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Accident Prediction Models for Akure – Ondo Carriageway, Ondo State Southwest Nigeria; Using Multiple Linear Regressions (Pp. 30-49)

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Abstract:
Accident data on the 52km Akure-Ondo Carriageway and Spot Speed data were collected and analyzed. The analysis of the Spot Speed gives an average of 51.5km/hr and 110.75km/hr for the 15th and 85th percentile speed respectively, the 85th percentile speed is higher than the posted speed limit of 60km/hr which indicate that the vehicle travelling at this speed are susceptible to accident. The analysis for the study area also shows that 759 peopled were involved in the accidents, 108 persons were killed and about 348 persons were injured between 2002-2007, 38% of the accident were fatal accident and 62% non-fatal accident, However, the regression analysis carried out on the accident data with number of accident as the dependent variables and number of people killed in the accident(X_1), number of people injure(X_2), number of people involved in the accident(X_3) as independent variables; gives a coefficient of correlation "R" value of 70.70% and coefficient of determination "R^2"of 49.70% respectively. Factors such as driver's behavior, poorly maintained vehicles, non adherence to traffic rules, poorly maintained road and verges, and over-speeding are causatives factors to road accident. However, road safety plans and road safety audit that are

effective strategies that could be used by the authorities concerned for mitigation of road accident are recommended..

Keywords: Road Accident, Carriageway, Spot Speed, Road Safety Plans and Road Safety Audit

Introduction

Transportation is vital both to the economic success and to the quality of life in urban and rural areas. However, the rapid growth of city populations and corresponding vehicle kilometre of travel, commerce, and transportation infrastructure has generated negative effects such as congestion, deterioration of air quality, noise, and motor vehicle crashes. An accident is an unpleasant, undesirable or damage that happens unexpectedly or by chance. Road accidents has been a treat to the safety of family members and are associated with numerous problems each of which needed to be addressed separately; human, vehicle and environmental factors play roles, before, during and after trauma event. According to Tandoh (2003), road accidents are becoming very common and are robbing the nation of its valuable human resources, he noted that the implications of these lead to both social and economic trauma. He emphasized that road accidents can be curbed by mainly educating drivers on defensive driving skills and also the enforcement of traffic laws.

Every year more than 1.17million people die in road crashes around the world, 70% of these occur in developing countries; globally, every 10million people are crippled or injured each year, 65% of deaths involved pedestrians, 35% pedestrians are children. It has been estimated that million more will die and 60million will be injured during the next 10years in developing countries unless urgent action is taken (US DOT 2003). US DOT (2003) also reported that one person died in roadway during crashes nearly every 12 minutes, and of that number 25,136 died in roadway departure crashes, 9,213 in intersection crashes and 4,749 in pedestrian crashes. The World Health Organization has estimated that nearly 25% of fatal injuries worldwide are a result of road traffic crashes, with 90% of the fatalities occurring in low and middle income countries. (The World Report on Road Traffic Injury Prevention, World Health Organization, 2004). Road accidents cause significant social and economic costs (typically between 1 and 3 percent of GNP) [Ross et-al R. (1991). They also result in the use of a high proportion of medical facilities and the scarce depletion of foreign exchange. The Global Burden on Disease Study undertaken by the World Health Organization (WHO), Harvard University and World Bank showed that in 1990 the traffic

sector was accessed to be the world ninth most important health concern. It is forecasted that by the year 2020 road accident would move up to third place leading causes of death and disability facing the world community.

In developing countries, growth in urbanization and in the number of vehicles has lead to increased traffic congestion in urban centers and increase in traffic accidents on road networks, which were never designed for the volumes and types of traffic that they are now to carry. There is also competition between different classes of road users coupled with poor road maintenance, bad and inadequate provision of road infrastructure. All these have contributed to the serious road safety problems in developing countries like Nigeria.

In Nigeria, about 300,000 persons lost their lives in 1,000,000 road accidents between 1960 and 2005-a period of 45years, while over 900,000 person suffered various degrees of injuries within the same period (FRSC and Balogun, 2005). The accident situation is more serious in Nigeria because of the rapid growth of motor vehicles in the past few years and the inadequacy of many of our roads. The trend in the accidents and fatalities in Nigeria for the period 1960 to 2006 is shown pictorial in Figure 1.

