HOUSEHOLDS' SOCIO-ECONOMIC CHARACTERISTICS AND URBAN TRAVEL BEHAVIOURS IN MINNA METROPOLIS, NIGERIA

Owoeye Adelanke Samuel*[1], Fadare Samson.O [2] (Ph.D), Ojekunle Joel. A[1] (Ph.D)

*[1]Department of Transport Management Technology, School of Entrepreneur and Management Technology, Federal University of Technology, Minna, Nigeria
Correspondence emails: lankiedudu@yahoo.com and ojekun@yahoo.com

[2]Department of Urban and Regional Planning, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract

Socio-economic characteristics of households are a major determinant on how urban residents travel in relation to various trip attraction centres. Thus, forecasting and managing urban travel requires transports planners and administrators understand the intricacies of relationship that exists between socio-economic characteristics of urban residents and their travel behaviour in Minna, Nigeria. To carry out this study, a questionnaire survey of *households' heads was carried out; in which 1,303 household hea*ds were randomly selected across 12 selected neighbourhoods in the City using Open Data Kit package (ODK) Information on their travel behaviours and socio-economic characteristics were collected. The step-wise regression technique was used to ascertain the influence of socio-economic variables on households travel behaviour. The findings revealed that number of cars, occupation, household size, number of employed household members, position in the family and car ownership have significant influence on households travel in Minna. These variables significantly explained 67% of variation in the household travel behaviour.

Keywords: Socio-economic, Variable, Household, Travel, Behaviour, Trip Characteristics,

1.1 INTRODUCTION

The urban centres of today are multidimensional in nature, cover enormous expanse of land and accommodate diverse activities (Hoyle and Knowles, 1998; Aderamo, 2004; Osoba, 2011; Raji, 2013). The consequence of these leads to the generation and attraction of immense number of individual daily trips by urban centres. Hitherto, cities worldwide are characterized by a set of activities, which account for the concentration of people in them. Such activities are peculiarly urban and include those emanating from manufacturing, trading, finance, transportation and tertiary activities, this evolves to generate spatial pattern of urban centres in that their requirement are often functionally differentiated and also spatially segregated (Solanke, 2014).

Hence, the spatial segregation of cities and land use types creates spatial disparity that necessitate spatial interface for purposeful interrelationship. Studies (Ayeni, 1974; Adeniyi, 1981; Ojo, 1990; Ogunsanya, 2002; Solanke, 2005; Osoba, 2011; Badejo, 2011; Raji, 2013) have revealed that in general, people tend to travel in order to gain access to a variety of other people' services and facilities that is not available at the origins of their respective trips. The necessity for people to move from one place to another is dictated by the spatial spread of events within the spatial environment (Fadare and Salami, 2004).This has brought about the emergence of increase in the usage of automobiles resulting into extended trip length and high dependence on car usage (Handy et al, 2005). Human travels made possible by transport, provide vital clues to the understanding of human spatial behaviour in all cities especially in developing countries where measures of telecommunications are likely to prove of much value, given the improved level of technology and the generally improving economic conditions.

It is noted that several factors affect the travel demand of households in different neighbourhoods, these include; socioeconomic characteristics of household, level of transport infrastructure development, religion, culture, government policy on reproduction, city structure, location of household within city, accessibility to public transport, ownership of means of transport, among others. Scholars (Fadare, 1987, 1989, Ogunjumo, 1986, Pucher and Renne, 2003, and Fujiwara et al, 2005) have identified household size, car ownership, income, age, gender, number of employed people in the family and occupation among others as major socio-economic attributes of households that influence their travel behaviour in both developed and developing countries.

The search for rationalization of the spatial effect of socio-economic attributes of urban residents on travels in developing countries particularly in Nigeria is not a conclusive one. More study has to be done to ascertain the importance of socio-economic attributes on urban trip generation in relation to various trip attraction centres and other land uses. It is against this backdrop, that this study attempts to analyze the effect of socio-economic characteristics of households on their travel behaviours in Minna Metropolis, Niger State, Nigeria. This study therefore laid emphasis in examining the effect of socio-economic attributes on households travel in Minna.

