

Analyzing Factors Responsible For Road Traffic Accidents along Kano-Kaduna-Abuja Dual Carriageway Nigeria

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ABSTRACT

This study analyzed factors responsible for road accidents along Kano-Kaduna-Abuja dual carriage way. Category Model was used for the primary data. The results obtained revealed that huge amounts of financial and human resources were lost due to road traffic accidents along the route. Our results revealed that the explanatory variables are jointly significant in explaining factors that are responsible for accidents. However, changes in family income did not significantly explain reasons for accident on the selected route. It was further discovered that lack of routine repairs, maintenance and the existence of potholes are responsible for crashes on the highway. It was recommended that the relevant ministry and its agencies should always effect repairs on bad portions of the highways. Driver's education and sensitization should always be strengthened and enforced to ensure compliance for proper driving habits.

1.0 INTRODUCTION

A good transportation system is very essential for rapid economic, industrial and cultural growth of any country. The five modes of transportation are road, rail, water, air and pipeline and they complement one another. The role of transport in spatial and economic development has been recognized in advanced and developing countries. The various modes of transport have their specific roles and service functions. In most cases, however, they serve complementary roles. Road transport in particular has played a prominent role in bridging the gap between producers and consumers, and production zones and consumption zones. Despite its importance in economic development, road transport has its own negative consequences. These include air and water pollution, noise and vibration, visual intrusion, distortion in bio-diversity, road accidents etc. (OECD, 1988; World Bank, 1994; Arosanyin, 1999 in Arosanyin, 2000).

Accidents are part of the constant trial and error process of living and they result from the fumbles that start with the intrinsic experiments of childhood and continue right through to the forgetfulness or confusion of old age. Along the way the possibilities for disaster are considerable (Welch, 1978). In other words, accidents can occur at any time during the life span of a man. In a more specific term, Blake (1963) defined "accident" as "an unplanned or unintended occurrence that interrupts or interferes with a work activity". Many accidents, in fact, the great majority, yield no injury and receive only passing attention, if any, unless they do considerable damage or are otherwise costly.

It is the costly accident involving deaths, disabilities, injuries, material lost etc, which are recorded and discussed (Omofunwa and Folarin, 1997). Traffic crashes and their associated injuries and fatalities are a world public health problem. Road accidents have claimed an estimated thirty (30) million lives in the last one hundred (100) years and, everyday about three thousand (3,000) people die and thirty thousand (30,000) are seriously injured on the world's roads (Murray and Lopez, 1996). In Europe, forty thousand (40,000) people die in traffic accidents every year and a further one million seven hundred thousand (1.7 million) people are injured, directly costing some one hundred and sixty (160) billion Euros (European Commission, 2003). For male adults aged between fifteen (15) and forty four (44), road accidents are the main causes of death, and some projections indicate that by year 2020 road traffic crashes will have moved from ninth (9th) to third (3d) place in the world ranking of the burden of disease (Murray and Lopez, 1997).

According to Yushau (2010), Nigeria, losses \$6.2 billion yearly to road crashes. The amount translates to about twelve per cent of Gross Domestic Product and about seventeen per cent of the current foreign reserve. He also lamented that many of the people who died as a result of road crashes were men in their active years between 25 years and 45 years. "There are a lot of social problems arising from road crashes including economic and health issues. The number of people in hospital having broken legs and arms from road crashes are major losses in our society".

Aipoh (2010) observed that youths were involved in about sixty five per cent of road accidents. According to him, it is sad that youths between the ages of 15 years and 45 years, who also are in their productive years, are often killed in most of the road accidents. This indeed, is a great challenge toward achieving the vision 20:20:20".

An increasing number of road accidents not only mean a considerable loss of human lives but also important economic costs to society. According to the Transport Road Research Laboratory (TRL), traffic

accidents annually cost developing countries about US\$53 billion (TRL, 1995). In Great Britain, estimates show that each fatal accident costs US\$2,665,000 while a serious casualty costs US\$310,000 (DETR, 2002). What these show is that traffic safety remains an important public and social priority issue as well as an economic challenge.

As a matter of fact, economic losses in terms of loss of life and life quality, property damage and loss of output due to temporary incapacitation is between one (1) and two (2) percent of Gross Domestic Product (GDP) in OECD countries or up to 4 percent if estimates are based on the 'willingness to pay' methodology (Barnett et al, 1999; Jara Diaz et al, 2000). On the positive side, however, it can also be said that every geographical region in the world has made progress in reducing fatalities over the past ten (10) to fifteen (15) years (Tessmer, 1999 in Garcia-Ferrer, et al, 2006).

