

# Influence of Residential Location on Mobility of Children

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**Abstract:** *Children's travel behaviour vary from that of other age cohorts due to security challenges. In most cases, they are often accompanied by parents or older adults during travel. Hence, this study examined the travel pattern of children in varying residential density zones. The multi-stage sampling technique was adopted for the study; the residential zone was stratified into three zones and political wards were randomly selected from each stratum. Thereafter, the children were systematically selected from 1 out of every 20 building which represents 5% of respondents in the study area. The study revealed that variations exist in the socio-economic characteristics of children in the different residential zones, and mean trip frequency for the respondents were 1.64, 1.75 and 2.56 for children in the core, transition and periphery zones respectively. The result of the stepwise regression analysis also revealed that three variables (cars in the household, licensed driver and income of respondents) were significant at influencing trip frequency in the core, four variables which are income of household head, income of respondents, cars in the household and travel cost were significant in the transition while the number of cars in the household, income of respondents and level of education of household head were significant variables influencing trip frequency of children in the periphery zone. We concluded that children's travel varies across the zones, and depend largely on their parents and dependants.*

**Keywords:** Residential location, Travel Characteristics, Mobility

## Introduction

The need for humans to travel from one place to another is necessitated by the spatial spread of activities within the geographical space. Children form an important component of traffics planning and travel analysis, and they are the key to the current transportation analysis because they represent a major transport user. Focusing on school children who constitute a close knit is very

cardinal because their trips usually take place at peak times and have the same destination everywhere (Ipingbemi & Aiworo 2013). The social ecology perspective recognizes that all environments which children are exposed to influence their behavior. Most researchers have acknowledged the importance of the family for understanding children's behavior, however, there

are individual factors where one's behavior is determined from a set of individual factors to a model where multiple set of factors operating at different levels, e.g. individual, family background and neighborhood affect behavior. As such, it is necessary to examine the travel behaviour of children in the different density zones in order to channel policies to them.

The reality is that an understanding of children's travel is necessary to understand adult travel. For years, researchers have noted how the presence of children in a household changes travel behavior and determines travel patterns. However there is a need to consider the influence of residential location on travel and mobility pattern of children. For all of these reasons, the study of children's travel is necessary and timely in order to formulate sustainable transport policies with understanding of key factors influencing children's travel and their relative impact on travel patterns. In view of this, it is pertinent that children be considered during the transportation planning of any town or city for sustainable development.

## Literature Reviews

### General Overview of Children's Mobility

In most international and national instruments, children are defined as boys and girls up to the age of 18. The age of 18 is the generally accepted age of maturity, though in all countries there are legal exceptions such as the age at which a child may be married, make a will, or consent to medical treatment (Smart, 2003).

Oftentimes, children are not usually considered the main actors in the domain of transportation, and when they do, their travel behavior is often evaluated in terms of their traffic safety and their health (Mackett, 2001), their inability to develop travel skills and their desire to travel independently (Hillman, 1999; McDonald, 2005).

It is broadly accepted that very young children are totally dependent on their parents when it comes to organizing their daily life activities, their nourishment and their travel. Children fully rely

on their parents to drive them or to escort them to where they want to go, which in turn strongly influences parents' travel behavior and intra-household decision-making (Copperman & Bhat 2007). At a certain age, children are considered able and old enough to travel independently by bicycle or on foot. The child's age at this turning point has been increasing in recent years, which in turn has led to a dramatic decrease in children's independent travel (Hillman, Adams & Whitelegg, 1990; Hillman, 1997; Pooley, Turnbull & Adams 2005).

The Federal Highway Administration (1997) provided basic data on children's travel. Social and recreational activities accounted for about 40% of children's travel, while trips to and from school represented about a quarter of all trips. Travel as a passenger in a motor vehicle dominated modal choice, representing about 80% of trips to and from school. However, the percentages for non-motorized forms of transportation were higher than in the general population.

The Organization for Economic Cooperation and Development (1998) reviewed children's mobility in Great Britain and found that walking accounted for some 40% of all journeys by children. Children aged 11 to 15 years walked more than any other age group. More than half of journeys by children aged 5 to 15 to and from school were on foot, nearly five times the percentage for American children. However, walking to or from school declined between 1975 and 1994, mainly in journeys of 1.5 to 3 kilometers in length, a decline that reflects a significant shift from walking to driving (U.K. Department of Transport, 1995).

