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DETERMINANTS OF INTRA-URBAN TRAVEL IN SOUTHEAST NIGERIA, EVIDENCE FROM THE CITY OF ENUGU

Summary. Identification of the variables that influence a commuter's decision to make or embark on a trip is perhaps one of the strategic guides for initiating or adopting any transportation policy in cities. This study aims to examine the influencing factors that determine intra-urban travel in the sub-Saharan city of Enugu, Nigeria. A qualitative research method is adopted, and from the city's various residential areas, three research clusters were identified and selected for investigation. A survey was conducted within the six selected neighbourhoods, which include Abakpa, Gariki and Ogbete neighbourhoods (high residential density areas); New Haven & Uwani neighbourhoods (medium residential density areas); and Trans-Ekulu (low residential density area). This was arrived at using a simple random and stratified sampling technique. The data collection instrument was a structured questionnaire distributed to 400 respondents based on the Yamane model. It was discovered that apart from socioeconomic determinants that influence the travel behaviour of commuters in the study area, other factors are related to public-transit service attributes. The results of the study also indicated that there is a statistically significant relationship between the various residential areas in Enugu metropolis and the residents' perception of the factors influencing intra-city mobility (i.e. $R = .488$ and $P = .006$ at 0.05 significance level). It is concluded and recommended that urban transportation policies, which emphasize accessibility with policies related to land-use planning and the decentralization of activity within the metropolis, need to be implemented. Other modes of non-motorized transportation should be reintroduced to address the determinants of intra-city mobility such as affordable prices of transport, safety of passengers on board, environmental pollution, traffic congestion and time wastage.

1. INTRODUCTION

It can be argued that the live wire of urban life is transportation and, currently, it is facing major challenges in most developing cities. Just like the arteries in the human body, transportation links city spaces and places. It is an essential urban infrastructure in any civilization, given the strong interaction between the way of life, distribution of economic and recreational activities and the commodities and services accessible for use in a city [1]. Thus, transportation mobility allows people to participate in activities, earn a living, meet their fundamental needs, relax and recreate and form and maintain social networks [2]. Furthermore, it is important for economic development, exchange of idea, experience and culture. This is why in cities of industrialized economies; it is considered as a fundamental human right for all citizens [3].

Intra-urban mobility is the movement of goods and people within a city [4], and therefore, it clearly depicts the travel patterns of the city dwellers. It has habitual qualities and tends to be a repetitive

activity that follows a defined and predictable pattern because citizens engage in it every day [5]. Therefore, one of the keyways for initiating or implementing any transportation policy is to first understand the factors that influence the decision of a commuter to make or embark on a trip. Evidence in the literature suggests that road-based transport with traditional passenger buses with a capacity of 7-50 seats is the predominant form of urban transit in third-world countries. It has therefore become imperative to investigate the factors that predicate this condition in the colonial city of Enugu. The study of Ojekunle et al [6], in Kaduna, attributed it to wider social and environmental benefits. However, it is only affordable to the urban poor [7].

Currently, the population of Enugu metropolis is rapidly increasing, and extension of the urban environment to the city's periphery follows suit as a result of the massive rural-urban exodus also from other Nigerian cities [8, 9]. This has grave consequences on the urban transport subsector in the city. The rapid rate of urbanization has promoted and ingrained various changes in urban structure, indicated by urban sprawl, with a palpable impact on the generation of longer trip distances, traffic congestions, and accidents. As highlighted by the previous study of Okeke et al, [10] Enugu city is gradually tilting with obvious indicators of fragility, and as a result, it is currently confronted with enormous challenges in terms of basic infrastructure delivery and the need to cope with rising transportation demand. The population explosion has also been associated with a significant enlargement of the city's boundaries and a considerably higher degree of industrial, economic and social activities resulting in an increased demand for intra-urban mobility. Consequently, the city is experiencing a high level of traffic congestion, traffic delay, near side parking, contumacious driving, etc. This situation has therefore led to calls for an urgent transportation plan from policy makers that could obliterate or ameliorate the challenges bedeviling intra-city mobility within the metropolis [11]. Conversely, substantial transportation planning cannot occur unless policymakers and transportation professionals first understand the factors that influence intra-urban mobility in a particular environment [1, 12].

