EFFECTS OF ROAD EXPANSION ON TRAVEL TIME AND ACCIDENTS RATE ON SOME SELECTED CORRIDORS IN ABUJA METROPOLIS.

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ABSTRACT

In this study, effort was made to analyze the impact of road expansion in some selected corridors in Abuja metropolis; Shehu Musa Yar'adua Expressway (Airport road), Murtala Mohammed Expressway (Kubwa Road) and Abuja-Keffi Expressway (Nyanya-A.Y.A). The scope of the study covered a period of eight years. Data on annual basis from 2006-2013 are employed for the study; this includes data before, during and after rehabilitation of the roads and field survey was also carried out. The analytical tools employed in this study were descriptive statistic, averages, graphs and percentages. It was discovered after the roads expansion in Abuja Metropolis there was a reduction in the total average travel time from 138.3 minutes in 2010 to 63.3 minutes in 2013 in the three selected corridors. However, the total accidents rate in 2007 of the routes was 5.9 percent; these significantly increased to 20 percent in 2013. This is due to increase in the speed of vehicles and people not using the pedestrian bridges made available. The study concludes that the road expansion in Abuja Metropolis has drastically reduced the travel time, but on the other hand, has increased the rate of accidents on the roads in the study area. It was recommended that government should embark on road expansion in the whole economy and also develop other mode of transportation in the country because it will help in bringing rapid economic growth and development in the economy and curb down travel time if this is well planned.

Key words: Accident rate, Nigeria, Road expansion and Travel time.

INTRODUCTION

The current level of infrastructure deficit in Nigeria has been identified by (Sanusi, 2012) as the major constraint towards achieving the nation's vision of becoming one of the 20 largest economies in 2020. He further proffered that about 70 percent of the 193,000 kilometres of roads in the country is in poor condition; that enterprise surveys show that the power outages the nation experiences amount to over 320 lost days a year, with over 60 percent of the population lacking access to electricity with over $13 billion spent annually to fuel generators and that Nigeria, which once had one of the most extensive railway systems in Africa, could now barely boast of a functional route either for passengers or freight.

Udjo and Booysen (2000) also identify infrastructure as having both direct and indirect impact on the growth of an economy. Infrastructure is said to add to economic growth and development

by raising efficiency and providing facilities which enhance the quality of life. Infrastructure as defined by (Akinyosoye, 2010) is the "unpaid factor of production" which tends to raise productivity of other factors while serving as intermediate inputs to production. Canning and Fay (1993) also found that the developing countries demonstrated a high rate of return on transport infrastructure which compared favourably with those of developed countries.

However, the condition of Nigerian roads has not ceased to amaze discerning observers and in effect, the roads have been ranked among the worst in the world. A significant portion of post-independence studies on transport systems have been devoted to examination of successive Nigerian government's budgetary allocations and development in the transport sector in general. Increasing level of traffic congestion is an unavoidable result of strong economic activity and life in urban areas. About half of congestion delay occurs in areas where demand has reached or exceeded capacity; the other half is due to incidents including accidents, stalled vehicles and roadside distractions (Thomson, 1997).

In 1914 the total road network in Nigeria is 3,200 km in length, 66,000km by 1960, and now the entire roads in the country are just a bit less than 200,000km of Federal, State and local road of which only just about 50,000km are paved. The Nigerian Inland Waterways and Railways are ineffective, hence the heavy reliance of the nation's economy on road transportation. Only 80% of federal roads in Nigeria are partially paved, disallowing proper coverage of the nation's over 900,000km^2 lands mass. Technically, over ₦200 billion will be required to construct and maintain the balance of 20%. In recognition of this, will the country attain stable and structured road network? Traffic movement has grown in urban areas of Nigeria over the decades, and further growth has been predicted (Adewumi, 2009).

Transportation is very crucial to the production and distribution of goods and services and also very essential for everyday mobility of people and goods to their destination. However, for this to be possible adequate road infrastructure is a fundamental condition for effective road transport system in the Nigerian economy. The Federal Capital Territory (FCT) administration facilitate road transport rehabilitation and expansion of Shehu Musa Yar'adua Expressway (Airport Road) Murtala Mohammed Express way (Kubwa road) and Abuja-Keffi Expressway (Nyanya-A.Y.A) was approved to be carried out immediately as a result of acute traffic congestion and other transport related problems.

