LEVEL OF UNDERSTANDING OF ROAD SIGNS AND MARKINGS BY NIGERIANS: A CASE STUDY OF SELECTED CITIES IN NIGERIA

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CERTIFICATION

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To the One and Only God

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ABSTRACT

Understanding road signs and pavement markings is an important aspect of the driving task. Consequently efforts have been made in this direction to optimize the use of traffic signs and markings by motorists but this has yielded little results. Therefore, the main objective of this study is to determine the level of understanding of traffic signs and markings by motorists. The primary data source was questionnaire administered and returned by motorists and road users. Secondary data sources comprised existing documents and published materials from the federal road safety commission. Two methods of data analysis were employed in this research. They are; Frequency Distribution or descriptive statistics and inferential statistics. The inferential statistics which include one sample population proportion test, Pearson chi-square and fishers exact test were employed for testing the hypotheses. Furthermore we carried out the analysis using statistical analysis software called SPSS, VERSION 15.0. our findings showed that motorists did well in identifying road signs more than pavement markings and so majority of them understand these signs and pavement markings but do not obey.

It was also observed that the road signs and markings are inadequate on our roads.It is therefore concluded that the Federal Road Safety Commission should emphasize training to make people understand and obey traffic signs and markings always. Awareness should also be created, to make people know that these signs and markings exist ,to look out for them, understand and obey them at all time. Obeying road signs and markings at all times and in every situation will definitely enhance in reduction of help road traffic accidents in Nigeria.

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INTRODUCTION

1.1 Background of the Study

Road safety is a serious concern all over the world. According to Ghee et al (1997), the reason for this stems from the disturbing statistics of road accidents and the consequent losses to the society. Studies have shown that globally, over a million people die every year and about ten times that number get injured in various degrees through road traffic accidents. Losses to countries range from 1% to 3% of their respective Gross Domestic Product (GDP) Ghee et al (1997). For instance in Nigeria, it was estimated that between 1981 and 1997, Nigeria lost about N108,217billion due to road accidents alone. (FRSC, 2005)

Also, a more disturbing and challenging issue is that road traffic accident which ranked world's ninth killer in 1998 has been predicted to become the second leading source of death by the year 2020. (WHO 1999). The fact that about 70% of these global road accidents and deaths occur in developing world is again very worrisome. Also, the forecast that road transport fatalities in sub-

Sahara Africa would most likely increase by 80% between 2000 and 2020 has made many countries to look inwards in the search for the causes of these accidents. (WHO 1999). In 2008, the Federal Road Safety Commission outlined the three major causes of road traffic crashes as

(1) Human Factor

This constitutes about 90% of road traffic crashes, out of this percentage, drivers make up 80%.Human factors can further be classified under the following.

(a)Over confidence

(b) Speeding

(c)Lack of concentration

(d)Tiredness

(e)Driving under the influence of alcohol

(F)Driving under the influence of drugs

(g)Indiscriminate parking and

(i)Dangerous overtaking

(2)Mechanical factors

This is irregular and poor maintenance of vehicle and can lead to crashes which may manifest while the vehicle is in motion.

(3) Environmental Factors

Includes improperly placed or absence of road signs, Potholes on our roads and Heavy rain etc

1.1.1 History of Road Signs

For hundreds, if not thousands of years, signs were crafted out of wood. Words and images were then hand – painted on the signs. The other traditional way of creating signs dealt with individual constructed letters carved from wood, molded or wrought from metal, which were then individually placed in the appropriate sequence. Also road signs were made of milestones, giving distance or direction; for example, the Romans erected stone columns through out their empire. In the middle ages, Multidirectional signs at intersections became common, giving direction to cities and towns. (Wikepedia, free online encyclopedia).

Traffic signs became more important with the development of automobiles. One of the first modern-day road sign system was devised by the Italian Touring Club in 1895. By 1900, a congress of international league of Touring organizations in Paris was considering proposals for standardization of road signage. The basic patterns of most traffic signs were set at the 1908

International Road Congress in Rome. In 1909, nine European governments agreed on the use of four pictorial symbols, indicating “Bump”, “curve” “Intersection”, and “Grade – level railroad crossing”. The intensive work on international road signs that took place between 1926 and 1949 eventually led to the development of the European road sign system. The United States developed its own road signage system, which was also adopted by several other nations (Becht S .L, 2009). Over the years, changes was gradual, today, signs are almost all metal, rather that road, and are coated with retro reflective sheeting’s of various types for nighttime and low-light visibility.

New generations of traffic signs based on big electronic displays can also change their symbols and provide intelligent beahviour by means of sensors or by remote control. The developed countries also have another “medium” for transferring information ordinarily associated with visible signs ie RIAS (Remote Infrared Audible Signage), e.g. “Talking signs” for print-handicapped (including blind/low-vision/illiterate) people. These are infrared transmitters serving signs when received by an appropriate device such as a hand-held receiver or one built into a cell phone. (Wikepedia, free online Encyclopedia). Signs consist of different categories namely: informative signs, warning signs, regulatory signs, guide signs, construction signs etc.

1.1.2 Some Country Specifications of Road Signs

(1) The U.S

The U.S Manual on uniform traffic control devices prescribes

- Red with white for stop signs, yield and forbidden actions (such as no parking).
- Green with white letters for information signs such as directions, distances and places.
- Brown with white for signs to parks, historic sites and camp grounds.
- Blue with white for rest areas, food, gasoline or petrol, hospitals etc.
- Black with white for commercial, special
- White with black (or red letters) for regulatory signs such as speed limits (or parking)
- Orange with black letters for temporary traffic control zones
- Yellow with black letters for warning signs, such as curves and schools zones

Regulatory signs are also sometimes seen with white letters on red or black signs. Many U.S states and Canadian provinces now use fluorescent orange for construction signs. (Manual on Uniform Traffic Control Devices).

(2) United Kingdom

Traffic signs in the UK conforms broadly to European norms, though a number of signs are unique to Britain and direction signs omit European route numbers. Britain remains the only European Union member nation and the only major common wealth country to use non-metric (imperial) measurements for distance and speed.

Three colour schemes exist for direction signs. A road may be a motor way (white on blue), a primary route (white on dark green with yellow route members) or a non-primary route (black on white). A fourth colours schemes, black on yellow, is seen on temporary signs, for example marking a diversionary route avoiding a road closure (Traffic signs regulations and general directions, 2002).

(3) Nigeria

Road signs in Nigeria are described in the Highway Code. Nigeria's first indigenous Highway Code was introduced in 1992, by the federal ministry of works, and it was to a large extent, an adaptation from the British Highway code. It was revised in 1989 and translated into three major Nigerian languages, Yoruba, Igbo and Hausa for easy understanding. It was last revised in 2008. (FRSC, 2008). The regulatory signs are mostly circular shape and are of two

types, those with red and yellow circles are prohibitive signs; those with blue circles but no red border are mandatory signs. They give positive instruction. The information signs are usually rectangular in shape and provide guidance information. The stop sign is a prohibitive sign. It is the only 8-sided traffic sign. It always means come to a complete stop before entering. Warning signs are usually triangular in shape with red perimeter. The only warning sign with converted triangle means YIELD OR GIVE WAY. (Nigeria Highway Code, 2008).

1.1.3 History of Road Markings

In the United States, two states claim to be the first to have developed center lines. According to the state of Michigan, painted white centre lines were developed by Edward N. Hines, the Chairman of the Wayne Country Michigan, Board of Roads in 1911. The first highway centerline was painted along M-15 (later a section of US Highway 41 or M-28 in 1917 by Kenneth Ingalls Sawyer (Michigan Transportation Hall of Fame 2006). According to the state of California, Dr. June McCarroll was the first to develop centerlines, in 1917 (the press-enterprise 2002). In 2002, a portion of interstate 10 was designated and signed as “the Doctor June McCarroll memorial Freeway” in her honour.

White centerlines were used in the United states until the 1971 edition of the manual on Uniform Traffic Control Devices, which mandated yellow as the standard color of centerlines nation wide (after several decades of debate on the issue) (MUTCD history3 Pdf 2008). Yellow was adopted because it was already the standard colour of warning signs and because it was easy to teach drivers to associate yellow lines with dividing opposing traffic and white direction. In turn, this greatly reduced head–on collisions and improved road traffic safety. The major downside to the MTCID white-yellow system is that yellow has slightly less contrast than white, especially at night, so for maximum contrast, bright yellow (highly toxic) lead chromatic was used to paint yellow lines through the end of the 20th century. As a result, U.S transportation workers must take special precautions when disturbing or removing yellow lane markings.