In Canada, the 1998 national survey contained a sub-sample of parents of school-aged children, some 36% of the parents surveyed stated that their children were allowed to walk to school. Of these, 86% of those lived within 1 kilometer and 50% lived within 3 kilometers of school. Rates of bicycling to school were much lower, with only 5% being allowed to take a bicycle to school most of the time. Safety issues dominate the literature on children's travel. Because children perceive

the environment differently from adults, are smaller in size, and lack experience in traffic situations, children are frequently the victims of traffic accidents. Although pedestrian and bicycling fatalities involving children dropped between 1980 and 1990 in OECD countries (OECD, 1998), the number of accidents involving children was still significant. Epidemiological studies have consistently shown that lower-income children, and especially children of lower-income minorities, are injured and killed more often while walking and bicycling than are middle-class and upper-income children (Durkin et al. 1994; Forkenbrock & Schweitzer 1997).

A major study of the effects of safety on children's travel was conducted by Hillman, Adams and Whitelegg (1990), children aged 7 to 11 years and 11 to 15 were explored. The authors found that British children were allowed to travel on their own consistently less than German children. The withdrawal of parental permission to walk or bike to school or other destinations was accompanied by a modal shift from walking to public transportation and private car. The study by Hillman et al, (1990) also included data on parents' concerns about the travel of their children. More than 40% of the parents surveyed listed traffic danger as the reason given for restricting the younger children (ages 7 -11) from coming home alone after school; about 20% said their children were unreliable or they feared molestation; about 15% said the distance home was too great. From the various studies on children's travel, it can be deduced that variations occur in different parts of the country on the pattern of travel by children. While some children were allowed to travel on their own, others rely on parent to make trips because of some factors such as safety, security, and age.

In the developing countries, children's travel varies across age groups, a study conducted by Amalan, Yoo and Kumarage (2017) revealed that car, motorcycle, and non-motorised transport were the predominate modes. Public transport such as bus share is very low among all the age groups and it is a popular mode for those above 19. About 30% trips were made by car and

average of 27% by non-motorised modes such as walking and cycling. The study opined that children who walk were escorted by their parents, friends or siblings or walks themselves. The study further asserted that non-motorised mode dominates the mode distribution for children in low-income background.

Daodu and Said (2019) examined the mobility of children in Nigeria, and discovered that independent mobility of children indicators in barrack included the destination accessibility, home range, travel time, and population density. The travel mode choice behaviour in Nigeria's military barrack is affected by factors that continuously reduced active and independent mobility of children. Eight travel mode choice behaviour factors that could jeopardize independent mobility of children in barrack were further included. These consist of the distance to school and playground, age, gender of children, and availability of cars. Others are traffic safety fears, danger of strangers, fear of injury to children, perceived environment, and policy environment. The study showed that travel behaviour exogenously predicted children's independent mobility with six factors.

Ipingbemi and Aiworo (2013) in the study of school children in Benin, Nigeria discovered that walking accounted for 65% of the mode to school; the main reason for walking among children were short distance and high cost of transportation. The study established that significant differences exist in the mode of transport to school by children.

Based on the studies above, it can be inferred that variations often occur in the travel pattern among children depending on the socio-economic background and respective location which may result in one risk or another as noted in the studies above. These variations are responsible for changes in their travel behavior.

### **Study area and Methodology**

Akure became the capital of Ondo State in 1976 and as well serving as the local government headquarters of Akure South Local Government Council since its creation. As at 1966, the city occupied an area extent of 36.55 square

kilometers, 274.93 square kilometers in 1986 and 531.09 square kilometers in 2002 (Ogunbodede, 2007). The dual political roles of Akure have since acted as impetus to the influx of people into the city. Population of the city grew from 38, 852 in 1952 to 71,106 in 1963. Its population was estimated to be 144,544 in 1987, 148,880 in 1988, 153,347 in 1989 and 157,947 in 1990 (Ondo State Government, 1990 cited in Ogunbodede, 2007). The 1991 national population census however, put the population of Akure at 239,124 and its estimated population in 1996 was 269,207 (NPC, 1996) and increased to 360,268 according to year 2006 census estimate. This influx was necessitated by the development attracted to the state capital.

The age structure of the population in the state signifies that children constitutes 38% of the population being in bracket (0-17). This implies that children constitutes about two-fifths of the population in the state. It is therefore necessary to understand their travel pattern in order to influence decision making process and the achievement of a sustainable mobility policy.