At present, to the best of the researcher's knowledge, no study has investigated the factors that influence intra-urban movement in Enugu metropolis. This study is therefore an attempt towards contributing to filling this existing gap in the literature. It is aimed at establishing the determinants of intra-urban travel across the residential areas in Enugu metropolis. Owing to the fact that no population census has been conducted in Nigeria in recent times, except statistics projection based on known data, the study encountered limitations in the adequacy of current demographic data. However, the research findings reflect all the major preferences of commuters in the metropolis and will guide policy makers and transportation experts to ensure that current transport planning issues in Enugu metropolis are resolved.

1.1. Context of the Study

One of the states in the south-eastern region of Nigeria is Enugu State. Geographically, in the south, it shares boundaries with Abia State and Imo State, Benue State to the northeast, Kogi State to the northwest, Ebonyi State to the east and Anambra State to the west. Located between $06^{\circ}21'0''N$ and $06^{\circ}30'0''N$ latitude and between $07^{\circ}26'0''E$ and $07^{\circ}37'0''E$ longitude, [8] Enugu urban has remained the capital city of Enugu state. The State comprises of 17 Local government areas and it is bordered by the Nkanu East local government area in the east, the Udi local government area in the west, the Enugu East local government area in the north and the Nkanu West Local Government Area in the south (see Fig. 1).

Enugu city is divided into three local municipalities (north, south and east), and the Igbo race constitutes over 90 percent of its population. It is categorized as a medium-sized city, despite the fact that it is fast growing and undergoing huge development in urbanized areas, with an increase in commercial activities, transport operations and immigration [13]. Data from the national bureau of statistics rank the city as the ninth most populated urban centre in Nigeria [14], having a total area coverage of 556 km^2 , with $1,300/\text{km}^2$ as the population density. The demographic figures evidently show the expansion of the population of the city from 62,764 in 1952 to 722,664 in 2006 [14], and projected to increase beyond 1,955,216 by 2040 [15].

