AN ANALYSIS OF DEATHS FROM ROAD TRAFFIC ACCIDENTS IN LAGOS STATE, NIGERIA

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Abstract
The major objective of this paper is to analyze the reported deaths from road traffic accidents in Lagos State, Nigeria. The study used mostly secondary data. The data were obtained for a period of thirty-two years (32) from 1970-2001. The 16 harmonics for the selected Local Government Areas considered contribute above 90% of the total variance in the time series. This means that more than 90% of deaths from road traffic accidents in Lagos State could be attributed to recklessness on the part of drivers, ignorance of high way codes, over speeding etc. Also, the dominant cycles of deaths from road traffic accidents observed in the study area have periodicities of 32.00, 10.67 and 4.0 years with the most dominant being 32 years. Based on the findings, recommendations were proffered.

Introduction
There are some accident characteristics which are common to a number of developing countries and yet are some what

different from those in developed countries. For instance, in the third world, a relatively high proportion of fatalities are pedestrians and children aged under 16 years and many fatal accidents involve trucks, buses and other public service vehicles (Downing, 1991).

Roads are often built through areas where economic activity already exists, thus creating conflict over space between road users and the local population. People also tend to settle near roads because of the increased economic activity. This is a dynamic process involving changing populations, changing settlements, changing migration patterns and changing needs, yet these changeable conditions are generally not considered in the design and construction of roads. Nantulya and Rich (2003) call for a paradigm shift in road safety and transportation planning so that the needs of all road users both in the rural and in the urban areas are taken into account.

One area of focus in road traffic research in developed countries in the 21st century is on road safety impact of highway projects. The interest of research in this area was triggered by the classification model adopted by the U.S. National Committee on injury prevention and control from road traffic accidents in 2001 aimed at enhancing safety on the highways and reducing road traffic accidents (Al-Masaeid et al, 2001; Hauer et al, 2003; Tarko et al, 2004). Also, experience from other countries showed that small roundabouts were an effective speed reducing measure (Simon, 1991). He also concluded that small roundabouts increased safety. Minnen (1992) reported that new roundabouts reduced the total number of accidents by 50% and the number of casualties by 80%.

Nigeria, like other developing countries, is experiencing a rapid increase in motorization without having

adequate road traffic safety mechanisms in place to control the growing number of road traffic crashes and injuries. As reported for other low-and-middle income countries, the main victims are pedestrians, cyclists and public transport passengers (Filani and Gbadamosi, 2007).

In Nigeria, the road traffic accident situation over the last three decades has been particularly disturbing. In 1976, there were 53,897 road traffic accidents resulting in 7,717 deaths. Although, in 1981, the magnitude reduced to 5,114 accidents, but the fatality increased to 10,236, which means that there was an average of 96 accidents and 28 deaths for everyday of that year (Ogunsanya, 1990). The situation in subsequent year has not been any better. The number of people killed in road accidents between 1990 and 2005 rose from 28,253 to 37,873 and the fatality rate remains consistently high (Atubi, 2009b).

Road traffic accident rates all over the world show great disparity, most especially between the developed and developing countries. It has been shown by research that the degree of severity of accidents and the frequency with which they occur in the developed continents such as North America and Europe are decreasing, while in the developing continents of Africa and Asia, the rates are increasing (Ghee et al, 1997; Yang et al, 2003; Afukaar et al, 2003; Odero, et al 2003; Atubi, 2010a, 2010c).

Based on data that are at best conservative estimates, Nigeria is a country with a serious and growing road accident problem that is among the worst in the world (Asogwa, 2002). Analysis of global statistics indicates that fatality rates (per licensed vehicle) in developing countries are high in comparison with those of developed countries (Adeniji, 2002). African countries in particular have rates often 30 to 50 times greater than those in the countries of Western Europe.

Nigeria has the highest rate of deaths from motor accidents in the world, according to statistics compiled by the Federal Road Safety Commission (FRSC). The country leads 37 other nations with 240 deaths in 10,000 vehicles crashes. Ethiopia ranked second with 200 deaths per 10,000 vehicles, Malawi took the third position with 180 deaths (The Guardian Newspaper, Lagos, 19 December, 1989, P. 12, Atubi, 2010b).

