ASSESSMENT OF THE EFFECTS OF ROAD SAFETY EDUCATION ON THE OCCURRENCE OF ROAD ACCIDENTS

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Abstract

The study assessed the effects of road safety education on the occurrence of road accidents. Secondary data - accident data collected from the Federal Road Safety Corps (FRSC), and Number of Registered Vehicle collected from Vehicle Inspectorate Office (VIO), Eleyele, Ibadan, Oyo State was used in analyses. The trend of accident occurrence was done, using the monthly accident cases in the study area from January 2011 till December 2016 for the trend analysis. This single set of data entered into a single column of the analytical tool. Trend analyses were done for the same period to examine the monthly enrolment rate and length of driver training in the study area. Lastly multiple regression analysis was done to reveal the relationship between attributes of driver training and accident occurrence. The results reveal that, accidents are preventable but they still occur; and that the accident levels are decreasing with time. The study recommends that all drivers should save their lives and that of other road users as well as properties by ensuring that daily and periodic inspection are done on their vehicles. Drivers must do proper driving test and undergo the various training stages before being allowed to handle vehicles independently. It also concluded that drivers should be educated from time to time.

Keywords: Education, road safety, accidents, occurrence

Introduction

The transport sector is the main mover of the Nigerian economy and indeed of any economy. The importance of mobility to a nation's economic base cannot be overemphasized. Specifically, transport is central to the developmental process of a healthy economy and societal growth. This is due to the fact that transport influences and is influenced by other sectors that make up, not only the total urban system, but the entire human settlements as well (Daramola, 2003). Transport is a critical sector of the Nigerian economy, whose catalytic effect, particularly on socio-economic development, cannot be, overemphasized. Over 80% of transportation in Nigeria is done by road (Oni, and Okanlawon 2010) Transportation safety implies the prevention of accidents and the minimization of accident losses. As Nigeria becomes more mobile, the possibility of accidents resulting in the death of people and the destruction of property on our highway becomes more of a critical factor. The consequences of accidents on our roads are immense. Accidents cause significant losses to present and future productive manpower of our country, as well as, in many cases, profound social problems, deaths or serious injury. Sometimes this results in loss of breadwinners, pushing the affected family into poverty, and jeopardizing educational upbringing of children. Accidents impose heavy costs on the health services (Afolabi, 2009).

Transport is also significant to the society in promoting national unity and social economic integration, generating sense of togetherness, and mutual understanding in a diversified society like Nigeria. The importance of transport is further evident in the fact that the worlds biggest cities are found in foci of transport routes - rail, water, road and air. With the growing demands on the road as a major mode of transport, the highway management and administration could not

function efficiently due to stress and neglect of traffic education and training programmes for the operators/drivers and the managers most especially in the developing worlds like Nigeria. Road accidents have become a normal and re-occurring phenomenon in Nigeria which constitutes a menace in modern times. Although both the developed and developing nations of the world have suffered from varying degrees of road accidents, the developing countries clearly dominates with Nigeria having the second highest rate of road accidents among 193 ranked countries of the world. Deaths from reckless driving are the third leading cause of death in Nigeria.

Literature review

Literature revealed that there was absence of good driving culture on most Nigerian roads and Highway (Oyeyemi, 2003; Balogun , 2006, FRSC 2007). According to Yakaisi (1998), Nigerian roads in the colonia era, were dominated by abundant combination of in experienced, drunk and over confident drivers who were unconcerned about the lives of other road users as well as theirs. He further claimed that many commercial vehicle drivers knew nothing more than the rudiments of moving vehicles and hooting their horns ostensibly to attract the attention of passengers. Maduagwu (1998) corroborated this when he states that most Nigerian drivers have no regard whatsoever to traffic rules and regulations. They do not observe speed limit of traffic signs on highways, many drivers over take anywhere and anyhow on roads and highways, while some park their vehicles anyhow on the roads with no thought of the other road users. The traffic situation was described as chaotic and unpredictable, public interest on road safety matters was minimal and there was no concrete and sustained policy action to addressed road safety question (FRSC, 2007). Hence, there was high rate of road traffic accident and fatalities.