In England, the idea of painting a centre white line was first experimented within 1921 in Sutton Coldfield, Birmingham. Following omplaints by residents over reckless driving and several collisions, the Sutton Coldfield corporation decided to paint the line on Maney corner in the area of Maney. (Jones, 1994). In 1971, a correspondent for the Sutton Coldfield News wrote an article in the newspaper recalling the event. The line was put down as an experiment as there were a lot of accidents there even in the early days of the

motor car. The experiment proved to be so successful that the whole country adopted it as a standard road safety device, and later foreign countries put white line on their roads too. From there other countries started getting involved in painting their roads

1.1.4 Some Country Specifications:

(1) United States

In the U.S; the type, placement, and graphic standards of traffic signs and road surfaces are legally regulated – the Federal Highway Administration's Manual Uniform Traffic Control devices is the standard, although each state produces its own manual based upon the Federal Manual (MUTCD 2003).

Generally white lane markings indicate a separation between lanes traveling in the same direction, white yellow markings indicate opposing traffic on the other side of the line. In some areas, black material is applied before a shorter white line is painted.

In general single broken lines means passing is allowed, single solid lines means pass only to avoid hazard and double solid lines means it is prohibited, as it often is in tunnels. On two-lane roads, a single broken centerline means that passing is allowed in either direction, a double solid centerline means passing is prohibited in both directions, and the combination of a solid line with

a broken line means that passing is allowed only from the side with the broken line and prohibited from the side with the solid line.

Crosswalks are indicated at a minimum by a pair of white lines.

(2) Nigeria

According to the Federal Road Safety Commission's Highway Code (2008), Road markings are basically of four major types – centerlines, edge lines, crosswalks and pavement messages.

Centerlines are lines in the centre of the road to separate traffic proceeding in opposite directions. Broken lines are used in areas where there are no restrictions on overtaking. In areas where there restrictions on overtaking, a solid line is painted alongside the broken line. You may not overtake if the solid line is on your side of the centerline.

Edge lines are solid lines along the side of the road. They indicate where the edge is and can be used also as traffic guidance. An edge line which slants towards the centre of the road forewarns that the road is narrow ahead. An edge line may be crossed only by traffic moving to and from the shoulder of the road. Crosswalks are usually white solid lines across the road. You must stop for pedestrian at cross walks. A solid white line across the road, usually at intersection, shows where you MUST STOP for GIVE WAY sign or STOP

sign or for red traffic light signal.Pavement markings are messages or symbols which are lettered or painted on the roads to warn of conditions ahead.

(3) Canada

According to the Ontario, Ministry of Transport Drivers handbook(2009), Generally speaking, Canadian pavement marking standards are consistent with those used throughout the United States.

Yellow lines are used to represent traffic moving in opposite directions, and white lines are used to separate traffic moving in the same direction, and on the shoulders of paved roads. On one-directional roads, a yellow line appears on the left shoulder, and a white line on the right shoulder. Passing roles are denoted by dashed lines as in the United States. Orange painted lines are used when the direction of the road is altered temporarily for construction projects. Broken lines that are wider and closer together than regular broken lines are called continuity lines. When you see continuity lines on your left side, it generally means the lane you are in is ending or exiting and that you must change lanes if you want to continue in your current direction. Continuity lines on your right means your lane will continue unaffected

1.2 Statement of Research problem

In transport, road signs and pavement markings are important for all road users. one important aspect of the driving task is that involving detection of road signs and pavement markings. It is a well known fact that drivers often fail to recognize road signs or obey the order which they represent. The reasons for this disobedience or phenomenon are often not clear.

All around Nigeria's major cities, the average driver has a habit of being deliberately reckless. The roads of our cities have become death traps because of the inability of most drivers to read or understand basic road signs and markings, let alone obey them. On the other hand, roads signs in Nigeria are particularly bad, there are standard signs defined but various authorities each use different ones instead. Thus a significant gap exists which this study attempts to fill and hence create a platform for further studies in enhancing the level of awareness of road users, as well as promotes change in their behavioral Pattern and their level of understanding of road signs and pavement markings.

1.3 Objectives of the study

The broad aim of this research is

1. To determine the level of understanding of traffic signs and makings by motorists.

Specifically the aim of this study is

2. To establish a relationship between motorists and their use of traffic signs in Nigeria.

3. To ascertain how driving experience has affected drivers' awareness of road signs and markings.

4Tto determine the relationship between category of driver and their level of understanding of road signs and markings.

.5.To ascertain whether non-provision of road signs and markings has affected road traffic accidents.

1.4 Research Questions

In order to achieve the objectives of this research, the following research questions are considered:

1. What is the level of understanding of traffic signs and markings by motorists?
2. What is the relationship between motorists and their use of traffic signs in Nigeria?
3. .How has driving experience affected drivers' awareness of road signs and markings?
4. What is the relationship between category of driver and level of understanding of traffic signs and markings?

5. How has non-provision of infrastructure affected road traffic accident in Nigeria?

1.5 Research Hypothesis:

Research hypothesis are tentative answers to the research questions designed above.

1. Ho There is no significant identification of traffic signs by motorists.

   Ha There is significant identification of traffic signs by motorists

2. Ho There is no significant identification of road markings by the motorists.

   Ha There is significant identification of road markings by the motorists

3. Ho There is no significant relationship between driving experience of motorists and awareness of road signs and markings.

   Ha There is significant relationship between driving experience of motorists and awareness of road signs and markings.

4. There is no significant relationship between category of Driver and level of understanding of Traffic signs and markings.

   Ha This is significant relationship between category of Driver and level of understanding of Traffic signs and markings

1.6 Significance of the Study

The fundamental premise on which this study is based is to provide theoretical and practical solution to one of the major causes of Road Crashes in Nigeria. This study provides basis for a closer scrutiny of the magnitude and extent of understanding of road signs and markings by motorists and road users in Nigeria. It will also enhance the level of awareness of road users thereby ensuring safety on the road.

Therefore, this study would be found very useful by

1) Decision and policy markers
2) Elected officials and the general public
3) The transport industry and
4) All classes of Road Users.

Above all, the study is expected to stimulate Research interest in other related areas of transport safety.

1.7 Scope

This study resolves around the fact that safety is one of the characteristics of transport; transport operation is not considered complete unless goods and services get to their destination safely. In this respect, it evaluates the level of understanding of road signs and markings by Nigerians, drivering experience and how it affects awareness of road signs and markings. We really made

careful effort to know how Nigerians understand and use these traffic signs and markings. .

The study was conducted in specified states in Nigeria which comprises Imo state, Rivers state, Plateau state, Edo state, and Lagos state. It covered commuters, private and commercial drivers.

1. 8 Limitation of study

This work was actually a challenging and beneficial work. Beneficial in the sense that it enlightened and exposed the researcher to other people's views concerning road signs and markings and how adhering to it could help reduce road traffic crash in Nigeria. The problems encountered during the study were associated with not having sufficient data, accessibility, transportation and hording of information by some motorists.

Time was also a constraint in the research as the researcher did not have enough time to explore more resources than was available to him. The actual survey period is 8 months, October 2010-May 2011.

Finance was equally a limiting factor as there were not enough funds to execute the research and it limited the movement and sourcing of more information for the work which was not really our intention.

As a result of the current economic predicament the cost of transportation is very high and so we could not cover other states in Nigeria. The researcher also

encountered some problems in the data collection. In most cases the secondary data used where collected from the internet and information on Nigerian in the internet is scanty and cannot justify quantum of information required for the study.

The academic level of most respondents especially the commercial operators was also a major hindrance in the completion of the questionnaire since most of them are not formally educated.

CHAPTER TWO

RIVIEW OF RELATED LITERATURE

2.1 Road Traffic Accident

Research into road safety in developing countries is scarce especially in Africa. This is consistent with the size of the problem. It has been predicted that by 2020, road traffic death will rank as high as the second leading cause of death WHO (1996). While south East Asia has the highest proportion of global road fatalities (one third of the 1.4 million occurring each year in the world), the road traffic injury mortality rate is highest in Africa (28.3 / 100, 000 Population) compared with 11.0 / 100, 000 population in Europe (Peden et al, 2004). Under reporting of accidents is known to be a particular problem in the developing world, where sometimes between 25 and 60 percent of accidents can go unrecorded, (Aaron 2000).

However, it is clear that road accidents are a major problem in developing countries and that they are increasing in number, especially when compared to more highly motorized countries. Jacobs (2000) estimates that about 70% of the

road fatalities occurring each year take place in those countries classified as low or middle income (see table 2.1). The Middle East, central and eastern European countries only accounted for 18%. Note, however that the highly motorized countries (HMC)/region will include countries on both sides of the Atlantic as well as in the Southern Hemisphere, and that North African countries are grouped with middle Eastern countries leaving sub-Sahara Africa as a distinct region.

Table 2.1 Proportion of all road accident fatalities in different regions.

Region	Proportion of all Accidents (%)
Asia and Pacific	44
Latin/Central America and Caribbean	13
Middle East /North Africa	6
Highly Motorized countries	14
Sub Sahara Africa	11
Central/East Europe	12

Source: Jacobs et al (2000) Estimating global road fatalities TRL report 445.Crowthorne: TRL Limited.

