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Travel behavior characteristics in Nigeria's most commercialized urban development: a Study of Eti-Osa Local Government, Lagos Nigeria

Adeniyi O Oluwakoya[1] and Seun Ogundipe[2]

[1]Department of Transport and Tourism Studies Redeemer's University, Ede, Osun State, Nigeria.
[2]Department of Transport and Tourism Studies, Redeemer's University, Ede, Osun State. Nigeria.

ABSTRACT

Globalisation has enhanced the rate of urbanisation and influenced the travel behaviour characteristics across the cities of the world. Remarkably, in the case of Nigeria, especially in the most commercialised local government area, the travel pattern seems erratic and unpredictable; problems associated with urban mobility include delay, traffic congestion, and chaotic trip pattern characteristics. In this regards, most related studies seems to be biased towards the developed economics urban metropolitan areas. Therefore this study intends to examine the travel behavior characteristics in Nigeria's most commercialised local government area. The methodology involves both the qualitative and the quantitative methods. The data is analysed with descriptive, chi-square statistical and regression analytical techniques. The study reveals that socio-economic characteristics especially gender, and the female to be specific contributes more to the volume of trips in the study area than the men. In addition, it shows there is a significant relationship between the mode of transport and level of accessibility among the residents of policy.

Keywords: Travel behavior characteristics, Nigeria's most commercialized urban development, Eti-Osa Local Government, Lagos

*Correspondence to Author:
Adeniyi O Oluwakoya
Department of Transport and Tourism Studies Redeemer's University, Ede, Osun State, Nigeria.

1. Introduction.

Cities all over the world are characterised by a set of activities, which actually account for the concentration of people in them. Such activities are distinctively urban and may include those emerging from assembling, commercial, transportation, and tertiary exercises. All these combine to generate the spatial configuration of the city because their requirements are sometimes functionally differentiated and also spatially segregated. The spatial segregation of urban land-use types creates spatial imbalances and this necessitates spatial interaction for functional inter-relationship.

In other words, urban areas are associated with complex development and this is accompanied by the growth of intricate patterns of movement[Error! Reference source not found.] (Hoyle and Knowles, 1998). In many countries, living, accommodation and places of other activities such as work, business, recreation etc. are no longer in close proximity. People can now choose to live long distances from their places of work and travel every day using any of the transport modes. The urge or craving to fulfil felt needs emerging from the partition of exercises may, therefore, be said to constitute a major focus of interest for many studies in geography. These include, for instance, studies on permanent and semi-permanent migrations, trading and marketing activities, transportation and traffic flows and even changes of residence within cities. To these, one could add to other studies concerned with the communication of ideas by telephoning, telegraphing and letter-writing.

Human movements made possible by transport, provide vital clues to the understanding of human spatial behaviour in all cities especially in developing countries where measures of telecommunication are not likely to prove of much value, given the low level of technology and the generally poor economic conditions. Transportation is very vital to urban life on the grounds that it is a necessary means to an end. It permits individuals to do the different extent of exercises that made up day by day life (Filani, 1991; Filani, 1993). According to Hanson and Giuliano (2017) "because cities consist of spatially separated, highly specialized land uses such as, food stores, hardware stores, banks, drug stores, hospitals, libraries, schools, post offices and so on, people must travel if they want to obtain necessary goods and services" (p. 3).

Worldwide, urban travel takes place when inhabitants of urban centres carry out their different activities in different places whether by necessity or by choice. Studies (Adeniji, 1998) have shown that in general, people tend to travel in order to obtain access to a variety of other people, services and facilities that are not available at the origins of their journeys. To what extent, how far and by what means they travel is a result of a complex interaction of socio-economic, political and physical factors (Adeniji, 1998). The nature and degree of influence of these factors, however, vary from city to city and even within a given urban

centre. (Garling et.al, 1994; Bhat and Koppelman, 1999).

Urbanization is the very embodiment of communication. Janelle and Goodchild (2011), states that "by the concentration of a wide variety of creative specialists in a region of limited extent and of high connectivity, cities minimize the need for costly movement of goods and people. This is most evident in the central business areas of such large cities as the Lagos metropolis where the chief executive of major firms and public agencies has opportunities to face-to-face exchanges. These urbanisation benefit, are achieved, however, at the price of overcrowding, congestion, excess demands on the natural environment and people to outlying areas" (p. 87). The root of this dilemma (the need for specialized interaction, information, the desire for "elbow now" and amenity) is in part the product of temporal and spatial constraints on human behaviour.

Urban travel is massively influenced by the demographic characteristics of the travelling population. Today in Nigeria, because of the substantial disposable income of some cities metropolitan area, where they live, type of job they have and how much they spend outside the household is greatly influenced. In fact, all these activities affect urban travel behaviour in the metropolitan area with a strong attachment to the central business areas. Eti-Osa Local Government is being considered as a study area because it has an increasing demand for intra-city travel patterns. This has contributed to its status as having the highest rate of traffic flow among the metropolitan cities in Nigeria. Also, it is the local government area where most Multinational Corporation has its offices in Nigeria. This study examines the structure of travel pattern characteristics of the urban residents in the Eti-Osa Local Government area of Lagos metropolis. The study seeks to assist the urban transport policymakers to understand trip pattern characteristics of urban residents with a high density of commercial and residential mix in the Lagos metropolis Nigeria.

