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MODELLING THE VARIATION IN THE MOBILITY PATTERN OF HOUSEHOLDS IN THE URBAN AND RURAL AREAS OF NIGERIA

Summary. There is evidence that rural areas are disadvantaged in mobility compared to urban areas. Hence, this study examined spatial variation in the travel pattern of households in urban and rural areas of Nigeria. This study used primary data obtained through questionnaire administration on household heads in the residential zones of both urban and rural areas studied, using the multi-stage sampling technique. Findings revealed that variations exist for age, education level, income level, and occupation in urban and rural areas, and household's average daily mean trip frequency showed a level of fewer trips being generated in the rural area than those in the urban area. Furthermore, the result of the stepwise multiple regression analysis showed that transport mode, household size, number of workers in the house, and occupation of household head were significant variables influencing trip making in urban areas while age, household size, the income of household head and number of employed people were significant in the rural areas. This study concludes that differences exist in the mobility pattern of urban and rural households, and as such, equal consideration and attention should be given to them in policy formulations.

Keywords: trip generation, socio-economic characteristics, mobility, urban, rural

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1. INTRODUCTION

The role of transportation in the development of any economy cannot be overemphasised, it is very pivotal in the overall development of any society, be it a rural or urban society, transportation constitutes the main avenue through which different parts of the society are connected. This aligns with the submission of Stead et al. [1], who opined that transport is inevitable to human development whether in urban or rural areas, as it enables people to participate in social and economic activities, thus, improving their overall health.

Travel represents an expression of an individual's behaviour and, as such, has the characteristics of being habitual. As a habit, it tends to be repetitive, and the repetition occurs in a definite pattern [2]. Studies by Solanke, [3-4,] Oyesiku, [5], and Osoba [6], asserted that individuals in various locations generate different mobility patterns, and almost all the world's urban areas face difficulties coping with the variety of travel, which are made in response to individual needs and desires. The descriptions of such travel activity patterns provide considerable insight into the nature of daily life and variations in the quality of life experienced by different groups of people. An important observation from existing works on urban travel is that the relationship between travel and individual characteristics implies, among other things, that individuals with the greatest extent, variety, and frequency of travel are those with the fewest constraints imposed upon them. Constraints can be imposed by one's socio-economic status, household and societal roles, and location vis-à-vis the size and density of settlements. Although research on mobility patterns of urban or rural dwellers exist, this study advances such discussions by examining a comparative study of mobility pattern as well as identifying factors influencing trip making in Nigeria's urban and rural areas. In this study, a detailed investigation and review of factors influencing household travel behaviour and mobility pattern were carried out.

2. LITERATURE REVIEW

2.1. Travel Situation in Developed and Developing Countries

Transport is essential in both developing and developed countries, although it is often taken for granted. Macroeconomic facts about transport are indeed impressive. Transport accounts for 3 to 8% of countries' GDP in Asia and the Pacific [7]. Over time, cities and towns have served as centres for entertainment, shopping, banking, and other activities. Due to the growing population in the twentieth century, most of these activities have also extended to the periphery. Beginning as early as the 1940s, downtown stores and banks, for example, found that they could serve their customers more conveniently by locating a branch in the suburbs [8]. Bert et al. [9] believed that land-use and transport policies' sole aim is to improve accessibility. This reflects in the ability of producers to transport finished goods to and between different locations.

In developing countries, urbanisation rates have led to a higher dependence on motorized travel, hence, leading to a deterioration of transport infrastructures since demand outweighs supply. [10]. This notion of dependence on motorised transport is supported by Mackenzie and Walsh [11], who asserted that there has been an increase in the number of vehicles globally. For instance, in 1950, about 53 million cars were on the world's roads, four decades later, this number rose to over 400 million, with an average growth of 9 million motor vehicles per year. Based on the above, it can be said that there has been an increase in car dependence, which may influence travel, especially in developed countries. However, despite the increase in car

ownership and reliance on private automobiles, it is pivotal to know if this has resulted in changes in the mobility of people irrespective of the location. Hence, it is expedient to identify spatial variation in travel of urban and rural dwellers to identify factors influencing their trip making.

2.2. Factors Influencing Travel

Generally, it has been discovered that different factors ranging from demographic attributes, level of transport infrastructure, government policy, city structure and location of households, among others, affect household travel behaviour [12-15]. Socio-economic characteristics have a significant impact on travel behaviour and must be adequately represented at a disaggregate level in models that attempt to estimate the impact of the built environment on travel behaviour. Age, household composition, income, gender, and car ownership are the most important socio-demographic variables influencing travel behaviour. It can be ascertained from the aforementioned studies that different factors account for changes in travel patterns and that people have different travel characteristics significant to them.