Using a slightly different classification of the world's regions, table 2.2 Jacobs et al (2000), show the percentage of all road deaths, the proportion of the world's registered vehicles and population in the different regions. It shows that

only around 4 percent of global road deaths occur in the so-called developed regions of the world, even though they have almost two thirds of the world's motor vehicles.

Table 2.2 proportion of road deaths, vehicles and population on different regions.

Region	Deaths	Vehicles	Population
Highly motorized countries	14	60	15
Latin America	13	14	8
Asia Pacific	44	16	54
Central – Eastern Europe	12	6	7
Africa (Sub-Sahara)	11	4	11
Middle East and North Africa	6	2	4

Source: Jacobs et al (2000) Estimating global road fatalities TRL report 445.Crowthorne: TRL Limited.

Table 2.1 and 2.2 show that the developing countries are the ones with the highest percentage of road accident. There must be awareness on road signs and marking to help reduce road accident. Most of the highly motorized countries are developed and so have standard road signs and markings which guard road users on the proper use of roads. According to Al-Madi and Abadul (2002) western drivers (in highly motorized countries) understand roads signs and

markings better than others in the less developed countries because of their better traffic education and the written test requirement which includes traffic signs and pavement markings for obtaining drivers' license.

In addition, while developing countries already account for more than 85% of all road traffic deaths in the world. Nantulya et al (2002); Ameratunga et al (2006); Mohan (2002) in separate studies estimated that the upsurge in the number of vehicles per inhabitant will result in an anticipated 80% increase in injury mortality rates between 2000 and 2020.(Peden et al (2004)). In Africa, it has been estimated that 59,000 people lost their lives in road traffic crashes in 1990 and that this figure would be 144,000 by 2020, a 144% increase Kopits (2005). Because road traffic deaths have long been considered to be inevitable and caused by random, unpredictable events, the international community's response to these worldwide public health crises came relatively late. The World Health Organization (WHO) arranged a consultation meeting in April 2001, which led to a report, entitled "A 5-year WHO strategy for road traffic injury prevention "that summarizes the main recommendations from the working group, WHO (2002). In 2003, the United Nations Secretary – General sounded the alarm with an official statement in UN General Assembly (2003) describing the global public Health challenge posed by road traffic injuries and encouraging member states to address the problem.

On of the recommendations is to promote and facilitate research on this subject, especially in low income countries where knowledge gaps often jeopardize appropriate resource allocation. Much needs to be done especially in the area of traffic signs and road marking. Motorists who understand and obey these signs and markings are not usually involved in accidents. Knowledge of road signs and markings is really essential if we want to reduce road traffic accidents in the world, Nigeria inclusive.

2.1.1 Trends in Road Traffic Death in Africa

The number of vehicles per inhabitant is still low in Africa; less than one licensed vehicle per 100 inhabitants in low income Africa versus 60 in high-income countries. Fleet growth leads to increased road insecurity in developing countries, (Mekky (1985), Garg et al (2006); Ka as et al (2003)). This explains for example the reported 400% increase in road deaths in Nigeria between the 1960s and the 1980 according to Oluwasanmi (1993). Available historical data from developed countries show that it is only when a development threshold is achieved that the road mortality starts to decrease(Kopits et al (2005), Bishai et al (2006), Vasconcellos (19991)). Such a threshold is far from being reached in sub-Sahara Africa, this is because most countries in Africa are either undeveloped or developing. Indeed in South Africa the most developed

African country, there were already 17 licensed vehicles per 100 inhabitants in 2005 and no decline in road traffic deaths has been observed so far, (Road Traffic Management Corporation (2006)), also in Nigeria, road traffic administrators have developed certain regulations intended to guide road use, as well as eliminate possibilities of road crashes. Research conducted by Federal road safety corps (FRSC Annual Reports (2002)) shows that these regulations are frequently broken by all categories of road users either through ignorance, negligence or willful act. Traffic rules and regulations must be obeyed at all times.

2.1.2 Road Traffic Accident in Nigeria

In most developing countries, Nigeria inclusive, road crashes are known to consume more human and material resources than most diseases put together. According to official figures from FRSC (2007), 9,946 people were killed in 20,530 road accidents in 2001, representing an increase of 1,473 in comparison with the death toil of 8,473 recorded accident cases in 2000, more than 28,000 people died in about 61,000 road accidents in Nigeria between 2002-2006, FRSC (2007). Also between 2007-2009, about 17,000 people died in 31,000 road accidents across Nigeria according to official statistics released by the FRSC (2010). More than 73,000 were injured in these accidents during the period under review.

Okpara (1980) as quoted in Oyeyemi (1999), compares most developing countries of the world with Nigeria in terms of the availability and or quality of road network. His verdict is that Nigeria has an abundance of good roads and even cars. He summarizes that the traffic density is not high in Nigeria when compared with many European countries. What worries him however is the incidence of road crashes, in terms of frequency and severity index which is indeed very high. Therefore, it could be seen that neither improvements of road network nor increased sophistication of cars will, by themselves, lead to a significant reduction in road crashes in Nigeria. In that case the major reduction contributing factor could be created elsewhere. Improve roads and markings are one such area that we should now emphasis.

2.1.3 Road Safety and Development

As recently advocated by Khayesi and Peden (2005), road safety in Africa is "part of the broader development process. The situation is particularly worrying in this continent because of the combination of incompatible road users, poor vehicle condition, under developed infrastructure, non provision of adequate signs and markings, lack of risk awareness and ineffective enforcement jeopardized by corruption or bribery. The road transport system is the dominant

form of Inland transportation and carries more than 95% of passengers traffic. This sector is often prioritized in donor development plans in some countries in Africa. Road transportation is essential to assess markets and services and to unlock agricultural potential, which will lead to improved income in rural areas. Road safety concerns could also endanger income from tourism. We cannot talk of road safety without making emphasis on road signs and pavement markings because if properly taken care of will lead to a drastic reduction in road traffic accidents in Nigeria and Africa as a whole. Donor agencies and development partners should incorporate safety in design of project in order to realize the objectives they set out to achieve.

2.2 Road Traffic Safety

Road safety aims to reduce harm (deaths, injuries and property damages) resulting from motor vehicle collisions. Harm from road traffic crashes is greater than that of all other transportation modes (air, sea, space, off-terrain etc) combined. Road traffic safety deals exclusively with road traffic crashes or accidents – how to reduce their number and their consequences. A road traffic crash is an event involving a road vehicle that results in harm.

2.2.1 Who is Responsible for Safety

Although road safety is increasingly recognized as a sizeable and growing problem in many countries, it is often given a relatively low priority from central or federal government. This is perhaps understandable given other pressing social and political problems, and a typical lack of funds. Maintaining and building roads is often considered more important than making them safe.

While governments have dedicated departments (within, for example a Department of transport or communications or ministry of works), some have constituted a National Road Safety Council or (committee) to be responsible for road safety e.g. In Nigeria we have the Federal Road Safety Corps (FRSC).

A recent study by Aeron - Thomas Et al (2002) on how road safety is 'managed' in different countries, reviewed road safety management in five-high-income countries, one Latin American country, three Asia countries, one Pacific and four African countries. It found that there were very marked differences even in developed countries that typically had a better safety record than the developing countries examined. However, there appears to be no best practice for managing and co-coordinating road safety activities in a given country. The process of planning and implementing road safety improvement needs to be multi disciplinary and dynamic. Co-ordination between the various

bodies involved in road safety activities, such as the Engineers, police, the road safety councils and the health sector is essential. There will often be a need to strengthen the institutions responsible for the various aspects of road safety, and to increase their capability for multi-sectoral action.

The importance of involving civil society groups in reducing accidents has been recognized in recent years, for example, road administrations consulting with local road users directly to determine their particular safety concerns and seeking their input into proposed improvements.

2.2.2 Global Status Report on Road Safety

The global status report on road safety conducted by the World Health Organization (WHO) (2009) is the first assessment of the road safety situation in 178 countries, using data drawn from a standardized survey. The results show that road traffic injuries remain an important public health problem, particularly for low income and middle income countries. Pedestrians, cyclists and motorists make up almost half of those killed on the roads, highlighting the need for these road users to be given more attention in road safety programmes. The results suggest that in many countries, road safety laws need to be made more comprehensive while enforcement should be strengthened. The global

status report on road safety results clearly show that significantly more action is needed to make the world's roads safer. This means that more emphasis should be placed on traffic signs and markings; they should and must be understood by motorists and road users and enforced by the appropriate authorities.

2.2.3 Road Safety in Nigeria

The paramount objective of road safety is to help reduce traffic accidents, identify high collision locations so as to review measures towards ensuring the safe operation of roadways and to help "engineer out" potentially unsafe features.

The federal Road Safety Commission in Nigeria was established in 1988. Among the responsibilities of the commission include;

- Preventing and minimizing road traffic crashes
- Clearing obstruction on the highways
- Educating drivers, motorists and other members of the public on the proper use of the high way.
- Conducting researches into causes of road traffic accidents.
- Determining and enforcing speed limits for all categories of road and vehicles.