### **Methodology**

Data for the study were obtained through questionnaire administration. Questionnaire was administered in the three identified residential zones in Akure South Local Government Area as explained by Olujimi (2010). Akure was stratified into three residential zones. These stratifications are as follows:

**The Core Zone:** This area is predominantly made up of old structures, whose construction predates the colonial period in Nigeria (i.e. pre-1914). The high residential density referred to as the core area of Akure. These areas do not have layout development and comprises old buildings where the early settlers in the town are located.

**The Transition Zone:** This is an extensive post-colonial development, spreading to all directions from the boundary of the city core. The zone is characterized by a strong mix of land uses such as commercial, administrative and residential. Unlike the core area, most of the residential properties enjoy fair accessibility.

**The Peripheral Zone:** These areas are post 1976 development (i.e. after the creation of Ondo State). They are located at the outskirts, and the residential properties in the areas are mostly of modern design and are physically sound. Most of residential properties were built on approved private residential layouts.

The multi stage sampling technique was adopted for this study. The first stage involved the stratification of residential areas into three different zones which are the core, transition, and the peripheral zone including the Government residential layout. Stratification of the area revealed that there are 2 wards in the core, 4 in the transition zone and 5 in the periphery making a total of 11 political wards in the study area. 50% of the wards were randomly selected. Using this method, one ward was selected in the core and two in the transition and three in the periphery making a total of six political selected for sampling.

Information from the Akure South Local Government revealed that there are a total of 34 streets in the selected area in the core, 67 in the transition, 106 in the periphery including the government residential quarters totaling 207 registered streets in the selected areas. Simple random sampling was used in selecting 7 streets in the core, 13 in the transition zone and 21 in the periphery representing 20% of the total streets.

Further information from the local government revealed that there are 698 registered buildings in the selected streets in the core, 1256 in the transition, and 1972 in the periphery. In selecting residents for sampling, systematic random sampling was adopted and respondents (children) were selected from 1 out of every 20 building. This represents 5% of the total number of buildings in the study area. Using this procedure, 35, 63 and 99 buildings were selected for sampling in the core, transition and periphery zones respectively. Thus a total of 197 buildings were surveyed and a child between the age of 10 and 17 years were sampled. Where the respondents were not available, the next building was selected for sampling.

The formula for the sample size in the study location:

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

Where K= sample size

N= Number of registered building/dwelling unit/household

n= represents 5% of all households per settlement in the urban and rural areas, respectively.

The questionnaire designed for the research had two main sections. Section 1 comprised information relating to the socio-economic characteristics of the respondents. They included gender, age, education, income, marital status, occupation of household head, and car ownership while section 2 focused on the travel characteristics of the respondents and information such as trip frequency (Average number of round trips), travel time, transport mode and travel cost were acquired.

## Results and Discussion

### Socio- Economic Characteristics of Respondents

#### Introduction

The socio-economic profile of residents in the study area can be explained empirically using data obtained from the survey. This profile includes gender, age, educational attainment, income of parents or guardian, household size among others. These socio-economic characteristics were considered important for this study as similar works on travel behaviour such as Giuliano (2003), Newbold (2005), Fadare and Alade (2010), argued that travel pattern within a given geographical area can be explained on the basis of the socio-economic and demographic characteristics of the residents in the area. The above listed socio-economic and demographic characteristics of the residents were thus considered in this study.

#### Gender of the residents

Researchers have argued that variation in travel pattern within a locality can find explanation in

the gender of residents (Fadare & Morenikeji, 2001; Odufuwa 2008). Based on the findings from the study, it was revealed that female respondents outweighed their male counterparts in all the zones in the study area. This could be attributed to the fact that household chores are roles ascribed to female gender in the African society which made a larger proportion (53.5%) of them available for sampling.

#### Age Distribution of respondents by age

World Bank (2008) identified age as one of the determining factors in assessing the level of vulnerability of people and group, the age at which people are excluded from being engaged in certain jobs or activities, the age at which one is able to make decision among others explain how vulnerable they are. In order to present this particular socio-economic characteristic in the study area, children between the age of 10&17 years were purposively selected for sampling because it is assumed that children at that age will be in secondary school and are matured enough to be sampled. In a study by Hillman (1999) on how children view their travel pattern, he identified children in this category as those graduating to another grade of education (secondary school) seeking autonomy in different aspect, especially their travel or trip making pattern with the parents being more protective because of the perception of risks and difficulties associated with travel. This necessitated the need for the age consideration. From the study, the majority (91.7%, 96.9%, and 59.2%) of the children in the core, transition and periphery zones respectively were teenagers. This is a result of the level of maturity of the children as majority of them were in secondary school, thus allows them participate effectively in the questionnaire answering without involving their parents.

