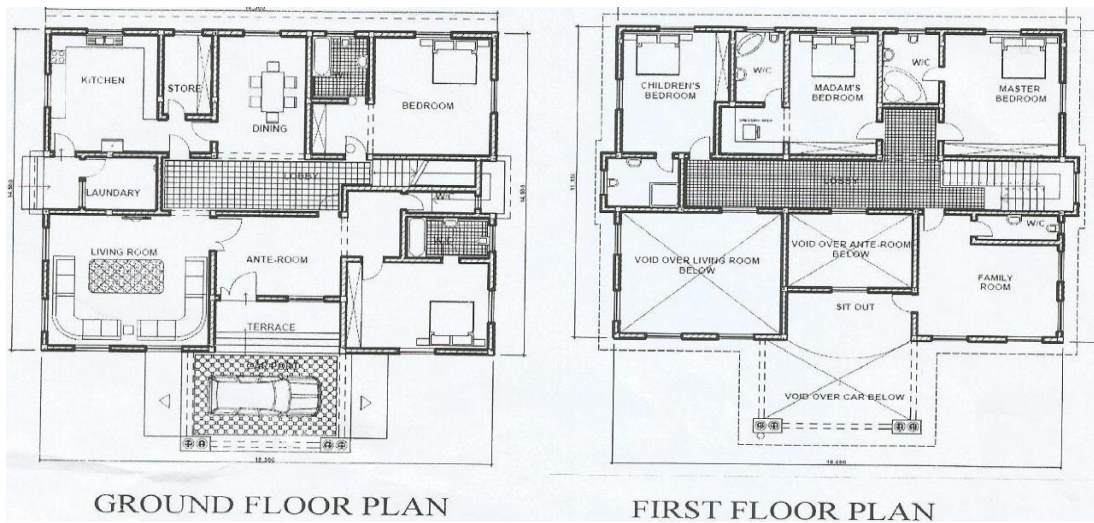
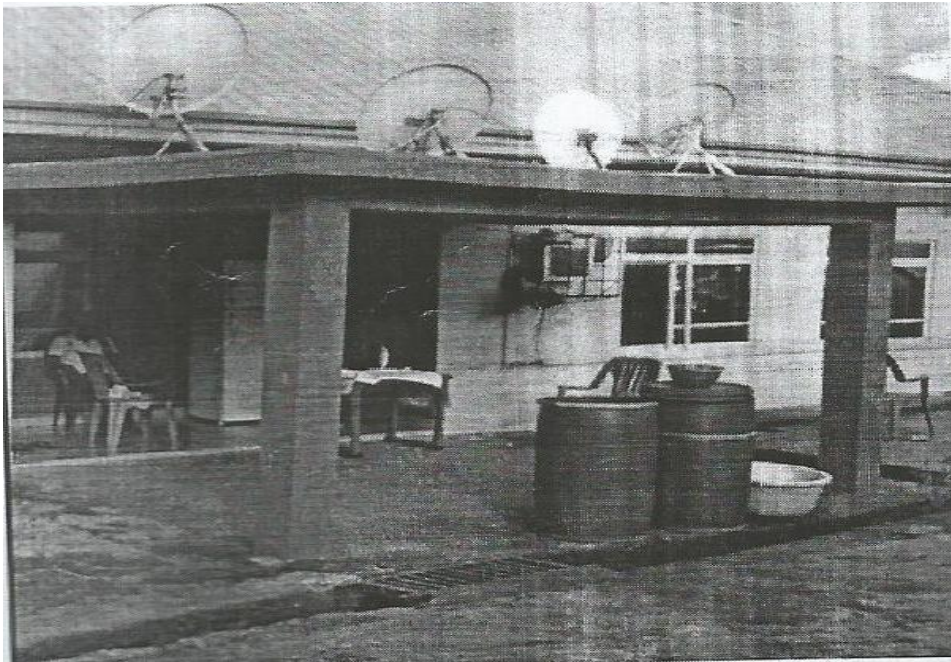


Fig.20: Site Plans

Source: Obi, N.I (Fieldwork Sketch); 2012

Trans Ekulu Phase 111:5- bedroom detached storied houses with 2- Bedroom Boys Quarter.

Plate 9: Car port adapted for resting, dinning and water storage



Source: Obi, N.I (Fieldwork); 2012

Abakpa Nike 2Bedroom Detached Bungalows.

Plate10: Post- occupancy modification measures-introduction of makeshift fencing and umbrella canopy on building frontage.



Source: Obi, N.I (Fieldwork); 2012

Real Estate Uwani: 2 bedroom/3Bedroom Block of Flats

Plate11: Adapted Water Storage and Car Parking on improper designed open space



Source: Obi, N.I (Fieldwork); 2012

Real Estate Uwani: 2 bedroom/3Bedroom Block of Flats

Plate12: Undefined Open Space modified to Gardening for Orchards



Source: Obi, N.I (Fieldwork); 2012

Real Estate Uwani: 2 bedroom/3Bedroom Block of Flats

Plate13: Undefined Open Space Adopted For sale of Water. (Water Storage)



Source: Obi, N.I (Fieldwork); 2012

Real Estate Uwani: 2 bedroom/3Bedroom Block of Flats

Plate14: Undefined Open Space adapted for Sale of Kerosene



Source: Obi, N.I (Fieldwork); 2012

Real Estate Uwani: 2 bedroom/3Bedroom Block of Flats

Plate15: Spreading of Clothes done on Balconies



Source: Obi, N.I (Fieldwork); 2012

Maryland Housing Estate: 3-Bedroom Block of Flats

Plate16: Inarticulate Landscaping



Source: Obi, N.I (Fieldwork); 2012

Maryland Housing Estate: 3-Bedroom Block of Flats

Plate17: Outdoor Space adapted for Small Scale Enterprise



Source: Obi, N.I (Fieldwork); 2012

6.0 CHAPTER SIX:

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.10: SUMMARY

6.11 Demographic and Socio- Economic Characteristics OF Residents

The issue of age within the family structure has implication to the design of outdoor spaces of the housing units such as children's play area, adult play or resting place. The socio-demographic characteristics of end users as established from this study indicate that they are highly educated and gainfully employed.

6.2 Outdoor Functional Activities and Use of Spaces

1. The extent of modification and adaptation of outdoor spaces

Major modification and re-adaptation of outdoor spaces were carried out by 77% of the middle-income residents. The high level of outdoor space modification and adaptation is an implication of inadequacy of outdoor space provision in the original planning and design of the housing units of the estates.

2. The residents level of satisfaction of existing outdoor spaces

Residents' level of satisfaction with the existing modified outdoor spaces of public housing estates in Enugu metropolis is very high, (77%), which is an indication that outdoor space needs have high significant effect on residents satisfaction.

3. Determination of outdoor space needs for the residents of the housing estates

The study identified high percentage of the residents' outdoor space needs, (76%) in the housing estates surveyed. This implies that the existing outdoor spaces did not meet the space needs of the residents of the housing estates on the original planning and design.

4. Mean Space Requirements for the residents of the housing estates

The study also determined for each prototype unit, average functional space requirement (m^2) that gave the residents satisfaction from the empirical study carried out on the modified outdoor

spaces of the existing plots in the estate. This was buttressed by other findings, which proved that a significant variation exists in the mean functional space requirement (m^2) of the outdoor activities in the public housing estate in Enugu metropolis. Minimum plot coverage of majority of the sampled housing units measured exceeded the recommended 33.3% and 40% of standard plot sizes for the 2bedroom/3bedroom, 4bedroom, and 5Bedroom house types respectively. The average outdoor space modification recorded from respondents is very high, 77%. This is because spaces for other socio economic variables were not accommodated in the original design and planning. In summary, the study determined 16 factors and categories of outdoor space needs of residents. It also determined the sizes or areas of the outdoor space requirements. The study established that different house types require different outdoor space needs. Most of the housing units were designed based on foreign standards, which did not put into consideration the essential outdoor space needs of the prospective owners. To date, no local standard has been adopted for the planning and design of public housing in Nigeria, except the Draft National Building Code proposed since 2006. This code has not been put into law by the National Assembly.

6.3 CONCLUSION

The study identified the socio-economic and physical factors that affect housing satisfaction of the middle-income residents in the public housing estates in Enugu Metropolis. The result of the study shows that functional outdoor spaces for middle-income residents have high response rating among the residents for sixteen out of fifty- nine identified factors, which are determinants of housing satisfaction. These are outdoor games, outdoor sanitation, outdoor security, outdoor recreation, home base enterprises, erecting pet house/animal husbandry, outdoor lighting, outdoor parking, playground, and ramp for physically challenged people. Others are schools, ancillary structures, water storage, outdoor floor finishes, landscaping and outdoor steps. The major finding in this study shows that the outdoor space provision in the original design and planning of public housing estates in Enugu metropolis is inadequate. The study identified variation in mean space requirements of the outdoor spaces that will serve as a guide for the planning and design of socio- economic and physical factors that affect housing satisfaction. The result of this study is in line with other previous studies and logically proved that an increase in the quantity of outdoor spaces for outdoor activities would lead to an increase in housing

satisfaction. Adesoji, D.J (2012 Ibe et al, (2013), Oladiran O.J (2013) The result of the study suggests that the design and planning template of residential outdoor spaces for outdoor activities should be based on the findings of this study. The study thus recommends a template that will embrace all the essential factors identified in this study. (See Template 1)

6.4 RECOMMENDATIONS

Recommendations made in this study are guided by the research findings.

1. The level of modification from the existing outdoor spaces was high (77%).The existing outdoor spaces of the surveyed estates did not meet the needs of the residents. That is the reason they recorded high-level modifications and adaptations to meet those needs. It is recommended that outdoor spaces of the current plot sizes should be increased to meet those needs as itemized in the templates. The needs are thus categorized below from the most pressing needs to the least. They include **outdoor recreation (19.078%)**; **outdoor games (14.377%)**, **informal sector activities (10.340%)**, **outdoor parking (4.815%)**, **small scale formal enterprise (4.419%)**, **home base enterprise (4.252%)**, **play ground (4.219%)**, **ramp for physically challenged people (4.206%)**, **animal husbandry (3.731%)**, **schools (3.472%)**, **sanitation equipment (3.028%)**. (See template II)

2. High level of outdoor space modification and increased space needs recorded in the study calls for increase in plot size allocation from the existing standard, thus, the following plot sizes are hereby recommended:

- a. The Floating Class- From 15m x 30m to **30m x 30m =900m²**
- b. Lower Middle Class-From 20m x 30m to **30m x 40m =1200 m²**
- c. Upper Middle Class –From 30m x 30m to **40m x 40m =1600 m²**

The recommended outdoor space needs are given minimum space allocation distributed according to percentages in the findings in line with plot sizes recommended for the house types

- a. The Floating Class- **594m² (66% of 900m²)**
- b. Lower Middle Class-792 m² (66% of 1200m²)

c. Upper Middle Class- **1056m² (66% of 1600m²)** (See Template II for details)

3. Evidence of variation recorded from ANOVA result is in line with the determined outdoor space requirements include 2/3 bedroom Block of Flats (298 m²); 3bedroom bungalows-(311m²); 4 bedroom bungalows (323 m²); 4 bedroom Storied houses(400 m²); and 5 bedroom Storied houses (501m²). Thus, this study recommends that the determined mean space requirements be used as minimum standard for outdoor space provision in planning and design of future public housing in Enugu metropolis. (see Template III for Details) Finally, the Three Templates below, developed in the course of this study is hereby recommended to serve as a guide for the design and planning of new estates in Enugu and other cities in Nigeria. However, I suggest Satellite low cost housing scheme with good link roads for the lower income workers in the rural communities around Enugu City because of cheaper cost of land if outdoor spaces should be increased. Campaign for family planning among the lower income workers should also be intensified

Table 54: TEMPLATE I FOR RECOMMENDED MINIMUM OUTDOOR SPACES FOR SATISFACTION OF DIFFERENT HOUSE TYPES FOR PUBLIC HOUSING DEVELOPMENT IN ENUGU METROPOLIS

S/N	Recommended Main Outdoor Activities (Modified Outdoor Spaces)	Components	Plot Size/ Percentage Coverage	Outdoor Space	Percentage Value (%)	Floating Class	Lower Middle Class	Upper Middle Class
1	OUTDOOR GAMES				12.606 %			
			30mx30m 900m² 34%	594m²		74.8 m²		
		Provision of outdoor bike racks	30mx40m 1200m 34%	792 m²			99.8 m²	

		Creating space for volley ball.	40mx40m 1600m 34%	1056 m²				133.1 m²
		Provision of outdoor garden sprinkler						
		Provision of outdoor water fountains						
		Creating space for table-tennis games in the compound						
		Creating space for basketball game in the compound						
		Creating own swimming pool						
2	OUTDOOR SANITATION				12.143 %			
		Creating space for additional car parking		594m ²		72.1 m ²		
		Grassing/Landscaping		792 m ²			96.1 m ²	

		Creating for garbage collection		1056 m ²				127.7 m ²
		Creating space for outdoor recreation						
		Reconstruction drainage channels						
		Grassing/landscaping in the compound						
		Making flowerbed around the house						
		Creating space for water storage						
		Gardening for orchards						
3	INFORMAL SECTOR ACTIVITIES				9.179 %			
		Creating spaces for grinding mill		594m ²		54.6 m ²		
		Creating spaces for selling		792 m ²			72.8 m ²	

		kerosene						
		Creating spaces for typing pool		1056 m ²				97.1 m ²
		Creating spaces for gas refilling						
		Creating spaces for water repairs						
4	OUTDOOR SECURITY				6.605%			
		Planting trees and herbs as shield from neighborhood		594m ²		39.2 m ²		
		Providing hedges around house		792 m ²			52.2 m ²	
		Increasing perimeter fence height for privacy and residents		1056 m ²			69.7 m ²	
		Extending caves of building to protect exposed balconies/verandahs						

5	ANCILLARY STRUCTURES				6.330 %			
		Converting gate house for other purpose activities		594m ²		37.4 m ²		
		Making own entrance porch		792 m ²			49.8 m ²	
		Converting car pot for other purposes		1056 m ²				66.5 m ²
		Building gate house						
6	ILLEGAL SPACE CONVERSION				5.319 %			
		Creating space for security house		594m ²		31.4 m ²		
		Creating space for selling water		792 m ²			41.9 m ²	
		Creating space for gate house		1056 m ²				55.9 m ²

7	OUTDOOR RECREATION				5.024 %			
		Screening balconies/V erandahs		594m ²		29.7 m ²		
		Creating space for outdoor resting		792 m ²			39.6 m ²	
		Provision of shades from weather		1056 m ²				52.8 m ²
8	HOME BASE ENTERPRISES				4.927 %			
		Creating space for small shopping		594m ²		29.1 m ²		
		Creating space for sewing clothes		792 m ²			38.8 m ²	
				1056 m ²				51.7 m ²
9	ERECTING PET HOUSE				4.127 %			
		Erecting pet house						

10	OUTDOOR LIGHTING				4.088 %			
		Provision of outdoor lighting		594m ²		24.3 m ²		
		Provision of outdoor steps		792 m ²			32.4 m ²	
				1056 m ²				43.3 m ²
11	BUILDING CONVERSION				3.479 %			
		Converting the entire bungalow to storey building		594m ²		20.7 m ²		
				792 m ²			27.7 m ²	
				1056 m ²				36.9 m ²
12	LANDSCAPING				2.835 %			
				594m ²		16.6 m ²		
		Grassing/landscaping in the compound		792 m ²			22.2 m ²	
		Creating space for selling of GMS Cards		1056 m ²				29.5 m ²
Cum. %							76.622 %	

Source: Field Survey, 2018.

Note: Explanation of the Template: Take for example, Serial number S//N 1 second row, **OUTDOOR GAMES** recorded percentage variance of **12.606 %** out of the total cumulative percentage of **76.622%**. All the outdoor space needs covered by **outdoor games**, called components are recorded on column 3. Now, 66% of the new recommended outdoor spaces in m² are **594m², 792m² and 1056m² for Floating, Lower and Higher** Income residents respectively. **12.606 %** of each of them is recorded in the last 3 columns from the right. For example, **12.0606%** of **594m², =74.8 m²** for floating class; **12.0606%** of **792m² = 99.8m²** for lower middle class; **2.0606%** of **1056m² =133.1m²** for upper middle class. This proposed distribution is applicable to the rest of the items in the template.

Table 55: TEMPLATE II FOR RECOMMENDED MINIMUM OUTDOOR SPACE

NEEDS FOR DIFFERENT HOUSE TYPES FOR PUBLIC HOUSING

DEVELOPMENT IN ENUGU METROPOLIS

S/N	Recommended Main Outdoor Activities	Components	Plot Size/ Percentage Coverage	Outdoor Space	Percentage Value(%)	Floating Class	Lower Middle Class	Upper Middle Class
1	OUTDOOR RECREATION				19.078%			
		Space for gardening/tree planting		594m ²		113.3 m ²		
		Space for flowerbeds		792 m ²			151.2m ²	
				1056m ²				201.6m ²
		Space for small scale gardening						
		Space for outdoor relaxation						

		Space for outdoor cooking/dinning						
		Space for entertainment of guest						
		Space for garbage collection and disposal						
		Space for spreading of clothes						
		Space for outdoor family meeting						
		Space for walkways						
		Space for patio and terrace						
		Space for outdoor washing/laundry						
		Space for walking/strolling						
		Space for water storage						
		Space for delivery access						
		Space for entrance porch						
		Space for outdoor resting						
2	OUTDOOR GAMES				14.377%			

		Space for jogging		594m ²		85,5 m ²		
		Space for strolling		792 m ²			114.1 m ²	
		Space for open swimming pool		1056 m ²				151.0 m ²
		Space for playing basket ball in compound						
		Space for gymnasium						
		Space for walking						
		Space for volley ball						
		Space for snooker board games						
		Space for playing by children						
		Space for playing by adults						
		Space for children play area						
		Space for fire protection gadget						
		Space for outdoor resting						
		Space for playing table tennis in compound						
		Space for tennis ball						

3	INFORMAL SECTOR ACTIVITIES				10.340%%			
				594m ²		61.2 m ²		
		Space for watch repairing		792 m ²			81.5 m ²	
		Space for mending shoes		1056 m ²				109.8 m ²
		Space for selling GSM Cards						
		Space for grinding mill						
		Space for gas refilling						
		Space for photocopying						
		Space for sewing clothes						
4	OUTDOOR PARKING				4.815%			
		Space for car parking		594m ²		28.5 m ²		
		Space for playing table tennis in compound		792 m ²			38.0 m ²	
		Space for water storage		1056 m ²				50.6 m ²

5	SMALL SCALE FORMAL ENTERPRISE				4.419%			
		Space for outdoor small scale shopping		594m ²		26.1 m ²		
		Space for poultry house		792 m ²			34.8 m ²	
				1056 m ²				46.5 m ²
6	HOME BASE ENTERPRISE				4.252%			
		Space for baking garri		594m ²		25.5 m ²		
		Space for baking beans/akara balls		792 m ²			34.1 m ²	
				1056 m ²				44.3 m ²
7	CHILDREN'S PLAY GROUND				4.219%			
		Space for giving children lessons		594m ²		24.9 m ²		
		Space for tiding bicycle by children.		792 m ²			33.3 m ²	
				1056 m ²				
8	RAMP FOR PHYSICALLY CHALLENGED PEOPLE.				4.206%			
		Space for ramp for disabled people.		594m ²		24.8		
				792 m ²			33.2	
				1056 m ²				43.2 m ²

9	ANIMAL HUSBANDARY				3.731%			
		Space for house for domestic pets	0.794	594m ²		21.9		
		Space for house for fending to pets	0.626	792 m ²			29.3	
				1o56 m ²				39.1 m ²
10	SCHOOLS				3.472%			
		Space for reading by children	0.751	594m ²		20.7 m ²		
		Space for tending to kids	0.638	792 m ²			27.7 m ²	
				1o56 m ²				36.9 m ²
11	SANITATION EQUIPMENT				3.028%			
		Space for Cleaning compound	-0.554	594m ²		17.8 m ²		
		Space for children play area	0.506	792 m ²			23.7 m ²	
				1o56 m ²				31.6 m ²
Cum. % (Total)					75.937%			