The causes of accident being interplay of a variety of factors, the analysis of accident data presents formidable problems. Qualitative methods of analysis of accident can provide insight into the causes that contributed to accident and can often help to identify the black spots on the street system. More recently, emphasis has shifted to the application of statistical technique in planning and analyzing experiments into the effectiveness of accident prevention measure and development of accident model. Some of the statistical techniques are Regression methods, Poisson distribution and Chi square test for comparing accident data.

Many researchers have attempted to find the variables most highly associated with crashes. Ross et al (1991) studied the prediction of the number of crashes versus the crash rate using Poisson regression. This type of regression was used to model both the crash and crash rate. Small data sets for several intersections were used for this study. Several ways of modeling highway safety were investigated, including different representations of traffic exposure and intersection effects as independent variables.

They suggested that the Poisson distribution allows for the relationship between exposure and crashes to be more accurately modeled as opposed to

the linear relationship assumed in crash rate prediction. Logistic regression (a type of regression where the dependent is categorical as opposed to a numerical variable) has been the most popular technique in developing injury severity prediction models. Lui and McGee (1998) used logistic regression to analyzed the probability of fatal outcomes of accidents given that the crash has occurred. In another study, a logistic regression approach was used to examine a contribution of individual variable to the injury severity (Al-Ghamdi, 2002).

This paper lays emphasis on accident studies on the 52km long Akure-Ondo road (a rural road) in South West Nigeria; while, the primary objective of the study is to identify factors that contribute to the cause of accident and develop an accident prediction model for the road segment using regression technique.

Accident Categorization

In order to provide a valuation of an accident it is necessary to have a consistent set of definitions for casualty severities, accident severities and the various components of costs associated with them within the country concerned. A well accepted set of categories for the classification of accidents is that developed by Nellthorp et al (1998) and is detailed in Table 1.0 below.

Methodology

The accident analysis process involves the identification of accident black spot locations, establishment of general patterns of accident, analysis of factors, and site studies. Site investigation is a very important element of any accident investigation; the purpose of site investigation is to support the data from analysis; this can give the best result in the study. The functions of site investigations are to;

- To confirm accident causal factors as suspected from the analysis.
- To correlate analysis findings and additional information with the site, route or area to gain a better appreciation of the problems.
- To identify any accident causal factor that was not apparent through the analysis of the data.
- To observe traffic and road user behaviour

Accident data were collected from Federal Road Safety Corps sector 19.3 Akure from the year 2002 to 2007 as shown in Appendix 2.0, this was used

to develop of an accident prediction model using Multiple Linear Regression.. However, spot speed data were collected using the stop watch method as it is easy and readily available for the Nigeria situation, this is used to determine the 15^{th} and 85^{th} percentile speed values to verified the posted speed value on the carriageway.

Result and Analysis

The analysis of the accident data collected shows that there is a reduction in accident trend from 2002 to 2007; this is shown in Figure 2.0 below. However, there were 62.0% reductions between 2002 and 2003, 37.0% increase between 2004 to 2005 while 85.0% reduction was obtained between 2006 to 2007, thus, showing improvement in road safety at the study location.

Accident Prediction Modeling

The accident data were modelled using multiple linear regressions. The dependent variable for the model is the fatality (F); while the independent variables are defined as follows:

- The number of people killed in the accident(X_1)
- The number of people injure(X_2)
- The number of people involved in the accident(X_3).

However, the following variables are used for the degree of fatality of the accident:

When the accident is minor, F=1

When the accident is serious, F=2; and

When the accident is fatal, F=3.

The model obtained using Statistical Package for Social Sciences (SPSS) is:

$F = 0.119X_1 + 0.075199X_2 – 0.007916X_3 + 1.562$

Remarks:

From the model equation, the positive sign in the coefficient of X_1 and X_2 indicate that an increase in their numbers is also associated with an increase in the nature of the accident (fatality). However, the negative sign in the coefficient of X_3 indicates the occurrence of Multi-collinearity in the independent variables; which caused X_3 to be highly correlated with X_1 and X_2 and has low correlation with the fatality (F).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1.	0.705	0.497	0.479	.543

Significance Test of the Regression Model

Model	Source of Variation	Sum of Squares	Degree of Freedom	Mean Square	F
	Regression	24.219	3	8.073	27.357
	Residual	24.494	83	.295	
	Total	48.713	86		

(a) Predictors: (Constant), involved, Killed, Injured
(b) Dependent Variables: Fatality

Prediction Ability of the Model:

- Coefficient of Correlation "R"
  R = 0.705 which means that there is 70.5% linear relationship between the dependent and independent variables
- Coefficient of Determination"R^2"
  R^2 = 0.497 which means that 49.7% of the dependent variable is explained by the independent variables.