Household Composition, Car Ownership and Income

A study by Ryley [16] on the composition of households in Edinburgh found that households with children have distinct travel behaviour characteristics. These households are highly dependent on cars as their primary source of travel mode, own but do not often use cycles, and favour cycle trips predominantly for leisure rather than work journeys. Key stages within the household life cycle that impact travel behaviours include gaining employment, having children and retirement. Thus, households consisting of students and the unemployed are most likely to use non-motorised forms of transport. Conversely, families consisting of retirees and high-income owners are least likely to use non-motorised forms of transport. According to Fadare and Alade [17], car ownership depends largely on the income level of an individual and could significantly influence trip making.

In addition to the above factors, psychosocial attributes also affect travel behaviour. These psychosocial attributes include:

i. Safety
ii. Protection from socially undesirable groups
iii. Feeling of prestige within the peer group
iv. Identification with selected peer group
v. Feelings of greater autonomy

Hiscock et al. [18] studied the perceived psychosocial benefits of car use and ownership. The study revealed some psychosocial benefits to car users. They felt that they gained protection, autonomy and prestige from their car and that car ownership is a form of high social status. Their car provided them with protection from 'undesirable' people, autonomy, convenience, and greater access to a greater range of destinations than public transport. In addition, Cullinane [19] observed similar psychosocial perceptions amongst students attending universities in Hong Kong. It was discovered from the study that car ownership was extremely low amongst the participants. Respondents felt that public transport was cheaper, readily available and also allowed them to interact with friends, hence, there is a perception that people consider these psychosocial attributes when making trips, thus influencing their mobility pattern.

Location of Land Users and Distance

These factors are very important to people who choose their travel characteristics, as their home and workplace are at two different locations. According to Johansson et al. [20], time and distance influence travel behaviour in a non-linear way. People get tired and bored in daily long-distance travel; this discourages them from embarking on trips.

Urban Structure

The urban structure is another aspect that defines travel characteristics. Census data for the Houston metropolitan area shows that from 1990 to 2000, the share of commuters driving alone to work rose from 75.7 to 76.6%, while the share that carpools declined from 14.6 to 14.4%, and those who ride transit fell from 3.8 to 3.5% [21]. This happened because of the urban growth wherein the high-density area, transit, and buses are available, but for the city sprawl, there is a big area to cover, and it is difficult for transit and buses to cover all the area. In another study by Boarnet and Crane [22], it was discovered that land use and design proposals would influence the price of travel and hence the type of trip undertaken. However, a study by Boarnet and Sarmiento [23] in Southern California on the relationship between land-use variables and travel behaviour was found to be statistically insignificant.

Congestion Factor

Traffic congestion issues have led to more complex problems such as delays, accidents, and increased travel costs, to mention just a few, hence discouraging people from making trips. Congestion indicator is on trip chaining: workers who commuted in peak periods and non-work trips among alternative chains [24]. Subsequently, people may reduce or not embark on trips if there are road congestions.

Stress/Health /Psychological Factor

Road users stuck in traffic congestions easily feel stressed and pressured, which negatively affects their health. Thus, all users tend to self-seeking behaviour like frustration and sometimes anger [25]. According to Koslowsky et al. [26], industrial and organisational psychologists are generally concerned with more indirect effects, such as attitudinal and emotional outcomes, which indirectly affect the mobility pattern of people.

Impact

A densely populated city suffering from heavy traffic experiences negative consequences like air pollution, fuel consumption, long travel time and stress [27-28, 21]. There are positive and negative impacts during travel, and traffic congestion is one of the negative impacts, resulting in delays and increased travel. Hence, discouraging people from embarking on a trip.

Cost of Trip

Travel cost is another factor that could influence travel behaviour, and it is one of the issues highlighted when people commute. Every single commute needs cost, but the difference is the high or low cost, which depends on the type of commute and the distance of commuting. This will also influence the use of either motorised or non-motorised transport, as the high cost of trips may influence the use of non-motorised trips such as cycling or walking in a friendly environment, and vice versa [29]. Hensher and King [30] studied the availability of parking spaces and the cost of parking on travel behaviour in Sydney. It was found that in 97% of the responses, the cost of the parking option was the most significant factor that determined travel mode and, as such, influences trip making.

Based on all these, trip making is a function of the socio-economic characteristic and demographic characteristics, such as location, and other travel-related impacts such as stress and fatigue, which could affect the health of an individual. As a result, people have different travel patterns due to variations in their socio-economic characteristics. This implies that differences in location, socio-economic characteristics, and travel characteristics of households could influence the mobility pattern of individuals and households.

2.3. Theoretical Review

The theoretical link between transport and location is explained from the outlined perspectives: Spatial Mismatch Theory, Social Exclusion Theory, and Social Justice Theory.