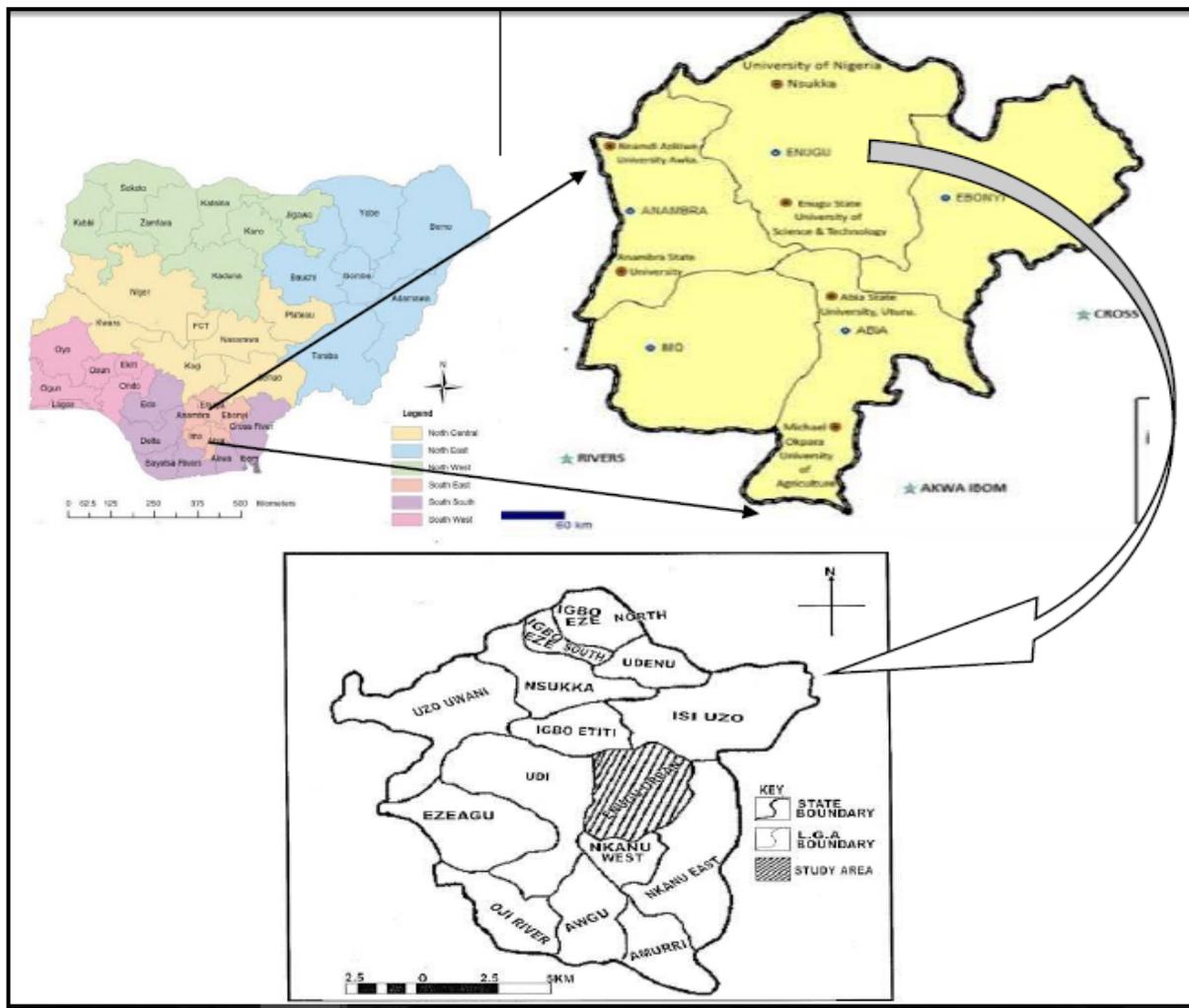


Fig. 1. Study area (Map of Nigeria; southeast Nigeria; Enugu State and Enugu city) Source. Nigeria National Bureau of Statistics 2021

Transportation studies of the city reveal that mini-buses, personal automobiles, tricycles and city shuttle buses are the predominant intra-urban transit modes. Traffic data indicate that private cars have the highest mode-share (71%). This is followed in descending order by buses, taxis, tricycle, lorry, articulated vehicles, and bicycles: 18%, 9%, 1.4%, 0.9%, 0.2%, and 0.03%, respectively [16]. The neglect of alternative transportation modes observable in the city due to overdependence on personal automobiles has been shown to have detrimental effects on intra-city mobility and environmental sustainability in the metropolis. Coupled with the flexibility of the informal transport sub-sector service delivery, the use of tricycles as the best option for intracity travel is beginning to gain momentum. This also exacerbated due to the fact that the popular ‘okada’ transport (commercial motorcycles), which formerly functioned as a public mode of transportation in the city, is no longer in use.

2. REVIEW OF THE LITERATURE

A series of trips over a single day that begin and end at the home location represent a travel pattern activity. Research on travel patterns within metropolitan areas has long piqued the interest of transportation experts and scholars. However, from the late 1960s, research efforts switched focus from traditional studies of the purpose and modes of intra-city travel to studies that capture

appropriately the underlying processes observed in travel patterns in conjunction with the available technologies and current planning practices. As a result, since then, studies have focused on explaining why and how commuters spread their visits and trips from one or more specific starting point to another destination area. Early publications on travel behaviour [17 - 19] used multiple measures of travel patterns, but none of them systematically showed the link between the personal traits of commuters and travel patterns.

The limitations of previous studies led researchers such as [20, 21] to pay more attention to the correlation between demographic and socioeconomic variables of the populations in metropolitan areas. Some studies have been conducted in the past on the connection between travel behaviour and socioeconomic background, utilizing various indicators such as educational status, occupation, automobile ownership and income level, just to mention a few [5, 21 - 23]. Evidence in the literature suggests that there is a significant effect of various socioeconomic factors on transport mobility of commuters. As revealed in the studies, a key determinant of a family's standard of living and, to some extent, reflecting the household income level is the occupation of the head of the household, and families with more than one car make more trips per unit compared with households with only one automobile. Also, the ability to afford a trip influences the number of journeys undertaken by a commuter. High-income residents can usually afford to meet more of their mobility needs than low-income residents. Therefore, it can be concluded that increasing household income equates to more trips, as household income is also reported to be related to automobile ownership levels. The mobility autonomy provided by personal automobiles, combined with the poor performance of public transportation systems in most third-world cities, has made it extremely difficult to sway commuters away from use of private cars towards public mass transit.

Consequently, the studies of [17, 24] proved that taking into account all trips undertaken within an urban environment, the less educated people and automobile owners make the highest number of trips than highly educated people and those who do not own cars. Olayemi [25] discovered that, in addition to variance in both time and space, several socioeconomic factors combine to influence when, how, where and why people commute in Lagos, Nigeria. In the same vein, Ogunjumo [26] discovered through regression analysis that trip frequencies in Ife, Nigeria, are influenced by household size, the number of workers per household and vehicle ownership. Because of its focus on an urban centre, the study, like Olayemi [25], did not find variations in residential areas.

