

ACCESSORY DWELLING UNITS AS AFFORDABLE HOUSING OPTION IN ASABA, DELTA STATE

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ABSTRACT

Research has often marginalized housing at the smallest spatial scale namely; the Accessory Dwelling Units (ADUs). The reason can be attributed to the subordinate size and location of ADUs in relation to the Primary Dwelling Units (PDUs) with which they share the same plots. The general assumption in Nigeria is that accessory dwelling units or Boys' Quarters (BQs) are exclusively occupied by boys or single persons. This study confirmed this assumption but not without exceptions. A total of 79 residential houses with accessory dwelling units were purposively selected in three stratified zones of Asaba. Student t-test was used to compare the socio-demographic composition of the occupants and rental differential between the PDUs and ADUs. The results showed that there is a statistically significant difference in the mean scores of the multivariate variables with the marital status of the PDU occupants (Mean = 1.88, Standard Deviation = 0.710) and the ADU occupants (Mean = 1.45, Standard Deviation = 0.711); $t(312) = 5.40, p = 0.00$; the household income of the PDU occupants (Mean = 3.89, Standard Deviation = 1.56) and the ADU occupants (Mean = 2.28, Standard Deviation = 0.99); $t(312) = 10.90, p = 0.00$; and the yearly rent of the PDUs (Mean = 4.32, Standard Deviation = 2.44) and the yearly rent of the ADUs (Mean = 2.44, Standard Deviation = 1.34); $t(236) = 8.188, p = 0.00$ (two tailed). ANOVA showed that spatial variation in the marital status of the respondents in the PDUs in the three Zones is not significant at the $P < 0.05$ level, $F = 1.17$, Sig. = 0.32; the household income is significant at the $P < 0.05$ level. $F = 65.71$, Sig. = 0.00 and the rental value is significant at the $P < 0.05$ level. $F = 50.78$, Sig. = 0.00. Also, the mean difference for the marital status of the respondents in the ADUs in the three Zones is significant at the $P < 0.05$ level. $F = 9.98$ Sig. = 0.00; the household income is significant at the $P < 0.05$ level. $F = 18.47$, Sig. = 0.00, and the rental value is significant at the $P < 0.05$ level. $F = 15.49$, Sig. = 0.00.

Keywords: Apartment; Housing; Neighbourhoods; Occupants; Plot; Resident

Introduction

Many low-income households in Nigeria find it increasingly difficult to afford housing costs. Increasing housing costs have forced many low-income earners to seek smaller apartments for rent. The high demand for small self-contained apartments has led to the rise in the construction of Accessory Dwelling Units (ADUs). ADUs are basically smaller self-contained houses attached to the main buildings or built on the remaining space not occupied by the main building. They are usually intended for persons other than the home owners. The preference for ADUs by renters is usually based on its affordability. The term 'affordable housing' is often associated with housing for low-income earners. ADUs are commonly known in Nigeria as Boys' Quarters (BQs) and they are thus used interchangeably in this article.

Besides serving as affordable housing for low-income earners, the increase in the construction of ADUs of various designs and sizes in many cities across Nigeria can be attributed to other reasons. These include the rapid increase in urban population evident in the increased demand for housing. Due to the high cost of land for housing, ADUs are developed as a form of in-fill development or conversion apartments in order to utilize the undeveloped portions of already built plots for residential houses and to expand the housing stock and diversity without additional new plots (Hare, *et al.*, 1981; Gellen, 2012).

Many urban planners have identified enormous potential for in-fill or conversion apartment development within the single-family neighbourhood as a means of generating additional revenue through the collection of rents by home owners and meeting the accommodation needs of family members (see Hare, 1989; Reule, 1991; Chapman and Howe, 2001; Hickey, 2010; Gellen, 2012). While home owners construct

ADUs for the benefits of additional rental income or housing a family member, Hare (1989) argues that the actual use is likely to alternate between family-related and non-related tenants over time. Older home owners also cite deterrence from crime, mitigating loneliness and exchange for services as reasons to build ADUs (Reule, 1991). ADUs are also commonly used as temporary accommodations for guests and visiting relatives. The dwelling units can also be used to provide housing for live-in caregivers for the aging home owners (Caro, 2006).

The rental value of ADUs is more often than not lesser than that of the primary dwelling units (PDUs) they share the plots with due to their subordinate size and location (Brown and Watkins, 2012). This can be attributed to a number of reasons ranging from the difference in size and quality of the structures, difference in demographic composition and income level of the occupants and facilities that can be found within both structures. On a positive note, ADUs may be beneficial for both the home owners and tenants in terms of the financial prospects of reduced living expenses. Depending on the agreement between the home owner and tenant, financial advantages may include shared cost of utilities, reduced rent in exchange for menial labour and other forms of assistance to the home owner, and supplemental income for the home owner (Hare, 1989 and Hare, 1991). Having the property owner and renter living on the same site presumably creates a more effective system of shared responsibility and companionship, resulting in greater care for the individual property and thus positively affecting the overall neighbourhood quality.