Table 56: TEMPLATE III FOR RECOMMENDED MEAN OUTDOOR SPACE REQUIREMENT FOR DIFFERENT HOUSE TYPES FOR PUBLIC HOUSING DEVELOPMENT IN ENUGU METROPOLIS

Average measured outdoor spaces for Two Bedroom (2 BRM) Bungalows	Size in m ²
2BRM Semi-detached bungalow Greenland Estate.	279.5 m ²
2 BRM Semi-detached Bungalow Green land Estate Phase	331.14m ²
2 BRM Bungalow Federal Housing Phase 1	238.50 m ²
2BRM semi-bungalow T/Ekulu	226.921m ²
2 BRM Semi-detached Bungalow Ahocol Estate Republic layout	269.271 m ²
2 BRM Semi-detached bungalow T/ekulu phase	279.58 m ²
2 BRM Bungalow River side housing Estate phase I&II	229.37 m ²
2 BRM Bungalow T/ekulu Phase I	275.16m ²
2 BRM Semi-detached Bungalow Federal Housing Abakpa	311.9m ²
	240. 674m ²

Average measured outdoor spaces for Two Bedroom/Three Bedroom (2 BRM/3BRM) Block of Flats	Size in m ²
2 BRM /3 BRM Block of Flats and Mansionettes in Real Estate Uwani (Site 1)	663m ²
2 BRM/3 BRM Block of Flats and Mansionettes in Real Estate, Uwani (SITE 2)	685m ²
	674m ²

Average measured outdoor spaces for Three Bedroom (3 BRM) Block of Flats	Size in m ²
3 BRM Block of flats Maryland Estate Ekulu phase I	315m ²
3 BRM block of flats Trans Ekulu phase	227.57m ²
3BRM block of flats, Maryland	351.04m ²
	298 m ²

Average measured outdoor spaces for Three Bedroom (3 BRM) Block Bungalows	Size in m ²
3 BRM bungalow: River side Estate Phase II	314.65m ²
3 BRM detached bungalow T/Ekulu phase II	307.33m ²
	311m ²

Average measured outdoor spaces for Four Bedroom (4 BRM) Bungalows	Size in m ²
4 BRM semi-detached bungalow phase II /Ekulu phase	336.95m ²
4 BRM detached bungalow. T/Ekulu phase VI	308.3m ²
	323 m ²

Average measured outdoor spaces for Four Bedroom (4 BRM) Storied Houses	Size in m ²
4 BRM detached storied house: Ebeano housing Estate	446.1m ²
4 BRM semi-detached storied house with B.Q T/Ekulu phase II	527.1m ²
4 BRM detached storied house: Fidelity Estate by Ebeano Tunel	226.8m ²
	400 m ²
Average measured outdoor spaces for Five Bedroom (5 BRM) Storied Houses with 2 BRM. BQ.	Size in m ²
5 BRM detached storied house with 2 BRM. BQ. T/Ekulu phase III	422m ²
5 BRM detached storied house with 2 BRM BQ. T/Ekulu phase VI	546.76m ²
	484 m ²

Average measured outdoor spaces for Five Bedroom (5 BRM) Storied Houses	Size in m ²
5 BRM detached storied Golf course Estate phase I	566.4m ²
5 BRM detached storied housing Estate, Ebeano Housing Estate: Chime Ave/Bisala Rd	467m ²
5 BRM detached storied house. Fidelity housing Estate: old trade	469.5m ²
	501 m ²

Source: Field Survey, 2018.

6.5 CONTRIBUTION TO KNOWLEDGE:

This study has for the first time specifically dwelt on the post occupancy evaluation of outdoor spaces of public housing estates with a view to determining the housing satisfaction of middle-income residents in Enugu Nigeria. It has been able to develop for the first time a template that will serve as a guide for the design of outdoor spaces in future housing estates for the middle-income residents in Enugu and elsewhere in Nigeria.

6.6 SUGGESTION FOR FURTHER RESEARCH

The following are possible areas of further research: -

Evaluation of the adequacy of outdoor facilities for socio-economic activities in Public Housing Estates in Enugu Nigeria.

Application of vegetation for improvement of the microclimate of outdoor spaces in Public Housing Estates in Enugu Nigeria

Determinants of residential satisfaction with multi-linear regression approach on the adequacy of security and privacy of outdoor spaces of post-independence housing schemes in Enugu Nigeria.

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APPENDICES

Appendix 1

QUESTIONNAIRE ON POST OCCUPANCY EVALUATION OF OUTDOOR SPECES OF MIDDLE INCOME PUBLIC HOUSING ESTATE IN ENUGU METROPOLIS

Dear Respondents,

My name is OBI IHEANACHO NICHOLAS. I am conducting an academic research on Post-Occupancy evaluation of the outdoor residential environment of middle income public housing estate in Enugu, Enugu State. Please kindly complete the questionnaire by filling the correct answers to the questions to enable me arrive at factual conclusions based on the information you supplied to the questions. I assure you that all information given herein will be treated as purely confidential, and will be used only for the purposes of this study.

Thank you.

Signed..... Date.....

OBI IHEANACHO NICHOLAS
PhD Research student, University of Nigeria, Enugu Campus

QUESTIONNAIRE

PART A: DEMOGRAPHIC CHARACTERISTICS

G

1.

Gender (Sex)

Male

Female

2. Marital Status

Married

Separated

Divorced

Widowed

Single

3. Which of these best describes the status of your residency?

Rent paying tenancy Owner-occupier

4. How long have you lived in this house?

Less than one year

1 to 5 years

Up to 10 years

Up to 20 years

More than 20 years

PART B – SOCIO ECONOMIC CHARACTERISTICS

5. Which of these is closest to your annual income?

N240, 000-N1, 199,999 p.a

N1, 200,000-N2, 399,999 p.a

N2, 400,000 – N4, 399,999 p.a

6. What is the highest level of your educational attainment?

- Education
- Primary school
- Secondary school
- Post-secondary school
- Post-graduate school

7. What type of house do you live?

- * 2 Bedroom, detached Bungalow
- * 2 Bedroom semi-detached Bungalow
- * 2 Bedroom Block of Flats
- * 3 Bedroom detached Bungalow
- * 3 Bedroom semi-detached Bungalow
- * 3 Bedroom Block of Flats
- * 4 Bedroom detached Bungalow
- * 4 Bedroom semi-detached Bungalow
- * 4 Bedroom Duplex detached
- * 4 Bedroom Duplex with semi-detached with B.Q
- * 5 Bedroom storey house with BQ

8. What is the total number of people living in your house?

- 1-3 people
- 4-6 people
- 7 and above

9. What is the nature of your present employment?

- Employed in the public sector (Civil servant)
- Employed in the organized private sector (Private Employee)
- Self-employed
- Unemployed
- Retiree

Part A: Demographic characteristics of respondents.

Frequencies & Frequency Tables

The question asked to determine the ratio of married male with their spouses to single female respondents revealed 92.5% to 7.5% respectively. This is an indication that the males are married men living with their spouses at the time of the survey since the married men are regarded as heads of their household units. The proportion of married males to single females is (92.5%, 7.5%).

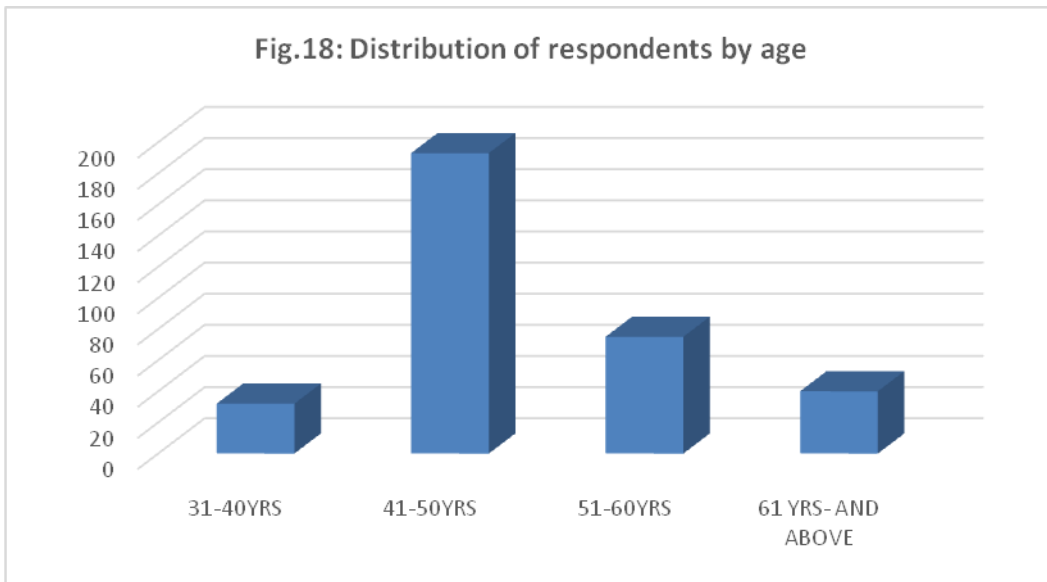


Fig.18 Age of Respondents

Source: Obi, N.I (Bar Chart Diagram); 2012

Marital Status

The marital status of respondents was requested in order to ascertain perception of satisfaction derived from outdoor housing spaces because the perception from a married couple may differ from those in singles category.

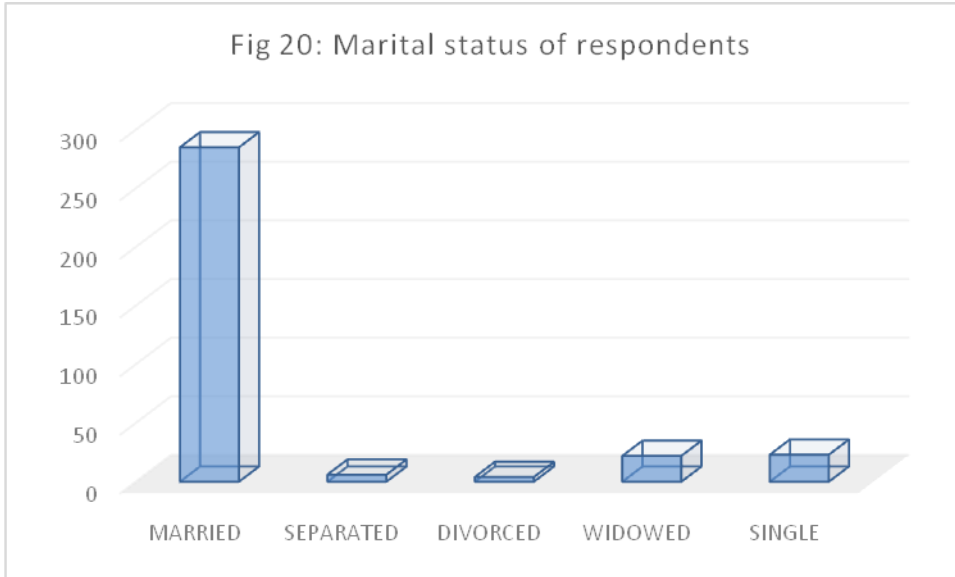


Fig. 20: Marital Status

Source: Obi, N.I (Bar Chart Diagram); 2012

Residency Status

The residency status whether rent paying or owner-occupier could affect respondents’ satisfaction with the outdoor space activities. The greater numbers of respondents are rent paying tenants. The reason being that most government allottees rent out their housing units and strive to build their own more conducive houses.

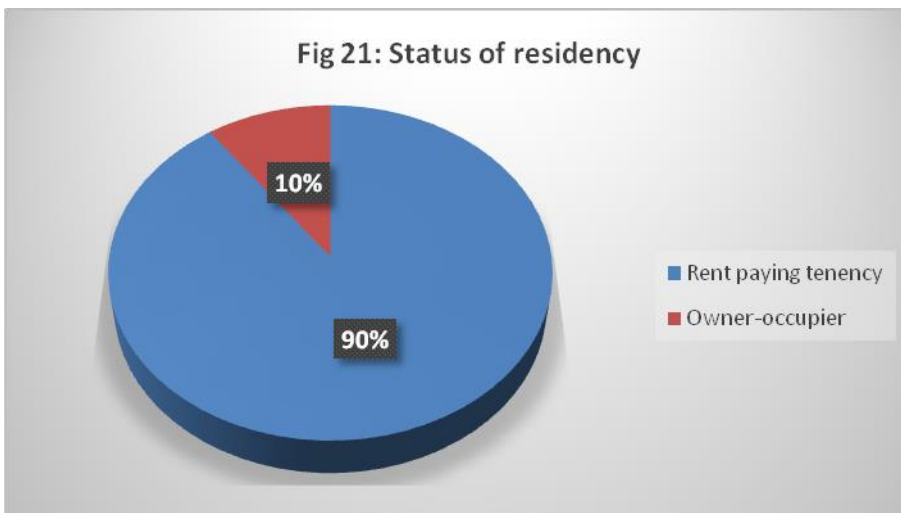


Fig.21: Status of Residency

Source: Obi, N.I (Pie Chart Diagram); 2012

Duration of Residency

How long have you lived in this house? The purpose of this question is to address the duration of residency, in order to ascertain the respondent's perception of satisfaction with their outdoor spaces. From the findings, majority have lived up to 10 years corresponding to 60% (203) while about 28.8 % (98) have lived in the estates for up to 5 years. The assessment of their housing satisfaction should be drawn from the majority because of their long period of residency.

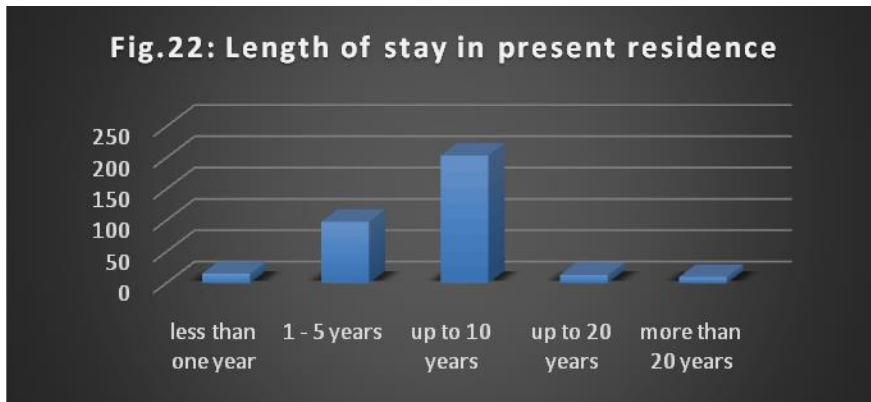


Fig. 22: Duration of Residency

Source: Obi, N.I (Bar Chart Diagram); 2012

Table 10: Summary of Demographic Characteristics of Respondents

S/N	General information (Biodata)		Frequency (No)	Total Responses (No)	Percentages (%)
1	Gender	Total head of units	313	339	92.5%
		Male with spouses			
		284plus			
		29 single males			
		Female singles	26		7.5%
2	Age	31-40 years	32		9.4%
		41-50 years	193		56.9%
		51-60 years	75		21.9%
		61 years and above	40	339	11.8%

3	Marital Status	Married	284		83.7%
		Separated (male)	6		1.7%
		Divorced (female)	4		1.3%
		Single (female)	22		6.6%
		Single (male)	23	339	6.7%
4	Status Residency	Rent paying Tenancy	305	339	89.9%
		Owner occupier	34		10.1%
5	Length of tenancy	Less than one year	15		4.5%
		1-5 years	98		28.7%
		Up to 10 years	203		59.9%
		U to 20 years	13		3.9%
		More than 20 years	10	339	3.0%

Source: Obi, N.I (Fieldwork); 2012

Part B- Socio-economic Characteristics of Residents

Annual Income

Which of this is closest to your household income?

Income is one of the variables used to assess the social status of the residents in order to determine the influence of income on housing satisfaction. The respondents were asked to choose from the range of salary scale provided. This helped to determine housing affordability which may or may not compel them to live where they live because that is what they can afford or if they are dissatisfied in spite of their income.

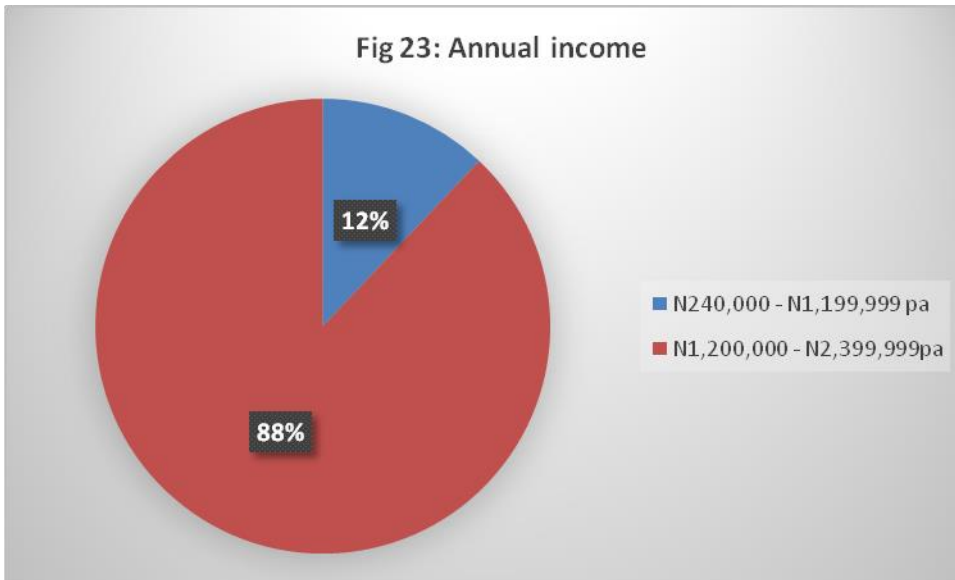


Fig. 23: Annual Income

Source: Obi, N.I (Pie Chart Diagram); 2012

All the 339 residents responded to this question. Out of this number, 12 percent (41) of residents were in the category that earns ~~N~~240,000 - ~~N~~1,199,999, two hundred and forty thousand naira to one million, one hundred and ninety-nine thousand, nine hundred and ninety-nine naira (per annum) which is the floating class. The rest 88 percent (298) earn income of ~~N~~1, 200,000 – ~~N~~2, 999,999 (one million, two hundred thousand naira to two million, nine hundred ninety-nine thousand, nine hundred and ninety-nine naira) per annum and above.

Educational Qualification

What is the highest level of your educational attainment?

This question helps to assess the effect of educational enlightenment on respondents' assessment of housing satisfaction because education is a very important indicator of one's socio-economic status

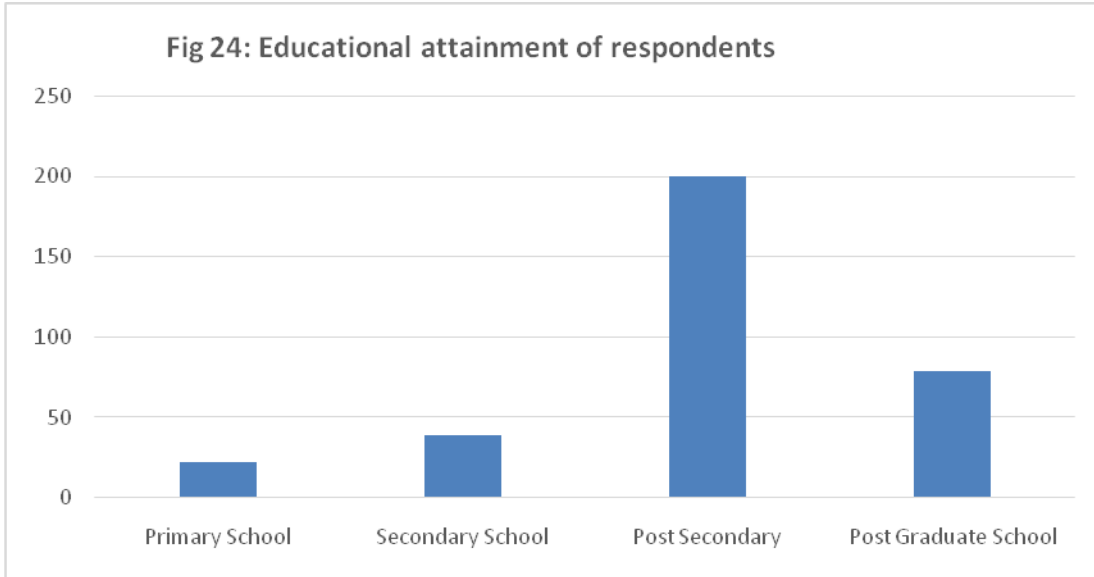


Fig. 24: Educational Qualification

Source: Obi, N.I (Bar Chart Diagram); 2012

Family Size

What is the total number of people living in your house?