In Nigeria, the genesis of road traffic accidents is intricately linked with road transport development in the country. Road traffic accidents started in Nigeria in 1906 in Lagos. However, whether at the global or national level, human and material resources vital for development process are destroyed in road crashes. Apart from the social costs of road accidents in terms of pain, grief and suffering, the economic effects are many. The economic impact include output loss due to death and injury, replacement cost of damaged vehicles, roads and road accessories, opportunity cost of delays in traffic hold ups and accident clearing, cost of 'goods in transit' destroyed in the accident etc (Agunloye, 1993; Oluduro, 1998; cited in Arosanyin, 2001).

Road accidents constitute one of the major social problems in Nigeria. In 1986, before the establishment of the Federal Road Safety Commission (FRSC) a total of 25,188 accidents were recorded and it increased to 28,215 in 1987. The number of deaths initially reduced from 8,154 deaths in 1986 to 7,912 deaths in 1987 before it increased in 1988 to 9,077 deaths.

As soon as FRSC was constituted in 1988, the number of deaths dropped in 1989 to 8,714 deaths and 8,154 deaths in 1990. Sudden increase was observed in 1991 and 1992. Gradual reduction was observed from 1992 throughout 1999 and from 2002 to 2005 while increments were observed in 2000, 2001 and 2006. Non-consistency in the trend of fatalities for over twenty (20) years is an indication of the need to learn from the developed countries on how considerable success has been achieved in tackling their road safety problems. Developed nations have involved both the elimination of the most hazardous location and safety conscious planning and design to improve traffic safety on their road network (Ibitoye, 2008).

2.0 The Problem

One major problem facing the Nigerian road is rapid deterioration due to construction of far below quality of engineering standards required (CBN, 2000). Also, the rates of accidents causing loss of lives and damages to roads have increased. In fact now, the major roads in Nigeria are in a great state of disrepair. Between 1991 and 1995, the economic cost of road accidents in Nigeria was estimated at about N44 billion or (\$554 million) (Arosanyin, 2001).

According to Ogunsanya (2006) Nigeria has a total of 193,200 km of roads, made up of 34,123 km of federal roads, 30,500 km of state roads and 129,577 km of local government roads. He further added that in many parts of the country, the roads are in a very deplorable condition having been neglected over the years.

In a CBN report (2000), about 23 percent of national roads were in bad shape since 1985 and that rose to 50 percent in 2001. The report further explains that a road study undertaken in 1998 indicated that N300 billion would be required over the next ten (10) years to bring the national road network into a fairly good condition. After the recovery, an average of N24 billion would be required each year for subsequent maintenance and N32 billion per year for road rehabilitation. Further neglect of these roads implies a loss of network value of N80 billion per year and an additional operating cost of N53 billion per year. But, except these roads and bridges are kept in good condition, they cannot support the desired social and economic development of the country.

The major objective of the study is to analyze and examine the factors responsible for road traffic accidents along the Kano-Kaduna-Abuja dual carriageway.

This is because the selected routes are major highways that connect the Northwestern and Northeastern Geo-Political Zones of the country to the nation's capital city (Abuja) and equally, other parts of the country. The study will also provide empirical estimates of the costs of road traffic accidents.

3.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

3.1 Literature Review

Johnson (1966) defined Road traffic accident as an unpremeditated event that results in recognizable injury. The epidemic of twentieth century, road traffic accidents, had a modest beginning. The first recorded death in the United States of America due to a mechanical vehicle was recorded in 1899. Nigeria has an enviable record of road traffic accidents among the developing world.

According to Anyanwu, et al (1997), the problems of road transport in Nigeria are multifaceted. The major one however, is the frequent rate of accidents, the substantial effort at road improvement notwithstanding.

It is however, noteworthy that good roads do not in themselves prevent accident. Such factors as poor enforcement of safety regulations by law enforcement agents, over speeding, dangerous overtaking and parking and also, mechanical faults in vehicles largely accounts for the high carnage rate on Nigerian roads. The high accident rate on Nigerian roads can be reduced by stricter enforcement of traffic regulations. The revival of Federal Road Safety Commission (FRSC) is a laudable step towards reducing the high accident rates on Nigerian roads.

Gbadamosi (1997) stressed that more than half of all the road traffic accidents and casualties were due to drivers' error which include recklessness, over speeding, improper overtaking, inattention or confusion, inexperience, carelessness at junctions and intoxication. Furthermore, according to him nearly six (6) percent of the accidents were due to mechanical vehicular factors while another six (6) percent was due to road construction problems. As for mechanical causes, the incidence is traced to owners' or drivers' refusal to take adequate care of the defects in their vehicles until they degenerate into disastrous conditions.