Most existing studies of accessory dwelling units utilized economic approach to look at their preferences (see Brown and

Watkins, 2011; Brown & Palmeri, 2014) or seek to study the regulatory challenges associated with such house type (see Liebig *et al.*, 2006; Been *et al.*, 2014). The demographic and social dimensions have often been neglected partly because occupants of such dwellings are strictly regulated in advanced countries. The aim of this study therefore is to analyze and compare the demographic compositions of occupants and rental differential of primary and accessory dwelling units in order to confirm or refute the perception that ADUs are exclusively for 'boys'. Previous studies of accessory dwelling units have largely been carried out in planned cities of the developed countries, particularly in the United States of America. Their empirical findings have not been applied in unplanned and spontaneously growing cities of developing countries. Researchers in Nigeria have had very little to report about the manifestation of housing at the smallest spatial scale namely; the accessory dwelling units (ADUs). This study is therefore a contribution to the often neglected area of housing studies.

While ADUs may seem to focus on the personal needs of individuals, another significance is that it provides a mix of housing types. Diversity in housing within residential neighbourhoods not only speaks to the needs of diversity of the population, but also helps to increase the housing turnover rate within predominantly renter-occupied housing developments (Bachmann and Cooper, 2014). However, these romanticized views of ADUs have some criticisms. Against the many economic and social benefits previously cited, neighbourhood residents have voiced concerns that properties with ADUs potentially altered the composition of single family neighbourhoods. Residents of communities are often concerned about protecting the visual coherence of a

neighbourhood in relation to the existing structures already in place (Koebel *et al.*, 2003; Liebig *et al.*, 2006; Been *et al.*, 2014). As a separate living space, an ADU requires almost the same services as the primary dwelling structure namely; water, electricity, sewer, and other utilities. Housing density naturally requires additional capacity of infrastructure facilities and community services. The impact of this increased demand may exert stress on the existing local utilities and requires a significant commitment of resources by the services providers.

In addition to increasing density, neighbourhood residents fear that on-street parking issues may arise from additional vehicles own by occupants of ADUs, resulting in traffic congestion and unacceptable parking practices (Katsuyama, 1995). ADUs may also impact the total ratio of impervious surfaces to unpaved open space and directly affect local storm water management practices and the aesthetic appeal of a given neighbourhood. Parking requirements are continually referenced in the literature as the largest obstacle for further housing expansion. One of the most frequent objections to ADU developments is the fear they will reduce the availability of on-street parking for current neighbourhood residents (Campbell, 2013).

Another concern raised against ADUs is the social or cultural conflict. Some fear that accessory apartments represent a deviation from the traditional image of housing, family, and neighbourhood. According to Gellen (2012), ADU symbolizes a change in the way the single family house is used, a change that clashes with the traditional meanings attached to the categories of residential zoning. The "American Dream" of a single family detached house, according to de Neufville and Barton (1987), acts as a dominant cultural driver. Hickey (2010) added that the American system of zoning is based on an implicit value

judgment about the ordering of land development where single-family neighbourhoods reign over apartments and all other housing types.

Despite these criticisms, permitted accessory dwellings are increasingly recognized in the literature as new forms of suburban and in-fill development (Rudel, 1984; Landis *et al.*, 2006; Wegmann & Nemirow, 2011). It is expensive to buy land within a city, or buy old house for remediation or demolish and rebuild. Piecemeal in-fill development in the form of accessory dwelling units utilizes private investment to fund this form of micro housing development (Wegmann & Nemirow, 2011). ADUs do not expand the footprint of the built environment, but concentrate use. However, existing literature (cited above) revealed a lack of proper monitoring of secondary dwelling units and the common problem of non-permitted dwelling units particularly in cities of developing countries requires further interrogations.

Accessory Dwelling Units: A Conceptual Clarification

Accessory Dwelling Unit (ADU), by definition, is a small self-contained apartment typically with its own entrance, cooking and bathing facilities that share the same compound or premises with a larger Primary Dwelling Unit (PDU). ADUs may be attached to or detached from the PDU. An ADU is not an independent property as it is designed to serve the PDU. Usually, it is architecturally less prominent than the PDU.

An Accessory Dwelling Unit (ADU) is a small, self-contained residential unit located on the same plot with an existing single-family home (Municipal Research & Services Center, 1995). Common terms used to describe accessory dwelling unit include accessory apartment, elders' cottage, accessory cottage,

granny unit, mother-in-law apartment and garage apartment (Sage Computing, 2008). Other codes use terms such as accessory apartment, accessory living unit, or Secondary Dwelling Unit (SDU) with a similar meaning (Brown and Watkins, 2012). These terms vary in context in which they are used. In the U.S, for example, they are called "mother-in-law apartments" or "granny flats" because they are often used to house extended family members.

Being a self-contained residential unit, an ADU has all the basic facilities such as a living room, bedroom, kitchen, toilet and bathroom needed for the day-to-day living independent of the main house. As the term "accessory" implies, ADUs are generally smaller in size and less prominent than the main house on the same plot. Some building codes specified the size limit to be between 30–300 square metres and a location that is not readily visible from the street (Liebig *et al.*, 2006). In other words, an ADU is an attached or detached form of supplemental housing unit usually behind the main building. While on the same plot with the main building, ADUs are considered as separate dwellings; meaning that they have separate entrances from the primary dwelling unit. While considered as a separate dwelling unit, most housing codes required, as a rule but with exceptions (Macht, 2015), that an ADU can be rented but cannot be sold separately from the PDU.