#### Income distribution of children by Income (Stipends from Parents)

Income of residents is another important variable in the explanation of their travel behaviour. It can be asserted from this study that children earn below the minimum wage as they all rely on their parents for their wellbeing. In addition to this, it

was stated by these children that their monthly income comes from their parents mainly for transport and lunch fee especially when in school. The minimum monthly stipend received by the children from the parents is 200 naira while the maximum was 20000 naira. The average monthly stipend for the study area is 3272 naira. Therefore, the income range is low. This can be attributed to the fact that children do not have responsibilities which may demand huge income as they depend on their parents and close relatives for their wellbeing.

From the study, children receiving below 5000 naira monthly as stipends are 47.1% of the respondents, and those receiving below 1000 naira were 38.5%. 14.4% of those sampled receives 5001 and 10000 naira while others receive more than 10,000 naira. However, income of respondent varies across the zones. A larger percentage (55.1%) of the children in the periphery zones received 1001- 5000 naira while a larger percentage (54.2%) of their counterparts in the core areas received below 1000 naira monthly. This is also not different from what is observable in the transition zones as a larger percentage (50.8%) of them also earn below 1000 naira as opposed to the (40.0%) of their colleagues in the periphery who receive the same amount. The mean income for the children are 2333, 2684 and 5888 naira in the core, transition and periphery zones respectively. This confirmed the variation in the income level of children in the different zones. The mean income in the core and transition zones earn is lower than the average monthly income in the study area. The result of the analysis of variance ( $F=5.666$ ,  $p=0.00$ ) also confirmed the variation in the income of residents in the identified residential areas in Akure. The observed variation in income is most likely to affect their travel behaviour as will be verified later.

### **Income Level of Household Head**

In order to present this, income group for federal tax rating was adopted to illustrate the income distribution of the aged in Akure South Local Government Area. As indicated in the study, the majority (54.2%) of the household heads in the

core earn below 20,000 naira while the majority (43.9%) of those in the periphery zone earn above 100,000 naira and majority (29.2%) of those in the transition earn between 40,001-60,000 naira. The mean income for the household head in the core were 26,625 naira while those in the transition and periphery were 43,000 naira and 63,653 naira respectively. It was deduced from this study that household head in the periphery earn more than those in the transition while household head in the transition have higher income than their counterparts in the core areas. This may also explain why variations exist in the income of the children in the varying residential zones as they rely on their parents and guardians for their wellbeing. This may also have effect on their travel behaviour as explained by scholars such as Pucher and Renee (2005).

### **Number of Cars in each Household**

The availability of cars for a household is a function of the income earned by the household. It is thus given all things being equal that household with higher income are likely to be able to afford cars to ease its movement. This can be established from number of cars in each household in the different residential zones. From the study, majority 11(45.8%) of the households in the core areas do not own a car against the 8(12.3%) and 3(3.1%) of the households without a car in the transition and periphery zones respectively. In the same vein, majority 31(31.6%) of the households who have more than five cars were observed in the periphery against the 0(0%) and 1(1.5%) of the counterparts in the core and transition zones respectively. Further analysis from the study explained the variation in car ownership of each household as the mean household car in the core is 0.7 while the transition and periphery zone has 1.46 and 2.84 respectively. It is clearly evident that periphery households cannot be compared with transition zone as much as also transition zones households cannot be compared with households in the core areas in terms of the availability of and accessibility to cars to aid movement. A study by Fadare and Alade (2010) asserted that the higher

the income, the higher the number of vehicles per household.

### Travel Characteristics of Respondents

#### Analysis of Trip Frequency of Respondents

Analysis of general purpose trip (daily round trip) frequency indicated that a greater proportion of respondents (53.1%) who make 3-4 trips are found in the periphery zone of the study while those who make 1- 2 trips (70.8% and 67.7% ) concentrated in the core and transition zones as opposed to the 36.7% of their counterparts in the periphery zones. The study further revealed that the average trips made by children in the core are 1.64 while that of the transition and periphery zone are 1.75 and 2.56 respectively. This may be due to the level of income of the respondents of each household in these areas as well as the number of cars in the households as observed earlier in the study. This suggests that trip frequency of people is a function of income, car ownership among other factors.

