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Towards Reducing Traffic Accidents on Nigerian Roads: The Role of Engineers

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Abstract:
The objective of this paper is to investigate the factors responsible for the frequency of accidents rates on Nigerian roads, with special emphasis on Lagos roads. In the course of this study the number of injuries, fatalities and the type of vehicles involved in road traffic accidents were obtained. Efforts made in improving the road transport sectors through reforms to enable it contribute to the socio-economic development of the country were analysed. Major other issues and challenges confronting road transport subsector, that incapacitated the sector into contributing to the socio-economic development of the nation were discussed. The identified problems include misuse of roads, indiscipline, carefree attitude of road users, and poor intermodal transport system, poor road maintenance among others. To carry out this study, information was obtained from car users, lorry drivers, Tanker and Trailer drivers, and other vehicles operators generally. Data base compiled by the Police, Federal Road Safety Commission, Lagos State Transport Management Authority, and other relevant agencies were assessed. Careful study of past works and relevant topics were considered for useful information. The studies observed that the government's desire to introduce reforms capable of improving the service delivery, enhance management capacity, create conducive institutional, legal and regulatory framework to check the excesses of the road users has not yielded much dividends. The unnecessary rivalry and political differences between the organs of State and Federal governments, as to who controls the roads, has done more damage to the smooth operations of the roads in Nigeria.

Keywords: *Vehicular characteristics, government policy, accidents, roads condition, federal road safety corps (FRSC)*

1. Introduction

Road traffic accident may be defined as anything which happens by chance, anything occurring unexpectedly and un-designed. (Odugbemi, 2010). Accidents occur when a vehicle collides with another vehicle, pedestrian, animal, road debris or stationary obstructions, such as a tree or utility pole. With a total network of about 193,000 kilometres, Nigeria road sector carries more than ninety percent (90%) of domestic passengers and freight and thereby turn out to be the dominant mode. Road transport plays very important roles in the social and economic life of Nigeria. It is in the centre of connectivity of all other modes of transport. The annual reports on accidents fatalities and serious injuries have been a source a concern to all and sundry. The administration of road transportation in Nigeria shows that the Federal Government is responsible for 34,120km (17.6%) of the road network, State governments 30,500km (15.7%) and local government 129,580km (66.7%) (FMOT, 2007). Consideration is given to government reforms and its effectiveness in addressing the issues and policy thrust and strategies to mitigate the problems. The deterioration of roads across the state often begins with cracks or pot-holes on the road pavements either at the edges or along the drive way, which are noticeable by their shapes, configuration and rate of deformations (Agbonkhese et al., 2013). In determining the cause of an accident, it is often easier to identify the immediate cause rather than the root cause.

According to Eze (2012), accident reconstruction relies on knowledge of the five phases of motor accidents viz: Perception-Reaction (This is the phase where the driver perceives a hazard in front of him and decides on a response. Perception/reaction time is estimated at 1.1 to 1.5 seconds), Avoidance (Braking/Steering: In this next phase, the driver typically engages in some type of avoidance using the front brake, rear brake or a combination. Physical evidence at the scene combined with statements from witnesses can give clues as to what type of avoidance really occurred), Pre-impact Sliding (During braking, drivers may overuse the brakes, resulting in locking of the front and/or rear wheel. If the front wheel locks accidentally, the driver will almost certainly lose control and crash), Impact (The vehicle and/or driver may collide with other objects like a vehicle or guardrail. Damage caused by impact can be evaluated and combined with sliding distance to help determine the vehicle's speed during the course of accident) and Post-Impact Motion (After impact, additional movement to the point of final rest can occur. Analysis of post-impact travel distance can also determine speeds associated with the accident).

Furthermore, environmental related issues are also important. There are several factors that fall on these category including weather, mist, fog, rain, sun rays etc. contribute greatly to the rates of accident on our roads. In 2010, Asalor identified deficiencies are due largely to inadequate road design specifications and maintenance., posited that inadequate drainage, the issues of pot-holes, the

indiscriminate location of Police check points and the reluctance of the appropriate authorities to continually improve on the conditions of the roads.