In view of the above, it is assumed that commuters' socioeconomic backgrounds might limit their ability to travel throughout the city. According to Goeverden and Hilbers [27] and supported by economic theories, a traveller's personal characteristics affect his or her purchasing power and quality demands. Similarly, it has been established that higher-income households embark on more trips and travel longer distances [28].

Evidence from the literature has revealed that the importance of respondents' socioeconomic attributes cannot be underrated when considering intra-city mobility. However, the focus of previous research on the city as a whole obscured the much-desired variations in residential areas, resulting in a knowledge gap in intra urban travel studies of sub-Saharan cities, especially Enugu, Nigeria.

3. RESEARCH METHODOLOGY

This study used a cross-sectional survey design aimed at determining the factors that predicate the existing pattern of intra-city traffic in Enugu metropolis. Disaggregate data from a transportation survey (questionnaire) conducted by the researchers in 2018 were used for the study. The questionnaire had 2 sections: A and B. Variables included in section A include the socio-demographic data of the respondents, while section B included 6 items of information on factors influencing intra-urban mobility in Enugu metropolis. Because the majority of commuters in the city could understand the English language, the data collection instrument (questionnaire) was drafted in English. The study population consisted of three study groups from various residential areas in the city. The eighteen neighbourhoods that comprised the study area served as the sampling frame. Using a combination of stratified and simple random sampling techniques, three neighbourhoods from a high-density

residential area, two neighbourhoods from a medium-density residential area and one neighbourhood from a low-density residential area were selected. In particular, this was achieved by dividing the sample area into three distinct strata comprising residential areas from which households were randomly selected without replacement to ensure equal representation of various residential areas. The selected neighbourhoods were Trans-Ekulu (low density), New haven and Uwani (medium density) and Abakpa, Gariki and Ogbete (high density). 418,122 is the population of inhabitants in the randomly selected neighbourhoods and this was obtained from the projected last official Nigerian national population census figure of 2006 to 2018 using the Thomas Malthus exponential model [14]. This is illustrated in Table 1.

Table 1

Population of sampled neighbourhoods

Selected Neighbourhoods	Neighbourhood Density	Population Figure of 1991	Population Figure of 2006	Projected Population of 2018
Abakpa	High	90,619	126,232	190,998
Ogbete	High	25,994	36,209	54,789
Gariki	High	19,662	27,389	41,442
Uwani	Medium	31,875	44,401	67,183
New haven	Medium	18,753	26,123	39,526
Trans Ekulu	low	11,474	15,983	24,184
Total		198,377	276,337	418,122

Source: National Population Commission 2006 and projected to 2018 by researchers).

The appropriate sample size for investigation was obtained using Yamane's [29] model as follows:

$$n = \frac{N}{1 + N(e^2)} \quad (1)$$

Furthermore, a proportionate allocation approach was utilized to determine the sample size for each neighbourhood based on the various household sizes, and 400 questionnaires were administered by hand to household members aged 18 years of age and older. The formula that was used is as follows:

Sample size of the neighbourhood = percentage of the neighbourhood's household population multiplied by the total sample size for the study. Table 2 shows the details.

The collected data was analysed using inferential and descriptive statistics. Using the Statistical Package for Social Science (SPSS) version 23, a correlation model was used for the analysis at a 0.05 level of significance. The correlation model was used to ascertain whether there was a significant relationship between the various residential areas in Enugu metropolis and the determinants of intra-city mobility in Enugu metropolis. Generally, a response rate of 95% was achieved.

Table 2

Sample size and study areas

Study area	2018 Projected population	Population of household	%	Sample size
Abakpa	190,998	31,833	46	184
Ogbete	54,789	9,132	13	52
Gariki	41,442	6,907	10	40
Uwani	67,183	11,197	16	64
New haven	39,526	6,588	9	36
Trans Ekulu	24,184	4,031	6	24
Total	418,122	69,687	100	400

Source: Researcher's Survey, 2018.

4. RESULTS

4.1. Respondents Socio-economic attributes

In the survey research, age, marital status, educational levels, occupation and income levels influence the perceptions of individuals on issues of life. Consequently, the personal characteristics of the respondents in this study were examined and are shown in Table 3.