2. Conceptual framework and literature review

2.1 Travel Distance

Spence and Lineker (1994), described the changes in the commuting distance between 1971 and 1981 in the three largest cities in Great Britain, London, Manchester and Birmingham and shows how commuting distance changes with increasing distance between home and the urban centre. In London, commuting distance increases almost linearly with distance between home and urban centre. At a distance of 20 kilometres from the centre of London, commuting distance continues to increase with increasing distance from the centre of the city. In Manchester and Birmingham however, the relationship is different. Commuting distance in Birmingham first increases with increasing distance between home and the urban centre but at a distance of around 7 kilometres from the urban centre commuting distance reaches a plateau. At a distance of around 9 kilometres from the centre,

commuting distance begins to decrease as the distance from the urban Centre increases. Commuting distance in Manchester first increases with increasing distance from the urban centre. At a distance of around 5 kilometres from the centre, commuting distance reaches a plateau and does not change with further increases from the city centre unlike the trend in the commuting distance in Birmingham which begins to decrease at a distance of 9 kilometres from the city centre.

The trends in the commuting distance by the distance from home to the urban centre in the three cities between 1971 and 1981 are similar. Gordon et al. (1989a) describe the changes in average travel distance in the United States between 1977 and 1983 of people residing inside and outside cities. In various sizes of city journey distances for both work and non-work journeys in 1977 and 1983 were almost always lower for residents inside cities than for residents outside cities Næss et al. (1995), identified a statistical relationship between the distances from the urban centre and travel distance per person in Oslo in which total distance increases with increases between home and the urban centre. It is claimed that the distance between home and the urban centre is an important determinant of travel distance in addition to factors such as car ownership and the proximity to local facilities from the home.

In a study of travel patterns in various locations in and around Oxford, Curtis (1995) shows that average work journey distance may be linked to the distance between home and urban centre. According to the data collected by Curtis (1995), the frequency of work and non-work journeys does not vary significantly according to the distance between home and the urban centre. The proportion of journeys by car may be related to some extent to the distance between home and the city centre. The proportion of car journeys is lowest in the two locations closest to the centre of Oxford and highest in the two locations furthest from the city centre. Stead (1999) examines the relationship between the proximity of homes to high street shops as a proxy for the distance between home and the urban centre (recognizing that this measure may not accurately reflect the proximity to the nearest urban centre, since high street shops are not always found in central urban areas – they can also be found in out of town shopping centers and along the radial routes of larger cities for example) but finds no relationship between the distance between home and high street shops.

In many studies, increasing distance from home to the urban centre is associated with increased travel distance, an increasing proportion of car journeys and increasing transport energy consumption. Trip frequency, however, does not vary significantly according to the distance between home and the urban centre. It is recognized here that urban areas are not monocentric and there are often urban locations outside of the centre where major employment, services and facilities can also be found. Thus, the distance between the home

and urban centre may only be a rough indicator of the remoteness of development.

2.2 Travel Time

Nowadays, travel time information plays a heavy role in transportation and logistics and has been applied in various Intelligent Transport Systems (ITS), such as in-vehicle route guidance (RGS) and advanced traffic management systems (ATMS). However, travel time is affected by a range of different traffic factors. Thus, accurate prediction of travel time is difficult and needs much traffic data. Understanding those traffic factors affecting travel time is essential for improving prediction accuracy in related travel time studies. Humans, vehicles and facilities, such as roads and signals, are the main components of the traffic environment. Various factors which affect the three elements usually influence the final travel time as well. For instance, different drivers and road conditions could cause large differences in journey times. Even in the same time interval and on the same link, different vehicles can have quite different travel-times.

Free flow travel speed is one of the factors that affect travel time. However, the journey speed along an arterial road depends not only on the arterial road geometry but also on the traffic flow characteristics and traffic signal coordination (Lum et al., 1998). Other main factors related to travel time prediction that have also been cited in previous studies include holiday and special incidents (Karl et al., 1999), signal delay (Wu, 2001), weather conditions (Chien and Kuchipudi, 2003), traffic operation

(disturbed level) and congestion level (traffic flow) (Richardson 2004).

The study reveals that the greater the length of the forecasting period, the higher the prediction error" (Kisgyorgy and Rilett, 2002). The adoption of specific variables for prediction will determine the efficiency and accuracy of the travel-time prediction model. Travel time data may be recorded through a wide variety of methods. An individual traveller may register his/her time using a stop-watch. More generally applicable methods- that do not involve the individual traveller to determine the travel time- make use of for instance license plate recognition, toll-gates, in-car systems. (Taylor et al., 2000a).The measurement methods can be simply divided to two types: (1) logging the passage of vehicles from selected points along a road section or route, or (2) using moving observation platforms travelling in the traffic stream itself and recording information about their progress (Taylor et al., 2000a). The site-based methods, group (1), include registration plate matching, remote or indirect tracking and input-output methods and so on. Also, the stationary observer techniques that include loop detectors, transponders, radio beacons, video surveillance were identified (D'Este et al., 1999). Meanwhile, the moving observer methods (vehicle-based methods) include the floating car, volunteer driver and probe vehicle methods. The following sections introduce the main techniques of travel time measurements in there two method groups.