#### Trip Distance and Travel Time of Respondents

The propensity of households to generate trips is a function of accessibility. Accessibility factor must thus be taken into consideration, and this is done by an analysis of the distance (trip length) and travel time to the different trip purposes.

Analysis of trip distance revealed that children travel shorter distance to all the identified trips.

A larger proportion (46.5%, 41.2%, 51.3% and 48.7%) makes trips of less than 1km to school, health facilities, shopping, and recreational facilities respectively. Similarly, children have shorter travel time, majority travel between 10-20 minutes to the entire identified trip (school, health, shopping and recreational trips. This is due to their accessibility to all these facilities and the decisions of their parents, who may not want them travelling far. In addition, the levels of autonomy children have over their choices make them stay within the available options. Overall, we found that irrespective of their location, children generally travel shorter distances to the different trip activities.

#### Respondents trip mode in the residential zones

Analysis of trip mode of respondents in the residential zones revealed in Table 1 indicates that 91.7% of the children in the core walk, as opposed to the 53.8% and 15.3% of their counterparts in the transition and periphery zones respectively. More than 60% of the children in the periphery had access to a car and used private car for their daily activities as opposed to 0% and 10.8% of their peers in the core and transition zones respectively. This corroborates the study of Towner, et al (1994) which opined that children from deprived background were less likely to travel in cars and more likely to walk compared with their more affluent counterparts.

**Table 1: Transport mode of respondents in the different residential zones**

Transport mode	CORE	TRANSITION	PERIPHERY	TOTAL
Walk	22 (91.7%)	35 (53.8%)	15 (15.3%)	72 (38.5%)
Bicycle	0 (0%)	1 (1.5%)	0 (0%)	1 (0.5%)
Private car	0 (0%)	7 (10.8%)	64 (65.3%)	71 (38.0%)
Public transport	2 (8.3%)	22 (33.8%)	19 (19.4%)	43 (23.0%)
Total	24 (100%)	65 (100%)	98 (100%)	187

Source: Author’s Field survey

**Analysis of Factors Influencing Trip Making of Children in the Varying Residential Zones**

A stepwise regression analysis to determine the factors influencing trip generation of children in the residential zones was carried out. The formula for this is:

$$Y = a + b_1 x_1 + b_2 x_2 + \dots + b_n x_n + e$$

Where Y represents the dependent variable. The dependent variables, in this case, represents Y= Trip frequency.

$x_1, x_2, x_3, \dots, x_n$  represent the independent variables

a, b are constants

e is the error term.

**Table 2: Summary of Regression Coefficients for trip frequency of children in the core areas of the study**

Variables	Unstandard coefficient			
	B	Std error	t Statistics	p-value
(Constant)	2.341	0.451	5.385	0.001
Cars in the household	-0.605	0.275	-2.204	0.005
Licensed Driver	-0.056	-0.039	-0.095	0.003
Income of respondent	1.025	0.437	2.261	0.001

**Source: Author’s Field survey (SPSS Result)**

As revealed from the stepwise multiple regression, a total of three variables have significant influence on trip frequency of the children in the core areas. The variables are cars in the household, licensed driver and income of respondent and is significant at  $P \leq 0.05$ . This is similar to the study by Ryley (2005) who stated that income and cars in the household are some of the factors influencing travel behaviour of households with children. It can therefore be

asserted that income, cars in the household and licensed drivers are among the factors influencing the number of trips generated by children in the core area of the study area. The  $R^2$  value which represents the coefficient of determination (59.6%) is low for any model to be developed but provide a useful basis for explaining the factors that affect children trip frequency in the core area of the study.