Table 3
Respondents' Socio-demographic characteristics (n = 380)

Characteristics	Frequency	Percent (%)
Gender		
Female	185	48.7
Male	195	51.3
Age Range (years)		
20 years and below	54	14.2
21 – 40 years	227	59.6
31 – 60 years	97	25.5
> 60 years	2	0.5
Mean ± SD (years)	33.4 ± 8.6	
Marital Status		
Single	199	52.4
Married	163	42.9
Widowed/Divorced/separated	18	4.7
Occupation		
Business individuals/ Self-employed/ Trader	100	26.3
Students	96	25.3
Civil servant	86	22.6
Private sector employed	63	16.6
Unemployed	35	9.2
Monthly earnings (₦)		
Below ₦ 10,000	24	6.3
₦ 10,001 - ₦ 20,000	68	17.9
₦ 20,001 - ₦ 30,000	91	23.9
₦ 30,001 - ₦ 40,000	63	16.6
₦ 40,001 - ₦ 50,000	39	10.3
Above ₦ 50,000	95	25.0
Mean ± SD (income)	32,224 ± 13,940	

The respondents' socio-demographic characteristics are shown in Table 3 above. Males made up more than half of the population (51.3 percent), with a mean age of 33.4 (±8.6) years. More than half (59.6 percent) were between the ages of 21 and 40 years, with 52.4 percent being single. Furthermore, their main occupations (26.3 percent) and (22.6 percent) were business and civil services, respectively, and the average monthly earning of the respondents was 32,224 (±13,940) Naira.

4.2. Determinants of Intra-city mobility across various residential areas in Enugu Metropolis

This section presents data on the commuters' perceptions of the determinants of intra-city mobility across residential areas in Enugu metropolis.

Table 4

Relationship between Occupation and Travel Behaviour

Options	Neighborhoods						Total	%
	Abakpa	Gariki	Ogbete	New Haven	Uwani	Transekulu		
Strongly agree	56	15	14	5	22	4	116	30.5
Agree	61	6	16	17	20	10	130	34.2
Indifferent	10	2	10	2	4	2	30	7.9
Disagree	16	8	3	4	8	4	43	11.3
Strongly disagree	31	7	7	6	6	4	61	16.1
TOTAL	174	38	50	34	60	24	380	100

Source: Researcher's Survey, 2018.

Table 4 shows the relationship between commuters' occupation and their travel behaviour in Enugu metropolis. It was found that 116 respondents (representing 30.5%) strongly agreed that the occupation of a commuter influences his/her travel behaviour, 130 respondents (representing 34.2%) agreed that the occupation of a commuter influences his/her travel behaviour, 43 respondents (representing 11.3%) disagreed that the occupation of a commuter influences his/her travel behaviour and 61 respondents (representing 16.1%) strongly disagreed that the occupation of a commuter influences his/her travel behaviour. This indicated that the occupation of a person influences his or her travel behaviour.

Table 5 shows the relationship between commuters' gender and their travel behaviour. It was found that 89 respondents (representing 23.4%) strongly agreed that the gender of a commuter influences his/her travel behaviour, 134 respondents (representing 35.3%) agreed that the gender of a commuter influences his/her travel behaviour, 71 respondents (representing 18.7%) disagreed that the gender of a commuter influences his/her travel behaviour and 55 respondents (representing 14.5%) strongly disagreed that the gender of a commuter influences his/her travel behaviour. This means that the gender of a commuter influences his or her travel behaviour.

Table 5

Relationship between gender and travel behaviour

Options	Neighborhoods						Total	%
	Abakpa	Gariki	Ogbete	New Haven	Uwani	Transekulu		
Strongly agree	40	7	16	5	15	6	89	23.4
Agree	59	21	18	12	18	6	134	35.3
Indifferent	12	4	6	2	7	-	31	8.2
Disagree	36	4	4	9	12	6	71	18.7
Strongly disagree	27	2	6	6	8	6	55	14.5
TOTAL	174	38	50	34	60	24	380	100