The spatial mismatch theory explores the relationship between transport and poverty from a geographical perspective. It was developed primarily in North America in 1960 by John F. Kain, and it explains the relationship between location, accessibility, and poverty. This explains the spatial barriers poorer people face to access jobs and services in the context of suburbanisation and high car dependency [31]. As explained by the theory, cheaper, more affordable housing tends to be in areas with poor transport connectivity and poor service provision; thus, it becomes increasingly difficult for those of lower income and without a car to access jobs and quality services, hence, negatively affecting their quality of life. This can be likened to the situation in the rural areas, where most households are low-income earners who may not be able to afford the cost of living in urban areas with quality services for transport and housing, thus, settling in environments with poorer transport connectivity which disconnects them from accessing good and quality services and transport infrastructures which may impact their wellbeing negatively. Hence, the location of an individual can be linked to his status, given such socio-economic characteristics as income, level of education, and occupation, among others, and these factors influence one's travel behaviour. Overall, this theory explains the relationship between the locational pattern of people and their socio-economic status. It emphasises the reason the poor resides in areas where there are poor services due to their inability to afford the luxury of urban living.

Social exclusion theory: This examines relationships between transport and poverty, and contrary to the spatial mismatch theory, social exclusion literature focuses more on the consequences of transport deprivation than on the processes leading to it. The spatial mismatch theory is the process leading to the consequences being explained by the social exclusion theory. Mainly a theory from the social sciences, it is based on a term first developed in France by Red Lenoir in the early 1970s, which refers to the loss of the ability to connect with the services and facilities needed to participate in society fully. It explains the consequences or the impacts of poor transport facilities on the poor, who live in locations with poor transport connectivity; they become disadvantaged because of their socio-economic conditions and their location. Research on transport builds upon this general conceptualisation to define transport-related social exclusion as the process by which people are prevented from participating in the community's economic, political, and social life. This is typical of the experience in rural areas, and Akure North Local Government Area dwellers may not escape these consequences as most of them are deprived of accessibility to good transport infrastructures to enhance their mobility.

Social justice theory: This approach was developed by John Rawls, author of the seminal in the 1970s. His thought centred on the idea of fair distribution and equality of opportunity. It examined transport-related disadvantages and their relation to poverty from a perspective of inequality. This approach relates mainly to the underlying idea of equality of access and thus suggests that policies should focus on offering the greatest benefit to the least advantaged

members of society [32-33]. This approach allows equality in the distribution of infrastructures and facilities to disadvantaged communities and populations to enhance their mobility. This is particularly relevant to those living in poor transport connectivity environments like rural areas.

3. METHODOLOGY

Our study used primary data which was collected using trained research assistants, and we adopted the multi-stage sampling procedure. In the first stage, stratification of the study areas (Akure North Local Government Area (Rural) and Akure South Local Government Area (Urban)) was employed. In the urban area, stratification of the area revealed that there are 11 political wards, and 50% were randomly selected. Further information from the Area Town Planning Area office revealed that there are 5,123 registered buildings in the selected wards, and 10% were randomly selected. Thus, a total of 512 buildings representing households were surveyed. In line with the study of Bookwalter et al. [34] and Owoeye et al. [35], who justified and used the household head as the basis for the selection of respondents in a household for the survey, systematic random sampling was thus adopted in selecting a household head from 1 out of every 10th building. The first building was chosen at random, and subsequent buildings were systematically selected. A household head not below the age of 18 years (adult) on each floor of the selected building was sampled. Based on this, a total of 512 respondents were surveyed. Where the respondent was not available, the next building was selected for the sample. However, a total of 498 questionnaires (97%) were found usable for analysis. In selecting respondents in the rural areas, information from the stratification of the area revealed that there are a total of 12 political wards in the study area. Further, 50% of the wards were randomly selected. Using this method, six (6) political wards were selected for sampling. The selected wards include Ayede/Ogbese, Agamo Oke Ore/Akomowa, Isimija/Ilado, Odo Oja/Ijigbo, Oke Ofa/Owode, and Moferere.

In the second stage, buildings in the selected wards were identified, ranging from semi-detached houses to hut structures made of traditional materials, among others. Information from the National population commission revealed that there are a total of 12,365 registered buildings in the selected wards, and 4% of these buildings were selected for questionnaire administration. The number of questionnaires administered in each settlement was based on a sample size of 4% of the listed households, and the use of a 4% sample size in this kind of study is not new. For example, Olawole [36], in a study of rural mobile phone usage and travel behaviour in Nigeria, suggested a maximum of 10% sample of rural household heads in studies involving rural residents. The last stage involved the selection of respondents for questionnaire administration. The systematic random sampling technique was adopted in selecting respondents, and an adult not below the age of 18 years was surveyed. Further, 1 of every 25th and 10th building was systematically selected, representing 4 and 10% of the total building in the rural and urban areas, respectively. Using this procedure, a total of 495 and 512 respondents were surveyed.

The formula for the sample size in the study location:

$$K = N/n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots i$$

Where K= sample size

N= number of registered building/dwelling unit/household

n= represents 10 and 4% of all households per settlement in the urban and rural areas, respectively.

Study Area

The study locations, as presented in Figures 1 and 2, are Akure North Local Government Area (Rural) and Akure South Local Government Area (Urban). The choice of the study locations was influenced by the population size, occupation, administrative activities, infrastructural provision, and development.

