🏆 reviewed paper

Telecommunication and Travel Behaviour of Households in the Rural Areas of Nigeria: Substitution, Complementarity or Trip Inducement

Ouwayemi-Oniya Aderibigbe, Trynos Gumbo, Thembani Moyo, Siphiwe Given Mbatha

(Dr. Ouwayemi-Oniya Aderibigbe, Dept. of Urban and Regional Planning, University of Johannesburg. Cnr Siemert & Beit Streets, Doornfontein 0184 Johannesburg, South Africa, oboniya@uj.ac..za)
(Prof Trynos Gumbo, Dept. of Urban and Regional Planning, University of Johannesburg. Cnr Siemert & Beit Streets, Doornfontein 0184 Johannesburg, South Africa, tgumbo@uj.ac.za)
(Thembani Moyo, Dept of Urban and Regional Planning, University of Johannesburg. Cnr Siemert & Beit Streets, Doornfontein 0184 Johannesburg, South Africa- tmoyo@uj.ac.za)
(Siphiwe Given Mbatha, Dept. of Urban and Regional Planning, University of Johannesburg. Cnr Siemert & Beit Streets, Doornfontein 0184 Johannesburg, South Africa, gmbatha@uj.ac.za)

1 ABSTRACT

Several studies have been documented on travel behaviour and mobility patterns. Recently telecommunications have been adopted and implemented to influence and transform behaviour and mobility pattern of commuters. There has also been a major debate on the impact of telecommunications and travel, while some subscribe to the complementing effect of technologies on travel, others believe in the substitution or trip generation effect. Consequently, this study explored the effect of telecommunication on trip making in the rural area of Akure North Local Government Area, Nigeria. Systematic sampling technique was used to survey 4 percent representing 495 household heads of a total 12,365 registered buildings by means of questionnaire administration. However, 339 copies of the questionnaire were retrieved and found usable for analysis. This accounts for 72.9% response rate. The study found 1.36 as average number of respondents' trips while 46.4% of the respondents normally travel by non-motorised means of transport. The Global System of Mobile Communication (GSM) serves as frequent means of telecommunication for 64.3% of the respondents. However, most of the respondents being 92.9% do not use social media platforms of telecommunication. The study further revealed that the complementing effect of telecommunication was significant. The correlation coefficient (R) for the relationship between telecommunication usage and complemented trips equals 0.409 significant at p=0.000. The study concluded that the use of telecommunication go beyond call linkages as there are other purposes served by telecommunication and recommends that telecommunication facilities should be provided and encouraged as an alternative to physical movement by the rural dwellers to avoid the inherent transport problems in the cities and urban centres.

Keywords: Telecommunication, Travel, Travel Behaviour, Households, Rural Areas

2 INTRODUCTION

As society grows in terms of population and functions, people's activities (shopping, recreational, health, religion, among others) being performed by people in space vary, thereby resulting in changes in their travel behaviour. Because of this, it has necessitated the need for interaction among various transport components. Despite the crucial role being performed by transportation, its negativities resulting from externalities pose some threat to the people and the society at large, among which are traffic congestion, poor transportation infrastructure due to over-dependence on the available ones, among others (Bannister, 2002). There is, therefore, the need to generate alternative means of reducing or altering physical movement to reduce some of the transport difficulties encountered by people. One way this can be effective is using telecommunications to serve a substitution or complementarity effect on transportation. Telecommunications and the internet offer a wide range of possibilities for people to conduct activities virtually, without traveling to the activity places.

Telecommunications involves the transportation of electrons over cables or radio waves through the air. These information and communication technologies refer to all those means and methods of transmitting information, ideas, images, and non-tangible messages from one place to another (Ogunsanya, 2005). The major mediums through which telecommunications are facilitated are telephone, internet, radio message, and fax. As a result of this, it is easier for family, friends, and colleagues to interact. Household members might call during a journey to ask for a favor that obliges the traveler to make another trip or prevent the caller from embarking on trips. (Olawole 2013).

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

The relationships that are possible between telecommunication and physical travel as identified by (Mokhtarian, 1990; Mokhtarian & Salomon, 2002; and Nobis & Lenz, 2009) include substitution, complementarity, inducement, and neutrality. It is now generally recognized that Information and Communication Technologies (ICT) in its several forms may impact activity patterns and travel behaviour, along the lines of the four components of accessibility. This paper adds further weight to such discussions of telecommunication and travel behaviour by focusing on the rural environment of Nigeria, where there has been little research on the influence of telecommunication on travel. With this purview, this study examined the influence of telecommunication on travel behaviour of rural households in Akure North Local Government Area, Nigeria.

3 LITERATURE REVIEW

The relationship between transportation and telecommunication is complex as it involves the constant change of individual behaviour and organizations.

3.1 Telecommunication and Travel

One of the purposes of travel is to exchange information (Salomon,1986); thus, mobile phones or any other telecommunication technology directly impact trip rates, travel behaviour, and the transport system. The literature is replete with studies detailing the impact of telephones on travel behaviour (Moktanan 1991; Hanson 2000; Ogunbodede 2002; Gbadamosi 2004). Specifically, this impact exists in the form of an interactive relationship between transportation and telecommunications. The relationship between telecommunications and transportation has been advanced in the literature in two ways: substitution and complementarity (Oyesiku, 1996). Substitution impact of telecommunications on travel assumes that the more advanced and widespread the telecommunications system becomes, the smaller the travel demand. The second type of interaction is that telecommunications and trip generation complement each other. Complementarity comprises two distinct types of interaction. The first is that one system increases the efficiency of the other. For example, unnecessary trips will be eliminated as better coordination is achieved regarding how, where, and when to make trips.