In the Nigeria context, accessory dwelling units (ADUs) are popularly known as Boys' Quarters (BQs). This term has a colonial root as Boys' Quarters were unique features of colonial housing in Nigeria. Pre-colonial houses never included Boys' Quarters to the main buildings. BQs first appeared in Nigeria during the colonial period when expatriates occupied exclusive Government Reservation Areas (GRAs) in which Nigerians were not allowed to rent houses (Enahoro, 2013). This

posed a problem for residents who needed servants or houseboys and housemaids for domestic chores. The colonial officials and wealthy Nigerians have always had servants as domestic help. As a solution, they built “boys’ quarters” at the back of their residences primarily to house their servants. This phenomenon was evident in the presence of BQs in most GRAs and also behind the main houses of affluent Nigerians across the country during the colonial period. It is widely believed that occupants of BQs in Nigeria today are either house servants, low income earning tenants, or elderly relatives of the home owners, particularly the male members of the family.

The Study Area

This study was carried out in Asaba, Delta State. Asaba is the capital of Delta State since its creation on August 27th, 1991 out of the defunct Bendel State. It also serves as the Local Government Headquarter of Oshimili South Local Government Area. Geographically, Asaba is located on Latitude 6°11' 52.23"N - 6°12' 00"N and Longitude 6°43'42.48"E - 6°44'00"E on the bank of the River Niger,

about 160 kilometers north of the mouth of River Niger. The city is located on the western slope of River Niger and serves as a connector between the western and eastern parts of Nigeria via the River Niger Bridge (see Fig. 1). By virtue of its position as a state capital, the population of Asaba has grown tremendously from 49,725 in 1991 to 150,032 in the 2006 census (NPC, 2006). This rise can be attributed to the influx of migrants since its designation as a state capital.

The settlement pattern of Asaba is a nucleated linear pattern (see Fig. 2). This is attributed to the existence of two prominent linear features; the River Niger and Benin-Onitsha highway along which the town tends to expand. As a modern city, Asaba has a lot of residential houses with Boys’ Quarters attached which reflects the trend in modern housing development. BQs tend to cushion the housing scarcity in the city occasioned by rising population. Therefore, the city offers us a better vantage point to investigate the demographic composition and rental differentials between primary and accessory dwelling units than the traditional pre-colonial cities in Nigeria.



Figure 1: Delta State Showing the Study Area
Source: Ministry of Lands and Survey, Asaba (2018).

Methods

The study area was stratified into three zones and each zone was further stratified into neighbourhoods (see Fig. 2). Zone 1 (Central Core Area) is the traditional quarters or neighbourhoods comprising Umuagu, Umuonaje, Umuaji, Umuezei, Isieke and Ezenei. Zone 2 is the high-brow residential areas and comprises the Government Reservation Area (GRA), Direct Labor Agency

(DLA) Area and West End Area. Zone 3 (Eastern New Layout) is the middle-class residential area comprising the Cable-point Area and Akwuebulo Layout. From these three zones and their neighbourhoods, purposive sampling technique was used to select residential buildings with Boy's Quarters because such buildings are randomly distributed in the study area.

