

Analysis of the Variance Spectra (Anovas) of Deaths from Road Traffic Accidents in Lagos State, Nigeria

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Abstract

This paper examines the analysis of variance spectra (ANOVAS) of deaths from road traffic accidents in Lagos State, Nigeria and to suggest preventive and corrective safety approaches towards reducing deaths from road traffic accident in the study area. The variance spectra for Ikorodu, Ajeromi/Ifelodun, Lagos Island, Lagos Mainland; Ikeja, Epe and Badagry Local Government Areas shows no regularity in the occurrence of deaths from road traffic accident patterns. However, on the average, 90% of the reported number of deaths from road traffic accident variation in the long period of accidents occurrence of Lagos State are composed of different cycles. This means that 90% of deaths from (RTA's) could be attributed to recklessness on the part of drivers, ignorance of highway codes, driving under the influence of alcohol, wrongful overtaking, over speeding etc. Based on the findings, policy recommendations were proffered on how to reduce the ugly incidence of road traffic deaths in Lagos state and Nigeria in general.

Keywords: Variance Spectra; deaths; traffic; accidents; road; Lagos State; vehicles.

I. Introduction

Road traffic accident rates and fatality rates in the industrialized countries have tended to exhibit pronounced downward time trends. Some Scholars i.e. Oppe (1991) interpret the downward trend as evidence of experimental learning, while others like Peltzman (1975), Harvey and Durbin (1986) and Broughton (1999) treat it as a nuisance parameter that happens to be essential for model fitting.

In almost all countries in Africa, Asia and Latin America road traffic crashes have become one of the leading causes of death in order children and economically active adults between the ages 30 and 49 years (Murray et al, 1996; Ross et al, 1991; Jacobs et al, 2000 and Atubi 2012g). despite this burgeoning problem, little attention has been paid to road traffic injury prevention and treatment in most developing countries. Efforts to combat the problem of injuries have in most cases been hampered by paucity of funds and lack of relevant data. It is however a fact that organized road safety

research, adoption of cost – effective accident reduction and prevention techniques and trauma care are associated with a decreased road traffic mortality and morbidity (Murray et al, 1996; Mock et al, 1998).

A study of road traffic accident trends in Nigeria between the period 1960 and 2001 revealed a sharp increase in fatal accident occurrence. Between 1960 and 1969, it was observed that over 18,000 deaths occurred as a result of road accidents. By the third and fourth decades (1980-2001), this figure increased to about five times, that is, more than 116,022 deaths (Omojola, 2004; Atubi, 2006). The number of people killed in road accidents between 1990 and 2005 rose from 28,253 and the fatality rate remains consistently high (Atubi, 2009c).

Thus, Nigeria's annual 8,000 to 10,000 accident deaths between 1980 and 2003 were a personal and traffic safety, problem, as well as a terrible waste of human resources for the country. In terms of the personal safety, problem Nigeria and indeed Lagos State is a high risk region with an average of 32 traffic deaths per 1,000 people (Filani et al, 2007; Atubi, 2010c). This is very high compared with the united state's 1.6 traffic deaths per 1,000 population and with the united kingdom's 1.4 deaths per 1,000 people (Trinca et al, 1988). In terms of traffic safety, there are on average 23 accidents per 1,000 vehicles in Nigeria (i.e. 230 per 10,000 vehicles) far in excess of the accident rate in the USA (2.7 accidents per 10,000 vehicles) and the UK (3.2 accidents per 10,000 vehicles).

According to data from the Nigeria Federal Road Safety commission, the country has the highest rate of death from motor accident in Africa; leading 43 other nations in the number of deaths per 10,000 vehicles crashes (FRSC, 2006, Obinna, 2007. P. 35). Nigeria is followed by Ethiopia, Malawi, and Ghana with 219,183 and 178 deaths per 10,000 vehicles respectively (Daramola, 2004).

Road traffic accidents statistics in Nigeria reveal a serious and growing problem with absolute fatality rate and casualty figure rising rapidly. In majority of developing countries, accident occurrence and related deaths are relative to either population or number of vehicles. Ironically, in Nigeria, studies have indicated that better facilities in terms of good quality and standardized roads have been accompanied by increasing number of accidents (Onakomaiya, 1988; Gbadamosi, 2002; Atubi and Onokala, 2009). This is totally contrary to the trends in countries where even the level of sophisticated road network and volume of vehicular traffic are much higher (Atubi, 2010a).