The second type of complementary interaction is that an increased use of one system causes an increase in the complementing system. According to Gbadamosi (2004), empirical studies have shown that telecommunication (GSM) does not totally substitute human movement involving transportation modes, but it enhances movement. This is in line with an earlier view of Oyesiku (1990) on the impact of the telephone on social trips; the study asserted that the social and cultural background of the people in Nigeria society is such that the physical presence of friends, relatives, and business associates in gatherings is often appreciated. Telecommunication does not merely serves as a means of contact for social and business activities but also, to a large extend, induce face-to-face interpersonal connections, which in the most case involved actual travel. However, opinions still differ as to whether telecommunications generate more trips or curtail them. In an extensive body of published work, Salomon (1985) has argued against the wisdom that telecommunications are a substitute for transportation, as there is much more to be learned about how travels and telecommunications interact. Taking these views together, it is therefore not clear whether telecommunication usage induces, substitutes, complement or have no impact on physical travel in Nigeria; especially the rural areas where people may likely have little or no access to telecommunications facilities.

3.2 Concept of Rural area

The term ‘rural’ is indeed ambiguous. Laah, Abba, Ishaya, and Gana (2013) point out that there is no exact definition of the term. Still, those rural areas are ‘recognizable,’ which implies that the physical attribute of an environment could depict if it’s either rural or urban. The rural area constitutes the space where human settlement and infrastructure occupy only small patches of the landscape, dominated mainly by fields and pastures, woods and forest, water, mountain, and desert. (IFAD 2001) adds to this that rural people usually live in farmsteads or settlements of 5-10,000 persons and point that ‘national distinctions between rural and urban are arbitrary and varied.’

The word “rural” connotes different meanings to different people depending on their background. What is regarded in developed countries as rural may be considered as urban in developing countries. Given certain

criteria, rural settlements in Nigeria are regarded as settlements with less than 20,000 people and predominantly engage in primary production (Aderamo & Mogaji 2010). Rural settlements were also described by (Weir and McCabe 2012) as areas with relatively low development densities, typically less than one resident per acre.

Olatunbosun (1975) cited in Omale (2005), a rural area is an area with a population lower than 20,000, occupationally specific, locationally removed from an urban area in terms of services, e.g., water, health, electricity, transport, among others. Measured by the index of demography, Nigeria is 80% rural. Therefore, Anele (2012) hypothetically said; that life in the rural areas is challenging, rustic, and sometimes inhuman. Many rural dwellers are traumatized by poverty, starvation, and diseases. It has been succinctly observed that: there is a realization that a dangerous gap exists in the development levels of both urban and rural areas. This seems to be threatening the political and social stability of the nation. Even though an overwhelming proportion of our national population resides in the rural areas, they are characterized by depressingly meager annual per capita income, pervasive and endemic poverty, manifested by widespread hunger, malnutrition, poor health, general lack of access to formal education, livable housing and various forms of social and political isolation compared to their urban counterparts (Muoghalu, 1992). In an explicit description, Roberts (2014) explained that the term rural is highly cryptic. Some metropolitan cities in Nigeria have impoverished areas and what is described as rural in general terms is noticeable. It understood rural areas to make up of space where homes and infrastructure occupy minimal space. Most landmarks are dominated by fields, pastures, forest, water, mountains, and deserts.

In developing countries, rural farmers contribute significantly to the socio-economic development of nations. Today, more than two-thirds of the Nigerian population whose primary occupation is subsistence agriculture reside in rural areas. These rural areas serve as sources of the nation's staple food like maize, cassava, yam, wheat, guinea corn, and plantain for urban dwellers and provide raw materials for industries. With all these efforts, the rural farmers earn meager income and are always neglected. It is easy to observe that the rural sector constitutes the economically backward areas of Nigeria and has been so since the colonial days.

Olatunboson (1975) in Omale (2005) is of the view that the term "rural" is measured by two indices viz:

(1) A spatial index indicating the percentage of the people living in rural areas and,

(2) An occupational index that shows the percentage of the labour force in an agricultural occupation.

(3) Anazodo (1982), cited in Nwachukwu and Adejuwon (2012), identified the characteristics of rural dwellers in Nigeria to include;

(4) Their standard of living is static and declining

(5) They generally engaged in agriculture, working small plots of land with traditional hand tools.

(6) Most are engaged in subsistence farming or generate only small marketable surpluses.

(a) They are primarily located in areas poorly served by almost all public utilities which transport is one

(b) Their family incomes are unlikely to exceed more than a few tens of naira a year.

In this context, the rural area being adopted for this study was chosen based on the criteria cited above, such as population, infrastructural facilities, occupation, among others.

