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ANALYSIS OF MONTHLY VARIATION OF ROAD TRAFFIC ACCIDENTS IN NIGERIA

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Abstract

This study analysed monthly variation of road traffic accidents in Nigeria. The data for the study were obtained from National Bureau of Statistics (N.B.S). The data collected were coded and recorded for ease of analysis. The data were analysed using percentage, frequency table, simple Index Number and spearman correlation. The result shows that the month of December has 11.4% of the total accidents with 11.60% fatalities, followed by the month of April with 8.9% and 9.37% fatalities. Similarly, speed violation accounts for 51.4% of the total cause of accidents. Car which is the most common means of transport account for 31.3% of vehicles involved in accidents. The correlation result shows a strong positive significant relationship of between accident and live lost p-value of 0.84. The study recommended that over loading of both passengers and goods should be avoided more especially during the ember months because these months tend have more passengers and goods.

Keywords: Accident, Road, Temporal, Traffic, Transport, Variation

1. Introduction

The rate of road traffic accidents is on the increase especially in urban areas of developing countries that is characterized by bad road, poor/absence of road signs, and reckless drivers. Globally, over 1.35 million lives of people yearly are cut short as a result of a road traffic accident and between 20 and 50 million people suffer non-fatal injuries, with many becoming disable as a result of the accident (World Health Organizations, 2018). According to World Health Organizations (2018) more than 90% of road traffic deaths occur in low- and middle-income countries. The report shows that road traffic injury death rates are high in the African region since majority of African countries fall within low and middle income countries. Therefore, this menace poses significant thread to life and properties.

According to World Health Organizations (2016) road traffic accident is the number eight leading cause of death globally for people of all ages, and the leading cause of death for children and young adults between the ages 5–29 years. Road traffic deaths and injuries shatter lives and throw families into poverty. On average, road traffic accidents cost countries 3% of their Gross Domestic Products (GDP) of developing countries (Babtie, 2003). Over 50% of road traffic accidents are among young adults between the age range of 15–44 years (Peden, *et al.*, 2000). The road traffic death toll represents only a "tip of the iceberg" of the total waste of human and societal resources from road injuries. Most of the fatal road traffic accidents occur due to over speeding, fatigue, drunkenness, brake failures or steering, tyre burst, insufficient headlights, overloading, projecting loads, Potholes, damaged road,

eroded road merging of rural roads with highways, diversions, heavy rainfall, wind storms, hail storms (National Bureau of Statistics, 2019).

Even thought, the number of people dying annually as a result of road traffic injury surpasses those dying from HIV/AIDS, Tuberculosis, and diarrhoeal diseases the political commitment and financial investment is road safety is only a small fraction of that made to combat these disease (World Health Organizations 2018). About three quarters 73% of all traffic death occur among young males under the age of 29 year who are almost 3 times as likely to be killed in a road traffic accidents as young females (Jacobs *et al.*, 2000). According to Kopits and Cropper (2003) road traffic injuries represent 12% of the global burden of disease, the third most important cause of overall mortality and the main cause of death among 1–40-year olds.

Several studies were carrier-out within and outside Nigeria on road traffic accidents.

These include the studies of Ohakwe, Iheanyi and Chikezie (2011) 0n road traffic accidents in Imo State Nigeria. Similarly, Eze (2012) examine traffic accidents in Nigeria and its public health problems. However, all these studies were done outside the study area and none of these study attempt to show the temporal distribution of road traffic accidents. Therefore, it is against this background that this study critically examines the temporal distribution of road traffic accidents in Nigeria.

2. Materials and Methods

2.1 Study Area

Nigeria lies between latitude 04º 00ˈ N to 14º 00ˈ N and longitude 03º 00ˈ E and 15º 00ˈ E of the Greenwich Meridian (Iwena, 2015). Nigeria is bounded in the North by Niger Republic, in the South by the Atlantic Ocean, to East by Cameroon Republic and in the West by Benin Republic. (Fig 1)

Nigeria is the fourth largest country in West Africa with a total land area of 923,768sq. Km.The population of the country stood at 200,963,599 in 2019 with annual growth rate of 2.6% (WorldoMeter, 2020).