Good road infrastructure is vital in economic development. It promotes factor mobility and reduces trade costs. Furthermore, it promotes market integration, thereby providing avenue for the reduction of price volatility and reallocation of resources in line with comparative advantage. Transport infrastructure growth along with economic development is a complex process, particularly in developing countries like Nigeria. It was argued that the links between transport

systems in developing countries are different from those of industrialised nations, because of transport infrastructure shortage in developing countries (Haynes and Button, 2001, pp.264). Transportation infrastructure may affect economic productivity by changing aggregate demand through the creation and increased demand for intermediate inputs from other sectors with related multiplier effects in the economy. Such infrastructure can also indirectly enhance the productivity of existing resources.

Ortiz-Moctezuma *et al.* (2010) identified two schools of thought with respect to the link between road infrastructure and economic growth. Firstly, the Keynesian school starts with the notion that any income or infrastructure can only be generated by economic growth itself in the first place. On the other hand, the Neo-Classical approach treats infrastructure as a production factor in the same style as labour and capital, as embedded within the Endogenous Growth Theory.

Samuelsson in his 1954 article on the pure theory of public expenditure split the economy between goods provided on markets and goods provided by the public sector. This theory was later developed as part of public choice theory by (Buchanan, 1968). The existence of goods, such as transport infrastructure, that will likely be provided by the public sector is generally explained by the existence of efficiencies of scale and scope in the systems, the existence of external effects which are difficult to price, and the general deficiencies of payment systems, that has hampered the introduction of fee-funded roads and railroads and made it difficult to exclude users. All these factors have made the introduction of markets for the provision of transport infrastructure less viable.

According to Adewumi (2009), the performance of the Nigerian roads sector has not been satisfactory despite its enormous potentials for growth and development. Traditionally, the poor transport facilities and infrastructure have severely deferred economic development and this destabilized transport infrastructure has contributed negative attempts to ease poverty in the country. In recent times, academics and practical people have made their contribution to the state of the Nigerian road. There is urgent need to preach breakage from past wastefulness, negligence, deceit and bad policy as regard the road network in the country. Road transportation in Nigeria controls over 95% of all surface transportation with a total asset base of over Three Trillion Naira. In a review by Yusuf (2008), over 80% of Nigerian road network are under state level estimated to be over 160,000km. However, insensitivity has marred rural roads, perpetuated by roads engineers, professionals, users, and politician at state and national level.

Journey or traveling time, is the actual time spend in the public transport by the passenger, before reaching his or her destination. It also include the entire time spend on the bus at the bus stop along the road were vehicles stopped to pick passenger until the bus passenger finally alight from the bus. Journey time is the act of traveling from one place to another, distance to be travelled or the time required for a trip. Transportation economics says the Value of Travel Time (VTT)

refers to the cost of time spent on transport. It includes costs to businesses of time their employees and vehicles spend on travel, and cost to consumers of personal (unpaid) time spent on travel. The value of travel time savings (VTTs) refers to the benefits from reduced travel time costs. Travel time savings is often the principal benefit of a transportation project. Congestion relief projects are justified primarily by the reduction in travel time, they will bring about. Travel time savings can also lead to reductions in vehicle operating costs (Fawohunre, 2014).

Akinmade *et al.,* (2013) stated that in the planning and design phases of road networks, the estimation of traffic flow parameters is crucial. Such parameters include travel time which is an indicator or a measure of the condition of the existing road surface. In their study, travel time along a designated stretch of roadway was established using moving car observer (MCO) method. A 1.2km stretch of a two-lane roadway along Wuse Zone 2 within the Wuse district of the F.C.T was used as test section. Before the rehabilitation of the road, a visual assessment of the road showed that cracks were the predominant distress type, covering about 60.29 percent of the roadway. Other distress types observed include potholes and patches 36.76% and polishing 2.94 percent. Prior to rehabilitation, travel and traffic flow were 3.06mins and 713veh/hr respectively from points A to B and 3.4mins and 700veh/hr respectively from points A to B and 3.4mins and 700veh/hr respectively from B to A with level of service LOS Category B. however after rehabilitation, the travel times reduces to 1.49mins and 1.56mins respectively and traffic flow of 1177veh/hr and 1014veh/hr were recorded respectively with LOS of C. Result show that there was 51.3 percent and 55.04 percent reduction in travel time on both ways as a result of rehabilitation and maintenance. It highlights the impact of pavement distress on travel time and emphasized the need for routine and timely maintenance of all roadways.