3.3 Telecommunications and Rural Development

According to Ndukwe (2002), it was noted that information and communications have always formed the basis for human existence. This fact has driven man to continuously seek ways to improve the processing of information and communicating; such information to one another irrespective of distance and on a real-time basis. Advancement in information and communication technologies (ICT) has demonstrated opportunities for people to utilize it in their socio-economic and cultural development better and more sophisticatedly. Using it, the government finds the importance and role of delivering services at the locations convenient to the citizens. The rural ICT applications attempt to offer development ideas and solutions to the people deprived of basic human facilities such as safe drinking water, diary, education, immunization, reproductive health, employment generation, and human rights. Thus, telecommunication is a reflection of the economic activity of a society. In order to remedy the rural-urban telecommunications gap, it is necessary to address the economic gap in living standards between regions. In this 21st century, the world has witnessed an

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

upsurge in telecommunications and information technology in nearly all aspects of human endeavour. Access to telecommunications is therefore essential to the development of a nation's social and economic life. In the new world order that is driven by knowledge and exchange of information and ideas, surviving in the information age, therefore, depends on access to national and global information networks hence the need for all members of the society to have access to telecommunications facilities to aid their mobility.

4 STUDY AREA AND METHODOLOGY

4.1 Akure North Local Government Area.

Akure North Local Government Area came into existence on 1st October 1996 when it was carved out of the defunct Akure South Local Government. The administrative headquarter is situated at iju/itaogbolu. The local government is made up of so many small communities, villages, and camps. Among the towns are Oba-ile, Itaogbolu, Iju, Ogbese, Igbatoro, while few among the smaller communities are Eleyowo, Owode, Igoba, Isinigbo, Orojuda, Bolorunduro, Ala, Ilu- Abo, Ago Dada, among others. The administrative headquarter is headed by a recognized traditional ruler or an Oba, while Olus and Baales administer the small communities.

The local government is located at the border area of Ondo and Ekiti States, with ikere Ekiti as its immediate neighbor. It is also bordered in the south by Idanre local government, in the east by Akure South Local Government, while in the west with Owo local government Area. The local government is blessed with fertile land, suitable for agriculture. This has made farming the primary occupation of the people. This typically depicts the area as rural as the majority of the populace engage in agricultural activities.

Due to the agrarian nature of the local government, with fertile lands in all parts of the area, farming becomes the major occupation of the people, with many of the households concentrating on the growth of cash and food crops. It is interesting to know that the local government is one of the major cocoa-producing local governments. The majority of the people practice subsistence farming, operating in small-scale agriculture due to the shortage of funds to embark on mechanized agriculture. Moreso, the majority of the farm produce is sold locally in their neighbouring markets such as itaogbolu, iju, oba ile, ala, and ogbese. This is one of the typical characteristics that characterized the local government as a rural area as most households engage in agricultural activities. Information from the Akure North Local Government Area revealed that there is no presence of any big industry in the local government. This is another feature that typically depicts the local government as a rural area. Nevertheless, the availability of hard rock has led to the establishment of granite depots in some parts of the local government e. g J.C.C, Phoenix, Samtex, among others.

As established by the National Population Commission in the 2006 national housing and building census, the total population of the Local Government revealed that there are 130,765 people in the local government, with males amounting to 66,526 and females 64,329. It is worthy of note that the local government is one of the least populated towns in the state; this is due to some of the rural attributes of the town making it difficult for people to settle. Further information on the study, as asserted by National Population Commission (2006), revealed that 11,932 people in the local government do not have access to telecommunication facilities while 10,900 use the few business centres in the community when there is an urgent need for it.

To get information on the availability of telecommunication for the rural areas, point locations of the availability of telecommunication mast was established using a GPS. This was later to the ARCGIS software where it was digitized. This is a method of spatially referencing the base stations in the selected locations (wards), and it was digitized by the ARCGIS software. Through this, information on the availability of the networks/telecommunications stations in the study area was established. From the study, it was discovered that Oke ofa/Owode has the largest number of telecommunication base stations with eleven (11) telecommunication mast of different network providers; precisely MTN, GLOBACOM and AIRTEL. Agamo/Oke ore and Moferere has nine (9) base stations each. Isimija/Ilado Ward has six (6) base stations while Ayede/Ogbese and Odo Oja has three (3) and, two (2) telecommunication stations, respectively. From the, it can be asserted that the number of base stations in some selected rural settlements such as Ayede/Ogbese and Odo oja are few compared to other settlements in the local government. As such, there will be congestion on the few available ones since it is inadequate. Further to this, the issue of power in major parts of the rural settlements is a problem and this has disrupted accessibility to telecommunication networks. Although, power/electricity is a problem in major parts of Nigeria, because there has been

instability in the supply of electricity in both the urban and rural areas. Nevertheless, the rural areas are more affected in this respect thus, discouraging telecommunication subscribers from putting up their base stations in the remote areas.