The presence of pot-holes aside from human and vehicle related factors are known to be major causes of road traffic accidents in the metropolis. Accidents may be fatal, resulting in deaths of the road users (passengers, drivers or pedestrian) or minor, when it is not serious enough to cause substantial hardship. Road traffic accidents occur worldwide but the incidence is more in developing countries. Annually, about 1.24 million people die each year as a result of road traffic crashes (Toriola, 2013). In Lagos today, report revealed that hardly a day goes by, without the occurrence of a road traffic accident leading to general increasing incidence of morbidity and mortality rates as well as financial costs to both the society and individuals involved (Adiele, 2011). Contrary to the general belief that most road users possess very low level of awareness on the causes of road traffic accidents, previous research has shown that Nigerians know quite a lot about what could cause road traffic accidents (Asalor, 2010). The discovery of oil in Nigeria came with its own problems. The oil boom brought along with an increase in disposable income of the people, which in turns increases vehicle ownership. These developments were not matched by adequate measures and control as reported by (Sheriff, 2009). Consequently, the roads grew to be death traps for the users, an incidence which grew with phenomenal increase (Eze, 2012). Effective interventions include designing safer infrastructure and incorporating road safety features into transport planning. In many parts of the world, concerted efforts are being made to establish standards that vehicles have to meet to be allowed to ply the country's highways. It is necessary, therefore to look into the various factors that cause accidents on Nigerian roads, and the steps that can be taken to minimize the carnage on our roads.

2. Methodology

For this study, information was obtained from car users, lorry drivers, Tanker and Trailer drivers, and other vehicles operators generally. Data base compiled by the Police, Federal Road Safety Commission, Lagos State Transport Management Authority, and other relevant agencies were assessed as shown in Table 1 and 2. Careful study of past works and relevant topics were considered for useful information. Regular and where possible immediate visits were made to accident locations on some Lagos roads. It is quite interesting to note that while good and favourable response were received from vehicle operators including private Car owners, the road Traffic accident statistics department of the motor Transport department of the Nigerian Police and others. Data from the Police were summarized and analyzed to determine accident characteristics from month to month and year to year. It was also possible to determine accident rates, Casualties, total number of accidents with emphasis on fatalities, serious accidents and minor ones as shown in Figures 1-7. Assuming that the level of discipline of a country is measured by the ratio of minor accidents to total accidents for a particular period it was possible for us to estimate this level over a period of years. Vehicular accident reconstruction is the scientific process of investigating, analyzing, and drawing conclusions about the causes and events during a vehicle collision. Reconstruction are employed to conduct in-depth collision analysis and to identify the collision causation and contributing factors in different types of collisions, including the role of the driver(s), vehicle(s), roadway and the environment. The laws of physics and engineering principles such as the conservation of linear momentum, work-energy methods and kinematics are the basis for these analysis. Accident reconstruction provides rigorous analysis that an expert witnesses can present at trial. Accident reconstructions are done in cases involving fatalities, and often when personal injury is involved. Results from accident reconstruction are also useful in developing recommendations for making roads and highways safer. These are often conducted by forensic engineers, specialised units in law enforcement agencies, or private consultants. Vehicle speeds are frequently underestimated by a driver, so an independent estimate of speed is often essential in accidents. Inspection of the road surface is also vital, especially when traction has been lost due to black ice, diesel fuel contamination, or obstacles such as road debris. Data from an event data recorder also provides valuable information such as speed of the vehicle a few seconds for a collision (Soluade, 2011).