Nigeria has the largest road network in West Africa. According to the Government Infrastructure Concession Regulatory Commission, Nigeria has about 195,000 km of road network of which about 60,000 km are paved (2019). Nigeria's most important highways run from South to North and were designed to bring produce from the hinterlands to the coast for export and to link the economies of old Northern and Southern Nigeria. These highways are labelled A1, A2, A3 and A4. All other major roads in the country originate from these four. (https://dlca.logcluster.org/download/attachments/853387/NGA_LCA_RoadNetwork_A4L_20191029.png?version=1&modificationDate=1588851314000&api=v2)

Nigerian Bureau of Statistics (2018) estimated that the total number of vehicles in the country is about 11.7 million with commercial vehicles constituting about 58.08% of the number. Furthermore, out of these 11,653,871 million vehicles, commercial vehicles are 6,768,756, representing about 58.08%; private are 4,739,939 (40.67%), government vehicles followed with 139,264 (1.19%), while Diplomatic vehicles accounted for 5,912 (0.05%).

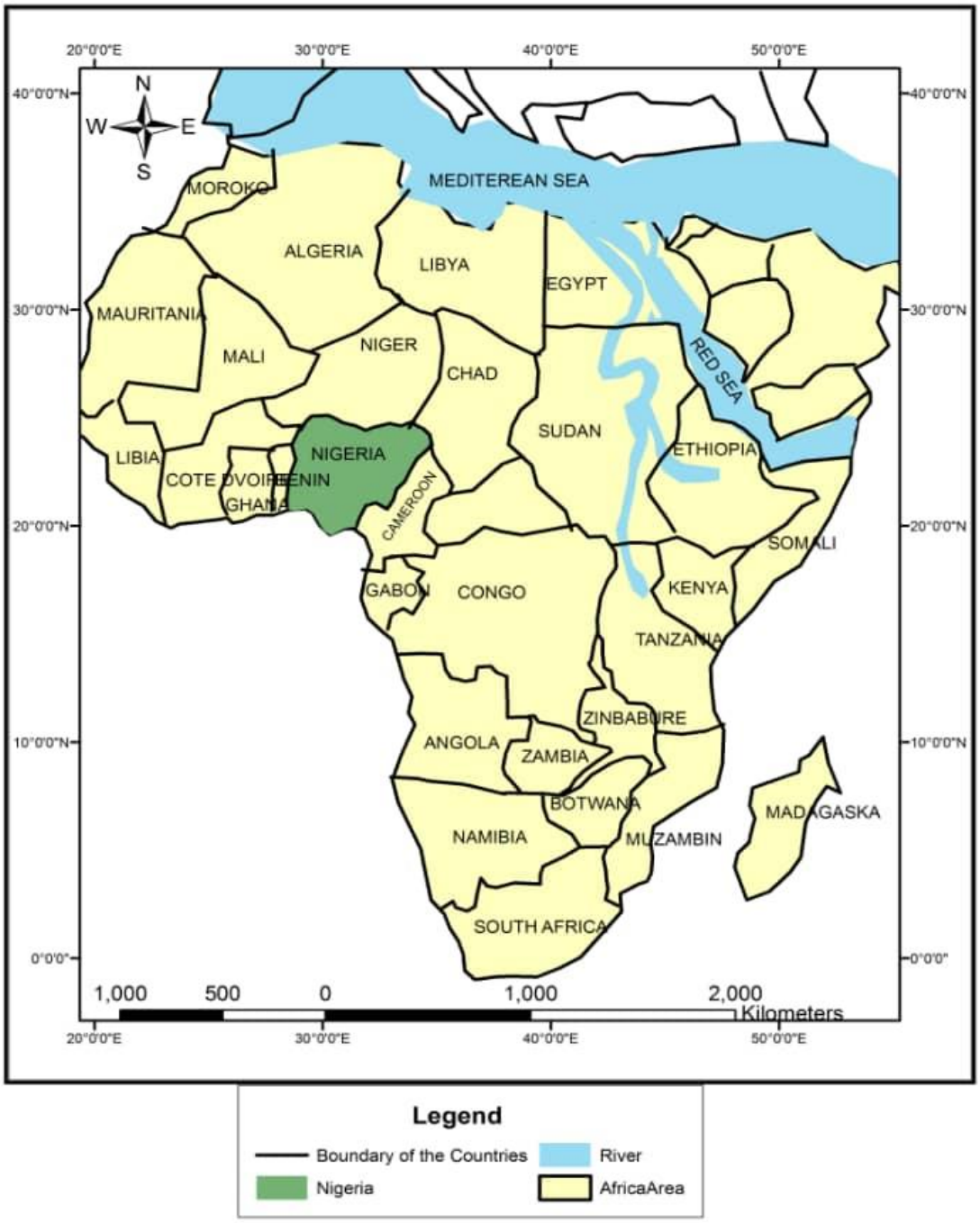

Figure 1: Study Area
Source: GIS Unit, Department of Geography, MAUTECH (2021)

3. Methodology

The data for this study were obtained from secondary sources. The type of secondary data sought were months of accident, vehicle involved and the severity of the fatality. The Data on road traffic accidents were sought from the National Bureau of Statistics while the population of the study area was sought from National Population Commission similarly, map of the study area was obtained from Google Earth. The data collected were coded and recorded for ease of analysis. The data were analysed using percentage, frequency table spearman correlation and Simple Index Number. The simple index number shows the relative change (over time) in accidents and fatality. The computational formula is given by

$S_1(t) = Y_1 \div Y_0 \times 100$
Where $S_1(t)$ = index number at time t
