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CAUSES OF ACCIDENTS INVOLVING COMMERCIAL MINI BUSES IN ONDO STATE, NIGERIA

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Abstract

The study set out to reveal the causes of accidents involving commercial minibuses, and the factors that make degrees of fatality and casualty high in Ondo State, Nigeria between 2008 and 2015. To do this, data from the FRSC Command in Ondo State were collected for analysis. The research work revealed that accidents that occurred in the hours of the night result to high and severe casualty than those that occurred during the day. Inexperienced and unqualified drivers constitute a quantum of the minibuses drivers, most of whom never attended any formal driving school/training. It was discovered that casualty figures were recorded in about 95% of the road traffic accidents involving minibuses that occurred within the period covered in the research work. It was observed that most vehicles involved in Road Traffic Accidents (RTAs) that had severe cases were not adequately equipped with protective devices such as air bags, occupant restraining seat belt and impact protection for drivers. Speed violation constituted a greater causative factor of road traffic accidents involving minibuses as recorded in the research work. Degree of severity and percentage casualty were also assessed in the work. This was done using selected variables, viz; route condition, age of driver, driving experience, period or season of accident, time of travel, speed of vehicle, over loading of vehicle and driving pattern. The assessment revealed that relationship exists between cause of road traffic accident and degree of severity in road traffic accident.

Keywords: Minibuses; Road Traffic Accidents; Causes; Degree of Severity; Degree of Fatality.
JEL Classification: R41.

1. INTRODUCTION

The movement of people, goods and services from one point to another has been perceived as inevitable since the stone age of human endeavour where animals was the major means of transportation on land. The development of human race coupled with advancement in technology brought about a developed transport system with mechanical orientation requiring that movement take place on road in various types of vehicles between geographical locations. The usage of these vehicles and its interactions with other components of geographical locations sometimes generate a form of error that often results into road traffic accidents (Musa, 2017).

Nigeria has one of the highest levels of Road Traffic Accidents (RTAs) occurrence in the world (Balogun S. A., 2006). Lots of RTA studies have been conducted in Nigeria, examples include: Abubakar (2011); Agbonkhese, Yisa, Agbonkhese, Akanbi, Aka and Mondigha (2013); Anslem and Jaro (2011); Arosanyin, (2000); Asiribo and Aminu (2011); Ayeni, Doherty, Soneye, and Muyiwa (2011); Balogun and Abereoje (1992); Balogun (2006); Balogun (2008); Federal Road Safety Commission (2005); Federal Road Safety Commission (2016); Ogunsanya (1986); Ohakwe, Iwueze, and Chikezie (2011). All these show that RTA has become a serious national malaise and the cost is colossal. According to Aaron and Strasser (1974), human factors contribute approximately 85% to road traffic accident, while Balogun (2006) reported approximately 90% contribution of human factors to road traffic accident in Nigeria. The level of RTAs in is relatively high when compared to what is obtainable in other developing countries and with statistics from developed nations. However, there are more vehicles per square metres in Britain than in Nigeria but more people die on Nigerian roads than in Britain. Aside more people per RTA in Nigeria than in Britain (Musa, 2017). Musa's study vindicated that of Jacobs and Fouracre (1977).

Finding the causes of accidents has been ongoing since the advent automobiles. Several studies have been done so that RTA occurrences can be reduced if not eliminated [Ogunsanya (1986); Hopkin and Simpson (1995); Luby, Hassan, Jahangir, and Rizvi (1997); Mock, Amegashie, and Darteh (1999); Stutts and Hunter (1999); Hijar, Carrillo, Flores, Anaya, and Lopez (2000); Jha, Srinivasa, Roy, and Jagdish (2004); Yamamoto and Shankar (2004); Chang and Wang (2006); Sze and Wong (2007); Milton, Shankar, and Mannering (2008); Dawan and Ebehikhalu (2011); Ayeni, Doherty, Soneye, and Muyiwa (2011); Ohakwe, Iwueze, and Chikezie (2011), Stephens and Ukpere (2011); Theofilatos, Graham, and Yannis (2012); Anderson and Johnson (2014)]. In a study in 1978, it was discovered that for human errors attributable to the driver, "lack of care" was the most prevailing cause of road accidents (905 cases i.e. 25.59 percent of the total 3536 cases recorded). This was followed by being "too fast" (12.73 percent). While for human error on the part of the pedestrians involved in accidents "lack of care" still accounted for the majority of the accidents (i.e. 69.05 percent of the total 168 cases reported). The conclusion was that human error was the major cause of road accidents from that study (A