Akure South Local Government Area is the capital of Ondo State in 1976 and the headquarters of Akure South Local Government Council since its creation. The socio-economic activities in the town have made it a convergent point for people from different parts of the state. Also, the multifarious activities performed in the local government have given rise to improvements in transport facilities by influencing the state government to construct new roads and rehabilitate the old ones. Akure North Local Government Area was created on the 1st of October, 1996. The local government is blessed with fertile land that is good for agriculture. This has made farming the major occupation of the people. This typically depicts the area as rural as most of the populace engage in agricultural activities. Even though both local governments are approachable by road, it is unfortunate that most communities in some parts of the local government, such as Ala- Igabatoro, and Elefosan, among others, are usually cut off from other parts of the local government, especially during the rainy season as most of the footbridges in the area are over flooded, making transportation a big task.

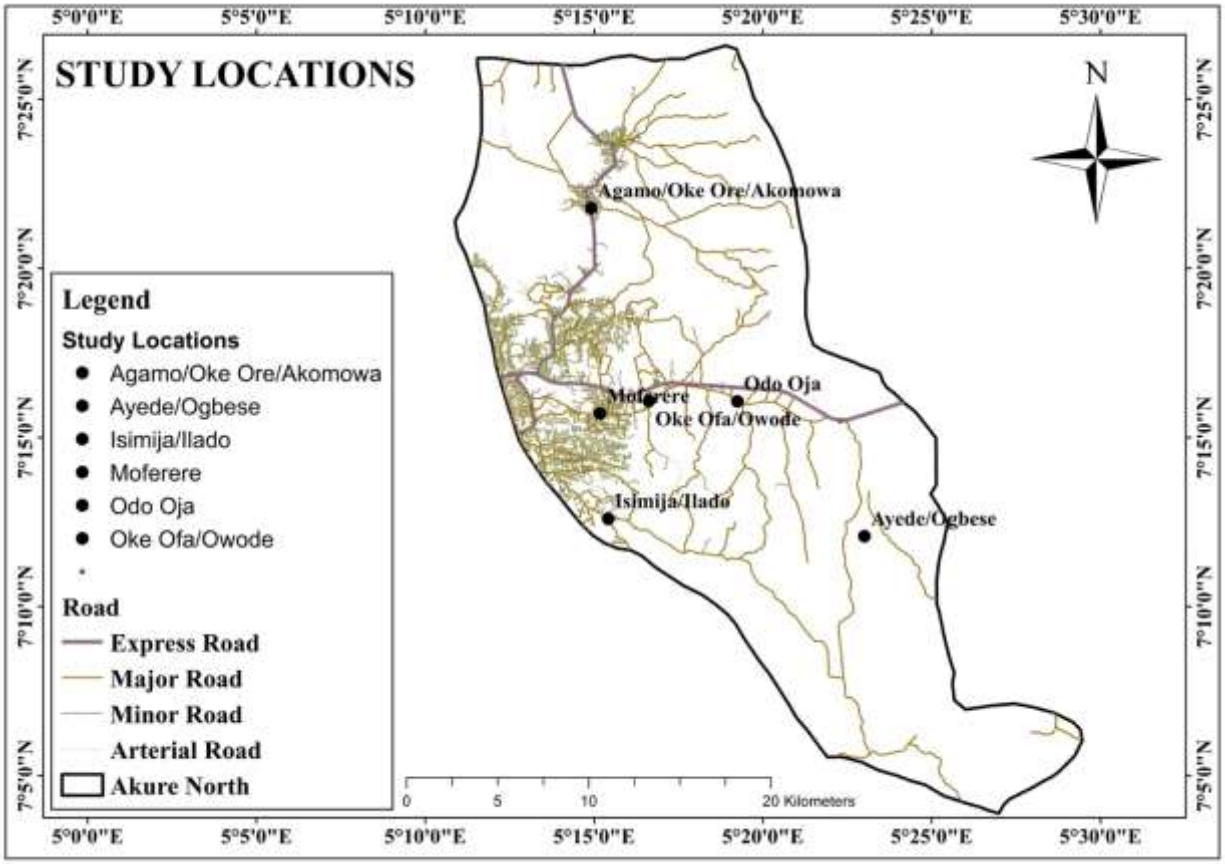

Fig. 1. Study Location (Akure North Local Government Area- Rural Areas)
Source: ARCGIS 2021