Y_1 = Time series value at time t
Y_0 = Time series values at the base period
While the correlation equation used is expressed as thus;

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$$

Where p= Spearman rank order correlation coefficient
1= unity for a perfect correlation
6= Constant Value
Σd^2= (sum of difference in rank squared)
N= (number of Months)

4. Results and Discussions

Table 1 shows the temporal distribution of road traffic accident and the severity of fatalities in Nigeria for the year 2019. The results show that the month of December has the highest rate of Accidents 11.4% and the highest rate of fatalities 11.60%, followed by the month of April with 8.9% and 9.37% fatalities. The result reveals that months of January and November have 8.6% and 8.6% rate of Accidents with 9.85% and 8.35% fatalities respectively. For the months of May and June the accidents rate was 8.4% but the fatalities rate differs months of May had 8.61% fatalities while Month of June had 7.33%. The result further reveals that the month of November had a total of 8.6% accidents but the severity of fatalities stood at 8.35% persons. Similarly, the month of August accounts for 8.4% of the total accidents for the year but fatalities was 8.74%. However, the Months of February and September have the 6.5% and 6.8% of the total's accidents with 7.22% and 6.29% fatalities. It is pertinent to note that the Months of December and January has the highest rate of Accidents and Fatalities. December is the end of the year which people travels to meet their family obligations. Similarly, the month of January many people undertakes many trips. Earlier studies reveals that accidents occurred in the months of June, July, September, October, November and December because of the wet road condition which affects many drivers ability to see and be seen (Atubi, 2012). However, Owunari, Davies and Ekute (2019) reported that there is no seasonality

in the occurrence of road traffic accident. The findings of this study concurred with Atubi (2012).