Oyesiku *et al.,* (2013) investigated the impact of public sector investment in transport on economic growth, using Nigeria as a case study. The empirical model for the study was developed from the endogenous growth framework in which transport investment entered into the production function as input, using the Ordinary Least Squares (OLS) estimation technique and time series properties tests conducted on variables. Data for the study covered from 1977 to 2009. The findings showed that transportation played an insignificant role in the determination of economic growth in Nigeria. An increase in public funding and complete overhauling of the transportation system in the country are suggested.

In the light of the prior review, it seems that the literature is full of loopholes on the effect of road expansion on travel time and accidents rate Nigeria. In particular, few studies exist on the impact of road transport infrastructural development on output performance, particularly with reference to Nigeria. The idea thereof of this study is to fill this gap in research. The objectives of this study are to evaluate the effects of road expansion on travel time, pre and post of roads expansion and to examine the trend of accident rate before and after rehabilitation and expansion

of the roads in the area of study. This paper is divided into five sections. However Section 1 consists of the introduction, Section 2 materials and methods. The methodology adopted for the study is discussed in Section 3. The empirical findings were analyzed in Section 4. Section 5 concludes the paper.

STUDY AREA

Abuja is located within latitudes 8° 25C and 9° 25C /North of the Equator and longitudes 6° 45C and 7° 45C /East of the Greenwich. It is bordered to the North by Kaduna state, to the east by Nassarawa state, to the west by Niger state and to the south by Kogi state. The Federal Capital City (FCC) is located on the north-eastern part of the FCT. According to (Mabogunje 1976), the area is considered the most ideal and conducive for human habitation and settlement development within the FCT. The area is characterized by a hilly, dissected terrain and is the highest part of the FCT with several peaks that are 760 m above sea level (Balogun, 2001). The geology of the area is underlain by basement complex rocks. The annual rainfall is highest within the FCC and its environs which is about 1,631.7 mm. The annual mean temperature ranges between 25.8^{o}C and30.2°C (Adakayi, 2000) and (Balogun, 2001). The soils of the study area are basically Alluvial and Luvisols.

The FCT has three main entrances which are: Musa Yar'dua Expressway which have the following features: 10 lanes, 26.5km length of road, 30 numbers of bridges, 294 numbers of culverts, 3 numbers of clover leaf interchange, 6 pedestrian bridges and lay-by, 84 length of storm water drainage, 3,388 numbers of street lighting and 26.4km length of telecommunication duct. The Murtala Muhammed Expressway covers 10 lanes, a distance of 59.25km length of road, 2 numbers of bridges, 56 numbers of culverts, 6 numbers of clover leaf interchange. There are 11 numbers of pedestrian bridges and lay-by, 84 lengths of storm water drainage, 20.35km street lighting and 20km length of telecommunication duct while Abuja–Keffi Expressway is 6.75 km length of road, 4 numbers of bridges. Although, before now, the Airport road and Kubwa road were dual carriage with 6 lanes respectively while the Abuja – Keffi Expressway was a single carriage way with two lanes.

In the year 2009, Musa Yardua and Murtala Muhammed Expressways were awarded for rehabilitation and expansion to multiple carriage ways of ten lanes whereas the Abuja – Keffi Expressway was awarded for dualization in 2003 into six lanes, MusaYardua, Murtala Muhammed and Abuja-Keffi Expressways was awarded to M/S Julius Berger, (M/S Dantata & Sawoe and M/S CGC) and M/S Setraco respectively.