Source: Researcher's field survey, 2018

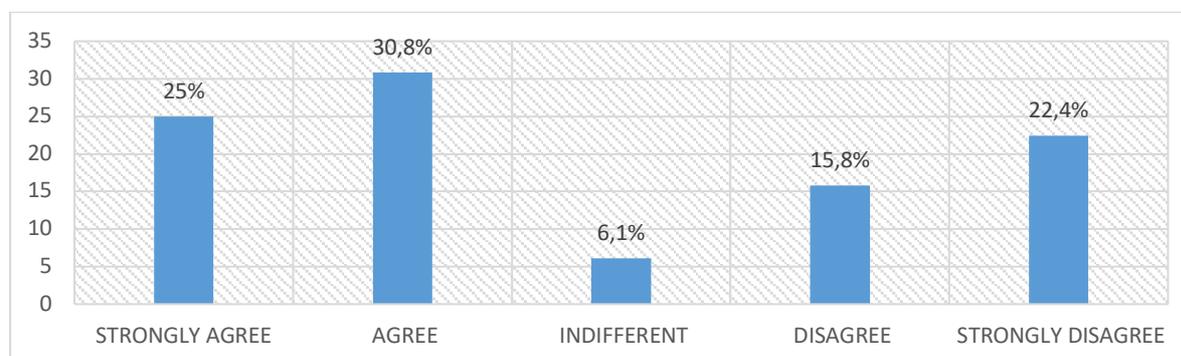


Fig. 2. Relationship between Income Level and Travel Behaviour

Source. Field Survey, 2018

Fig. 2 shows the relationship between commuters' income level and their travel behaviour. It showed that 95 respondents (representing 25%) strongly agreed that the income level of a commuter influences his/her travel behaviour, 117 respondents (representing 30.8%) agreed that the income level of a commuter influences his/her travel behaviour, 60 respondents (representing 15.8%) disagreed that the income level of a commuter influences his/her travel behaviour and 85 respondents (representing 22.4%) strongly disagreed that the income level of a commuter influences his/her travel behaviour. This means that the income level of a commuter influences his or her travel behaviour.

Table 6

Relationship between educational qualifications and travel behaviour

Options	Neighborhoods						Total	%
	Abakpa	Gariki	Ogbete	New Haven	Uwani	Transekulu		
Strongly agree	24	4	8	6	6	3	51	13.4
Agree	12	3	10	10	7	4	46	12.1
Indifferent	14	5	11	3	10	4	47	12.4
Disagree	56	11	10	8	18	7	110	28.9
Strongly disagree	68	15	11	7	19	6	126	33.2
TOTAL	174	38	50	34	60	24	380	100

Source: Field Survey, 2018

Table 6 shows the relationship between commuters' educational qualifications and travel behaviour. It was found that 51 respondents (representing 13.4%) strongly agreed that the educational qualifications of a commuter influence his/her travel behaviour, 46 respondents (representing 12.1%) agreed that the educational qualifications of a commuter influence his/her travel behaviour, 110 respondents (representing 28.9%) disagreed that the educational qualifications of a commuter influence his/her travel behaviour and 126 respondents (representing 33.2%) strongly disagreed that the educational qualifications of a commuter influence his/her travel behaviour. This means that educational qualifications of commuters do not influence their travel behaviour.

Table 7

Relationship between auto-ownership and travel behaviour

Options	Neighborhoods						Total	%
	Abakpa	Gariki	Ogbete	New Haven	Uwani	Transekulu		
Strongly agree	54	10	21	12	16	7	120	31.6
Agree	62	14	14	10	26	9	135	35.5
Indifferent	8	2	3	3	3	2	21	5.5
Disagree	20	6	5	3	7	3	44	11.6
Strongly disagree	30	6	7	6	8	3	60	15.8
TOTAL	174	38	50	34	60	24	380	100

Source: Field Survey, 2018

Table 7 shows the relationship between commuters' ownership of cars and their travel behaviour. It was found that 120 respondents (representing 31.6%) strongly agreed that auto-ownership influences commuters' travel behaviour, 135 respondents (representing 35.5%) agreed that auto-ownership influences commuters' travel behaviour, 44 respondents (representing 11.6%) disagreed that auto-ownership influences commuters' travel behaviour and 60 respondents (representing 15.8%) strongly disagreed that auto-ownership influences commuters' travel behaviour. This means that auto-ownership influences commuters' travel behaviour in Enugu metropolis.

Table 8 shows the determinants of travel behaviour in Enugu metropolis. It was found that the respondents stated that the 'convenience of the vehicle, travel time, car availability and ownership, trip purpose, affordable price of transport, safety of passengers on board, waiting time and traffic congestion' were determinants of the travel behaviour of commuters in Enugu urban (the mean score of the aforementioned factors were greater than 2.5).

