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Road Traffic Accidents in Warri and Environs: A Ten-Year Survey

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Abstract

This study examined Road Traffic Accidents in Warri and Environs from 1990-2009. The data generated was analysed using time-series and one-way ANOVA analysis and these are the findings: the road traffic accident shows a fluctuating pattern from 1990-1999 and increased in 2009 having a total of 3,475 road traffic accident cases within the period of study. It was also observed that there is an upward trend in RTA in the study area which is evident as a calculated value of 3.728 which is greater than the critical table of 1.734 at $p < 0.05$. The model further forecasted that RTA will eventually increase by 66.68% by 2015 if the current trend is unabated. Further observation revealed that there is spatial variability in road traffic accident trends in the different areas of Warri, and environs with a calculated F value of 13 which is greater than the critical table value of 3.16 at $P < 0.05$. Based on the findings recommendations were proffered.

Key words: Accidents; traffic; road; ten-year; Warri and environs.

Introduction

At the global level, road accidents have been ranked as the 9th leading cause of mortality (World Health Organisation, 1998). The World Health Organisation (WHO) estimated that 1.17 million deaths occur each year worldwide due to road traffic accident. Succinctly, this accounts for about 70% of deaths in developing countries such as Nigeria. The increased rate of fatal road traffic accidents worldwide has been attributed to population explosion and increased motorization (Atubi, 2008). Increased motorization may be characterised briefly as the “automotive revolution”, that is, the motorizing of urban population especially in the developing countries.

The number of reported cases of fatal road traffic accidents in Nigeria has shown an increasing trend from 12,212 cases of accidents in 1995 to 13,913 in 1996 and 15,418 in 2004, indicating an increase of 13.9% in fatal road accidents from 1995 to 1996 (Central Bank of Nigeria, 1997). Fatal road accident figures across the federation of Nigeria rose sharply in 1992 resulting in 22,992 deaths (CBN, 1994). According to the Annual Abstract of Statistics (2008), between 2003 and 2007, a total of 225,891 accident cases were reported by the Nigeria police force, out of which 29,490 were fatal, 39,065 were serious cases, 23,380 were minor cases.

Dramatic increases in the proportion and absolute number of traffic fatalities have been witnessed in a number of developing countries, while they decreased by more than 20% in industrialised nations (Ross et al, 1991). In both Nigeria (Oluwasanmi, 1993; Ezenwa, 1986; Atubi, 2009b; 2010a) and Kenya (National Road safety council of Kenya, 1992), for example, a fivefold increase in traffic – related fatalities was observed over the last 30 years. African and Asian countries, with relatively low vehicle densities, are experiencing substantially higher fatality rates per 10,000 vehicles than the industrialised European and North American States (Jacobs and Sayer, 1983; WHO, 1984).

Traffic crashes also impact on the economy of developing countries at an estimated cost of 1.2% of a country’s GNP per annum, as a result of morbidity, mortality and property – related costs (Fouracre and Jacobs, 1976; Jacobs and Sayer, 1983; WHO, 1989; Jadan, 1989a and 1990; Downing et al, 1991). Causes of motor vehicle crashes are multifactorial and involve the interaction of a number of pre-crash factors that include people, vehicles and

the road environment (Haddon, 1980; AMA, 1983; Stansfield et al, 1992; Robertson, 1992).

Human error is estimated to account for between 64 and 95% of all causes of traffic crashes in developing countries (Atubi, 2009b). A high prevalence of old vehicles that often carry many more people than they are designed to carry, lack of safety belts and helmet use, poor road design and maintenance and the traffic mix on roads are other factors that contribute to the high rate of fatalities in less developed countries.

Other researchers concentrated on the factors affecting road safety (Ajedi, 1980; Perrow, 1984; Agunloye, 1989; Golias et al, 1997). For instance, Ajedi (1980) and Atubi (2010b) reported that the poor interconnections of existing Nigerian roads and poor maintenance of these roads were responsible for the chaotic urban transportation, which in turn leads to accidents and irreparable losses in human lives and physical resources.

In Nigeria, the road traffic accident situation over the last three decades has been particularly disturbing. In 1976, there were 53,897 road traffic accidents resulting in 7,717 deaths. Although in 1981, the magnitude reduced to 5,114 accidents, but the fatality increased to 10,236, which means that there was an average of 96 accidents and 28 deaths for every day of that year (Ogunsanya, 1990).

The situation in subsequent years has not been any better. The number of people killed in road accidents between 1990 and 2005 rose from 28,253 to 37,873 and the fatality rate remains consistently high (Atubi, 2009b).