Special Correspondent, 1978). Vogel and Bester (2018), determined risk factors from analysis of the accidents reports, relationships found and literature studied. Weighing the risk factors percentages with the number of times the accident types occurred, the human factor was the biggest factor (75.40 percent), followed by the environment factor (14.50) daylight, rush hour traffic and inadequate facilities for pedestrians. The main environment factors were daylight and vehicle factors (10.20 percent). Negligence was the main human factor, followed by excess speed, dangerious overtaking, pedestrian in road and inconsiderate driving behaviour. This was consistent with the results of the Spacial Correspondent (1978). For the vehicle factors, faulty brakes and tyres were prominent. These were in range with what the South African Department of Transport issued, which implies that the risk factors per accident type can be used as a starting point to determine the causes of road accidents. The common accident types noted by Vogel and Bester were: Head/Rear end (25 percent); Sideswipe: same direction (13.9 percent); accident with pedestrian (10.4 percent); accident with fixed object (9.9 percent); single vehicle overturned (9.7 percent); sideswipe: opposite directions (8.7 percent); other: vehicle left road (5.2 percent); accident with animals (4.5 percent); turn right in face of oncoming traffic (2.7 percent); head on (2.5 percent); turn left in face of wrong lane (1.0 percent); reversing (0.5 percent); approach at angle-one or both turning (Vogel and Bester, 2018). In Northern Ghana, overloading and obstruction were found to be the main causes of severity of road accidents. The study used extracts from Police-Accident reports (Abdul-Rahaman, 2014). In Abdul-Rahaman's study, he used the following as independent variables: gender; age; date of date of accident; alcohol; safety belt; vehicle ownership; type of vehicle, age of vehicle; wieght of vehicle; vehicles tyre condition; estimated speed at the time of accient; posted speed limit at the site of accident; road surface condition when accident occurred; weather condition when accident occurred; traffic lighting condition at the time of accident; driver's familiarity of route; type of driving license; age of driving license; scene of accident and cause of accident. The dependent variable was set to be the degree of severity of the accident. Binary entry of results was used so that each of these variables were scored between 0 and 1. However, it could be curious to know if the vehicle ownership type would really have any eefect on the degree of severity of accidents.

Bin Islam and Kanitpong (2009), attempted to establish a linkage between the causes and consequences with event classification of an investigated case by highlighting the dynamic driving situation with initial travelling speed, pre-impact and post-impact speed of the involved vehicles to decsribe the crash scenario. However, inaccurate risk assessment and late evassive action, absence of street-light facilities, inadequate lane marking and visibility were also outlined as major risk factors increasing the severity of crash and injury in investigated case (Bin Islam and Kanitpong, 2009).

Road crash modeling on different factors causing accidents have been conducted.This is because accident modeling helps to understand the real causative agents behind accident occurences. Mohanty and Gupta (2015) divided accident

modeling into two based on location of road: accidents on urban roads and accidents on rural roads. It was discovered that mainly regression techniques like linear, multi-linear, logit and poisons regression have been used for modeling the road crashes. It was also discovered that most authors tried to research on specific cause and go deep into it rather than consider all the factors at a time.

In 2012, at least 473 persons died from a total of 1115 vehicular accidents in Nigeria (Agbonkhese, Yisa, Agbonkhese , Akanbi, Aka and Mondigha, 2013). A downward level of oocurence of RTAs was noted in the study by Afolabi and Gbadamosi (2017) when they studied road traffic crashes in Nigeria: causes and prevention. However, their work was mainly narrative and not quantitative as it just reviewed others' conclusions without necessarily finding the causes, that will enable one make judgment on prevention. In Kisii, Central district in Kenya, most of the vehicles involved in RTAs were matatus (minibuses) (73.4 percent, buses (13.3 percent) and private vehicles (13 percent). It was noted that the main contributory factors were human errors (59.5 percent); bad roads (19.5 percent); defective vehicles (29.9 percent). The Antecedent factors associated with these RTAs were over-speeding, overloading and laxed policing (Osoro, Ng'ang'a, and Yitambe, 2015).

Dawan and Obieikhalu (2011) study on the analysis of the major causes and costs of RTA in FCT agreed with the work of Anslem and Jaro (2011) on urban Zaria. The studies identified more drivers' related causes of RTA which include; dangerous driving, speed violation, overtaking, traffic violation and road hazards violation. Furthermore, the work of Ayeni *et al* (2011) relates RTA to climatic seasons in Lagos state between 2005-2010, using accident and climatic data obtained from NPF, FRSC and NIMET. The study shows that RTA and causalities occurred more during rainy season, attributed to slippery road surface and poor visibility. But this contrast with the findings of George, Athanasios, and George (2017) stated that good weather condition and night accidents, increase severity and crash types, are consistently affecting accident severity.