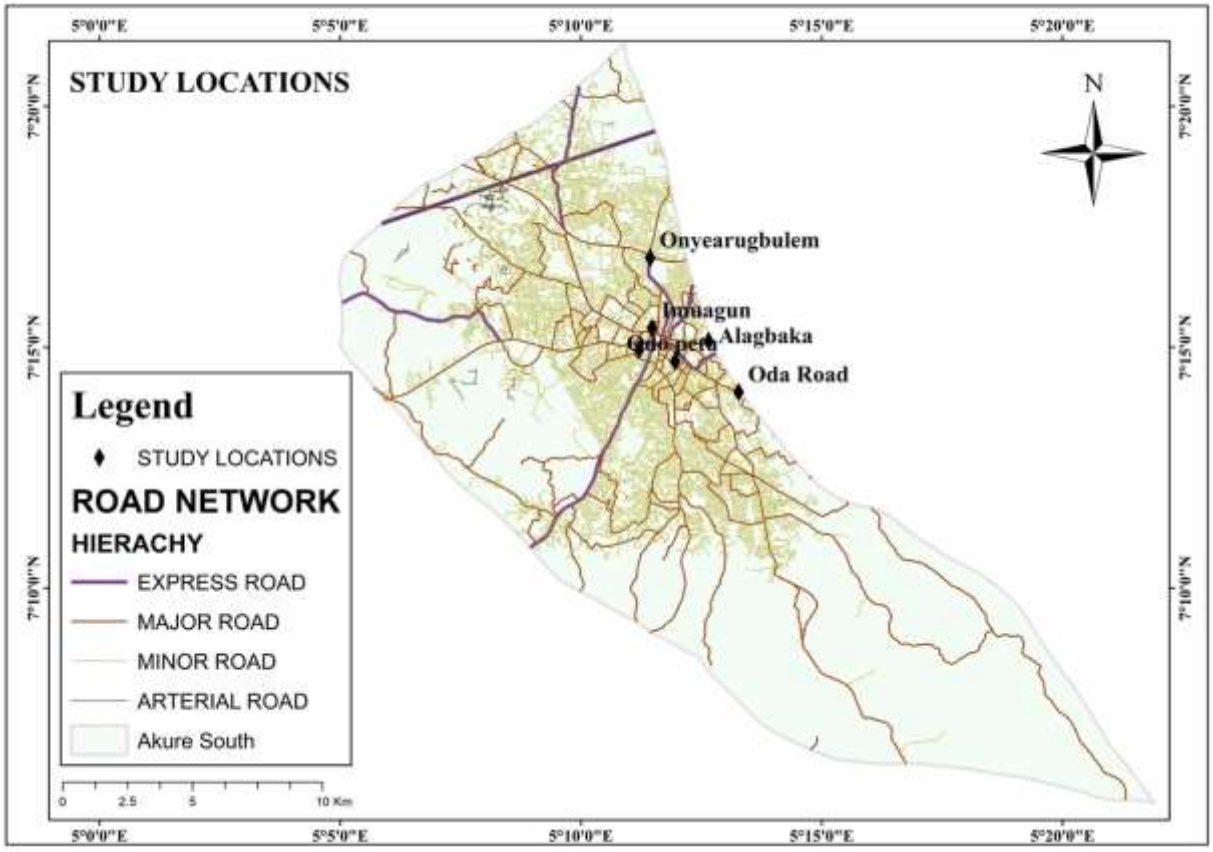

Fig. 2. Study Location (Akure South Local Government Area- Urban Areas)
Source: ARCGIS 2021

4. RESULTS AND DISCUSSIONS

Information and results on the socio-economic characteristics of respondents, travel characteristics of respondents and factors influencing the trip generation of households are discussed in this section.

4.1. Socio-economic Characteristics of Respondents

Polk [37] found a significant relationship between sustainable travel patterns and gender. Information on the gender of respondents revealed that the majority (54.1%) of respondents in the urban areas were male, while the majority (52.5%) of those in the rural areas were females. The result on the age distribution of households showed variation in the age of urban and rural households. From the study, 63.7% of respondents in the urban area were between the ages of 18-40 years, while the elderly, which were from 60-69 years old, accounted for the largest (43.7%) proportion in the rural areas. This agrees with the assertions of the World Bank [38] that the aged, who are from 60 years upwards, dominate the rural areas. The study further identified the median age for respondents in the rural areas as 51 while that of the urban as 45.

The result on education distribution also found variation in the distributional pattern of households in both areas. While a greater number (72.1%) of respondents in the urban area had tertiary education, only 33.3% of their counterparts in the rural area fell into that category. Most of the rural households (54.4%) had secondary education. A study by Gardiner [39] on variation in the educational level and performance of both urban and rural areas showed that most people between the ages of 25 and 34 in urban areas had completed matriculation than their rural counterparts and more than double the number of urban people has achieved a post-school qualification (tertiary education) than the rural people have done, thus corroborating the findings of this study. Occupation of residents or the profession an individual engages in is a determinant of their level of income [40-41]. We found out that most of the urban respondents were civil servants (42.5%) against 10.6% of their counterparts within the same category in the rural areas. Households in rural areas engage in farming activities, with 40.3% of the respondents in this occupational category, while only 4% of their counterparts in the urban area engage in farming. It is noteworthy that the variation in occupation of urban and rural dwellers reflects their education level. The assertion by Ahn [42] and Kyeremeh and Fiagborlo [43] that one's level of education could determine the type of job one could engage in upholds this fact. Also, Nwachukwu [44] argued that farming is one of the dominant activities of households in rural areas.