Globally, many people drive several hours on a daily basis and this exposes them to the risk of road crashes and ensuing injuries. “Most crashes are caused by the driver’s behaviour and not always as a result of bad roads and that the Idea of a “Safe Road” in Nigeria is more of changing our driving behaviour than advocating for good road infrastructure.” “Deaths and injuries due to crashes by 50% can be reduced if citizens do not drink and drive, over speed, use phone or eat while driving but obey traffic rules, wear helmets and seatbelts and tell people about Safe Road Nigeria. Also, in Nigeria, studies have showed that must drivers with driver’s license do not undergo any driving training before obtaining their driver’s license, and road traffic accident records have clearly shown that the attitude of the Nigerian driver to driving code and etiquette is the single most important contributing factor as driver factors solely contributes to about 57 per cent of road traffic accidents and 93 per cent either alone or in combination with other factors. Driver-related issues include: speed and indiscriminate use of Sirens, drink–driving and use of drugs, not having the basic drivers training, distracted driving,

Road safety measures aimed at achieving this safety goal by preventing traffic crashes and reducing their severity, are traditionally referred as the three E's: Enforcement measures, Engineering measures and Education measures. From the experiences of the best performing countries, it has becomes evident that for road users in general, and for children in particular, a holistic approach is needed in which the three E's are combined (OECD, 2004).

However, with respect to the effectiveness of road safety education relatively little is known, whereas the effects of police enforcement and infrastructural measures are well documented (Ogden, 2006). This despite the fact that it has convincingly been demonstrated that education is needed for the successful performing of even simple activities like walking, writing, or using the toilet. In contrast, safe participation in traffic is a complex task requiring skills like rule application, speed estimation and prediction, and it is self-evident that extensive practice is needed to acquire these skills ((Rothengatter, 2002).

In addition, crash statistics show that the adoption of any new traffic role leads to subsequent increase in crash rates (Baluja, 2010), indicating a poor performance of novices. Although, the role of traffic education is not necessarily under discussion, the

knowledge about the effectiveness and the characteristics of „good" programmes is still insufficient.

Traffic education entails the conscious training of all road users, most especially drivers of motor vehicles and motorcycles towards proper and lawful behaviour on public highways Oni (2000) stated that this should involve: Knowledge of road traffic laws and Highway Code, Comprehension of road signs and traffic signals, Knowledge of one"s responsibilities while driving Respect for other road users, Respect for traffic control officers and their directives, Proficiency in driving.

The attended neglect and gaps in Nigeria"s road traffic safety administration are great and are responsible for the high rate of traffic accidents. A chaotic situation has arisen from this unhealthy development. The major stumbling block has been identified as human factors ((Oni, 2000).

These problems include motorist/driving culture, poor attitudinal and incompetence of many professional drivers and wide extensive indiscipline, corruption, enforcement, disobedience for law, institutional gridlocks characterizing the motoring behaviour. Hence, a well-founded and integrated road safety and behavioural education will serve as succour for this. Since, no matter the sophistication level of engineering ingenuity could resolve the problem, except an integrated traffic education, attitudinal change, persuasion, reorientation and modification of drivers and road users" minds and character.

As a measure, it is used for all kinds of road user groups and for all sorts of road safety issues. It ranges from training young moped riders to 'driver improvement' of convicted drivers. However, to find out if road safety education is effective and which are the effective programme components, a focus is needed on age groups and problem behaviour for which a large number of educational programmes has been developed and some evaluation studies are also available.

The study area

Ibadan North-East (Yoruba: Ariwa-Ilaorun Ibadan) is a second-order administrative division and a Local Government Area in Oyo State, Nigeria. It was created on 27th August 1991, by the administration of former Head of State General Ibrahim Badamosi Babangida. It was carved out of the defunct Ibadan Municipal Government and derived its name from the metropolitan nature of the area. It covered then (12km radius with the Mapo as the centre). The local Government has its administrative headquarter located along the Iwo Road axis of Ibadan a major entry point through, Ife/Ibadan express way end of the Oyo State Capital.

The estimate terrain elevation above sea level is 184 metres. Latitude: 7°20'46.18", Longitude: 3°57'2.38". It has an area of 18 km² with land mass of 125km^2 and a population of 330,399 at the 2006 census. Density: 21,825.6 inh. /km² [2011] – Change: +3.46%/year [2006 → 2011] z. The inhabitants of the local Government are predominantly Yoruba, although it is highly heterogeneous, accommodating people from various other tribes who either engage in commercial activities or work in the public service.