Categories of commercial Vehicle	**2009**		**2010**		**2011**		**2012**	
	Number of Vehicles Registered	**Number of Vehicles Inspected**	**Number of Vehicles Registered**	**Number of Vehicles Inspected**	**Number of Vehicles Registered**	**Number of Vehicles Inspected**	**Number of Vehicles Registered**	**Number of Vehicles Inspected**
Commercial vehicles including motorcycles	226,291	662,491	307,823	646,953	310,469	707,054	280,530	649, 506
Private Vehicles (MOT)	622, 215	119, 215	658, 051	62, 581	711, 236	47, 544	707, 344	20 469
Grand Total	**848, 506**	**781, 526**	**965, 874**	**709, 534**	**1, 021, 705**	**754, 598**	**987, 874**	**669, 975**

Table 1: The number of vehicles registered and inspected for road worthiness Certificate (RWC) and Ministry of Transport (MOT) Certificate in Lagos State

Source: Lagos State Vehicle Inspection Service (VIS) and Lagos State Motor Vehicle Administration Agency (MAVAA)

Year	No Vehicles with RWC	No Driver License & R C	Vehicle Not RW & Overloading	Unpainted Vehicles	Vehicles with Fake Doc	Total
2009	22,695	10.194	15,146	3,297	19,392	70,724
2010	26,281	7,821	11,762	2,674	12,083	60,621
2011	14,150	8,786	10,414	225	17,862	51,437
2012	27,059	8,317	12,916	655	8,743	57,690
Total	90,185	35,118	50,238	6,851	58,080	240,472

Table 2: The data showing the traffic violation of Traffic Offence
Source: Lagos State Vehicle Inspection Service (VIS) and Lagos State Traffic Management Authority (LASTMA)

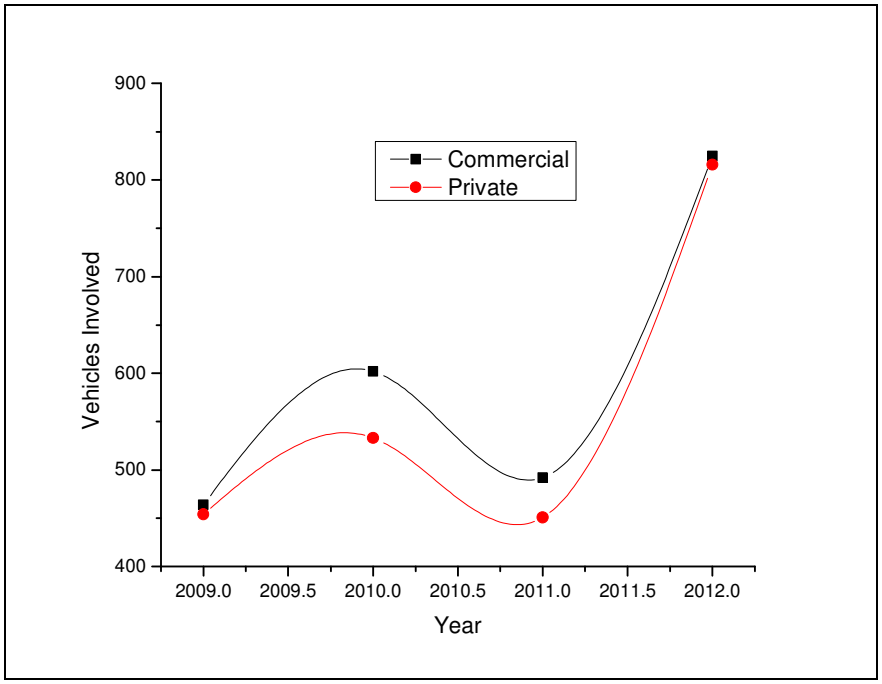


Figure 1: Record of accidents involving commercial and private vehicles between 2009 and 2012