Other human faults consist of irregular servicing, failure to check engine oil and cooling systems, failure to replace worn-out tyres or repair of defective brakes or clutch systems. On the road, human being place obstructive materials on the highways. The components are broken down vehicles, failure to remove figs, trees, stones, electric poles, blocks and failure to seal up water pipe trenches after completing the laying of water mains across a road. Finally, there are environmental factors like gullies, erosion, slippery surfaces, fog, and rain that blur visibility.

Furthermore, Badejo (1997) classified five major factors that cause road traffic accidents in Nigeria. They are:

- i. Behavioural Factors
- ii. Mechanical Factors
- iii. Load / Environmental Factors
- iv. Institutional Factors
- v. Natural Factors

He also identified the need for a general reorientation of the whole society thereby raising awareness on the effects of accidents. There is need for, intensified educational and enlightenment exercises through the communicative media. Also, there is the need for better arid compulsory retraining programmes particularly in the area of defensive driving for drivers.

One important feature of National transport development in Nigeria is the attendant increases in road network; incidence of motor accidents is also on the increase (Jegede, 1988). Gbadamosi (1997) in his study of Nigerians road usage habits concluded that if Nigerians had invented the motor car, the rest of the humanity would not have had the opportunity of riding in one because Nigerians would have smashed themselves and their invention to smothering before the outside world ever knew what was happening. This refers to the violent nature of Nigerians behind the wheel resulting in regular and daily carnage on Nigerian roads. The World Health Organization (WHO) (1984) in its report on accidents concluded that Nigeria had the record of having the world's greatest occurrence of fatal road accidents. Traffic fatalities per One thousand (1000) vehicles are about three times those of most other African countries and some sixty (60) times higher than industrialized countries like the United States of America.

Onakomaiya (1991) sought to find reasons why road traffic accidents had continued to be on the increase and concluded that "safety has been the most neglected aspect of road transportation in Nigeria a situation that can be blamed on the failure of the past governments and decision makers to appreciate the magnitude of the problem and attendant costs of road traffic accidents to the national economy" (Gbadamosi, 1994). Road traffic accidents statistics in Nigeria revealed a serious and growing problem rising rapidly in the majority of developing countries and with death rates relative to either population or number of vehicles. He also, stressed that if Nigeria is to stop mass killing on her highways among other steps that needs to be taken as a matter of urgency, there is need for permanent system of collection, compilation and analysis of road traffic accidents in the country with a view to gaining fuller understanding of the causes, process and consequences of road accidents. With such approach of diagnosing the causes, it would be easier to evolve feasible solution which would focus on these major causes and black spot locations of road accidents in the country.

According to Ademiluyi and Solanke (1997), the alarming rate of accident has evoked a great concern. In fact, there is hardly any family in Nigeria today which has not experienced the anguish of the sudden loss of a beloved one as a result of accidents that could have been avoided on our highways. If we broaden our search to embrace the traditional framework of the extended family, we can go even further to declare that no day passes without each such family undergoing the agony of the premature loss of one of its members. This violent

interruption of an ordered, secure existence has become a common place in the life of the average Nigerian, creating a permanent state of anxiety whenever a friend, relation or colleague is waved off at the commencement of even the briefest journey on our roads. The routine greeting of “safe journey” is silently or loudly augmented by fervent prayers for a successful conclusion of this plunge into the unknown.

3.2 Empirical Review

Empirical results from Garcia-Ferrer, et al (2006) established posterior causal models and whether or not economic activity and road accidents have a common component in the long run and a varying lead-lag relationship depending on the cycles.

Road traffic accident (RTA) is a current global development epidemic. The World Health Organization (WHO) ‘estimates that road traffic crashes cause over 1.2 million deaths and about 50 million people are injured per year’ (WHO, 2009). Developing countries account for over 85% of the deaths, and close to 90% of disability is caused by RTAs globally (Krug, 1999; Astrom, et al., 2006). The World report on road traffic injury prevention (WHO, 2006 and Peden, et al., 2002) indicated that there are notable differences in the way different road users are affected by road traffic collisions as follows: “More than half of all global road traffic deaths occur among young adults between 15 and 44 years of age and 73% of all global road traffic fatalities are males. Vulnerable road users (pedestrians, cyclists and motorcyclists) account for a much greater proportion of road traffic collisions in low-income and middle-income countries than in high income countries”.