Aisha (2011) applied Duncan Multiple range test to show that there is significant difference in the frequency of RTA within monthly spread of the year, and found drivers recklessness to be the major cause of RTA on Zaria roads. There exist many other studies covering different aspect of road traffic accidents. Examples of such studies include: Arosanyin (2000) focusing on the estimation of the socio-economic costs of road traffic accident in South-Western Nigeria. Okoro (2010), Abubakar (2011) and Osayomi (2011) carried out an analysis of the trends of accident rates in different locations in Nigeria, while Balogun (2006) examined the spatio-temporal pattern of RTA in a given city. A common shortfall of these studies is that they are largely focussed on the overall examination of RTAs involving different categories of vehicles without specific reference to vehicle types, driver's age, and length of driving experience. This makes a holistic appraisal and recommendations at mitigating the occurrence of RTA less effective. The challenges in road accident reduction demands an accurate, appropriate and case specific analysis of relevant information on vehicle types, driver's age and experience rather

than the normative issues of the causes and casualty of road traffic accidents. Therefore, it is this research gap in knowledge that this study intends to fill.

The aim of the study is to examine the trend of road traffic accidents involving minibuses in Ondo State, with a view to assessing the driver's age and experience that frequently involve in RTA on different roads in Ondo State. Therefore, the study seeks to examine the age and length of driving experience mini buses drivers that often involve in RTA in Ondo State; examine the major causes of mini buses accidents in Ondo State; significant factors in degrees of fatalities and severities; and assess the level of casualty and severity of RTA involving mini buses in Ondo State – these form the specific objectives of this study.

2. METODOLOGY

Both qualitative and quantitative analysis was adopted to form the design of the research, in addressing the specific objectives of this study. To achieve these, a review of the databases of the FRSC relating to accident/incident records in Ondo State over an eight-year period between 2008-2015 (Federal Road Safety Commission, 2016).

Ondo State of Nigeria is the study area and was created on the 3rd February 1976 from the former Western State by the then Federal Military Government of Nigeria, with Akure as the State capital. The State has eighteen Local Government Areas and the majority of the state's citizens live in urban centres. The State has a land mass of about 15,500 square KM, and a population density of 220 per square KM. Ondo State lies between latitude 5º45' and 7º52'N and longitudes 4º20' and 6º5'E. It has a population of (as at the 2006 National Census) about 3,440,000 people. Ondo State is situated in the humid tropical region of Nigeria, it enjoys abundant rainfall in most of the year. During the months of December, January and February, the cooler dry continental air from the northeast prevails. The rainy season lasts from March to October (National Bureau of Statictics, 2010).

The study reviewed data for RTA cases between 2008 and 2015 in the State involving commercial minibuses form the population of the study. Data collected covered different weather and seasonal conditions for the purpose of observing how they affect RTA in the study area. Only accident cases found in the FRSC Ondo State Command records were used. Records exists with the Nigeria Police Force but data from the FRSC were richer in quality, content and volume. As the study was for commercial minibuses, it is imperative that the records involving this category of vehicles were extracted from RTA covering all categories of mini buses types and models in Ondo state, during the period under study were obtained and use for analysis. The study adopted stratified sampling technique in the extraction of data from the records of FRSC Ondo State Command. The study made use of both descriptive and inferential statistics to analyse the data for the achievement of the stated study objectives. The descriptive statistics include frequency, percentages, mean and probability.

Multiple linear regression analysis, was used to relate to each case of RTA's degree of severity (and also the RTA degree of fatality) to the different causes identified in the RTA reports of the FRSC during the targeted study period. The model specification for the extent of relationship between the dependent variable and the independent variables takes the general form:

$$Y_{ds} = \beta_0 + \beta_i X_{ds1} + \beta_2 X_{ds2} + \beta_3 X_{ds3} + \beta_4 X_{ds4} + \beta_5 X_{ds5} + \beta_6 X_{ds6} + \beta_7 X_{ds7} + \beta_7 X_{ds7} + \varepsilon_{ds} \quad \text{Equation 1}$$

where: Y_{ds} is the degree of severity and the dependent variable; b0 is the intercept; β_0, β_1, β_2, β_3, β_4 to β_8 are coefficients of the independent variables; and X_1-X_8 are the independent variables which are road conditions, age of driver, driving experience, season in which accident occurred, time of accidents, speed of vehicle as reported in the FRSC database, overloading of vehicle involved in accident, pattern of driving of the driver as reported in the FRSC database and The term ε_i is the residual or error for individual *i* and represents the deviation of the observed value of the response for this individual from that expected by the model. These error terms are assumed to have a normal distribution with the variance.

$$Y_{pc} = \beta_0 + \beta_i X_{pc1} + \beta_2 X_{pc2} + \beta_3 X_{pc3} + \beta_4 X_{pc4} + \beta_5 X_{pc5} + \beta_6 X_{pc6} + \beta_7 X_{pc7} + \beta_7 X_{pc7} + \varepsilon_{pc} \quad \text{Equation 2}$$

where: Y_{pc} is the percentage of severity and ε_{pc} is the residual error for individual *pc* and represents that deviation of the observed value of the response for this individual from that expected by the model. All the independent variables are as in Equation 1 but for *pc*.