Accident Scenario

The analysis of the accident data collected from the FRSC for the study area shows that 759 peopled were involved in the accidents. It also revealed that 108 persons were killed and about 348 persons were injured between 2002-2007; this is shown schematically in Figure 2.The highest number of fatality was recorded in 2002; the analysis also showed that there were 38% fatal accident and 62% non-fatal accident, this is depicted in Figure 3. The accident frequency distribution by vehicle involvement as shown in Figure 4 are Buses(48%), Cars(29%), Lorries/truck(22%) and Bike(1%).

Analysis of Speed Data

The spot speed data collected at the two selected locations is as shown in Tables 2 and 3 respectively; while the cumulative frequency curve is depicted

in Figures 5.0 and 6.0. The analysis gives average values of 51.5km/hr and 110.75km/hr for the 15th and 85th percentile speeds. The 85th percentile speed being higher than the posted speed limit value of 60km/hr; the implication is that vehicle travelling above the posted speed limit is susceptible to accident. Thus, the higher speed contributed to the crashes on the carriageway.

Summary of Findings

The analysis of spot speed indicated that higher value of 85th percentile contributed to the accident on the carriageway with a posted speed limit of 60km/hr; other contributing factors are drivers' behavior; poorly maintained vehicles; non adherence to traffic rules; poorly maintained road and verges; and over-speeding

Remedial Measures

Several measures such as the three E's viz-a-viz education, engineering and enforcement has been used for the mitigation of road accident. However, road safety plans and road safety audit are strategies that could be used by the authorities concerned for effective mitigation of road accident.

- Road Safety Plan: The authorities in charge should produce annual road plans and guidance. The plan should set out the authorities strategies for road safety and plans for safety measures. These will cover road safety engineering measures such as accident data summary, road user education, publicity, enforcement, safety target, coordination, encouragement of safety awareness, and monitoring.

- Road Safety Audit: Safety audit are primarily intended to ensure that new road schemes, improvement to highways and traffic management measures are designed and implemented to operate as safely as possible. The audit will identify potential safety hazards typically under different grades of severity such as problem or warning.

- Pavement Widening: Considering the fact that the road was constructed over two decades ago when the vehicular volume was low, increasing the pavement by dualizing it will reduce the accident on the carriageway.

Conclusion

The analysis of the accident data collected shows that 759 peopled were involved in the accidents, 108 persons were killed and about 348 persons

were injured between 2002 and 2007. There were 38% fatal accident and 62% non-fatal accident, while vehicle involvement are Buses (48%), Cars (29%), Lorries/truck(22%) and Bike(1%). The spot speed data collected at the two selected locations gives average values of 51.5km/hr and 110.75km/hr for the 15th and 85th percentile speeds respectively. The 85th percentile speed being higher than the posted speed limit value of 60km/hr; the implication is that vehicle travelling above the posted speed limit is susceptible to accident.

Road accidents in Nigeria have been on the increase. Some of the factors that are responsible for those accidents have been outlined in this paper. To promote road safety in the country, the government, the agencies involved and the general public have significant role to play. The government should ensure that there are good roads for road users and should make laws and regulations which govern the use of the roads by all categories of road users.

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Table 1: Aggregate Data on Road Traffic Accident in Nigeria (1960 - 2005)