The purpose of this question is to determine family size to ascertain this factor for housing satisfaction studies because, it is construed that the greater the number of occupants in a housing unit, the more their space requirements.

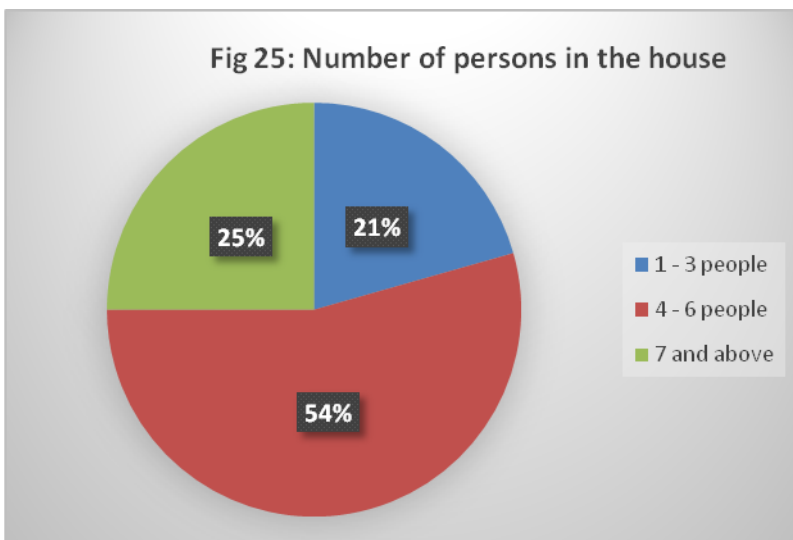


Fig. 24: Family Size

Source: Obi, N.I (Pie Chart Diagram); 2012

Majority of the households 184 (54%) had between 4-6 persons per unit while about 84(25%) percent were seen in households that had about 7 persons and above in a unit. Also 71 (21%) had between 1-3 persons per unit.

Family Structure

Which of these best describes the relationships between persons living in your house?

This question addresses the structure of the family. This is important from the point of view that this factor is likely to have implications for space provision, privacy and other sociological issues in a household.

The results showed that nuclear and extended family structure had greater respondents 73 percent (247 persons).

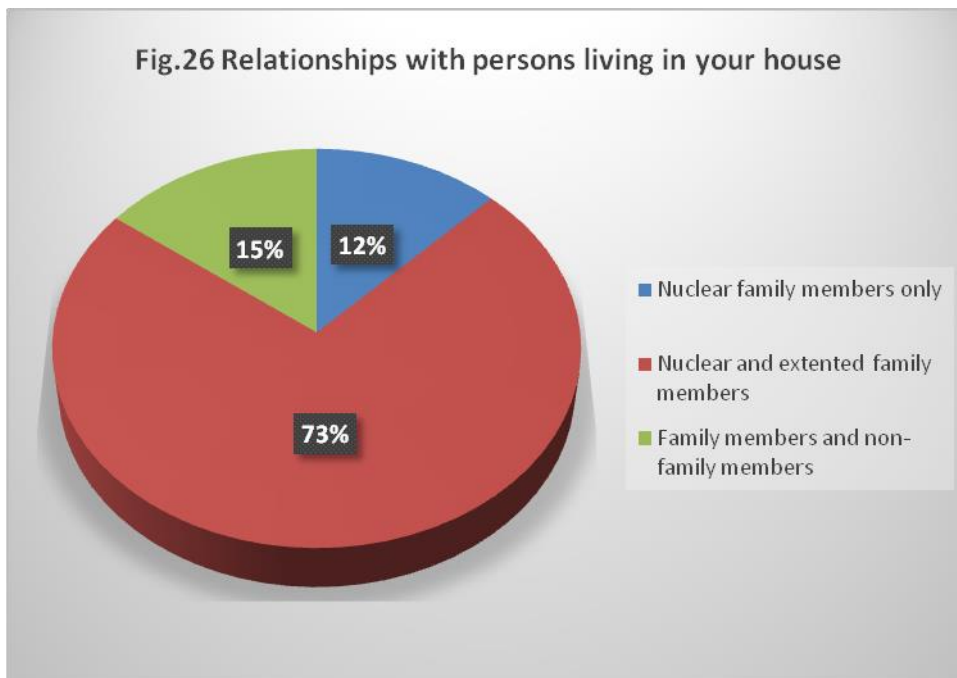


Fig. 26: Family Structure

Source: Obi, N.I (Pie Chart Diagram); 2012

Nature of present Employment

What is the nature of your present employment?

Nature of employment may have implication for design consideration of the compound especially in terms of plot size, space allocation for car parks etc.

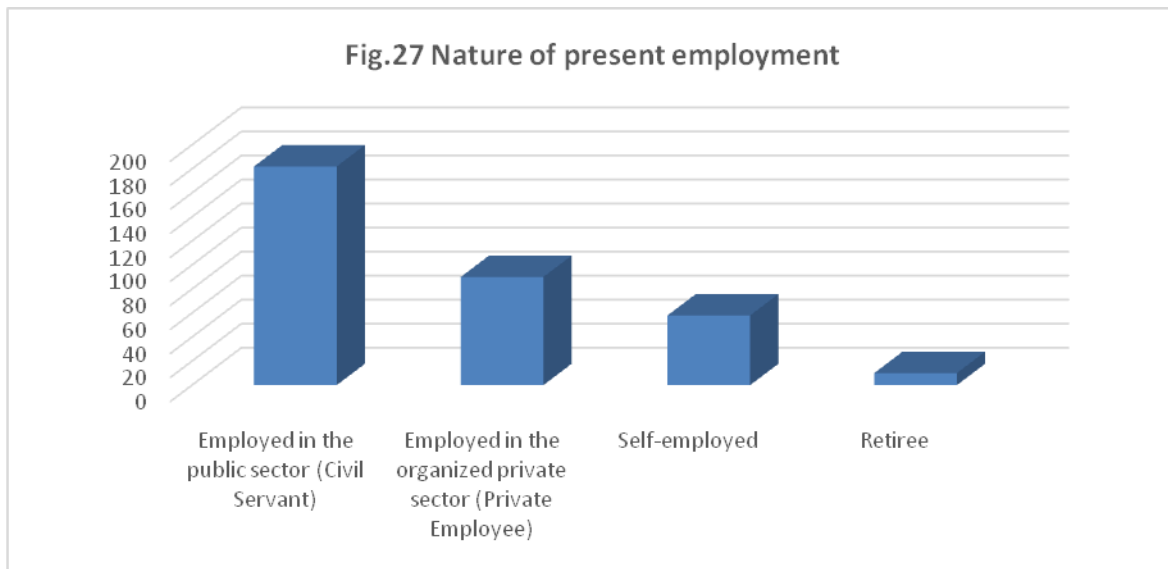


Fig. 27: Nature of Employment

Source: Obi, N.I (Bar Chart Diagram); 2012

Table 55: FUNCTIONAL OUTDOOR ACTIVITIES AND USE OF SPACES

a. Extent of functional outdoor activities and use of spaces in the housing estates

PLEASE RATE THE EXTENT YOU WANT EACH OF THESE UNDER LISTED OUTDOOR SPACE ACTIVITIES AND USES BE LOCATED IN YOUR HOUSING ESTATES.

S/N	Extent of functional outdoor activities and use of spaces in the housing estates	Very High	High	Moderate	Low	Very Low.	Not At All
1	Space for gymnasium						
2	Spaces for strolling						
3	Space for walking						
4	Space for juggling						
5	Space playing basketball in compound						
6	Space for playing table tennis in compound						
7	Space for drying and baking garri						
8	Space for baking beans (Akara cakes)						
9	Space for small scale poultry						
10	Space for bicycle riding by children						
11	Space for cleaning compound						
12	Space for tending to pets (e.g. dogs)						
13	Space for outdoor washing/laundry						
14	Space for small scale gardening (Orchards)						
15	Space for grassing/tree planting (landscaping)						
16	Space for tending to kids (babysitting)						
17	Space for reading by children						

18	Space for water storage						
19	Space for garbage collection and disposal						
20	Space for outdoor recreation						
21	Space for outdoor cooking/dinning						
22	Space for outdoor family meeting						
23	Space for outdoor resting						
24	Space for outdoor playing by adult						
25	Space for outdoor playing by children						
26	Space for car parking						
27	Space for spreading clothes						
28	Space for entertainment of guest						
29	Space for outdoor sewing of clothes						
30	Space for outdoor small scale shopping						
31	Space for ramp for disabled people – ramp usage						
32	Space for Indoor – outdoor linkage (outdoor connection)						
33	Space for Fire protection gadget (hydrant spot)						
34	Space for House for domestic pets (e.g. dog)						
35	Space for Poultry house (small scale poultry farming)						
36	Space for Children play area (basketball)						
37	Space for Tennis ball (playing by children)						
38	Space for Volley ball - (playing)						

39	Space for Snooker board games –(playing)						
40	Space for Open - swimming (swimming pool)						
41	Space for Driveway access – (driving car)						
42	Space for walkways – (walking)						
43	Space for Entrance porch - (sitting)						
44	Space for Patio/terrace – (resting)						
45	Space for Flower bed -(planting flower)						
46	Space for Garden/orchard -(gardening)						
47	Space for Spreading of clothes						
48	Space for Sewing clothes (tailoring)						
49	Space for mending shoes						
50	Space for Selling GSM Cards						
51	Space for selling kerosene						
52	Space for grinding mill (grinding spot)						
53	Space for giving children lessons						
54	Space for riding bicycle by children						
55	Space for walking/strolling						
56	Space for entertaining of guest						
57	Space for gas refilling						
58	Space for typing/photocopying						
59	Space for watch repairing						

b. Extent of Modifications and Re-adaptations of the Outdoor Spaces

PLEASE RATE THE EXTENT EACH OF THESE UNDER LISTED MODIFICATIONS AND RE-ADAPTATIONS OF OUTDOOR SPACES HAVE TAKEN PLACE IN YOUR HOUSING ESTATES

S/N	Extent of Modifications and Re-adaptations of the Outdoor Spaces	Very High	High	Moderate	Low	Very Low.	Not At All
1	Increasing perimeter fence height for privacy of residence						
2	Planting trees and herbs as shield from neighbourhoods						
3	Providing hedges around house						
4	Resurfacing compound with cement screed/interlocking stones						
5	Grassing/landscaping the compound						
6	Building gatehouse (where they are unavailable)						
7	Extending eaves of buildings to protect exposed balconies/verandah						
8	Screening balconies/verandahs with temporary structures (e.g. sun baffles or screen walls)						
9	Converting your gatehouse for other outdoor activities (where they are available)						
10	.Converting sit-outs for other purposes						
11	Converting car pot for other purposes e.g. for private lessons or storage						
12	Extending your building roof to have additional shaded						

	outdoor spaces						
13	Converting the entire bungalow to storey building thereby reducing the outdoor spaces						
14	Creating space for basketball games in compound,						
15	15.Creating space for table tennis games in compound						
16	Erecting pet house.						
17	Gardening for orchards						
18	Grassing/landscaping						
19	Creating space for water storage,						
20	Creating space for garbage collection,						
21	Creating space for outdoor recreation,						
22	Creating space for outdoor cooking,						
23	Creating space for outdoor resting,						
24	Creating space for additional car parking,						
25	Creating space for sewing of clothes, (tailoring)						
26	Creating space for small scale shopping,						
27	Attaching covered walkway,						
28	Creating space for volleyball,						
29	Creating own swimming pool,						
30	Making own entrance porch,						
31	Making flower bed around the house,						

32	Creating space for small scale poultry,						
33	Creating space for mending shoes,						
34	Creating space for selling GSM cards,						
35	Creating space for selling kerosene,						
36	Creating space for grinding mill,						
37	Creating space for gas refilling,						
38	Creating space for typing/photocopying,						
39	Creating space for watch repairing,						
40	Reconstructing drainage channel						
41	Creating space for generator house						
42	Creating space for gatehouse						
43	Creating space for security house						
44	Creating space for selling water						
45	Provision of outdoor lighting						
46	Provision of outdoor steps						
47	Provision of outdoor of garden lights						
48	Provision of outdoor garden sprinkler						
49	Provision of outdoor bike racks						
50	Provision of shades from weather elements						
51	Provision of outdoor signage						
52	Provision of outdoor water fountains						

Appendix II: TESTING OF HYPOTHESES

Extent of modifications and re-adaptations of the outdoor spaces in the housing estates.

OBJECTIVE ONE

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.723
	Approx. Chi-Square	4601.386
Bartlett's Test of Sphericity	df	1326
	Sig.	.000

Communalities

	Initial	Extraction
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	1.000	.795
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	1.000	.697
PROVIDING HEDGES AROUND HOUSE	1.000	.642
RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	1.000	.829
GRASSING/LANDSCAPING THE COMPOUND	1.000	.702
BUILDING GATEHOUSE	1.000	.835

EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAH	1.000	.759
SCREENING BALCONIES/VERANDAS	1.000	.850
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	1.000	.762
CONVERTING SIT-OUTS FOR OTHER PURPOSES	1.000	.752
CONVERTING CAR PORT FOR OTHER PURPOSES	1.000	.702
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	1.000	.755
CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THEREBY REDUCING THE OUTDOOR SPACES	1.000	.853
CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	1.000	.728
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	1.000	.785
ERECTING PET HOUSE	1.000	.690
GARDENING FOR ORCHARDS	1.000	.679
GRASSING/LANDSCAPING	1.000	.841
CREATING SPACE FOR WATER STORAGE	1.000	.812
CREATING SPACE FOR GARBAGE COLLECTION	1.000	.812

CREATING SPACE FOR OUTDOOR RECREATION	1.000	.761
CREATING SPACE FOR OUTDOOR COOKING	1.000	.745
CREATING SPACE FOR OUTDOOR RESTING	1.000	.751
CREATING SPACE FOR ADDITIONAL CAR PARKING	1.000	.785
CREATING SPACE FOR SEWING OF CLOTHES	1.000	.767
CREATING SPACE FOR SMALL SCALE SHOPPING	1.000	.769
ATTACHING COVERED WALKWAY	1.000	.759
CREATING SPACE FOR VOLLEYBALL	1.000	.857
CREATING OWN SWIMMING POOL	1.000	.783
MAKING OWN ENTRANCE PORCH	1.000	.747
MAKING FLOWER BED AROUND THE HOUSE	1.000	.804
CREATING SPACE FOR SMALL SCALE POULTRY	1.000	.804
CREATING SPACE FOR MENDING SHOES	1.000	.776
CREATING SPACE FOR SELLING GSM CARDS	1.000	.754
CREATING SPACE FOR SELLING KEROSENE	1.000	.818
CREATING SPACE FOR GRINDING MILL	1.000	.865
CREATING SPACE FOR GAS REFILLING	1.000	.761

CREATING SPACE FOR TYPING/PHOTOCOPYING	1.000	.708
CREATING SPACE FOR WATCH REPAIRING	1.000	.698
RECONSTRUCTING DRAINAGE CHANNEL	1.000	.608
CREATING SPACE FOR GENERATOR HOUSE	1.000	.690
CREATING SPACE FOR GATE HOUSE	1.000	.846
CREATING SPACE FOR SECURITY HOUSE	1.000	.785
CREATING SPACE FOR SELLING WATER	1.000	.751
PROVISION OF OUTDOOR LIGHTING	1.000	.711
PROVISION OF OUTDOOR STEPS	1.000	.824
PROVISION OF OUTDOOR GARDEN LIGHTS	1.000	.835
PROVISION OF OUTDOOR GARDEN SPRINKLER	1.000	.808
PROVISION OF OUTDOOR BIKE RACKS	1.000	.806
PROVISION OF SHADES FROM WEATHER	1.000	.782
PROVISION OF OUTDOOR SIGNAGE	1.000	.732
PROVISION OF OUTDOOR WATER FOUNTAINS	1.000	.807

Extraction Method: Principal Component Analysis.

Total Variance Explained

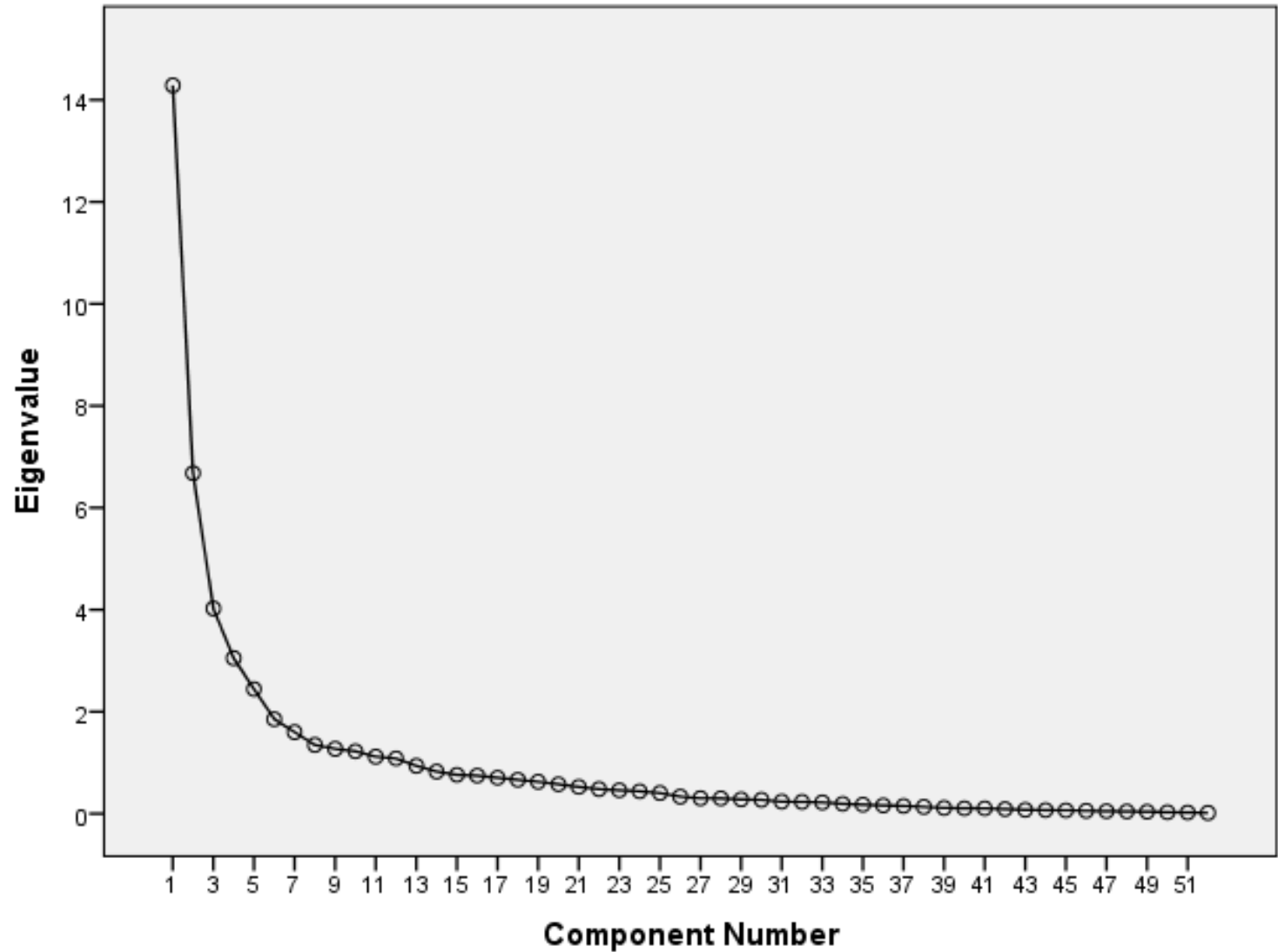
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.284	27.469	27.469	14.284	27.469	27.469	7.592	14.599	14.599
2	6.680	12.846	40.315	6.680	12.846	40.315	5.461	10.501	25.100
3	4.025	7.740	48.055	4.025	7.740	48.055	5.405	10.395	35.495
4	3.051	5.868	53.923	3.051	5.868	53.923	4.386	8.435	43.930
5	2.444	4.701	58.624	2.444	4.701	58.624	4.304	8.277	52.207
6	1.853	3.564	62.188	1.853	3.564	62.188	2.794	5.374	57.581
7	1.600	3.076	65.265	1.600	3.076	65.265	1.832	3.522	61.104
8	1.348	2.592	67.857	1.348	2.592	67.857	1.794	3.450	64.554
9	1.272	2.446	70.302	1.272	2.446	70.302	1.752	3.370	67.924
10	1.223	2.352	72.654	1.223	2.352	72.654	1.664	3.200	71.124
11	1.118	2.151	74.805	1.118	2.151	74.805	1.616	3.108	74.232
12	1.083	2.082	76.887	1.083	2.082	76.887	1.381	2.655	76.887
13	.939	1.806	78.693						
13	.939	1.806	78.693						
14	.826	1.588	80.281						
15	.762	1.465	81.746						