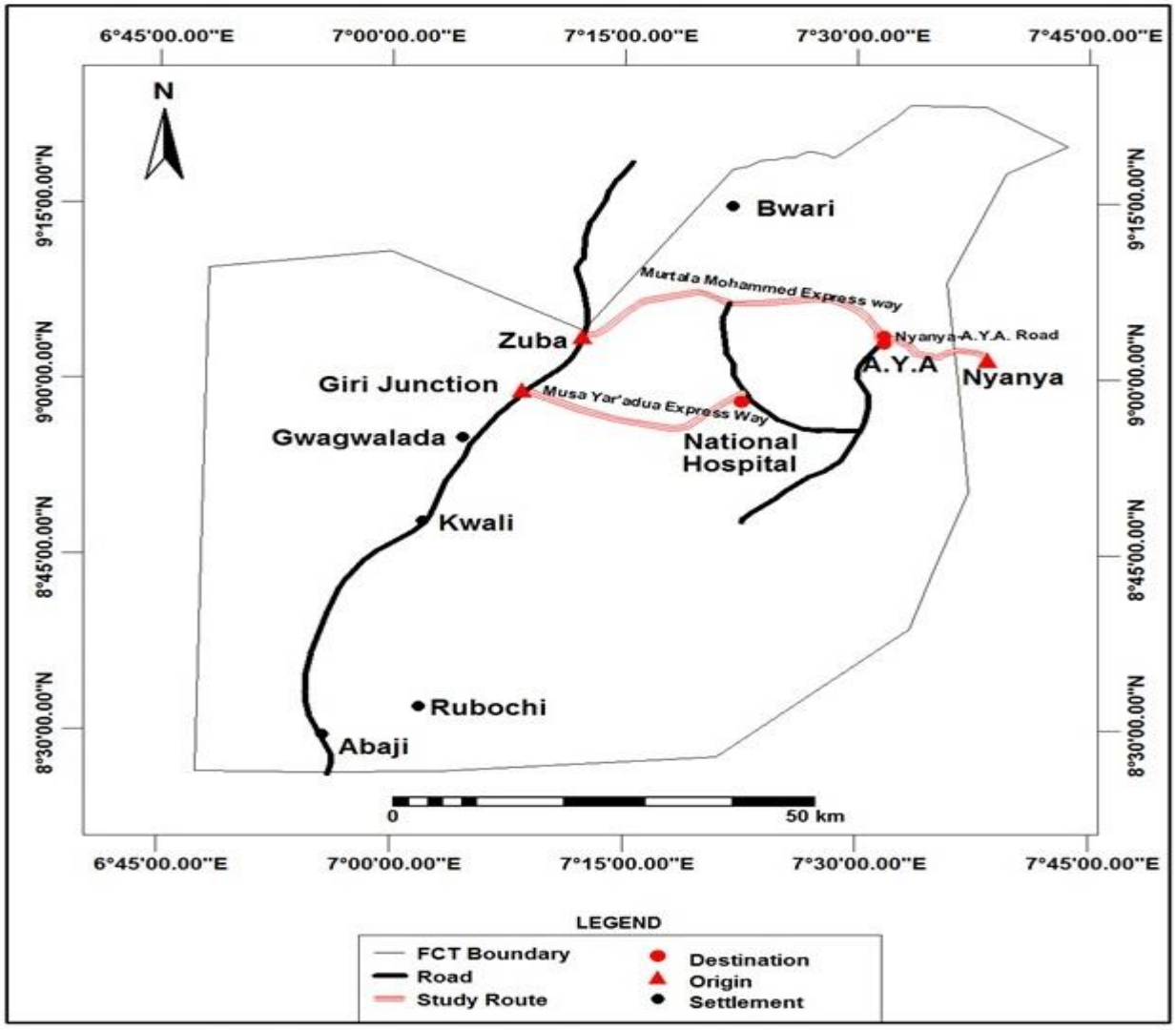

Fig.1 :Abuja Showing the Study Routes
Source : Adapted and modified from Administrative map of Abuja 2012

MATERIALS AND METHODS

The data for this study depend mainly on secondary sources gotten from Federal Road Safety Corp for a period of eight years from (2006 – 2013). Hence, data on travel time were sourced from the record of joint work done by Nigerian Institute of Transport Technology and Transport Secretariat Abuja, Abuja Urban Mass Transit Company and Transport Secretariat, Abuja respectively. However, field survey was also carried out by the authors to ascertain the actual average travel time on the three corridors of the study. Furthermore, simple descriptive statistics such as tables, graphs and percentages were employed to analyse the trend of road traffic accidents and travel time in this study.

RESULTS AND DISCUSSIONS

The table 1 below shows that vehicles spent an average of 60 minutes to cover 40.2 km on Murtala Mohammed route, average of 70 minutes was spent to cover 38 km on Musa Yar'adua route while an average of 120 minutes was used to cover the shortest distance of 7.4 km on Nyanya-A.Y.A route in 2006. It also noticed that the average time spent on the three corridors continued to increase from 2006-2011. However, in 2011 an average of 135 minutes was used to cover Murtala Mohammed route, average of 125 minutes was used to cover Musa Yar'adua route and an average of 150 minutes for Nyanya-A.Y.A route. Consequently, there was a drastic decrease in the average time spent from 110 minutes in Zuba – A.Y.A, an average travel time of 100 minutes for both Giri and Nyanya roads in 2012 to average travel time of 60 minutes for both Murtala Mohammed and Musa Yar'adua routes while an average travel time 70 minutes in Nyanya – A.Y.A route in 2013. The reason for the decline in travel time in the selected corridors of study was due to increase in the number of lanes constructed after the road expansion. Furthermore, this act was able to greatly reduce the level of congestion that was experienced before the road expansion on all the routes in the study area.