Year	Cases Reported	Person Killed	Person Injured	National Population (2.45%)	Total Casuality	Vehicle Licensed(2.2%)	ACC/1000 Veh	Death/10^{X8} POP (Personal Safety)	Death/ACCT Fatality Index	Casuality ACCT	Fatal/Casuality (Severity Index)	Time/Killed (MIN)	Time RTA Case (MIN)Death/1000 (Traffic Safety)	Death/1000 (Traffic Survey)	Veh/100 0 Popu (Motorization Level)
1960	14130	1083	10216	30817891	11299	84025	168	4	0.08	0.8	0.1	485	37.2	129	3
1961	15963	1313	10614	31890354	11927	101774	157	4	0.08	0.75	0.11	400	33	129	3
1962	16317	1578	10341	33000138	11919	119523	137	5	0.1	0.73	0.13	333	32.2	132	4
1963	19835	1532	7771	34148543	9303	137272	145	5	0.08	0.47	0.16	343	27	112	4
1964	15927	1769	12581	35336912	14350	155021	103	5	0.11	0.9	0.12	297	33	114	4
1965	16904	1918	12024	36566656	13942	172770	98	5	0.11	0.82	0.14	274	31.1	111	5
1966	14000	2000	13000	37839156	15000	190519	74	5	0.14	1.07	0.13	263	38	105	5
1967	13000	2400	1000	39155958	12400	208268	64	6	0.18	0.95	0.19	219	40.4	115	5
1968	12163	2808	9474	40518586	12282	226017	54	7	0.23	1.01	0.23	187	43.2	124	6
1969	12998	2347	8804	41928633	11150	243766	53	6	0.18	0.86	0.21	224	40.4	96	6
1970	16666	2893	13154	43387749	16047	261515	64	7	0.17	0.96	0.18	182	32	111	6
1971	17745	3206	14592	44897643	17798	279264	64	7	0.18	1	0.18	164	30	115	6

1972	23287	3921	16161	46460081	20082	297013	78	8	0.17	0.86	0.2	134	23	132	6
1973	24844	4637	18154	48076891	22691	314764	79	10	0.18	0.91	0.2	116	21.2	147	7
1974	28893	4992	18660	49749967	23652	332511	87	10	0.17	0.82	0.21	105	18.2	150	7
1975	32651	5552	20132	51481266	25684	350260	93	11	0.17	0.79	0.22	94.7	16.1	158	7
1976	40881	6761	28155	53272815	34916	368009	111	13	0.17	0.85	0.19	78	13	184	7
1977	35351	8000	30032	55126708	38023	385768	92	15	0.23	1.08	0.21	66	15	207	7
1978	36111	9252	28854	57145118	38106	403507	90	16	0.26	1.06	0.24	57	15	229	7
1979	29271	8022	21203	59131288	29225	421256	70	14	0.27	1	0.27	66	18	190	7
1980	32138	8736	25401	61084542	34220	439005	73	14	0.27	1.06	0.26	60.2	16.4	119	7
1981	33777	10202	26337	63210285	36539	456756	74	16	0.3	1.08	0.28	52	16	223	7
1982	37094	11382	28539	65410002	39921	474503	78	17	0.31	1.08	0.28	46.2	14.2	240	7
1983	32109	10462	26866	67686271	32328	492252	65	16	0.33	1.16	0.28	50.2	16.4	213	7
1984	28892	8830	23861	70041753	32691	510001	57	13	0.31	1.13	0.27	60	18.2	173	7
1985	28976	9221	23853	72479206	33074	527750	55	13	0.32	1.13	0.28	57	18.1	175	7
1986	25188	8154	22176	75001482	30330	545499	46	11	0.32	1.2	0.27	67	20.9	150	7
1987	26215	7912	22747	77611534	30659	563248	47	11	0.3	1.17	0.26	66.4	20.1	141	7
1988	25792	9077	24413	80312415	33490	580997	44	11	0.35	1.3	0.27	58	22.4	156	7