Study area

Warri is located between latitude 5°30' and 5°35'N and longitude 5°29'E and 5°48'E. Warri is situated within the Niger Delta region of Nigeria. It is bounded to the north by Okpe and Sapele Local Government Areas, to the South by Warri South West Local Government Area and the Atlantic ocean, to the east by Ughelli South and to the west by the Warri North Local Government Area (See Figure 1). Warri metropolis is made up of Warri south, Udu and Uvwie Local Government Areas.

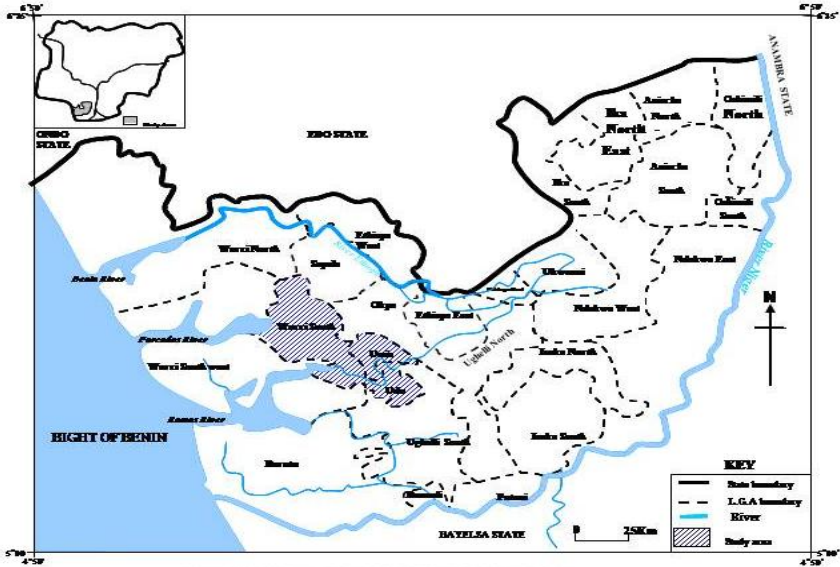


Figure 1: Map of Delta State Showing Study Area

Research methodology

The data used in this study were derived from secondary source. The secondary data include records on road traffic accidents in Warri and environs for a period of twenty (20) years (1990-2009) from the state office of Federal Road Safety Commission (FRSC), and the Nigeria Police Force, Warri and complemented with information from research reports and articles and national statistical abstracts and newspapers. The data were presented in tables and analysed with the aid of percentages, time-series and one-way ANOVA analysis. Simple descriptive analysis of the distributions and cross tabulation of variables were carried out. The data on accident cases were analysed with time series by using auto-regressive integrated moving averages (ARIMA) models. The moving averages were specifically applied in this study because of the basic assumption that trend must be linear or approximately linear (Hammond and McCullagh, 1974; Okeke, 1996; Atubi, 2009a).

Discussion of results/findings

This study showed that there were a lot of pot holes but few black spots on almost all the roads in the study area despite the billions of naira that the government of the state has claimed they spent on road repairs and maintenance. This has contributed in no small measure to the peculiar nature and rate of RTA in Warri and environs. This by implication means that the government is not sincere with their claims and partly as a result of the substandard roads constructed by contractors.

Table 1: Major black spots distribution in Warri and environs

Roads	No. of black spots	Major black spots areas
NPA	1	Before NPA gate
Ajaminmogha	Nil	Nil
Ugboro	Nil	Nil
Okere	1	By Robert road junction
Eboh	Nil	Nil
Deco	1	Before Gbagi's plaza
Enerhen	Nil	Nil
Airport road	1	U-turn by old airport
Ugborikoko	Nil	Nil
Udu	1	Around Udu bridge
Mcdermott	Nil	Nil

Source: Fieldwork, 2010

One major contributor to the incessant spoilage of the roads is the nature of land use in the study area. Being a highly urbanised centre with 17.76km² (35.2% of the total land area) of residential landuse, 6.87km² (19.8%) of industrial landuse and 4.27km² (11.9%) of commercial landuse thus high volume of traffic and subsequently pressures on the existing roads (see Figure 2 and Table 1). The study also revealed that the study area has about five (5) major black spots where road traffic accidents occur regularly.