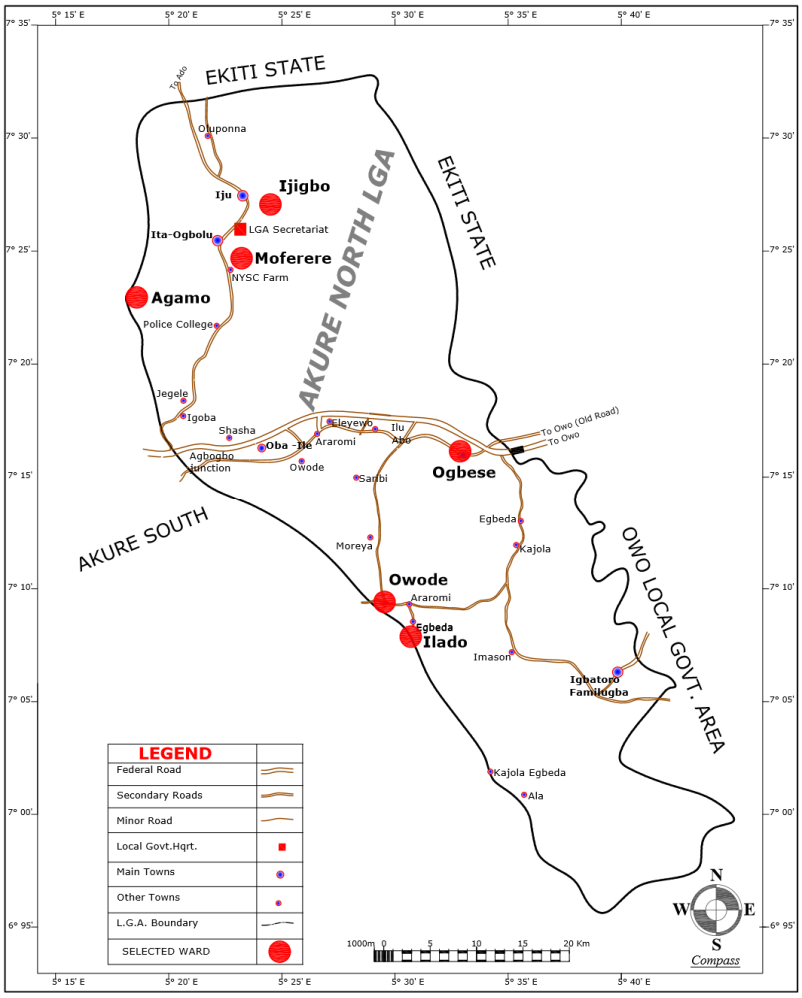

Fig 1: Map of Akure North Local Government showing the study locations (Selected Wards)

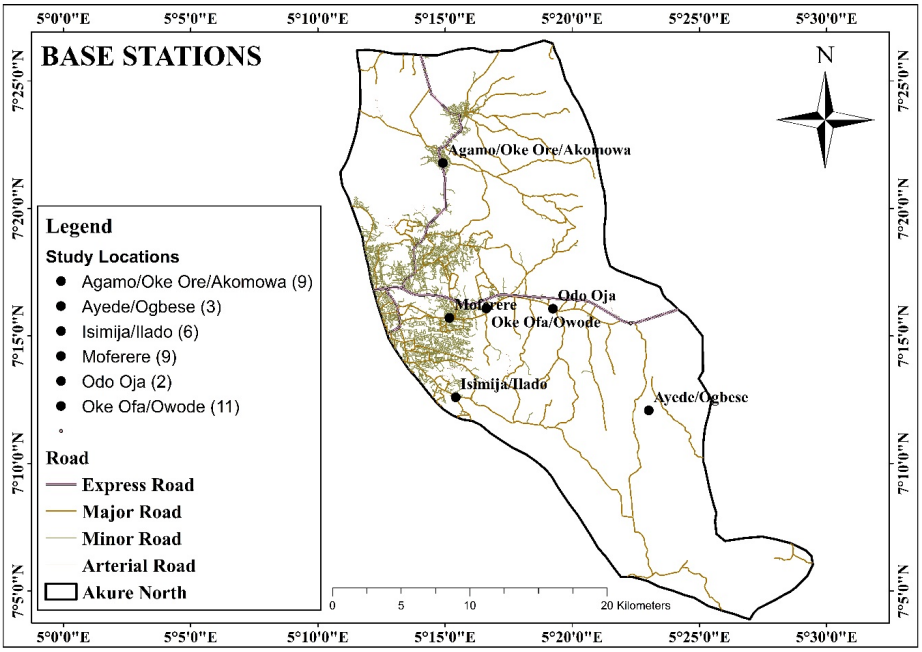

Fig 2: Telecommunication stations in the study area

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

4.2 Methodology

Information from the Akure North Local Government Area of Ondo State revealed that there are twelve (12) political wards in the local government. 50% of the wards were randomly selected. Base on this, six wards were chosen for questionnaire administration in the town. The selected wards include ayede/ogbese, agamo/oke ore/akomowa, isimija/ilado, odo Oja/ijigbo, oke afa/owode and moferere. Further information from the National population commission revealed a total of 28,341 buildings in the local government. This includes semidetached houses, hut structures made of traditional materials, among others. However, there are a total of 12,365 buildings in the selected wards. 4% of the building were systematically selected. This implies that 1 out of every 25th building was systematically selected. Base on this, a total of 495 buildings were selected. In each building, the household head was sampled. Questionnaires were administered on the household head, not below the age of 18years, on each floor of the selected buildings sampled. Where the household head was not available, the next building was thus selected for sampling. A total of 339 questionnaires were retrieved during questionnaire administration.