Various road safety strategies and counter measures have been used at different stages of network development. This method of seeking to prevent road accident mainly involves conscious planning, design and operations of roads. One of the most important factors in this method is the systematic identification and treatment of hazardous locations. The main objective of the study is to develop a model necessary to identify these hazardous locations on roads commonly termed as black spots. In general, the various factors that cause accidents can be broadly categorized into road related, vehicle related and driver related (Atubi, 2012).

Study area

Lagos State is a suitable case study because it hosts metropolitan Lagos, Nigeria's major traffic centre, fastest growing city, and most heavily motorized urban area in the country. Consequently, the state has one of the highest accident and casualty rates in the country (Federal Republic of Nigeria, 1997, p. 6). Moreover, the traffic situation in Lagos State is bad because of the absence of effective planning, vehicle-misuse, poor management, inadequate street parking, traffic congestion, delays and accidents among other contributory factors.

Lagos State is situated in the South Western corner of Nigeria. This elongated state spans the Guinea Atlantic coast for over 180km, from the Republic of Benin on the west to its

boundary with Ogun State in the east (Figure 1), while Lagos State is the smallest in Nigeria, it has over 5 percent (i.e. 9,013,534) of the country's estimated 140 million people (National Population Census, 2006). Its rate of population growth has been in excess of 9 percent per annum, or 25,000 per month or 833 per day or 34 per hours in the last decade (Lagos urban Transport Project, 2002). This population increase has been accompanied by a corresponding increase in motor vehicles and traffic accidents. However, accident rates in Lagos State are still very much on the high side compared to other states in the federation. But, fatalities and non-survival indices for the state are on the decline. This is attributable to its high level of traffic congestion (which reduces the probability of the high fatality accidents resulting from over speeding) and accessibility to good post – crash medical care in the Lagos metropolitan area.