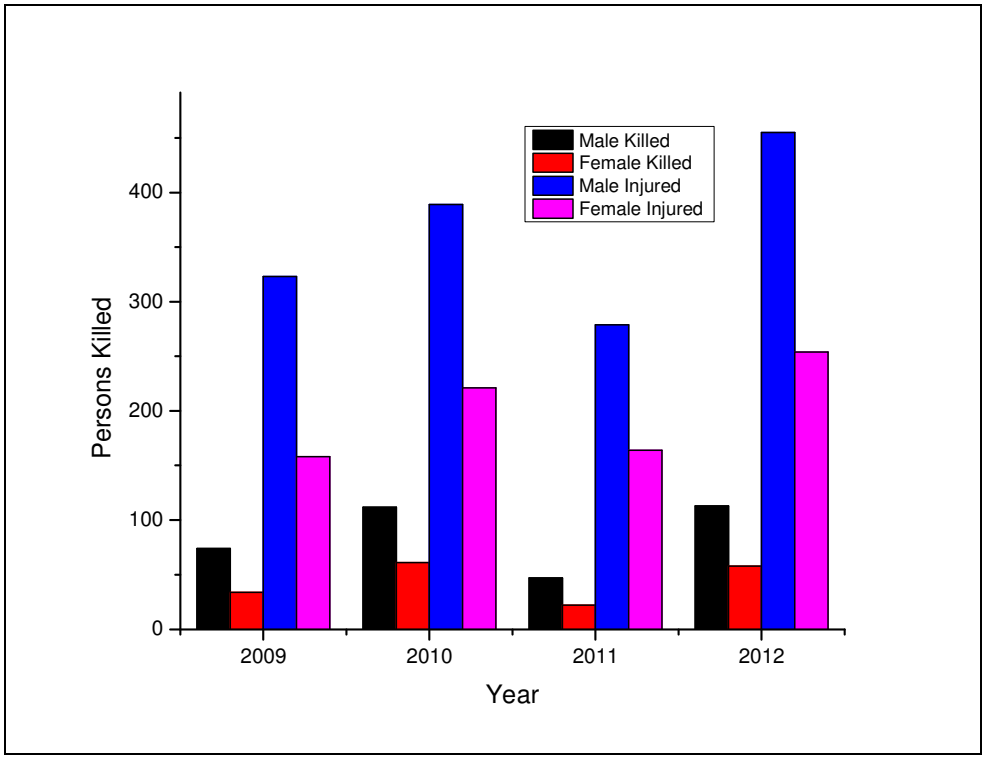
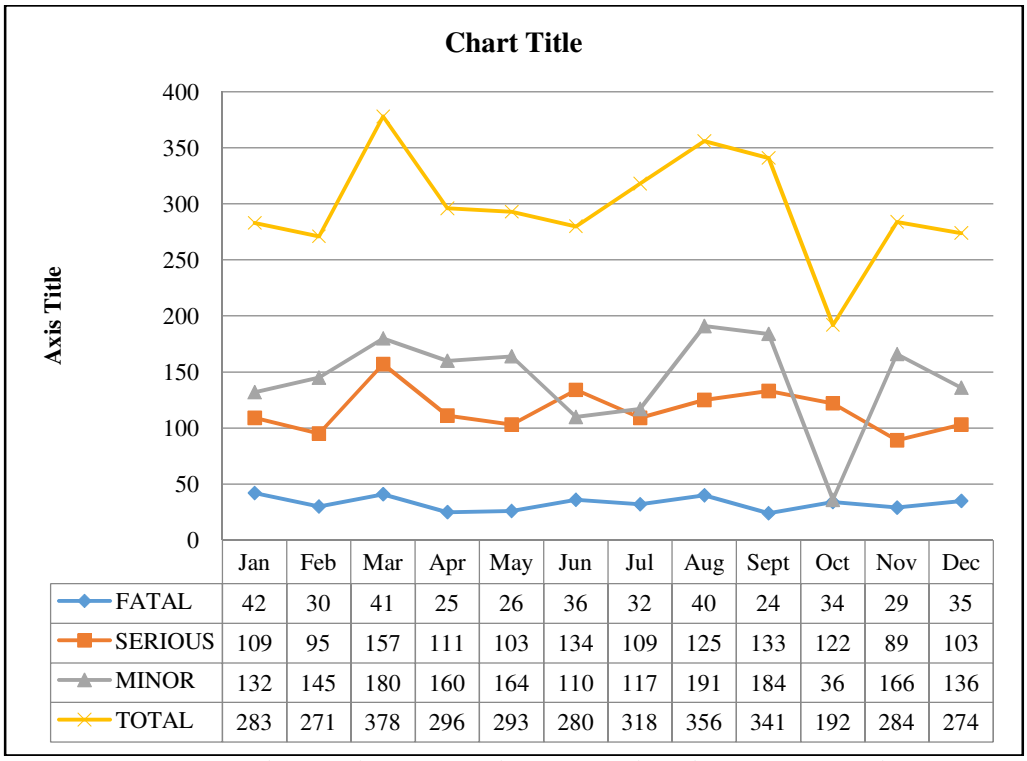