3. RESULTS AND DISCUTION

Accident Rates of Mini Buses on Road Networks in Ondo State

Road networks are designed to facilitate the ease of movement of passengers and goods for interaction that is geared towards economic development of communities. The traffic volume on the roads results from the basic need of movement that is inevitable. The result in Table 1 indicates a high probability of accident occurrence across road networks in Ondo State. Twenty six routes in Ondo state recorded at least one road traffic accidents as analysed in the work. Some of these routes are major routes conveying traffic that link vehicles plying inter-state, while others are minor routes that are intra-state.

Table 1. *Frequency of Mini Busses accident on Road Networks in Ondo State*

Route	RTA
Akure-Ado	1
Akure-Ilesa	69
Akure-Owo	176
Akure-Ondo	34
Akure-Township	4
Owo-Benin	22
Ikare-Ado	1
Ikare-Ajowa	1
Ikare-Akungba	1
Ikare-Epinmi	3
Ikare-Ise Akoko	1
Ikare-Isua	28
Ikare-Oka	3
Ikare-Owo	79
Ikare-Supare	1
Ikare-Township	8
Ikare-Ugbe	1
Ore-Lagos	142
Ondo-Ife	13
Ondo-Ore	52
Ondo-Benin	47
Ore-Irele	1
Ore-Okitipupa	1
Owo-Ajagba	1
Owo-Ipele	1
Owo-Ose	7

Source: FRSC 2008 -2015

The major routes are characterized by heavy traffic flow that leads to vehicles competing for available space and good portions of the road. High volume of traffic and categories of vehicles plying these routes lead to their poor conditions and incessant road traffic accidents. This may probably be responsible for the rate of accidents on the roads. It is noted that Akure – Owo expressway records the highest rate of accidents (176) followed by Ore – Lagos expressway (142). This could be as a result of high traffic and condition of the roads. This is because the two roads connect the North and the Southeast/South-South to the Southwest respectively.

It is observed that road networks with the least rate of accidents are the ones that connect towns within Ondo state. These routes have lower traffic volume as a result of less demand for movement between locations. This is based on the fact that the roads did serve to provide links for interstate traffic.

Age and Driving Experience of Mini Buses Drivers involved in RTA in Ondo State

Road traffic injuries cause considerable economic losses to victims, their families, and to nations as a whole. These losses arise from the cost of treatment (including rehabilitation and incident investigation) as well as reduced/lost

productivity (e.g. in wages) for those killed or disabled by their injuries, and for family members who need to take time off work (or school) to care for the injured.

Table 2. *Ages of Mini Buses Drivers involved in Accidents*

Age of Driver	Frequency of accident
Below18	9
18-20	87
21-23	126
24-26	89
27-29	141
30-32	73
33-35	85
36-38	20
39-41	17
42-44	29
45-48	13
49-51	6
52-55	3

Source: FRSC Ondo State Command 2008 – 2015

Table 2 presents the ages of min busses drivers involved in road traffic accidents in Ondo state from 2008 – 2015. Most accidents involving mini busses occur as a result of the youthful age of drivers. This is evident from Table 2 indicating that a whole 141 records of mini busses accidents involved drivers whose ages are between 27 – 29 years. This is sufficiently followed by a total of 126 accident cases involving drivers who are between 21 – 23 years old. It is suffice to adduce that commercial youth drivers are prone to be involved in road traffic accident in one way or the other. This is a result of restlessness and adventuresome that characterised youths in handling matters. From the data analysed average driving age is twenty eight (28).

This confirms the fact that most commercial vehicles on Nigeria roads are driven by youths between the ages of 18 to 40. From Table 2, it can be seen that drivers below the age of 30 years had the most cases of RTAs.

Experience of Mini Buses Drivers involved in Road Traffic Accidents in Ondo State

The work experience can be said to be one of the factors capable of ensuring competency and efficiency in work place. This study looked at the work experience of mini bus drivers (in years) to highlight their proneness to accidents. Table 3 shows the years of driving experience of drivers involved in RTA and frequency of accidents. It revealed that drivers with less years of experience have higher degree of involving in RTA than those with longer years of experience.