The income of residents is another important variable in the explanation of trip making. To present this, the income group for federal tax rating was adopted to illustrate the income distribution of respondents. The minimum monthly income in the urban areas is ₦1000, the maximum is ₦400,000, and the average monthly income for the respondents is ₦51, 686.8k. Also, 54.8% of the urban dwellers earned between ₦60,000 - ₦79,999, thus constituting the highest in that category. In the rural area, majority (34.8%) of the respondents earned below the federal government adopted minimum wage of ₦20,000. This implied that the average income for rural households is low compared to those in urban areas. The mean income for the rural dwellers stood at ₦35,215.9k, while that of the urban areas was ₦51,686.8k. Car ownership is a form of income earned by an individual, and it is another socio-economic variable influencing mobility patterns. The study revealed that about half (49.6%) of the respondents in the rural areas do not own a car; on the contrary, almost half of the households, precisely, 49.3% of urban households, own a car. This supports the assumption of Giuliano [45], which argued that the rate of car ownership among low-income earners is low compared to the high-income earners in the society, which may be typical of a rural environment.

4.2. Travel Characteristics of Households

The travel characteristics of respondents to the trip frequency, travel cost, transport mode and trip purpose are discussed here. Analysis of the trip frequency of households in the study areas revealed that the urban dwellers made more trips than the rural dwellers. From the study, 50.8% of respondents in the urban areas made an average of 4 daily trips while 71.9% of their counterparts in the rural area made an average of 1 daily trip. The mean trip stood at 2.29 and 1.36 for the urban and rural dwellers, respectively. The reason for the differences in the trip generation rate of households in both urban and rural areas of the study is not far-fetched, as the majority of those in the rural areas do not own a car; hence, may be discouraged from embarking on numerous trips. Our finding corroborates the assertions from the 2017 National household travel survey [46], which stated that rural dwellers make fewer trips compared to those in the urban areas. The reason for the fewer trips by rural dwellers was attributed to factors ranging from poor road conditions in the rural areas, lack of organized public transport, and the

low level of income, among others. Information on travel mode also showed significant differences among the urban and rural respondents, while 50.7% of urban dwellers used a private car for their trips; this is not the case in the rural area as a greater proportion (43.2%) used the non-motorised travel (walking/cycling) for most of their trips. This is not surprising as studies by Starkey [47] and Towner [48] upheld the use of non-motorised transport as the dominant mode for most rural dwellers.

The travel cost of respondents was also examined, and it was discovered that school trips accounted for the highest cost by rural dwellers as 43.3% averagely spent ₦4286. The majority of them attributed this to distant learning due to the poor quality of education in the neighbourhood; hence, travel to the urban centres for good, quality education. Contrarily, the trip to work had the highest amount compared to other trip types in the urban centres. It was discovered from the study that travel costs, as explained by the respondents, includes money spent on fuelling the vehicles, especially for those who made use of their private automobiles, public transport fares and other cost incurred especially during peak hour travels and traffic congestion. On average, 80% of the respondents spent ₦73,485 averagely on work trips.

Overall, the summary of socio-economic and travel characteristics of respondents showed variation in age, education, occupation, income distribution, car ownership, trip frequency and transport mode. This can be likened to the spatial mismatch and social exclusion theory which explains the impact of one's socio-economic characteristics in determining the location (urban/rural) due to the affordable housing and transportation cost in most remote locations; hence, individuals with low income tend to settle in places with a lower cost of living and vice versa. This, in turn, excludes them from better opportunities that could positively affect their overall quality of life because of social exclusion.

4.3. Analysis of Factors Influencing Trip Generation of Respondents in the Urban Areas

A stepwise regression analysis determining the factors influencing the trip generation of households was carried out to identify factors influencing trip generation.

The formula for this is:

$$Y = a + b_1 x_1 + b_2 x_2 + \ldots\ldots\ldots + b_n x_n + e \quad (1)$$

Where Y represents the dependent variable. The dependent variables, in this case, represents *Y= Trip frequency*,
$x_1, x_2, x_3 \ldots\ldots\ldots x_n$ represent the independent variables,
a, b are constants,
e is the error term.

A total of 10 predictors/independent variables listed below were employed in both the urban and rural areas: age, the income of respondents, gender, education, occupation, household size, cars in the household, employed people/workers in the house, and travel cost and transport mode. As revealed in Tables 1 and 2 from the stepwise multiple regression analysis for the urban area, four variables were significant in influencing trips. These variables include transport mode, household size, workers in the house, and occupation of the household head. The model summary result showed that the coefficient of determination (R^2) is 0.349, implying that about 34.9% of trip frequency is explained by the combined influence of the four independent variables selected by the stepwise regression model. Findings from this study corroborate

earlier studies [15, 29] that found a similar result of household size, travel cost, and transport mode influencing trip generation.