Table 1. Monthly Road Traffic Accident in Nigeria

S/No	Month	Accidents	Percent (%)	Fatality	Percent (%)
1.	January	950	8.58	540	9.85
2	February	716	6.47	396	7.22
3	March	922	8.33	420	7.66
4	April	981	8.86	514	9.37
5	May	927	8.37	472	8.61
6	June	927	8.37	402	7.33
7	July	826	7.46	433	7.90
8	August	935	8.44	479	8.74
9	September	754	6.81	345	6.29
10	October	924	8.35	388	7.08
11	November	950	8.58	458	8.35
12	December	1260	11.38	636	11.60
	Total	11,072	100.00	5483	100.00

Source: National Bureau of Statistics (2019)

Table 2. shows the Correlation result of accidents and the rate of fatalities. The correlation analysis shows that accidents and fatalities have a positive and significant correlation at 95% confidence level (R2 = 0.839; p = 0.034) as shown in table 2. This practically means that, the higher the number of accidents case, the higher the lives lost and vice versa. This result is in agreement with similar research (Spasova, 2012). The highest number of road crashes is observed in December, road accidents level in December differs significantly from the all other months of the year.

Table 2: Spearman Correlation of Accidents and Fatalities in Nigeria 2019

S/N	Months	Accidents	Fatality	Rank of Accident	Rank of Fatality	d	d2
1	January	950	540	3	2	1	1
2	February	716	396	12	10	2	4
3	March	922	420	9	8	1	1
4	April	981	514	2	3	-1	1
5	May	927	472	6	5	1	1
6	June	927	402	6	9	-3	9
7	July	826	433	10	7	3	9
8	August	935	479	5	4	1	1
9	September	754	345	11	12	-1	1
10	October	924	388	8	11	-3	9
11	November	950	458	3	6	-3	9
12	December	1260	636	1	1	0	0
	Total	**11,072**	**5,483**				Σd^2=**46**

Source: Adopted and modified from National Bureau of Statistics (2019)

The causes of accident that had the highest scores are shown in Table 3. Speed violation accounted for 51.4% of the total accidents for the Year. Different roads in Nigeria are by law required to have a specific speed limits. For example, in Nigeria, the Highway Code part 2, section A, rule 9 imposes maximum limit of 100km/hr for cars on any highway in Nigeria. Taxis and Buses are expected to maintain 50Km/hr within built up areas like streets in towns, villages and cities. Articulated vehicles like tankers and trailers are expected to maintain a maximum speed limit of 50Km/hr on highways and 60Km/hr on expressways. However, the violation of these speed limits is what characterized Nigerian roads, particularly Government and Commercial vehicles on inter and intra-regional journeys (Mubarak, Jamila and Magaji, 2015).

Table 3: Causes of RTAs in Nigeria

S/No	Causes	Frequency	Percentage	Rank of causes of RTAs
1.	Speed violation	5,342	51.40	1
2.	Tyre Burst	772	7.43	4
3.	Mechanical problems	329	3.17	8
4.	Brake Failure	576	5.54	5
5.	Wrongful Overtaking	966	9.29	2
6.	Dangerous Driving	962	9.26	3
7.	Road violations	510	4.91	6
8.	Road obstructions	191	1.84	10
9.	Road sign violation	498	4.79	7
10.	Others	247	2.37	9
	Total	**10,393**	**100.00**	**18.00**

Source: National Bureau Statistics (2019)

Another major cause of accidents was wrongful overtaking which account for about 9.3% of accidents. Dangerous driving accounts for about 9.3% cause of accidents. The result further revealed that 7.4% of accidents occur as a result of tyre burst. This could be seen from the way drivers patronized used and expired tyre from vulcanized. Brake failure accounts for 5.5%. Road violations that is not using the appropriate route or any route directions given accounts for 4.9%. Road violations is among the number one categories of offences which attracts a fine of 5000 Naira (Okeafor, 2019). Road sign violation accounts for about 4.8% this is common among vehicles on a long-distance journey. These are violations of any road markings, regulatory, prohibitory or mandatory road traffic signs. The result indicated that mechanical problems accounts for only 3.2%. Earlier studies have shown shows that the efficiency of speed enforcement has a significant decreasing correlation with the number of traffic accident fatalities (Jetsada, Thaned and Wichuda, 2016). Similarly, the correlation between speed limit and rate of accident fatalities were found to be higher among vehicles moving at a high speed (Davies, Hacker, Savolainen % Gate, 2015). The findings of this study is in congruent with the earlier studies.