Floating car is the most common travel time collection methods and consist of a vehicle(s) that is specifically dispatched to drive with the traffic stream for the express purpose of data collection (Turner et al., 1998). The simplest method to perform the survey manually records travel times at designed checkpoints using a clipboard and stopwatch, or computer instrumentation may be used to record vehicle speed, travel times or distances at preset checkpoints or intervals. By fitting a GPS receiver to a vehicle, it is possible to obtain time-stamped location information which can be used to track the location and determine travel times (Zito and Taylor, 1994, Rose, 1996). Furthermore, the GPS-GIS combination forms contribute the efficiency in both data collection and results analysis (Zito and Taylor, 1994) and (Taylor et al., 2000c).

Bus travel time in urban conditions can be typical twice the corresponding travel time for a car. The road travel time for arterial roads is influenced by delays associated with road geometry, traffic control devices (e.g. traffic signals, roundabouts) and interactions with other vehicles. The travel time function has been considered in Australia by Akcelik (1991) and Tisato (1991). The prediction of travel time is important in evaluating the effect of changes in traffic conditions. In situations of high vehicle flows there is an increased interaction with other traffic and the delays are higher for vehicles using the route. In these circumstances, the benefits of bus priority treatments are the most significant. The travel time effects for buses and general-purpose traffic are considered for the main bus priority treatments used throughout the world.

2.3 Modal Split

The modal split of transport describes the relative share of each mode of transport. The modal split is usually defined for a specific geographic area and/or time period. The choice of transport mode is probably one of the most important classic models in transport planning. This is because of the key role played by public transport in policymaking. Public transport modes make use of road space more efficiently than private transport. Also, they have more social benefits like if more people begin to use public transport, there will be less congestion on the roads and the accidents will be less. Again, in public transport, we can travel at low cost. In addition, the fuel is used more efficiently. Main characteristics of public transport are that they will have some particular schedule, frequency etc.

The varying proportions of different transport modes which may be used at any time. The choices of modes may be determined by the costs, destinations, capacities, and frequencies of the modes together with the nature of the goods carried and their destinations. Modes of transport may be seen as competing services, and particularly so in the rivalry between private cars and public transport systems. In many cases, the travelling time and comfort of a car journey outweigh costs so that non-cost factors play an important part in determining the modal choice. By the mid-1990s it seemed that the shift to private motoring which characterized

British government policy in the 1980s was waning and that the later 1990s might see restriction for motorists.

The modal transport in Lagos metropolis has encountered several challenges, in an apparent response to solving these problems over the years; government initiated a transport relief scheme, which includes the construction of two more Mainland Bridges (Carter and Eko bridges) and the Lagos Inner ring road. The present expansion of the road network others includes improving the state of existing roads, the introduction of odd and even numbers edict in 1975. The failed attempt to build a metro-line, Other measures include: the establishment of Lagos State Transport Corporation (LSTC), the rejuvenation of the Lagos State Ferry Services (LSFC), the Bus Rapid Transit (BRT), the deployment of more Traffic wardens on the road, the concession of part of the services of the Nigeria Railway Corporation to Jubilee line owned by Lagos State Government, the commissioning in1991 of the Third Axial Bridge (TAB) to reduce the traffic load on Carter and Eko bridges and the conversion of some roads to one way traffic flow. As important as these measures are to the metropolis, they all focused concomitantly on individual developments rather than on proper holistic planning that will see the implementation of a functional intermodal transport system. (Lagos Urban Transport Project, 2003).

2.3 Literature Review

There are many studies that focus on the relationship between the built environment and urban travel behaviour. As a consequence, an enormous variety of variables have been taken into consideration. This section briefly summarizes some of the relevant literature on car ownership and urban travel behaviour. For more comprehensive reviews, see, e.g., Handy (2005), Stead and Marshall (2001) and Van Acker and Witlox (2005).

2.3.1 The built environment and travel behaviour

The effects of spatial density on travel demand have long been acknowledged (e.g., Levinson and Wynn, 1963) and remain well studied and understood. Higher spatial densities are associated with lower car ownership and more public transport use, less car use, and more walking and cycling. After all, in a high-density area, public transport is organized more efficiently (more routes, higher-frequency of services) and higher densities are also associated with higher levels of congestion (Schwanen et al., 2004). Also, in dense areas, people tend to travel shorter distances and they spend less time travelling on average (Cervero and Kockelman, 1997; Dargayand Hanly, 2004; Hammadou et al., 2008; Kitamura et al., 1997; Schwanen et al., 2004; Stead, 2001).

A second issue is spatial diversity. Several indicators have been developed to measure diversity: among others, a job/housing ratio (Boarnet and Sarmiento, 1998; Ewing et al., 1994), an entropy index to quantify the degree of balance across various land use types (Frank and Pivo, 1994; Kockelman, 1997) or a (dis)similarity index to indicate the degree to

which different land uses lie within a person's surrounding (Kockelman, 1997). The effects of more diversity on car ownership and travel behaviour are comparable to the effects of higher densities.