Table 1: Average Peak Travel Time of three Corridors of Abuja in Minutes.

Year	Murtala Mohammed Zuba – A.Y.A (40.2 km)	Musa Yar'adua Giri – N/Hospital (38 km)	Nyanya-Aya Nyanya-Aya (7.4 km)
2006	60 minutes	70 minutes	120 minutes
2007	90 minutes	90 minutes	130 minutes
2008	100 minutes	95 minutes	130 minutes
2009	120 minutes	110 minutes	140 minutes
2010	130 minutes	135 minutes	150 minutes
2011	135 minutes	125 minutes	150 minutes
2012	110 minutes	100 minutes	100 minutes
2013	60 minutes	60 minutes	70 minutes

Source: Abuja Transport Secretariat, Monitoring Report 2013.

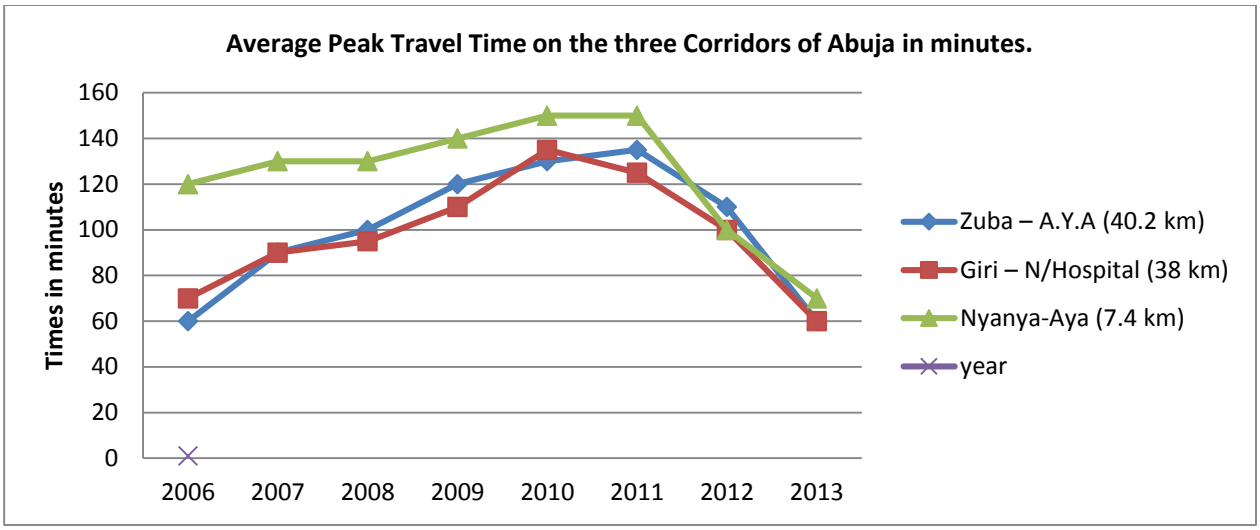

Fig. 1: Average peak travel time

Figure 1 above shows the trend of the average peak travel time in the three corridors of study in Abuja before, during and after the road expansion from 2006 to 2013. It showed that year 2010 has the highest average peak travel time in the whole corridors of study. Nevertheless, 2013 indicated a significant drop in the average peak travel time in the three corridors of study because of the completion of expansion in all the routes. It was found that there has been a drastic drop in the travel time in the three corridors after the expansion of the roads.

Table 2 Accident Rate on Zuba – A.Y.A, Giri – N/Hospital and Nyanya- A.Y.A Road

Year /Route	Zuba – A.Y.A	Giri – N/Hospital	Nyanya- A.Y.A	Total
2007	20	29	18	67
2008	32	31	21	84
2009	52	39	52	143
2010	112	42	63	217
2011	68	49	45	162
2012	65	90	68	223
2013	68	62	94	224

Source Federal Road Safety Corps; 2014

The results in table 2 show that in 2007, the three corridors had a total of 67 accident cases 30 percent of the accident occurred in Zuba- A.Y.A route, 43 percent occurred in Giri-National Hospital route and 27 percent of the accident rate occurred in Nyanya – A.Y.A route. While in 2009 and 2010 the total accident rate increase from 143 to 217 respectively 52 percent of the accident rate that occurred in 2010 occurred along Zuba – A.Y.A route. In fact, in 2013 the total

accident rate was 224 and the highest rate of accident occurred along Nyanya route representing 42 percent. It was discovered that after the road expansion in the study area the total rate of accidents has been increasing.