As noted by Grimm and Treibich 2010; Khan 2007) ‘road traffic injuries have to be seen in low and middle income countries as one of the most important health problem that may also entail major economic problems at household levels’. This is because families have to use the available resources to provide care and support to the victim because in poorer countries there is no much support offered to disabled persons. Moreover, children might stop their education at any level due to financial constraints if one of the parents is involved in RTAs induced PDs. The household might as well find itself in a debt burden that may result into exposing family properties like a plot, a house, vehicle or animals for sale to repay back the debt if the situation gets worse. The government health systems might be overwhelmed due to the big number of RTA victims who requires treatment and rehabilitation services for long period of time.

Risk factors for involvement in a traffic accident are often classified into three large groups: ‘driver dependent (or pedestrian dependent for accidents between a vehicle and a pedestrian), vehicle related, and environment dependent’. Most scholars attributed most accidents to driver dependent factors, which are thought to account for 60% to 90% of all traffic accidents (Claret, et al., 2002; Jelalian, et al., 2000; Oginni, 2008). ‘The growth in numbers of motor vehicles is a major contributing factor in the rising toll of fatalities and injuries from road traffic crashes in poor countries’ (Hague 1999; McGrowder, 2008; Nantulya, 2002).

He added that another explanation for the high burden of RTAs is “Poor enforcement of traffic safety regulations in low income countries are due to inadequate resources, administrative problems and corruption. Corruption is a huge problem in some countries, often creating a circle of blame the police, blame drivers and the public, the public blames drivers and the police, and drivers blame the police. Corruption also extends to vehicle and driver licensing agencies” Nantulya (2002).

Oginni (2008) further identified the specific risk factors such as ‘uneducated and unlicensed drivers and riders, reckless driving, carelessness, drunkenness, lack of knowledge on road safety rules, driver’s age, fatigue, unimplemented government policies, failure in law enforcement and corruption’. Furthermore the literature on RTAs has noted that poor vehicle conditions, poor road infrastructure and poor traffic management are some risk factors contributing to RTAs.

As noted by (Peden and Sminkey 2004) ‘economic costs are just the tip of the iceberg. For everyone killed, injured, or disabled by a road traffic crash there are countless others deeply affected. Many families are driven deeper into poverty by the expenses of prolonged medical care, loss of a family breadwinner, or the added burden of caring for the disabled. Ericson (2008) wrote, ‘While the effects of road traffic injury on victims and their families are somber, some consolation can be found in the knowledge that we know how to reduce road traffic injury rates’. He added that, “Development donors have spent billions of dollars promoting and funding improved road expenditure in developing countries but we have largely neglected to address the resulting health risk. As a consequence, road traffic accidents have become a major health risk and will substantially impede progress towards the Millennium Development Goals. The challenge is to effectively transfer technology and policies so that road safety programmes proven effective in the advanced developed countries can be implemented in less developed countries”.

4.0 METHODOLOGY

Primary data were obtained directly through the administration of questionnaires. The structured questionnaires were used to collect information. It contained categories of questions, which were meant to guide the respondents so that they could supply appropriate data for the study.

The entire States of Kano, Kaduna, Niger and the Federal Capital Territory (Abuja) form the population of the study. The selected route cuts across the mentioned states. Equally, motorists from the Northwestern and Northeastern parts of the country ply this route.

Six hundred (600) respondents were selected out of which 300 were car owners and or drivers and 300 were passengers. The selected respondents were based on random sampling technique or procedure.

Through intense discussion with passengers and drivers after which questionnaire were given to be filled out. In many cases the questionnaires were filled and returned before the journey, while in other cases they were returned through the drivers when they return from the journey.

A total of 591 five hundred and ninety one questionnaires were properly and adequately filled and returned by the respondents representing ninety nine (99) per cent of the total.

This work adapted the works of Lewis-Beck (1980), Ogunjumo (1986), Okoko and Fasakin (2003) and Siyan (2006) with major modifications particularly in the area of variables specified in the study. The purpose is to estimate road accident and involvement rate among household or organizations. However, the conceptual category model is specified to identify, analyze and examine the factors responsible for road traffic accidents in Nigeria.

4.1 The Model

$$\text{AccC} = b_0 + b_1\text{NoWives} + b_2\text{NoVeh} + b_3\text{MonIn} + b_4\text{VehType} + b_5\text{NoTT} + b_6\text{AssHigh} + b_7\text{NoDep} + b_8\text{Age} + e_i \quad (3.1)$$

The model shows a measure of the rate of accidents to explanatory variables b_1 to b_8 .