1989	23987	8714	23687	83107287	32401	598946	40	11	0.36	1.35	0.27	60.3	22	141	7
1990	21721	7755	23490	85999420	31204	616493	35	9	0.36	1.45	0.25	68	24.4	126	7
1991	22498	7523	25627	88992200	33150	634244	36	9	0.36	1.6	0.23	70	23.4	119	7
1992	22909	8701	25154	92088111	33855	615993	37	10	0.39	1.53	0.26	60.4	23	134	7
1993	21412	6342	22882	95293857	29224	669742	32	7	0.31	1.45	0.22	83	25	95	7
1994	18218	5407	17890	98613440	23297	687491	27	6	0.3	1.28	0.23	97.2	29	79	7
1995	17000	6647	14431	102050991	21078	705240	24	7	0.3931	1.24	0.32	79.1	31	94	7
1996	16973	6364	15290	105564166	21654	722989	23	6	0.38	1.29	0.29	83	31.3	88	7
1997	9034	6104	15464	109200353	21568	740738	12	6	0.37	1.29	0.28	145	58	82	7
1998	16046	6538	17341	112963946	23879	758487	21	6	0.41	1.49	0.27	80	33	86	7
1999	12424	5370	17585	116859503	22955	776236	16	5	0.43	1.86	0.41	97	42	69	7
2000	12705	6521	20671	120891747	27198	793985	16	5	0.51	2.14	0.24	81	41	82	7
2001	13801	8109	22202	124938081	31265	811734	17	7	0.59	2.27	0.44	66	38	100	7
2002	14544	7407	22112	129285926	29515	829443	18	6	0.51	2.03	0.25	71	36	89	6.4
2003	14363	6452	18116	133785076	24568	847432	17	4.8	0.5	1.71	0.26	82	37	76	6
2004	14279	5351	16897	138400661	11803	865871	17	4.7	0.45	0.82	0.55	82	37	76	6
2005	8962	4519	15779												

Source: FRSC 2005

Table 2: Accident Classification

Casualty Severities			**Accident Severities**
Fatality	Serious injury	Slight injury	
death within 30 days for causes arising out of the accident	casualties who require hospital treatment and have lasting injuries, but who do not die within the recording period for a fatality;	casualties whose injuries do not require hospital treatment or, if they do, the effects of the injuries quickly subside.	A 'damage-only' accident is one in which there are no casualties. A 'fatal' accident is one in which there is at least one fatality. A 'serious' accident is one in which there is at least one serious casualty but no fatalities. A 'slight' accident is one in which there is at least one slight casualty but no serious injuries and no fatalities

Source: Nellthorp et al (1998)

Table 3: Accident Data for Akure – Ondo Carriageway from 2002 – 2007

DATE	VEHICLE INVOLVED	NO OF VEHICLE	CAUSES	PEOPLE INVOLVED	NUMBER INJURED	NUMBER KILLED	TYPE
04/01/02	Accord/Starlet	2	OVT	2	-	-	Minor
06/01/02	Benz, PGT 504/Bus	3	Overspeeding	4	3	-	Serious
24/01/02	Iveco	1	DGD	3	-	-	Minor
30/01/02	PGT 305	1	Drink Driving	4	1	-	Serious
30/01/02	Benz/Mazda	3	Tyre burst	3	1	-	Serious
07/02/02	Man Diesel Truck	1	Tyre burst	30	14	7	Fatal
08/02/02	TYT Hiace/Narz	2	Overtaking & Overspeeding	24	23	1	Fatal
23/02/02	Volkswagen	1	DGD	2	2	-	Serious
24/03/02	Bus/Lorry	2	DGD	11	4	7	Fatal
08/04/02	Trailer/TYT	2	DGD	6	2	4	Fatal
18/04/02	Benz 911 Truck	1	Tyre Burst	5	5	-	Serious
26/04/02	Volks/Golf	2	Overtaking	4	3	1	Fatal
27/04/02	Truck/Trailer	2	DGD	7	-	-	Minor
26/05/02	TYT Taxi	3	DGD	5	1	-	Serious
30/05/02	Cars	2	OVT	5	4	-	Serious
02/06/02	TYT Liteace	3	DGD	4	3	-	Serious
20/06/02	TYT Hiace	1	OVT	1	1	-	Serious
04/07/02	Taxi & Jeep	2	DGD	5	2	-	Serious
12/07/02	Opel	1	OVT	1	-	-	Minor
12/07/02	Luxurious Bus	1	DGD	55	-	-	Minor
26/08/02	Man Diesel	1	Dangerous	8	5	3	Fatal