Table 4 shows the distribution of type of vehicles involved in road traffic accidents. Table shows that Car which is the most common mode of transport accounts for 31.3%. It was estimated that the country has one car per six persons (Adesoji, 2019). The second vehicles involved in accidents was Motorcycles with 19.9%. This mode of transport that emerged as a result of economic prosperity in 1970 has became popular in most of cities and beyond (Galtima, 1999). However, with the coming of insecurity in the country, cities are banning the use of this mode of transport. Minibus that in used for intra and inter urban transport accounts for 19.4% of the road clashes in the country. Truck which is the major mode of transporting goods in the country accounts for 12.7 % of the total vehicles involved in road clashes it is common along truck A, B, C, D roads of the country. Trailer which are privately owned means of transporting goods across regions in the country accounts for 4.1% of the crashes in the country. Furthermore, tricycles a recently introduced mode of urban transport account for 3.5% of the total crashes. Similarly, Jeep SUV mostly owned and operated by individuals' accounts for 3.1% of the crashes. However, Bicycle accounts for only 0.8% which is the least as environmentally friendly mode of urban areas. Previous studies reported that private cars and taxis are the type of vehicles that are more prone to accident (Atubi, 2012). The finding of this studies agreed with the earlier studies.

Table 4: Vehicles Involved in RTAs in Nigeria

S/No	Vehicles	Frequency	Percentage
1.	Bicycle	32	0.18
2.	Motorcycle	3488	19.93
3.	Tricycle	613	3.50
4.	Car	5476	31.30
5.	Jeep (SUV)	546	3.12
6.	Van	36	0.21
7.	Minibus	3386	19.36
8.	Luxury Bus	42	0.24
9.	Pick up	498	2.85
10.	Truck	2214	12.66
11.	Tanker	364	2.08
12.	Trailers	722	4.13
13.	Others	77	0.44
	Total	**17,497**	**100.00**

Source: National Bureau of Statistics (2019)

Table 5 shows the decrease in the percentage of accidents and Live lost from the month of January to December. The table shows that accidents in the month of January decrease by 24.6% while live lost decrease by 30.4%. This is obvious because there is substantial reduction in activities that demand for movement that characterized the month of January. Furthermore, there is reduction of 2.9% of accidents in the month of March and Live lost also decreased by 21.1% from the month of January (base month). However, the month of April saw an increase of 3.3% of accidents rate. Despite the increased in Accident rate, live lost decreases by 4.8% against the month of January. The rate of Accidents decreases by 2.4% in the month of May, similarly, live lost decreased by 12.6% from the base month (January). The result reveals that accidents decreased by 2.4% and live lost decreased by 25.6%. Accidents rate for the Month of July decreased by 13.1% from the based month and the live lost for the Month decreases by 19.8%. Further analysis of the result reveals that accident rate decreases by only 1.6% which is the least for the years but live lost remains in double digits of 11.3%.

Table 5: Simple Index Mean of Accidents and Live lost

Months	Accidents (X)	Simple Index Number (St) %	100-St	Fatality (y)	Simple Index Number (St) %	100-St
January	950	100.00	0.00	540	100.00	0.00
February	716	75.36	24.64	396	69.63	30.37
March	922	97.05	2.95	426	78.89	21.11
April	981	103.26	-3.26	514	95.19	4.81
May	927	97.58	2.42	472	87.41	12.59
June	927	97.58	2.42	402	74.44	25.56
July	826	86.95	13.05	433	80.19	19.81
August	935	98.42	1.58	479	88.70	11.30
September	754	79.37	20.63	345	63.89	36.11
October	924	97.26	2.74	388	71.85	28.1
November	950	100.00	0.00	458	84.44	15.56
December	1260	132.63	-32.63	636	117.78	-17.78
Total	**11,072**		**70.43/8=8.80**	**5483**		**205.33/11=18.66**