Fig. 1: Map of Nigeria showing Oyo State

Source: Google map 2017

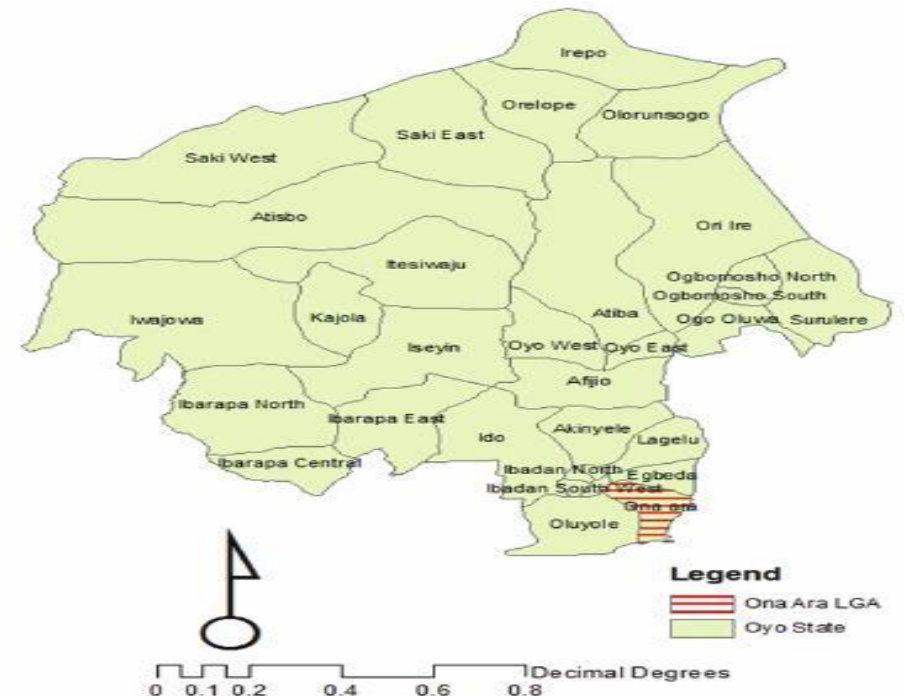

Fig. 2: Map of Oyo State, showing Local Governments Areas in Oyo State.

Source: Google map 2017

Research methodology

Study design:
The study was designed to determine the trend of accidents occurrence in the study. Data collected include accidents occurrence on annual basis recorded in the study area for 2011 to 2016. The study also ensured that the rate of enrolment at driver training school/centres were collected. Along with this, the average length of training period spent by each drivers across the training centres in the study was estimated. Also the length and scope of driver training programmes in the different training centres were assessed and finally the relationship between driver training and accident occurrence was investigated.

Methods of data collection and instruments
Secondary data were sourced from the Federal Road Safety Commission to assess the trend of accident occurrence in the study areas during the period the study covered. The sourced from the FRSC also showed level of enrolment for driver training at the different driving school or driver training centres in the study area. From the records of Vehicle Inspectorate Office in the study area, the average length of driver training undergone by trainee drivers were extracted.

Method of data analysis
The trend of accident occurrence was done by using the monthly accident cases in the study area from January 2011 till December 2016 to do a trend analysis. This is a single set of data entered into a single column of the analytical tool. Trend analyses were done for the same period to examine the monthly enrolment rate and length of driver training in the study area. And lastly a multiple regression analysis was done to reveal the relationship between attributes of driver training and accident occurrence. These attributes were number of registered drivers, average age of trainee drivers and the length of driver training. The software or programme used for these analyses was MegaStat®. A projections were done into the future for accident occurrence, enrolment rates and length of driver training.