**Table 3: Summary of Regression Coefficients for trip frequency of children in the transition areas of the study**

Variables	Unstandard co- efficient			
	B	Std error	t Statistics	p-value
(Constant)	3.658	0.321	4.192	0.000
Income of HH	-0.669	0.420	-2.217	0.010
Income of respondent	0.034	-0.029	-0.549	0.004
Cars in the Household	1.025	0.417	1.912	0.005
Travel cost	-1.045	0.926	1.056	0.043

**Source: Author’s Field survey (SPSS Result)**

As presented in Table 3, income of household head, income of respondents, cars in the household and travel cost were significant factors influencing trip frequency of respondents in the transition zone. Most especially, the income of parents is seen to be significant and one of the factors influencing trip generation of children in the transition zone. This corroborates the study of Copperman and Bhat (2007) who asserted that children’s travel is dependent on the socio

economic indices of their parents, income being one. In the same vein, the significant and negative unstandardized regression coefficient recorded for travel cost indicates that a unit increase in travel cost will decrease trip frequency of children by 1.045. This is an indication that increase in travel cost will ultimately reduce the number of trips embarked upon by children as their travel pattern is dependent on their parents.



**Table 4: Model summary for trip frequency of children in the transition zone**

Model	R	R Square	Standard Error of the Estimate
Income of head	0.698	0.394	0.156
Income of respondent	0.705	0.462	0.134
Cars in the household	0.785	0.535	0.090
Travel cost	0.791	0.567	0.081

**Source: Author's Field Survey(SPSS Result)**

Table 4 disclosed the R square value of the regression model for the trip frequency of children in the transition as 56.7%. Income of household head recorded the highest with 39.4% contributing factor influencing trip frequency of the children in the zone. It was however discovered that there was no statistically

significant increases in R square between cars in the household and travel cost. In summary, the four variables (income of household head, income of respondents, cars in the household and travel cost) jointly account for 56.7% of the factors influencing trip frequency of the children. These variables are significant at  $P \leq 0.05$ .

**Table 5: Summary of Regression Coefficients for trip frequency of children in the periphery zone of the study**

Variables	Unstandard co- efficient			
	B	Std error	t Statistics	p-value
(Constant)	4.425	0.718	6.152	0.003
Cars in the household	2.156	0.692	3.276	0.015
Income of respondent	1.095	0.529	3.095	0.004
Education of HH	1.010	0.384	1.187	0.025

**Source: Author's Field Survey(SPSS Result)**

As revealed from the stepwise multiple regression, a total of three variables have significant influence on trip frequency of the children in the periphery zone. The variables are cars in the household, income of respondent, and level of education of household head. The summary of the regression coefficients for the children could be used to develop a multiple linear regression model as follows

$$Y = 4.425 + 2.156(\text{cars HH}) + 1.095(\text{Income R}) + 1.010(\text{Edu})$$

It can thus be inferred from the regression analysis that an increase in the number of cars in the household, income of respondent and education of household head will increase trip frequency for the children by 2.156, 1.095 and 1.010 respectively. It can thus be asserted that availability of car in a house will propel the trip making behaviour of children in the study area. Likewise income is another similar variable influencing trip frequency for the children in the core, transition and periphery zones of Akure South Local Government Area.

**Table 6: Model summary for trip frequency of children in the periphery zone**

Model	R	R Square	Standard Error of the Estimate
Cars in the household	0.648	0.582	1.352
Income of respondent	0.712	0.624	1.229
Education of household head	0.697	0.663	1.016

**Source: Author's Field Survey(SPSS Result)**

As indicated in the model summary in Table 6, three of the independent variables (car in the household, income of respondent and education of household head) account for 66.3% of the total factors influencing trip frequency of the children in the study area. Cars in the household had the highest contribution with  $R^2$  of 58.2%. It increased to 62.4% and 66.3% with the inclusion of income of respondent and education of household head respectively. From the study, it was discovered that factors influencing trip frequency of the children vary across the zones. However, cars in the household and income of respondent were the only constant variables influencing trip frequency of children in all the zones.

## Conclusion

The study concludes that children have unique and distinct travel behaviour, and differences exist in their trip making across the residential zones. It was also discovered that children travel pattern is greatly influenced by their parents which are indications of the socio-economic characteristics and location attributes of the households. Based on this, we proposed that transport managers, government and relevant stakeholders in the built environment make provision for suitable and affordable transport such as cheap, convenient and accessible public transport in all the zones especially the core zone where the socio-economic characteristics of the parents and standard of living is quite low compared to their counterparts in the transition and periphery zones. Also, children in the core areas travel more on foot than their colleagues in other zones, hence a need to provide better transport services to enhance their mobility. This will ensure that children from low-income and deprived backgrounds have access to good transport infrastructures which can favorably compete with other locations interims of availability, accessibility and affordability.