The commission since inception in 1988 no doubt has been involved in series of activities aimed at reducing and preventing road crashes in Nigeria and the impact such measures have been felt through the reduction of number of road accident cases.

However, it has been found that while the number of accident cases has reduced since the inception of FRSC, fatality has continued to increase (Nnadi and Ibe, 2007). According to Akinyemi (1986), the road safety engineering program is a set of activities designed to reduce the number and/or severity of accidents on specific road sections by exchanging or modifying some road environment characteristics. The activities generally consist of planning i.e., identification of safety problems, road locations and feasible road counter measures, implementation, i.e. installation or construction of the counter measures. Hence better engineered roads mean less driver error and a more forgiving environment when an error is made.

The complexities in road administration in Nigeria are responsible for the inability to attain this lofty assertion as stated above. Rather, the road traffic environment in Nigeria is characterized by the following;

- Over-speeding
- Blocked drains
- Narrow pedestrian walkways

- Busy road environment
- Rough and undulating surfaces
- Black spots
- Narrow bridges
- Defaced signs
- Non-functional traffic signs
- Irregular road marking
- Road median not crash-worthy (concrete)
- Poor guard for traffic regulations and the law; and
- Flooded road surfaces. Odeleye (2000).

The FRSC has been trying to reduce and prevent road traffic accidents in Nigeria but their efforts is not enough. The commission is not adequately funded and functional, so the laws are not actually enforced on motorists and road users. In 2008, they published the revised Nigerian Highway Code all in the bid to improve road safety among Nigerians. The Highway Code consist of 3 parts-

a. Pre Road use Activities

- The road
- Categories of road users
- Qualifying for driver license

- Vehicle registration
- Vehicle checklist
- Basic vehicle safety check
- Requirements for a tourist in Nigeria
- Services for persons with disabilities
- Causes of road crashes

b. Road use Activities

- How to drive safely
- Road signs, signals and marking
- Lane discipline
- Driving under special conditions
- Defensive driving

c. Post-Road Use Activities/other information

- Responsibilities in the event of road crash
- Vehicle fire prevention/Drills
- Warning danger labels for hazardous substances.
- Traffic offences at a glance

If adequately studied by motorists and road users and at the same time enforced by the FRSC will to a very large extent reduce/prevent road traffic accident in

Nigeria. Part B of the Highway Code talks about road signs and markings which must be well understood by all road users.

According to Odeleye (2000) internationally, the following key issues are considered and addressed during road safety audit operations. This is with a view to measuring the degree of safety on a particular road.

- Road alignment
- Pavement width
- Pavement roughness
- Intersection treatment/consistency of applications of traffic control devices
- Consistency of geometric roadway standards
- Road shoulder conditions
- Road shoulder width
- Pavement edges and drop offs to shoulder
- Lateral clearance to road side objects
- Guardrail
- Median barriers
- Culverts
- Embankments

- Information signs
- Number Signs
- Sign size/letter size
- Sight distance to signs
- Signs at hazards
- Sign conditions
- Centre lines
- Edge lines / shoulder lines
- Lane lines and overtaking lanes
- Intersection delineation
- Guide posts and guardrail reflectors
- Bridge markers
- Lighting at intersections and night time visibility
- Animal fencing and other mitigation measures
- Capacity and level – of – service analysis
- Climbing lane warrant analysis
- Traffic signal warrants
- Traffic signal timings and phasing
- Posted speed limits; and
- Police enforcement

However, experience from series of empirical survey and studies of the road traffic environment in Nigeria, confirmed that the components listed above are provided during road construction exercises. Afterwards they are either vandalized or technically abandoned to degenerate to such a standard that the road traffic environment is rendered unsafe at any speed at any time of the day. More than 50% of the points highlighted above talks about signs, signals and markings. This means that they roads must be properly marked, and signs placed in the appropriate places and properly maintained and enforced, if really we want to attain a high safety standard.

2.3 Other Areas of Interest

While talking about safety, it is also important for us to talk about improvements in other areas of road transport operations aimed at improving safety before going elaborately into signs and marking. Such areas as transport regulation, driver behaviour and driver education.

2.3.1 Driver Education

According to Ibe (2006) driver education is a programme of organized learning and practices made to provide the knowledge, attitude and skills needed for safe driving performance under peculiar circumstances.

In this way, the content of driver education is meant to improve the drivers;

- Knowledge
- Skills
- Attitude and
- Behaviour.

It could also be defined as a formal class or program that prepares a new driver to obtain a learners permit or drivers license. It may take place in vehicle, classroom, online or a combination of the above.

Typically, instruction will warn of dangerous condition in driving such as road conditions, driver impairments and hazardous weather. The content of driver education should be dynamic and be subjected to periodic reviews based on current information in the field. The analysis of current knowledge may be very important for the creation of good driver training so as to provide safe and sensible drivers who will be able to drive in traffic without causing conflicts or accidents.

A safe driver is not only skilled in vehicle control and maneuvering, but also sensible and wise. This means that safe driving is a result of good choices in connection with abilities. (Gregerson, 2005). As a result, the required skill for safe driving are developed through an appropriate driver education, which is a difficult but possible safety measure. Driver training and education must now be taken seriously in Nigeria since a study carried out in 2004 indicated that most drivers issued with driving licenses are untrained (Stephens and Ibe, 2006). A survey of 3000 drivers in Apapa in 2004 showed that about 55% of untrained drivers are private car owner; twenty six percent are private drivers, while all commercial daily earning drivers are untrained. Parham et al (2010) suggested that roads signs and markings most be included in all drivers education programmes, drivers who undergo these programmes know that it is very safe to understand and obey traffic signs and markings at all times, he suggested updating educational materials on traffic control devices periodically. Nigerian public road transport is made up of mostly daily earners who are not educated on proper use of roads and therefore are exposed to great risk of crashes. Therefore, all stakeholders must now come up with strategies whereby drivers on Nigeria roads must be exposed to compulsory training after every five years for revalidation of driving licenses. Regulation is also important in terms of safety. Many countries face the challenge of how to manage the road

system to reduce road crashes. Safety can be made integral to the design and management of the road transport system, just as it is in the management of other transport modes, aviation in particular. In Nigeria, despite the importance of the road transport sector and giving the background information sufficient though not enough to plan effectively for regulatory purposes, the current structure of that sector is continuously afflicted by (FMT, 2008).

- Lack of effective regulating and control measures with numerous ministries involved as supervisory agencies, causing unprecedented confusion;
- No clear definition of responsibilities among the three ties of government, particularly in terms of policy formulation and coordination.
- No meaningful long-term strategic planning, leading to ad-hoc and fire brigade type of responses to challenges; and
- Poor regulation and enforcement

2.3.2 Driver Behaviour

Driving involves responding to real objects in the spatial world. It requires specific knowledge, motor skills and high perceptual and cognitive skills; Driver behaviour is what the driver chooses to do with these attributes (Evans, 2004) Formal driving instruction (education is generally assumed to be the most

important method by which drivers acquire the basic skills and knowledge that govern behaviour in traffic.

Most transportation safety work form a basic theoretical framework that comprises fundamental concepts and views of transportation safety as a result of driver behaviour, societal norms and situation factors. Lee Jones' (Jones 1989) definition of safety says transportation safety can be defined as the degree of protection during carrier (driver) movement of freight and passengers. Driver behaviour refers to all driver actions and mental events having the driver's welfare as a referent, while societal norms are public expectations of transportation driver behaviour, e.g. those embodied in safety regulations, while situated factors refer to uncontrollable factors present in physical environments where transportation occurs. Ogwude and Ugboma (2005). Drivers behaviour often make majority of drivers believe themselves to be more skillful than the average driver (Kuiken(1996); Gregersen(1996)). Accident liability can be affected by many factors including performance skills and behavioural, cognitive, attitudinal and social factors. (Grayson and Noordzy, 1990). Psychological studies have contributed substantially to the current body of knowledge on traffic safety; however as knapper and Gropley (1981) pointed out; it appears that the practical usefulness of much psychological work in the

area of driving behaviour is of questionable utility. It would seem intuitively obvious that driver skills or performance should be good predicators of subsequent liability. Social issues influence attitudes, motives and what decisions drivers make about their driving behaviour. According to Gregersen (2005), for young drivers, these decisions too often result in high speed, drunk driving, driving without using seat-belts and other dangerous behaviours.