Results and discussion

Accidents are preventable but they still occur. It is best to keep records of the occurrences. From the data gotten from the FRSC. It can be seen from Table1 that the rates of accidents has been reducing with increased enforcement of driver training before the issuance of driving licenses to drivers

Table 1: Accidents occurrence

	2011	2012	2013	2014	2015	2016		Total
Jan	226	44	153	108	183	118	Jan	832
Feb	187	115	52	111	116	214	Feb	795
Mar	189	158	141	148	96	142	Mar	874
Apr	151	190	159	115	177	103	Apr	895
May	144	106	195	156	105	150	May	856
Jun	204	134	134	86	118	75	Jun	751
Jul	127	196	119	115	77	94	Jul	728
Aug	205	139	128	71	136	144	Aug	823
Sep	92	158	195	91	155	136	Sep	827
Oct	226	235	204	151	82	123	Oct	1021
Nov	462	74	161	127	91	95	Nov	1010
Dec	334	192	209	127	118	113	Dec	1093

Source: FRSC 2017

It can be seen that the fourth quarter of the year had the largest level of accident occurrence for all the periods as the aggregated level of occurrence for October, November and December were 1021, 1010 and 1093 respectively. This correlates with the usual fear of accidents happening in the "ber" months. These period are the period people usually go for festivities and holidays, it is a period when people plan to travel, usually once in a year. The visual spread of the accident levels for various months between 2011 and 2016 is further shown in Figure 3.

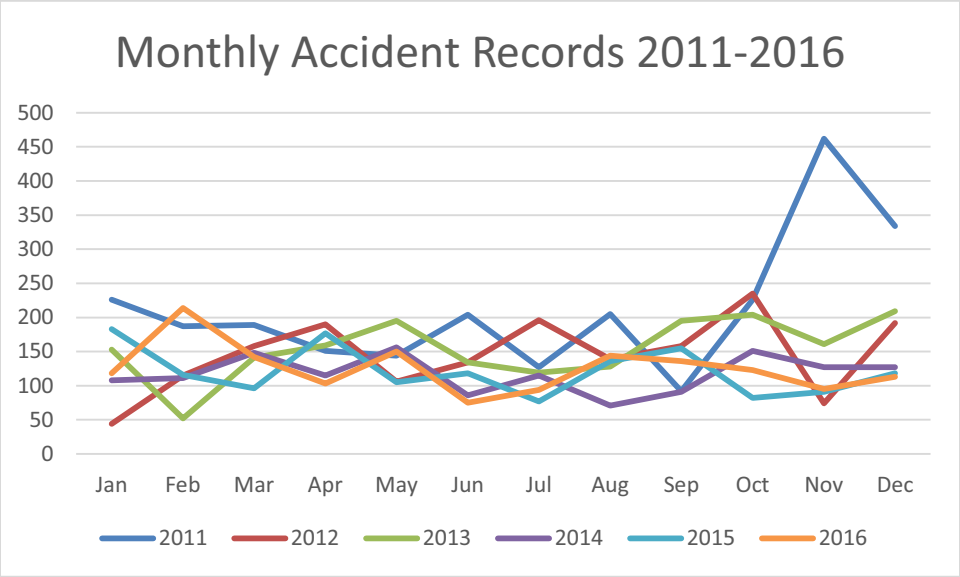

Figure 3:

Source: Field Work 2017

Performing a trend analysis gave rise to Table 2, it was discovered that the data used cannot (as it is now, unless larger period was covered) explaining the model because the coefficient of determination r^2 was just 0.154. This is just too low but the differences between the means are statistically significant as the *p-value* was level below the 5% threshold for significance. However, a linear curve fit (Figure 2) showed that the accident levels are decreasing with time but the plots were well scattered away from the model.

The model is $y = -1.169x + 187.391$ when $r^2 = 0.154$ ----------equation 1

Table 2: Regression Analysis (Trend Analysis for Accident Occurrence)

	r^2	0.154	n	72	2
	r	-0.393	k	1	
	Std. Error	57.698	Dep. Var.	Y	

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	42,473.7923	1	42,473.7923	12.76	.0006
Residual	233,036.5272	70	3,329.0932		
Total	275,510.3194	71			

Regression output

					confidence interval	
variables	*coefficients*	*std. error*	*t (df=70)*	*p-value*	*95% lower*	*95% upper*
Intercept	187.3908					
t	-1.1687	0.3272	-3.572	.0006	-1.8212	-0.5161