Source: Adopted and modified from National Bureau of Statistics (2019)

In the month of September, accidents rate decreases by 20.6% from the base month. However, live lost was lower than the previous months. It is worthy to note that the month of September make the beginning of the ember months where there is tremendous campaign against road traffic accident. The month of October, there is decreased of 2.7% form the based month and Live lost stood at 28.1%. The month of November, accident rate is the same with the base month but the live lost decreases by 15.7% of the base month. This simply means that the rate of accident for the Month of January and November were the same but the number of live lost for the Month of November is 15.6% leads than the months of January. The month of December

that is characterized by high degree of inter and intra regional movement had 32.6% increased of Accidents rate and 17.8% increased of live lost from the base month. Generally, the rate of accident for the year decreases by 8.8% while live lost stood at 18.7%.

5. Conclusion

Road traffic accidents have continued to be a major problem in Nigeria where fatalities, injuries vehicles involved and causes of the accidents were found to vary over time but occurred mostly in the month of December. Speed limit violation was found to be the main causes of accidents with cars recording the highest rate of accidents. The correlation of accidents and fatalities shows a positive relationship.

6. Recommendations

Based on the findings of the study, the following recommendations have been made:

i) Over loading of both passengers and goods should be avoided more especially during the ember months because these months tend have more passengers and goods.

ii) Speed humps and raised platforms should be constructed on the road particularly at 100 metres (0.062 Miles) from the entry to the exits of a settlement. The speed humps and raised platforms should be careful design and place to maximise their effectiveness.

iii) The Federal Road Safety Corps FRSC, vehicle Inspection Officer (V.I.O) should make their toll-free contact available to passengers as while as communities to report an erring driver that is violating road safety rules and regulations.

iv) Ministry of Transport in collaboration with the Board of Internal Revenue should introduces Polluter Pays Principle (P.P.P) in transport sector this would reduce the number of cars plying the road as many motorists will resort to public transport (Mass Transit) or park and ride.

v) Federal Road Safety Corps (FRSC), The Department of Road Transport Services (DRTS) and Vehicle Inspection Officer (VIO) should be conducting monthly road worthiness inspection of vehicle, particularly vehicles that undertakes long distance journeys. This will check problem of brake failure, tyre burst and Mechanical problem associated with accidents.

REFERENCES

Adesoji, S. B. (2019). Number of cars on Nigerian roads hit 11.8m in a year. Retrieved from https://nairametrics.com/2019/03/11/data-on-the-total-number-of-on-nigerian-roads/. 14/05/2021

Atubi, A. O. (2012). A Monthly Analysis of Road Traffic Accidents in Selected Local Government Area of Lagos State, Nigeria: *Mediterranean Journal of Social Sciences* 3 (11): 47-62 www.richtmann.org.article>view.

Babtie, R. S. (2003). Guidelines for estimating the cost of road crashes in developing countries. Department for International Development London: *Transport Research Laboratory. Project* R7780.

Banik, B. K., Chowdhary, M. A. I., Hossain, E., and Moumdar, B. (2011). Road Accident and Safety Study in Sylhet Region of Bangladesh*: Journal of Engineering Science and Technology* 6(4):493-505

Binbol, N. L. and Zemba, A. A. (2007). Analysis of Rainfall Data for Effective Agricultural Production in Adamawa State, Nigeria: *Multidisciplinary Journal of Empirical Research* 4 (1): 169-175

Davis, A., Hacker, E., Savolainen, P. T., and Gates, T. J., (2015). Longitudinal Analysis of Rural Interstate Fatalities in Relation to Speed Limit Policies. Transportation Research Record: *Journal of the Transportation Research Board*, 2514, 21–31

Eze, B. (2012). Road Traffic Accidents in Nigeria: A Public Health Problem. *AFRIMEDIC Journal* 2 (7): 33-35.