Taylor (Taylor 1964) argued that drivers attempt to maintain a constant level of anxiety when driving which Wilde (Wilde 1982) interpreted to be coupled to subjective estimates of the probability of collision. Naatenen and Summala (1976) similarly rejected the concept of statistical risk as a determinant of driver behaviour. Risk estimates linked to risk feelings are not ongoing determinants of driver decision making. This view is largely concordant with that proposed by Naabanen and Sumonala (1976), Mckenna (1988) and Wageaar (1992) summarized by Summala (1986) who rejects the concept of risk as a determinant of driver behaviour. Summala argues that in most situation drivers know what they should do or not do to avoid a certain or almost certain accident. Drivers' behaviour according to Fuller, (2005) is determined by the maintenance of safety margins operationalized in his terms as the distance of the driver from a hazard. In another formulation, Summala (1996, 1997)

describes a lane tube, formed by the road way and lane markings pointed on it. If a driver maintains speed and direction, it is the time to crossing the boundaries of the tube (time-to-line crossing) which provides the control measures for lane keeping and similarly time to collision provides the control measure for headway selection and approach to stationary obstructions. No concern is normally given to risks. As Wagenaar (1992) succinctly states;

"…People… run risks, but they do not take them"

Given Summala's position on the determination of driver behaviour, the question then arises as to how drivers determine what a safe margin in any given driving situation is. Safe margins are learned through experience and so most of driving becomes a habitual activity which is based on largely automatized control of safety margins in partial tasks. (Summala 1986 p 10.). Gregersen (2005) described a safe driver as someone who is not making decisions about driving behaviour that will lead to an accident and is also skilled enough to apply these decisions to actual driving behaviour.

Dowing (1991) found out that driver behaviour such as not stopping at pedestrian crossing, traffic signals and not obeying signs and marking were found to be due to poor attitudes rather than poor knowledge.

2.4 Road Signs

Traffic signs or road signs are erected at the side of roads to provide information to road users.

According to the Nigeria, Highway Code (2008), traffic signs tell you about traffic regulations, special hazards and other road conditions, construction areas, speed limit, etc. traffic signs are important for travelers and drivers alike. Erected at conspicuous places of roads, traffic signs provide useful information to road users. It also helps prevent road accidents and reduce risks in driving. With increasing speed of transport, the tendency its for countries to adopt pictorial signs or otherwise simplify and standardize signs, to facilitate international travel where language differences can create barriers and in general to reduce the risks of driving. Such pictorial signs use symbols in place of words and are usually a result of international standards. Such signs were first developed in Europe and have been adopted by most countries to varying degrees.

Although we all know what traffic signs are and what they are used for, problem however is that we are not all familiar with the different categories of traffic signs and the meaning they convey. The inability to interpret the meanings therefore constitutes serious problems and hence resolved in conflicts on the use of roadways. According to the Vienna convention on Road signs and

signals (1986), traffic signs could be defined as consisting of eight categories of signs namely:

- Danger warning signs
- Priority signs
- Prohibitory or restrictive signs
- Mandatory signs
- Special regulation signs
- Information, facilities or service signs
- Direction, position, or indication signs
- Additional panels.

In the United States however, the categories, placement, and graphic standards for traffic signs and pavement markings are legally defined in the federal highway administration's manual on uniform traffic control devices as the standard. Also in Nigeria everything about road traffic laws, standards for traffic signs and pavement markings' are contained in the federal road safety commissions Highway Code.

2.4.1 Information Signs

According to Wikepedia (online encyclopedia), an information sign is a sign very legibly printed and very noticeable placed that informs people of the

purpose of any object, or gives them instruction on the use of something. Information signs have been growing in visibility due to the explosion of sign technologies.

A direction sign, more fully defined as a direction, position, or indication sign by the Vienna convention on Road signs and signal, (1986) is any road sign used primarily to give information about the location of either the driver or possible destinations, and are considered a subset of the informative signs group.

Direction signs are far more varied internationally than other classes of sign, as the Vienna convention does not specify size, colours, symbols or positions of such signs. (UNESCO Vienna convention on road signs and signals, 1978). The only restriction given are that direction signs must be either rectangle or an arrow shaped pentagon and that they may not contain place names in more than two languages. Additionally, direction signs on motorways must be blue or green, while temporary direction signs are yellow or orange. As a result different nations can have widely different direction signs. The United State, Canada, and Australia almost universally use the plain green signs; Nigeria uses rectangular shape and green colour but uses white letters or drawings. They provide guidance to information.

2.4.2 Warning Signs

Warning signs give us early warning about dangers on the road. A traffic warning sign is a type of traffic sign that indicates a hazard ahead on the road that may not be readily apparent to a driver (FHWA 2003). In most countries, they usually take the shape of an equilateral triangle with a white background and a thick red boarder. However, both the colour of the background and the colour and thickness of the border vary from country to country. In China, warning signs appear with a black boarder and a yellow background. Some countries use diamond shape rather than the standard triangular shape. They elp people on the road to be aware of possible dangers. These signals give people early warning, so they are not surprised by what happens on the road. It helps people to be ready to make good decisions that help them to stay safer on the road.

Common colours of warning signs are yellow, Fluorescent yellow, Fluorescent green, red, orange, black etc.Common shapes used in Nigeria are Triangles.

2.4.3 Regulatory Signs

This tells us what to do and how to obey road rules. They are intended to instruct road users on what they must or should do (or not do) under a given set of circumstances. Other types may be signs located on streets and in parking lots having to do with parking, signs in public parks and on beaches or in

architectural facilities prohibiting specific types of activities. The term regulatory sign describes a range of signs that are used to indicate or reinforce traffic laws, regulations or requirements which apply either at all times or at specified times or places upon a street or highway, the disregard of which may constitute a violation (FHWA 2003). Regulatory signs tell people how to obey the rules (regulations) of the road. Regulatory signs are some what known as prohibition signs, that is what not to do on roads. In Nigeria, prohibition signs are under regulatory signs in the highway code.

These signs include do not enter, no parking, no u-turn etc. Also examples of non-traffic types of regulatory signs may be no smoking signs, where there are laws prohibiting smoking. They come in various colours like black and white but the regulatory signs in Nigeria come with white borders with red and yellow background and black letters. The shapes are usually square, rectangle, and in some countries they use circle.

2.4.4 Guide Signs

This helps us to know where we are and how to get where we want to go. The guide signs on roads indicate the place where you are exactly on. Also it makes you aware of some places that you are going through ahead. For example if there is a school ahead, it will indicate to you earlier, so that you can slow down your vehicle to avoid some facilitates. E.g. the guide sign on Obinze Ihiagwa

road indicating there is a University ahead. The guide signs in the Nigeria Higway code are under information signs. It usually comes in Green and white colours. The various shapes are rectangle and square.

2.4.5 Construction Signs

Construction signs let us know when people are working on the road. It tells people about work that is being done on roads. Every one should slow down where work is being done. Sometimes someone called a “flagger” will stand in the road with a sign that tells you to stop or go. Common colours are Orange and black .Common shapes are square, diamond and rectangle

2.4.6 Recreational and Activity Signs

Tells us about nearby activities and interests. They are used to direct persons to facilities, structures, places, and to identify various services available to the general public. (FHWA 2003). They point out nearby activities of interest like camping, boating, or fishing. Common colours are Brown and white

Common shapes are rectangle and square.

2.4.7 Service Road Signs

This helps people to find things they need like hospitals, food, gas or hotel. If someone is new to a place, those signs help you locate hotels, gas stations etc

easily. Common colours are Blue and white Common shapes are rectangle and square.

2.5 Lane Markings

Road marking, Lane marking or pavement marking is any kind of device or material that is used on a road surface in order to convey official information. They are used on paved road ways to provide guidance and information to drivers and pedestrians; they control traffic on highways. The markings supplement the functions of traffic signs. They serve as a psychological barrier and signify the delineation of movement of traffic. Hence they are very important to ensure the safe, smooth and harmonious flow of traffic.

Uniformity of the markings is an important factor in minimizing confusion and uncertainty about their meaning and efforts exist to standardize such markings across boarder. However, countries and areas categorize and specify road markings in different ways. Road surface markings are mechanical, non-mechanical, or temporary. They can be used to delineate traffic lanes or inform motorists and pedestrians. They also indicate regulation for parking and stopping.

2.5.1 Classification of road markings

There is continuous effort to improve the road marking system, and technological breakthroughs include; adding reflectivity, increasing longetivity and lowering installation cost.

Road markings are lines, patterns, words or other devices, except signs, set into applied or attached to the carriageway or Kerbs or to objects within or adjacent to the carriageway, for controlling, warning, guiding and informing the users. According to Matthew (2008), road markings are classified as follows

2.6 Carriageway Markings

2.6.1 Longitudinal Markings

Longitudinal markings are placed along the direction of traffic on the road way surface, for the purpose of indicating to the driver, his proper position on the roadway. They follow the length of the road.

Longitudinal markings are provided for separating traffic flow in the same direction and the predominant colour used is white. Yellow colour is used to separate the traffic flow in opposite direction and also to separate the pavement edges.

Different types of longitudinal markings are

2.6.2 Centerline

Centerlines are the most common forms of road surface markings, providing separation between traffic moving in opposite directions. It separates the opposing streams of traffic and facilitates their movements. Usually no centerline is provided for roads having width less than 5m and for roads having more than four lanes. The centerline may be marked with single broken line, single double line, double broken line, or double solid line depending upon the road and traffic requirements.