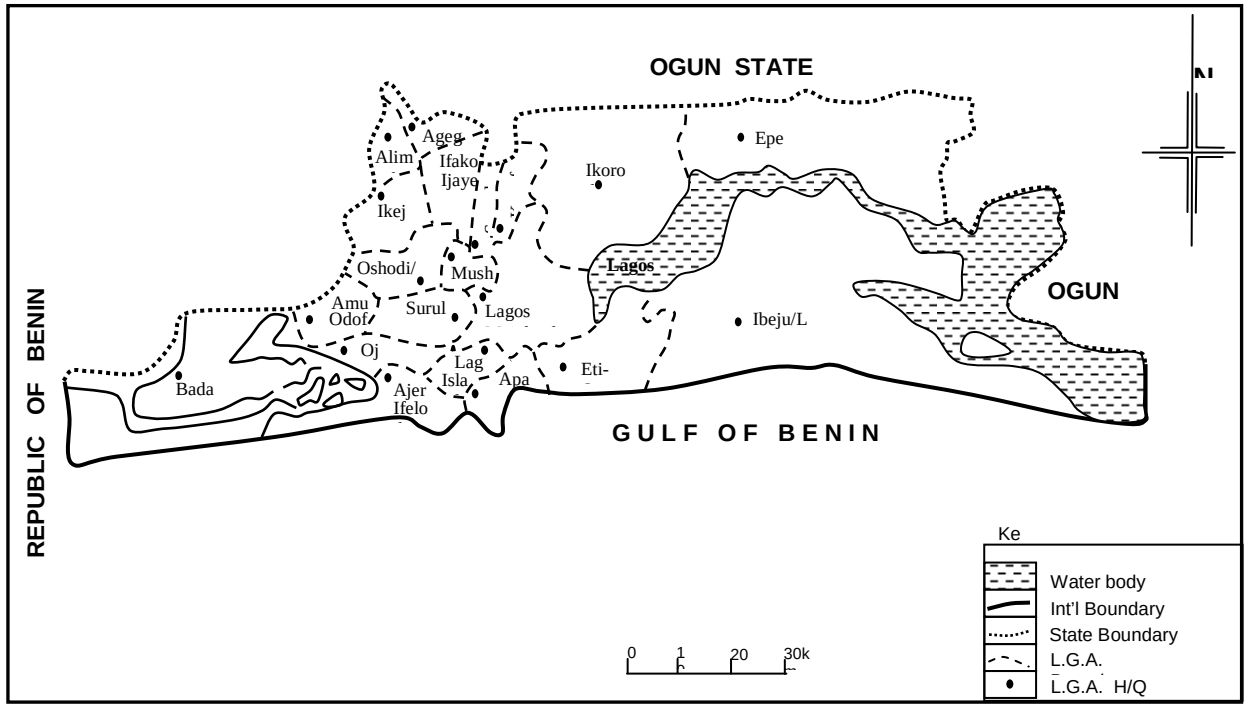

Fig. 7.1: ***Map of Lagos State showing the 20 Local Government Areas.***
Source: Lagos State Ministry of Environment and Physical Planning (1999)

Materials and Methods

Data for the study were mainly obtained from the Nigeria Police Force accident records, the Federal Road Safety Commission (FRSC) and were complemented with data from research reports and articles and national statistical abstracts and newspapers. The author reviewed the statistics of deaths for the year 1970 to 2001, disaggregated by administrative councils.

The harmonic analysis was used to estimate the contributions of particular bands of frequencies to the overall variance in terms of a fluctuating time series. However, the justification for choosing Ikeja, Lagos Island, Lagos Mainland and Ajeromi/Ifelodun Local Government Areas for this study lies in the fact that they carry more than fifty (50%) percent of the vehicular traffic in Lagos State (Atubi, 2007).

Results/Findings and Discussion

Table 7.1 and Figure 2 and 3 revealed the reported number of deaths from road traffic accidents in Lagos State from 1970 – 2001. it is observed from the table that the highest number of deaths from road traffic accident was recorded in Ikeja Local Government Area with a total of 1825 representing 15.78% of the total death from motor traffic accidents. This is followed by Lagos Island Local Government Area with 1693 deaths representing 14.64%. Ajeromi/Ifelodun Local Government Area recorded 1148 deaths representing 9.93% of the total deaths.

Table 7.1: ***Reported number of deaths from RTAs in Lagos State, 1970-2001***

Year	Lagos Island	Ajeromi/Ifelodun	Ikeja	Lagos Mainland
1970	22	20	26	16
1971	20	19	22	18
1972	25	22	28	20
1973	70	60	78	60
1974	50	30	60	28
1975	73	45	78	40
1976	80	50	80	40
1977	66	42	69	42
1978	100	58	98	50
1979	85	67	89	60
1980	100	72	102	70
1981	92	60	94	50
1982	50	35	53	52
1983	60	30	62	27
1984	63	38	62	36
1985	105	96	104	91
1986	74	52	73	50
1987	64	40	68	41
1988	91	51	90	49
1989	60	35	63	33
1990	56	30	60	28
1991	29	15	32	13
1992	26	15	28	12
1993	20	17	22	16
1994	20	16	22	14
1995	16	16	18	14
1996	22	18	24	19
1997	30	21	32	18
1998	32	20	38	21
1999	30	19	40	20
2000	30	20	50	18
2001	32	19	60	29
Total	1693	1148	1825	1095
%	14.64	9.93	15.78	9.47