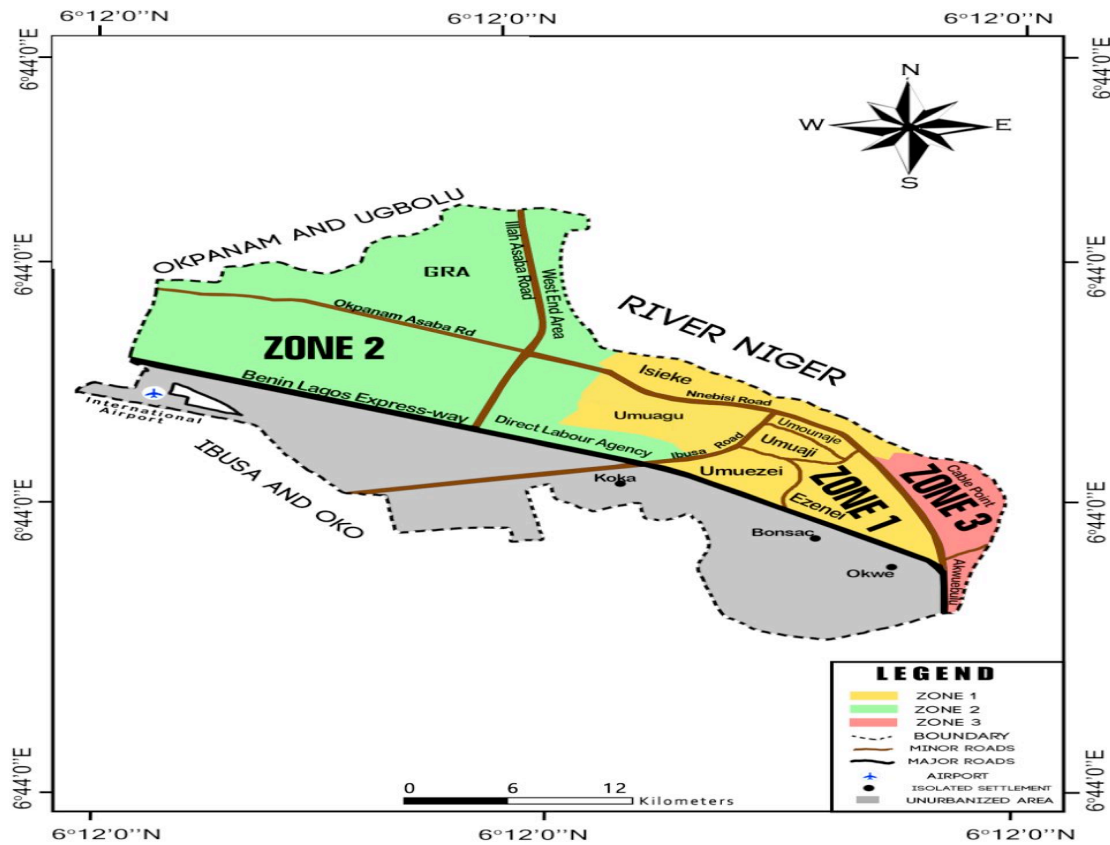


Figure 2: Asaba Showing the Sampled Zones

Source: Google Map of Asaba (Modified by the Authors, 2018).

A total of 79 residential houses with accessory dwelling units were purposively selected in the three zones (see Tables 1 & 2). Based on accessibility and permission derived from home owners, 25 homes were selected in Zone 1, 30 in Zone 2 and 24 in Zone 3. Two copies of questionnaire were administered in each selected house to the occupants of the primary dwelling unit and BQ respectively. A total of 158 copies of questionnaire were therefore administered out of which 157 were returned valid. Descriptive statistics were utilized in the analysis of the data collected. Frequency distribution tables and simple percentages were used to present and analyze the number of respondents and their socio-

economic and demographic data. All the analyses of the data obtained from the administered questionnaire were performed by the Statistical Package for Social Sciences (SPSS) software, version 21. The responses gathered from the respondents aided the comparison of their socio-demographic compositions and the rental differential between the primary and accessory dwelling units. Student t-test was used to compare the rental differentials and demographic variables between the primary and accessory dwelling units. Analysis of Variance (ANOVA) was used to further analyze the spatial variation of the variables in the selected zones of Asaba.

Table 1: Building Types with ADUs

Building Type	Frequency	Percentage
Duplex	17	21.5
Owner-occupied Bungalow	21	26.6
Apartment Building	29	36.7
Rooming House	12	15.2
Total	79	100.0

Source: Authors (2018).

Table 2: Accessory Dwelling Units (ADUs)

Building Type	Frequency	Percentage
Attached Bungalow BQ	16	20.3
Detached Bungalow BQ	58	73.4
Attached Storey BQ	3	3.8
Detached Storey BQ	2	2.5
Total	79	100.0

Source: Authors (2018).

Results

The results of the analyzed data are outlined in four broad sections. The first section presents the socio-demographic characteristics of the respondents. The second section covers the rental differential between the PDUs and ADUs. The third section deals with the comparison of the socio-demographic variables and rental values between the PDUs

and ADUs. The fourth section showed the spatial variation of socio-demographic variables and rental differential in Asaba. The socio-demographic variables and rental values of the PDUs and ADUs are presented in Table 3. Each of the variables is analyzed in the following section.

Table 3: The Socio-Demographic Variables and Rental Values of the PDUs and ADUs

Variable	Value	House Type			
		X (PDU)		Y (ADU)	
		Frequency	Percentage	Freq.	Percentage
Gender of the respondents	Male	112	71.3%	103	65.6%
	Female	45	28.7%	54	34.4%
Age of the respondent	Under 26 years	22	14.0%	54	34.6%
	26-35 years	33	21.0%	76	48.7%
	36-45 years	45	28.7%	16	10.3%
	46-55 years	33	21.0%	7	4.5%
	56-65 years	16	10.2%	2	1.3%
	66 years and above	8	5.1%	1	0.6%
Marital status	Single	41	26.1%	101	64.3%
	Married	103	65.6%	48	30.6%
	Divorced/Separated	4	2.5%	2	1.3%
	Widowed	9	5.7%	6	3.8%
Educational qualification	No formal education	8	5.1%	12	7.6%
	Primary school	7	4.5%	17	10.8%
	Secondary school	38	24.2%	58	36.9%
	Tertiary/higher educational degree	104	66.2%	70	44.6%
Occupation	Civil Servant	57	36.8%	28	20.7%
	Self-employed	72	46.5%	84	62.2%
	Retired	11	7.1%	1	0.7%
	Unemployed	5	3.2%	4	3.0%
	Student	10	6.5%	18	13.3%
Household income bracket	25,000 and below	13	8.3%	36	22.9%
	26,000-50,000	20	12.7%	62	39.5%
	51,000-100,000	31	19.7%	42	26.8%
	101,000-150,000	31	19.7%	13	8.3%
	151,000-200,000	32	20.4%	4	2.5%
	Above 200,000	30	19.1%	0	0.0%