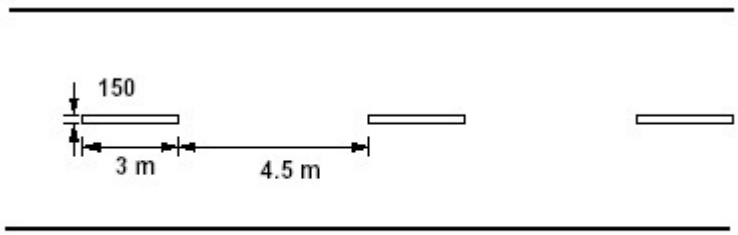

Figure 2.1 Centerline marking for a two lane road

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

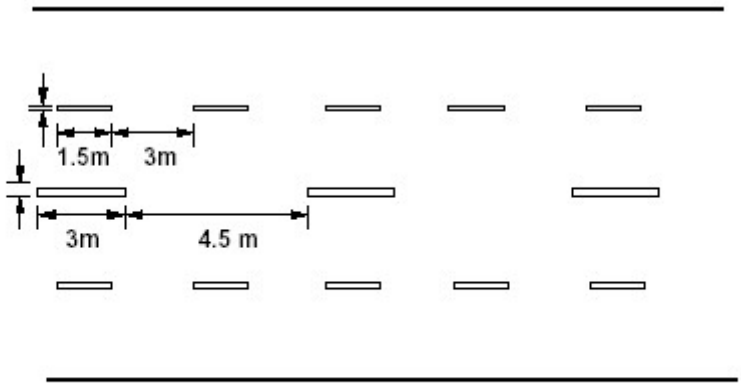

Figure 2.2 Centerline and lane marking for a four lane road

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

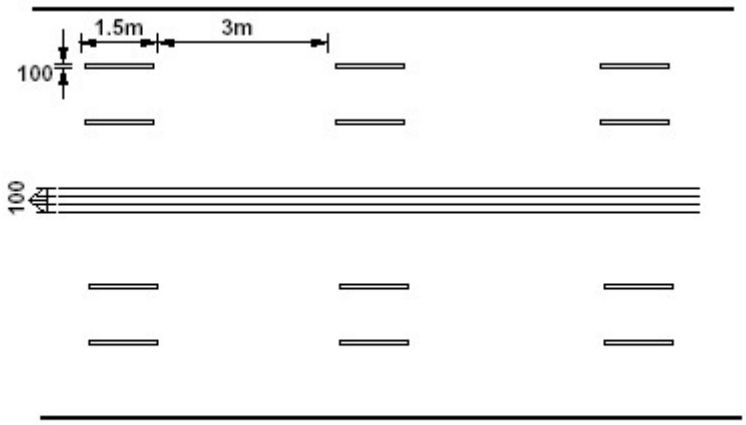

Figure 2.3 Double solid line for a two lane road

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

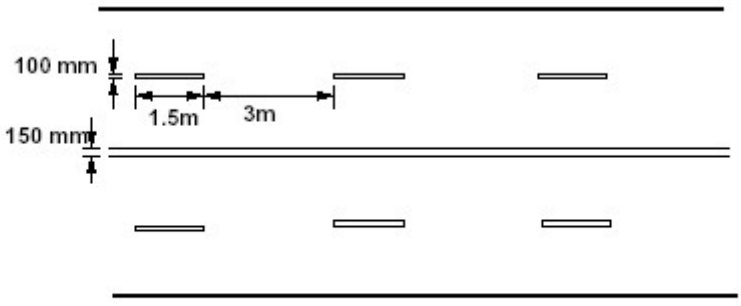

Figure 2.4 Center barrier line marking for four lane road

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

2.6.3 Traffic Lane lines

The subdivision of wide carriageways into separate lanes on either side of the carriage way helps the driver to go straight and also curbs the meandering tendency of the driver. At intersections, these traffic lane lines will eliminate confusion and facilitates turning movements. Thus traffic lane markings help in increasing the capacity of the road in addition ensuring more safety. The traffic lane lines are normally single broken lines of 100 nm width, some examples are shown below.

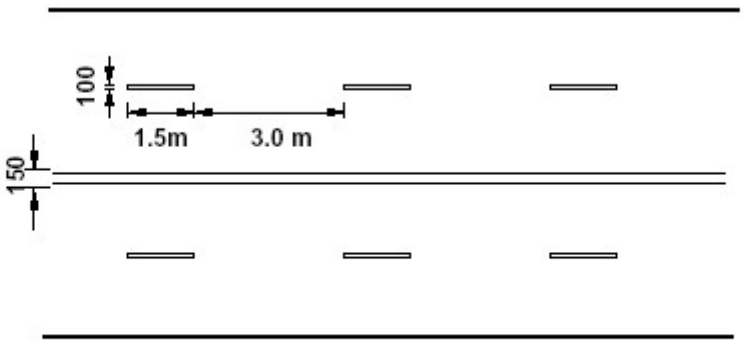

Figure 2.5 lane marking for a four lane road with solid barrier

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

2.6.4 No Passing Zones

No passing zones are established on summit curves, horizontal curves, and on two lane and three lane highways where overtaking maneuvers are prohibited because of low sight distance. It may be marked by a solid yellow line along the centre or a double yellow line. In the case of a double yellow line, the left hand element may be a solid barrier line; the right hand may be either a broken line or a solid line. These solid lines are also called barrier lines. When a solid line is to the right of the broken line, the passing restriction will apply only to the opposing traffic.

2.6.5 Warning Lines

Warning lines warn the drivers about the obstruction approaches. They are marked on horizontal and vertical curves where visibility is greater than prohibitory criteria specified for no overtaking zones. They are broken lines with 6m length and 3m gap.

2.6.6 Edge Lines

Edge lines indicate edges of rural roads which have no kerbs to delineate the limits up to which the driver can safely venture. They should be at least 150mm from the actual edge of the pavement. They are painted in yellow or white. All the lines should be preferably light reflective, so that they will be visible during

night also. Improved night visibility may also be obtained by the use of minute glass beads embedded in the pavement marking materials to produce a retro reflective surface.

2.6.7 Transverse Markings

Transverse markings are marked across the direction of traffic. They are those that go opposite of the direction of the road (ie cross walks) the site conditions play a very important role. The type of road marking for a particular intersection depends on several variables such as speed characteristics of traffic, availability of space etc. Stop line markings for pedestrian crossing, direction arrows, etc are some of the markings on approaches to intersections.

2.6.8 Stop Lines

Stop line indicate the position beyond which the vehicles should not proceed when required to stop by control devices like signals or by traffic police. They should be placed either parallel to the intersecting roadway or at right angles to the direction of approaching vehicles. An example for stop line marking is shown below

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

2.6.9 Pedestrian Crossing

Pedestrian crossings are provided where the conflict between vehicular and pedestrian traffic is severe. The site should be selected so that there is less inconvenience to the pedestrians and also the vehicles are not interrupted too much. At intersections, the pedestrian crossings should be preceded by a stop line at a distance of 2 to 3m for unsignalized intersections and at a distance of one meter for signalized intersections. Most commonly used pattern for pedestrian crossing is Zebra crossing consisting of equally spaced white strips of 500mm wide. Below is an example of pedestrian crossing.

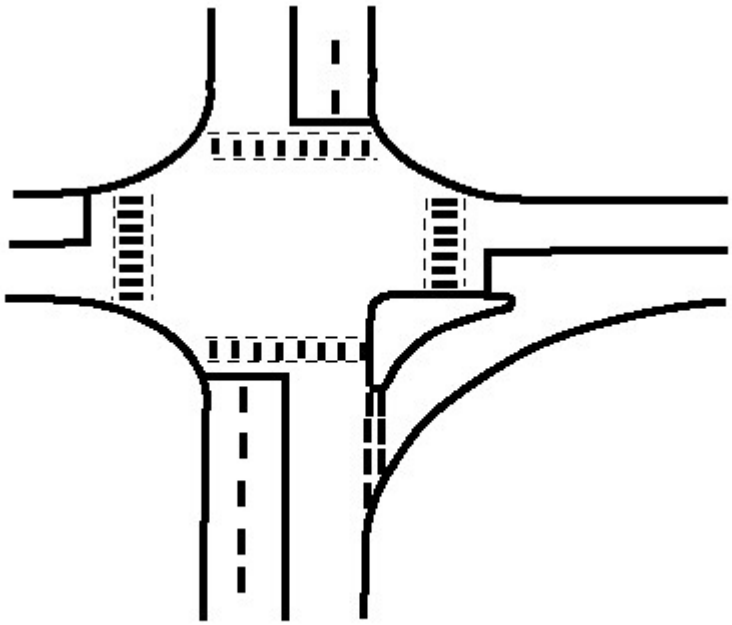

Figure 2 .8 Pedestrian marking

Source;Mattew ,T.V.and Karishna,K.V.(2006)Road markings .India:NAPTEL

2.6.10 Directional Arrows

In addition to the warning lines on approaching lanes, directional arrows should be used to guide the drivers in advance over the correct lane to be taken while approaching busy intersections. Because of the low angle at which the markings are viewed by the drivers, the arrows should be elongated in the direction of traffic for adequate visibility. A typical example is shown below.

