Spatial Trend and Management of Road Traffic Accident Fatalities in Nigeria

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Abstract

Nigeria has an unenviable record of road accident fatalities when statistics of road traffic accident across the globe are contrasted. The magnitude of road traffic accident in Nigeria has been known to vary significantly among the various traffic corridors located in all the states of the federation. The occurrence of accident is somewhat influenced by the level of economic and social development at the state level. This paper attempt to provide an insight to the spatial and geographical dimension of Road Traffic Accident in Nigeria over time. Adequate attempt has been made to examine the relative impact of the Federal Road Safety Commission in its effort to achieving its mandate. The methodology of study involved the ranking of the states of the federation and federal capital territory using available records of road accident fatalities. This is with a view to provide insight to the need for variation in the application of accidents prevention strategies across the states of the federation. The paper advocated for the application of accident prevention strategies with due consideration of the uniqueness of the distinctive spatial attributes of each states.

Keywords:*Spatial, Safety , Records , Geographical Information System , Dimension*

1. Introduction

The major objective of this paper is to examine the spatial trend in terms of the distribution and magnitude of road traffic accident occurrence in Nigeria. It also considered the management strategy employed in the handling of accident fatalities in terms of emergencies in Nigeria. The essence of this is to underscore the significance of the variation in the occurrence of accident fatalities among the states of the federation. This is with a view to recommend appropriate remedies for reducing the impact of the human and material losses suffered from accidents with due consideration to variation in the magnitude of fatalities among the states.

The role of transport in the movement of goods and service in space all over the globe is of unique economic and social importance. Its role in the actualization of the desire of people to travel from one place to another regularly or occasionally is not in doubt. It has assisted greatly in the process of freight transportation domestically and internationally. Transport industries fulfill one of the most important functions and are one of the most pervasive activities in any society or economy (Hoyle et al, 2000).

Movement as facilitated by transport is necessary for all human activities in all ramifications. Transport infrastructure has grown over the years and has revolutionized the process of spatial interaction and the location of human activities with respect to commerce, housing, recreation, education, industrial activities among others. Road traffic accident has been recognized as the most deleterious and noxious negative extremity associated with the operation of transport despite its undisputed role on the effective functioning of modern societies. (Gbadamosi, 2002 ; Ogunsanya, 2000).

The consequential effect of the negative externalities of transport is accident with its attendant injuries and fatalities capable of neutralizing its social and economic benefits if not well managed. Traffic fatalities from automobile crashes have been known to be high in developing countries in which Nigeria constitute an integral part despite the much lower vehicle ownership in relation to population strength.

Transport operation in all location calls for a reduction in its environmental challenges as it affects accident considering its impact on the loss of life and property. This paper provide an insight to the magnitude of spatial attributes of accident in Nigeria with reference to geographical boundaries with respect to the state of federation using (GIS) Geographical information system. It catalogued the policy advocated by the government to reduce the magnitude of accidents and also the fatality management.

Road traffic accidents data were considered for the entire country between 1990 and 2012. The data were analysed to establish the magnitude and variation in the pattern of occurrence of accidents among the states of the

federation. The data were analysed and presented with graphics of the pattern of accident fatalities among the state of the federation to show at a glance the attributes of each of the states within the period under investigation. The fatality index was also calculated to rank the states of the federation accordingly. The paper calls for a much stronger policy advocate for transport to become less environmentally harmful and more sustainable with appropriate steps taken to curb human excesses as the most vulnerable group that bears the brunch.

2. Relative Magnitude of Traffic Accident in Nigeria

Nigeria has one of the worst scenarios of accident occurrence as it ranked high as one of the countries in Africa with high incidence of road traffic accidents. The level of fatality of road traffic accident in Nigeria is quite worrisome considering the extent of human and material losses suffered as a result of traffic accident fatalities. The situation with road traffic accidents in Nigeria is uniquely high as a result of the overdependence of spatial mobility demand of commuters on the road mode. The road transport sub sector has continued to grow much more than other transport sub sectors in terms of motor vehicles in operation size of road network. Not less than 90% of Nigerian mobility needs in terms of movement of goods and services are satisfied through the mode at the expense of the potential contribution other modes. The over reliance on the road system constitute the creation of unnecessary pressure on the highway in the country which more often than not resulted in regular occurrence of accidents, a situation that has been made worse by their deteriorating condition. (Gbadamosi, 2005,).