16	.747	1.436	83.182						
17	.704	1.353	84.535						
18	.665	1.278	85.814						
19	.625	1.203	87.017						
20	.576	1.108	88.125						
21	.525	1.010	89.135						
22	.482	.926	90.061						
23	.458	.880	90.941						
24	.440	.846	91.787						
25	.404	.778	92.564						
26	.333	.641	93.205						
27	.303	.583	93.788						
28	.299	.575	94.363						
29	.280	.539	94.902						
30	.272	.523	95.425						
31	.236	.454	95.879						
32	.230	.443	96.322						
33	.220	.423	96.745						
34	.193	.370	97.116						

35	.175	.337	97.452						
36	.162	.312	97.764						
37	.151	.290	98.054						
38	.133	.256	98.310						
39	.113	.217	98.527						
40	.104	.201	98.728						
41	.103	.199	98.927						
42	.091	.174	99.101						
43	.076	.146	99.247						
44	.070	.134	99.381						
45	.066	.126	99.508						
46	.056	.108	99.616						
47	.050	.096	99.712						
48	.044	.085	99.796						
49	.039	.074	99.870						
50	.027	.052	99.923						
51	.025	.047	99.970						
52	.016	.030	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	.533	-.305	.347	.091	.347	-.088	-.099	-.264	.234	-.149	.007	-.060
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	.468	.163	.547	.170	-.033	.195	-.086	-.075	.016	-.265	.002	.021
PROVIDING HEDGES AROUND HOUSE	.618	-.210	.118	.358	.143	-.140	.085	.066	-.016	.098	.049	.103
RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	.156	.091	.528	-.120	.437	.135	.336	-.195	-.245	-.098	-.253	.100
GRASSING/LANDSCAPING THE COMPOUND	.276	.584	.367	.068	.049	.142	.051	.039	-.097	.177	.059	.272
BUILDING GATEHOUSE	.690	.095	.054	-.405	.261	-.068	-.299	.096	-.014	.003	.033	-.103

EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAS	.637	.007	.208	.269	.273	-.069	-.264	-.025	-.011	.292	.006	.046
SCREENING BALCONIES/VERANDAS	.430	.323	-.127	.229	-.142	-.005	-.225	-.261	-.209	.552	.050	-.048
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	.632	-.137	.123	-.304	.060	-.139	-.350	-.049	-.046	-.042	.267	-.119
CONVERTING SIT-OUTS FOR OTHER PURPOSES	.257	-.595	.226	.322	.113	-.027	.147	-.025	-.055	-.185	.259	.192
CONVERTING CAR PORT FOR OTHER PURPOSES	.537	-.266	.076	-.025	.463	-.228	-.213	-.061	-.055	.073	.034	-.109
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	.638	.170	.092	.117	-.213	-.392	-.136	-.221	-.126	-.020	.119	.012
CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THERBY REDUCING THE OUTDOOR SPACES	.626	.072	-.103	.153	-.100	-.508	-.151	.138	.164	-.257	-.118	.075

CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	.691	-.156	-.410	.036	-.028	-.021	.055	.060	-.121	.096	.096	.130
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	.584	-.071	-.581	.165	-.043	.015	-.136	-.102	.061	-.044	.041	.188
ERECTING PET HOUSE	.382	-.150	-.173	.039	.400	.506	-.107	.192	-.154	-.045	.004	.023
GARDENING FOR ORCHARDS	.443	.490	.134	.155	-.221	-.186	.092	.164	.013	-.278	-.059	.016
GRASSING/LANDSCAPING	.537	.460	.083	.201	-.129	.178	.007	.251	-.171	.022	.382	-.081
CREATING SPACE FOR WATER STORAGE	.317	.626	.178	-.219	-.289	.148	-.087	.196	.290	.023	.065	.006
CREATING SPACE FOR GARBAGE COLLECTION	.259	.638	.033	-.380	-.342	.073	-.225	.090	.035	-.071	.063	-.032
CREATING SPACE FOR OUTDOOR RECREATION	.661	.460	-.239	-.069	-.114	-.057	-.023	-.027	-.018	.024	.073	.166
CREATING SPACE FOR OUTDOOR COOKING	.692	.077	.144	.182	-.147	-.323	.168	.025	-.056	-.152	-.058	.147
CREATING SPACE FOR OUTDOOR RESTING	.596	.206	.064	.558	-.055	-.041	.036	.039	.007	.062	-.043	-.159
CREATING SPACE FOR ADDITIONAL CAR PARKING	.390	.613	.075	.249	-.065	.046	.173	.174	-.300	.040	-.178	.020

CREATING SPACE FOR SEWING OF CLOTHES	.350	-0.718	-0.076	.226	-0.013	-0.111	.025	.093	-0.080	-0.028	.127	.164
CREATING SPACE FOR SMALL SCALE SHOPPING	.077	-0.630	.223	-0.076	.074	.094	-0.067	.370	-0.158	-0.073	.221	.276
ATTACHING COVERED WALKWAY	.747	.047	-0.148	-0.140	-0.135	.032	-0.002	-0.123	-0.179	-0.156	.108	.234
CREATING SPACE FOR VOLLEYBALL	.761	-0.063	-0.416	.075	-0.137	.031	.127	-0.105	-0.069	-0.077	-0.154	-0.113
CREATING OWN SWIMMING POOL	.678	-0.059	-0.426	-0.033	-0.155	.059	.102	-0.079	-0.160	-0.049	-0.113	-0.229
MAKING OWN ENTRANCE PORCH	.633	.068	.187	.076	.347	.151	-0.257	-0.134	-0.063	-0.050	-0.259	-0.009
MAKING FLOWER BED AROUND THE HOUSE	.451	.425	.270	.354	.217	.186	.059	.125	-0.034	-0.065	.172	-0.293
CREATING SPACE FOR SMALL SCALE POULTRY	.670	-0.315	.029	.188	-0.093	-0.199	.077	.027	.260	-0.024	-0.092	-0.299
CREATING SPACE FOR MENDING SHOES	.312	-0.767	.081	.156	-0.111	.072	.119	-0.016	.027	.108	-0.011	-0.122
CREATING SPACE FOR SELLING GSM CARDS	.355	-0.471	.404	-0.096	-0.319	.140	.107	.253	.164	-0.016	-0.058	-0.084
CREATING SPACE FOR SELLING KEROSENE	.508	-0.512	.455	.002	-0.265	.085	-0.038	.079	.014	.065	-0.008	-0.028

CREATING SPACE FOR GRINDING MILL	.630	-.465	.389	-.111	-.221	.106	-.053	-.055	.032	.039	-.137	.004
CREATING SPACE FOR GAS REFILLING	.562	-.127	.274	-.336	-.342	.144	-.179	-.109	-.112	.010	-.215	.040
CREATING SPACE FOR TYPING/PHOTOCOPYING	.441	-.293	.348	-.281	-.342	.220	-.053	.054	.147	.154	.097	.033
CREATING SPACE FOR WATCH REPAIRING	.452	-.463	.028	-.267	-.114	.149	-.192	-.024	-.140	.116	-.313	.050
RECONSTRUCTING DRAINAGE CHANNEL	.162	.508	.352	.302	-.072	.224	.141	-.080	-.037	-.098	-.123	.038
CREATING SPACE FOR GENERATOR HOUSE	.367	.416	-.036	-.424	.300	-.136	-.123	.109	.059	-.078	-.137	.193
CREATING SPACE FOR GATE HOUSE	.508	.221	-.058	-.461	.381	-.088	.107	.243	-.081	-.169	.006	-.255
CREATING SPACE FOR SECURITY HOUSE	.619	.062	.009	-.364	.263	-.174	.301	.187	-.064	.135	-.008	-.135
CREATING SPACE FOR SELLING WATER	.404	-.310	-.007	-.290	-.087	-.274	.429	.233	-.104	.244	-.122	-.012
PROVISION OF OUTDOOR LIGHTING	.330	.143	.228	-.261	.148	.067	.379	-.248	.177	.225	.350	-.162
PROVISION OF OUTDOOR STEPS	.516	.135	-.143	-.263	.247	.010	.234	-.050	.371	.152	.040	.410

PROVISION OF OUTDOOR GARDEN LIGHTS	.672	.151	-.010	-.152	-.045	.116	.201	-.414	.283	-.141	.101	.010
PROVISION OF OUTDOOR GARDEN SPRINKLER	.664	-.053	-.409	-.045	-.044	.321	.122	-.170	.014	-.177	.115	-.035
PROVISION OF OUTDOOR BIKE RACKS	.666	-.111	-.448	-.076	-.077	.255	.222	-.083	-.068	-.021	-.102	.042
PROVISION OF SHADES FROM WEATHER	.416	.354	.051	.317	.125	-.026	.021	.203	.392	.321	-.234	.106
PROVISION OF OUTDOOR SIGNAGE	.169	-.175	-.391	.342	.201	.397	-.164	.210	.344	-.071	-.100	-.004
PROVISION OF OUTDOOR WATER FOUNTAINS	.623	-.110	-.593	.013	.039	.103	-.029	.177	.033	.027	.035	-.089

Extraction Method: Principal Component Analysis.

a. 12 components extracted.

Rotated Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	.063	.311	.043	.496	.391	.228	.297	-.213	.190	-.023	.248	-.098
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	-.016	.381	.576	.199	.048	.168	.107	-.283	-.001	-.072	.229	.014
PROVIDING HEDGES AROUND HOUSE	.251	.204	.291	.218	.502	.227	.050	.126	.229	.166	.030	.041
RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	-.180	.078	.276	.216	.116	-.115	.182	.149	-.091	-.094	.748	.092
GRASSING/LANDSCAPING THE COMPOUND	-.103	.012	.640	.073	-.201	.003	.131	.032	.060	.216	.168	.373
BUILDING GATEHOUSE	.283	.252	.119	.779	-.182	.078	.080	.108	.018	.048	-.013	.106

EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAS	.133	.196	.330	.479	.260	.113	.030	-.035	.301	.429	.053	.063
SCREENING BALCONIES/VERANDAS	.291	.003	.292	.073	-.134	.052	.054	-.012	.059	.801	-.073	-.015
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	.230	.376	.034	.656	.030	.176	.151	-.043	-.188	.114	-.174	.042
CONVERTING SIT-OUTS FOR OTHER PURPOSES	.066	.266	.050	.031	.792	.090	.082	-.083	-.066	-.124	.020	.066
CONVERTING CAR PORT FOR OTHER PURPOSES	.159	.121	-.039	.687	.342	.105	.067	.067	.099	.174	.086	-.065
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	.262	.161	.296	.252	.031	.594	.102	-.012	-.150	.347	-.041	.012
CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THEREBY REDUCING THE OUTDOOR SPACES	.328	.084	.160	.312	.050	.729	-.142	.051	.208	-.047	-.116	.027

CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	.714	.123	.068	.182	.210	.112	-.005	.198	.049	.167	-.132	.152
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	.776	-.034	-.029	.114	.122	.197	-.052	-.141	.167	.154	-.140	.141
ERECTING PET HOUSE	.433	.072	.182	.349	.209	-.483	-.141	-.074	.133	-.097	.084	.077
GARDENING FOR ORCHARDS	.157	.021	.585	.046	-.212	.492	-.029	.070	.033	-.120	.005	.031
GRASSING/LANDSCAPING	.271	.053	.785	.145	-.074	.001	.097	.044	-.084	.109	-.296	.075
CREATING SPACE FOR WATER STORAGE	.033	.199	.470	.075	-.624	.125	.188	-.021	.149	-.055	-.194	.203
CREATING SPACE FOR GARBAGE COLLECTION	.116	.120	.333	.150	-.735	.149	.048	-.048	-.149	.008	-.177	.176
CREATING SPACE FOR OUTDOOR RECREATION	.541	-.021	.360	.204	-.281	.292	.114	.070	.036	.188	-.061	.273
CREATING SPACE FOR OUTDOOR COOKING	.304	.220	.394	.132	.176	.585	.035	.184	.033	.038	.110	.094
CREATING SPACE FOR OUTDOOR RESTING	.295	.067	.597	.065	.176	.278	.010	-.003	.285	.241	-.014	-.228
CREATING SPACE FOR ADDITIONAL CAR PARKING	.197	-.116	.731	-.017	-.214	.129	-.144	.226	.047	.162	.187	.039

CREATING SPACE FOR SEWING OF CLOTHES	.290	.328	-.171	.054	.702	.111	-.119	.068	.012	-.001	-.133	.042
CREATING SPACE FOR SMALL SCALE SHOPPING	-.083	.417	-.101	.150	.535	-.202	-.206	.088	-.135	-.226	-.164	.284
ATTACHING COVERED WALKWAY	.634	.246	.217	.232	.008	.247	.081	.004	-.196	.074	.059	.283
CREATING SPACE FOR VOLLEYBALL	.833	.162	.120	.107	.038	.228	.021	.120	.076	.090	.074	-.155
CREATING OWN SWIMMING POOL	.791	.158	.082	.133	-.041	.124	.005	.168	-.045	.096	.022	-.225
MAKING OWN ENTRANCE PORCH	.261	.212	.296	.542	.052	.032	-.046	-.174	.207	.153	.387	-.014
MAKING FLOWER BED AROUND THE HOUSE	.079	-.053	.788	.277	.044	-.037	.180	-.048	.130	.011	.005	-.205
CREATING SPACE FOR SMALL SCALE POULTRY	.354	.400	.081	.210	.263	.377	.152	.128	.296	-.005	-.076	-.352
CREATING SPACE FOR MENDING SHOES	.211	.544	-.195	-.045	.564	-.040	.045	.093	.081	.035	-.028	-.238
CREATING SPACE FOR SELLING GSM CARDS	.006	.789	.067	-.022	.180	.036	.048	.153	.088	-.215	-.075	-.086
CREATING SPACE FOR SELLING KEROSENE	.053	.821	.108	.107	.317	.095	.036	.055	.010	.040	-.011	-.056

CREATING SPACE FOR GRINDING MILL	.193	.834	.046	.188	.207	.134	.073	.027	.033	.064	.148	-.025
CREATING SPACE FOR GAS REFILLING	.243	.722	.069	.190	-.208	.130	-.029	-.003	-.143	.131	.190	.075
CREATING SPACE FOR TYPING/PHOTOCOPYING	.088	.786	.047	.074	-.021	-.030	.204	.037	-.009	.030	-.119	.125
CREATING SPACE FOR WATCH REPAIRING	.325	.619	-.228	.224	.052	-.061	-.198	.082	.003	.137	.186	.024
RECONSTRUCTING DRAINAGE CHANNEL	-.064	.002	.653	-.152	-.158	.076	.075	-.148	.078	.034	.298	.001
CREATING SPACE FOR GENERATOR HOUSE	.142	-.096	.097	.527	-.390	.154	.022	.145	.103	-.089	.163	.361
CREATING SPACE FOR GATE HOUSE	.283	-.037	.176	.657	-.220	.000	.138	.387	-.058	-.273	.072	-.024
CREATING SPACE FOR SECURITY HOUSE	.295	.125	.150	.480	-.037	.068	.255	.587	.044	-.040	.094	.049
CREATING SPACE FOR SELLING WATER	.216	.334	-.116	.066	.142	.144	.086	.724	.006	-.001	.034	.039
PROVISION OF OUTDOOR LIGHTING	.046	.109	.175	.171	-.037	-.077	.761	.199	-.043	.075	.050	.028
PROVISION OF OUTDOOR STEPS	.369	.030	-.003	.218	-.058	.096	.424	.173	.356	-.028	.116	.525

PROVISION OF OUTDOOR GARDEN LIGHTS	.507	.218	.173	.155	-.117	.251	.582	-.133	.047	-.023	.188	.071
PROVISION OF OUTDOOR GARDEN SPRINKLER	.835	.136	.120	.114	.031	-.032	.221	-.093	-.026	-.065	.010	.001
PROVISION OF OUTDOOR BIKE RACKS	.850	.182	.046	.032	.024	-.028	.086	.141	.055	.014	.116	.042
PROVISION OF SHADES FROM WEATHER	.087	.000	.392	.088	-.093	.165	.061	.110	.716	.193	.014	.111
PROVISION OF OUTDOOR SIGNAGE	.404	-.044	.002	.030	.175	-.261	-.164	-.285	.548	-.177	-.151	-.071
PROVISION OF OUTDOOR WATER FOUNTAINS	.790	.029	.012	.240	.057	-.025	-.054	.135	.200	.015	-.242	-.034

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 21 iterations.