Table 3 Continues

Number of occupants per house	1	5	3.2%	23	14.6%
	2	15	9.6%	30	19.1%
	3	22	14.0%	44	28.0%
	4	26	16.6%	21	13.4%
	5	24	15.3%	20	12.7%
	6	24	15.3%	7	4.5%
	7	20	12.7%	6	3.8%
	8	5	3.2%	1	0.6%
	9	5	3.2%	4	2.5%
	10	1	0.6%	0	0.0%
	11	1	0.6%	0	0.0%
	12	2	1.3%	0	0.0%
	13	4	2.5%	0	0.0%
	14	1	0.6%	0	0.0%
	15	0	0.0%	1	0.6%
	16	1	0.6%	0	0.0%
	21	1	0.6%	0	0.0%
Number of households per house	1	89	56.7%	74	47.4%
	2	24	15.3%	53	34.0%
	3	14	8.9%	21	13.5%
	4	17	10.8%	8	5.1%
	Above 4	13	8.3%	0	0.0%
Yearly rent	30,000 and below	11	11.0%	28	20.3%
	31,000-60,000	11	11.0%	59	42.8%
	61,000-90,000	17	17.0%	3	25.4%
	91,000-120,000	18	18.0%	6	4.3%
	121,000-150,000	17	17.0%	3	2.2%
	151,000-180,000	6	6.0%	2	1.4%
	181,000-200,000	5	5.0%	5	3.6%
	201,000 and above	15	15.0%	0	0.0%

Source: Authors (2018).

The Socio-Demographic Characteristics of the Respondents

A detailed analysis of the data collected from the field revealed that there are few similarities and many contrasts between the occupants of the PDUs and ADUs in Asaba. A

higher percentage of the occupants of both dwelling unit types (71.3% PDUs; 65.6% ADUs) were males. The gender imbalance can be attributed to the fact that males are

predominant household heads in Nigeria. The majority (28.7%) of the respondents in the PDUs was between the ages of 36-45 years and 48.4% in ADUs were between the ages of 26-35 years. In Nigeria, the definition of youths falls within the age bracket of 26-35 years. When compared the percentage of respondents in this age bracket living in PDUs and ADUs, this results showed that the preponderance of finding the youths living in ADUs is higher than in PDUs. While the majority of the PDU occupants (65.6%) were married, the majority of the ADU occupants (64.3%) were single.

The monthly household income is also higher in the PDUs than in the ADUs occupants across the three Zones. The majority (20.4%) of the occupants of PDUs earned between N151,000-N200,000 per month while the majority of the highest monthly income earner (39.5%) in ADUs earn between N26,000-N50,000. This result showed that while the majority of the occupants of the PDUs can be classified as middle income earners, the majority of the occupants of the ADUs are low income earners.

The number of occupants and households per dwelling unit is higher in the PDUs than in the ADUs across the three Zones. Overall, the majority (16.6%) of the PDUs have 4 occupants per dwelling unit while 28.0% of the ADUs have 3 occupants. Similarly, the majority (56.7%) of the PDUs have 1 household while 47.4% of the ADUs have 1 household. While 8.3% of the PDUs have more than 4 households, no ADU has more than 4 households. ADUs may have more than one household in cases where there are two or more rooms occupied by single individuals in rooming accessory dwelling units. The variation in the number of household per dwelling unit is dependent on the dwelling type. The results showed that apartment buildings with BQs constitute the majority

(36.7%) of the house type. Apartment buildings are more likely to have multiple households than owner-occupier houses. The detached bungalow BQs which form the majority (73.4%) of the ADUs in the study area is easily understood by a layman as ADU than the various types of attached BQs.

Analysis of the household size of the dwelling units showed that the majority (47.1%) of the occupants of the PDUs have 4-6 persons per household while 61.8% occupants of ADUs have 1-3 persons per household. Unlike the occupants of the PDUs, this result showed that the majority of the occupants of ADUs have smaller family sizes. Against the popular belief that ADUs are occupied by servants or relations of house owners, the results showed that 94.9% of the ADU occupants have no relationship or family ties with the house owners. The 5.1% of the respondents who have some form of relationship with the house owners ranges between family members and friends. There was not a case of servant or house help occupying the ADUs. The implication of the results is that the construction of accessory dwelling units in the study area is primarily for commercial purposes.

The Rental Differential between the PDUs and ADUs

There is a wide variation in the yearly rent paid between the occupants of PDUs and ADUs in the study area. This is due to the size, location and availability of the facilities in the dwelling units. The yearly rent paid in the PDUs ranges between N30, 000 and N200,000 while those of the ADUs ranges between N30,000 and N180,000. However, the majority (11.5%) of the occupants living in the PDUs paid a yearly rent ranging between N91,000 and N120, 000 while (37.6%) in the ADUs paid a yearly rent ranging between N31,000 and N60,000. The results showed that while 36.3%

of the respondents in the PDUs do not pay rent because they are either the property owners or relations to the property owners, 12.1% of the respondents in ADUs do not pay rent because of their relationship with the property owner.

Comparison of the Socio-Demographic Variables and Rental Values between the PDUs and ADUs

Student *t*-test was conducted to compare three key variables of the respondents. These multivariate variables are socio-demographic characteristics, income level of the

respondents, and the rental values of the PDUs and ADUs. While the above analyses of the collected data were sufficient to see the differences in the socio-economic characteristics of the respondents and the rental differential between the PDUs and ADUs, it is necessary to further test the three variables identified above in order to determine if there are significant statistical differences in the status of the two categories of respondents. The group statistics for these multivariate variables are presented in Table 4.