The World Health Organization (WHO 1984) estimated that 1.3 million deaths occur each year worldwide due to road traffic accidents and well over 90% of road traffic crashes are caused by human error resulting in over 50 million people seriously injured every year and 3,500 deaths per day or 150deaths per hour. It is on record that about 70% of these deaths occur in developing countries of which Nigeria constitute a part.

The increasing magnitude of fatal road traffic accident globally has been attributed to population explosion and increased level of motorization. Motor vehicle crashes are the leading cause of death in adolescent and people in the prime age (Taket 1986, Moham et at, 1991 , Smith et al 1991 and Atubi et al 2009) . There has been an upsurge in the proportion and absolute number of traffic fatalities witnessed in a number of developing countries while the industrial nations are witnessing downward trend in the occurrence of accident by more than 20% (Ross et al, 1991).

Road traffic accidents have impacted negatively on the economy of developing countries at an estimated cost of 1-2% of country's GNP per annum as a result of morbidity, mortality and property related cost (Fourace et al 1976, Jacobs et- al 1983, WHO ,1989 Jadaan ,1989,Dowing 1991). The advent of automobile comes along with the negative consequence of accident arising from its misuse. United States of America had its first death from automobile accident in 1899 (Johnson 1966). WHO has consistently provide extensive information on road traffic injuries as the leading risk factors of the consequences of transport operation. Nigeria has an unenviable record of road traffic accidents as a developing country and recorded her first traffic accident in Lagos in 1906 (Oluduro 1966).

The world health organization report over the years has consistently revealed that road traffic injuries are the eight leading cause of death for people in their prime age. According to the 2013 WHO report on Global status report on road safety (2013) revealed that more than a million people die each year on the world's roads while, the cost of dealing with the consequences of these crashes runs to billions of dollars. with varying degrees of impact on the economy of different countries . Road traffic accident situation in Nigeria has been alarming and particularly disturbing ever since the first auto crash was recorded. Nigeria Traffic accidents in Nigeria vary by states. Nigeria has been consistently been ranked as having the highest incidents of road traffic accidents in the world for obvious reasons in addition to known causes of accidents across the globe which include very bad road arising from poor maintenance culture and poor road management.

Table: 1. Road Traffic Accident (RTA) Statistics in Nigeria 1990- 2012

Years	RTA			Total	Causality		Total	*Fatality index
	Fatal	Serious	Minor		Killed	injured		
1990	6140	8796	6998	21934	8154	22786	30940	0.37
1991	6719	8982	6845	22546	9525	24508	34033	0.42
1992	6986	9324	6554	22864	9620	25759	35379	0.42
1993	6735	8443	6281	21459	9454	24146	33600	0.44
1994	5407	7522	5275	18204	7440	17938	25378	0.41
1995	4701	7276	5053	17030	6647	14561	21208	0.39
1996	4790	6964	6488	18242	6364	15290	21654	0.35
1997	4800	7701	4987	17488	6500	10786	17286	0.37
1998	4757	7081	4300	16138	6538	17341	23879	0.41
1999	4621	6888	4356	15865	6795	17728	24523	0.43
2000	5287	6820	4499	16606	8473	20677	29150	0.51
2001	6966	8185	5379	20530	9946	23249	33195	048
2002	4029	7190	3325	14544	7407	22112	29519	0.51
2003	3910	7882	2572	14364	6452	18116	24568	0.45
2004	3275	6949	4051	14275	5351	16897	22249	0.37
2005	2299	4143	2620	9062	4519	15779	20298	0.49
2006	2600	5550	964	9114	4944	17390	22334	0.54
2007	2162	4812	1503	8477	4673	17794	22467	0.55
2008	3024	5671	2646	11341	6661	27980	34641	0.59
2009	2460	6024	2370	10854	5693	27270	32963	**0.52**
2010	1178	2819	1333	5330	4065	18095	22160	**0.76**
2011	**1764**	**2485**	**516**	**4765**	**4372**	**17464**	21836	0.92
2012	**1953**	**3106**	**1210**	**6269**	**4260**	**20757**	25017	0.68
TOTAL	96563	150613	90125	337301	153853	454423	608277	0.46
%	28.6	44.7	26.7		25.3	74.7		

Authors Estimates.