Source: Field Work 2017

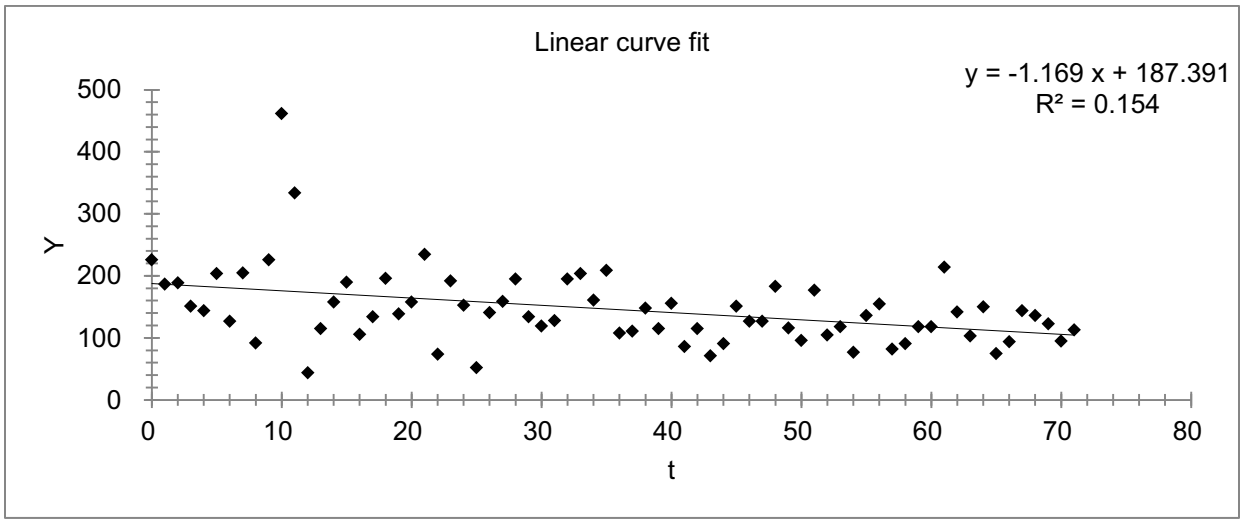

Figure 4: Linear curve fit for the accident occurrence between 2011 and 2016.

Source: Field Work 2017

The plot shown in Figure 4 was obtained from the data presented in Table 2. Table 2 showed the prediction derived from the trend analysis for year 2018 to 2065.

Table 2: Trend Analysis Projection for accident occurrence

T	*Predicted*	*Residual*
2018	187.4	38.6
2019	186.2	0.8
2020	185.1	3.9
2021	183.9	-32.9
2022	182.7	-38.7
2023	181.5	22.5
2024	180.4	-53.4
2025	179.2	25.8
2026	178.0	-86.0
2027	176.9	49.1
2028	175.7	286.3
2029	174.5	159.5
2030	173.4	-129.4
2031	172.2	-57.2
2032	171.0	-13.0
2033	169.9	20.1
2034	168.7	-62.7
2035	167.5	-33.5
2036	166.4	29.6
2037	165.2	-26.2
2038	164.0	-6.0
2039	162.8	72.2
2040	161.7	-87.7
2041	160.5	31.5
2042	159.3	-6.3
2043	158.2	-106.2
2044	157.0	-16.0
2045	155.8	3.2
2046	154.7	40.3
2047	153.5	-19.5
2048	152.3	-33.3
2049	151.2	-23.2
2050	150.0	45.0
2051	148.8	55.2
2052	147.7	13.3
2053	146.5	62.5
2054	145.3	-37.3
2055	144.1	-33.1
2056	143.0	5.0
2057	141.8	-26.8
2058	140.6	15.4
2059	139.5	-53.5
2060	138.3	-23.3
2061	137.1	-66.1
2062	136.0	-45.0
2063	134.8	16.2
2064	133.6	-6.6
2065	132.5	-5.5

Source: Field work (2018)

The conduct of a trend analysis for the prediction of driver training enrolment (Table 3) showed that the predicted number of enrolment will continue to drop with time. This can be attributed to the poor level of enforcement of the need to get a training before the issuance of a driving license and the relative ease that driver training was assumed to be by the majority of people.