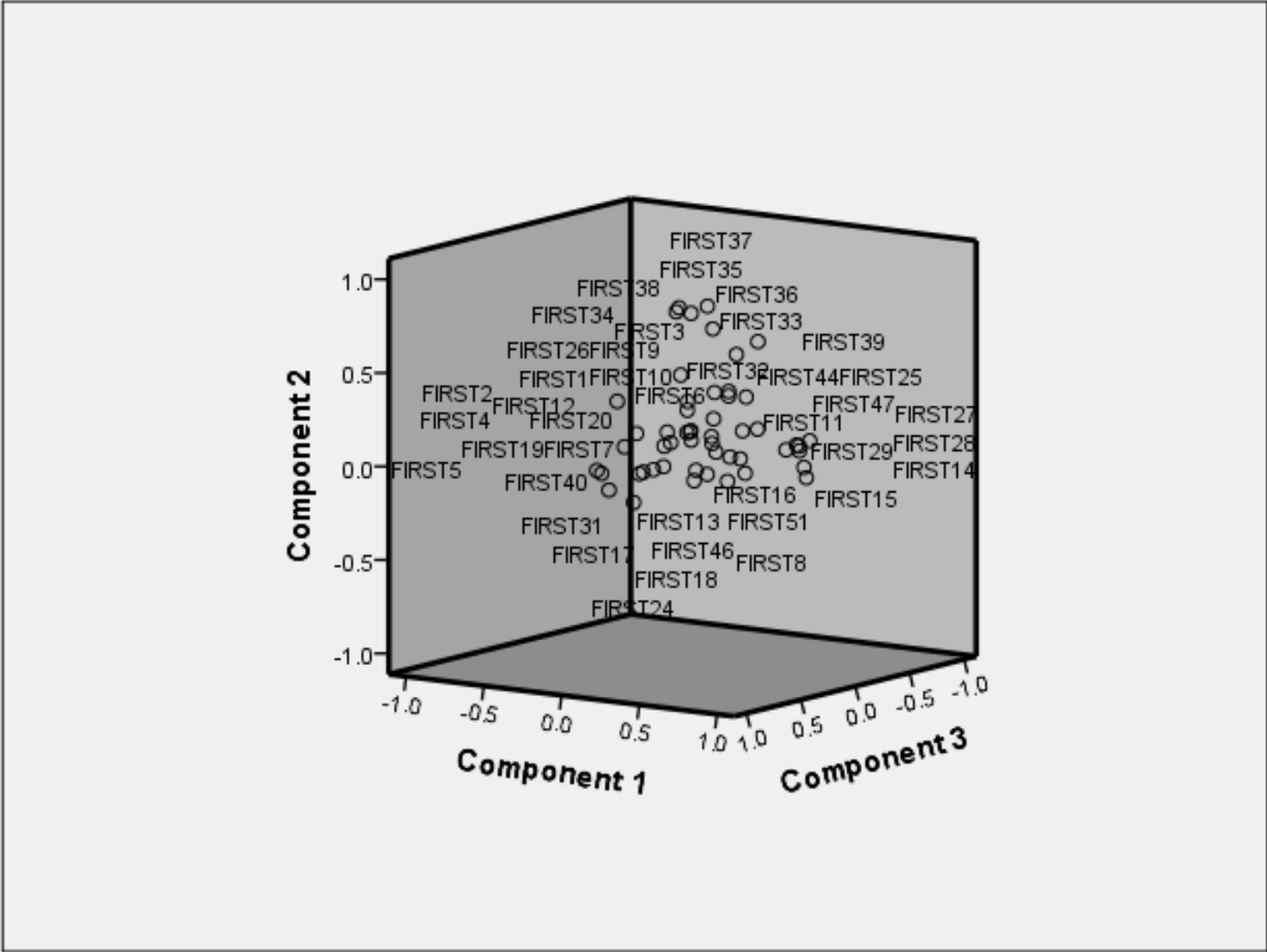
Component Transformation Matrix

Component	1	2	3	4	5	6	7	8	9	10	11	12
1	.614	.393	.361	.425	.093	.268	.152	.117	.131	.129	.051	.062
2	-.063	-.456	.557	.014	-.649	.118	.098	-.029	.030	.104	.046	.137
3	-.697	.489	.377	.119	.104	.071	.162	-.044	-.076	-.025	.263	.017
4	.004	-.238	.432	-.327	.531	.145	-.209	-.288	.327	.214	-.054	-.255
5	-.109	-.469	-.041	.616	.308	-.318	.112	.035	.243	-.100	.322	.066
6	.252	.249	.237	-.199	-.121	-.774	.041	-.348	.069	-.137	.130	.041
7	.121	-.125	.137	-.461	.190	-.012	.447	.579	-.026	-.294	.281	-.028
8	-.119	.082	.267	.098	.005	-.165	-.470	.454	.247	-.397	-.461	.119
9	-.091	.097	-.210	-.056	-.155	.186	.442	-.246	.697	-.288	-.226	.021
10	-.140	.095	-.096	-.075	-.044	-.308	.146	.380	.308	.755	-.148	.086
11	-.037	-.137	.164	.093	.278	-.117	.473	-.141	-.398	.003	-.641	.200
12	.021	-.007	-.054	-.197	.171	.132	-.149	-.110	.068	.027	.168	.918

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



OBJECTIVE TWO

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.723
	Approx. Chi-Square	4594.842
Bartlett's Test of Sphericity	df	1326
	Sig.	.000

Communalities

	Initial	Extraction
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	1.000	.849
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	1.000	.855
PROVIDING HEDGES AROUND HOUSE	1.000	.845

RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	1.000	.678
GRASSING/LANDSCAPING THE COMPOUND	1.000	.822
BUILDING GATEHOUSE	1.000	.761
EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAH	1.000	.829
SCREENING BALCONIES/VERANDAS	1.000	.738
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	1.000	.759
CONVERTING SIT-OUTS FOR OTHER PURPOSES	1.000	.762
CONVERTING CAR PORT FOR OTHER PURPOSES	1.000	.798
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	1.000	.834

CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THERBY REDUCING THE OUTDOOR SPACES	1.000	.819
CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	1.000	.800
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	1.000	.790
ERECTING PET HOUSE	1.000	.764
GARDENING FOR ORCHARDS	1.000	.838
GRASSING/LANDSCAPING	1.000	.782
CREATING SPACE FOR WATER STORAGE	1.000	.736
CREATING SPACE FOR GARBAGE COLLECTION	1.000	.833
CREATING SPACE FOR OUTDOOR RECREATION	1.000	.785
CREATING SPACE FOR OUTDOOR COOKING	1.000	.678
CREATING SPACE FOR OUTDOOR RESTING	1.000	.770

CREATING SPACE FOR ADDITIONAL CAR PARKING	1.000	.766
CREATING SPACE FOR SEWING OF CLOTHES	1.000	.768
CREATING SPACE FOR SMALL SCALE SHOPPING	1.000	.757
ATTACHING COVERED WALKWAY	1.000	.734
CREATING SPACE FOR VOLLEYBALL	1.000	.848
CREATING OWN SWIMMING POOL	1.000	.738
MAKING OWN ENTRANCE PORCH	1.000	.755
MAKING FLOWER BED AROUND THE HOUSE	1.000	.713
CREATING SPACE FOR SMALL SCALE POULTRY	1.000	.758
CREATING SPACE FOR MENDING SHOES	1.000	.866
CREATING SPACE FOR SELLING GSM CARDS	1.000	.796
CREATING SPACE FOR SELLING KEROSENE	1.000	.833

CREATING SPACE FOR GRINDING MILL	1.000	.908
CREATING SPACE FOR GAS REFILLING	1.000	.791
CREATING SPACE FOR TYPING/PHOTOCOPYING	1.000	.717
CREATING SPACE FOR WATCH REPAIRING	1.000	.634
RECONSTRUCTING DRAINAGE CHANNEL	1.000	.619
CREATING SPACE FOR GENERATOR HOUSE	1.000	.698
CREATING SPACE FOR GATE HOUSE	1.000	.733
CREATING SPACE FOR SECURITY HOUSE	1.000	.817
CREATING SPACE FOR SELLING WATER	1.000	.629
PROVISION OF OUTDOOR LIGHTING	1.000	.784
PROVISION OF OUTDOOR STEPS	1.000	.693
PROVISION OF OUTDOOR GARDEN LIGHTS	1.000	.730

Total Variance Explained

PROVISION OF OUTDOOR GARDEN SPRINKLER	1.000	.758
PROVISION OF OUTDOOR BIKE RACKS	1.000	.840
PROVISION OF SHADES FROM WEATHER	1.000	.673
PROVISION OF OUTDOOR SIGNAGE	1.000	.631
PROVISION OF OUTDOOR WATER FOUNTAINS	1.000	.751

Extraction Method: Principal Component Analysis.

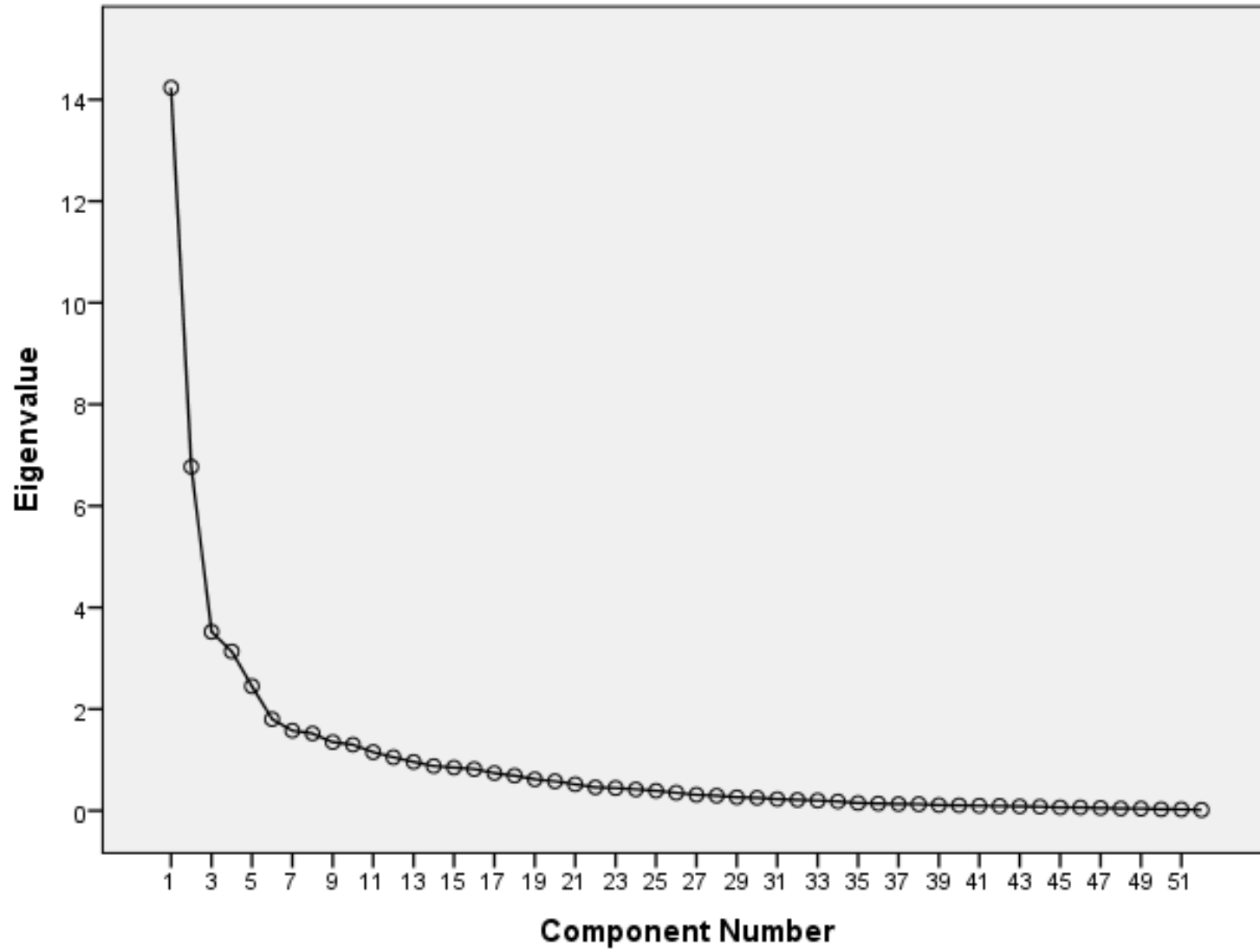
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.233	27.372	27.372	14.233	27.372	27.372	6.555	12.606	12.606
2	6.770	13.020	40.392	6.770	13.020	40.392	6.314	12.143	24.749
3	3.523	6.775	47.167	3.523	6.775	47.167	4.773	9.179	33.928
4	3.136	6.031	53.199	3.136	6.031	53.199	3.435	6.605	40.533
5	2.451	4.714	57.912	2.451	4.714	57.912	3.292	6.330	46.863
6	1.801	3.464	61.377	1.801	3.464	61.377	2.766	5.319	52.182
7	1.575	3.029	64.406	1.575	3.029	64.406	2.612	5.024	57.206
8	1.520	2.922	67.328	1.520	2.922	67.328	2.562	4.927	62.133
9	1.350	2.597	69.925	1.350	2.597	69.925	2.146	4.127	66.260
10	1.299	2.498	72.423	1.299	2.498	72.423	2.126	4.088	70.348
11	1.153	2.218	74.641	1.153	2.218	74.641	1.809	3.479	73.827
12	1.051	2.021	76.662	1.051	2.021	76.662	1.474	2.835	76.662
13	.961	1.848	78.509						
14	.878	1.689	80.198						
15	.849	1.633	81.831						
16	.819	1.576	83.407						
17	.740	1.423	84.830						

18	.690	1.327	86.157					
19	.619	1.190	87.347					
20	.580	1.115	88.462					
21	.519	.998	89.460					
22	.460	.885	90.344					
23	.446	.857	91.202					
24	.419	.807	92.008					
25	.392	.755	92.763					
26	.355	.682	93.445					
27	.312	.601	94.045					
28	.295	.567	94.613					
29	.265	.510	95.123					
30	.253	.487	95.609					
31	.229	.441	96.050					
32	.214	.411	96.461					
33	.199	.383	96.844					
34	.181	.349	97.193					
35	.151	.290	97.482					
36	.143	.274	97.757					

37	.131	.253	98.009					
38	.127	.245	98.254					
39	.111	.214	98.468					
40	.106	.204	98.672					
41	.098	.188	98.860					
42	.093	.178	99.038					
43	.085	.164	99.202					
44	.078	.149	99.352					
45	.065	.125	99.477					
46	.063	.120	99.597					
47	.054	.104	99.701					
48	.045	.086	99.787					
49	.041	.079	99.866					
50	.029	.055	99.921					
51	.025	.049	99.969					
52	.016	.031	100.000					

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	.322	.136	.543	-.125	-.040	-.532	.043	-.151	.075	.271	-.049	-.162
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	.461	-.344	.497	-.194	.171	-.123	.088	-.077	-.201	.372	.038	.039
PROVIDING HEDGES AROUND HOUSE	.406	-.086	.603	-.293	-.074	.100	.131	-.039	-.246	.220	.281	-.038
RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	.185	-.332	.518	.241	-.049	.155	.092	.281	.024	-.250	-.127	.118
GRASSING/LANDSCAPING THE COMPOUND	.295	-.601	.098	.084	.254	-.012	.252	.108	-.281	.010	.159	.335
BUILDING GATEHOUSE	.628	-.167	.152	-.112	-.383	-.265	-.023	.122	.069	.023	.168	.196

EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAS	.583	.006	.553	-.073	-.242	-.034	.177	-.253	.044	-.051	-.139	-.002
SCREENING BALCONIES/VERANDAS	.591	-.342	-.157	-.144	-.202	.284	.074	-.031	-.039	-.153	-.269	-.017
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	.609	.072	.097	-.218	-.189	-.153	-.414	.305	.008	-.018	-.054	.002
CONVERTING SIT-OUTS FOR OTHER PURPOSES	.135	.356	.564	-.340	.114	-.109	-.138	.301	.088	-.133	.087	.123
CONVERTING CAR PORT FOR OTHER PURPOSES	.555	.207	.041	-.389	-.383	-.106	.037	.038	.182	-.279	-.127	-.086
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	.774	-.188	.102	-.208	-.261	.154	-.093	-.121	-.137	-.085	.024	-.064
CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THEREBY REDUCING THE OUTDOOR SPACES	.619	.219	-.013	-.177	-.156	-.155	.133	-.182	-.059	-.252	.390	-.194

CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	.675	.379	-.201	-.293	.058	.102	.073	.199	.037	-.080	-.078	-.031
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	.652	.181	-.372	-.334	.087	-.079	.008	.079	.076	-.106	.104	-.186
ERECTING PET HOUSE	.449	-.080	-.040	-.442	.068	.235	-.206	.360	.261	.199	-.054	.125
GARDENING FOR ORCHARDS	.530	-.521	.067	-.100	.114	.203	-.092	-.030	.237	-.121	.354	-.109
GRASSING/LANDSCAPING	.648	-.452	.102	.063	.224	.195	-.030	.111	.056	.144	-.049	.125
CREATING SPACE FOR WATER STORAGE	.565	-.384	.072	.373	-.025	.082	-.108	-.016	.271	.090	.148	.047
CREATING SPACE FOR GARBAGE COLLECTION	.568	-.430	-.186	.399	-.147	.106	-.187	.166	.085	-.070	.152	.038
CREATING SPACE FOR OUTDOOR RECREATION	.696	-.364	-.167	.138	-.097	.040	-.062	.105	-.229	-.147	.022	-.141
CREATING SPACE FOR OUTDOOR COOKING	.736	.049	.159	.069	.101	.011	.053	-.235	-.001	-.180	.054	-.013
CREATING SPACE FOR OUTDOOR RESTING	.584	-.294	.225	-.209	.322	.161	-.086	-.222	-.101	-.201	-.081	.065
CREATING SPACE FOR ADDITIONAL CAR PARKING	.384	-.470	.000	.229	.378	.081	-.024	.073	-.289	-.155	.032	-.286

CREATING SPACE FOR SEWING OF CLOTHES	.132	.720	.047	-.151	.164	.142	.261	.114	-.024	-.037	.154	.231
CREATING SPACE FOR SMALL SCALE SHOPPING	.089	.500	.230	.096	.208	.046	.302	.514	-.157	.060	.091	-.012
ATTACHING COVERED WALKWAY	.705	-.030	-.178	.081	.085	-.232	-.013	.307	-.192	-.045	-.004	-.064
CREATING SPACE FOR VOLLEYBALL	.645	.312	-.392	-.036	-.044	-.083	.154	-.215	-.260	.083	-.143	.082
CREATING OWN SWIMMING POOL	.663	.161	-.262	-.172	-.115	-.083	.063	-.191	-.003	.148	-.096	.287
MAKING OWN ENTRANCE PORCH	.594	-.103	.080	-.053	-.119	-.240	-.197	.052	-.179	-.129	-.459	.102
MAKING FLOWER BED AROUND THE HOUSE	.441	-.427	.204	-.045	.288	.158	-.193	-.045	.010	.265	-.191	-.194
CREATING SPACE FOR SMALL SCALE POULTRY	.541	.403	.123	-.113	.097	.215	-.226	-.264	.125	.156	.121	-.208
CREATING SPACE FOR MENDING SHOES	.150	.791	.192	-.109	.277	.200	-.085	.059	.023	.066	-.099	-.162
CREATING SPACE FOR SELLING GSM CARDS	.277	.537	.262	.350	.166	-.026	.045	.156	.177	-.094	-.140	-.355
CREATING SPACE FOR SELLING KEROSENE	.325	.632	.276	.427	.185	.012	.009	-.100	-.037	-.109	-.058	.091

CREATING SPACE FOR GRINDING MILL	.471	.650	.178	.328	.109	-.003	-.209	-.200	-.034	-.052	.063	.145
CREATING SPACE FOR GAS REFILLING	.497	.443	-.113	.382	.069	-.106	-.329	-.059	-.160	-.008	.153	.110
CREATING SPACE FOR TYPING/PHOTOCOPYING	.412	.348	.113	.389	.036	.195	-.284	-.090	.241	-.008	.024	.275
CREATING SPACE FOR WATCH REPAIRING	.315	.574	.114	.113	-.191	-.092	-.158	.097	-.284	-.109	-.040	.079
RECONSTRUCTING DRAINAGE CHANNEL	.297	-.420	.070	.396	.344	-.199	.040	.030	.040	.032	-.172	-.019
CREATING SPACE FOR GENERATOR HOUSE	.606	-.229	-.230	.188	-.178	-.337	-.068	.072	.015	.182	.041	.017
CREATING SPACE FOR GATE HOUSE	.494	.072	-.114	.326	-.424	-.010	-.037	.125	-.027	.376	.018	-.158
CREATING SPACE FOR SECURITY HOUSE	.428	.193	.052	.384	-.374	.342	.323	.047	-.009	.205	-.183	-.090
CREATING SPACE FOR SELLING WATER	.216	.297	.094	.406	-.414	.288	.221	-.044	.063	.070	.072	.038
PROVISION OF OUTDOOR LIGHTING	.580	-.164	.073	.034	.065	-.120	.393	.047	.469	-.007	-.136	.010
PROVISION OF OUTDOOR STEPS	.572	-.133	-.135	.196	.009	-.249	.380	.067	.159	-.195	.133	-.013

PROVISION OF OUTDOOR GARDEN LIGHTS	.649	-.022	-.278	.254	.255	-.253	-.068	-.118	.128	-.035	.048	.000
PROVISION OF OUTDOOR GARDEN SPRINKLER	.663	.188	-.373	-.024	.180	-.070	.088	.098	-.020	.276	.046	-.099
PROVISION OF OUTDOOR BIKE RACKS	.621	.370	-.399	-.096	.181	.239	.124	.042	-.192	.035	-.040	-.052
PROVISION OF SHADES FROM WEATHER	.684	-.241	.083	-.089	.064	.175	.126	-.222	-.029	-.121	-.122	.039
PROVISION OF OUTDOOR SIGNAGE	.266	.205	-.251	-.128	.524	-.229	.139	-.114	.218	.049	-.099	.140
PROVISION OF OUTDOOR WATER FOUNTAINS	.624	.101	-.364	-.332	-.025	.251	.008	-.025	.053	.127	.058	.146

Extraction Method: Principal Component Analysis.

a. 12 components extracted.