Table 8

Determinants of travel behaviour of respondents

Determinants	Strongly Agree (5)	Agree (4)	Indifferent (3)	Disagree (2)	Strongly Disagree (1)	Weighted mean	Perception
Vehicle Convenience	120	135	21	44	60	3.6	Agreed
Travel time	116	130	30	43	61	3.5	Agreed
Car availability and ownership	89	134	31	71	55	3.3	Agreed
Purpose of the trip	95	117	23	60	85	3.2	Agreed
Time of the day when the journey is taken	45	39	26	170	100	2.4	Disagreed
Reliability and regularity	30	51	10	175	114	2.2	Disagreed
Affordable price of transport	109	169	25	40	37	3.7	Agreed
Safety of the passengers on board	87	160	21	72	40	3.5	Agreed
Waiting time	159	124	16	30	51	3.8	Agreed
Household structure	51	46	47	110	126	2.4	Disagreed
Residential density	16	34	16	127	187	1.9	Disagreed
Traffic congestion	98	170	25	35	52	3.6	Agreed

Source: Field Survey, 2018

It was also found that ‘time of the day when the journey is taken, reliability and regularity, household structure and residential density’ were not determinants of the travel behaviour of commuters in Enugu urban (the mean score of the aforementioned factors was less than 2.5).

4.3. Test of Hypothesis

H₀: There is no statistically significant relationship between the various residential areas in the city of Enugu and the determinants of intra-city mobility in the metropolis.

T₀: To test the hypothesis, the responses to questions on the areas of residence of respondents as well as their perception of the factors influencing intra-city mobility were used. The results are presented in Table 9.

The result of the Pearson Product–Moment Correlation test showed that there was a statistically significant relationship between the various residential areas in Enugu metropolis and the residents’ perceptions of the factors influencing intra-city mobility (i.e. $p < 0.05$ at a 0.05 significance level). This shows that the relationship between the residential density and the perception of factors influencing intra-city mobility was fairly strong ($R = .488$). This also indicates that the relationship between the respondents’ area of residence and their perceptions was negative.

However, the transport determinants in table 9 represent an aggregated indicator of all variables that were used to measure the influence of travel behaviour.

In addition, the coefficient of determination (R^2), which explains the variance between residential areas in Enugu metropolis and residents' perception of the factors influencing intra-city mobility, indicates 0.24% percent shared variance. This implies that the proportion of variation of the residents' perception of factors influencing intra-city mobility in Enugu metropolis that can be attributed to residential areas is 24% which is little, but a significant amount of the variance explained.

5. DISCUSSION

This study revealed that the socio-economic determinants of the travel behaviour of commuters in Enugu urban are the occupation of the commuter, the gender of the commuter, the income level of the commuter and ownership of a vehicle. However, the study found that the educational qualifications of commuters did not influence their travel behaviour in Enugu urban. The occupation of commuter influences travel behaviour because commuters who work in private or public organizations have to make work-related trips outside their homes. These findings are also consistent with the results of authors like [30 - 33].

Table 9

Correlation Test

		LOCATION	TRANSPORT DETERMINANTS
LOCATION	Pearson Correlation	1	-.488**
	Sig. (2-tailed)		.006
	N	380	380
TRANSPORT DETERMINANTS	Pearson Correlation	-.488**	1
	Sig. (2-tailed)	.006	
	N	380	380

** Correlation is significant at the 0.05 level (1-tailed).

Source: Researcher's SPSS Analysis, 2018.

In the same way, ownership of vehicles as well as the income level of the commuter influence the tendency of the commuter to make trips as well as the modes of transport that the commuter chooses. People with higher incomes are usually dependent on cars, while those with relatively low incomes have to use public transport, although the demand for this service particularly during peak hours is beyond its capacity and the quality of service is poorer. This corroborates the studies of Ojekunle et al [6] in Kaduna State Nigeria, which showed that the income of commuters is a major factor that influences the level of bus usage. Furthermore, men are known to make long-distance trips, while women are known to make short-distance trips, and this agrees with the study of Oyesiku and Odufuwa [34]. In contrast, most countries in East Africa and the United Arab Emirates have restrictions on intra-urban trips for females due to cultural and religious beliefs [35]. These findings were also reported in the study of Zhou [36], who revealed that socio-economic transition and diversity of social groups have a significant influence on the distribution of travel modes. In other words, modes of public transport were favoured by low- and middle-income groups, while private automobiles were favoured by people with high incomes and educational levels. This finding therefore suggests that transportation experts in Enugu metropolis need to understand the link between residents' choice of mode of transport and socio-economic characteristics when proposing transportation schemes. This assumption is consistent with the submission of Ghanaian scholar Paul [37].