2. 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.

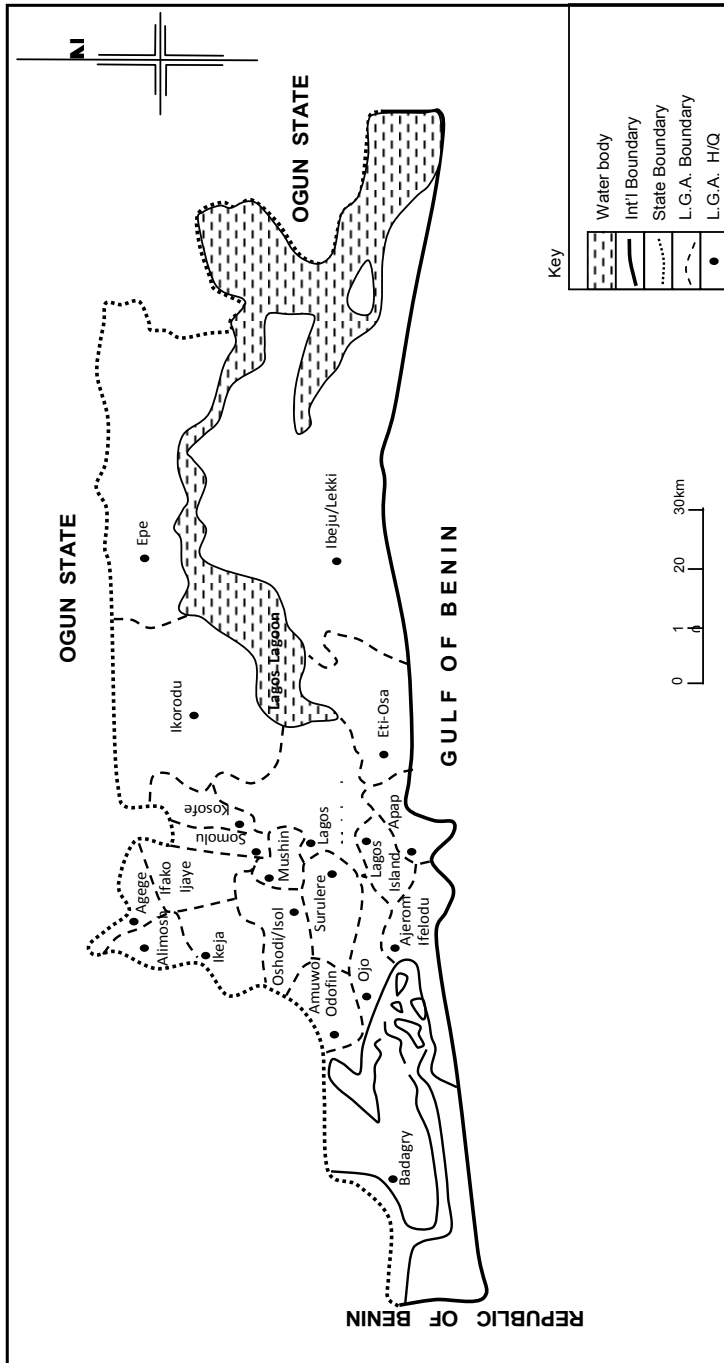


FIG. 1: MAP OF LAGOS STATE SHOWING THE 20 L.G.A.S

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

3. Research Methodology

The data used in this study were derived from secondary source. The secondary data includes records of road traffic accidents (RTA) characteristics, such as total number of accidents, total number of deaths, total number of injuries, fatal, serious and minor cases of road traffic accidents in Lagos State for a period of 32 years (i.e. 1970-2001). This study covers the 20 local government areas of Lagos State, but only eight (8) local government areas were considered for this particular analysis. This is because the eight local government areas are relevant to the harmonic analysis behaviour. They were selected based on available data as well as the nature of the study area because there were only eight local government areas with complete data from 1970-2001.

4. Discussion of Results/Findings

On the arithmetic mean 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 (Table I). 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 I: Variance spectra of number of deaths from Road Traffic Accidents

Harmonics	Lagos		Lagos Island		Ikorodu		Ajeromi		Badagrey		Epe		Ikeja		Mushin		Lagos Mainland	
	%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	17.75	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
8	9.57	43.12	9.17	3.44	6.09	2.86	4.92	6.38	1.18	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	1.28	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	1.58	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	0.78	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 99.48%.