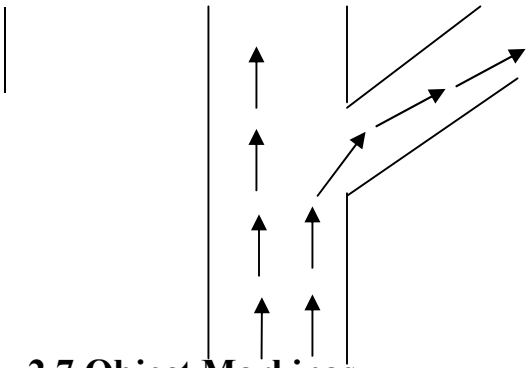

Figure.2 .9 Directional arrow marking

2.7 Object Markings

Physical obstruction in a carriageway like traffic Island or obstructions near carriageway like signal posts etc. cause serious hazard to the flow of traffic and should be adequately marked. They may be marked on the objects adjacent to the carriageway.

2.7.1 Objects within the Carriageway

The obstructions within the carriageway such as traffic Islands, raised medians etc. may be marked by not less than five alternate black and yellow stripes. The stripes should slope forward at an angle of 45^{o} with respect to the direction of traffic. The stripes must be uniform.

2.7.2 Objects adjacent to Carriageway

Sometimes, objects adjacent to the carriageway may pose some obstructions to the flow of traffic. Objects such as sub-way piers and abutments culvet headwalls etc. are examples. They should be marked with alternate black and

white stripes at a forward angle of 45˚ with respect to the direction of traffic. Poles close to the carriageway should be painted in alternate black and whsite. Other objects such as guard stones, drums, guard rails etc. where chances of vehicles hitting them are only when vehicles run off the carriageway should be painted in solid white.

2.8 Word Messages

Information to guide, regulate or warn the road user may also be conveyed by inscription of word message on road surface. Characters for word messages are usually capital letters. Word messages require more and important time to read and comprehend than other road markings.

Therefore, only few and important ones are usually adopted. Some of the examples of word messages are STOP, SLOW, SCHOOL, RIGHT TURN ONLY etc. The character of a road message is also elongated so that driver looking at the road surface at a low angle can also read them easily.

2.8.1 Parking

The marking of the parking space limits on urban roads promotes more efficient use of the parking spaces and tends to prevent encroachment on places like bus stops, fire hydrant zones etc where parking is undesirable. Such parking space

limitations should be indicated with markings that are solid white lines 100mm wide. Words like TAXI, CARS, SCOOTERS etc. may also be written if the parking area is specific for any particular type of vehicle.

2.9 Understanding Road Signs and Markings

Motorists must understand the messages traffic signs and pavement markings are designed to convey in order to make appropriate, safe driving decisions. As the number of signs and markings used on our highways increases and designs change, road traffic safety professionals are concerned about the continued effectiveness of some traffic signs and markings. According to Hughes (2010), there are 3 ways to read signs; by their shape, colour and the messages printed on them. Also in the Nigeria high way code (2008), the signs have different shapes and colours with which you can recognize them, they have six categories. On the other hand signals have two categories namely – traffic control signals and hand signals with explanations of the meaning. Road markings have about 4 categories and various illustrations of how the lines, colours and what graphics on the road surface designate, for example pedestrian crossing, reserved lanes, turning lanes etc.

These signs convey messages in terms of words /or symbols and are placed to regulate, warn or guide road users. They are essential when different regulation applies at specific places and times or where hazard are not evident (Pignataro,

1973). Motorists and road users need to see these signs, signals and markings, instantly comprehend and reflexively follow to safely 'go with' the traffic flow. And that's not all, some of the signs, like stop signs, set up flow patterns with their own sets of rules. Every driver must know and understand these signs and markings in order to use them effectively.

For instance, to demonstrate the understanding of traffic signs and markings, 119,920 out of a total of 435,659 road traffic offences committed in 2009 which represents 27 percent can be traced to road signs and markings violation. See appendix I for the figures.

2.10 Importance of Road Signs and markings

There are numerous signs, signals and markings you will find on roads that keep safe environment at every cross roads. Every driver must be careful of the traffic signs that get changed in minutes. Do you know for what purpose these traffic signals are used? The traffic signals direct the flow of traffic with the exemption of signals with turning arrows which should be compulsory in accord with each other. Traffic signals help you to drive your vehicles in a safer manner lowering the risk of accidents, if properly followed.

They assist the driver in the following situations

- They make a driver aware regarding the speed at which a vehicle should move at a particular road
- They help you to identify your destination through proper arrows displaying the routes and places.
- They make you alert about the exposure ahead that might otherwise create a risk of crashes
- They also tell you the distance you need to cover from the source of destination.

What you must also remember is that even if you are traveling with the green signal favouring your side, you should always be aware of other things going around. It may happen that some emergency vehicles like ambulance or fire brigade are on emergency and you could not control your balance. So always be attentive in any case when you are on road driving the vehicle.

Usually the signs

WARN you of hazards ahead that might otherwise be difficult to see.

GUIDE you to your destination by identifying the route.

INFORM you to local regulations and practices.

REGULATE the speed and movement of traffic. These signs are most effective when they comply with the following requirements: fulfill a need, command

attention, convey a clear and simple message, command respect of the road users and give adequate time for proper response (Pline, 1992).

Signs, signals and markings tell you where you are, regulate your driving and tell you how to drive. The greatest contribution you can make to highway safety is to be constantly alert for those signs, signals and markings that regulate the safe operation of all vehicles using our common highways. To see them is a necessity, to understand them is important and to obey them is life saving. Without them, traffic, streets and highways would be in shambles, Accidents would be a certainty.

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2.11 Summary of the Review of the Related Literature

2.11.1 Highpoints of the Review

.Road traffic accident has been recognized as a serious world health problem, sometimes referred to as a global 'epidemic'.Importatly,it is a problem that is worsening year by year, in 1990 the World Health Organization (WHO,1999) calculated that road accidents were the ninth most important cause of 'years of life lost' around the world, it forecasts that by the year2020 ,road accidents will have moved up to second place-unless the growing problem is tackled. Measures should be put in place to help reduce road traffic accidents especially in the area of road signs and markings.

The complexity of traffic controls varies a great deal depending on the mode of transportation and density of traffic. Road signs and Markings were developed or introduced to help reduce crashes on our roads. As traffic volumes increases, highway systems rely mostly on passive devices such as signs, markings and traffic signals to complement the rules of the road. One important aspect of the demands of the driving task is that involving detection of road signs and pavement markings. What do they really mean? These traffic signals we see (or ignore) along Nigerian roads, what exactly do they mean to us? Are they just decorative and land scarping items or should they act as guides and guards to all road users-motorists, pedestrians, cyclists, motor cyclist etc.

Abuja, a well designed city in Nigeria, a place with well designed roads, lots of very visible road signs, clear pavement markings but sadly a place with very many road crashes, majority of them serious and even fatal. The obvious question then is “With all these signs consisting of prohibitive, mandatory, warning and informative, why do we still have so many accidents?”

Firstly, the signs are indeed quite inadequate, indicating that if followed by all road users, hardly should we see any accident on our roads. It might also surprise us to learn that nowhere within the highways in Nigeria does the maximum permissible speed exceed 80km/hr (Nigeria Highway Code 2008)

Secondly, we will also observe that the road markings clearly and adequately guide movement for all motorists and pedestrians alike. So why then do drivers make turns on pedestrian lay-by's, why are 3 lanes converted to 5, why do people travel at speeds more than 120km/hr in an 80km/hr zone? Why do motorists make illegal U-turns and park indiscriminately?

The answer is simple: Ignorance, Nigerians are simply uninformed, since we do not fully understand the applications and importance of roads signs and pavement markings. Thirdly, regulations are not often enforced. In Nigeria, the FRSC and traffic police are grossly under-resourced and under trained to deal effectively with road safety violation. Effective traffic law enforcement can play an important role in reducing traffic crashes. In order to make sure the highways are safe and not congested, the FRSC enforces traffic rules by monitoring motorists activities, traffic violators are arrested and prosecuted. Obeying road signs and pavement markets should be enforced by the appropriate agencies

2.11.2 Gaps in the Literature

From the literatures reviewed, so much has been written on road traffic accidents, road safety and road sings and markings in other countries of the

world and attitude of drivers towards them. It is a different case in Nigeria where this study is being done.