The study tested hypothesis which was stated in the Null and Alternative form:

H0: There is no significant relationship between telecommunications and complemented trips

H1: There is a significant relationship between telecommunication and complemented trips

5 RESULTS AND DISCUSSIONS

5.1 Socio-economic characteristics of Households

The age distribution of respondents in the study area revealed that participants between the ages of 60-69 accounted for the largest (43.7%) proportion of the respondents. This agrees with World Bank's (2008) assertions that the aged, who are from 60 years upwards, dominate the rural areas. Further to this, the Individual highest level of education attained to some degree determines the kind of occupation someone can engage in (Jayamala 2008). This could also be a determinant of individual income. The study showed that those with secondary education accounted for the largest percentage of the respondents with 54.4%, while those with tertiary education were next with 33.9%. 5.9% and 5.2% of the respondents had no formal education and primary education, respectively. This information shows that most of the respondents in the rural areas had no tertiary education, thus corroborating the findings of Olawole (2013) which asserted that households in the rural areas has low level of education compared to those in the urban areas where about 72.1% of households had tertiary education (Gbadamosi & Aderibigbe, 2019).

As established from the study, the occupation of residents revealed that a higher proportion of the household head (40.3%) in the rural areas engage in farming. This could be related to the level of education as contained in the respondents' information, where most of them had secondary education. Nwachukwu (2016) argued that farming is one of the dominant household activities in rural areas, thus corroborating these findings. Income of residents is another important variable in the explanation of travel behaviour of people. To present this, the income group for federal tax rating was adopted to illustrate the income distribution of respondents; it was discovered in the study that 34.8% of the respondents earn below N 20,000, thus constituting the most significant percentage in the income-earning rate of the respondents. Next to this are those who make between N 40,000- N 59,999, with 21.5% of the population. Only 5.9% of the respondents earn above 100000 compared to what was obtainable in the urban areas. It can be inferred from the study that the income-earning rate of respondents in the core areas of the metropolitan area and the rural area is similar as the majority of these categories earn below the minimum income adopted by the federal tax rating. The mean income for the rural populace is N 35215.9, while the minimum and maximum incomes are N 1000 and N 120,000, respectively. It can be opined from the study that the demography attributes of households in the rural area showed a lower income category for the majority of the respondents, and the majority of them had secondary education.

5.2 Travel Behaviour of Households in Akure North Local Government Area.

5.2.1 Trip frequency of respondents

Information on the trip frequency based on all-purpose trips indicates that 71.9% of the respondents make on average one trip in a day that constitutes the largest in that category; this is closely followed by 22.9% of

those who make two trips in a day. In summary, a larger percentage (93.9%) of the respondents make between 1-2 trips daily. This corroborates the study of the 2017 National household travel survey (2019), which stated that rural dwellers make fewer trips compared to those in the urban environment. Likewise, the average trips made by respondents weekly by the rural respondents indicate that a larger proportion (71%) makes between 5-9 trips while 20.6% make between 10-19 trips weekly. The mean trip volume daily is 1.36, while that of the week is 8.34.

Number of Trips made in a day	Daily trip frequency		Weekly trip frequency		
	Frequency	Percentage (%)	Number of trips	Frequency	Percentage (%)
1	235	71.9	Less than 5trips	20	6
2	72	22.0	5-9 trips	235	71
3	16	4.9	10-19 trips	68	20.6
4	2	.6	20 trips -above	8	2.4
5	2	.6			100
6 and above	-	-			
Total	327	100.0			
Mean	1.36		8.34		
Std. Dev.	0.663		3.77		

Table 1: Average Daily trips of respondents. Source: Author's Field Survey 2020.

5.2.2 Trip purpose of respondents

Travel is a derived demand, in that people do not travel for travel's sake. Transportation occurs to facilitate community services, both socially and economically (Oyedepo & Makinde, 2009). They thus asserted that each trip is made for a particular purpose. The trip purpose of respondents was classified into discretionary (social, shopping, medical) and non-discretionary (work and school). The trip purpose of respondents is examined based on the dominant trip made daily. The result on the trip purpose of households in the study area established that 65.3% make more of work-related trip, which is non-discretionary trips, next to this is 12.2% of them who make school-related trips. The remaining 22.5% of the respondents made discretionary trips such as recreational trips, shopping trips, religious trips and health related trips.

5.2.3 Transport mode of respondents

Examination of transport mode of respondents reveals that non-motorized mode of transport such as (walk) accounted for the largest proportion in this section with 43.2% of the total respondents in the study area. 24.6% and 13.9% make use of public transport and private cars respectively. This is no different from the findings of Starkey, Ellis, Hine, and Ternnel (2002); Clark, Chatterjee, and Melia (2016) and Tao, Fu, and Comber (2018), which attested to the use of non-motorized transport as the dominant mode of transport for most rural dwellers.

Dominant mode of transportation used	Rural	
	Frequency	Percentage (%)
Walking	137	43.2
Bicycle	10	3.2
Private car	44	13.9
Public transport	78	24.6
Others	48	15.1
Total	317	100.0

Table 2: Transport mode of respondents. Source: Author's Field Survey 2020.