Source: Federal Road Safety (FRSC) Annual Report (2013)

Table 1 present a general pattern of road traffic accident in Nigeria between 1990 and 2012. A total of three million thirty seven thousand three hundred and one (3,37301) road traffic accidents was recorded in Nigeria within the period under investigation. Out of this we have ninety six thousand five hundred and sixty three (96, 563) fatal accident, one hundred and fifty thousand six hundred and thirteen (150,613) serious accident and. Ninety thousand one hundred and twenty thousand (90,125) minor. These represent 28.6%, 44.7% and 26.7% respectively.

A total of Six million eight thousand two hundred and seventy seven (6,08,277) victims were involved in accident within the period under investigation . One million fifty thousand eight hundred and fifty three (1,53,853) (25. 3%) out of this number lost their lives outrightly while, Four million fifty four thousand four hundred and twenty three (4,54,423) (74.7%) sustain varying degrees of injuries .The national fatality index average for the country is 0.46. which implies that not less than 46deaths are recorded per 1000 accident in the country . Available data in **Table 1** regarding the fatality index for the country reflected a significant variation among the years under consideration. However, 2010, 2011 and 2012 had a significantly high fatality index for the country. In actual fact, 2011 is almost twice the national average fatality index. 1996 recorded the lowest fatality figure for the country. The data in **Table 1** reflected a downward reduction in the magnitude of accident occurrence but the level of fatality is quite alarming. The specific reasons for the high intensity of accident fatality will be discussed in the other section of this paper.

The Figure 1a shows the trend of accident cases recorded by the Federal Road Safety Corps in Nigeria. The figure shows that serious accident cases are more frequent on Nigeria roads than the other two classified types of accident cases. It should be clearly noted that the trend of all categories of accidents are generally reducing on Nigeria roads as shown in Fig 1a. The figure shows that fatal accidents reduced to 1,953 in 2012 from 6,140 in 1990, serious accidents reduced from 8,796 in 1990 to 3106 by 2012 while minor accidents reduced from 6,998 in 1990 to only 1210 in 2012, although the trends were characterised by fluctuations.

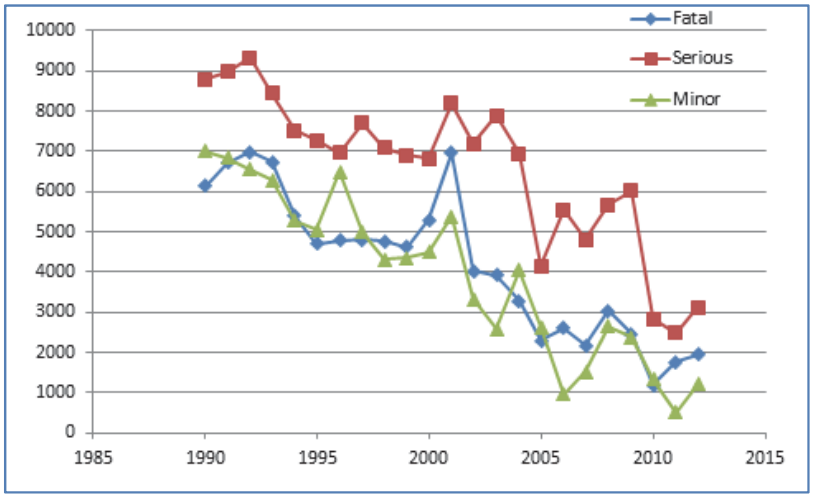


Fig 1a: Road Traffic Accident (RTA) Statistics by Casualty in Nigeria 1990- 2012

The gradual reduction in the total number of road traffic accidents with its consequent casualty might be attributable to the increased in the level of transport infrastructure provision manifesting in improved road condition and connectivity through rehabilitation and construction, and to the success of effective road safety education and campaign embarked upon by government agency like the FRSC and other nongovernment organizations in the country. A further