Figure 2: Record of accidents involving Male and Female between 2009 and 2012



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
FATAL	42	30	41	25	26	36	32	40	24	34	29	35
SERIOUS	109	95	157	111	103	134	109	125	133	122	89	103
MINOR	132	145	180	160	164	110	117	191	184	36	166	136
TOTAL	283	271	378	296	293	280	318	356	341	192	284	274

Figure 3: Record of Fatal, Serious and Minor accidents between 2009 and 2012

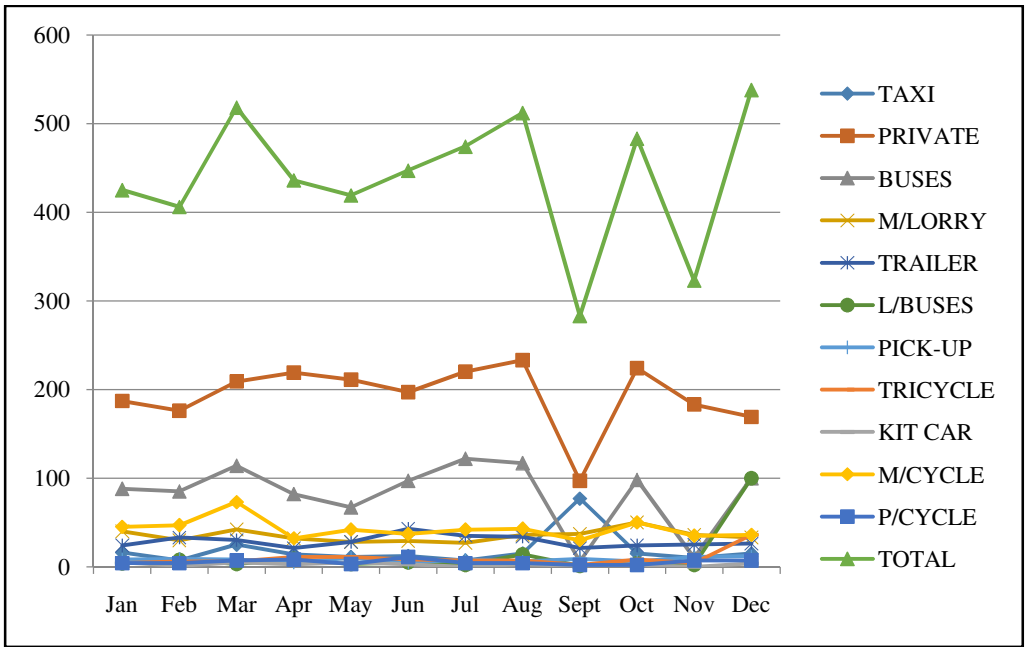
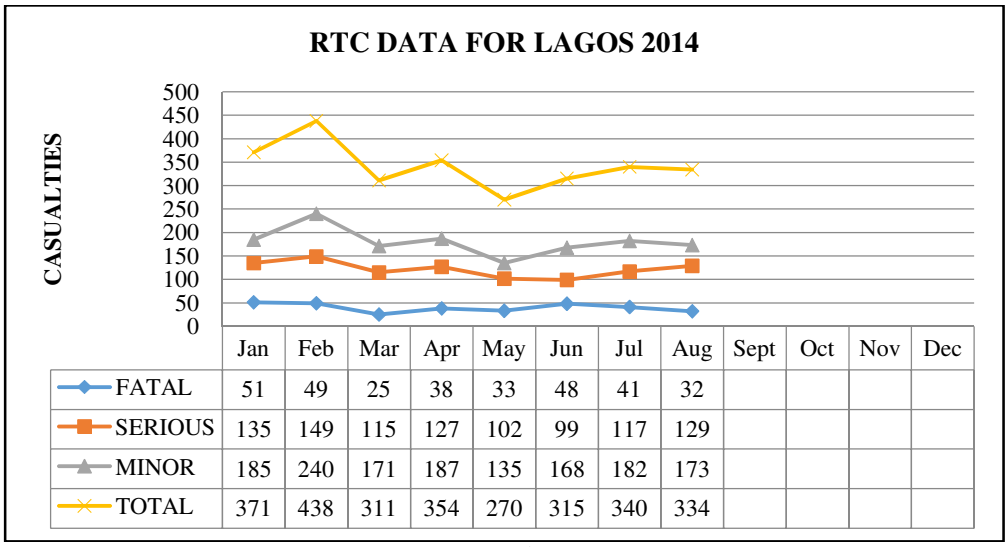
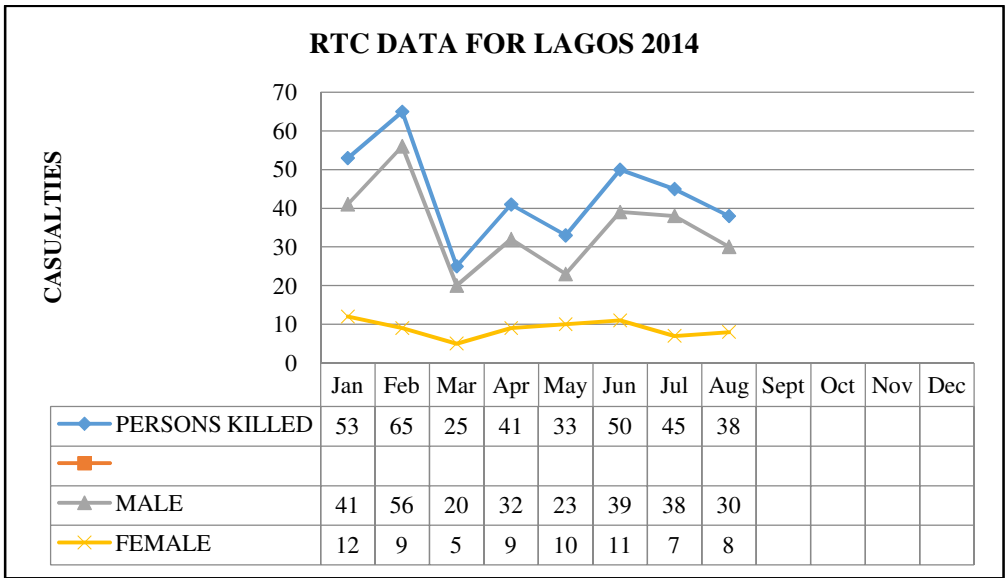