Rotated Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
INCREASING PERIMETER FENCE HEIGHT FOR PRIVACY RESIDENCE	-.015	-.081	.160	.758	.291	-.043	-.095	.008	-.118	.293	.016	.216
PLANTING TREES AND HERBS AS SHIELD FROM NEIGHBOURHOODS	.067	.383	-.062	.803	.070	-.043	.096	.037	.103	.036	-.083	-.139
PROVIDING HEDGES AROUND HOUSE	.007	.135	-.005	.777	.028	.125	.179	.218	.154	-.161	.253	-.117
RESURFACING COMPOUND WITH CEMENT SCREED/INTERLOCKING STONES	-.479	.386	.030	.093	.167	.171	.340	.260	.105	.151	-.026	-.124
GRASSING/LANDSCAPING THE COMPOUND	.008	.616	-.182	.210	-.050	-.069	.109	.101	-.021	.097	-.033	-.571
BUILDING GATEHOUSE	.137	.139	.043	.338	.548	.198	.060	-.076	.199	.234	.289	-.282

EXTENDING EAVES OF BUILDINGS TO PROTECT EXPOSED BALCONIES/VERANDAS	-0.006	.055	.216	.587	.227	.243	.493	-0.004	-.012	.243	.147	.043
SCREENING BALCONIES/VERANDAS	.321	.344	-.176	-.021	.232	.242	.563	-.155	.164	.040	.051	-.028
CONVERTING YOUR GATEHOUSE FOR OTHER OUTDOOR ACTIVITIES	.217	.138	.176	.173	.692	-.007	.055	.050	.350	-.048	.121	.091
CONVERTING SIT-OUTS FOR OTHER PURPOSES	-.161	-.220	.254	.331	.273	-.291	.077	.489	.296	.030	.129	.059
CONVERTING CAR PORT FOR OTHER PURPOSES	.300	-.205	.023	.119	.515	.097	.399	.042	.148	.221	.343	.166
EXTENDING YOUR BUILDING ROOF TO HAVE ADDITIONAL SHADED OUTDOOR SPACES	.322	.316	.062	.323	.345	.211	.446	-.144	.185	-.087	.311	-.028
CONVERTING THE ENTIRE BUNGALOW TO STOREY BUILDING THEREBY REDUCING THE OUTDOOR SPACES	.421	.041	.194	.239	.191	.058	.142	.045	-.113	.107	.676	.031

CREATING SPACE FOR BASKETBALL GAMES IN COMPOUND	.662	.014	.168	-.003	.261	.048	.236	.312	.241	.109	.144	.136
CREATING SPACE FOR TABLE TENNIS GAMES IN COMPOUND	.707	.122	.027	-.019	.246	-.095	.077	.074	.168	.142	.340	.169
ERECTING PET HOUSE	.316	.113	-.099	.100	.232	-.049	.110	.110	.739	.032	-.054	.021
GARDENING FOR ORCHARDS	.058	.579	-.070	.157	-.038	-.034	.183	-.183	.421	.137	.450	-.038
GRASSING/LANDSCAPING	.177	.668	.037	.229	.071	.089	.213	-.024	.371	.157	-.095	-.143
CREATING SPACE FOR WATER STORAGE	-.013	.583	.216	.106	.079	.290	.010	-.251	.283	.283	.127	-.094
CREATING SPACE FOR GARBAGE COLLECTION	.069	.658	.111	-.178	.265	.327	-.002	-.221	.218	.111	.191	-.170
CREATING SPACE FOR OUTDOOR RECREATION	.301	.651	-.022	-.003	.354	.212	.200	-.085	-.009	-.031	.220	-.056
CREATING SPACE FOR OUTDOOR COOKING	.298	.339	.395	.269	.105	.057	.348	-.002	-.012	.204	.262	.018
CREATING SPACE FOR OUTDOOR RESTING	.185	.477	.139	.309	.026	-.262	.536	-.057	.158	.009	.079	-.042
CREATING SPACE FOR ADDITIONAL CAR PARKING	.068	.835	-.058	.029	-.019	-.084	.117	.054	-.129	-.080	.079	.083

CREATING SPACE FOR SEWING OF CLOTHES	.336	-.388	.371	.021	-.155	-.006	.046	.563	.069	.037	.089	-.095
CREATING SPACE FOR SMALL SCALE SHOPPING	.082	-.043	.185	.069	-.011	.127	-.165	.814	-.021	.024	-.038	.035
ATTACHING COVERED WALKWAY	.457	.481	.102	.038	.463	.052	-.040	.194	-.033	.124	.096	-.025
CREATING SPACE FOR VOLLEYBALL	.796	.033	.242	.064	.188	.176	.169	-.041	-.211	.046	-.019	-.081
CREATING OWN SWIMMING POOL	.662	-.028	.209	.167	.244	.127	.191	-.159	.100	.182	-.016	-.216
MAKING OWN ENTRANCE PORCH	.207	.255	.135	.159	.654	-.021	.355	-.074	-.050	.074	-.190	.005
MAKING FLOWER BED AROUND THE HOUSE	.089	.585	-.041	.373	.007	-.036	.167	-.152	.286	-.024	-.202	.217
CREATING SPACE FOR SMALL SCALE POULTRY	.388	.008	.486	.315	-.056	.080	.110	-.044	.277	-.083	.207	.348
CREATING SPACE FOR MENDING SHOES	.260	-.285	.497	.107	-.098	-.052	.044	.461	.132	-.127	-.073	.440
CREATING SPACE FOR SELLING GSM CARDS	.008	.060	.490	.018	.063	.175	-.025	.406	-.093	.233	.018	.536
CREATING SPACE FOR SELLING KEROSENE	.074	-.011	.797	.070	-.014	.131	.082	.318	-.185	.115	-.047	.114

CREATING SPACE FOR GRINDING MILL	.222	-.030	.894	.114	.085	.094	.037	.127	-.054	.011	.062	.065
CREATING SPACE FOR GAS REFILLING	.330	.172	.731	-.047	.232	.092	-.174	.011	-.078	-.091	.090	-.031
CREATING SPACE FOR TYPING/PHOTOCOPIYING	.052	.082	.756	-.062	.042	.200	.065	-.035	.266	.111	-.027	-.027
CREATING SPACE FOR WATCH REPAIRING	.181	-.169	.504	.045	.397	.153	.040	.270	-.152	-.185	.059	.017
RECONSTRUCTING DRAINAGE CHANNEL	-.061	.647	.063	.077	.040	-.050	-.026	-.073	-.116	.334	-.227	-.006
CREATING SPACE FOR GENERATOR HOUSE	.338	.388	.044	.111	.438	.226	-.186	-.245	.004	.247	.065	-.127
CREATING SPACE FOR GATE HOUSE	.264	.183	.138	.120	.316	.657	-.214	-.104	.049	.014	.021	.075
CREATING SPACE FOR SECURITY HOUSE	.176	.087	.178	.059	.017	.814	.197	.140	-.022	.097	-.079	.081
CREATING SPACE FOR SELLING WATER	-.005	-.102	.319	-.020	-.058	.691	.087	.083	-.027	.064	.115	-.047
PROVISION OF OUTDOOR LIGHTING	.203	.257	-.017	.176	.081	.162	.215	.051	.167	.728	.051	.048
PROVISION OF OUTDOOR STEPS	.277	.360	.032	-.001	.153	.156	.055	.079	-.132	.552	.301	-.124

PROVISION OF OUTDOOR GARDEN LIGHTS	.451	.452	.348	-.024	.152	-.053	-.073	-.172	-.039	.358	.097	.015
PROVISION OF OUTDOOR GARDEN SPRINKLER	.751	.261	.132	.085	.113	.128	-.152	.095	.101	.152	.020	.078
PROVISION OF OUTDOOR BIKE RACKS	.804	.149	.215	-.087	.007	.132	.166	.240	.056	-.071	.045	.073
PROVISION OF SHADES FROM WEATHER	.307	.402	.085	.249	.059	.079	.532	-.095	.091	.155	.102	-.059
PROVISION OF OUTDOOR SIGNAGE	.492	.025	.183	.006	-.129	-.373	-.038	.057	.025	.412	-.150	.030
PROVISION OF OUTDOOR WATER FOUNTAINS	.708	.053	.052	.024	.076	.112	.206	-.050	.389	.004	.124	-.117

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 14 iterations.

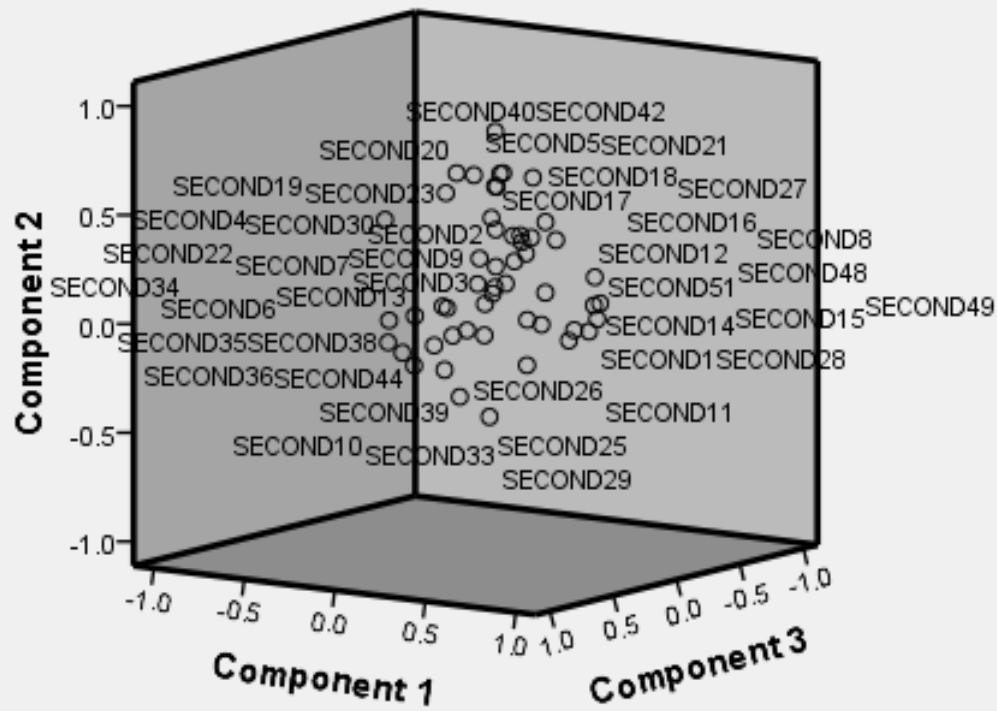
Component Transformation Matrix

Component	1	2	3	4	5	6	7	8	9	10	11	12
1	.537	.447	.300	.274	.346	.199	.267	.023	.180	.212	.195	-.004
2	.286	-.596	.564	-.066	-.006	.063	-.108	.390	-.094	-.069	.020	.243
3	-.624	-.001	.216	.651	.037	-.004	.217	.284	.066	.014	.009	.077
4	-.305	.404	.464	-.291	-.105	.449	-.260	-.054	-.335	.152	-.155	-.028
5	.161	.398	.178	.013	-.450	-.641	-.091	.275	.030	.109	-.246	.115
6	-.003	.091	.033	-.222	-.488	.360	.433	.118	.450	-.408	-.017	.045
7	.164	-.097	-.370	.119	-.375	.298	.177	.395	-.359	.477	.054	-.191
8	-.111	.165	-.260	-.266	.405	.089	-.292	.670	.327	.003	-.090	-.018
9	-.165	-.187	.059	-.157	-.125	.013	-.062	-.217	.532	.694	.094	.264
10	.231	-.047	-.107	.485	-.177	.320	-.515	-.139	.242	-.091	-.460	.003
11	-.021	.063	.084	.111	-.268	-.025	-.453	.053	.133	-.125	.749	-.318
12	-.022	-.192	.266	-.071	.053	-.121	.122	-.008	.208	.124	-.289	-.844

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



OBJECTIVE THREE

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.700
	Approx. Chi-Square	5897.715
Bartlett's Test of Sphericity	df	1711
	Sig.	.000

Communalities

	Initial	Extraction
SPACE FOR GYMNASIUM	1.000	.679
SPACE FOR STROLLING	1.000	.881
SPACE FOR WALKING	1.000	.896
SPACE FOR JOGGING	1.000	.832
SPACE FOR PLAYING BASKETBALL IN COMPOUND	1.000	.762
SPACE FOR PLAYING TABLE TENNIS IN COMPOUND	1.000	.849

SPACE FOR DRYING AND BAKING GARRI	1.000	.878
SPACE FOR BAKING BEANS	1.000	.855
SPACE FOR SMALL SCALE POULTRY	1.000	.823
SPACE FOR BICYCLE RIDING BY CHILDREN	1.000	.785
SPACE FOR CLEANING COMPOUND	1.000	.693
SPACE FOR TENDING TO PETS	1.000	.724
SPACE FOR OUTDOOR WASHING/LAUNDRY	1.000	.746
SPACE FOR SMALL SCALE GARDENING	1.000	.720
SPACE FOR GRASSING/TREE PLANTING	1.000	.886
SPACE FOR TENDING TO KIDS	1.000	.756
SPACE FOR READING BY CHILDREN	1.000	.793
SPACE FOR WATER STORAGE	1.000	.801

SPACE FOR GARBAGE COLLECTION AND DISPOSAL	1.000	.825
SPACE FOR OUTDOOR RECREATION	1.000	.734
SPACE FOR OUTDOOR COOKING/DINING	1.000	.792
SPACE FOR OUTDOOR FAMILY MEETING	1.000	.844
SPACE FOR OUTDOOR RESTING	1.000	.776
SPACE FOR OUTDOOR PLAYING BY ADULT	1.000	.650
SPACE FOR OUTDOOR PLAYING BY CHILDREN	1.000	.705
SPACE FOR PARKING	1.000	.852
SPACE FOR SPREADING CLOTHES	1.000	.764
SPACE FOR ENTERTAINMENT OF GUEST	1.000	.782
SPACE FOR OUTDOOR SEWING CLOTHES	1.000	.817
SPACE FOR OUTDOOR SMALL SCALE SHOPPING	1.000	.714

SPACE FOR RAMP FOR DISABLED PEOPLE	1.000	.786
SPACE FOR INDOOR- OUTDOOR LINKAGE	1.000	.755
SPACE FOR FIRE PROTECTION GADGET	1.000	.762
SPACE FOR HOUSE FOR DOMESTIC PETS	1.000	.818
SPACE FOR POULTRY HOUSE	1.000	.873
SPACE FOR CHILDREN PLAY AREA	1.000	.654
SPACE FOR TENNIS BALL	1.000	.795
SPACE FOR VOLLEY BALL	1.000	.784
SPACE FOR SNOOKER BOARD GAMES	1.000	.803
SPACE FOR OPEN- SWIMMING	1.000	.700
SPACE FOR DRIVEWAY ACCESS	1.000	.742
SPACE FOR WALKWAYS	1.000	.864
SPACE FOR ENTRANCE PORCH	1.000	.652

SPACE FOR PATIO/TERRACE	1.000	.697
SPACE FOR FLOWER BED	1.000	.794
SPACE FOR GARDEN/ORCHARD	1.000	.848
SPACE FOR SPREADING OF CLOTHES	1.000	.702
SPACE FOR SEWING CLOTHES	1.000	.820
SPACE FOR MENDING SHOES	1.000	.820
SPACE FOR SELLING GSM CARDS	1.000	.798
SPACE FOR SELLING KEROSENE	1.000	.870
SPACE FOR GRINDING MILL	1.000	.778
SPACE FOR GIVING CHILDREN LESSONS	1.000	.807
SPACE FOR RIDING BICYCLE BY CHILDREN	1.000	.814
SPACE FOR WALKING/STROLLING	1.000	.807

SPACE FOR ENTERTAINING OF GUEST	1.000	.716
SPACE FOR GAS REFILLING	1.000	.702
SPACE FOR TYPING/PHOTOCOPYING	1.000	.670
SPACE FOR WATCH REPAIRING	1.000	.817

Extraction Method: Principal Component Analysis.

Total Variance Explained

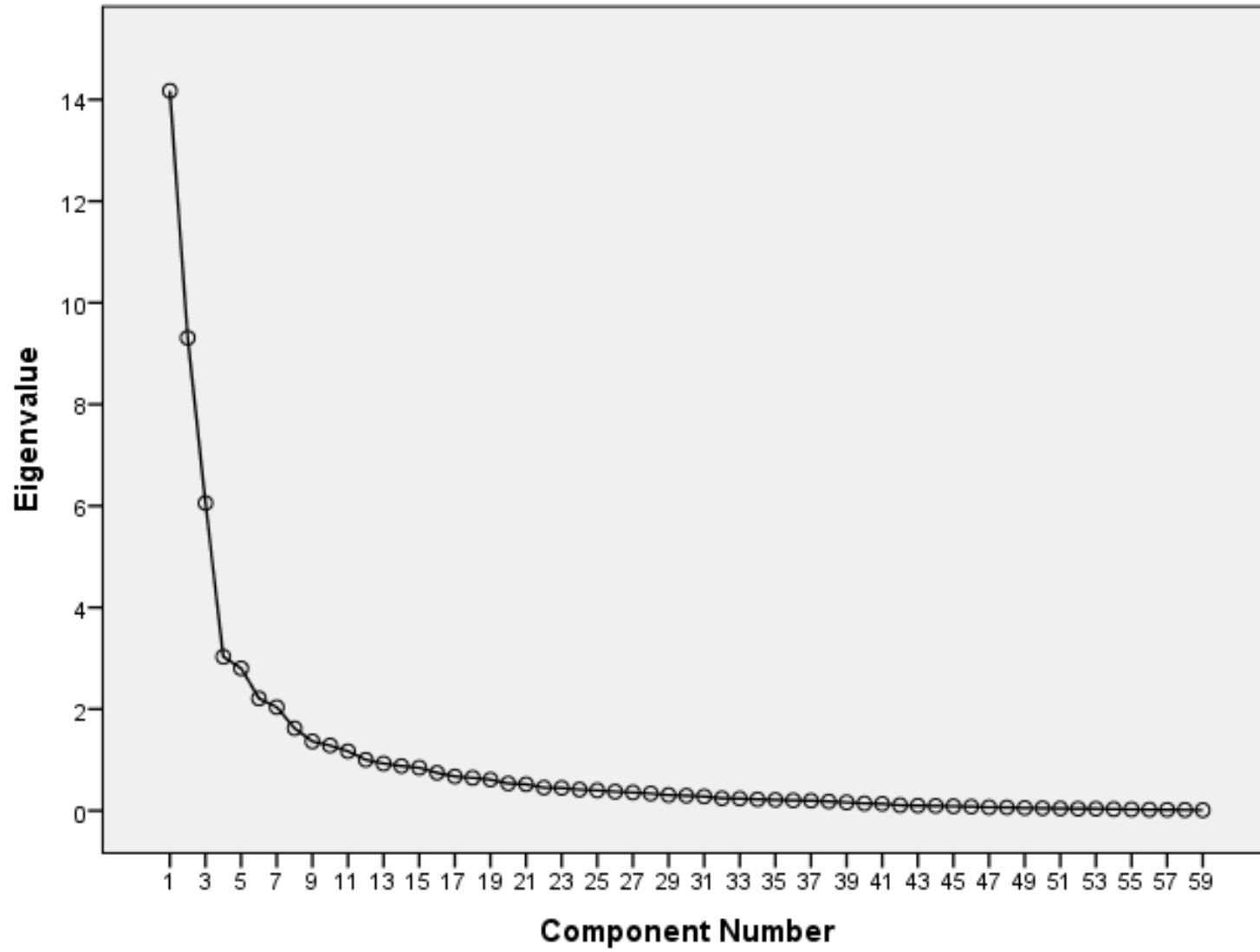
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.172	24.020	24.020	14.172	24.020	24.020	11.256	19.078	19.078
2	9.310	15.779	39.799	9.310	15.779	39.799	8.483	14.377	33.455
3	6.057	10.266	50.064	6.057	10.266	50.064	6.100	10.340	43.795
4	3.030	5.136	55.201	3.030	5.136	55.201	2.841	4.815	48.610
5	2.803	4.751	59.951	2.803	4.751	59.951	2.607	4.419	53.029
6	2.210	3.746	63.697	2.210	3.746	63.697	2.509	4.252	57.282
7	2.037	3.453	67.150	2.037	3.453	67.150	2.489	4.219	61.500
8	1.623	2.750	69.900	1.623	2.750	69.900	2.482	4.206	65.707
9	1.364	2.311	72.211	1.364	2.311	72.211	2.201	3.731	69.437
10	1.283	2.175	74.386	1.283	2.175	74.386	2.049	3.472	72.909
11	1.171	1.985	76.371	1.171	1.985	76.371	1.786	3.028	75.937
12	1.002	1.699	78.070	1.002	1.699	78.070	1.259	2.133	78.070
13	.928	1.572	79.642						
14	.880	1.492	81.135						
15	.846	1.434	82.568						
16	.746	1.265	83.833						
17	.674	1.143	84.976						

18	.646	1.094	86.070
19	.611	1.036	87.106
20	.536	.909	88.015
21	.521	.882	88.897
22	.452	.766	89.663
23	.448	.760	90.423
24	.415	.704	91.127
25	.400	.679	91.805
26	.374	.635	92.440
27	.359	.608	93.048
28	.338	.573	93.621
29	.308	.522	94.143
30	.296	.502	94.644
31	.280	.475	95.119
32	.243	.411	95.530
33	.238	.404	95.934
34	.222	.377	96.311
35	.214	.363	96.674
36	.202	.342	97.016
37	.196	.332	97.348
38	.182	.308	97.656

39	.163	.277	97.933					
40	.144	.245	98.178					
41	.135	.229	98.406					
42	.107	.181	98.587					
43	.100	.169	98.757					
44	.094	.159	98.915					
45	.087	.148	99.063					
46	.079	.134	99.198					
47	.066	.112	99.309					
48	.064	.108	99.418					
49	.053	.089	99.507					
50	.049	.083	99.590					
51	.043	.073	99.663					
52	.039	.067	99.730					
53	.037	.063	99.793					
54	.031	.052	99.845					
55	.026	.043	99.888					
56	.021	.036	99.924					
57	.019	.032	99.955					
58	.015	.026	99.981					
59	.011	.019	100.000					

Extraction Method: Principal Component Analysis.