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Table 3. *Experience of Drivers involved in RTA in Ondo State*

Year of driving experience	Frequency of accident
Below 1	21
1 to 3	353
4 to 6	179
7 to 9	91
10 to 12	27
13 to 15	9
16 to 18	5
19 to 21	6
22 to 24	5
25 above	2

Source: FRSC Ondo State Command, 2008 – 2015

An examination of the Table 3 shows that a total of 353 numbers of accidents were recorded to involve drivers with who just started to drive with experience not more than 3 years. The table shows a form of a decreasing trend in accident rates as the number of years of experience of drivers increases. This implies that drivers with more years of experience seem to have developed self-discipline in the control of vehicles. This is evident from Table 3 as only 2, 5 and 6 total rates of accidents were recorded for drivers whose driving experience ranges from 25 years and above, 22 – 24 years and 19 – 21 years respectively over a period of 8 years. The more the experience and age of drivers, the less likely they will be involved in RTAs.

Time of Occurrence of Road Traffic Accidents in Ondo State

The results presented in Table 4 shows the time of RTA occurrence in Ondo State. It reveals that most accidents involving mini buses in Ondo state occur between the hours of 0900am to 0559pm. These hours represent the period of high traffic demand on roads across Ondo state.

Table 4. *Time of RTA Occurrence in Ondo State*

Time of RTA	Frequency of RTA	Average Degree of Severity (%)
1200-1259 (am)	7	75
0100-0159 (am)	10	73
0200-0259 (am)	5	67
0300-0359 (am)	15	65

0400-0459 (am)	16	63
0500-0559 (am)	19	25
0600-0659 (am)	16	45
0700-0759 (am)	18	45
0800-0859 (am)	25	42
0900-0959 (am)	45	23
1000-1059 (am)	57	17
1100-1159 (am)	58	21
1200-1259 (pm)	65	28
0100-0159 (pm)	57	30
0200-0259 (pm)	67	35
0300-0359 (pm)	52	23
0400-0459 (pm)	56	14
0500-0559 (pm)	36	13
0600-0659 (pm)	24	25
0700-0759 (pm)	12	28
0800-0859 (pm)	15	35
0900-0959 (pm)	10	45
1000-1059 (pm)	7	50
1100-1159 (pm)	5	54

Source: FRSC Ondo State Command, 2008 – 2015

The location of Ondo State makes its roads a common route for traffic passing through it from other parts of the nation – those going from the Southwest (Ibadan and Oyo axes) to the East and from the Southwest to the North Central and Northeast. Most of these vehicles gets to Ondo State's roads around noon and 2 PM for those that left around 6 AM – 8 AM. Records from the data also show that road traffic accidents that occurred within the hours of the night resulted to higher casualty figure and degree of severity. This is attributed to low visibility and poor emergency response within such hours.

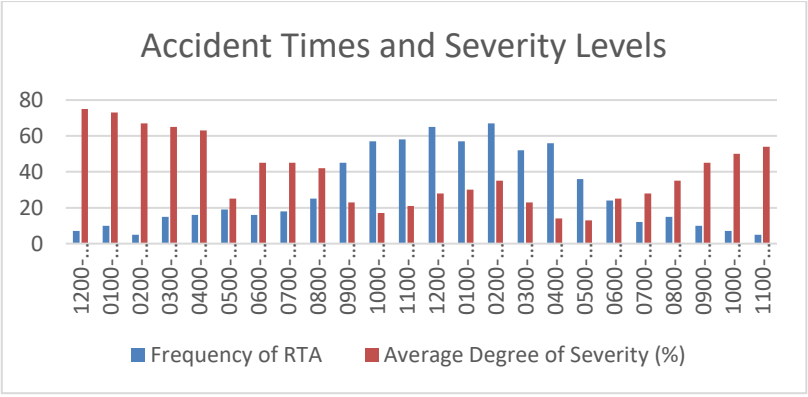

Figure 2. *Level of Casualty from RTA involving Mini Buses in Ondo State*
Source: FRSC Ondo State Command, 2008 – 2015

Causes of Road Traffic Accidents involving Mini Buses in Ondo State

Accidents do not occur in space without a cause or combination of causes. This implies that all accidents are as a result of the actions and inactions of drivers and other road users, and reactions of environmental and mechanical issues. Table 5 presents the accident rates as caused by various factors in Ondo state. It is evident from the Table 5 that majority of the accident cases recorded to have involved mini buses across road networks in Ondo state were as a result of speed violation. This implies that actions and inactions of drivers form the major cause of accidents involving mini buses in Ondo state.