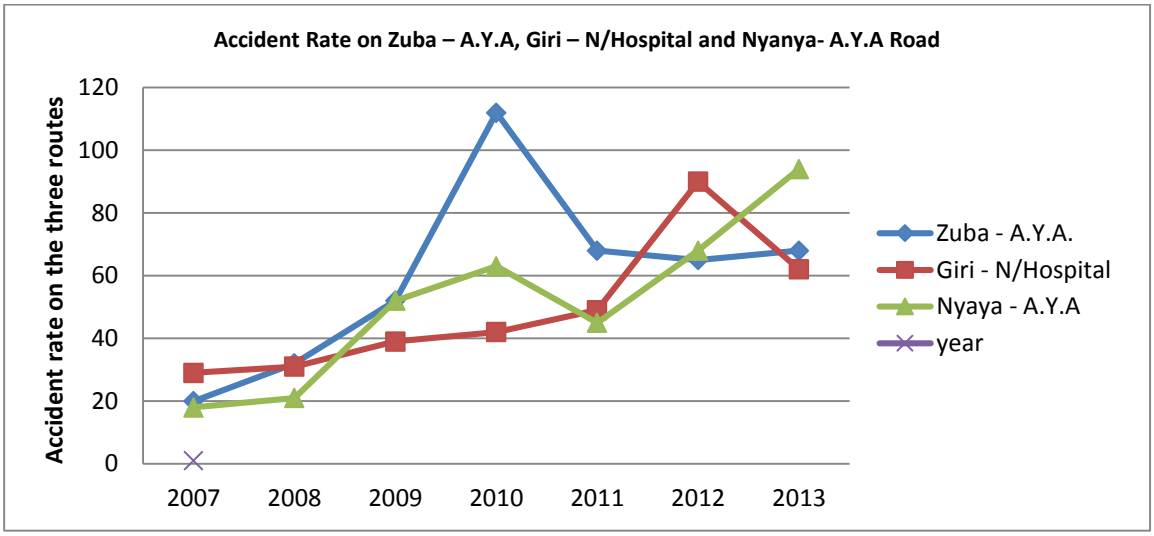

Fig. 2: Trend of Accident rate on the three routes.

The above figure 2 shows the trend of accidents rate on the three routes of study, in 2007 the trend of accident were low compared to the period during expansion (2010) and after expansion (2013). It was discovered that there was increase in the number of cars that ply the routes during and after expansion this contributed to increase in the trend of accidents in the area of study. However, the period with the highest trend of accident was 2010 for Zuba – A.Y.A route, while Giri – National Hospital route had the greatest trend of accident in 2012. In 2013 the trends of accident increase in Nyanya – A.Y.A route compared to the other two routes.

Plate 1: People crossing express road and bus picking passengers and illegally parking vehicles along the road.

Plate 1 shows clearly people crossing the road without making use of the pedestrian bridge that is meant for them to use to cross the road, it was also discovered that drivers pick and drop passengers along the road without making use of the bus stop meant for that purpose and hawking activity are on, and packing of vehicles by the side of the roads etc, these are some of the reasons why there is increase in the occurrence of accidents in the selected corridors.

CONCLUSION

This study examines the effect of road expansion in some selected corridors of Abuja using simple descriptive statistic. The road expansion in Abuja Metropolis has drastically reduced the travel time, but on the other hand, has increased the rate of accidents on the roads in the study area. The following recommendations are therefore made:

1. Government should embark on road expansion in the whole economy and also develop other mode of transportation in the country because it will help in bringing rapid economic growth and development in the economy and curb down travel time if this is well planned.

2. There should be integrated traffic management by police, VIO and FRSC who need to be down to business with reference to the trailers and other vehicles that are always packed on the road side, over speeding, illegal buses picking and dropping passengers on the road, street hawking and people wrongly crossing the expressway without making use of the over head bridges such offenders should be arrested to serve as hindrance to others. This will also help to reduce the rate of accidents occurrence on the roads.

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