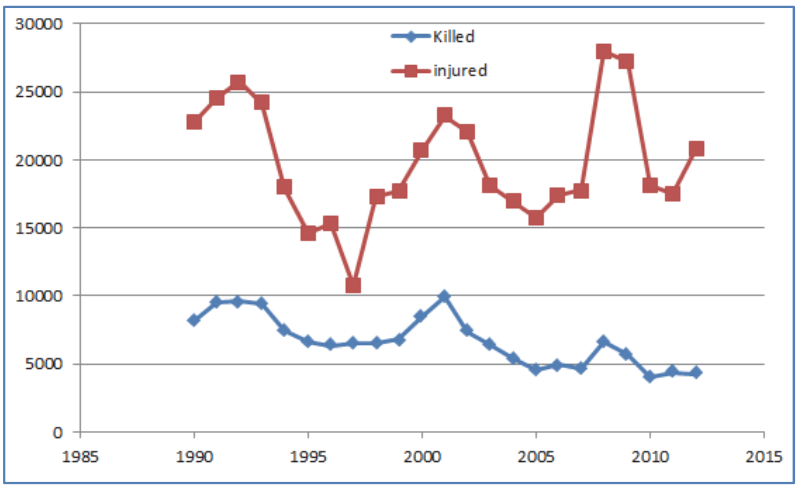


Fig 1b: Road Traffic Accident (RTA) Statistics by Casualty in Nigeria 1990- 2012

3. Spatial Configuration of Accident Occurrence in Nigeria on State Geographical Magnitude 2011-2012

An attempt was made to establish the spatial trend of road traffic accident in the country with a special focus on available road traffic accident data between 2011 and 2012. The data were presented with the spatial spread of accident on state basis using GIS. The country's accident data were imposed on the country's political map reflecting the geographical boundaries of the state of the federation. The available records of Road traffic Accident for 2011 and 2012 were used to establish the spatial pattern of traffic accidents among the 36 states and The Federal Capital Territory, Abuja. GIS application have been used to give an insight to the magnitude of the road traffic accident indices as regard their spatial pattern by state of the federation using the data in **Table 2**. The composition of vehicles involved was also taken into consideration.

Table 2: State by State Road Traffic Accident Indices in Nigeria 2011 -2012

State	Road Traffic Crashes		Persons killed		2 Year Total Person Killed	Fatality Ranking	Vehicle Component				
	2011	2012	2011	2012		*	Car	Bus	Truck	Tanker	Motorcycle
Abia	76	71	56	17	73	31	53	35	9	7	19
Adamawa	57	109	38	75	113	26	170	20	5	10	56
Akwa Ibom	47	56	18	31	49	35	54	10	14	5	26
Anambra	36	113	34	36	70	32	73	57	20	10	40
Bauchi	180	201	257	293	550	1	173	96	30	16	95
Bayelsa	32	44	15	10	25	37	46	14	9	6	14
Benue	251	196	187	117	304	11	178	55	61	17	11
Borno	36	39	69	81	150	22	38	15	1	2	7
Cross River	16	50	23	37	60	34	33	16	7	16	25
Delta	105	262	96	154	250	15	200	91	51	13	80
Ebonyi	33	57	16	22	38	36	30	22	11	5	23
Edo	152	344	184	228	412	9	212	138	122	62	99
Ekiti	57	118	18	86	104	28	82	25	12	18	38
Enugu	80	131	84	77	161	21	66	43	22	13	21
FCT	475	531	254	238	492	3	470	198	86	47	85
Gombe	77	131	108	90	198	18	91	45	12	11	42
Imo	102	175	63	79	142	24	83	60	41	15	52
Jigawa	38	24	53	41	94	29	19	14	5	9	2
Kaduna	90	336	173	281	454	5	225	102	15	39	63
Kano	222	228	279	158	437	7	125	52	16	22	57
Katsina	54	93	139	135	274	14	65	13	1	8	15
Kebbi	40	13	36	34	70	33	11	1	0	4	4
Kogi	343	365	231	211	442	6	214	135	71	39	41
Kwara	156	200	174	114	288	12	132	50	34	23	47
Lagos	68	336	70	110	180	19	271	98	60	36	110
Nasarawa	268	218	113	134	247	16	304	72	34	20	159
Niger	88	92	182	97	279	13	59	28	11	13	14
Ogun	227	374	166	247	413	8	288	178	87	58	72
Ondo	268	287	234	239	473	4	160	138	47	17	51
Osun	260	306	189	178	367	10	151	144	38	17	61
Oyo	294	281	303	245	548	2	179	151	53	24	74
Plateau	57	85	97	52	149	23	77	31	6	6	25
Rivers	95	117	47	59	106	27	124	38	20	15	45
Sokoto	70	36	86	50	136	25	17	8	6	6	53
Taraba	111	89	30	44	74	30	58	8	9	2	44
Yobe	52	52	109	71	180	20	35	11	2	7	5
Zamfara	152	109	142	89	231	17	66	27	9	3	32
Total	**4765**	**6269**	**4372**	**4260**	**8633**		**4632**	**2239**	**1037**	**641**	**1807**

Authors estimates

Source: Federal Road Safety Commission. (2013)

Attempt was made to establish the magnitude of accident indices among the states using the following parameters .