Table 3: Regression Analysis (trend analysis for the number of those registered for driver education

	r^2	0.002	n	72
	r	-0.044	k	1
	Std. Error	51.219	Dep. Var.	**Number registered for driver education**

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	359.1538	1	359.1538	0.14	0.0004
Residual	183,636.1240	70	2,623.3732		
Total	183,995.2778	71			

Regression output

					confidence interval	
Variables	*coefficients*	*std. error*	*t (df=70)*	*p-value*	*95% lower*	*95% upper*
Intercept	121.5095	11.9477	10.170	1.97E-15	97.6805	145.3385
t	-0.1075	0.2904	-0.370	.7125	-0.6867	0.4718

Durbin-Watson = 2.11

Source: Field work (2018)

Table 4: Predicted values for: Number registered for driver education

		95% Confidence Intervals		*95% Prediction Intervals*		
t	*Predicted*	*lower*	*upper*	*lower*	*upper*	*Leverage*
2018	121.5	97.7	145.3	16.6	226.4	0.054
2019	121.4	98.1	144.7	16.6	226.2	0.052
2020	121.3	98.5	144.1	16.6	226.0	0.050
2021	121.2	98.8	143.5	16.6	225.8	0.048
2022	121.1	99.2	142.9	16.6	225.5	0.046
2023	121.0	99.6	142.4	16.6	225.3	0.044
2024	120.9	100.0	141.8	16.6	225.1	0.042
2025	120.8	100.3	141.2	16.6	224.9	0.040
2026	120.6	100.7	140.6	16.6	224.7	0.038
2027	120.5	101.0	140.1	16.5	224.5	0.036
2028	120.4	101.4	139.5	16.5	224.3	0.035
2029	120.3	101.7	138.9	16.5	224.2	0.033
2030	120.2	102.0	138.4	16.5	224.0	0.032
2031	120.1	102.4	137.9	16.4	223.8	0.030
2032	120.0	102.7	137.3	16.4	223.6	0.029
2033	119.9	103.0	136.8	16.4	223.4	0.027
2034	119.8	103.3	136.3	16.3	223.3	0.026
2035	119.7	103.6	135.8	16.3	223.1	0.025
2036	119.6	103.8	135.3	16.2	222.9	0.024
2037	119.5	104.1	134.8	16.2	222.8	0.023

2038	119.4	104.3	134.4	16.1	222.6	0.022
2039	119.3	104.6	133.9	16.1	222.5	0.021
2040	119.1	104.8	133.5	16.0	222.3	0.020
2041	119.0	105.0	133.1	15.9	222.2	0.019
2042	118.9	105.2	132.7	15.9	222.0	0.018
2043	118.8	105.3	132.3	15.8	221.9	0.017
2044	118.7	105.5	132.0	15.7	221.7	0.017
2045	118.6	105.6	131.6	15.6	221.6	0.016
2046	118.5	105.7	131.3	15.5	221.5	0.016
2047	118.4	105.8	131.0	15.5	221.3	0.015

Source: Field work (2018)

By 2047, it is expected that 118 drivers will be educated (as shown on Table 5). This is quite a reduction from 121 drivers that was predicted for 2018.

Table 5: Regression Analysis (Trend analysis for length of time spent on driver training

	r^2	0.011	n	72
	r	0.104	k	1
	Std. Error	3.047	Dep. Var.	**Average length of time spent on driver training**

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	7.1185	1	7.1185	0.77	0.003204
Residual	649.8676	70	9.2838		
Total	656.9861	71			

Regression output

					confidence interval 95%	
Variables	*coefficients*	*std. error*	*t (df=70)*	*p-value*	*lower*	*95% upper*
Intercept	6.4490	0.7108	9.073	1.94E-13	5.0315	7.8666
t	0.0151	0.0173	0.876	.3842	-0.0193	0.0496

Durbin-Watson = 1.79

Source: Field work (2018)

Table 6: Predicted values for: Average length of time spent on driver training

		95% Confidence Intervals		*95% Prediction Intervals*		
t	*Predicted*	*Lower*	*upper*	*lower*	*upper*	*Leverage*
0	6.4	5.0	7.9	0.2	12.7	0.054
1	6.5	5.1	7.9	0.2	12.7	0.052
2	6.5	5.1	7.8	0.3	12.7	0.050
3	6.5	5.2	7.8	0.3	12.7	0.048
4	6.5	5.2	7.8	0.3	12.7	0.046
5	6.5	5.3	7.8	0.3	12.7	0.044
6	6.5	5.3	7.8	0.3	12.7	0.042
7	6.6	5.3	7.8	0.4	12.8	0.040
8	6.6	5.4	7.8	0.4	12.8	0.038
9	6.6	5.4	7.7	0.4	12.8	0.036
10	6.6	5.5	7.7	0.4	12.8	0.035
11	6.6	5.5	7.7	0.4	12.8	0.033