Table 5. *Table showing cause of RTA and frequency*

Cause of RTA	Frequency
Bad road	8
Brake failure	41
Speed violation	226
Driving under the influence of alcohol and drugs	10
Fatigue	13
Loss of control	32
Mechanical deficient vehicle	19
Road obstruction	26
Tyre Burst	54
Wrongful overtaking	141
Dangerous driving	117
Others	12

Source: FRSC Ondo State Command, 2008 – 2015

A further examination of the Table 5 shows that high rates of accidents recorded accounted for 141 for wrongful overtaking and 117 for dangerous driving. These causes are without doubt related to drivers' behaviour. This implies that the attitude of drivers while on steering goes a long way to influence the rate of accidents on roads. The fact also remain that other causes accounted for road traffic accidents involving mini buses are minor and can be avoided if adequate care is given to human behaviour.

Casualty and Severity level of Road Traffic Accidents involving Mini Buses in Ondo State

Accidents have been responsible for a great means of loss of lives and properties all over the world. Road traffic accidents are characterised by negative effects to any society. It brings about economic and social loss to people, its society and the nation as a whole. The Figure 2 shows the level of casualty and severity of RTA involving mini buses in Ondo state from the year 2008 – 2015. It shows that more people get injured in RTA than the number of people that are dead.

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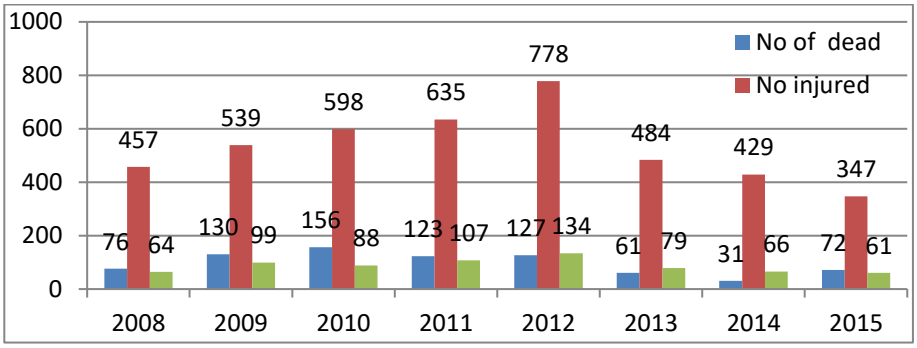

Figure 2. *Level of Casualty from RTA involving Mini Buses in Ondo State*
Source: FRSC Ondo State Command, 2008 – 2015

The Figure 2 further shows that the year 2012 records the highest number of accident cases with 134 total road traffic accidents, the year also accounted for the highest number of people that are injured as a result of road accident. The highest number of deaths of 156 was recorded in the year 2011. However, it is worthy to note that the number deaths, people injured and total road traffic accidents reduced from 76, 457 and 64 respectively to 72, 347 and 61 respectively. This might be as a result of the enlightenment and enforcement programmes of the Federal Road Safety commission (FRSC) in Ondo state. The following attributes were used as the causal factors in determining the degree of severity and percentage casualty: road condition, age of driver, driver's experience, season, time of accident, speed, day of the week, driving pattern.

The Table 6 is presented to calculate the level of casualty and severity of accidents involving mini buses in Ondo state.

Table 6. *RTA of Mini Buses and casualty rates in Ondo state*

Year	RTAs	Number of people dead	Number of people injured	Total causality	Number of people involved
2008	64	76	457	533	973
2009	99	130	539	702	1437
2010	88	156	598	245	1516
2011	107	123	635	261	1443
2012	134	127	778	905	2006
2013	79	61	484	545	1173
2014	66	31	429	460	995
2015	61	72	347	429	790

Source: Author's survey

$$\text{Percentage Casualty} = \frac{Total\ Casualty}{Number\ of\ persons\ involved} * 100 \qquad \text{Equation 3}$$

$$\text{Degree of Casualty} = \frac{Total\ Killed}{Total\ Casualty} * 100 \qquad \text{Equation 4}$$

In order to establish relationship between: degree of severity (ds), percentage casualty (pc) and the variables which were adjudged to be factors causing road traffic accidents in Ondo state, Nigeria, Regression Analysis was used.

The model specification for the extent of relationship between the dependent variable and the independent variables takes the general form:

$$Y_i = \beta_0 + \beta_i X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_q X_q + \varepsilon_i$$

The outcome of the regression analysis gives the summary statistics in tables above. The regression result shows that Degree of Severity has a positive relationship with; Experience of driver, Time of accident and Pattern of driving. On the other hand Degree of Severity has a negative relationship with; route of travels, age of driver, Season of accident, Speed of vehicle and Overloading of vehicle.