5.3 Telecommunication usage of respondents

5.3.1 Access to telecommunication facilities

Access to telecommunication facilities of respondents indicates that the majority (85.8%) do have access to a form of telecommunication against the 14.2% of their counterparts who do not have access to any form of telecommunication facility. This indicates that the level of awareness on telecommunication is okay in the study area, and it is not surprising, as Nigeria's teledensity level is relatively high, thus corroborating the findings of Wojuade (2014) and Olawole (2013). The findings from this study contradict the previous assertion from the National Population Commission (2006) that 11,932 of the households do not have access

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

to any form of telecommunication facility. This shows an improvement in the households' ownership and access to at least one of the telecommunication media from 2006 to 2019.

5.3.2 Type of telecommunication facilities frequently used

Information and communication technologies go beyond mobile phones, which people commonly use. It ranges from mobile phones, personal computers, and desktops where internet services such as e-shopping, e-banking, e-business, etc., emails, among others, can be performed. In lieu of this, information on the type of telecommunication facilities commonly used and available to people was sought. As established in table 3, the majority (64.3%%) of the respondents indicated the GSM as the most available and frequently used. This includes personal phones and call centres (mobile phone business centres). 14.5% of the respondents indicated they use of the internet such as emails, and 7.1% use other social media platforms for communicating. It can be asserted from this that mobile phone is the most available and frequently used form of telecommunication in the rural area.

Telecommunication Facility Used Frequently	Rural	
	Frequency	Percentage (%)
GSM	218	64.3
Internet (Personal Computer, Desktop)	49	14.5
Social Media (Facebook, Instagram, Whatsapp)	24	7.1
None	48	14.2
Total	339	100.0

Table 3: Frequently used telecommunication facility/services. Source: Author's Field Survey 2020.

5.3.3 Internet facilities use and awareness level of respondents in the rural area

As established by scholars such as Kashorda and Waema's (2014), the use of information and communication technology at enhancing or substituting physical trips is on the increase globally, hence the need for this. Information on internet facilities such as e-banking, e-shopping, emails, and e-business revealed that 85.5% of the respondents do not utilize any of these platforms to conduct business activities and shopping. 4.7% of those sampled used email, while 9.1% and 0.6% use the e-banking and e-business platforms, respectively, for their activities. This indicates that using other forms of telecommunication facilities (personal computers, desktops, and tablets) outside the GSM for making calls is low in the rural area of the study.

5.3.4 Social media platforms as a form of communication in the rural area

From the study, it was discovered that 92.9% of the rural respondents do not use any of the social media platforms (Instagram, Facebook, and Whatsapp) as a means of communication as these platforms may displace the execution of physical trips or complement physical movement thus having an impact on their trip making and travel behaviour. This is particularly relevant to shopping trips as examined by Lens and Nobis (2007), which opined that telecommunication leads to a reorganization of activities in time and space. As established from the study, 4.4% use WhatsApp while 0.9 use Instagram as a form of communication. 0.6% and 1.2% make use of Twitter and Facebook as a means of communication. The result of the findings may be attributed to the assertion of Oyesiku (1990) that the social and cultural background of the people in Nigeria society is such that the presence of friends, relatives, and business associates in gatherings is often appreciated; hence they may not appreciate the use of social media for communicating with friends which is typical in the rural areas.

Amount Spent on Recharge/ mobile subscription

From the study, 69.9% of the respondents spend 100 naira to recharge their phones while the remaining 23% and 7.1% spend 200 naira and 400 naira respectively to subscribe or recharge their phones. The amount spent by respondents in the rural areas to recharge or subscribe to mobile telecommunication is very low, as seen in the study a larger percentage spent less than one USD (1$) on mobile subscription monthly, which is very low when compared to households in the urban areas and developed countries.

5.4 Effect of Telecommunication on Trip Making of Respondents

5.4.1 Average Daily Trips Complemented, Induced, and Substituted by the different Telecommunication Means

This section examined the number of complimentary trips induced and substituted by the different telecommunication media. It aims to examine the most frequently used form of telecommunication by households at either complementing, inducing, or substituting trips. The average number of trips complemented, substituted, and induced by telecommunication revealed that phone calls were more predominant at substituting, complementing, or inducing trips in the rural areas. It was discovered that 1654 trips were influenced by the use of phone calls in the rural area. The study further revealed that 217 trips were being carried out through the use of email. It implies that only a few respondents in the rural areas compose mails, which may indicate their socio-economic status as revealed by Olawole (2013) since the most of them havee a low level of educatio,n, which may have a significant effect on their usage of telecommunication.

The use of e-banking to communicate in the study area revealed that 361 trips were either complemented, substituted, or induced through that platform. The use of the social media platforms such as Facebook, Instagram, and Whatsapp to either complement or substitute physical movement was low in the rural areas; a total of 505 trips were influenced through the platform in the rural areas of the study. The study shows that phone calls were more predominant in the study area as a larger volume of trips were being influenced through that platform. This corroborates Fadare and Olojede (2009) finding, which stipulated that mobile phones are no longer a symbol of economic status as most households now have access to it.