Scree Plot



Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
SPACE FOR GYMNASIUM	.302	.364	-.449	-.110	.276	-.074	.161	.255	.076	-.209	.010	.143
SPACE FOR STROLLING	.607	.371	-.451	-.162	-.023	-.280	.112	-.177	.087	.043	-.109	.024
SPACE FOR WALKING	.604	.351	-.347	-.209	-.251	-.270	.066	-.192	.040	.153	-.170	.118
SPACE FOR JOGGING	.460	.376	-.623	-.009	.109	-.182	.099	-.122	-.006	.020	-.047	.136
SPACE FOR PLAYING BASKETBALL IN COMPOUND	.252	.590	-.461	-.203	.151	.082	.058	.204	.095	.080	-.070	.036
SPACE FOR PLAYING TABLE TENNIS IN COMPOUND	.373	.628	-.014	-.338	-.033	-.014	-.098	.282	-.189	.069	-.186	.188
SPACE FOR DRYING AND BAKING GARRI	-.054	.384	.184	-.031	.594	.151	.112	-.311	.063	.350	.222	.180
SPACE FOR BAKING BEANS	-.018	.387	.394	-.046	.709	.080	.033	-.034	.074	.012	.169	.046
SPACE FOR SMALL SCALE POULTRY	.020	.490	.424	-.016	.279	.437	.102	-.186	-.098	-.127	-.213	.130
SPACE FOR BICYCLE RIDING BY CHILDREN	.574	.320	-.259	.131	-.030	.165	.285	-.226	.128	-.212	.045	.213

SPACE FOR CLEANING COMPOUND	.460	-.005	.218	-.383	.121	-.215	.327	.001	.085	.106	-.318	-.020
SPACE FOR TENDING TO PETS	.260	.291	.225	-.547	-.289	-.001	.178	.115	.298	.067	.007	-.035
SPACE FOR OUTDOOR WASHING/LAUNDRY	.418	-.167	.586	-.336	-.244	.017	-.011	.154	-.036	-.014	-.038	.011
SPACE FOR SMALL SCALE GARDENING	.528	-.368	.269	-.248	.105	.132	-.052	.101	.058	-.150	.113	.303
SPACE FOR GRASSING/TREE PLANTING	.700	-.385	.291	.007	.083	-.020	.006	.135	-.212	.022	.066	.295
SPACE FOR TENDING TO KIDS	.544	.210	.100	-.196	.028	-.298	.106	.061	-.247	.356	.274	.005
SPACE FOR READING BY CHILDREN	.442	.267	.016	-.087	.252	-.166	.293	-.116	-.445	.087	.311	-.157
SPACE FOR WATER STORAGE	.408	-.499	.173	.216	.257	-.209	.335	.165	-.001	-.140	.012	-.200
SPACE FOR GARBAGE COLLECTION AND DISPOSAL	.477	-.641	.095	.115	.066	.016	.016	.116	.285	.062	.244	-.045
SPACE FOR OUTDOOR RECREATION	.712	-.088	.156	-.009	.056	.213	-.273	.153	.175	-.122	.018	.041
SPACE FOR OUTDOOR COOKING/DINING	.680	-.128	.347	-.152	.098	.192	-.126	.068	.201	.063	-.123	-.206

SPACE FOR OUTDOOR FAMILY MEETING	.764	-.176	-.012	-.013	.212	.217	.119	.019	.011	.160	-.218	-.221
SPACE FOR OUTDOOR RESTING	.705	.038	-.231	-.014	.282	.229	.002	.099	-.067	.188	-.192	-.077
SPACE FOR OUTDOOR PLAYING BY ADULT	.624	.048	-.252	-.256	.291	.073	-.048	-.150	-.005	-.093	-.065	-.044
SPACE FOR OUTDOOR PLAYING BY CHILDREN	.624	.207	-.192	.134	-.220	.020	.096	-.208	-.132	-.285	.090	.098
SPACE FOR PARKING	.410	-.476	.025	.474	-.076	.169	.384	-.138	-.050	-.105	.132	-.016
SPACE FOR SPREADING CLOTHES	.524	-.442	.386	-.156	-.058	.006	.122	-.209	-.204	-.094	.083	.038
SPACE FOR ENTERTAINMENT OF GUEST	.699	-.062	.346	.008	-.093	.085	.008	.271	-.117	.067	.007	-.250
SPACE FOR OUTDOOR SEWING CLOTHES	.059	.664	.418	.018	-.147	.122	-.077	.254	-.284	-.008	.038	.097
SPACE FOR OUTDOOR SMALL SCALE SHOPPING	.060	.251	.393	.446	-.173	.341	.132	.210	-.155	.102	-.196	.117
SPACE FOR RAMP FOR DISABLED PEOPLE	.297	-.019	-.233	.633	.108	-.172	-.174	.311	.103	.228	.096	.049
SPACE FOR INDOOR-OUTDOOR LINKAGE	.515	-.063	-.249	.005	.184	-.104	-.591	.056	-.075	.131	-.025	-.054

SPACE FOR FIRE PROTECTION GADGET	.226	.514	-.392	.347	-.251	.139	.037	.126	.128	.181	.117	.098
SPACE FOR HOUSE FOR DOMESTIC PETS	.184	.470	-.221	-.150	-.358	.003	.336	.040	.305	.238	.266	-.169
SPACE FOR POULTRY HOUSE	-.222	.375	.130	.254	-.061	.642	.273	-.153	.104	.267	-.040	-.067
SPACE FOR CHILDREN PLAY AREA	.418	.473	-.207	.152	-.084	.291	-.185	.020	.022	-.151	.164	-.115
SPACE FOR TENNIS BALL	.563	.480	-.150	-.035	-.213	.176	-.352	-.028	-.007	.071	.122	-.050
SPACE FOR VOLLEY BALL	.560	.442	-.270	.135	.002	.179	-.187	-.054	.084	-.214	.160	-.189
SPACE FOR SNOOKER BOARD GAMES	.451	.546	-.142	.057	.125	.001	.201	.250	-.201	-.226	-.063	-.253
SPACE FOR OPEN-SWIMMING	.305	.471	-.473	.243	.238	-.033	-.035	-.021	-.094	-.158	-.079	.054
SPACE FOR DRIVEWAY ACCESS	.578	-.398	.030	.361	.185	-.169	.044	-.166	-.025	.123	-.085	-.064
SPACE FOR WALKWAYS	.805	-.154	.085	.281	-.014	-.148	-.152	-.026	-.041	.221	-.044	.089
SPACE FOR ENTRANCE PORCH	.632	-.134	.041	.236	-.292	-.087	.158	.032	.149	-.094	-.165	.028
SPACE FOR PATIO/TERRACE	.715	-.151	.097	.054	-.177	.076	.300	.091	.096	.021	-.020	.068

SPACE FOR FLOWER BED	.729	-.408	-.063	-.001	.189	.022	.007	.056	.187	-.044	-.116	.044
SPACE FOR GARDEN/ORCHARD	.686	-.457	.014	-.102	.088	.104	-.087	.004	.252	-.073	.117	.222
SPACE FOR SPREADING OF CLOTHES	.385	-.436	.429	-.221	.167	-.003	-.179	-.135	.137	-.059	.173	-.016
SPACE FOR SEWING CLOTHES	-.016	.713	.440	-.144	-.100	.064	-.049	.056	.061	.017	.263	.059
SPACE FOR MENDING SHOES	-.003	.686	.467	-.043	-.068	-.226	.110	.055	.017	-.214	.111	-.016
SPACE FOR SELLING GSM CARDS	-.116	.611	.191	.138	.326	-.314	-.034	.042	.293	-.223	.023	-.113
SPACE FOR SELLING KEROSENE	-.006	.648	.394	.246	.303	-.249	-.182	-.067	.102	-.018	-.081	-.159
SPACE FOR GRINDING MILL	.184	.520	.575	.131	.000	.018	-.147	-.237	.019	-.049	-.215	.009
SPACE FOR GIVING CHILDREN LESSONS	.418	.298	.370	-.076	-.305	-.074	-.120	-.490	.038	-.005	-.057	-.208
SPACE FOR RIDING BICYCLE BY CHILDREN	.749	.118	-.005	.121	-.285	-.084	-.294	-.199	-.091	-.003	-.011	.050
SPACE FOR WALKING/STROLLING	.817	-.092	-.023	.089	-.231	-.064	-.133	-.178	-.078	.002	.092	.017

SPACE FOR ENTERTAINING GUEST	.755	.038	.257	-.097	-.037	.077	-.005	.096	-.144	-.098	.076	-.128
SPACE FOR GAS REFILLING	.203	.188	.470	.395	-.085	-.407	.197	.130	.056	-.095	-.010	.088
SPACE FOR TYPING/PHOTOCOPYING	.046	.197	.603	.342	.008	-.239	-.035	-.120	.098	.193	-.127	.112
SPACE FOR WATCH REPAIRING	-.164	.611	.550	.146	-.085	-.170	-.050	.100	.182	.008	.002	.103

Extraction Method: Principal Component Analysis.

a. 12 components extracted.

Rotated Component Matrix^a

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
SPACE FOR GYMNASIUM	.030	.715	.026	.088	-.126	.049	-.371	.006	.046	.030	-.021	-.016
SPACE FOR STROLLING	.135	.802	-.002	.038	-.213	-.038	.261	.050	.208	.120	-.205	.036
SPACE FOR WALKING	.163	.686	-.006	.164	-.112	-.150	.410	.049	.270	.121	-.272	-.069
SPACE FOR JOGGING	-.028	.857	-.110	.010	-.135	.048	.108	.151	.049	.105	-.114	-.052
SPACE FOR PLAYING BASKETBALL IN COMPOUND	-.102	.719	.007	.332	.042	.138	-.163	.042	.235	.017	-.002	.136
SPACE FOR PLAYING TABLE TENNIS IN COMPOUND	.127	.510	.275	.638	.142	-.046	-.017	-.083	.091	.207	-.097	.007
SPACE FOR DRYING AND BAKING GARRI	-.091	.086	.211	.022	.102	.883	.026	.012	.035	.133	-.064	-.058
SPACE FOR BAKING BEANS	.065	.031	.476	.049	-.003	.719	-.242	-.105	-.112	.102	.044	.102
SPACE FOR SMALL SCALE POULTRY	.041	.126	.408	.116	.489	.418	.035	-.415	-.176	-.057	.019	.056
SPACE FOR BICYCLE RIDING BY CHILDREN	.247	.725	.044	-.257	.187	.068	.124	-.099	.130	-.040	.065	-.208
SPACE FOR CLEANING COMPOUND	.443	.166	.128	.044	-.085	.032	.028	-.222	.180	.138	-.554	.187

SPACE FOR TENDING TO PETS	.253	.099	.209	.297	-.031	-.062	.040	-.320	.626	.011	-.128	.022
SPACE FOR OUTDOOR WASHING/LAUNDRY	.646	-.273	.193	.213	.055	-.198	.094	-.246	.163	.152	-.093	-.017
SPACE FOR SMALL SCALE GARDENING	.778	-.042	-.081	.069	-.083	.062	-.103	-.142	-.057	-.012	-.002	-.238
SPACE FOR GRASSING/TREE PLANTING	.831	-.002	-.042	-.014	.052	-.042	-.008	.112	-.198	.269	-.122	-.224
SPACE FOR TENDING TO KIDS	.328	.223	.133	.171	-.105	.102	.138	.171	.236	.638	-.130	-.052
SPACE FOR READING BY CHILDREN	.155	.345	.106	-.115	-.038	.218	.054	-.074	.012	.751	.005	.059
SPACE FOR WATER STORAGE	.528	-.077	-.002	-.529	-.119	-.117	-.262	.107	-.130	.201	-.188	.190
SPACE FOR GARBAGE COLLECTION AND DISPOSAL	.697	-.188	-.241	-.334	-.174	-.005	-.087	.277	.114	-.053	.057	-.004
SPACE FOR OUTDOOR RECREATION	.768	.207	.068	.113	.019	-.011	.043	.083	-.023	-.128	.228	.067
SPACE FOR OUTDOOR COOKING/DINING	.785	.031	.096	.080	.043	.076	.135	-.033	.108	-.048	.020	.342
SPACE FOR OUTDOOR FAMILY MEETING	.680	.304	-.189	-.106	.162	.094	.094	.067	.007	.104	-.133	.406

SPACE FOR OUTDOOR RESTING	.506	.513	-.213	.096	.168	.155	.023	.165	-.062	.113	-.067	.318
SPACE FOR OUTDOOR PLAYING BY ADULT	.433	.542	-.170	.055	-.180	.186	.108	-.133	-.074	.067	-.001	.174
SPACE FOR OUTDOOR PLAYING BY CHILDREN	.294	.594	.043	-.193	.087	-.205	.270	-.086	-.010	.156	.180	-.201
SPACE FOR PARKING	.429	.004	-.222	-.700	.267	-.118	.036	.110	-.072	.100	.043	-.111
SPACE FOR SPREADING OF CLOTHES	.681	-.175	-.080	-.200	-.029	-.052	.222	-.251	-.093	.278	-.089	-.122
SPACE FOR ENTERTAINMENT OF GUEST	.702	.036	.150	.041	.186	-.191	.051	.073	.106	.307	.082	.268
SPACE FOR OUTDOOR SEWING CLOTHES	-.032	.082	.577	.418	.416	-.039	-.014	-.089	.036	.275	.190	-.075
SPACE FOR OUTDOOR SMALL SCALE SHOPPING	.081	-.071	.333	.007	.750	-.090	-.020	.122	-.062	.014	.021	-.020
SPACE FOR RAMP FOR DISABLED PEOPLE	.136	.222	.059	-.143	.046	-.072	-.105	.810	-.099	-.007	.099	.017
SPACE FOR INDOOR-OUTDOOR LINKAGE	.372	.287	-.143	.309	-.284	.017	.217	.395	-.262	.033	.169	.187
SPACE FOR FIRE PROTECTION GADGET	-.159	.553	.060	.039	.327	-.068	.068	.394	.309	-.030	.216	-.110

SPACE FOR HOUSE FOR DOMESTIC PETS	-.124	.367	.061	-.005	.070	-.030	.077	.032	.794	.129	.066	.014
SPACE FOR POULTRY HOUSE	-.264	-.020	.058	-.102	.734	.347	.086	-.072	.259	-.140	.136	.110
SPACE FOR CHILDREN PLAY AREA	.118	.541	.122	.086	.185	-.006	.126	.058	.094	.005	.506	.083
SPACE FOR TENNIS BALL	.241	.510	.107	.341	.099	-.026	.361	.124	.180	.076	.390	.045
SPACE FOR VOLLEY BALL	.207	.656	.128	-.006	.022	.007	.166	.060	.076	.006	.482	.155
SPACE FOR SNOOKER BOARD GAMES	.091	.649	.288	.016	.159	-.126	-.178	-.076	.012	.322	.121	.306
SPACE FOR OPEN- SWIMMING	-.116	.765	.087	-.015	.031	.061	-.017	.164	-.209	.036	.111	.058
SPACE FOR DRIVEWAY ACCESS	.522	.092	-.087	-.415	-.047	.014	.216	.344	-.231	.113	-.182	.118
SPACE FOR WALKWAYS	.671	.231	.050	-.077	.037	-.072	.323	.444	-.104	.157	-.091	-.010
SPACE FOR ENTRANCE PORCH	.522	.260	.077	-.270	.123	-.372	.170	.139	.107	-.060	-.127	-.029
SPACE FOR PATIO/TERRACE	.660	.243	-.028	-.208	.202	-.173	.048	.044	.230	.100	-.130	-.055
SPACE FOR FLOWER BED	.766	.245	-.207	-.168	-.122	-.012	-.013	.134	-.071	-.099	-.133	.100

SPACE FOR GARDEN/ORCHARD	.825	.124	-.237	-.097	-.172	.056	.017	.073	.021	-.146	.024	-.163
SPACE FOR SPREADING OF CLOTHES	.678	-.303	.013	-.061	-.282	.180	.121	-.121	-.044	.003	.053	-.007
SPACE FOR SEWING CLOTHES	-.075	.042	.633	.328	.166	.200	.049	-.168	.329	.148	.244	-.126
SPACE FOR MENDING SHOES	-.111	.110	.804	.106	.040	-.004	-.016	-.233	.188	.192	.069	-.069
SPACE FOR SELLING GSM CARDS	-.240	.225	.737	-.033	-.206	.205	-.155	.020	.024	-.102	.060	.152
SPACE FOR SELLING KEROSENE	-.147	.123	.813	.064	-.015	.260	.114	.114	-.108	.018	.047	.246
SPACE FOR GRINDING MILL	.122	.051	.699	.115	.255	.143	.371	-.140	-.090	-.046	.006	.077
SPACE FOR GIVING CHILDREN LESSONS	.247	.097	.382	-.016	.011	-.035	.701	-.223	.167	.084	.063	.098
SPACE FOR RIDING BICYCLE BY CHILDREN	.486	.387	.107	.070	.003	-.217	.543	.171	-.042	.111	.145	-.082
SPACE FOR WALKING/STROLLING	.615	.331	-.044	-.090	-.037	-.190	.439	.150	.017	.188	.113	-.088
SPACE FOR ENTERTAINING OF GUEST	.689	.222	.152	.040	.078	-.105	.112	-.093	.045	.307	.137	.121

SPACE FOR GAS REFILLING	.173	-.024	.673	-.257	.083	-.200	-.024	.195	.010	.138	-.174	-.135
SPACE FOR TYPING/PHOTOCOPYI NG	.100	-.231	.629	-.077	.168	.112	.252	.219	-.052	-.010	-.217	-.057
SPACE FOR WATCH REPAIRING	-.160	-.098	.824	.177	.162	.063	.025	.033	.167	-.053	.005	-.096

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 16 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6	7	8	9	10	11	12
-----------	---	---	---	---	---	---	---	---	---	----	----	----

1	.796	.502	.024	-.044	.014	-.070	.218	.114	.060	.194	.007	.065
2	-.375	.521	.581	.309	.209	.164	.079	-.071	.204	.102	.141	.044
3	.357	-.603	.628	.021	.196	.113	.080	-.207	-.014	.092	-.065	-.012
4	-.117	.028	.231	-.533	.374	-.105	.045	.599	-.303	-.108	.178	-.033
5	.081	.127	.060	-.073	-.212	.710	-.394	.049	-.422	.044	-.110	.264
6	.144	-.019	-.356	.094	.667	.273	-.067	-.262	.035	-.255	.419	.095
7	-.072	.134	-.041	-.546	.295	.018	-.319	-.287	.361	.273	-.443	-.068
8	.147	-.052	.077	.356	.119	-.358	-.758	.301	.115	.065	.045	.126
9	.128	.019	.167	-.172	-.235	.165	-.076	.136	.530	-.731	-.026	.052
10	-.057	-.210	-.219	.262	.214	.352	.260	.547	.342	.227	-.340	.121
11	.020	-.126	-.030	-.176	-.260	.255	-.132	.118	.329	.400	.607	-.389
12	.100	.120	.001	.224	.132	.146	-.106	.070	-.180	-.200	-.270	-.851

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

OBJECTIVE FOUR

ONEWAY OUTDOOR SPACE BY CODE ANOVA

Oneway

Notes

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	Cases Used	Statistics for each analysis are based on cases with no missing data for any variable in the analysis.