For Ikorodu Local Government Area, the 1st harmonic contributes the highest percentage variance 50.27% and the 9th harmonic which has 10.82% variance of the total variance observed. This is closely followed by the 6th harmonic of 9.15%. The total percentage variance contributed by all 16 harmonics is 96.94%. The 14th harmonic contributes the lowest percentage variance of 0.04% to the total variance of the time series.

Similarly, the 1st harmonic accounts for the highest percentage variance of 57.26% for Ajeromi/Ifelodun Local Government Area, 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 0.11%. The 16 harmonics contributes a total of 97.6% to the temporal pattern of reported death from road traffic accident occurrence over the part of Lagos State.

For Badagry Local Government Area, the 1st harmonic contributes the highest percentage (50.21%) of the total variance, closely followed by the 11th and 3rd harmonics which contributes 9.53% and 12.59% of the variance respectively. The 10th harmonic contributes the lowest percentage variance (0.21%). All 16 harmonics contributes a total of 95.48% of the variance in temporal occurrence of number of deaths from road traffic accidents over the 32 years. In other words, 95.48% of the total variation in long period of number of deaths from road traffic accidents occurrence in Badagry Local Government Area are composed of different cycles.

Similarly, 1st harmonic account for the highest percentage variance of 59.03% for Epe Local Government Area, closely followed by the 3rd and 4th harmonic with percentage variances of 7.30% and 7.27% respectively. The 16th harmonic contributes the lowest percentage variance (0.04%). The 16 harmonics contributes a total of 96.8% to the temporal pattern of number of deaths from road traffic accident occurrence over that part of Lagos State.

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 death over the 32 years.

Similarly, the 1st harmonic accounts for the highest percentage variance of 53.21% for Mushin Local Government Area, closely followed by the 8th and 6th harmonics with percentage variances of 5.81% and 5.71% respectively. The 6th harmonic contributes to the lowest percentage variance (0.01%). The 16 harmonics contributes a total of 94.74% to the temporal pattern of reported number of death from road traffic accident occurrence over the part of Lagos state.

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 deaths from road traffic accident over the 32years. In other words, 94.87% of the reported number of deaths from road traffic accident variation in the long period of accident occurrence of Lagos State are composed of different cycles. This means that 94.87% of the deaths from road traffic accidents could be attributed to recklessness on the part of drivers, ignorance of highway codes, driving under the influence of alcohol, wrongful over taking, over speeding etc leaving 5.13% to other factors.

5. Implication of Findings/Recommendations

Prevention measures should be taken which would include proper design of road networks as well as the planning of the general public transport system to ensure that it runs in an effective and efficient manner as this would reduce the volume of vehicles plying the roads; these measures must be commenced in the early stages of urban planning.

One area where stakeholders could focus on to work with government would be the improvement of the roads and adjacent road space. The general condition of roads is poor, with potholes and all sorts of obstacles in the way. It is common to see animals on the rural roads, as well as children using them as play grounds. In the urban setting there is a general misuse of the roads. Vehicles are often in adequately parked. In some places, sidewalks do not exist, forcing people to walk on the road. Root causes of the problem are the general lack of education about safe driving and walking, and the inadequate road infrastructure.

To deal with the local government areas that are prone to death from road traffic accidents in Lagos State (i.e. Lagos Island, Ikorodu, Badagry, Ajeromi/Ifelodun, Lagos Mainland, Mushine, Ikeja and Epe) the authorities should provide recommendations for strong political commitment to ensure on a long term basis, appropriate monitoring of the road accident situation in which pertinent decisions can be made.

Government efforts towards road traffic accident reduction in the study area; in the light of the findings of this study should be elaborate, total and wide spread covering every segment of the state. Both the police and the federal road safety commission (FRSC) should consider the whole of the study area as accident prone area, and thus, police, FRSC should be treated accordingly. It is important to say that the setting up of Lagos Metropolitan area transport authority (LAMATA) as an additional law enforcement agents for the maintenance of the roads, towing of broken down vehicles and those involved in road traffic accidents is inevitable.

6. Conclusion

While emphasizing an accident prevention policy, it is important that the policy of government emphasizes a reduction in the amount of people's exposure to the automobile through a deliberate reduction in the need for people to move. Policies such as landuse planning measures and public transport measures should be properly implemented.

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