A third dimension is a spatial design. It can be characterized by a general classification of neighbourhoods with a standard suburban neighbourhood and a neo-traditional neighbourhood as extremes (Gorham, 2002; McNally and Kulkarni, 1997). Standard suburban neighbourhoods are characterized by low densities, limited diversity, and a car-orientated design. These neighbourhoods are associated with more cars per capita and more car use. The spatial design however also relates to site design, and dwelling and street characteristics. Neighbourhoods characterized by small block sizes, a complete sidewalk system, the absence of cul-de-sacs and limited residential parking tend to encourage walking and cycling (Cerveroand Kockelman, 1997; Hess et al., 1999; Stead, 2001). Meurs and Haaijer (2001) noted that, although characteristics of the dwelling, street, and neighbourhood may influence modal choice, this is only true for shopping and social or recreational purposes. Working trips are less likely to be influenced by spatial design characteristics.

Accessibility is a fourth important characteristic of the built environment which generally refers to the ability "to reach activities or locations by means of a (combination of) travel mode(s)"(Geurs and van Wee, 2004). Most studies pointed out that accessibility is negatively associated with car ownership (e.g., Chen et al., 2008; Gao et al., 2008; Kockelman, 1997; Simma and Axhausen, 2003). Rajamani et al. (2003) found that higher accessibility by a given mode is likely to result in higher usage of that mode. For example, households living in neighbourhoods that are easily accessible by public transport tend to make more trips by public transport (Kitamura et al., 1997). Similarly, individuals that have several facilities and services such as shops, banks, schools and doctors within walking distance of their residence undertake more walk trips and fewer car trips (Simma and Axhausen, 2003). However, some confounding results exist related to the influence of accessibility by the car on car use. Some studies (e.g., Rajamani et al., 2003) found that better accessibility by car results in more car use, whereas other studies state the opposite (e.g., Kockelman, 1997). Despite high levels of car accessibility, Kockelman (1997) argued that less car use might still occur since higher accessibility is generally associated with higher land prices, less convenient parking options and more roadway congestion.

2.3.2. Socio-economic and demographic differences in travel behaviour

Empirical studies focusing on the relationship between the built environment and travel behaviour should also control their results for various socio-economic and demographic characteristics of the individual and the household. Age is an important variable. Car

ownership and car use tend to be lower among older persons (aged above 65 years). Moreover, if older persons travel by car, they are likely to travel shorter distances. Note also that older person not only travel because they want to participate in activities, but the travelling itself can also have certain socializing opportunities. Ride-sharing for non-work trips is, therefore, found to increase by age (Boarnet and Sarmiento, 1998; Dargay and Hanly, 2004; Schwanen et al., 2004; Stead, 2001).

Gender is another important variable. The difference in travel behaviour between women and men depends on the trip purpose. Other findings can be formulated whether work travel or non-work travel is analyzed. Women are inclined to commute more often by public transport, by bike or on foot, whereas car use tends to be higher among men for work trips. Moreover, commuting distances and times appear to be shorter for women (Schwanen et al., 2002, 2004; Stead, 2001). This gender difference is partly explained by the fact that women earn lower wages, and fulfil other types of jobs (Hanson and Pratt, 1988; Madden, 1981). Because women remain primarily responsible for most household maintenance tasks, some studies (e.g., Boarnet and Sarmiento, 1998) specify that women use a car more often and travel longer distances for non-work trips.

However, other studies (e.g., Schwanen et al., 2002) found the opposite: women spend less time on car travel for shopping purposes than men do. This indicates that women are more likely to travel to shops within walking or cycling distance from their residence.

Educational level, employment status, and income are related variables, thus resulting in comparable findings. Hence, highly educated persons often obtain more specialized jobs which are generally concentrated in high-density or central business district office parks. As a result, higher educated persons are more involved in long-distance commuting and their car use is higher (Boarnet and Sarmiento, 1998; Dargay and Hanly, 2004; Dieleman et al., 2002; Kockelman, 1997; Krizek, 2003; McNally and Kulkarni, 1997; Schwanen et al., 2002, 2004; Stead, 2001). However, the use of public transport, especially train use, might also be higher if this high-density or central business centre office parks are located nearby a railway station.

Household size is positively associated with car ownership. Because of intra-household decisions related to the activities of several household members, the need to own more than one car increases within larger households. Households that own several cars are likely to use their cars more often. Furthermore, because of their possibly stronger car dependency, members of larger households tend to travel longer distances (Dargay and Hanly, 2004; Kockelman, 1997). Comparable results can be found with respect to the number of employed persons in the household (Cervero and Kockelman, 1997; Krizek, 2003) and, to some degree, to the presence of children. Since they do not have to spend time on

childcare responsibilities, singles and childless couples tend to have longer total daily travel times (Boarnet and Sarmiento, 1998; Dargay and Hanly, 2004; Dieleman et al., 2002; Schwanen et al., 2002; Stead, 2001).