Source: Lagos State Police Command, Ikeja 2004

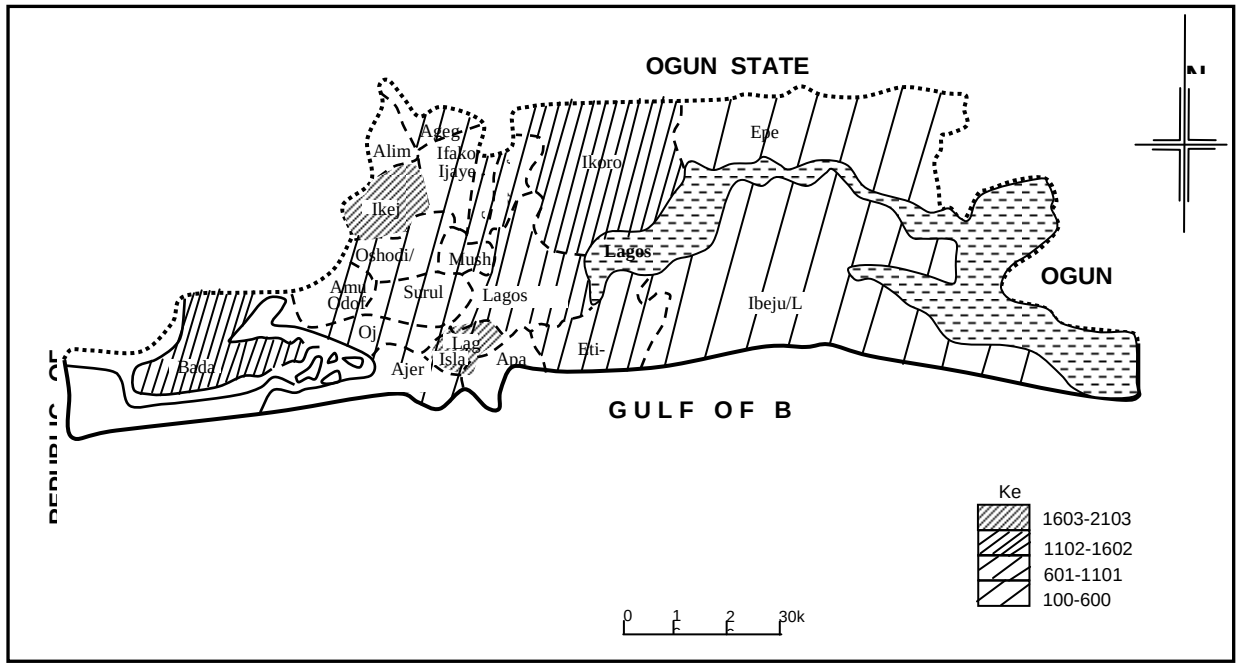

Fig. 7.2: ***Chloropleth Map Showing the Reported Number of deaths from Road Traffic Accident in Lagos State (1970-2001)***

Source: Lagos State Ministry of Environment and Physical Planning (1999)

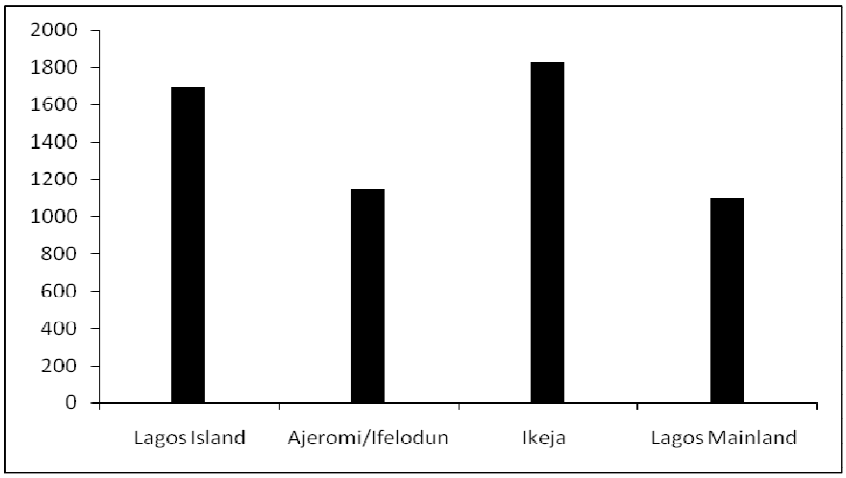

Fig 7.3: ***Reported deaths from RTAs in Lagos State*** (Adapted from Table 7.1)

Table 7.1 shows that Ikeja, Lagos Island and Ajeromi/Ifelodun Local Governments Areas are the three Local Governments with the highest number of deaths from road traffic accidents in the study area. These three Local Governments emerged as the ones with highest road traffic accident records. Ikeja Local Government Area in particular also appear among the Local Governments with highest number of deaths from road traffic accidents. All these then show that Ikeja, Ajeromi/Ifelodun, Lagos Mainland and Lagos Island Local Government Areas are very notorious for road traffic accidents and associated consequences such as deaths and injuries.

In an attempt to examine the temporal patterns of deaths from road traffic accidents in Lagos State, the time series and trend analysis of the accident statistics leading to deaths in respect to each of the selected Local Government Areas were undertaken. The results of these analyses are shown in (Figure

4 and Table 7.2). This figure revealed the time series as well as trend of death from road traffic accidents for Lagos State. The year 1988 recorded the highest figure of 478 while the least was in 1972 with 209 deaths from road traffic accidents. The trend of deaths from road traffic accidents as shown in figure 4 reveals that the phenomenon is on the increase; in other words, the trend of deaths occurrence from road traffic accidents is on the increase in Lagos State between 1970 and 2001 as revealed by the trend analysis.