Where:

AccC	=	Accident Cost over the period of observation
b_0	=	Intercept parameter
b_1 to b_8	=	Regression coefficients
NoW	=	Number of Wives
NoVeh	=	Number of Vehicles owned per household
MonIn	=	Monthly Income
VehType	=	Type of Vehicle used for travel
NoTT	=	Number of times travelled through the highways in a year
AssHigh:	=	Assessment of the state of the Highway
NoofDep	=	Number of Dependants
Age	=	Age of the passengers/drivers
e_i	=	Error term

4.2 The Category Model Regression Analysis

4.2.1 Regression Analysis on Road Accident and Income

$$Y = 2.184 + 0.010 \text{ Numwives} - 0.191 \text{ Numvehs} + 0.189 \text{ MonIncome} + 0.063$$

$$\text{SE} = (0.657) \quad (0.73) \quad (0.119) \quad (0.078)$$

$$\text{t-value} \quad 3.324 \quad 0.138 \quad -1.601 \quad 2.417$$

$$\text{VehType} - 0.152 \text{ NoTT} - 0.081 \text{ Asshighways} - 0.005 \text{ NoofDep} - 0.068 \text{ Age}$$

$$(0.093) \quad (0.55) \quad (0.94) \quad (0.014) \quad (0.091)$$

$$0.681 \quad -2.756 \quad -0.864 \quad -0.376 \quad -0.742$$

$$R^2 \quad 0.438 \quad \text{and} \quad F \quad 0.007$$

$$\text{DW} \quad 2.023$$

Source: Output, SPSS Version 13.

The SPSS output shows that the variables accounts for 44 percent of involvement in road accidents. The Durbin-Watson Statistic value (2.02) shows the variances are heteroscedastic. That means, the residuals are uncorrelated. It shows that each value of the income variable is independent. The F statistic (7) reveals that the explanatory variables are jointly significant in explaining involvement in road traffic accidents.

The result for coefficients shows the difference between involvement in road accidents and change in income. The beta values reveal the relative difference between each group and the group that we choose as a baseline category. Furthermore, a unit change in involvement in road traffic accident does not affect or influence number of wives with a positive value of (.010). The second variable, number of vehicles owned by the family is not significant and the beta value is negative (-0.191) which indicates that involvement in road traffic accident

decreases the number of vehicles owned by household. The third variable, monthly income is significant and the beta value is positive (0.189), which shows that increase in family income leads to increase in road accidents. The fourth variable is not significant but has positive beta value of (0.063) indicating that the type of vehicle travelling has no influence on road traffic accident. The fifth variable, how many times have you travelled to your destination in a year through the highways is significant but with a negative beta value of (-0.152). This shows that road traffic accident is highly influenced by the frequency of journeys a person embark on. On the other hand, when the frequency of journey decreases it reduces the rate of involvement in road traffic accident. The 6th, 7th and 8th variables are not significant and they have negative beta values of (-0.081), (-0.005) and (-0.068). Road traffic accident has little influence on income because the level of road assessment is low. It greatly affects dependants negatively and more youths in their primes are victims of the road traffic accidents. Overall, this has shown us that road traffic accident has great influence on monthly income and the frequency of travelling or journeys people make.

The policy implication is that road traffic accidents leads to economic and financial losses that negatively affects the individual involved and the economy generally.

Similarly, the results of the regression equation revealed that intercept is significant as well as the monthly income of the head of the family, number of wives or marital status as well as the type of vehicle he is travelling in are significant in explaining the determinants of the economic costs of road accidents.

The results show that there are important factors that are individually and collectively responsible for traffic accidents along the Kano-Kaduna-Abuja dual carriageway.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

The development of the road transport system which also is the most popular mode of travel in the country has been associated with accidents. However, it has now become one of the most pressing problems that almost all governments in the country have tried to curtail or reduce to the barest minimum. Road traffic accidents have both social and economic costs to individuals involved and the economy generally.

The spectacular increase in the number of motor vehicles on the roads has created a major social problem as well as high rate of loss of lives through road traffic accidents. The appalling human misery and the serious economic losses caused by road accidents demands the attention of the society and call for solution(s) to the problem.

Furthermore, in line with the objectives of the study, findings revealed that factors such as the bad and or poor state of the highway as well as neglect by the government attributed to lack of repairs and maintenance by the government has led to road traffic accidents along the highway.

Based on the findings the study recommends that relevant ministry and its agencies should always effect repairs or fix bad portions of the highways. Bad roads usually lead to accidents which in turn result in injuries, permanent disabilities and sometimes death.

Driver education and sensitization should be strengthen and enforced on the need for proper driving habits and road infrastructure should be provided along the highways in order to alert drivers on the presence of dangerous and or bad portions, bends, narrow bridges etc on the road.

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