Several studies use car ownership as an independent variable in order to explain travel behaviour. Car use seems on average higher among households owning several cars than among household without a car (Dieleman et al., 2002). Moreover, owning a car enables people to travel longer distances compared to people that must rely on slower modes such as public transport, walking and biking (Bagley and Mokhtarian, 2002; Krizek, 2003; Schwanen et al., 2002). On the other hand, car ownership in itself is influenced by other socio-economic variables, especially income. Car ownership is generally higher among high-income groups (Dargay and Hanly, 2004; Kockelman, 1997; Soltani, 2005; Whelan, 2007).

2.3.3. The built environment or the individual and it's household?

There seems to be a lot of literature confirming the relationship between the built environment and travel behaviour. Kockelman (1997) stressed that, after demographic characteristics were controlled for, the built environment still proved to have an important influence on travel behaviour. Similar conclusions have been made by, e.g., Dargay and Hanly (2004) and Zhang (2004). Meurs and Haaijer (2001) refined these findings. According to their analyses, the built environment has a significant influence on non-work travel,

whereas work travel is almost entirely determined by personal characteristics. Dieleman et al. (2002) found an equal influence of the built environment and personal characteristics. On the other hand, several studies point out that the built environment has an only moderate effect on travel behaviour (e.g., Cervero and Kockelman, 1997; Schwanen et al., 2004; Simma and Axhausen, 2003; Stead, 2001).

Moreover, there is a fundamental question of causation in any of the previously mentioned studies (Handy et al., 2005; Kockelman, 1997). Based on these studies, it seems that in certain circumstances the built environment may have a statistically significant influence on travel behaviour. However, statistical results can mask underlying linkages that are more important and of which the built environment characteristics are only a proxy. For example, most recently, there is a growing body of literature on the relationship between the built environment and personal travel characteristics (e.g., Bagley and Mokhtarian, 2002; Bhat and Guo,2007; Cao et al., 2006; Pinjari et al., 2007). This research question refers to the issue of residential self-selection: people might self-select themselves into different residential neighbourhoods. Or in other words, people may choose their residential neighbourhood according to their personal attitudes and preferences. For example, people's residential location decision might be based on their travel preferences, so that they are able to travel according to these preferences. Consequently, the connection between the built environment

and travel behaviour is more a matter of personal attitudes and preferences. Moreover, this suggests that the influence of the built environment cannot be exogenously determined from these personal characteristics. This is confirmed by Bagley and Mokhtarian (2002) and Cao et al. (2006): i.e., after controlling for residential self-selection, the built environment was found to have little effect on travel behaviour. However, Bhat and Guo (2007) and Pinjari et al. (2007) state the opposite.

3. Methodology

3.1. Research design

A cross-sectional survey design was used to analyse the travel behaviour of residents in Eti-Osa local government area of Lagos state (see Figure 1). A descriptive, exploratory and explanatory design was used to describe each of the many variables that are used for this research. Eti-Osa Local Government Area is a high brow area that has high earning residents which were part of the respondents considered.

3.2. Types and sources of data

The primary data was obtained through a validated questionnaire. A reconnaissance study was first carried out on a pre-tested population sample. The selected samples are a dummy of the actual population selected. The primary data include relevant information on the socioeconomic characteristics of the residents. These are considered important to give a hint on the background information on the selected respondent going through the selected area. A total of 200 questionnaires were randomly distributed to the residents of Eti-Osa Local Government metropolitan area. However, 120 respondents who filled in satisfactorily were used for the analysis.
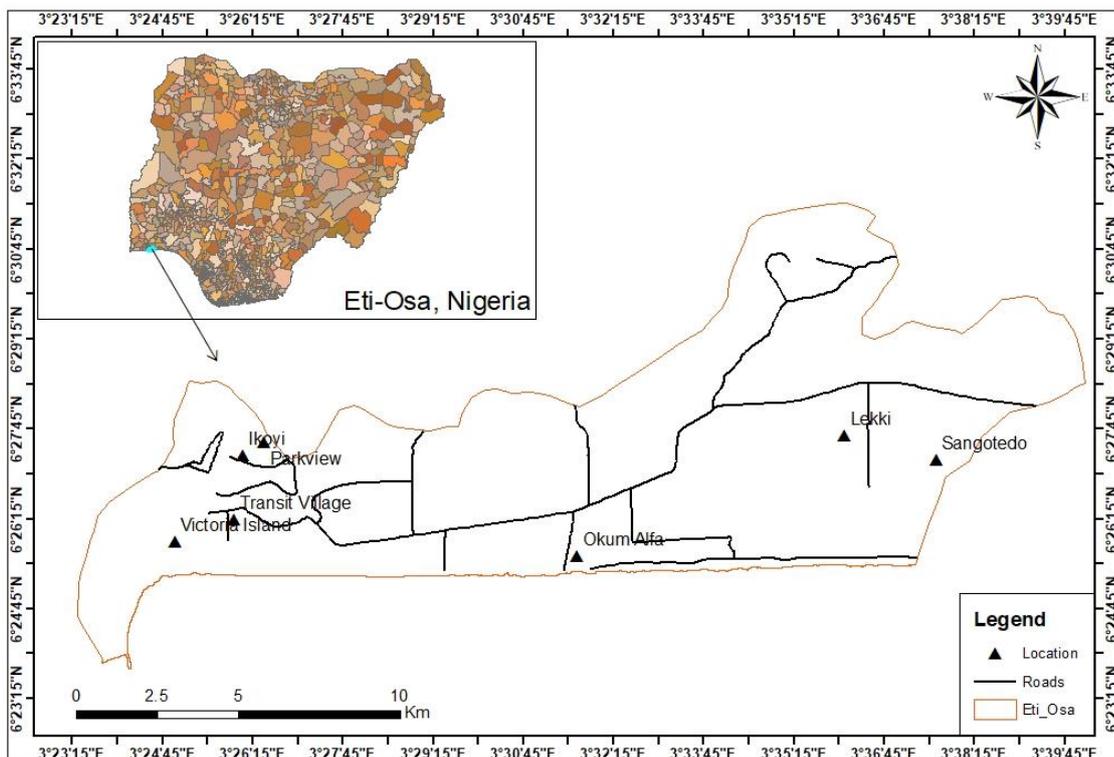