On the arithmetic mean of reported number of deaths from road traffic accidents in Lagos State, generally the 1st harmonic contributes the highest percentage variance of 27.81%, closely followed by the 3rd and 8th harmonics contributing 22.15% and 9.57% of the total variance respectively (See Table 3). The lowest percentage variance of 0.20% is contributed by the 7th harmonic. The 16 harmonics contribute 98.56% of the total variance in the time series.

Table 7.2: ***5 Year Moving Averages of Reported Number of Deaths from Road Traffic Accidents in Selected Local Government Areas in Lagos State (1970-2001)***

S/N	Lagos State	Lagos Island	Ikorodu	Ajeromi/ Ifelodun	Badagry	Epe	Ikeja	Mushin	Lagos Mainland
1	208.60	37.40	15.40	30.20	15.60	11.40	42.80	32.00	33.20
2	250.00	47.60	19.40	35.20	17.20	12.20	53.20	37.20	37.60
3	299.60	59.60	25.40	41.40	20.60	13.00	64.80	41.20	42.00
4	33300	67.80	25.40	45.40	24.20	14.00	73.00	38.80	40.00
5	340.80	73.80	25.20	45.00	25.80	15.20	77.00	43.00	46.40
6	379.40	80.60	27.20	52.40	30.80	16.00	82.80	47.00	52.40
7	407.80	86.20	26.60	57.60	32.60	17.40	87.60	49.60	54.40
8	415.00	88.60	22.60	59.60	30.60	19.00	90.40	49.60	56.40
9	410.00	85.40	23.40	58.40	28.60	21.00	87.20	47.20	51.80
10	379.80	77.40	24.00	52.80	25.00	19.60	80.00	42.60	47.00
11	35120	73.00	23.00	47.00	22.80	19.20	74.60	42.60	51.20
13	359.20	74.00	21.00	51.80	22.80	18.80	75.00	40.60	51.20
13	367.80	70.40	23.00	50.20	22.80	17.40	70.80	39.60	49.00
14	393.60	73.20	24.40	51.20	22.80	16.20	73.80	42.00	53.40
15	441.00	79.40	24.00	55.40	24.60	18.20	79.40	43.00	52.80
16	478.20	78.80	21.80	54.80	24.00	19.40	79.60	36.60	40.20
17	460.00	69.00	22.20	41.60	23.80	19.60	79.30	29.40	32.80
16	437.60	60.00	21.60	34,20	23.80	19.60	70.80	24.80	27.00
19	417.40	52.40	18.40	29.20	21.40	17.60	62.60	19.80	20.40
20	391.40	38.20	16.80	22.40	20.40	16.40	54.60	15.80	16.60
21	372.80	30.20	15.80	18.60	18.40	14.40	41.00	13.00	13.30
22	36060	22.20	13.40	15.80	14.80	12.60	32.80	13.40	15.00
23	37040	20.80	10.20	16.40	14.00	11.60	24.40	14.80	16.20
24	383.20	21.60	10.00	17.60	14.00	11.40	22.80	15.40	17.20
25	377.80	24.00	9.60	18.20	12.20	10.80	23.60	16.20	18.40
25	368.20	26.00	9.60	18.80	12.20	11.00	26.80	16.40	19.20
27	360.20	28.80	9.40	19.60	12.40	10.80	30.40	17.00	21.28
28	371.80	114.80	10.40	19.80	12.00	11.00	36.30	25.20	29.60