Galtima, M. (1999). Transport and Environment: Journal *of the Nigerian Institute of Transport Technology, Zaria* 1 (5): 12-25.

Global Logistics Cluster (2019) Nigerian Road Network Retrieved from https://dlca.logcluster.org/plugins/servlet/mobile?contentId=853387#content/view/853387. 17/02/2021

Iwena, O. A. (2015). Essential geography for senior secondary schools. Sixth edition, Tonad Publishers Lagos/Lagos expressway, Obafo, Ogun State

Jacobs, G., Aeron-Thomas, A., and Astrop, A. (2000). Estimating global road fatalities. Crowthorne, *Transport Research Laboratory, TRL Report, No. 445*.

Jetsada, K., Thaned, S and Wichuda, S. (2016). A Correlation of Traffic Accident Fatalities, Speed Enforcement and the Gross National Income of Thailand and its Cross-border Countries: *International Journal of Technology*, 7: 1141-1146

Kopits, E., Cropper M. (2003). Traffic fatalities and economic growth. Washington, DC, The World Bank, *Policy Research Working Paper No. 3035.*

Mubarak, H. M., Jamilu, I. M. and Magaji, S. (2015). An Observation of Traffic Laws Violations by Motorists in Dutse Metropolis, Jigawa State, Nigeria. *The International Journal of Humanities & Social Studies*: 3 (7): 438-444, www.theijhss.com.

National Bureau of Statistics (2018). Vehicles in Nigeria. Retrieved from https://m.guardian.ng/features/vehicles-in-nigeria-hit-11-7-million/amp/ 19/07/2021

National Bureau of Statistics (2019). Transport Data Full Year. Retrieved from https://www.proshareng.com/news/TRANSPORTATION/11-072-Road-Traffic-Crashes-Occurred-in-2019---NBS/51441 24/04/2021

National Population Commission (2006). Population and Housing Census of the Federal Republic of Nigeria.

Ogunbodede, E. F. (2008). Urban road transportation in Nigeria from 1960 to 2006: problems, prospects and challenges: *Ethiopian Journal of Environmental Studies and Management* 1 (1): 7-18

Ohakwe, J., Iheanyi, I., and Chikezie, D. C. (2011). Analysis of Road Traffic Accidents in Nigeria: A Case Study of Obinze, Nekede, Iheagwe Road Imo State, South Eastern, Nigeria, *Asian Journal of Applied Sciences* 4 (2): 166-175,

Okeafor, J. P. (2019). Traffic offences and fines in Nigeria by FRSC. Retrieved from https://naijauto.com/safe-driving/traffic-offences-and-fines-in-nigeria-3150, 13/05/2021

Omenihu,F. C., Onundi, L. O., and Alkali, M. A. (2016). An analysis of building collapse in Nigeria (1971-2016): Challenges for Stakeholders: *Annals of Borno*. 26: 113-140.

Owunari, S., Davies, E. H., Ekuk, E. A. (2019). Time Series Analysis of Road Traffic Accidents in River State, Nigeria. *Ianna Journal of Inter-disciplinary Studies* 1 (1): 120-134 www.researchers.net>download.

Peden M., McGee K, Krug, E. (2000). Injury a leading cause of the global burden of disease (eds), Geneva World Health Organization http://whqlibdoc.who.int/publications/2020/ 9241562323.pdf, accessed 10 October 2020

Spasova, Z. B. (2012). Monthly And Seasonal Distribution Of Road Accidents in Sofia, Retrieved from: https://www.researchgate.net/publication/318745099_Monthly_And_Seasonal_Distribution_Of_Road_Accidents_in_Sofia. 30/07/2021

This Day (2017). What is Dangerous Driving Road Safety Article. Retrieved from https://www.thisdaylive.com/index.php/2017/08/05/what-is-dangerous-driving/ 13/05/2021.

Thuso M. (2011). The impact of traffic law enforcement on road accident fatalities in Botswana: *Journal of Transport and Supply Chain Management.* 5(1): 264-277.