Table 4: Group Statistics for *t*-Test between the PDU and ADU Variables

Variables	House Type	N	Mean	Std. Deviation	Std. Error Mean
Marital status	PDU	157	1.88	.710	.057
	ADU	157	1.45	.711	.057
Household income bracket	PDU	157	3.89	1.556	.124
	ADU	157	2.28	.993	.079
Yearly rent	PDU	100	4.32	2.192	.219
	ADU	138	2.44	1.335	.114

Source: Authors (2018).

An independent *t*-test was conducted to compare the marital status of the respondents in the primary and accessory dwelling units. Table 4 revealed that there is a significant difference in the mean scores for the marital status of the PDU respondents (Mean = 1.88, Standard Deviation = 0.710) and the ADU respondents (Mean = 1.45, Standard Deviation = 0.711); $t(312) = 5.40$, $p = 0.00$ (two tailed).

The magnitude of the differences in the means (Mean Difference = 0.43, 95% confidence interval) is small (see Table 5). Since the significant value (p) 0.00 (two tailed) in the *t*-test output table is below the required cut-off of $\alpha = 0.05$, we conclude that there is a statistically significant difference in the mean scores of the marital status of the respondents in PDUs and ADUs.

Table 5: Independent Samples t-Test Output Table

Variables		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Marital status	Equal variances assumed	4.42	.036	5.40	312	.00	.43	.08	.28	.59
	Equal variances not assumed			5.40	312.00	.00	.43	.08	.28	.59
Household income bracket	Equal variances assumed	38.06	.00	10.90	.312	.00	1.61	.147	1.32	1.90
	Equal variances not assumed			10.90	264.86	.00	1.61	.147	1.32	1.90
Yearly rent	Equal variances assumed	36.44	.00	8.18	236	.000	1.88	.23	1.43	2.33
	Equal variances not assumed			7.61	151.43	.000	1.88	.25	1.39	2.37

Source: Authors (2018).

An independent *t*-test was conducted to compare the household income of the respondents in the primary and accessory dwelling units. Table 4 revealed that there is a significant difference in the scores for the household income of the PDU respondents (Mean = 3.89, Standard Deviation = 1.56) and the ADU respondents (Mean = 2.28, Standard Deviation = 0.99); $t(312) = 10.90$, $p = 0.00$ (two tailed). The magnitude of the differences in the means (Mean Difference = 1.61, 95% confidence interval) is large (see Table 5). Since the significant value (p) 0.00 (two tailed) in the *t*-test output table is below the required cut-off of $\alpha = 0.05$, we conclude that there is a statistically significant difference in the mean scores of the household income of the respondents in PDUs and ADUs.

Lastly, an independent *t*-test was conducted to compare the yearly rent between the primary

and accessory dwelling units. Table 4 revealed that there is a significant difference in the scores for the yearly rent of the PDUs (Mean = 4.32, Standard Deviation = 2.44) and the yearly rent of the ADUs (Mean = 2.44, Standard Deviation = 1.34); $t(236) = 8.188$, $p = 0.00$ (two tailed). The magnitude of the differences in the means (Mean Difference = 1.88, 95% confidence interval) is large (see Table 5). However, since the significant value (p) 0.00 (two tailed) in the *t*-test output table is below the required cut-off of $\alpha = 0.05$, the conclusion is that there is a statistically significant difference in the mean scores between the yearly rent of PDUs and ADUs.

The comparison of the multivariate variables of the respondents showed that there is a statistically significant difference in the mean scores of the three variables. This revealed that there are significant differences in the status of the two categories of

respondents. As expected, occupants of the primary dwelling units (PDUs) are more likely to marry, earn higher income and pay higher yearly house rents than those of the accessory dwelling units (ADUs).

Spatial Variation of the Multivariate Variables in the Three Zones of Asaba

Analysis of variance (ANOVA) was performed to show the spatial variation of the multivariate variables of marital status, income bracket and yearly house rent in the three stratified zones of Asaba. Tables 6 and 7 showed the calculated means and the ANOVA output table for the PDUs in the three zones of Asaba respectively.

Table 6: The Calculated Means for the ANOVA Output Table for the PDUs

Variables	Mean	Zone			
		Zone 1	Zone 2	Zone 3	Total
Marital status	Mean	1.92	1.95	1.75	1.88
	Number	50	59	48	157
	Std. Deviation	.83	.68	.60	.71
Household income bracket	Mean	2.96	5.24	3.19	3.89
	Number	50	59	48	157
	Std. Deviation	1.31	.86	1.28	1.56
Yearly rent	Mean	3.39	6.76	3.22	4.32
	Number	44	29	27	100
	Std. Deviation	1.62	1.55	1.42	2.19

Source: Authors (2018).

Table 7: ANOVA Output Table of the PDU Variables

Variables		Sum of Squares	df	Mean Square	F	Sig.
Marital status	Between Groups	1.17	2	.587	1.165	.315
	Within Groups	77.53	154	.503		
	Total	78.70	156			
Household income bracket	Between Groups	174.03	2	87.01	65.72	.00
	Within Groups	203.91	154	1.32		
	Total	377.94	156			
Yearly rent	Between Groups	243.35	2	121.68	50.78	.000
	Within Groups	232.41	97	2.40		
	Total	475.76	99			

Source: Authors (2018).