2.1 LITERATURE REVIEW

The study of travel behaviour over the last half century has yielded critical insights into the choices that individuals and household make about their daily travel (Clifton and Handy, 2001). These insights have contributed to the development of more studies in America, Europe, Asia and Africa with increasingly sophisticated methods by researchers and transport experts to understand and predict travel behaviour. The outcome of many of these studies have influenced to a great deal several transport planning decisions and policy issues in many countries of the world (Fadare, 1989, Mokhatarian, 2002, Srinivasan, 2005).

Studies have shown that in general, people tend to travel in order to obtain access to 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, 1991; Ayeni, 1974; Adeniji, 1981; Ojo, 1990).
Fadare and Hay (1990) noted that various trips exist in the socio-economic attributes of urban residents as a result of the density of their residential areas which has implications for their trip generation. The nature and degree of influence of these factors however vary from city to city and even within a given urban center; Hanson and Schwab, 1987; Gordon et al, 1988; Rimmer, 1986; White, 1990; Garling et al, 1994; Bhat and Koppelman, 1999. A variety of socio-demographic factors such as household composition, age, gender, car ownership, employment status, retirement status, educational status and income all influence the choice of travel mode, the length, duration of the journey, travel patterns and behaviours of households, Best and Lanzendorf (2005).

Dieleman et al, (2002), concluded that household with higher income tend to own and use a car and family with children were more likely to use the car than one-person families. Newbold et el, (2005), concluded that factors other than age can also influence travel behaviour. In that daily trip numbers and duration decreased significantly due to changes in employment status and health status of households. The review of literature above shows the significance of socio-economic factors in the global discussions of travel behaviour.

3.1 THE STUDY AREA

Minna, is one of the most rapidly developing urban centres in North-Central Nigeria. Minna is located between Latitudes 8˚20’ N and 11˚30’ N and between Longitude 3˚30’ E and 7˚20’ N. It lies wholly with the physical and cultural zone of transition described as the “middle

belt of Nigeria". Kaduna and Federal Capital Territory border the State to both North-East and South-West respectively. Minna has a total land area of 74,344 km^2 wide and it is approximately 8% of the land area of the country. Minna is a town comprising majorly Gbagi, Nupe and Hausa speaking people. The population of Minna has grown from 128,988 to 176,756 (NPC; 2006 to 2016 estimates) at 3.2% growth rate. There are twenty-four neighbourhoods in Minna. The three major types of transport modes that ply Minna road network includes; Cars/taxis, Mini-buses and motor bikes/tricycles.