Figure 4: Record of various vehicles registered in Lagos



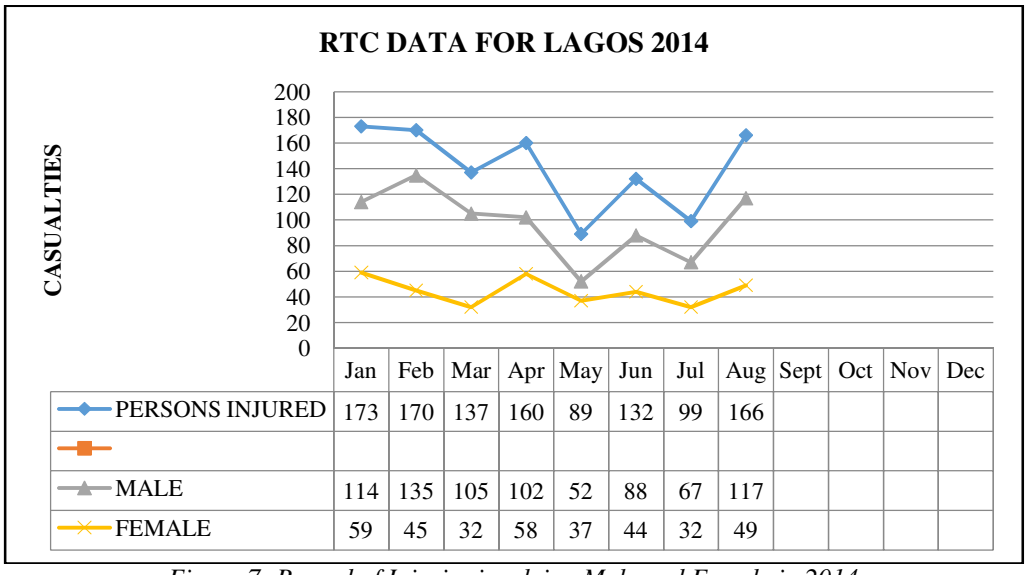
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
FATAL	51	49	25	38	33	48	41	32				
SERIOUS	135	149	115	127	102	99	117	129				
MINOR	185	240	171	187	135	168	182	173				
TOTAL	371	438	311	354	270	315	340	334				

Figure 5: Degree of accidents in Lagos in 2014



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
PERSONS KILLED	53	65	25	41	33	50	45	38				
MALE	41	56	20	32	23	39	38	30				
FEMALE	12	9	5	9	10	11	7	8				

Figure 6: Record of Fatalities involving Male and Female in 2014



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
PERSONS INJURED	173	170	137	160	89	132	99	166				
MALE	114	135	105	102	52	88	67	117				
FEMALE	59	45	32	58	37	44	32	49				