ANOVA showed that the mean difference for the marital status of the respondents in the PDUs in the three Zones is not significant at the $P < 0.05$ level, $F = 1.17$, Sig. = 0.32. Since the significant value is above 0.05 (p value), it indicates that there is no statistically significant difference in the spatial variation in the marital status of the respondents in the PDUs in the three zones. Majority of the respondents in the three zones were married.

ANOVA showed that the mean difference for the household income of the respondents in the PDUs in the three Zones is significant at the $P < 0.05$ level. $F = 65.71$, Sig. = 0.00. Since the significant value is 0.00 which is less than 0.05 (p value), it indicates that the difference in the spatial variation in the household income of the respondents in the PDUs in the three zones is statistically significant. Since it is not known where this difference has occurred, further post-hoc comparisons using the Scheffe test showed that the difference occurs in two zones. The Scheffe test showed that the mean score for the respondents' household income was significantly different between Zone 1 ($M = 2.96$, $SD = 1.31$) and Zone 2 ($M = 5.24$, $SD = 0.86$) at the 0.05 level. Zone 1 did not differ significantly from Zone 3 ($M = 3.19$, $SD = 1.28$) at the 0.05 level.

ANOVA showed that the mean difference for the rental value of the PDUs in the three Zones is significant at the $P < 0.05$ level. $F = 50.78$, Sig. = 0.00. Since the significant value is 0.00 which is less than 0.05 (p value), it indicates that the difference in the spatial variation in the rental value of the PDUs in the three zones in Asaba is statistically significant.

To know which zones this difference lies, further post-hoc comparisons using the Scheffe test showed that the difference lies in two zones. The Scheffe test indicated that the mean score for the rental value of the PDUs was significantly different between Zone 1 ($M = 3.39$, $SD = 1.62$) and Zone 2 ($M = 6.76$, $SD = 1.55$) at the 0.05 level. Zone 1 did not differ significantly from Zone 3 ($M = 3.22$, $SD = 1.42$) at the 0.05 level. The reason for the difference in the household income level of the respondents and rental value is a matter of location as can be seen later.

Tables 8 and 9 showed the calculated means and the ANOVA output table for the ADUs in the three zones of Asaba respectively. ANOVA showed that the mean difference for the marital status of the respondents in the ADUs in the three Zones is significant at the $P < 0.05$ level. $F = 9.98$ Sig. = 0.00. Since the significant value is less than 0.05 (p value), it indicates that there is a statistically significant difference in the spatial variation in the marital status of the respondents in the ADUs in the three zones. Further post-hoc comparisons using the Scheffe test showed that the difference lies between two of the three zones. The Scheffe test indicated that the mean score for the respondents' marital status for Zone 2 ($M = 1.19$, $SD = 0.39$) was significantly different from Zone 3 ($M = 1.77$, $SD = 0.99$) at the 0.05 level. Zone 1 ($M = 1.44$, $SD = 0.54$) did not differ significantly from either Zone 2 or 3.

Table 8: The Calculated Means for the ANOVA Output Table for the ADUs

Variables	Mean	Zone			
		Zone 1	Zone 2	Zone 3	Total
Marital status	Mean	1.44	1.19	1.77	1.45
	Number	50	59	48	157
	Std. Deviation	.54	.39	.99	.71
Household income bracket	Mean	2.18	2.80	1.75	2.28
	Number	50	59	48	157
	Std. Deviation	.80	1.10	.70	.99
Yearly rent	Mean	2.12	3.23	1.93	2.44
	Number	50	47	41	138
	Std. Deviation	.90	1.72	.76	1.34

Source: Authors (2018).

ANOVA showed that the mean difference for the household income of the respondents in the ADUs in the three Zones is significant at the $P < 0.05$ level. $F = 18.47$, $\text{Sig.} = 0.00$. Since the significant value is less than 0.05 (p value), it indicates that the difference in the spatial variation in the household income of the respondents in the ADUs in the three zones is statistically significant. Further post-hoc

comparisons using the Scheffe test showed that the difference lies in two zones. The Scheffe test showed that the mean score for the respondents' household income was significantly different between Zone 1 ($M = 2.18$, $SD = 0.80$) and Zone 2 ($M = 2.80$, $SD = 1.10$) at the 0.05 level. Zone 1 did not differ significantly from Zone 3 ($M = 1.75$, $SD = 0.70$).

Table 9: ANOVA Output of the ADU Variables

Variables		Sum of Squares	df	Mean Square	F	Sig.
Marital status	Between Groups	9.04	2	4.52	9.98	.00
	Within Groups	69.75	154	.45		
	Total	78.79	156			
Household income bracket	Between Groups	29.73	2	14.87	18.47	.00
	Within Groups	123.94	154	.81		
	Total	153.67	156			
Yearly rent	Between Groups	45.55	2	22.78	15.49	.000
	Within Groups	198.49	135	1.47		
	Total	244.04	137			

Source: Authors (2018).