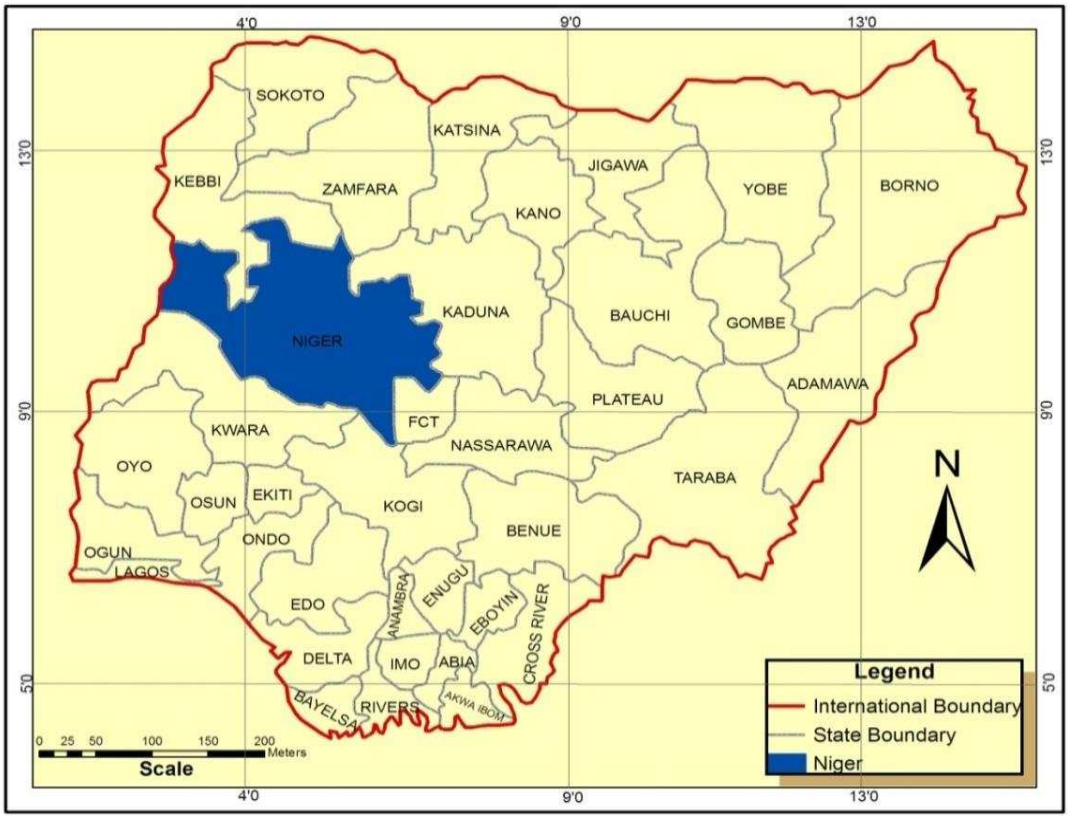


Figure 1: Map of Niger State in the context of Nigeria

Source: Niger State Ministry of Lands and Housing (2018)