Figure 1: Map showing the Study Area

3.3. Data analysis procedure

Both the quantitative and the qualitative were employed in the analysis. The qualitative analysis employs the use of descriptive statistics to explain the analysis of the variable characteristics. Meanwhile, the quantitative makes use of both regression coefficient and chi-square analysis to describe the relationship between the dependent and the independent variable. In this study, two hypotheses are tested. The first hypothesis states there is no significant variation between the socio-economic characteristics and travel pattern among residents. While the second hypothesis states that is no significant relationship between mode of transport and the level of accessibility among residents in Eti-Osa Local Government Area. Both hypotheses were tested using the regression coefficient and chi-square. For the first hypothesis, the variable of interest is the socio-economic and the travel patterns characteristics. In the second hypothesis, the variables of interest are modes of transport and level of accessibility among the residents.

4. Results and data analysis

The analysis was done with respect to the general distribution of sex, age, marital status, household size, educational status, employment status, occupational status, income status both allowance and salaries and nationality of each correspondent. Other descriptions included the exact volume of trips made, purpose of trips, amounts of trips made, how often residents travel, the challenges faced, level of accessibility, modes of transportation, motive for travelling, average distance, rating of mode in trip making and how road infrastructure has affected trip pattern in Eti-Osa local government area. In addition, the hypotheses on the relationships between variable s are tested.

4.1. Socio-economic characteristics

This section discusses the socio-economic characteristics of the residents of Eti-Osa Local Government metropolitan area. This is included to basically understand the demographic characteristics of the residents. Though, the area is perceived as one of the most elegant neighbourhood in the metropolis, as it supports and provides a haven for the affluent in Lagos State. However, there still exist some areas that are not so well off but are part of the local government area. The distribution of the socioeconomic variable (see Table 1) for sex reveals that 49.2% for male and 50.8% are female. The gender distribution supports the growing insinuation that the present urban workgroup realities have heightened the importance of the female folk's contribution to the urban economy. As many women sit atop of large multinational companies as part of the management team in some of these corporations situated in the central business district of Lagos. Typically, the high brow neighbourhood of the Eti-Osa Local Government provides the potential abode for numerous chief executive officers that work in the central business districts of Lagos. For the household size, which is also a significant contributor to the travel pattern of the urban travel characteristics, 37.6% of the respondents

have a household size of 5-6 family members, 28.3% of the respondents had (3-4), 16.7% of the respondents had (1-2), 12.5% of the respondents had (7-8) and 5.8% of the respondents had (8 and above).Implicitly, the distribution shows that the Eti-Osa Local Government residents had a fair share of household making trips that contribute to the urban travel patterns. The age distribution reveals that 37.5% of the respondents were in the range of 18-25, 36.7% of the respondents fall between 26-35 age group and the others have a lower share of the age distribution. The implication of the distribution shows that most of the residents still fall within the active age making category of the residents.

Table 1 Demographic and the socio-economic characteristics of respondents

Characteristics	Status	Frequency	Percentage
Age	< 18	8	6.7
	18 – 25	45	37.5
	26 – 35	44	36.7
	36 – 45	11	9.2
	46 and above	12	10.0
Sex	Male	59	49.2
	Female	61	50.8
Employment	Self-employed	96	68.6
	Part-time employed	21	15.0
	Fully employed	14	10.0
	Unemployed	9	6.4
Marital Status	Single	63	52.5
	Married	44	36.7
	Separated	9	7.5
	Widowed	4	3.3
Household Size	1 – 2	20	16.7
	3 – 4	34	28.3
	5 – 6	44	36.7
	7 – 8	15	12.5
	8 – Above	7	5.8
Educational	None	6	5.0
	Primary School leaving certificate	2	1.7
	Senior Secondary School	18	15.0
	Diploma	19	15.8
	HND/B.Ed/B.Sc. degree	59	49.2
	M.Sc	16	13.3
Occupation	Civil servant	11	9.2
	Private sector employed	58	49.4
	Manager	7	5.8
	Business person	15	12.5
	Others	29	24.2

Source: Author's Analysis (2016)