The study also revealed that apart from the socio-economic determinants that influence the travel behaviour of commuters, vehicle convenience, the travel time, car availability and ownership, purpose of the trips, affordable price of transport, safety of passengers onboard, waiting time and traffic congestion were other determinants of travel behaviour of commuters in Enugu urban. 'vehicle

convenience', 'safety of passengers on board' and 'travel time' as determinants of the travel behaviour of commuters could be attributed to the fact that commuters in Enugu urban prefer to travel in vehicles that have better designs that provide convenience and safety for commuters as well as provide shorter travel time. This finding can be supported by the fact that the most preferable modes of vehicles for intra-city mobility in Enugu urban are mini-buses, tricycles and cars [16]. This view is corroborated by Moeinaddini et al [38], who believed that urban public transport usage is determined by convenience, safety and security. It can therefore be deduced that the preference for car usage in Enugu metropolis is not only associated with commuters' utilitarian perception of the mode of transport (ability to travel quickly, efficiently and safely) but also their psychosocial perception of the mode of transport (autonomy, prestige, identity and self-esteem). This finding is consistent with that of Manssour, et al. [39]

In addition, car availability and ownership influence the travel behaviour of commuters in Enugu urban. This can be explained by the fact that commuters in Enugu urban who have access to private cars are likely to make more trips unlike those who have to rely on public transport. Moreover, during peak hours in Enugu urban, commuters prefer to use private vehicles rather than public transport, mainly because of the challenge associated with traffic congestion and waiting time. This might explain the increasing dependence on automobiles in Enugu metropolis as well as the attendant consequences such as congestion, reduced accessibility to and through commercial centres, parking problems, increased spending on automobile-friendly infrastructure and urban sprawl as revealed by [40,41]. The above results are in line with Adeel's [42] report, which revealed that most of Pakistan's city mobility demand is met by privately owned minivans and buses, which users generally dislike due to their poor service and lack of coverage within the city. In view of this situation, personal mobility-based automobiles offer an ideal option for urban commuters [43].

Furthermore, 'trip purpose' and 'affordable transport price' are also determinants of intra-city mobility in Enugu urban. 'Trip purpose' as a determinant can be explained by the fact that the reason or purpose for which a commuter makes a trip determines the travel mode that the commuter chooses as well as the travel behaviour of the commuter. For example, in Enugu urban, people who make work trips, school trips and commercial trips travel more frequently than those who make social, religious or recreational trips. In the same way, affordable transport prices during intra-city trips in Enugu urban are one of the reasons most commuters use public transport. These findings are supported by the findings of the study of Goeverden & Hilders [27], who noted that personal characteristics of the traveller result in restrictions on their relative mobility within the city. This is also consistent with the findings of [4, 28], who revealed that higher-income households undertake more trips and travel longer distances.

6. CONCLUSIONS AND RECOMMENDATION

In line with the aim of this research, which is to investigate the factors influencing intra-city mobility in Enugu metropolis, three key issues have been identified:

- There is evidence of commuters perceived association between socioeconomic and transportation variables and travel behaviour in Enugu city. These socio-economic determinants include the occupation of the commuter, the gender of the commuter, the income level of the commuter and ownership of a vehicle.
- The study also revealed that apart from the socio-economic determinants that show a close association with the travel behaviour of commuters, vehicle convenience, travel time, car availability and ownership, the purpose of trips, affordable price of transport, safety of passengers onboard, waiting time and traffic congestion were other determinants that affected travel behaviour of commuters in Enugu urban.
- There was a statistically significant relationship between the various residential areas in Enugu metropolis and the residents' perception of the factors influencing intra-city mobility (i.e. $R = .488$ and $P = .006$ at 0.05 significance level).

These findings indicate that transportation experts in Enugu metropolis need to understand the link between residents' choice of mode of transport and socio-economic characteristics when proposing transportation schemes. Consequently, the following recommendations are proposed:

- An intensive road expansion and improvement programme should be pursued by the state government in Enugu urban. This is attributable to the fact that a community without roads does not have a way out.
- In the planning of new suburbs, transport policies that promote decentralization of activity and residential areas with dense urban communities should be implemented.
- Other modes of non-motorized transport should be reintroduced to address the determinants of intra-city mobility such as travel time, affordable price of transport, traffic congestion, etc.
- Improved standardized ergonomic design of most intra-city buses, i.e., seat sizes, height, and aisle spacing, to decrease travel stress and address determinants of travel behaviour of vehicle convenience and passenger safety.

This study shows that there is evidence that passengers perceive linkages between socioeconomic and transportation characteristics and intra-city mobility travel patterns in Enugu metropolis, and recommendations have been proposed. However, the limitation of this current research is that it measured subjective attributes and opinions. It is therefore suggested that further detailed study with a complex research design on the determinants of intra-urban mobility in other Nigerian cities be carried out.

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