Source: Analysis of Data Collected

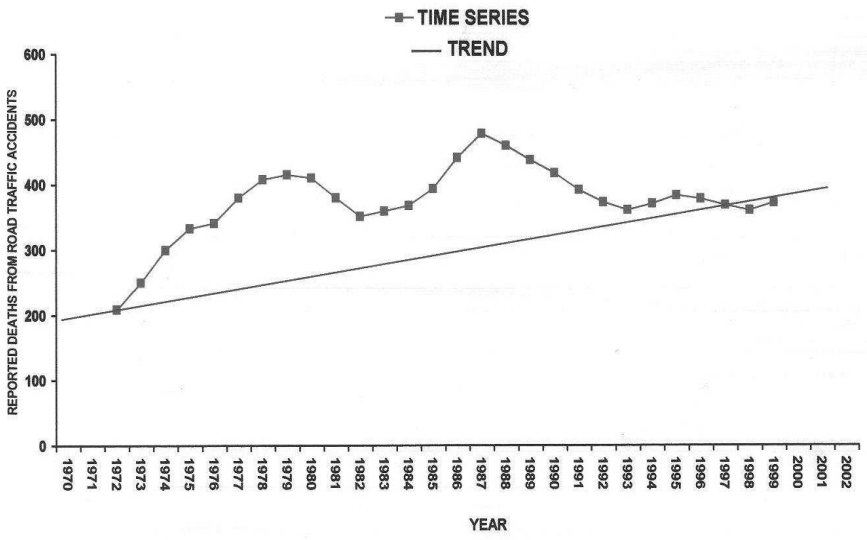

Fig. 7.4: ***Time series and trend of the reported deaths from road traffic accidents in Lagos State (1970-2001)***

Table 7.3: ***Variance spectra of reported number of deaths from RTAs for selected LGAs in Lagos State***

	Lagos		Lagos Island		Ikorodu		Ajeromi		Badagrey		Epe		Ikeja		Mushin		Lagos Mainland	
Harmonics	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**	**%V**	**Amp**
1	27.81	73.50	4.36	22.37	50.27	8.20	57.26	21.78	50.21	8.10	59.03	5.00	58.75	29.98	33.21	16.92	47.14	19.10
2	3.77	27.05	5.59	25.32	6.42	2.93	0.11	0.95	7.51	3.13	0.45	0.44	0.25	1.97	1.55	2.39	4.12	5.65
3	22.15	65.59	7.48	29.31	3.49	2.16	4.87	6.35	9.41	3.51	7.30	1.76	12.39	13.77	1.23	2.58	4.43	3.33
4	1.63	17.7S	5.05	24.08	1.35	1.34	3.30	5.23	1 78	1.52	7.27	1.75	0.15	1.53	4.83	5.1	5.28	6.39
5	7.56	38.33	5.31	24.68	0.83	1.05	6.08	7.10	2.95	1.96	3.00	1.15	3.56	7.33	1.06	2.39	1.58	3.50
6	9.35	42.62	8.71	31.62	9.15	3.50	4.59	6.16	7.53	3.13	2.20	0.96	4.28	8.09	5.71	5.54	5.92	6.30
7	0.20	6.21	4.30	23.48	0.67	0.94	2.53	7.62	1.50	1.40	0.97	0.64	0.16	1.59	2.10	3.36	1.19	3.03
6	9.57	43.12	9.17	3.44	6.09	2.86	4.92	6.38	1.1S	1.25	4.15	1.33	3.55	7.33	5.81	5.59	6.44	7.06
9	1.18	15.11	5.55	2.24	10 32	3.30	0.39	1.79	0.57	0.66	150.00	0.30	0.17	1.64	1.54	2.88	1.55	3.47
10	3.40	25.63	7.77	29.37	1.25	1 2S	2.42	4.48	0.21	0.52	0.80	0.58	1.04	3.98	4.65	5	5.32	6.41
11	0.40	8.36	5.23	24.02	2.57	1 85	3.14	5.10	9.53	3.53	3.67	1.25	0.30	2.15	4.91	5.14	7.6	7.67
12	0.51	9.97	5.51	25.15	0.19	0.51	0.15	1.11	0.61	0.39	2.80	1.09	0.36	2.35	1.81	3.12	6.88	2.61
13	1.95	19.44	4.21	21.08	1.89	1.5S	4.74	6.27	0.27	0.59	0.23	0.32	3.65	7.47	5.09	5.23	6.32	6.99
14	3.88	27.46	8.38	31.01	0.04	0.23	1.18	3.12	1.12	1.21	1.71	0.85	1.35	5.32	0.45	1.55	6.66	2.26
15	1.84	10.92	6.55	27.42	1.72	1 52	0.49	2.01	0.71	0.96	1.57	0.83	0.57	2.97	0.7S	2.06	0.23	1.35
16	3.36	25.56	6.32	26.94	0.19	0.50	1.33	3.38	0.36	0.69	0.04	0.13	0.35	2.31	0.00	0.06	0.01	0.31