			Overtaking				
28/08/02	Liteace (2) & Truck	3	Dangerous Overtaking	2	1	-	Serious
21/11/02	TYT/TYT	2	DGD/OVT	2	2	-	Serious
11/10/02	TYT/Pick-up	2	DGD	2	-	-	Minor
26/10/02	Benz 190/TYT Starlet	2	DGD	1	-	1	Fatal
03/11/02	TYT/Bus/Trailer/ Hiace/Benz 190/TYT Starlet	6	OVT/DGD/DOV	12	10	2	Fatal
13/11/02	TYT (2) /Sunny	3	OVT	4	-	-	Minor
11/11/02	Accord/Bus	2	Mechanical fault	24	12	11	Fatal
24/12/02	911/JJ Ducto	2	Tyre Burst	2	-	-	Minor
02/01/03	Benz	1	Tyre Burst	12	11	-	Serious
31/01/03	Benz/Bedford	2	DGD	2	-	-	Minor
24/02/03	Pick-up	2	Overspeeding	2	-	1	Fatal
25/02//03	TYT	2	OVT/DGD	4	-	1	Fatal
28/02/03	Mazda/Truck	2	OVT	22	7	3	Fatal
24/03/03	Pick-up/Benz	2	OVT	3	-	-	Minor
19/04/03	Benz/Mazda	2	Loss of control	15	12	3	Fatal
27/05/03	Mazda	1	DOV	30	5	-	Serious
26/06/03	TYT Hiace	1	Mechanical fault	30	23	7	Fatal
13/07/03	TYT Hiace	1	Loss of control	14	13	1	Fatal
02/11/03	TYT/Liteace/Bus	3	Road Defect	6	5	-	Serious
28/01/04	Nissan	1	Tyre removed	3	2	1	Fatal
29/02/04	Bedford/Daff	2	DGD	4	2	2	Fatal
16/03/04	Balsam/TYT	2	DGD/Overspeeding	25	7	-	Serious

26/05/04	TYT Camry/Benz	2	DGD	2	-	-	Minor
07/06/04	Lux Bus/Truck	2	Mechanical failure	4	1	1	Fatal
11/08/04	Trailer/TYT	2	DOV	2	1	-	Serious
13/08/04	Trailer	1	Loss of control	3	3	-	Serious
23/10/04	TYT	1	DOV	5	5	-	Serious
30/12/04	Mercedes Benz	1	Mechanical failure	1	1	-	Serious
08/01/05	Benz 911/Mazda	2	OVT	5	4	1	Fatal
22/02/05	Bus/Truck	2	DGD	30	9	2	Fatal
14/03/05	Soy	1	Tyre Burst	9	5	-	Serious
05/05/05	TYT/Man Diesel	2	Loss of control	8	5	3	Fatal
18/05/05	Bedford	1	Dangerous Driving	3	1	-	Serious
11/06/05	Mac	1	Loss of control	3	1	-	Serious
18/07/05	TYT Hiace (2) / PGT 404	3	OVT/DGD	31	5	2	Fatal
07/08/05	Daf/Benz	2	DOV	6	4	-	Serious
16/08/05	Benz/TYT	2	DGD/OVT	3	-	-	Minor
19/09/05	PGT 406/Nissan/TYT	3	OVT	3	2	-	Serious
04/10/05	Mac	1	Loss of control	3	1	-	Serious
26/12/05	TYT/Mercedes Benz	2	Road Defect	9	6	-	Serious
07/01/06	TYT Bus/Passat	2	DGD	25	22	1	Fatal
21/01/06	Passat Wagon	2	DGD	4	2	2	Fatal
14/02/06	PGT Soy/Tipper	2	DOVT	4	1	-	Serious
12/03/06	Truck	1	Dangerous driving	3	-	-	Minor
15/03/06	Pick-up/Car	2	DGD	2	-	-	Minor

17/04/06	2 TYT/Daf/Nissan/ Bike	5	Tyre Burst	8	7	1	Fatal
10/05/06	TYT Celica	1	DOV	3	1	-	Serious
17/05/06	Pick-up/Tipper	2	OVT	4	-	-	Minor
03/06/06	Honda Accord	1	Drink driving	1	-	-	Minor
19/06/06	TYt	1	DOV	5	-	-	Minor
18/07/06	911/Nissan	2	DGD	8	3	-	Serious
19/08/06	TYT	2	DOV/Tyre Burst	5	5	-	Serious
07/09/06	Daf Truck	2	DOV	4	-	4	Fatal
07/09/06	TYT/Wagon	2	DOV	9	4	-	Serious
26/09/06	Nissan/Honda	2	DGD	5	-	5	Fatal
21/10/06	Mazda/Bus	2	DOV	18	12	-	Serious
21/12/06	TYT Hiace/TYT Liteace	2	DOV	21	3	17	Fatal
19/02/07	PGT/J5/Nissan Bus	3	DOV	18	13	4	Fatal
13/03/07	TYT	1	DOV	3	-	1	Fatal
14/04/07	PGT 504/911	2	DGD	2	1	-	Serious
29/06/07	Mazda	2	DOV	24	18	1	Fatal
12/07/07	TYT Hiace	1	OVT	18	5	6	Fatal
10/09/07	TYT	2	DGD	7	-	-	Minor
21/11/07	Benz/Man Diesel	2	DGD	5	5	-	Serious
07/12/07	Mazda 626/TYT	2	DGD	4	4	-	Serious
11/12/07	Gallant/Benz 911	2	OVT	5	3	1	Fatal