This section discusses the trip pattern characteristics of the residents of Eti-Osa Local Government metropolitan area. It shows the travel behaviour characteristics of the Eti-Osa Local Government area residents as a significant part of the Lagos metropolis. The variables included in measuring the trip patterns characteristics include the volume of trips, the purpose of trips, challenges encountered during the trip making, modes rating, and effectiveness of transport mode, the average distance travelled, road infrastructure effect on the trip and the level of accessibility. The distribution of the trip pattern characteristics variable (see Table 2), for the volume of trips, the distribution reveals that 40% had 1-10 trips, 20% makes 21-30 trips, 17.5 makes 31-40 trips, 12.5% makes 11-20 trips and 10% makes above 40 trips. By and large, the trip distribution reveals that a considerable amount of trips from the local government areas. However, the level of road infrastructure has not kept pace with the level of trips generated and developments from the local government areas. The purpose of trips distribution reveals that working, work-related and personal business and business account for 55% of all the purpose of trip engagement in the metropolis. The other trip engagement need includes social visits (18.3%), recreation and vacation (11.7%), schooling (9.2%) and 0.8% for medical trips. The implication for both urban and transport planners is to encourage adequate transport infrastructure and services that would be able to contend with complexities of peak and base movement in the area. In terms of the perception on the level of accessibility of the area, 31.7% of the respondents believe the area is highly accessible, 54.2% of the respondent were of the median opinion on the level of accessibility of the local government area. In contrast, 14.1% of the respondent attests that the level of accessibility of the area is very low. The mode of trip making among the respondents from the area reveals that 41.6% of the respondents travel by car, 36.7% by bus, 6.7% by tricycle and 15% through other means of transport. The high level of motorisation in the area has an implication for both environmental and congestion hazards in the area. Invalidating the relationship between the travel behaviour patterns among the urban residents of Eti-Osa Local Government area, Lagos state, the hypothesis which states "There is no significant relationship between socio-economic characteristics and the travel pattern of residents in Eti-Osa local government area" was tested. Both the predictor and the outcome variable were used to follow the basic assumption of normal distribution and interval variable. This simple linear regression was used to test this hypothesis. Table 3 shows the combined model showing the ANOVA and the coefficients of the regression. The dependent variable is travel behaviour among urban residents (volume of trips) and the independent is the socio-economic characteristics (sex, age, marital status, education etc) of the travellers. It reveals that there is a significant relationship between the dependent and the independents variable. The model is significant

at 0.001, the F ratio is 3.984. The socio-economic characteristics of respondents influenced the volume of trips in the area. The standardised beta weight of the variable reveals that sex contributes more to the volume of trips generated in the area.

Another very important relationship this study seeks to examine if there is a significant relationship between the mode of transport and level of accessibility among residents in Eti-Osa LGA.

Table 2 Trips pattern characteristics of respondents in Eti-Osa Local Government Area

Characteristics	Status	Frequency	Percentages
Volumes of the trip (Weekly)	1-10	48	40.0
	11-20	16	12.5
	21-30	25	20.0
	31-40	22	17.5
	above 40	9	10.0
Purpose of trips (monthly)	Social visits	22	18.3
	Schooling	11	9.2
	Recreation/vacation	15	11.7
	Medicals	1	0.8
	Working	22	19.2
	Personal business	18	15.0
	Work-related	22	18.3
	Business	3	2.5
	Tourism	6	5.0
Challenges encountered in trip making	Yes		
	No	32	35.0
		68	65.0
Level of accessibility	High		
	Medium	38	31.7
	Low	65	54.2
		17	14.1
Mode of trips	Car	50	41.6
	Bus	44	36.7
	Tricycle	8	6.7
	Others	18	15
Average distance travelled	1-5km	15	12.5
	6-10km	19	15.8
	11-15km	29	24.2
	16-20km	28	23.3
	20-25km	27	22.5
	above 25km	2	1.7
Modes rating	high	28	23.4
	medium	64	53.3
	low	28	23.3
Effective transport mode	Yes	72	60.0
	No	48	40.0
Effect of road infrastructure on the trip	Positive	65	54.2
	Negative	55	45.8

Table 3 The relationship between socio-economic and travel patterns among residents Eti-Osa local government area.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	47.819	6	7.90	3.984	0.001
Residual	226.048	113	2.000		
Total	273.867	119			

Model	Unstandardised Coefficients		Standardised Coefficient		
	B	Std. Error	Beta	t	Sig
(Constant)	2.320	.696		3.332	.001
Sex	-.767	.274	-.254	-2.802	.006
Age	-.228	.168	-.170	-1.359	.177
Marital Status	.316	.226	.160	1.397	.165
Educational Status	.140	.106	.132	1.320	.189
Household Size	.244	.132	.176	1.844	.068
Income per Month	.075	.086	.098	.872	.385

Source: Author's Analysis 2016

Table 4 The relationship between mode of transport and level of accessibility

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.632E2a	12	.000
Likelihood Ratio	53.452	12	.000
Linear-by-Linear Association N	21.963	1	.000
of Valid Cases	120		

The hypothesis which states "There is no significant relationship between mode of transport and level of accessibility among residents in Eti-Osa Local Government Area" is tested. Pearson's chi-square was used to test this hypothesis. The dependent variable is the mode of transport and the independent variable is the level of accessibility.