In addition, the ANOVA result with F=10.100, 7.495, 10.727 and 9.786 at 'P= 0.02, 0.01, 0.00 and 0.00' similarly concludes that there is a significant overall regression using all the variables in the model. Furthermore, the coefficient of the regression provides information on the regression coefficient, standard error of the estimates and the t-tests. The estimated coefficients are given under the heading 'Standardised (Beta) coefficients'; the predicted change in the dependent variable when each explanatory variable is increased by one unit, conditional upon the fact that all other variables in the model remain constant.

The summary of the regression coefficients was used to develop a multiple linear regression model as:

$$Y= 3.153-0.280(MODE)+0.625(HHS)-0.570(EMPLOYED)+0.216(OCCU) \quad (2)$$

Prediction Ability of the Model: Coefficient of Correlation "R", R = 0.591 means that there is a 59.1% linear relationship between the dependent and independent variables, while "Coefficient of Determination R^2", R^2 = 0.349 means that 34.9% of the dependent variable is explained by the independent variables. From the model equations, the positive sign in the coefficient of HHS (household size) and OCCU (occupation) indicates that an increase in their numbers is also associated with an increase in trip generation for the respondents. For instance, an increase in the number of the household by one additional member will lead to an additional trip. However, the negative sign in the coefficient of MODE indicates a reduction in trip generation upon utilization of either walking/cycling. This implies that a reduction in the accessibility to a private car or public transport for a member of the household in the urban area will automatically reduce the trip generated by such an individual and household. We can then deduce from this that the availability of a car or accessibility to a motorized mode of transport such as public transport for an individual or household will motivate travel; hence, improving their mobility pattern and overall quality of life since mobility enables interactions with people and places.

Tab. 1

Model summary for trip generation in the urban area

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.343[a]	.117	.106	5.57582
2	.408[b]	.167	.144	5.45396
3	.551[c]	.303	.275	5.02097
4	.591[d]	.349	.313	4.88568

a. Predictors: (Constant), Dominant mode of transportation used

b. Predictors: (Constant), Dominant mode of transportation used, Household size

c. Predictors: (Constant), Dominant mode of transportation used, Household size, Number of employed people in the household

Source: SPSS OUTPUT/Authors' Survey 2021

Tab. 2

Coefficients for Regression analysis of Trip Generation in the Urban area

Model		Unstandardised coefficients		Standardised coefficients		
		B	Std. error	Beta	T	Sig.
1	(Constant)	22.312	3.254		6.857	.000
	Dominant mode of transportation used	-3.140	.988	-.343	-3.178	.002
	(Constant)	19.631	3.428		5.727	.000
2	Dominant mode of transportation used,	-3.198	.967	-.349	-3.308	.001
	Household size	.575	.273	.222	2.106	.039
3	(Constant)	19.992	3.157		6.332	.000
	Dominant mode of transportation used,	-2.635	.902	-.287	-2.920	.005
	Household size,	1.547	.358	.597	4.317	.000
	Number of employed people in the household	-3.011	.791	-.531	-3.807	.000
4	(Constant)	18.377	3.153		5.827	.000
	Dominant mode of transportation used,	-2.563	.879	-.280	-2.918	.005
	Household size,	1.619	.350	.625	4.624	.000
	Number of employed people in the household,	-3.232	.776	-.570	-4.166	.000
	Occupation of the household head	.486	.214	.216	2.270	.026

Source: SPSS Output 2021

a. Dependent variable: average number of trips

(Significant at P≤ '0.05')

4.4. Analysis of Factors Influencing the Trip Generation of Respondents in the Rural Areas

The result of the stepwise regression analysis in Tables 3 and 4 for the rural respondents revealed that four significant socio-economic variables: age, household size, the income of household head and the number of employed people in the house, were significant in influencing trip making. The R^2 value, which represents the coefficient of determination, shows 0.202 and 0.273 for age and household size, respectively. This implies that age with R^2 value of 0.202 and household size, 0.273, contributes about 20.2 and 27.3% to influencing the average trip making of respondents in the rural areas. Further to this, the coefficient of multiple determination for income of household head shows 0.326, implying that 32.6% of factors influencing the trip making of respondents is influenced by the income of the household head while the number of employed people in the household has an R^2 of 0.368; thus, suggesting that the average number of employed people in the house contribute 36.8% to factors influencing the trip making of respondents in the urban area of the study.

The ANOVA result with F=33.436, 24.577, 20.986 and 18.761 for the four significant independent variables at 'P =0.01' for age, household size, the income of household head and the number of employed people in the house further revealed the significant overall regression.