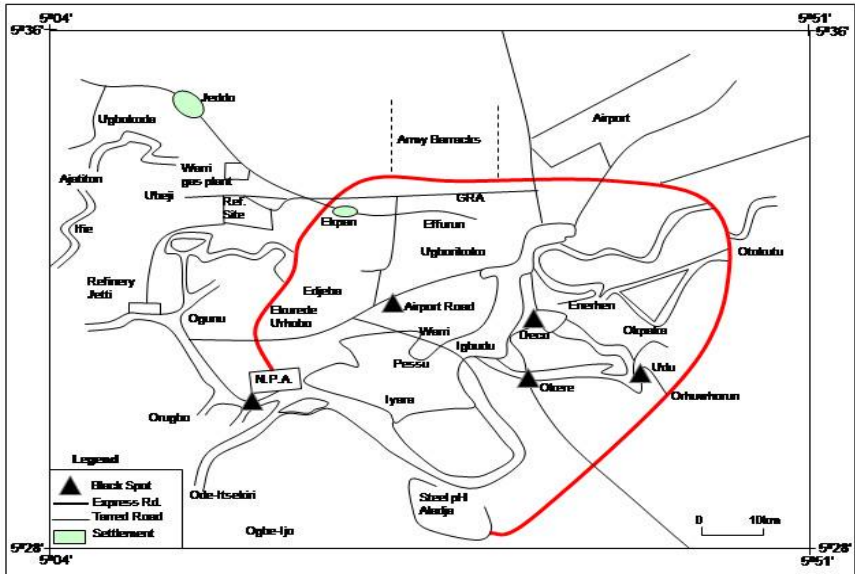


Figure 2: Map of Warri and environs showing accident spots

Table 2: Road traffic accident distribution

Zones	Place of occurrence	Daily traffic	Accident cases	% of RTA
Warri	Ogunu road to Okere road	1276	3	4.8
	Okumagba avenue road	1168	7	11.1
	Edjeba road to Apala road	1054	2	3.2
	NPA road	1071	5	7.9
	Makiava road to Warri main market road	1014	9	14.3
Uvwie	Airport road to Enerhen road	1854	13	20.6
	Refinery road	1730	6	9.5
	Ekpan to Jakpa road	1124	3	4.8
	PTI road	1601	8	12.7
Udu	Udu road	1152	5	7.9
	DSC road	1011	2	3.2

Source: Nigeria Police (A and B division) Road Traffic Accident Statistics, Warri (2010)

** adapted from Atubi and Onokala (2005d).

From table 2, 6307 daily traffic pass along Uvwie area, while 5583,2163 daily traffic pass along Warri and Udu respectively. 20.6% of accidents occur in Airport road – Enerhen road axis while 3.2% of accidents occur in Edjeba road – Apala road and DSC road axis (see Table 2). Succinctly, the accident rate in Warri and environs increases correspondingly with the daily volume of traffic within Warri and environs (Figure 3). These findings are in line with the work of Atubi and Onokala (2005d) which states that the increased rate of fatal road traffic accident in Warri and environs has been attributed to population explosion and increased daily traffic.

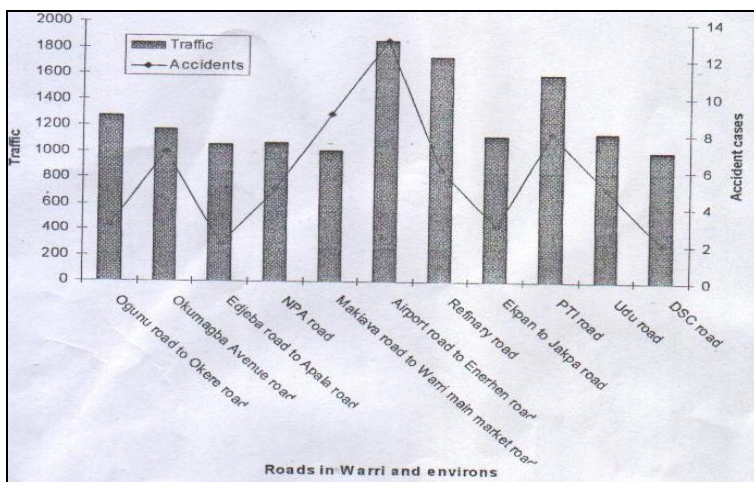


Figure 3: Accident distribution in Warri and environs

Table 3 indicates that the actual number of traffic accidents for the period under review was 3,475. The highest number of road traffic accident cases was in 1997 with a total of 359 cases while the lowest number of cases which is 50 were recorded in the year 2004. The year 2000, 2001, 2002, 2003, 2005, 2006, 2007, 2008 and 2009 have annual total RTA cases of 195, 124, 130, 71, 106, 142, 110, 81 and 63 while the years 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1998 and 1999 had annual total of 239, 203, 199, 231, 218, 175, 332, 221 and 227 RTA cases respectively. These first ten years of the

period under review accounted for 2,404 (69.2%) of the traffic accident cases within the period while the last ten years accounted for 1,071 (30.8%) of the road traffic accident cases during the period.