The significant difference in the household income level of the respondents in both the PDUs and ADUs in Zone 1 and Zone 2 is not unexpected because Zone 2 is a high brow residential area for the high income earners whereas Zone 1 is the traditional residential neighbourhoods where low income earners are more likely live.

ANOVA showed that the mean difference for the rental value of the ADUs in the three Zones is significant at the $P < 0.05$ level. $F = 15.49$, Sig. = 0.00. Since the significant value is 0.00 which is less than 0.05 (p value), it indicates that the difference in the spatial variation in the rental value of the ADUs in the three zones is statistically significant. Further post-hoc comparisons using the Scheffe test showed that the difference lies in two zones. The Scheffe test indicated that the mean score for the yearly rent of ADUs was significantly different between Zone 1 ($M = 2.12$, $SD = 0.90$) and Zone 2 ($M = 3.23$, $SD = 1.72$) at the 0.05 level. Zone 1 did not differ significantly from Zone 3 ($M = 1.93$, $SD = 0.76$).

The significant difference in the rental value of both the PDUs and ADUs between Zone 2 and Zone 1 did not come as a surprise. This is because Zone 2, as shown earlier, is a high brow residential area which attracts high rental value. There is not much difference in rental value and household income level between Zone 1 which is a low income area and Zone 3 which is a middle income residential area of Asaba.

Discussion

The results of the analyzed data provide a deep understanding of the socio-demographic characteristics of the occupants of PDUs and ADUs in the study area. The composition of population is part of the social environment of housing (OECD, 2009). The descriptive variables are necessary for understanding the social dynamics for comparative research. The

findings of this study agreed with those of Brown and Palmeri (2014) who compared the ages of PDUs householders in Portland, U.S.A with those of ADUs rentals. While the age distributions are similar, the median age of the renter-householder was nearly identical to the estimated median for ADU renters.

When it comes to the number of household per dwelling unit, communities in developed countries are hesitant to adopt ADU policies fearing an uncontrollable increase in population in predominantly single family neighbourhoods and the number of permits requested (Hickey, 2010). However, Chapman and Howe (2001) suggest that in Seattle, U.S.A, of the 2.16% individuals living in dwelling units with an accessory unit, 1.2% individuals reside in ADUs on average. This study also agrees with earlier studies that ADUs have mutual benefits to the home owner and the renter (Howe & Chapman, 2001; Caro, 2006). If rented, ADUs provide additional income for homeowners while making homes more affordable to renters.

Due to their subordinate size and location to the PDUs, most ADUs rent for less than the main house. However, rental housing of any form is almost always associated with two perceived threats: the people they attract and the impact of rent on property values (Brown and Watkins, 2012). The latter is a common concern among neighbourhood residents where ADUs are allowed. However, there is no consensus among researchers as to whether the effects are positive or negative. Some of the resultant valuation of property depends on the appraisal formulas employed by various agencies (Brown & Watkins, 2012; Brown & Palmeri, 2014). Apart from their subordinate size and location, ADUs may be rented for less than PDUs because of the informal way they are often supplied and managed.

One of the most frequent objections to ADU developments is the fear they will reduce

the availability of on-street parking for neighbourhood residents (Campbell, 2013). Parking requirements are continually referenced in the literature as the largest obstacle for further density expansion in single-family neighbourhoods (Carlson & Shishir, 2004). There is very little published evidence of the effect, positive or negative, of ADUs on street parking (Katsuyama, 1995). There is no evidence of any causal relationship between ADUs and on-street parking in this study. However, it is expected that ADUs can potentially increase the rate of car ownership particularly in the high income area.

Conclusion

The population demographics of the respondents in this study revealed that accessory dwelling units (ADUs) are needed for the change in population dynamics in the study area. ADUs or Boys Quarters are commonly thought of as being constructed for boys, servants or attendants. This study has showed that this it is not always the case as ADUs provide accommodation for both the young and old with varying income levels as well as singles and married couples as it is found in the primary dwelling units (PDUs). The study has showed that there are contrasts and similarities in the socio-demographic characteristics of the occupants in both the PDUs and ADUs in the study area. Also, the rental values of both the primary and accessory dwelling units vary across the three zones of Asaba.

The rapid expansion of Asaba will potentially lead to housing shortage in the near future. ADUs will mitigate such shortfall in housing need when it arises. ADUs therefore provide not only affordable accommodations for people with different socio-economic background but provide a mix of housing types within residential neighbourhoods.

The popularity of ADU in the city of Asaba is an indication of the public acceptance and affordability of this housing option. The worries of ADU opponents will be softened with the documentation of this alternative housing option and its increased property values instead of the preconceived fear of neighbourhood blight and congestion. While the ADU does represent a change in the classic image of a single-family neighbourhood, it serves in conjunction with the existing housing infrastructure to diversify options.

Although housing standards and development control regulations are beyond the scope of this study, it should however be stated that there is need for the appropriate agencies of government to monitor residential development and ensure that proper planning and building standards are adhered to. This is because most ADUs in Asaba are constructed without adequate setbacks and airspaces between them and the PDUs. The number of occupants of some ADUs is disproportionately high in relation to the number of rooms and room sizes. There should be regulations in place to keep the number and population density of ADUs in check.

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