From the table above, the Pearson chi-square value was given as 1.632E2, the degree of freedom was given as 12, and the level of significance was given at 0.000. Since the level of significance is 0.000, therefore the alternative hypothesis H_1 is accepted and the null hypothesis is rejected. From the foregoing, it can be said that there is a significant relationship between mode of transport and level accessibility among residents in Eti-Osa Local Government area.

5. Discussions

This study seeks to examine the travel behaviour patterns among the residents of Eti-Osa Local Government area in Lagos state, Nigeria. It tends to assess the nature and characteristics of trips making among the residents of Eti-Osa Local Government, which command the highest density of commercial activities with the mix of high profile residential

housing and apartments in Nigeria. Two hypotheses were tested to examine the relationship between identified variable relating to travel behaviour patterns among the residents of Eti-Osa Local Government area. Unlike the previous study on the travel behaviour of metropolitan residents which put the women at a great disadvantage in the trips making in the metropolitan regardless of their status (Gordon, Kumar& Richerdson 1989). However, this study reveals that gender contribute significantly to the volume of trips in the study area, and 50.8% of the trips are made by women, higher than the percentage recorded by men. The modern realities of the economic setting have placed the women folks into the higher societal hierarchy, in some societies, taking over the traditional role of breadwinner status often occupied by men. In addition, the first hypothesis of this study reveals that there is a strong relationship between the socio-economic characteristics and the travel pattern in the local government area. However, in terms of the contributions of the individual weight of the independent variable to the model, gender seems to be very significant above all other variables included in the model. Both the males and the females contributed significantly to the volume of trips generated in the area

This study reveals that 41.6% of all trips made in the area are through cars, this is largely expected as the nature and characteristics of the residents have a high propensity to a personal car for travels. However, there may be the need for the government to improve the road infrastructure and public transport services as the level of gridlock during the peak hour travel is highly worrisome. In addition, environmental livability could also be a strong factor to consider while forestalling environmental externalities from excessive personal car travel. In addition, public transport in the area can be enhanced by introducing quality buses with adequate conveniences to be able to discourage residents from intensive personal car travel. The foregoing supports the hypothesized relationship between the mode of transport and the level of accessibility in the local government area. The study establishes a positive relationship between the perception of the mode of transport and the level of accessibility. Of course, the variability of the transport mode and the level of accessibility were not tested but the study opines the great influence of the mode of transport use such as car, buses and tricycle, which have an overall effect on the level of accessibility in the area. The distribution for the level of accessibility reveals that 31.7% agrees that the area is highly accessible. However, there is a need for adequate planning of service and infrastructure to ensure balanced sustainable growth.

The road infrastructure constitutes a very important provision for effective and efficient urban metropolitan travel. In most countries, the difficulties often experienced in urban travel are related to the level of urban transport infrastructure (May 2013; Salon and Aligula, 2012 and Wegener, 2013). This study is consistent with the later literature, it reveals that 54.2% of the respondents agree that their daily

trips making have been affected by the level of road infrastructure. Therefore the need to put in place a sustainable urban transportation blueprint relies on the need to create a network of good road infrastructure. This study underscores the need for a public policy on revamping the strategies of urban roads provision and maintenance.

6.0 Conclusion

The growing level of metropolitan development in Nigerian call for an intense measure to improve mobility within the urban settings, as the growth witnessed has engendered intense mobility crisis within the local government areas and beyond. Eti-Osa local government remains the most commercialised local government areas in Nigeria as it hosts multinational corporations and high brow property and estate development. The development has given rise to a great deal of shambolic trip pattern behaviour among the people in the areas. Therefore, the growing mobility challenge in the area is a pointer to heighten the level of traffic congestion and numerous mobility issues witnessed in the areas.

In this paper, we have been able to examine the travel behaviour characteristics among the residents of Eti-Osa Local Government areas. It looks at both the socio-economic and trip patterns characteristics of the Eti-Osa local government areas, the flagship of commercial activities in Nigeria. The study reveals the present trip pattern characteristics and the challenges of trip making in the face of continuous urban development. No doubts the higher level of trip making occasioned by the residents in meeting the socio-economic obligations of the different households in the areas. More interesting is the role of gender especially the female folk who contributes more than the male counterpart in trip making in the areas. This is a reflection of the economic reality of the modern day where the traditional role of the man is being swapped by the women.

Moreover, the challenges identified in the study may be major setbacks to the sustainable urban travel improvement if left unattended. The need to strike a balance between rapid urban growth and economic improvement lies in the ease of travel within the urban setting. Lacks of road transport infrastructure planning have been identified as the bane of effective and efficient transportation in the area. Adequate investments in public transport infrastructure and services would ameliorate the current mobility crisis encountered in the area. Cases of congestion, delay, unstable public transit and unwholesome customer service disposition have been responsible for the cases apathy among the respondents. Consequently, this may affect the patronage of public transport service in the area.

Though, the study sees a positive relationship between the socio-economic and travel behaviour pattern in the area. Also, the mode of transport has influenced the level of accessibility in the area. However, there is a need for continuous investment in the urban road infrastructure in the study areas.

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