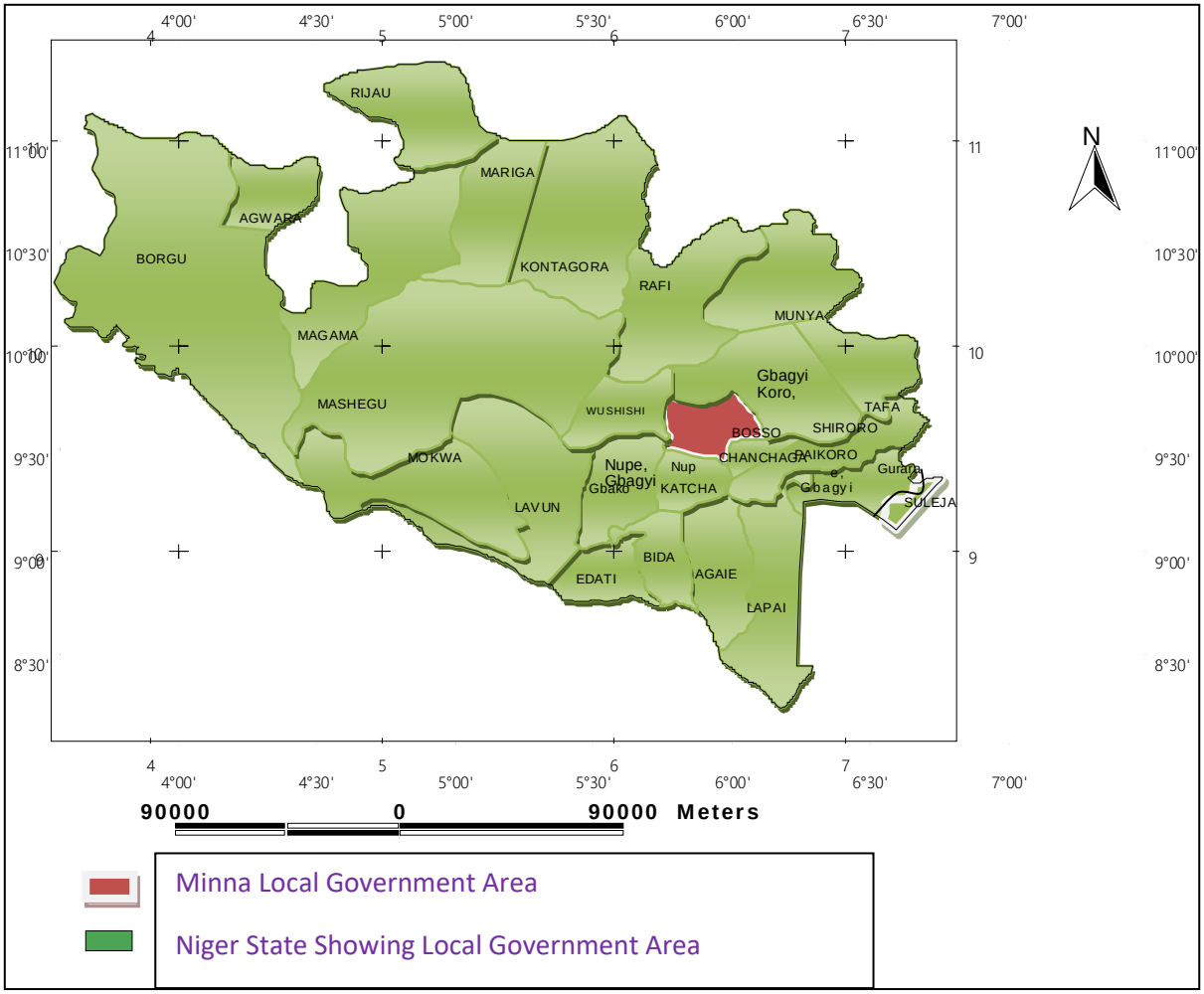


Figure 2 Map of Minna in the context of Niger State

Source: Niger State Ministry of Urban and Housing Development (2016)

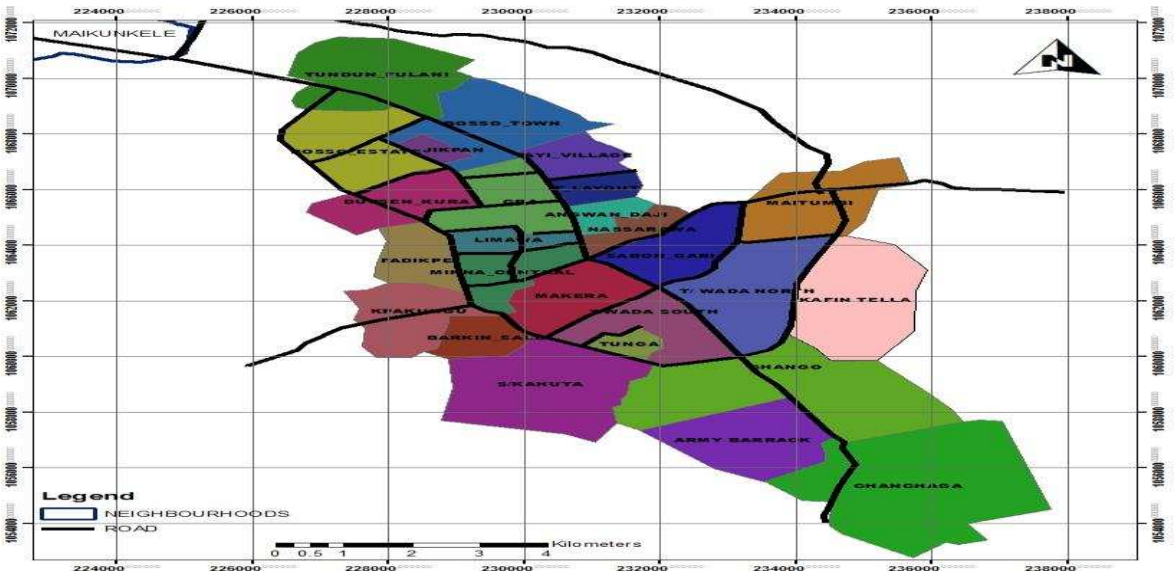
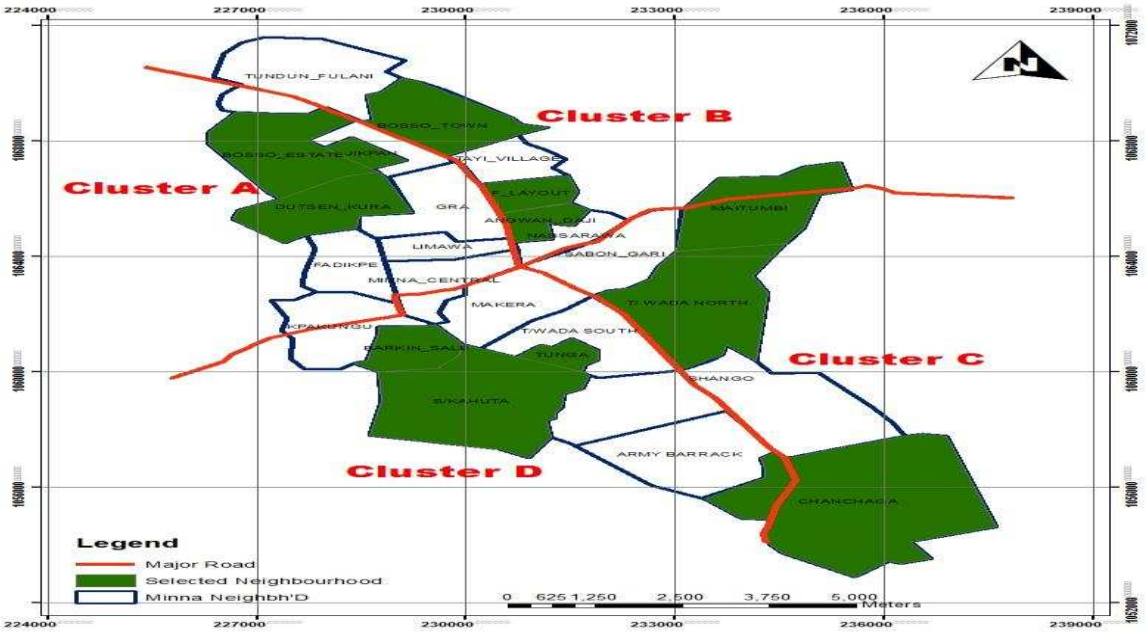