- The magnitude of road traffic accident
- The level of fatality and
- The range of vehicles involved.

The states were ranked on the bases of their level of fatality in terms of the number of deaths per 100,000 of the population. The variation in the magnitude of the above indices is responsible for the observed pattern of their spatial occurrence among the state of the federation (See Table 2). From all indication Bauchi , Oyo , FCT , Ondo, Kaduna , Kogi, Kano , Ogun, Edo and Osun are the first 10 states with high magnitude of road traffic accident fatalities While , States like Bayelsa , Ebonyi, Akwa Ibom have the least in the magnitude of road traffic accident fatalities . It is of interest

to note that the trend of the magnitude of accident in the country has continued to reduce but the level of fatality has continued to increase .

Information in Figures 2a- 2m represent the spatial perspective of distribution of the variation in the magnitude of the parameters used in the presentation of road traffic accident indices in Nigeria.

The components of vehicles involved in accident causation include Buses, Trucks Tanker and motorcycle. There is significant variation in the pattern of their contribution and the extent of explanation of accident occurrence as it involves the major types of vehicles plying Nigerian roads.

Of particular interest in the advent of motorcycle popularly referred to as OKADA which has changed the phases of accident occurrence by worsening accident occurrence in various states of the federation. This not far fetch from the uncoordinated attitude of most of the Okada riders coupled with their flagrant disobedience to traffic regulation.

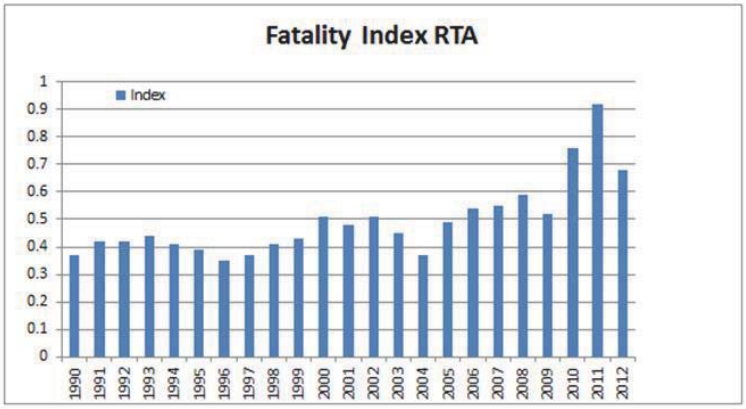
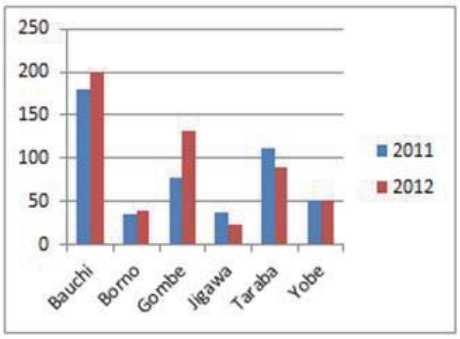