5.4.2 Trip Activities Complemented, Substituted, and Induced by Telecommunication in Akure North Local Government Area.

This section examined the dominant trip purpose, which was influenced by telecommunication. The aim is to examine the trip activities that were more impacted by telecommunication in the study. Findings from the study revealed that the complementarity effect of telecommunication was significant for the different trip purposes in the rural areas. A total of 546 (49%) work/business trips were complemented via the use of telecommunication in the study area. The reason is not farfetched from the fact that households in the rural areas engage in primary activities (farming) where the use of telecommunications might lead to a modification of their trips; this implies that the use of telecommunication provides information to users in the study on where to travel and time to make trips. This does not necessarily mean the trip will not be made but gives information on the time and place to conduct their activities to avoid some of the negative externalities of transportation thus corroborating the study of Oyesiku (1996) which opined that the use of telecommunication enables individuals to be better coordinated regarding when, how and where to travel. In addition to this, 519 (48.3%) of work trips were also substituted through telecommunication. Further to this, a larger proportion of 252(28%) of social/ recreational trips was induced due to telecommunication use in the rural areas. This is an indication that the use of telecommunication has not replaced family and social gatherings in the rural areas and is a testament to the assertion of Oyesiku (1996), which explains that the physical presence of friends and relatives can not be replaced through telecommunication. In summary, telecommunications had more impact on the non-discretionary trips (work) of households in the rural areas of the study.

5.5 Hypothesis Testing:

The hypothesis stated under the research methodology was tested in this section to ascertain the relationship between telecommunication and travel

The result of the hypothesis testing revealed that a relationship exists between the average number of complemented trips and Telecommunication usage (call volume) in the rural areas of the study. This implies that the null (H0) hypothesis is therefore rejected and the alternative (H1) hypothesis accepted. The result shows a weak positive relationship (0.409) between telecommunication and complemented trips in the rural areas of the study. The correlation coefficient for the relationship between telecommunication usage and complemented trips in the rural area is 0.409 and is significant at 0.00. The findings from this study corroborate the findings of Zumkeller (1996), Gbadamosi (2004), and Wojuade (2014), who found a complementarity effect of telecommunication on the trip. The correlation result for the relationship between

ISBN 978-3-9504945-0-1. Editors: M. SCHRENK, V. V: POPOVICH, P. ZEILE, P. ELISEI, C.BEYER, J. RYSER, G. STÖGLEHNER

telecommunication usage and substituted trips were not significant in the rural area, likewise, the correlation result for trips generated and telecommunication use were also not significant in the study.

		Average No of Calls(call frequency)	Telecommunication capacity to complement trips
Call volume/frequency	Pearson Correlation	1	.409**
	Sig. (2-tailed)		.000
	N	339	339
Telecommunication capacity to complement trips in the rural areas(number of complemented trips)	Pearson Correlation	.409**	1
	Sig. (2-tailed)	.000	
	N	339	339
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 4: Correlation Coefficient for Complemented Trip and Call Frequency in the Rural Areas. Source: Author's Field Survey 2020.

6 CONCLUSION AND RECOMMENDATIONS

The study has investigated the telecommunication and travel behaviour of rural dwellers. It was established from the study that non-motorized transport modes were more prevalent among rural households and the majority of households in the rural areas make fewer trips. In addition to this, the majority of respondents in the study area make use of the Global System of Mobile Communication (GSM) than other telecommunication media such as Personal Computer, Desktop among others.

As established from the study, the consequential effect of this revealed that households in rural areas rely more on telecommunication for call-making against the many benefits of telecommunications such as email, e-banking, and e-shopping and shopping, just to mention a few. As such, its impact on the trip-making behaviour of households may not be very effective. The study also established that the complementarity effect of telecommunication on the trip was significant in the study area. In lieu of this, stakeholders in the transport and telecommunication sectors should ensure that good and efficient transport and telecommunications systems are made available, accessible, and affordable to rural communities. The rural dwellers should be enlightened on the other benefits of telecommunication as telecommunication facilities go beyond call linkage as there are other purposes served by telephone that goes more in-depth and advance than call linkages.

7 REFERENCES

Aderamo, A. J. & Magaji, S. A. (2010). Rural Transportation and the Distribution of Public Facilities in Nigeria: Case Study of Edu Local Government Area of Kwara State. Journal of Human Ecology. 29 (3): 171-179.

Anele, D. (2012). A brief note on the condition of Rural Areas in Nigeria. Vanguard Sunday Perspectives, January 29. https://www.vanguardngr.com.

Banister D (2002): Transport Planning in the UK, USA, and Europe. London. E and FN Spon.

Clark, B., Chatterjee, K., & Melia, S. (2016). Changes to commute mode: The role of life events, spatial context, and environmental attitude. Transportation Research Part A: Policy and Practice, 89, 89-105.

Fadare S.O & Olojede (2009). Effect of Mobile Phone Use on Intra-Urban Travel Behaviour of Residents in Osogbo, Nigeria. Journal of Environmental Design and Management, 2 (2) pp 61-69.

Gbadamosi, K. T. (2004). Telecommuting and urban movement behaviour, in Vandu-Chikolo et al. (ed). Perspective on Urban Transportation in Nigeria. Published by NITT, Zaria.

Gbadamosi, K.T and Aderibigbe, O.O.(2019). Factors influencing Telecommunication use among residents of Akure metropolis: Implications on Transport. Paper presented at 2nd International conference of the School of Management Technology (SMAT), 26th -29th June, 2019.