Figure 3: Neighbourhoods Structures in Minna
Source: Author's Field work (2018)

4.1 METHODOLOGY

A cross-sectional survey approach was used to examine the socio-economic characteristics and trip attributes of respondents. Data for this study was obtained from both primary and secondary sources. The primary data were collected through the administration of questionnaires and field observations. The questionnaires were used to gathered information on the socio-economic characteristics of households and their travel characteristics. A multi-stage sampling technique was adopted in the application of the questionnaires. First, the study area was divided into 4 clusters with the use of the 4 major roads linking Minna with other neighbouring settlements. Since household is the target population, according to Nigerian Bureau of Statistics (NBS, 2010), an average number of 6 persons live in a household in Minna. The population is therefore divided by 6 which gave rise to 29,459 estimated households. However, this population size is considered too much, a Dillman (2007) formula was adopted for determining the appropriate sample size. Based on this a total number of 1,303 sample size was arrived at. Questionnaires were administered on this population using Open Data Kit (ODK) at 12 residential neighbourhoods in the city. An estimate of 1,303 questionnaires was administered through randomly sampling technique in proportion to the number of household heads in each neighbourhood out of which 888 were returned valid. Cluster A; Bosso Estate, Dutsen Kura and Jikpan were selected, while in cluster B; Bosso Town, F-Layout and Angwan Daji were selected. In cluster C; Maitumbi, Tudun Wada North and Chanchaga were the selected neighbourhood while, Barkin Saleh, Tunga and Saka Kahuta were selected for cluster D.

Figure 1: Selected 12 Neighbourhoods in Minna



Source: Author's field work (2017)

Table 1 Sample Size and Questionnaires Returned for the Selected Neighbourhoods

Cluster	Neighbourhoods	2006 Census Results	2006 - 2016 Projected Population	Number of Households in each Neighbourhood (Sample Frame)	Households Sample Size	Households Questionnaires Returned
A	Bosso Estate	583	799	133	05	05
A	Dutsen Kura	6,604	9,049	1,508	67	48
A	Jikpan	6,604	9,049	1,508	67	50
B	Bosso Town	43,856	60,091	10,015	443	278
B	F-Layout	6,604	9,049	1,508	67	52
B	Angwan Daji	612	839	140	6	6
C	Maitumbi	17,775	24,355	4,059	180	125
C	Tudun-Wada North	6,494	8,898	1,483	66	50
C	Chanchaga	23,236	31,838	5,306	235	148
D	Barkin Sale	5,862	8,032	1,339	58	44
D	Tunga	6,494	8,898	1,483	66	46
D	Sauka Kahuta	4,274	5,856	976	43	36
	Total	**128,998**	**176,753**	**29,459**	**1,303**	**888**

Source NPC (2006); Author's Projection and Compilation (2016)

5.1 Interpretation of Results

In examining the effects of socio-economic characteristics on household travel in the study area, the number of weekly trips made by each household was computed and represented as dependent variable. On the other hand, 12 household socio-economic characteristics earlier identified were represented as independent variables. Regression model was employed to do the analysis. The formula for the regression model is stated as:

$Y= F (X_1, X_2,X_3,X_4,X_5,X_6,X_7,X_8,X_9,X_{10},X_{11},X_{12}) + e$ .....(1)

Y = Household weekly trips which is referred to as dependent variable, while x_1 to x_{12} are independent variables. The independent variables are listed as follows:

X_1= Gender

X_2 = Marital status

X_3 = Age

X_4 = Household size

X_5 = Position in household

X_6 = Education Status

X_7 = Household income

X_8 = Occupation

X_9 = Number of employed member

X_{10} = Number of licensed driver

X_{11} = Car ownership

X_{12} = Number of cars in household

e = Error term of prediction

Equation (1) above is now made operational in the form of a regression

$Y= b_0 + b_{1(X1)} + b_{2(X2)} + b_{3(X3)} + b_{4(x4)} \ldots\ldots + b_{12}(x_{12}) + e$ …….....equation (2)

Where Y= dependent variable

X_n = independent variables

Where; b_0 -b_n are the parameters to be computed

b_0 = constant, and

b_1 - b_{12} = coefficient of independent variables

Hence, using equation (2) above, the data were subjected to stepwise multiple regression analysis using 12 variables as stated above. Only nine of the above variables entered the model in the following order as shown in Table 1

Table 2 Coefficient of independent variables

Coefficients[a]

Variables	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	20.434	2.128		9.601	.000
Number of cars in household	2.577	.281	.225	9.178	.000
Occupation	.503	.037	.287	13.432	.000
Position in Household	-1.791	.149	-.279	-12.042	.000
Household income	2.145	.247	.197	8.679	.000
Household size	2.268	.289	.192	7.857	.000
Number of employed member	2.283	.325	.148	7.023	.000
Do you own a car	-4.319	.649	-.159	-6.659	.000
Age	-.118	.038	-.067	-3.131	.002
Number of licensed driver	.869	.313	.060	2.774	.006

Source: Extract of Computer Analysis (2018)

The model derived from the study is presented below;

$Y = 20.434 + (2.577)x_{12} + (0.503)x_8 + (-1.791)x_5 + (2.145)x_7 + (2.268)x_4 + (2.2283)x_9 + (-4.319)x_{11} + (-0.118)x_3 (0.869)x_{10}$

From Table 2 the value 20.4 is the constant of the model which is the value of dependent variable when the independent variables are zero. 2.6 is the coefficient of X_{12} (Number of cars in household) which means the amount of change in Y as a result of a unit change in X_{12}. The value 0.5 in the model is the coefficient of X_8 (occupation) it shows a positive relationship conforming to a prior expectation. Also, the value -1.8 is the coefficient of X_5 (position in household) shows an inverse relationship which means a unit increase in X_5 result to -1.8 reductions in Y (total number of weekly trips). Then 2.1 on table 2 is the coefficient

of X_7 (household income) which is the amount of change in total number of weekly trips as a result of unit change in X_7(household income) and is also positive conforming to a prior expectation. Coefficient of X_4 (household size) 2.3 shows the level of change in Y (total number of weekly trips) as a result of a unit change in X_4 (household size). X_9 (number of employed member) also goes as X_4 (household size) as shown in table 2. The coefficient of X_{11} (do you own a car) -4.3 reveal inverse relationship with Y (total number of weekly trips). Likewise coefficient X_3 (Age) also indicate inverse relationship. Lastly, 0.9 which is the coefficient of X_{10} (number of licensed driver) shows the amount of changes in Y (total number of weekly trips) as a result of a unit change in X_{10}.

Therefore, the result of the regression analysis as shown in Table 2 shows that number of cars in household, occupation, position in family, household size, number of employed member and car ownership were the major socio-economic characteristics which affects households travel in the study area and were statistically significant based on their probability value except number of licensed driver which is insignificant.