## References

Daodu, T and Said, T. (2019). Effects of travel mode choice behaviour on active and independent

mobility of children in the military barrack of Nigeria. *Journal of Applied sciences & environmental sustainability*. 5: 11

Durkin, M., Davidson, L., Kuhn, L., OíConnor, P., and Barlow, B. (1994). Low-Income Neighborhoods and the Risk of Severe Pediatric Injury: A Small-Area Analysis. *American Journal of Public Health*, 84:4, 87-92.

Fadare, O. and Alade, W (2010). Aging and Households' travel pattern: implications for wellness of the Aged in Lagos, Nigeria. *The Lagos journal of Environmental Studies*, 7; 2.84-90.

Fadare, S.O. and Morenikeji, W. (2001). Gender-bias in intra-urban trip pattern in Niger State, Nigeria. *International Journal of Transportation Studies*, 73-85.

Federal Highway Administration (1997). *Our Nation's Travel: 1995 NPTS Early Results Report*. Washington, D.C.: U.S. Department of Transportation.

Forkenbrock, D. and Schweitzer, L. (1997). *Environmental Justice and Transportation Investment Policy*. Iowa City, IA: Public Policy Center, University of Iowa.

Giuliano, G. (2003). Travel, location and race/ethnicity. *Transportation Research Part A: Policy and Practice*, 37,4351-372.

Hillman, A. Adams, J and Whitelegg, J. (1990). *One false move. A study of children's independent mobility*. Policy studies Institute, London.

Hillman, M. (1997). *Children, Transport and the Quality of Urban Life*. In: Camstra, R. (Ed.), *Growing up in a changing Urban Landscape*. Van Gorcum, Assen, pp11-23.

Hillman, M. (1999). *The impact of transport policy on children's development*. Paper on the Canterbury Safe Routes to schools project seminar, Canterbury Christ Church University College <<http://www.spokescastkent.org.uk/mayer.htm>>. Cited February 11th 2009.

Ipingbemi, O. and Aiworo, A.B (2013). Journey to school, safety and security of school children in Benin City, Nigeria. *Transport Research Part F*. 19; 77-84

- Mackett, R.L. (2001). Are we making our children car dependent? Paper for a lecture at Trinity College Dublin, 17 May 2001. <<http://www.cts.ucl.ac.uk/research/chcaruse/Dublin.pdf>>. Cited February 11th 2009.
- McDonald, N. (2005). Children's Travel: Patterns and Influences. Ph.D. Thesis. University of California, USA.
- Newbold, K. B., Scott, D. M., Spinney, J. E. L. and Kanaroglou, P (2005). Travel behavior within Canada's older population: a cohort analysis. *Journal of Transport Geography*, 13: 4, 340-351.
- Odufuwa, O.B. (2008). Gender differentials, vulnerability and mobility coping strategies in Nigeria. *Journal of Geography and Regional Planning*. 17, 132-137.
- Ogunbodede E.F. (2007): Urban Road Transportation in Nigeria from 1960-2006: Problems, Prospects and Challenges. *Ethiopian Journal of Environmental Studies and Management*, 1; 1, pp 7-18.
- Olujimi J.A.B. (2010). Analysis of The Relationships of Infrastructural Facilities in the Determination of Rental Values of Residential Properties in Akure, Nigeria. *Arts and Social Sciences Journal*, Vol 2010; pp 1-10.
- Organisation for Economic Co-operation and Development (OECD). 1998. Safety of Vulnerable Road Users. DSTI/DOT/RTR/RS7(98)1/FINAL. Paris: OECD, Directorate for Science, Technology, and Industry, Scientific Expert Group on the Safety of Vulnerable Road Users.
- Pooley, C.G., Turnbull, J and Adams, M. (2005). The journey to school in Britain since the 1940s: Continuity and Change *Area* 37, 1, pp 43-53.
- Pucher, J., & Renne, J. L. (2005). Rural mobility and mode choice: Evidence from the 2001 national household travel survey transportation, Vol 32 No2, pp 165-186.
- Ryley, T. (2005) Use of non-motorised modes and life stage in Edinburgh. *Journal of Transport Geography*, In Press, Corrected Proof.
- Towner, E., Jarvis, S., Walsh, S. and Aynsley-Green, A. (1994). Measuring exposure to injury risk in school children aged 11-14. *British Medical Journal* 308: 449-452.
- World Bank (2008). "Disability and Poverty. A survey of World Bank poverty assessment and implications. [www.worldbank.org](http://www.worldbank.org).