12	6.6	5.5	7.7	0.5	12.8	0.032
13	6.6	5.6	7.7	0.5	12.8	0.030
14	6.7	5.6	7.7	0.5	12.8	0.029
15	6.7	5.7	7.7	0.5	12.8	0.027
16	6.7	5.7	7.7	0.5	12.8	0.026
17	6.7	5.7	7.7	0.6	12.9	0.025
18	6.7	5.8	7.7	0.6	12.9	0.024
19	6.7	5.8	7.7	0.6	12.9	0.023
20	6.8	5.9	7.6	0.6	12.9	0.022
21	6.8	5.9	7.6	0.6	12.9	0.021
22	6.8	5.9	7.6	0.6	12.9	0.020
23	6.8	6.0	7.6	0.7	12.9	0.019
24	6.8	6.0	7.6	0.7	12.9	0.018
25	6.8	6.0	7.6	0.7	13.0	0.017
26	6.8	6.1	7.6	0.7	13.0	0.017
27	6.9	6.1	7.6	0.7	13.0	0.016
28	6.9	6.1	7.6	0.7	13.0	0.016
29	6.9	6.1	7.6	0.8	13.0	0.015

Source: Field work (2018)

The length of time trainee drivers spent on the training was analyzed and it was discovered with a trend analysis that an average of 7 weeks (see Table 6) will be the length of time it will take to train a novice driver. However, like the first trend analysis for accident occurrence, those done for number of registered drivers for training and the length of driver training showed similar values and explanation for the coefficient of determination and the differences between the statistically significant. Their r-squared was too low and their *p-values* were well below the 5% threshold for significance.

Table 7:Regression Analysis for Accident Occurrence

R^2	0.783			
Adjusted R^2	0.773	n	72	
R	0.885	k	3	
Std. Error	75.466	Dep. Var.	Accidents Occurrence	

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	1,415,256.5279	3	471,752.1760	82.83	8.03E-23
Residual	392,962.4721	69	5,695.1083		
Total	1,808,219.0000	72			

Regression output

Variables	*coefficients*	*std. error*	*t (df=69)*	*p-value*	*confidence interval 95% lower*	*95% upper*	*VIF*
Intercept				2.61E-07			
Number registered for driver education	0.2208	0.1604	1.376	.1732	-0.0992	0.5408	1.024
Average length of time spent on driver training	5.4160	2.3930	2.263	.0268	0.6421	10.1899	1.014
Average age of driver trainee	1.7502	0.5078	3.447	.0010	0.7372	2.7632	1.032
						mean VIF	1.023

Durbin-Watson = 1.60

Source: Field work (2018)

Finally, the relationship between accident occurrence and driver training attributes like number of registered drivers for training education, average length of time spent on driver training and the average of enrolled trainee drivers, from the totality of data collected showed that 78% of the data explained the model generated by the regression analysis. The analysis of variance showed that the differences between the means are statistically significant as the *p-value* is very close to zero (see Table 7). The most significant cause of accident occurrence reduction as revealed by this study is average age of driver trainee which was followed by average length of time spent on the driver training programme at 0.0010 and 0.026 *p-values* respectively.

Conclusion

Accident is a common phenomenon. It does not segregate on the basis of time and place of occurrence. Road traffic accident in Nigeria is a very serious issue requiring a holistic attention and approach towards curbing its occurrence considering the magnitude of the problem it presents to every Nigerian road users.

Recommendations

From the study, the following recommendations were made.

1. All drivers should save their lives and that of other road users as well as properties by ensuring that daily and periodic in section are done on their vehicles.
2. The drivers must do proper driving test and undergo the various training stages before he/she is allowed to handle vehicle independently such as driving school.
3. All drivers must vehicle sympathy, knowledgeable in vehicle faults, proficient in highway code, healthy and have good eye sight and so on.
4. In other to reduce accident, all the components of the vehicles must be in good working condition and the vehicle must be road worthy. In other to enhance safety some of the components include:
   Wind Screen, Wiper, Break systems, Break light systems, Motor vehicle Break fluid, the tires should have minimum tread depth with the

manufacturers recommended tyre pressure, the use of 'Tokunbo Tyre' should be prohibited.

5 Government should ensure that all drivers undergo drivers training for at least seven weeks or more,so all rules and regulation concerning driving can be well understood.

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