Table 3 Regression Model for Socio-economic variables of Households

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.520[a]	.270	.269	14.534	.270	327.603	1	886	.000
2	.670[b]	.449	.448	12.634	.179	287.499	1	885	.000
3	.739[c]	.546	.544	11.474	.097	189.020	1	884	.000
4	.771[d]	.594	.592	10.855	.048	104.722	1	883	.000
5	.788[e]	.621	.619	10.495	.027	62.561	1	882	.000
6	.800[f]	.640	.638	10.234	.019	46.565	1	881	.000
7	.811[g]	.658	.655	9.982	.018	46.022	1	880	.000
8	.813[h]	.662	.659	9.933	.004	9.760	1	879	.002
9	.815[i]	.665	.661	9.896	.003	7.693	1	878	.006

Source: Computer Analysis (2017)

The model yielded an appreciable R^2 as these values varies from 0.270 at step 1 to 0.665 at step 9 moreover; the model is statistically significant at 0.05 as indicated in Table 3. This shows a strong level of explanation as the coefficient of determination varies from 27% in model 1 to 67% in model 9. The coefficient of determination R^2 (67%) obtained in the last model explains the amount of variation in the dependent variable as a result of variation in independent variables. That is 67% of changes in dependent variable (total number of weekly trip) is explained by the independent variables (socio economic variables) in the model under the period of consideration. While, the remaining 33% is accounted for by other factors which the study has not investigated.

6.1 Conclusion

This study has provided insights into the extent socio-economic characteristics of households can influence travel behaviours and trip generation of urban residents in Minna, Nigeria. The study is a confirmation of various previous studies established that socio-economic attributes of trip makers significantly affect their travel behaviours. However, the study revealed that gender, marital status and educational status have little or nothing to do with travel behaviours of residents in the study area. In the light of this finding, the following recommendations are outlined

7.1 Recommendations

1 Urban transportation in Minna should always consider the socio-economic characteristics of the urban residents as a major input required for forecasting future trip generation and travel demand.

2 Development of appropriate forecasting model for household trip generation in the study area should also explore other variables that account for the remaining unexplained 33% of factors that influence travel behaviour in the city.

3 While, taking transport policy decisions, government should take cognisance of the identified socio-economic factors and peculiarities of each neighbourhood in the prediction of households' travel behaviour.

References

Adeniyi, S.A, (1981). Public Transportation and Urban Development Strategy in Nigeria. Unpublished Ph.D. Thesis, University of Wales.

Adeniji, K. (1991), "Urban Mobility Crisis, where do we go from here?" Paper delivered at Ogun State Public Service Forum Gateway Hotel, Abeokuta.

Aderamo, A.J., (2004), Planning for Urban Transportation in Nigeria. In Vandu-Chikolo, J., A.A. Ogunsanya and A.G. Sumaila (Eds), Perspectives on Urban Transportation in Nigeria. NITT Zaria, pp: 312-231.

Ayeni, M.A.O. (1974), "Predictive Modeling of Urban Spatial Structure: the example of Jos, Benue-Plateau State, Nigeria, Unpublished Ph.D. Thesis, University of Ibadan.

Badejo, B.A., (2011), *Transportation, removing the clog to Nigeria's Development*. Anchorage Press and Publishers, Lagos, Nigeria. In Solanke, M. Olayiwola (2014): Socio-economic Determinants of Intra-Urban Trips Generation in Ogun State, Nigeria. Current Research Journal of Social Sciences 6 (1): 15-20, 2014 © Maxwell Scientific Organization, 2014.

Best .H. & Lanzendorf, M. (2005). Division of labour and gender differences in metropolitan car use: An empirical study in Cologne, Germany. Journal of Transport Geography, 13(2), 109-121.

Bhat C.B. and Koppelman, F.S. (1999). *"A* retrospective and prospective survey of time use *research"*, Transportation, Vol. 26, pp.119-139.

Dillman, D.A. Mail and Internet Surveys- the tailored design method, 2nd ed. New York 2007,. https://www.researchgate.net.

Clifton K.J. and C.L. Handy (2001)*"Qualitative methods in Travel* Behaviour Research" Paper presented at the International Conference on Transport Survey Quality and Innovation, Kinger National Park, South.

Dieleman, F. M., Dijst, M., & Burghouwt, G. (2002). Urban Form and Travel Behaviour: Micro-level Annals of the Social Science Council of Nigeria, No. 3, pp.13-30.

Fadare, S.O. (1987),*"Intra*-Urban travel characteristics: A study of Socio-economic attributes in Ibadan". Ph.D. Thesis submitted to University of Sheffield, England.

Fadare, O. (1989), *"Analysis of factors affecting Household trip generation in the* Residential Area of Ibadan". Ife Research Publications in Geography, Dept. of Geography, O.A.U., Ile-Ife, 3.