Source: FRSC, Akure Sector **Note**: **OVT:** Overtaking; **DOV:** Dangerous Overtaking; **DGD:** Dangerous Driving

Table 4: Summary of Spot Speed Data at Km 10 along Akure – Ondo Carriageway

Speed Class km/hr	Number of vehicles	Mean Speed km/hr	Cum Freq.	Percentile
30 – 39	3	34.5	3	
40 – 49	7	44.5	10	
50 – 59	7	54.5	17	15^{th} (53.5)
60 – 69	7	64.5	24	
70 – 79	8	74.5	32	
80 – 89	12	84.5	44	
90 – 99	22	94.5	66	
100 – 109	14	104.5	80	
110 – 119	9	114.5	89	85^{th} (109.5)
120 – 129	7	124.5	96	
130 – 139	4	134.5	100	

Table 5: Summary of Spot Speed Data at Km 28 along Akure – Ondo Carriageway

Speed Class km/hr	Number of vehicles	Mean Speed km/hr	Cum Freq.	Percentile
30 – 39	3	34.5	3	
40 – 49	6	44.5	9	
50 – 59	13	54.5	22	15^{th} (49.5)
60 – 69	10	64.5	32	
70 – 79	11	74.5	43	
80 – 89	9	84.5	52	
90 – 99	12	94.5	64	
100 – 109	12	104.5	76	
110 – 119	12	114.5	88	85^{th} (112.0)
120 – 129	6	124.5	94	
130 – 139	3	134.5	97	
140 – 149	1	144.5	98	
150 – 159	2	154.4	100	

Figure 1: Pictorial representation of Cases of Accident in Nigeria from 1960-2005

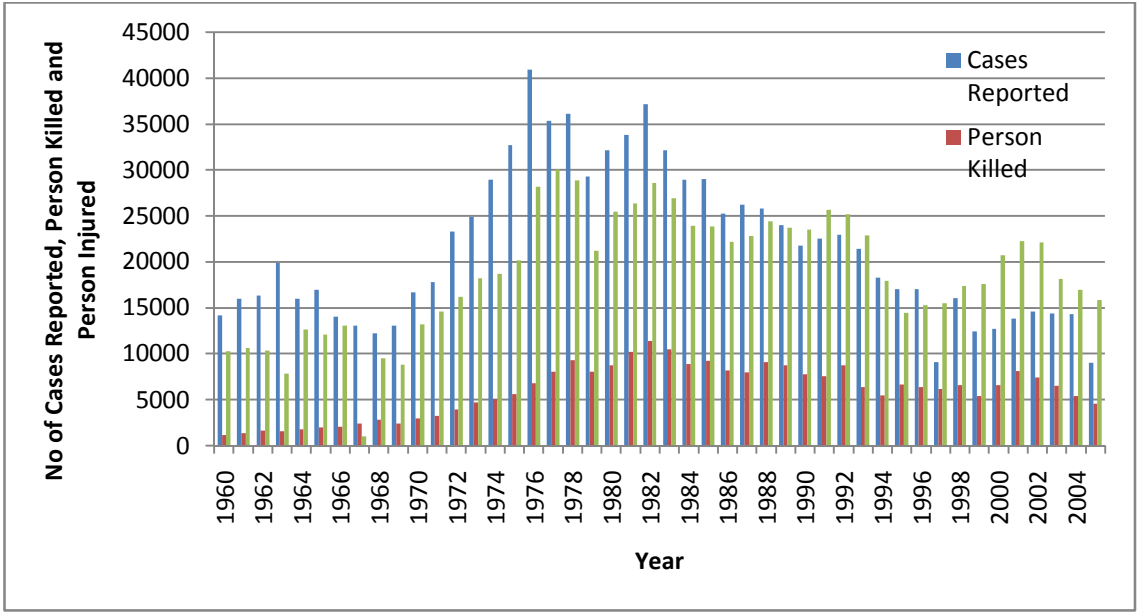

Figure 2.0: Pictorial Representation of the Accident Classification from 2002 – 2007