Fig 2a: Fatality Index of RTA 1990 – 2012



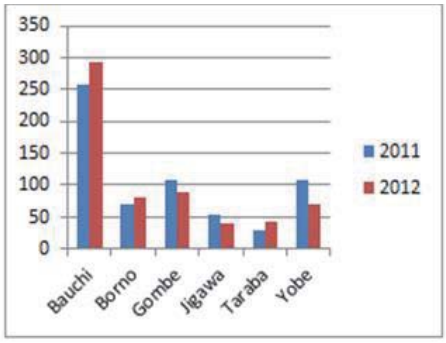


Fig 2b: RTA Crashes in Northeast 2011 -2012 Persons Killed in RTA

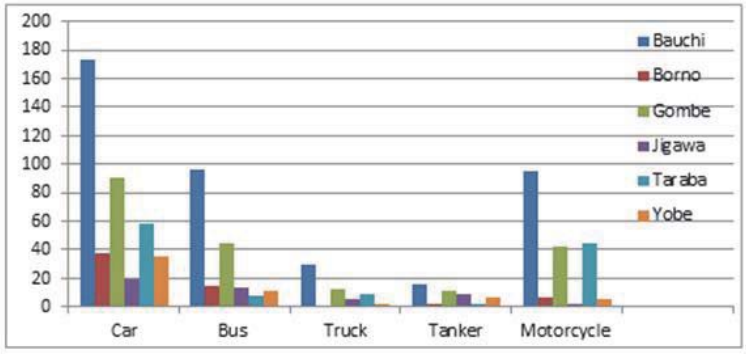


Fig 2c: Vehicle components involved in RTA – Northeast

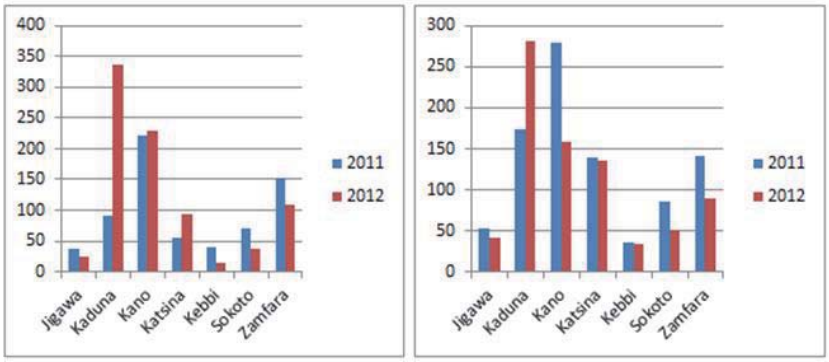


Fig 2d: RTA Crashes Northwest 2011 – 2012 Persons Killed in RTA

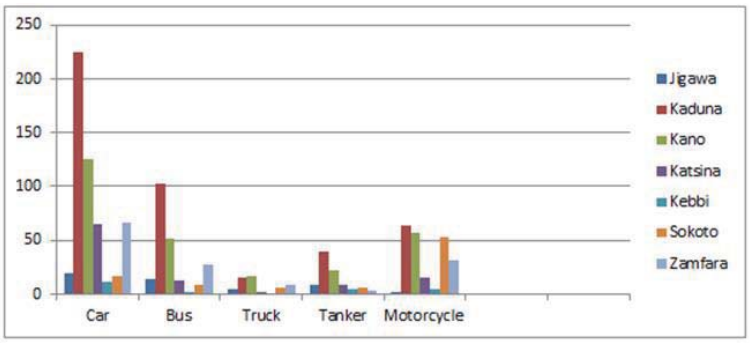


Fig 2e: Vehicle components involved in RTA – Northwest

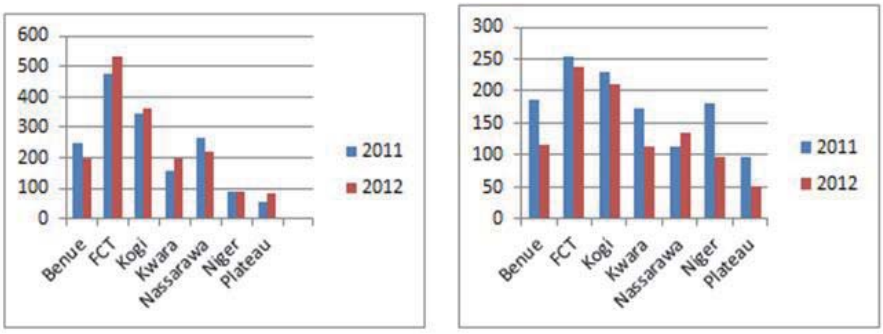


Fig 2f: RTA Crashes NorthCentral 2011 – 2012 Persons Killed in RTA North Central

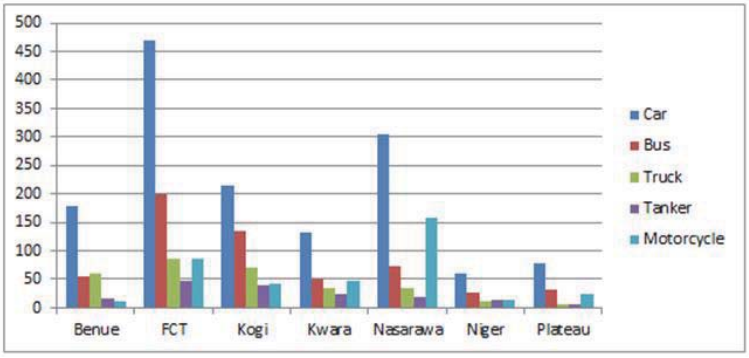


Fig 2g: Vehicle Components involved in RTA – Northcentral

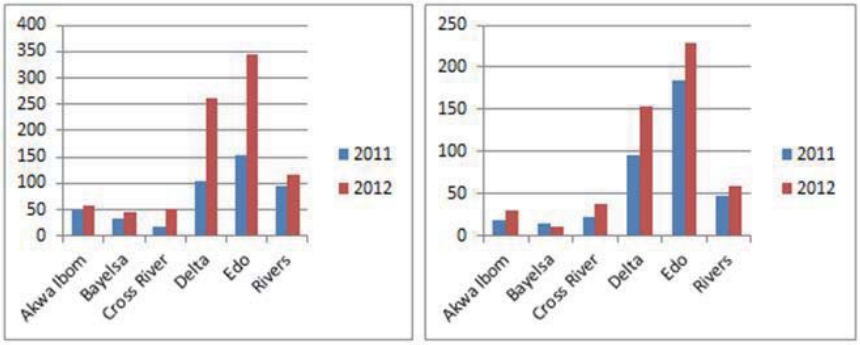


Fig 2h: RTA Crashes – South South Persons Killed in RTA South South

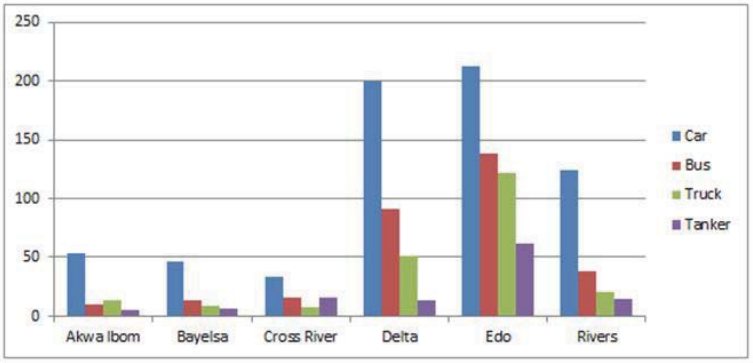


Fig 2i: Vehicle Components involvedin RTA – Southsouth

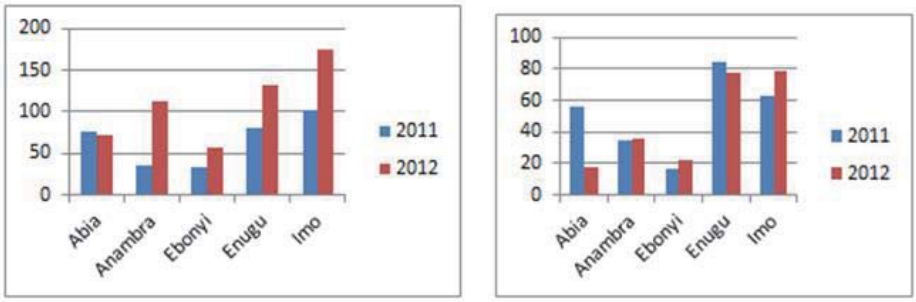


Fig 2j: RTA Crashes in Southeast 2011 – 2012 Persons Killed in RTA

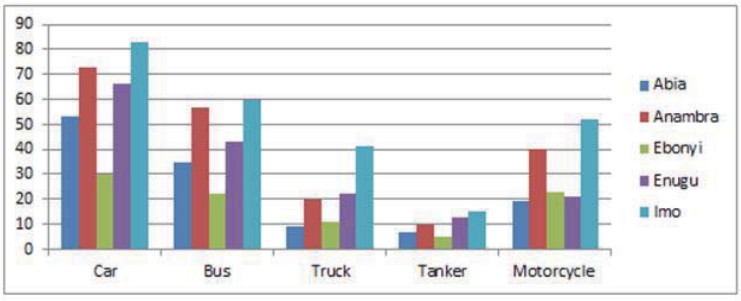


Fig k: Vehicle Comonents involoved in RTA – Southeast

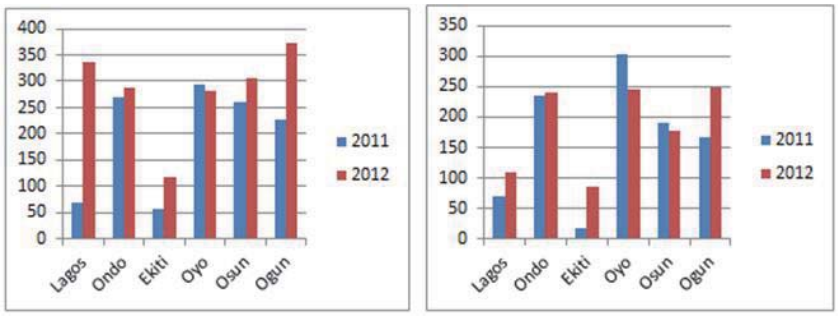


Fig 2l: RTA Crashes in Soutwest 2011-2012 Persons Killed in RTA - Southwest

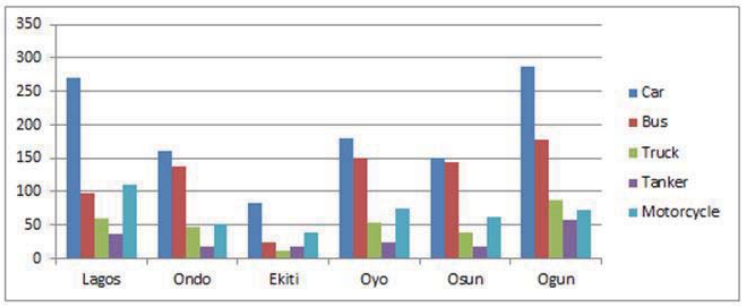


Fig 2m: Vehicle Components involved in RTA - Southwest

4. Major and Known Causes of Accidents in Nigeria

It has been established that accident don't just happened they are caused. This implies that the occurrence of accident can be attributed to specific factors. However, the contribution of man has been considered as the most potent factor in the occurrence of road traffic accident. Gbadamosi (1994, 2002), Onakomaiya (1990, 1998), Agunloye (1990) have all identified the human factor as the singular most important cause of accident in virtually all locations around the world. This is not unconnected with the role of man as the driver, pedestrian, passenger, engineer, law enforcement officer among others. The impact of human factor can be seeing in the area of drunkenness, fatigue, emotional instability , wrong judgment , over speeding , careless overtaking , underage driving among others . Aside these human factors , others can be attributed to:

- Environmental factors/ Road,
- Mechanical Factors
- Institutional Factors and
- Poor transport situation

Environmental factor: include all such situation associated with the physical environment such as the weather, the road system , time of the day all these has capacity to hinder the smooth operation of transport system .

Mechanical Factors : These are factors relating to the vehicle components defects .

Institutional Factors: These are faults that can be attributed to the weak institutional arrangement for curbing accident and apprehending herring road users.

Poor transport situation in Nigeria: Nigeria operates a mono transport system. Where, the major focus of transport development is the road sector at the expense of other modes of transport. This contrast to what is obtainable in developed country economy, where intermodal transportation development has assisted in the redistribution of the pressure on one mode to the other modes and also makes the system productive**.**

5. Management of Traffic accident Fatalities

The world Health organization underscored the likelihood of road traffic deaths becoming the 5th leading cause of death by 2030 unless something drastic is done. It is obvious that road accident cannot be totally be eradicated in as much as

movement take place. However , its impact on the loss of life and property can be reduce to the barest minimum. Government at various levels in Nigeria has come to terms with the establishment of specific strategies at managing traffic accident fatalities. Among these include:

1. Establishment of practicable and effective law enforcement organization
2. Development and location of accident emergencies handling centers'
3. Enforcement of Insurance policy compliance
4. Adequate equipment in Hospitals
5. Strict enforcement of traffic laws, apprehension and trial of traffic law offenders with the establishment of traffic mobile courts.

It is important to note that all the above steps of government at the state and federal level are not mutually exclusive as steps towards reducing the impact of road traffic accident on our roads but rather through a combination policy measures capable of reducing the impact of road traffic accident on the Nigerian environment.

6. Recommendation

As part of the strategy to reduce the incidences of road traffic accident fatalities it will be of interest if the government can change the focus and direction on the provision and development of transport infrastructure to capture multimodal development. This will go a long way in providing the much needed diversity in the available transport services by mode and as such reduce the pressure on the road mode which is the most available mode to meet the desires of Nigerian commuters on spatial interaction for commerce, services and other purposes. The fact that accident occurrence and its attributes varies among the states of the federation calls for a policy advocate that will take into consideration the uniqueness of the spatial attributes of each states of the federation in accident prevention strategies

7. Conclusion

This paper has discussed the magnitude of accident fatalities and its pattern across the state. The outcome of data evaluation has shown particular variation in the pattern of road traffic accident and its attributes among the state of the federation. The paper is of the opinion that the major strategy toward reducing road traffic incidence cannot be found in a straight jacket policy approach but rather through a combination of measures capable of mitigating the excesses of the human factor.

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