Fadare S.O. and A.M. Hay (1990) "Housing Densities, Life style and travel behavior in Third World City: The example of Ibadan". Nigerian Journal of Economic and Social Studies. Vol. 32 No.2 Pp 177-191.

Fadare, O. and Salami, B.T., (2004). Telephone uses and the travel behaviour of residents in Osogbo, Nigeria; an empirical analysis. Journal of Transport Geography, 12, 159-164.

Fujiwara, A., Soehodho, S., Hyodo, T., and Montalbo, C. (2005): "Urban travel behavior characteristics of 13 Cities based on Household interview survey data". Journal of the East Asia Society for Transportation studies. Vol.6 pp 23-38.

Garling T. K. and Golledge R.G. (1994), "Computational Process Modeling of household activity scheduling", Transportation Research, Vol. 28B No. 5, pp. 355-364.

Gordon P., Kumaar, A. and Ricahrdson, H.W. (1988), *"*Beyond the Journey to work", Transportation Research, Vol. A 22, pp. 419-426.

Handy, S., Weston, L., & Mokhtarian, P. L. (2005). Driving by choice or necessity? Transportation Research Part A: Policy and Practice Positive Utility of Travel, 39(2-3), 183-203.

Hanson, S. and Schwab, M. (1987), Accessibility and Intra urban travel, Environment and Planning, pp. 735-748.

Hoyle, B.S. and Knowles, R.D. (1998), *"Transport Geography an Introduction*", in Hoyles, B.S. and Knowles, R.D. (Ed.), Modern Transport Geography, John Wiley and Sons, pp. 1-12.

NBC. Socio-economic Survey. **www.nigeriastat.gov.ng** 2010

NPC.(2006) National Population Commission, Population and Housing Census of the Federal Republic of Nigeria, Published official Gazette of the Federal Republic of Nigeria No. 2, Vol. 96, 2009.

Mokhtarian, P.I. and Meenakshisundaram, R. (2002): "The patterns of Telecommunicating and engagement and frequency: A Cluster Analysis of Telecenter Users". Promethus, 20 (1).Pp 21-37

Newbold, K. B., Scott, D. M., Spinney, J. E. L., Kanaroglou, P., & Paez, A. (2005), Travel behaviour within Canada's older population: a cohort analysis. Journal of Transport Geography, 13(4), 340-351.

Ogunjumo, A. (1986)," The pattern of Trip current at Ile- Ife" Journal of the Institute of Town Planners. Vols. VI &VII, Pp 99-113.

Ogunsanya, A.A., (2002). Maker and Breaker of Cities. 59th Inaugural Lecture, University of Ilorin, Ilorin.

Ojo, O.E. (1990), Urban Travel-activity Pattern: A Case Study of Ibadan, Nigeria Unpublished Ph.D. Thesis, University of Ibadan.

Osoba, S.B., (2011), Variation in ownership of global system for mobile telecommunication GSM among socio-economic group in Lagos, Nigeria. J. Logist.Transport, 3(1):79-94

Pucher. J. and Renne J. (2003), *"Socio Economics of Urban Travel*: Evidence from the 2001 National Household Travel Survey". Transportation Quarterly, Vol.57. No.3. Pp 49-77.

Raji, B.A.,(2013). Spatial analysis of pedestrian traffic in Ikeja, Lagos State, Nigeria. An Unpublished Ph.D Thesis, University of Ibadan.

Solanke, M. Olayiwola (2005): Spatial analysis of intra-urban travel patterns in Ogun State. An Unpublished Ph.D Thesis, University of Ibadan.

Solanke, M. Olayiwola (2014): Socio-economic Determinants of Intra-Urban Trips Generation in Ogun State, Nigeria. Current Research Journal of Social Sciences 6 (1): 15-20, 2014 © Maxwell scientific organization, 2014.

Srinivasan S. and P. Rogers (2005):"Travel Behaviour of Low Income Residents: Studying two locations in the city of Chennai" Journal of Transport Geography. Vol. 13 Pp 265-274

Rimmer, P.J. (1986), Rikisha to rapid transit: Urban Public Transport Systems and Policy in South East Asia Sydney, Pentagon.

White P.R. (1990), "*Inadequacies of Urban public transport systems"*, in Dimitriou H.T. (Ed.), Transport Planning for Third World Cities, London, Routledge, pp. 85-116.