The coefficient of regression also explains the influence of the predictors/independent variables in influencing the dependent variables. From the table, it was discovered that the negative standardised coefficient for age implies that a unit increase in age will portend a decrease in the trip frequency of respondents in the urban area, while a unit increase in the household size will lead to an additional increase in trips. Likewise, the result of the regression analysis also established that the positive standardised regression coefficient of 0.232 and 0.250 for the income of the household head and the number of employed people, respectively, in the household explains that a unit increase in the income of respondents and number of employed people in the household by at least 0.232 and 0.250, respectively, will increase the trip rate for the household. The model result also supports earlier assertions that there is a likelihood for households with more seniors or elderly to generate fewer trips than households with other age cohorts. This was attributed to the deteriorating health condition of the aged, which may not encourage or allow them to embark on numerous trips. Also, the majority of the elderly are retired, thus reducing their number of trips.

The summary of the regression coefficients was used to develop a multiple linear regression model as:

$$Trip\ Frequency=3.934 -0.284(Age)+0.368(HousSize)+0.231(INC)+0.250(EmpMM) \quad (3)$$

Prediction Ability of the Model: "Coefficient of Correlation "R", R = 0.606 means that there is a 60.6% linear relationship between the dependent and independent variables, while "Coefficient of Determination R^2", R^2 = 0.368 means that 36.8% of the dependent variable is explained by the explanatory variables.

Conclusively, the common factors influencing trip generation of households in both urban and rural areas are the household size and the number of employed people in the house. From the model, an increase in the household size in both the urban and rural areas will result in additional trip generation for the households. Hence, the number of people living and feeding from the same pot portends an increase in trip generation patterns. However, the impact of the number of employed people on trip generation in the urban and rural areas varies, while an additional employed member/worker for the urban dwellers will result in lesser trip generation, the reverse is the case in the rural area. This implies that while the addition of an employed member to an urban household may reduce the number of trips being generated, other members of the household may not necessarily embark on some trips such as shopping or recreational, to mention just a few. Contrarily, the addition of an employed member for the rural dwellers will lead to additional trips.

Tab. 3

Model summary of regression analysis of rural respondents

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.450[a]	.202	.196	4.97857
2	.522[b]	.273	.262	4.77086
3	.571[c]	.326	.311	4.60986
4	.606[d]	.368	.348	4.48289

a. Predictors: (Constant), age
b. Predictors: (Constant), age, household size
c. Predictors: (Constant), age, household size, average monthly income of the household head
d. Predictors: (Constant), age, household size, average monthly income of the household head, number of employed people in the household
Source: SPSS OUTPUT/Authors' Survey 2021

Tab. 4

Coefficients for regression analysis of trip generation in the rural area

	Model	Unstandardised coefficients		Standardised coefficients	T	Sig.
		B	Std. error	beta		
1	(Constant)	.844	1.867		.452	.652
	Age	-.278	.048	-.450	5.782	.000
2	(Constant)	-3.167	2.113		-1.499	.136
	Age,	-.255	.047	-.412	5.480	.000
	Household size	1.047	.293	.269	3.570	.001
3	(Constant)	-.394	2.217		-.178	.859
	Age,	-.244	.045	-.394	5.400	.000
	Household size,	.998	.284	.256	3.518	.001
	Average monthly household income of the household head	2.569E-005	.000	.232	-3.211	.002
4	(Constant)	3.934	2.619		1.502	.136
	Age,	-.176	.050	-.284	3.544	.001
	Household size,	1.434	.314	.368	4.567	.000
	Average monthly income of the household head,	2.557E-005	.000	.231	-3.286	.001
	Number of employed people in the household	1.709	.587	.250	-2.910	.004

a. Dependent variable: trip frequency
Source: SPSS OUTPUT/Authors' Survey 2021
(Significant at P≤ '0.05')

5. CONCLUSION

This study examined the variation in households' trip generation pattern of urban and rural dwellers. It was discovered that variations exist in the socio-economic characteristics and travel characteristics of urban and rural dwellers. This difference is seen in the age, income, education level, occupation, trip frequency and transport mode of households, to mention just a few. The regression analysis was used to identify significant factors influencing trip generation in the rural and urban areas. From the analysis, variables such as household size and the number of employed people in the house were both significant in the urban and rural areas. Transport mode and occupation were the other two significant variables influencing trip generation in the urban areas, while the income of respondents and age were also significant for the rural

dwellers. The findings from this study show the extent of demographic attributes of households in influencing the mobility pattern of households. In addition to this, the travel pattern for the dominant transport mode goes a long way in determining the trip frequency rate of individuals or households. Given this, researchers need to be careful in relying on only socio-economic attributes as measures of determinants of travel behaviour, especially in developing countries. Considerations should be given to travel characteristics such as the influence of transport mode, and transport cost, among others, in measuring or determining household travel, or mobility pattern. Furthermore, we proposed that equal privilege should be given to the rural areas as those of their counterparts in the urban areas when formulating policies, especially transport policies. These privileges could be in public transport provision and the provision of relevant road transport infrastructures such as pedestrian walkways that could enhance their mobility, thus improving their quality of life. We conclude that the mobility pattern of respondents in the urban and rural areas varies; these variations are observed in the trip generation rate, travel characteristics and variations in factors influencing their travel.

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