% v = Percentage variance
Amp = Amplitude

Similarly, for Lagos Island Local Government Area, the 8th harmonic contributes the highest percentage variance of 9.17%, closely followed by the 6th harmonic of 8.71% and the 14th harmonic which has 8.38% variance of the total variance observed. The 13th harmonic contributes the lowest percentage variance of 4.21% to the total variance of the time series. The total percentage variance contributed by all 16 harmonics is 99.84%. This means that 99.84% of deaths from road traffic accidents in Lagos State could be attributed to recklessness on the part of drivers; ignorance of highway code, driving under the influence of alcohol, wrongful overtaking, over speeding, pot holes etc leaving 0.16% to other factors.

For Ajeromi/Ifelodun Local Government Area, the 1st harmonic accounts for the highest percentage variance of 57.26%, closely followed by the 5th and 8th harmonics with percentage variances of 6.08% and 4.92% respectively. The 2nd harmonic contributes the lowest percentage variance of 0.11%. The 16 harmonics contributes a total of 97.6% to the temporal pattern of reported death from road traffic accident occurrence over that part of Lagos State.

Similarly, for Ikeja Local Government Area, the 1st harmonic contributes the highest percentage variance of 58.75%, closely followed by the 3rd and 6th harmonics which contributes 12.39% and 4.28% of the variance respectively. The 4th harmonic contributes the lowest percentage variance of 0.15%. All 16 harmonics contribute a total of 91.38% of the variance in the temporal occurrence of reported number of deaths over the 32 years.

For Lagos Mainland Local Government Area, the 1st harmonic contributes the highest percentage (47.14%) of the total variance. Closely followed by the 11th and 8th harmonics which contributes 7.60% and 6.44% of the variance respectively. The 16th harmonic contributes the lowest percentage variance

(0.01%). All 16 harmonics contributes a total of 94.87% of the variance in the temporal occurrence of reported number of deaths from road traffic accidents over the 32 years. In other words, 94.87% of the reported deaths from road traffic accident variation in the long period of accident occurrence of Lagos State are composed of different cycles.

Table 4 shows that for Lagos State as a whole, dominant cycles of reported number of deaths from road traffic accidents observed have periodicities of 32.00, 10.67 and 4.00 years with the most dominant being 32 years. This means that the dominant and strongest number of deaths from road traffic accident pattern over Lagos State repeats itself every 32 years. This also means that if the traffic situation is not given due attention by the relevant authorities high rates of reported number of deaths from road traffic accidents will repeat itself by the year 2033 in the first instance and the year 2017. Variance spectra explaining the percentage variance explained by each harmonic have been drawn for Lagos State (see Figure 5).

Table 7.4: ***Dominant Deaths from Road Traffic Accidents in Lagos State***

Location		Cycles (Years)	% Variance	Amplitudes
Lagos State	1SI	32.00	27.81	73.50
	2nd	10.67	32.15	65.59
	3rd	4.00	9.57	43.12
Lagos Island	1st	4.00	9.17	32.44
	2nd	5.33	8.71	31.62
	3rd	2.29	8.38	31.01
Ikorodu	1st	32.00	50.27	8.20
	2nd	3.56	10.82	3.80
	3rd	5.33	9.15	3.50
Ajeromf/lfelodun	1SI	32.00	57.26	1.78
	2nd	6.40	6.08	7.10
	3rd	4.00	4.92	6.38
Badagry	1st	32.00	50.21	8.10
	2nd	2.91	9.55	353
	3rd	10.67	9.41	3.51
Epe	1SI	32.00	59.03	5.00
	2nd	10.67	7.30	1.76
	3rd	8.00	7.27	1.75
Ikeja	1SI	32.00	58.75	29.98
	2nd	10.67	12.39	13.77
	3rd	5.33	4.28	8.09
Mushin	1SI	32.00	53.21	16.92
	2nd	4.00	5.81	5.59
	3rd	5.33	5.71	5.54
Lagos Mainland	1st	32.00	47.14	19.10
	2nd	2.91	7.60	7.67
	3rd	4.00	6.44	7.06