The monthly traffic accident data of Warri and environs for the period under review is the basic information upon which analysis of trends and patterns were based and the frequency of reported road traffic accidents were also considered (see Table 4). There were a total of 3,475 reported road traffic accidents within the period with annual mean traffic accident value of 174 cases and a mean monthly RTA value of 15 cases. The deviations of the accident figures from the mean (\bar{x}) are presented in Table 4 and Figure 4.

Table 3: Total number of reported RTA in the study area from 1990-2009

Years	Months											Total	
	J	F	M	A	M	J	J	A	S	O	N		D
1990	9	15	25	39	21	17	21	14	23	22	18	15	239
1991	10	21	11	14	14	21	28	17	13	15	12	27	203
1992	20	15	17	29	10	17	18	9	21	14	15	14	199
1993	16	17	15	17	21	23	15	19	23	25	15	25	231
1994	18	20	22	12	9	13	6	11	48	25	16	18	218
1995	24	21	33	15	0	11	7	7	19	6	9	23	175
1996	40	39	39	31	31	31	22	22	27	18	16	16	332
1997	22	29	33	36	34	25	25	29	36	34	26	30	359
1998	45	29	10	15	16	15	13	4	17	32	8	17	221
1999	12	17	28	21	17	17	14	14	24	23	18	22	227
2000	16	11	12	27	16	25	17	22	21	9	5	14	195
2001	9	10	9	13	10	11	8	14	11	8	15	6	124
2002	9	10	13	10	7	6	10	11	14	14	10	16	130
2003	8	12	7	5	4	6	6	5	5	5	1	7	71
2004	5	3	6	4	6	4	0	5	6	4	1	6	50
2005	6	8	12	7	6	0	15	4	10	21	9	8	106
2006	28	10	6	12	15	8	10	21	5	6	4	17	142
2007	15	7	4	7	9	6	8	5	11	12	13	13	110
2008	10	5	9	0	5	6	4	9	10	6	8	9	81
2009	5	11	4	5	4	8	3	5	5	4	5	4	63
	327	310	315	319	255	270	250	247	349	303	224	307	3476

Source: Nigeria Police Force (A and B Division) Road Traffic Accident Statistics, Warri

Table 4: Deviations of reported cases of RTA figures from the mean

Year	Annual total (x)	Annual mean (x)	Deviation from the means (x-x)
1990	239	174	65
1991	203	174	29
1992	199	174	25
1993	231	174	57
1994	218	174	44
1995	175	174	1
1996	332	174	158
1997	359	174	185
1998	221	174	47
1999	227	174	53
2000	195	174	21
2001	124	174	-50
2002	130	174	-44
2003	71	174	-103
2004	50	174	-124
2005	106	174	-68
2006	142	174	-32
2007	110	174	-64
2008	81	174	-93
2009	63	174	-111