Syntax		ONEWAY OUTDOORSPACE BY CODE
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ANOVA

OUTDOOR SPACE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2511124.065	4	627781.016	145.733	.000
Within Groups	1038169.548	241	4307.757		
Total	3549293.613	245			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: OUTDOOR SPACE

Scheffe

(I) BUILDING PROTOTYPE	(J) BUILDING PROTOTYPE	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2 BEDROOM SEMI- DETACHED BUNGALOW	2 BRM/3 BRM BLOCK OF FLATS	-405.30077*	27.66401	.000	-491.1769	-319.4246
	3 BRM BUNGALOW	-34.44717	11.55392	.067	-70.3135	1.4192
	4 BRM DETACHED STORIED HOUSE	-99.54237*	11.55392	.000	-135.4087	-63.6760
	5 BRM DETACHED STORIED HOUSE	-234.83261*	11.62976	.000	-270.9344	-198.7308
2 BRM/3 BRM BLOCK OF FLATS	2 BEDROOM SEMI- DETACHED BUNGALOW	405.30077*	27.66401	.000	319.4246	491.1769
	3 BRM BUNGALOW	370.85360*	28.35692	.000	282.8265	458.8807
	4 BRM DETACHED STORIED HOUSE	305.75840*	28.35692	.000	217.7313	393.7855
	5 BRM DETACHED STORIED HOUSE	170.46816*	28.38790	.000	82.3449	258.5915

3 BRM BUNGALOW	2 BEDROOM SEMI-DETACHED BUNGALOW	34.44717	11.55392	.067	-1.4192	70.3135
	2 BRM/3 BRM BLOCK OF FLATS	-370.85360*	28.35692	.000	-458.8807	-282.8265
	4 BRM DETACHED STORIED HOUSE	-65.09520*	13.12670	.000	-105.8438	-24.3466
	5 BRM DETACHED STORIED HOUSE	-200.38544*	13.19350	.000	-241.3414	-159.4294
4 BRM DETACHED STORIED HOUSE	2 BEDROOM SEMI-DETACHED BUNGALOW	99.54237*	11.55392	.000	63.6760	135.4087
	2 BRM/3 BRM BLOCK OF FLATS	-305.75840*	28.35692	.000	-393.7855	-217.7313
	3 BRM BUNGALOW	65.09520*	13.12670	.000	24.3466	105.8438
	5 BRM DETACHED STORIED HOUSE	-135.29024*	13.19350	.000	-176.2462	-94.3342
5 BRM DETACHED STORIED HOUSE	2 BEDROOM SEMI-DETACHED BUNGALOW	234.83261*	11.62976	.000	198.7308	270.9344
	2 BRM/3 BRM BLOCK OF FLATS	-170.46816*	28.38790	.000	-258.5915	-82.3449
	3 BRM BUNGALOW	200.38544*	13.19350	.000	159.4294	241.3414
	4 BRM DETACHED STORIED HOUSE	135.29024*	13.19350	.000	94.3342	176.2462

*. The mean difference is significant at the 0.05 level.

Homogeneous Subsets

OUTDOOR SPACE

Scheffe^{a,b}

BUILDING PROTOTYPE	N	Subset for alpha = 0.05			
		1	2	3	4
2 BEDROOM SEMI-DETACHED BUNGALOW	91	268.4992			
3 BRM BUNGALOW	50	302.9464			
4 BRM DETACHED STORIED HOUSE	50		368.0416		
5 BRM DETACHED STORIED HOUSE	49			503.3318	
2 BRM/3 BRM BLOCK OF FLATS	6				673.8000
Sig.		.577	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 21.003.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix IV:

Secondary Data from Internet and Books.

Plate 18: Porches



Source: [Http://www.homedit.com](http://www.homedit.com), 2014



Plate 19: Entrance Porches

Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 20: Patios



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate. 21: Decks.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 22: Covered Patio



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate23: Umbrella covered backyard patio



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 24: Outdoor covered patio



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 25: Outdoor poolside relaxation area.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 26: Russian Poolside relaxation patio in a grass landscape environment.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 27: Covered Varandah



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 28: Verandahs for outdoor relaxation.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 29: Balconies



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 30: Landscaped garden and garden light.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 31: Brick surfaced walkway and patio.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 32: Outdoor Kitchen



Source: [Http://www.homedit.com](http://www.homedit.com), 2014



Plate33:Outdoor kitchen and dining

Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 34: Outdoor Dining area.



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 35: Covered Indoor-outdoor linkage



Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Plate 36: Landscaped garden

Source: [Http://www.homedit.com](http://www.homedit.com), 2014



Plates 37: Children's play areas

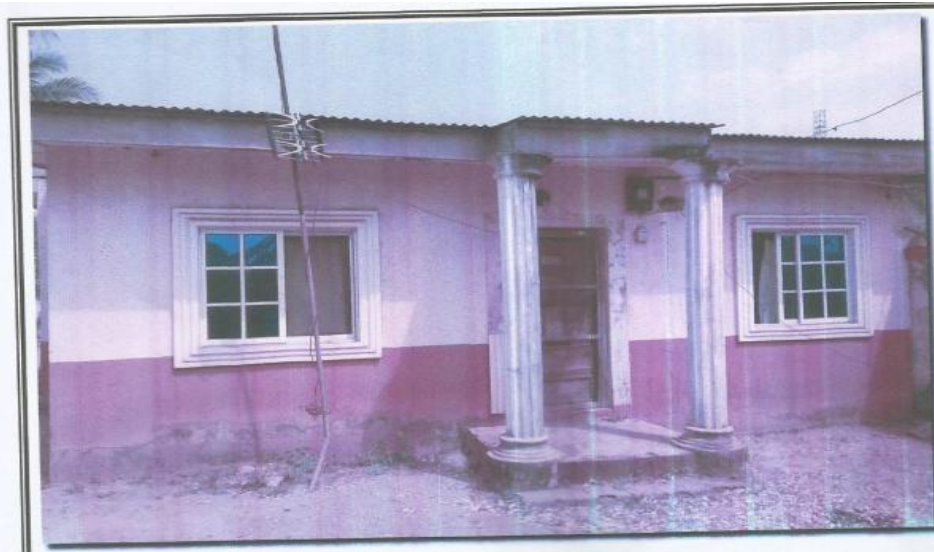


Source: [Http://www.homedit.com](http://www.homedit.com), 2014

Appendix IV: Field Observations: Part A- the Floating Class.

Trans- Ekulu, Greenland Estate Phase I:

Plate 38: Poorly Maintained Entrance Porch



Source: Source: Obi, N.I (Fieldwork); 2012

Plate 39: Improper garbage collection area.



Source: Source: Obi, N.I (Fieldwork); 2012.

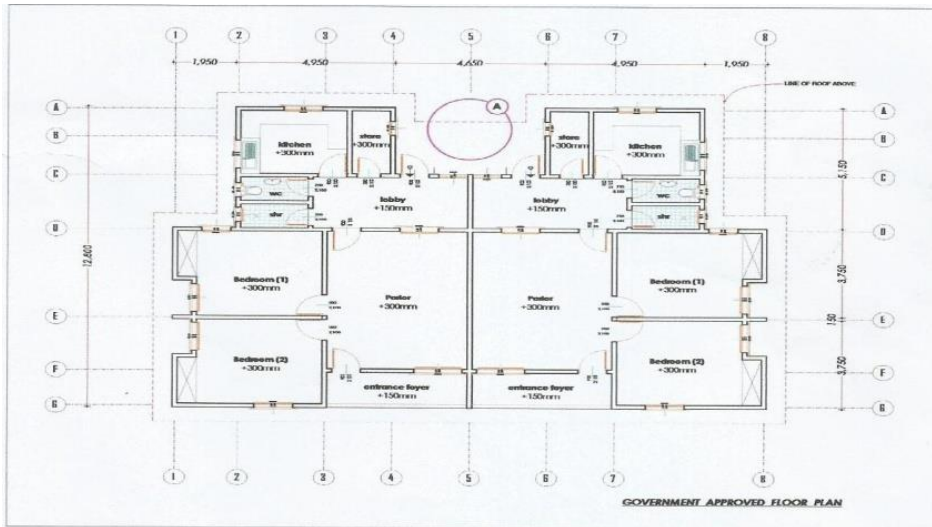


Fig.28: Floor Plan Sketch-Greenland Estate

Source: Obi, N.I (Fieldwork); 2012.

Plate 40: Verandah used for various outdoor activities



Source: Obi, N.I (Fieldwork); 2012.(Fed Housing Estate Trans Ekulu Phase I)

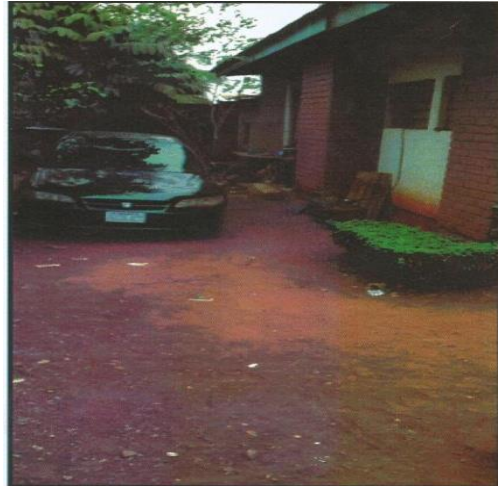
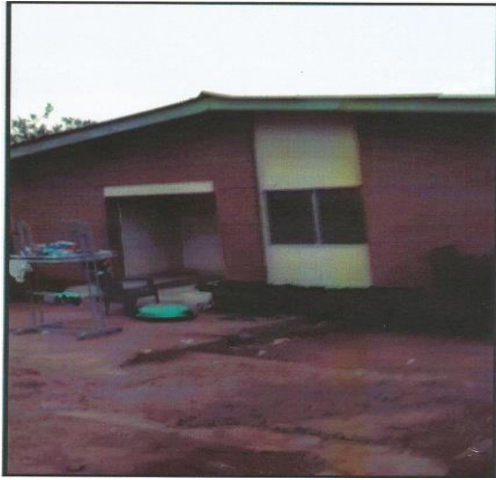
Plate 41: View of 2 Bedroom Block of Flats



Source: Obi, N.I (Fieldwork); 2012.

Trans- Ekulu Phase 1: 2Bedroom Detached Bungalow

Plate 42: Dilapidated outdoor spaces



Source: Obi, N.I (Fieldwork); 2012.

Ehocol Estate, Republic Layout, Enugu

Phase 1: 2-bedroom semi-detached bungalow

Floor Plan

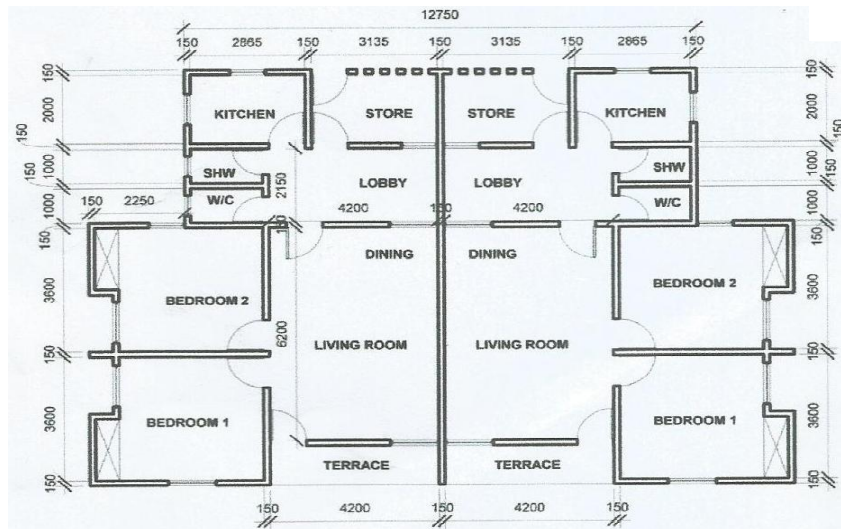


Fig. 29 Floor Plan Sketch-Ehocol Estate

Source: Obi, N.I (Fieldwork- Sketch Plan); 2012.

Plate 43 Inarticulate landscaping.



Source: Obi, N.I (Fieldwork); 2012.

Plate 44: Post-Occupancy Modification Measures-Introduction of Temporary Fence and Front Canopy



Obi, N.I (Fieldwork); 2012.

4.1.4: Part B: Lower-Middle-Income Class:

Trans-Ekulu Phase V. 3-Bedroom Bungalows:

Plate 45: Post Occupancy Modification by the Windows



RIGHT SIDE ELEVATION



Source: Obi, N.I (Fieldwork); 2012

Greenland Estate Phase II, Trans Ekulu.

Plate 46: View of the Estate Buildings showing lack of privacy from public view.



Source: Obi, N.I (Fieldwork); 2012

Trans Ekulu Phase II: 3-Bedroom Semi-Detached Storied House with attached Boys Quarters

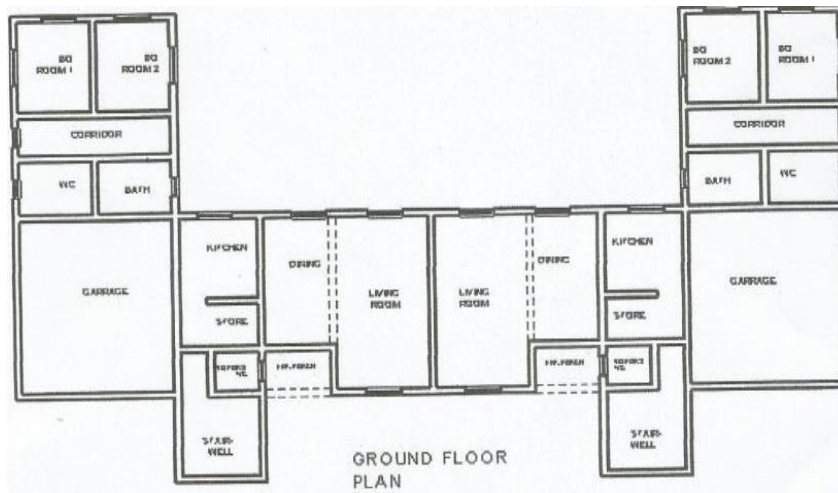
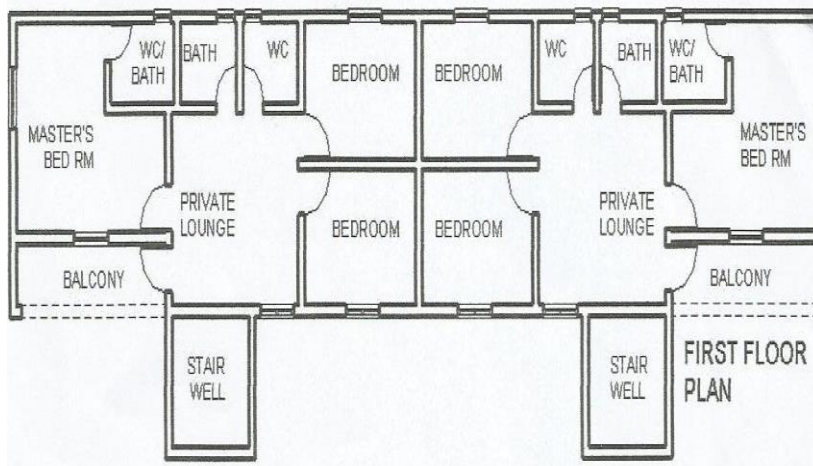


Fig. 30. Floor Plans Profile- Trans Ekulu Phase II

Source: Obi, N.I (Fieldwork); 2012

Real Estate, Uwani

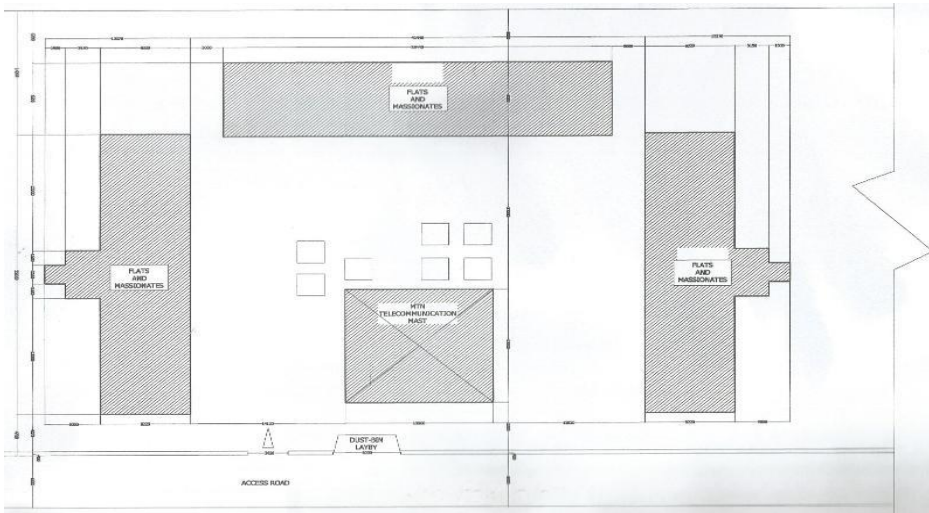


Fig.31: Sketch Plan Profile- Real Estate, Uwani
Source: Obi, N.I (Fieldwork); 2012

Plate 47: Improper Water Storage space



Plate 48: Improvised Car Parking Spaces



Source: Obi, N.I (Fieldwork); 2012

Federal Housing Estate, Phase I & II Abakpa 3Bedroom Bungalows

Plate 49: Flowerbed adapted as Verandah and as children's reading area.



Source: Obi, N.I (Fieldwork); 2012

**Greenland Estate Phase 111: Trans Ekulu:
Plate 50: Car Pot adapted for storage and improvised Rain Water Harvesting**



Source: Obi, N.I

(Fieldwork); 2012

Maryland Estate, Phase I (Enugu South) -3Bedroom Block of Flats

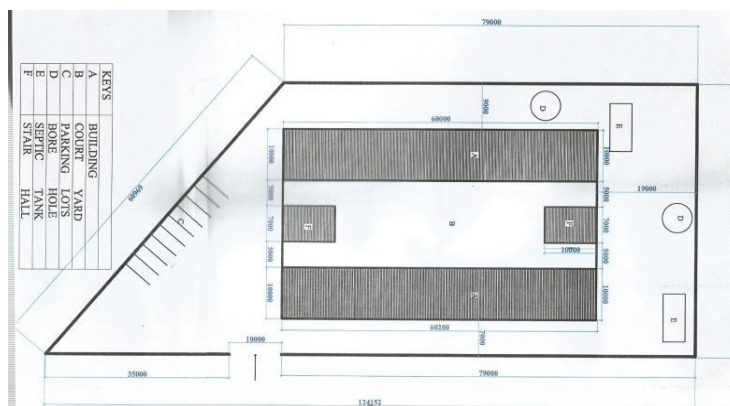


Fig.32: Sketch Plan Profile-Maryland Estate, Phase I (Block of Flats)

Source: Obi, N.I (Fieldwork); 2012

Plate 51: View of the block of Flats with unplanned outdoor spaces.



Source: Obi, N.I (Fieldwork); 2012

Plate 52: Outdoor Modifications around Buildings.