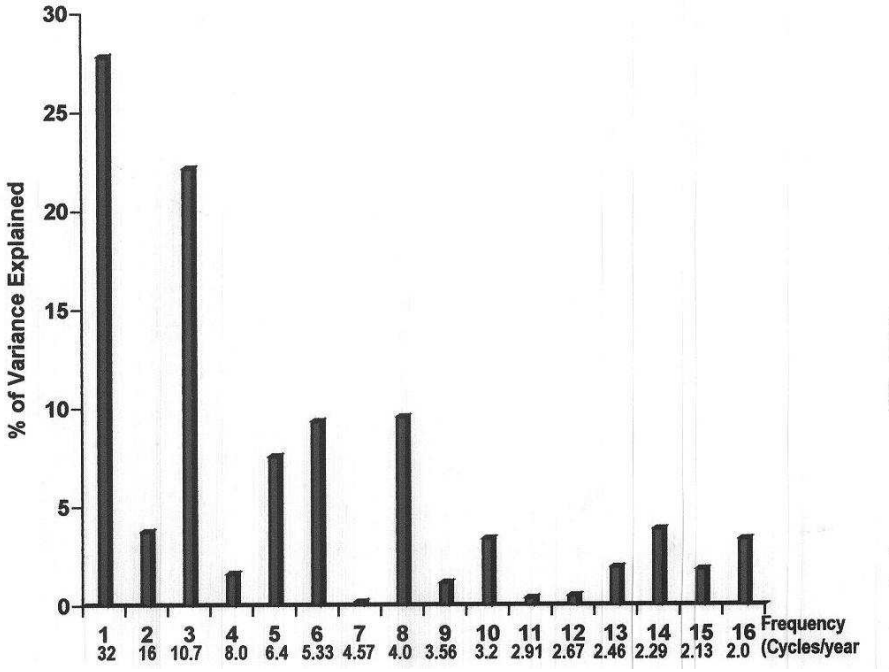

Figure 7.5: ***Variance Spectrum for Lagos State on the Number of Deaths from Road Traffic Accidents***

Policy implications and Recommendations

By the serious road traffic accident situation in the study area, Local Government Areas like Lagos Island, Lagos Mainland, Ajeromi/Ifelodun and Ikeja Local Government Areas can be described as accident prone areas, because they are all associated with high accident rate, high number of deaths, high number of injuries and so on. This trend therefore, suggest that these Local Government Areas of Lagos State are associated with the menace of road traffic accidents, and these deserves urgent attention and appropriate policy intervention.

Since the driver of a vehicle is the most important determinant of the occurrence of an accident, the quality of drivers on the roads in the study area cannot be over emphasized. Consequently, training and retraining of drivers should be a basic effort towards reducing the carnage on roads. The training and retraining of drivers constitu formidable means of effectively dealing with the issue of road traffic accident reduction.

In addition to the above, efforts should be made to provide parking spaces, sidewalks, road signs at appropriate places, adequate road and pavement markings and over head bridges at strategic points/places in all major roads in Lagos State.

These measures, if well executed, will contribute positively towards reducing the ugly incidence of road traffic accident in Lagos State and Nigeria in general. The current poor road safety record in Nigeria is not inevitable. As other countries like the U.S.A. and Britain have shown, population and vehicular traffic growth does not have to lead to increase in traffic crashes, deaths and permanent injuries as these undesirable outcomes can be minimized through adequate traffic accident control and injury prevention measures (Atubi, 2006).

Conclusion

Road traffic accident, a well documented consequence of motorization is the leading cause of deaths in Nigeria. While accidents occur in all modes of transport, including rail ways, no mode approaches the importance of the motor car in the scale of deaths and injuries. Living safely is a challenge that must be accepted by every one if we are to continue to move forward in an ever-changing society.

It is important to note that accident in any country and in Nigeria for that matter, cannot be found in a straight-jacket application of a package of "safety policies" without adequate understanding of the intricacies of the phenomenon. All these knowledge can be obtained through constant scientific investigation into the mechanical, social, cultural and physical characteristics of the road users, the vehicles and the road way as they all affect accidents.

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