Table 7. *Regression Analysis for Degree of Severity*

R^2	0.740		
Adjusted R^2	0.741	n	698
R	0.856	k	8
Std. Error	24.922	Dep. Var.	**Degree of severity**

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	20,155.0570	8	2,519.3821	4.06	.0001
Residual	427,956.4392	689	621.1269		
Total	448,111.4962	697			

Regression output *confidence interval*

variables	*coefficients*	*std. error*	*t (df=689)*	*p-value*	*95% lower*	*95% upper*
Intercept	25.0907	7.1884	3.490	.0005	10.9769	39.2045
Road Condition	-1.6567	1.4965	-1.107	.0411	-4.5949	1.2815
Age of Driver	-0.4227	0.3007	-1.406	.1602	-1.0130	0.1676
Driver's Experience	0.4448	0.5499	0.809	1.62E-03	-0.6348	1.5244
Season	-2.1211	1.9193	-1.105	.2695	-5.8895	1.6474
Time of accident	11.2840	2.4015	4.699	3.16E-06	6.5688	15.9993
Speed	-6.2347	3.4641	-1.800	2.16E-06	-13.0363	0.5668
Day of the Week	-19.1816	14.6291	-1.311	.1902	-47.9047	9.5415
Driving Pattern	6.4318	3.8005	1.692	.0910	-1.0301	13.8936

Durbin-Watson = 1.95

The Coefficient of Determination R2 has a value of 74 percent meaning that the combine influence of the eight independent variables is only 74 percent on the dependent variable degree of severity. Time of accident (with a p-value of 3.16E-06) is the most significant factor to the degree of accidents involving commercial minibuses in Ondo State. Closely following this are speed before the crash, driver's experience and road condition. This season in which the RTAs occurred had the least effect on the degrees of severity with a p-value of 0.1902 (see Table 7). This is also followed by day of the week the RTA occurred, age of driver and driving pattern.

$$Y_{ds} = \beta_0 + \beta_i X_{ds1} + \beta_2 X_{ds2} + \beta_3 X_{ds3} + \beta_4 X_{ds4} + \beta_5 X_{ds5} + \beta_6 X_{ds6} + \beta_7 X_{ds7} + \beta_7 X_{ds7} + \varepsilon_{ds}$$

where Y_{ds} = Degree of Severity; $ß_0$ = intercept; $ß_1$ = coefficient of road condition; X_{ds1} = road condition; $ß_2$ = coefficient of age of driver; X_{ds2} = age of driver; $ß_3$ = coefficient of driver's experience; X_{ds3} = driver's experience; $ß_4$ = coefficient of season; X_{ds4} = season; $ß_5$ = coefficient of time of accident; X_{ds5} = time of accident; $ß_6$ = coefficient of speed; X_{ds5} = speed; $ß_7$ = coefficient of day of the week; X_{ds7} = day of the week; $ß_8$ = coefficient of driving pattern; X_{ds8} = driving pattern and $\mathcal{E}_{ds}$.

So that

$$Y_{ds} = 25.09 - 1.66X_{ds1} - 0.42X_{ds2} + 0.45X_{ds3} - 2.12X_{ds4} + 11.28X_{ds5} - 6.24X_{ds6} - 19.18X_{ds7} + 6.43X_{ds7} + \varepsilon_{ds}$$

is our multiple regression model for degree of severity of RTAs involving commercial minibuses in Ondo State.

Percentage Casualty

The regression result shows that percentage casualty (pc) has a positive relationship with road condition, age of driver, season, time of accident, speed, day of the week, driving pattern. On the other hand, percentage casualty has negative relationship with driver's experience and season.

Table 8: Regression Analysis for Percentage of Casualty

R^2	0.674		
Adjusted R^2	0.675	n	698
R	0.816	k	8
Std. Error	37.425	Dep. Var.	**% of casualty**

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	17,372.2487	8	2,171.5311	1.55	.0040
Residual	965,032.0107	689	1,400.6270		
Total	982,404.2595	697			

Regression output					*confidence interval*	
Variables	*coefficients*	*std. error*	*t (df=689)*	*p-value*	*95% lower*	*95% upper*
Intercept	40.0854	10.7945	3.714	.0002	18.8913	61.2794
Road Condition	2.7439	2.2472	1.221	0.04121	-1.6683	7.1561
Age of Driver	0.1440	0.4515	0.319	.7498	-0.7424	1.0304
Driver's Experience	-0.1263	0.8257	-0.153	.0012	-1.7475	1.4949
Season	-1.8117	2.8822	-0.629	.5298	-7.4705	3.8472
Time of Accident	7.3366	3.6063	2.034	.0423	0.2560	14.4173
Speed	1.7257	5.2020	0.332	2.01E-04	-8.4878	11.9393
Day of the Week	7.8693	21.9680	0.358	.7203	-35.2629	51.0015
Driving Pattern	6.1678	5.7070	1.081	.2802	-5.0373	17.3730

Durbin-Watson = 1.83

The Coefficient of Determination R^2 has a value of 0.674% meaning that the combine influences of the eight independent variables is only 67.4%. This shows that the remaining 32.62% are due to (or explained by) other factors. From Table 8, we can see that speed of vehicle before RTA is the most significant factor that contributed to the percentage of casualty with a *p-value* of 2.01E-04. Other factors with significant contribution to percentage casualty in descending order are driver's experience (*p-value* of 0.0012), road condition (0.04121), and time of accident (0.0423). The remaining factors do not have significant impact at the 95% significance threshold.