Figure 7: Record of Injuries involving Male and Female in 2014

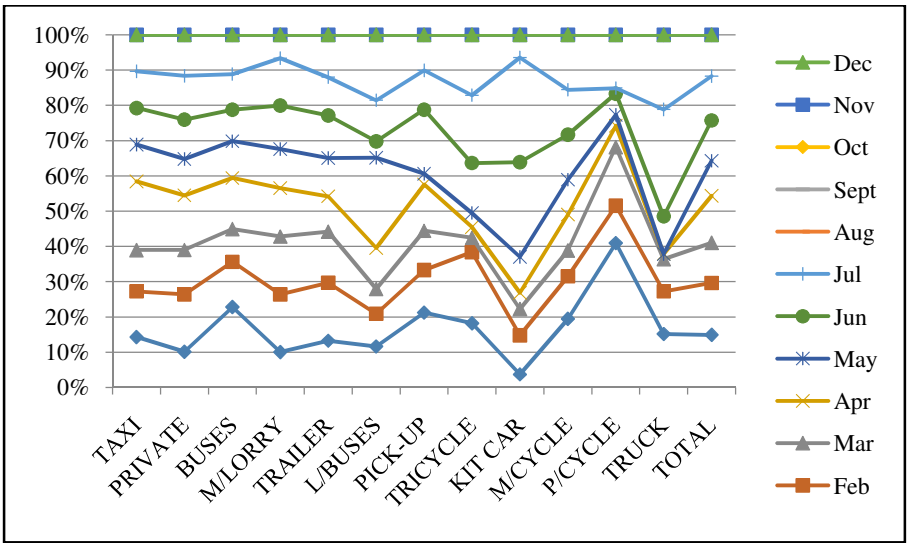


Figure 8: Type of vehicles involve in accidents in 2014

3. Discussion of Results

3.1. Causes of Road Accidents

The factors responsible for road accidents were identified to be: vehicle related; human or environmental. Most safety studies came to the conclusion that vehicle operator or driver factors (or human error) are the main causes of accidents. According to data from the Nigerian Federal Road Safety Commission, Nigeria has the highest rate of deaths from motor accidents in Africa; leading 43 other nations in the number of deaths per 10,000 vehicle crashes (FRSC, 2006). Indeed, the Nigeria accident pattern seems to suggest that the better the road, the higher the accident and fatality rate because of driver's non-compliance with speed limits (Soluade, 2011). This study is to provide answers to the following; the rate of vehicular accident on Lagos roads using data from such agencies as Police, Road Safety and VIO, in the last ten years; number of people wounded; those who sustained injuries; number of fatalities; types of vehicles involved and to illustrate the possible solutions to the accident rates as seen in Figures 1-8.

The analysis of the number and types of vehicle involved in road traffic accident as shown in Figure 1, yields important information. A total of 4,637 vehicles were involved in road traffic accident under the period of study (2009 to 2012). As can be seen from Figure 2, the number of male and female injuries increased greatly in 2012 when compared with previous years. The fatalities of male involved in accident resulting in either death or injuries is always more than that of female as shown in Figure 2,6 and 7 respectively. This implies that male is prone to more attacks from road accident than female because population of male drivers is more than that of female.

3.2. The Role of Engineers

The training and retraining of drivers by Engineers constitute a formidable means of effectively dealing with the issue of road traffic accident reduction (Eze, 2012). The driver himself is subject to physiological wear and tear, being the main actor in control of the factors responsible for accidents and should be encouraged to be absolutely alert physically and mentally when operating the vehicle (Gabriel, 2010). Education is another means of effectively reducing road traffic accidents; therefore, road safety education should always be emphasized to road users. Traffic laws meant to protect road users must be enforced by Vehicle Inspection Officers, Police, Lagos State Traffic Management Authority, and Federal Road Safety Corps (who are mostly Engineers) in all its ramifications, in order to reduce road traffic accidents. In carrying out construction jobs, Engineers must ensure good professional ethics and avoid cheap practices. Engineers must ensure the delivery of quality jobs and practices that would be of benefit to all road users. Road traffic accident in Nigeria is a very serious issue requiring a holistic approach towards curbing the magnitude of the problems it presents to every road user (Toriola, 2013). As a people, curbing road traffic accidents is to ensure that road traffic accident preventive measures are effectively and efficiently practiced at all times. Most of the factors that are responsible for road accidents in Nigeria have been examined. The factors include among others; the vehicle, the driver, the state of the roads and the environment. In addition, measures to reduce the rate of road accidents were equally highlighted by the FRSC in 2012. Undoubtedly the absence of adequate road maintenance shortens the useful life of the roads, thus resulting in premature and costly road reconstruction, while poor surface increases the operating costs of vehicles and has significant effect on road safety.

4. Conclusion

In conclusion, most Nigerians seldom service their vehicles; they only remember the mechanic when their vehicles break down. Speed limits are often neglected despite the situation of Lagos roads. Safety is the first priority for any transportation system; the roads should be made safe for all road users. Concerted efforts should be made to design, build and install signs to enable motorists to transit passengers to their respective destinations.

A lot of citizens do get their driver's license from the comfort of their homes without undergoing any formal test, which shouldn't be. The loads to be carried by vehicles should be weighed, 900 tonnes trailer should not be made to carry 1000 tonnes. It will help the driver to control the large vehicles when things go wrong and will save the roads from constant damages. A lot of the vehicle owners are not helping the situation, a vehicle that is designed to accommodate 4 often carry as many as 7 passengers. For instance, commercial vehicle operators are not helping either, they are only concerned about the money they make and often redesign the sitting pattern of their commercial vehicles to accommodate as many people as they can get in. Nigeria as a country needs to have regulations in place to determine the number of people that should be in each brands of vehicle at any particular time and strict compliance measure should be executed by the regulatory bodies.

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