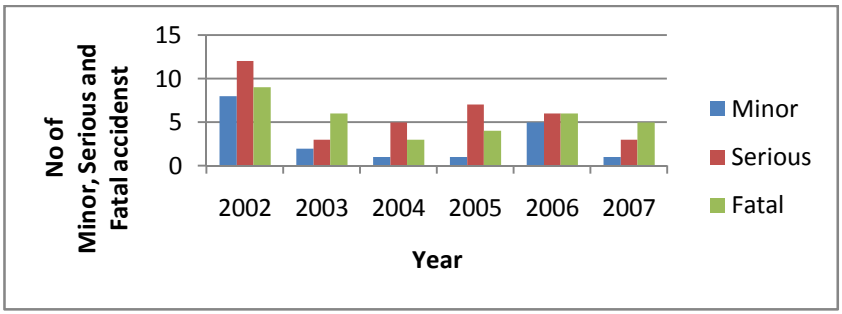

Figure 3.0: **Percentage of Accident severity**

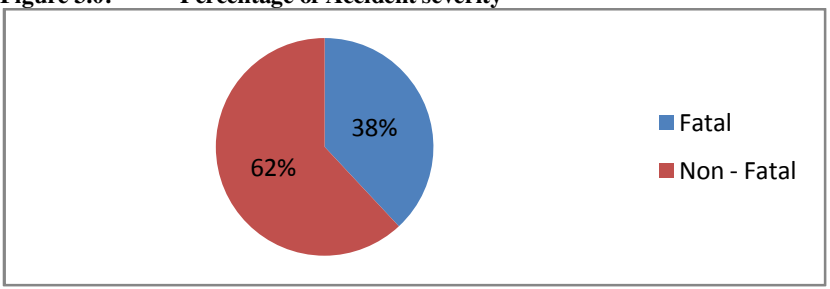

Figure 4.0: **Accident frequency Distribution by Vehicle Involvement**

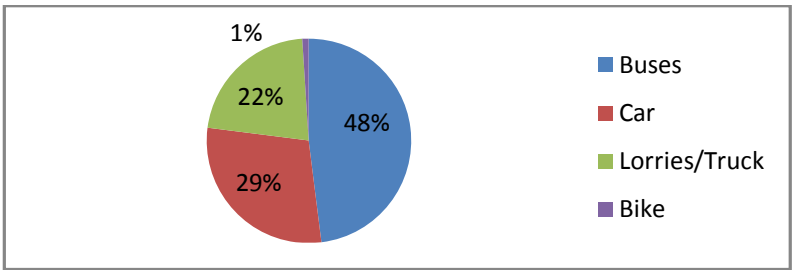

Figure 5.0: Cumulative Frequency Curve of Spot Speed at Km 10

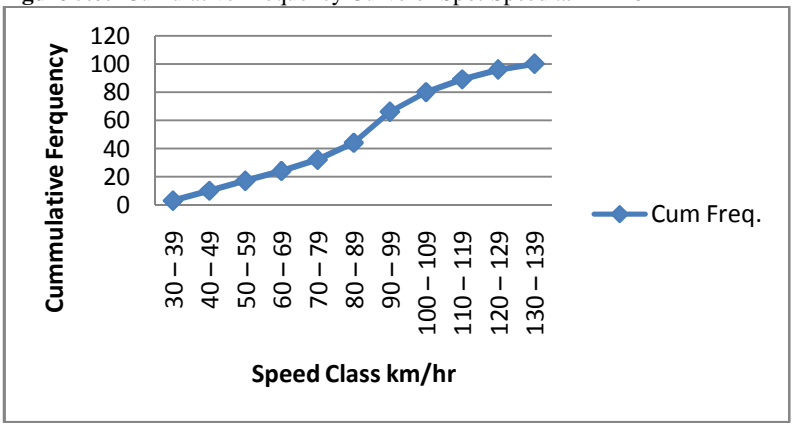

Figure6.0: Cumulative Frequency Curve of Spot Speed at Km 28