From the above, we can bring

$$Y_{pc} = \beta_0 + \beta_i X_{pc1} + \beta_2 X_{pc2} + \beta_3 X_{pc3} + \beta_4 X_{pc4} + \beta_5 X_{pc5} + \beta_6 X_{pc6} + \beta_7 X_{pc7} + \beta_7 X_{pc7} + \varepsilon_{pc}$$

where Y_{pc} = Degree of Severity; $ß_0$ = intercept; $ß_1$ = coefficient of road condition; X_{pc1} = road condition; $ß_2$ = coefficient of age of driver; X_{pc2} = age of driver; $ß_3$ = coefficient of driver's experience; X_{pc3} = driver's experience; $ß_4$ = coefficient of season; X_{pc4} = season; $ß_5$ = coefficient of time of accident; X_{pc5} = time of accident; $ß_6$ = coefficient of speed; X_{pc6} = speed; $ß_7$ = coefficient of day of the week; X_{pc7} = day of the week; $ß_8$ = coefficient of driving pattern; X_{pc8} = driving pattern and $\mathcal{E}_{pc}$.

So that

$Y_{pc} = 40.09 - 1.66X_{pc1} + 2.74X_{pc2} + 0.14X_{pc3} - 0.13X_{pc4} - 1.81X_{pc5} + 7.34X_{pc6} + 1.73X_{pc7} + 7.87X_{pc7} + \varepsilon_{pc}$ is our multiple regression model for degree of severity of RTAs involving commercial minibuses in Ondo State.

4. CONCLUSIONS AND RECOMMENDATIONS

The research work revealed that accidents that occurred in the hours of the night result to high and severe casualty than those that occurred during the day. This is probably due to poor night time visibility and lack of delayed responses to the victims of RTAs. Inexperienced and unqualified drivers constitute a quantum of the minibuses drivers, most of whom never attended any formal driving school/training. This affects their decision making ability and reaction to traffic is bad. It was discovered that casualty figures were recorded in about 95% of the road traffic accidents involving minibuses that occurred within the period covered in the research work. It was observed that most vehicles involved in RTAs that had severe cases were not adequately equipped with protecting devices such as air bags, occupant restraining seat belt and impact protection for drivers. Speed violation constituted a greater causative factor of road traffic accidents involving minibuses as recorded in the research work.

The research work examined the trend of road traffic accidents involving minibuses in Ondo State. This has been done by assessing the causes, magnitude and factors responsible for high and severed casualty figures of road traffic accidents involving minibuses. The work examined recorded data on road traffic accident involving minibuses that occurred on different routes in Ondo State within the periods of 2008 to 2015.

Degree of severity and percentage casualty were also assessed in the work. This was done using selected variables, viz; route condition, age of driver, driving experience, period or season of accident, time of travel, speed of vehicle, over loading of vehicle and driving pattern.

The assessment revealed that relationship exists between cause of road traffic accident and degree of severity in road traffic accident.

In view of the gravity of road traffic accidents, degree of severity and casualty figure, experience of best practices from developed countries should be borrowed. Furthermore, the following should be embarked on:

i. Government and Stakeholders on road transportation should adopt speed control measures by enforcing speed detecting devices like speed cameras, laser and radar devices that can be effective in reducing traffic speeds and reducing the level of road traffic crashes, injuries and deaths in the vicinity of device site.

ii. Vehicles used for public transportation should have interiors that are occupants friendly to give cushion effect to passengers in an event of road traffic accidents. Consequently government needs to consider legislation in that light.

iii. Government and companies saddled with the responsibility of constructing roads and highways should be mindful of the kind of safety barriers used on the highways to ensure road friendly barriers are used not concretes, irons or hard objects that may aggravate injury in an event of a road traffic accident.

iv. Government should revamp the railways in order to reduce pressure of articulated vehicles on roads which cause incessant road traffic accidents.

v. Safety organizations and safety professionals should discourage night travelling through public enlightenment and sensitization; they can also help to make the general public aware about sharing the roads safely with trucks and other large commercial vehicles. This information could be incorporated into driver education courses, drivers manuals and workplace driver training programs.

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