Hanson, S. (2000). Off the road? Reflections on transportation geography in the information age Journal of Transport Geography. 6,(4):241–249.

IFAD Annual Report 2001. www.ifad.org.

Jayamala, M. (2008). Trends and Spatial Patterns of Crime in India: A Case Study of a District in India. A doctoral dissertation in sociology, Annamalai University, Indian.

Kashorda, M. & Waema, T. (2014). E Readiness survey of Kenyan Universities 2013. Nairobi: KENET

Laah, D. E., Abba, M., Ishaya, D. S., & Gana, J. N. (2013). The mirage of rural development in Nigeria. Journal of Social Sciences and Public Policy . 5,(2).

Lenz, B. & Nobis, C. (2007). The changing allocation of activities in space and time by the use of ICT–'Fragmentation' as a new concept and empirical results. Transportation Research Part A, 41(2),190–204.

Mokhtarian, P.L.,(1990). A typology of relationships between telecommunications and transportation. Transportation Research 24, (3), 231-242.

Mokhtarian, P. L., & Salomon, I.(2002). Emerging travel patterns: Do Telecommunications make a difference? (H. S. Mahmassani, Ed.) In Perpetual Motion: Travel Behaviour Research Opportunities and Application Challenges, 143-182.

Muoghalu, L. N. (1992). Rural Development in Nigeria: A Review of Previous Initiatives, in Olisa, M.S.O. & Obiukwu, J. I., Rural Development in Nigeria: Dynamics and Strategies. Awka: MEKSLINK Publishers Nigeria.

National Household Travel survey report 2017 (2019): Travel behaviour and Trend analysis of workers and non-workers.

Ndukwe C.A. (2002). Telecommunications in National Development. www.ncc.gov.ng.

Nobis, C. & Lenz, B. (2009). Communication and Mobility behaviour- a trend and panel analysis of the correlation between mobile phone use and mobility. Journal of Transport Geography, 17(2). 93-103.

Nwachukwu, L. C. (2016). Revitalizing Sustainable Agriculture in Nigeria: The Participatory rural appraisal (PRA) Approach Revisited. Global Journal of Applied Management and Social Sciences: 12 pp 67-76.

Nwachukwu, F. F. & Adejuwon, K. D. (2012). The Challenges of Agriculture and Rural Development in Africa: The Case of Nigeria. International Journal of Academic Research in Progressive Education and Development. 1(3), 45-61.

Ogunbodede, E. F. (2002). Telecommuting and travel pattern. A preliminary assessment of the state of the practice of the use of GSM in Lagos State, in A Paper Presented at the 45thAnnual Conference of the Nigerian Geographical Association held at the University of Ilorin, Ilorin 28th May and 4th June 2002.

Ogunsanya, A. A. (2005). Geography in the information and communication technology age, in Presidential Address at the 47th Annual Conference of the Nigerian Geographical Association held at the University of Port-Harcourt, Port-Harcourt, Nigeria, 14–17 August, 2005.

Olawole , M.O. (2013). Exploring mobile phone uses and rural travel behaviour in ijesaland, south western Nigeria. Ife research Publication in Geography 12, (1&2), 29-44

Omale, I. (2005). Policies and Strategies for Rural Development in Nigeria from Colonial Era to the era of DFRRI in the Mid 80s to the Early 1990s in Omale I and Ebiloma, J. (ed). Principles and Practice of Community Development in Nigeria. Aboki Publisher.

Oyedepo, O.J & Makinde, O. (2009). Regression model of household trip generation of Ado-Ekiti township in Nigeria. European journal of Scientific Research 28 (1), 132-140.

Oyesiku, O.O., (1990). Inter-urban travel pattern in Nigeria. A case study of Ogun State, Unpublished PhD thesis, University of Benin.

Oyesiku, K., (1996). Inter-City Travels and Telecommunications relationship: An exploratory study in Nigeria. Ife Social Sciences Review, 3, (1 & 2),37-49

Roberts, R. E. (2014). Rural Poverty in Nigeria. Rebecca's thoughts on Development. http://rebeccaidd.wordpress.com/2012/10/06/rural-poverty-in-nigeria.

Salomon, I. (1985). Telecommunications and travel: Substitution or modified mobility? Journal of Transport Economics and Policy (September): 219– 235.

Salomon, I. (1986). Telecommunications and Travel Relationship: A Review. Transportation Research A, 20A (3), 223-238.

Starkey, P. Ellis, S, Hine, J. & Ternell, A. (2002). Improvong Rural Mobility. Options for Developing Motorized and Nonmotorised Transport in Rural Areas. World Bank Technical Paper. WTP525.

Tao, X., Fu, Z., & Comber, A. J. (2018). An analysis of mode of Commuting in Urban and Rural areas. www.researchgate.net/publication

Weir, L. J. & McCabe, F. (2012). Towards a Sustainable Rural Transport Policy Reform. 1-86.

Wojuade, C.A. (2014). Telephone Usage and Travel Behaviour in Nigeria. Developing Country Studies, 4, (20), 202-214

World Bank (2008). "Disability and Poverty. A survey of World Bank poverty assessment and implications. www.worldbank.org.

Zumkeller, D., (1996). Communication as an element of the overall transport context: An empirical study. In: survey methods in transport: 4th international conference.