Source: Fieldwork, 2010

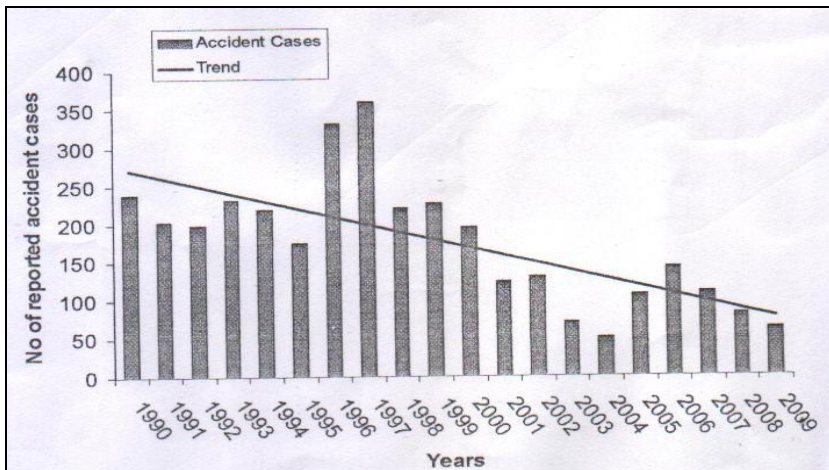


Figure 4: Trend in road traffic accidents in Warri and environs from 1999-2009

Road traffic accident cases were more in 1997, during which 359 road traffic accidents cases were reported. Since 1999 when 227 traffic accidents were reported, these was more of intermittent decrease up to 2009 during which only 63 traffic accident cases were reported. From the year 2001, the RTA cases were below the mean (\bar{x}) (less than 174). Figure 4 shows a progressive decrease from the mean (\bar{x}) up to the year 2009. This implies that from 1997 there has been an unstable decrease in RTA in Warri and environs. This could have arisen from improvement in road rehabilitation effort of the government, road safety practice of drivers and increased monitoring of speed by Federal Road Safety Corps marshals. When the Third Republic took effect in 1999, the civilian administration embarked on massive road rehabilitation through the agency called Federal Road Maintenance Agency (FERMA). The observed decreased in RTA cases which were below the mean (\bar{x}) from 2001-2009 may also be attributed to the increased use of information and communication technology (ICT) facilities by the population. The available ICT services such as e-mail, e-banking and the use of mobile phones had reduced unnecessary travels on the major roads. Road Traffic Accident rarely occurs when the population travels less frequently.

Table 5: Exponential smoothing model parameters

Model	Estimate	SE	t	Sign.
RTA-Model-1 No Alpha (level) transformation	.842	.226	3.728	.001

From table 5, it shows the calculated t (3.728) which is greater than the critical table (1.734) at $p < 0.05$ and thus, the model is significant. Therefore, there is an upward trend in road traffic accident in Warri and environs. This result implies that RTA in Warri and environs needs to be checked seriously by all relevant stakeholders using a holistic approach in order to step down the carnage and eventual loss of life and properties.

Table 6: Forecast

Model	2010	2011	2012	2013	2014	2015
RTA-Model-1 Forecast	66.68	66.68	66.68	66.68	66.68	66.68
UCL	188.99	226.55	256.83	282.91	306.17	327.36
LCL	-55.64	-93.20	-123.48	-149.56	-172.82	-194.01

For each model, forecasts start after the last non-missing in the range of the requested estimated period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

From table 5, the model further forecasted that road traffic accident trend is on the increase and will certainly increase to about 66.68% cases in 2015 if the trend of accident remains unabated. This means that there will be more loss of lives and properties which will affect the socio-economic status of the study area.

Table 7: ANOVA on variability of road traffic accidents

Square of variation	Sum of squares	Df	Mean sum of square	F	P
Between group	27913.8	2	13956.9	13	0.00
Within group	60707.3	57	1065		

From table 7, the calculated F value of 13 is greater than the critical table value of 3.16 at $p < 0.05$ and thus, the model is significant. Therefore, there is a significant variability in the trends of road traffic accidents in the different areas of Warri and environs. The implication of this is that the areas marked in Figure 2 as accident black spots in the study area should be monitored and proactive steps should be taken to reduce drastically the current trend of RTA.

Policy implications/recommendations

The study is involved with understanding pertinent locations and spatial trends of the road traffic accident over a period of twenty years (1990-2009) in Warri and its environs in Delta State. The result of this study have far reaching implication on road traffic planning and management sector of the economy. Also, the findings have far reaching implications on traffic monitoring and road rehabilitation in the country. This means that when similar studies are conducted in other parts of Nigeria, it can form the basis for generating regional or national empirical models based on the peculiar RTA factors identified in the study area.

In a similar vein, there will be room for comparative RTA analysis and studies between different states of Nigeria. In this regard, the influence of nature of road and months of the year can be determined by various parts of the country with a view to understanding the variations their individual and collective influences have on RTA occurrence.

Further studies are necessary in Delta State to ascertain the categories of vehicles that are frequently involved in RTA more than the other vehicle types.

Finally, the development of other modes of transportation such as the railway is necessary to reduce pressure and over dependence on the roads. In developed countries such as U.S.A., UK, France and Canada, road is not the only principal mode available for inter-urban transportation. Railway, inland water way and air ways are equally available at reduced cost. The contrast is the case in developing countries like Nigeria, Ghana and Liberia etc where there is over-dependence on road transport resulting to increased congestion and traffic accident. This measure if adopted will significantly reduce road traffic accident cases not only in Warri and its environs but also in Nigeria generally.

Conclusion

This study is one of the current attempts at placing transportation safety in the realm of burning national issues. This is to enable transportation geographers make more definitive and deterministic statements about processes and trends in the discipline. Despite the incomprehensiveness and non-availability of similar studies, particularly in the south-south geopolitical zone of Nigeria this study represents a huge success in analysis of general trend, spatial pattern and effects of fatal road traffic accident occurrences over a period of time. However, a lot remains to be done even in this respect.

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