In Nigeria, most drivers do not really care about traffic signs and markings, they don't actually look out for them. These signs and markings guide, warn, inform and regulate our speed on the road. We really need to pay attention to them and make sure we obey them. Often drivers accuse fellow drivers of failure to follow signs and markings properly and failure to use the lanes properly. You will hardly see any driver stopping at pedestrian crossings for pedestrians to pass, this is either because some drivers do not know what those markings mean or are simply in a hurry and so cannot stop to obey them. It's really that bad in Nigeria, very few people care about road signs and markings and still few obey the ones they really understand. Roads signs and markings are too important for the safety of every road user to be neglected. Drivers are supposed to take appropriate tests before using our roads and the law enforcement officers should work hand in hand to make sure drivers obey traffic signs and pavement markings.

The gap(s) in the literature which this study attempts to fill is knowing the level of understanding of road signs and markings by Nigerians, the relationship between driving experience of motorists and awareness of road signs and

markings and relationship between class of driver and level of understanding of traffic signs and markings.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the techniques and strategies used to achieve the purposes of the study as stated. It is aimed at ensuring that investigation, findings and conclusion on the topic are scientific and authentic. As this chapter stands as a road map of this project, it requires authentic and accurate investigation of facts, data and information to make the findings and recommendations reliable and dependable for generalization. These include sources of data and the instruments for data collection. The methods of data analysis that led to the findings, conclusions and recommendations were also discussed.

3.2 Sources of Data

For the purpose of this study, primary and secondary sources were adopted.

3.2.1 Primary Data

The study made use of an exploratory survey method which allows for both observatory method and interviews to obtain the data. The interviews consist of both personal interviews and questionnaire.

3.2.2 The Secondary Data

The study actually recognized the importance of primary data which ensured result validity. However, the study also relied on secondary data collected from various relevant organizations such as, the Nigerian police, Federal Road Safety Commission (FRSC), journals, international publications, information from the internet and State ministries.

3.3 Tools For Data Collection

The tools used in collecting data for this Research are;

3.3.1 Observatory Method

One of the instruments used for data collection is personal observation. The researcher personally visited the study locations like highways where there are road signs and markings to observe how motorists and road users understand and obey these signs and markings.

3.3.2 The Questionnaire

To design a questionnaire for this study was not an easy task since the questions need not be unambiguous. Also the questions need to be easily understood by the various classes of respondents especially those who are not quite educated. Also some of the respondents are professionals whose value of time is very high. They may not like to be engaged in elaborate or time consuming interviews.

Those with less academic qualification especially the commercial drivers may not like to be engaged in questions that require much thinking or mental adjustments before answers are provided. This group of people requires shorter questions that require shorter answers or options.

Our questions actually satisfied these conditions especially from section B to E. They were just asked to tick according to their answers. The questionnaire by design is divided into five groups or parts. The first part is concerned with personal data, the second part deals with Road Signs and markings awareness, the third part deals with road signs and markings assessment, the fourth and fifth parts deal with understanding road signs and markings respectively. It simplified the respondent task by listing out the various options for the respondent to choose from..

If these options were not listed, the respondents would no doubt have found it difficult to rate or identify what some of these signs and markings mean and also assessing them. They would have found the questionnaire very tasking and perhaps boring.

3.4 Data Collection

The questionnaire was distributed to various occupational sectors in each state. M.Sc and B.Sc students, Civil Servants and businessmen participating in distributing and collecting the questionnaire back. The questionnaire was usually left with the respondents for a few days before been collected. They were distributed at about the same time and took over eight months to finish. The questionnaire was administered to around 100 drivers; 20 in Imo State, 15 in River State, 20 in Plateau, 20 in Edo and 25 in Lagos State. The study was designed to determine the level of understanding of road signs and markings by Nigerians. Specifically, the study is a survey of how motorist understand and use these road signs and markings in order to prevent road accidents.

3.5 The Sample and Method of Selection

A sample of study is described as any portion of the population selected for study as the representative of the entire population. Sampling is very important in a survey whose population is large and unknown. This is because it helps in cutting down research cost as well as survey time. Sampling also enables the collection of information from a representative group, good enough to permit drawing inferences about the larger population.

Survey research design was adopted. This is the type of research design where the research is conducted through the use of appropriate research instruments and study sample units which are considered representative of the population .In order to elicit information about the objective of the study. This way, survey design here would imply "sample survey" and not population survey which would imply studying the entire population. Random sampling technique was applied in choosing the required number of motorists in which the surveys were conducted in each state, and also data on road traffic accidents in the states which shows that Lagos state has the highest number of road crashes and Rivers state has the lowest (between 1999-2009) was also considered, see figure 4.1.

The sample elements selected in the study consists of the motorists and road users of five states of the federation. A total of 100 questionnaires were administered, but only about 82 percent of it was returned.

3.6 Methods of Data Analyses

Two methods of data analysis were employed in this research. They are; Frequency Distribution or descriptive statistics and inferential statistics. The inferential statistics which include one sample population proportion test and Pearson chi-square test were employed for testing the hypotheses. Furthermore we carried out the analysis using statistical analysis software called SPSS, VERSION 15.0.

3.6.1 Frequency Distribution

The frequency distribution showed the distribution of rating scores from the questionnaire which is based on 5-point Likert scale. It tabulates the frequency of scores from the respondents for each question on the questionnaire. Other descriptive statistics employed includes time series graph.

3.6.2 One Sample Proportion-Test

This was employed to test for significant differences if any, in the proportion of respondents regarding some questions. For example, test of proportion can be employed to test the proportion of respondents regarding their level of understanding of Road Traffic signs and Markings. To test the null hypothesis that significant proportion of respondents did not identified Traffic signs

correctly, we set the null H_o: P = 0.5 against the alternative hypothesis, H_a: P > 0.5. The z-statistics for one sample population proportion is calculated thus;

$$z = \frac{\hat{p} - p}{\sqrt{pq / n}} \quad \ldots \quad (1)$$

Where

P = 0.5 is the hypothesized proportion.

P is calculated from the sample and q = 1-p

Where n is sample size form population of respondents

Critical region: $z_{cal} > z_{tab}$ (For a one-tailed test)

Decision: Reject H_o if $z_{tab} > 1.65$ or if P-value < 0.05

The sample size of the population under study is 83. This is made up of commercial drivers and private vehicle operators.

3.6.3 Pearson Chi-square

The Pearson Chi-square test is used in the analysis of nominal data i.e data resulting from counts or frequencies. It is a non-parametric test used to test the strength of association between two-way cross tabulated categorical variables. The Pearson test statistic is denoted by the Greek letter X^2. The test statistic for a two-way contingency is computed as follows;

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad \ldots \quad (2)$$

Where O_i = is the i^{th} observed frequency and E_i = is the i^{th} expected or theoretical frequency. The differences between the observed and expected frequencies are summed over all rows and columns (r and c, respectively). The test statistic computed in equation 2 above is approximately X^2 distributed with degrees of freedom, df = (r-1) (c-1). The expected count in cell (i, j), where R_j and C_i are the rows and columns totals, respectively is.

$$E_{ij} = \frac{R_i C_j}{n} \quad \ldots \quad (3)$$

The expected counts obtained from equation (3) above with the observed cell counts are used to compute the value of the X^2 statistic, which provides objective information needed to accept or reject the null hypothesis. In this study, we test the strength and significance of association between two categorical variables. For example, to test hypothesis on the strength and significance of association or impendence between driving experience and driver awareness of Traffic signs Chi-square statistic is employed. The two categorical variables under test are driving experience and driver awareness. It should be pointed out that Chi-square test is not efficient when the number of cell entry is less than 5. To correct for this, Fisher's exact test is employed.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 FREQUENCY DISTRIBUTION

The following is the frequency distribution of the respondents. It represents the demographic characteristics of the sample population of road users in Nigeria.

Table 4.1: Gender and Driving Experience of Respondents

	EXPERIENCE)			
GENDER	< 5yrs	5-10yrs	Abv 10yrs	Total
Male	7	43	18	68
Female	6	9	0	15
Total	13	52	18	83

Source: Field Survey (2010)

Table 4.2: Age Bracket and Type of Respondents

Key
frequency
row percentage

AGE	TYPE OF RESPONDENT: Private Dr	Comm Opr	Total
< 30yrs	3	17	20
	15.00	85.00	100.00
31-50yrs	24	38	62
	38.71	61.29	100.00
Above 50yrs	0	1	1
	0.00	100.00	100.00
Total	27	56	83
	32.53	67.47	100.00

Pearson chi2(2) = 4.3612 Pr = 0.113
Fisher's exact = 0.071

Table 4.1 shows that the respondents to the questionnaire consisted of 68 males and 15 females. Majority of them has driving experience spanning over 5 years. Our sample is also made up Commercial drivers (67.47%) and private drivers (32.53%) and 62% of them are between the ages of 31 and 50yrs, see table 4.2. The complete frequency distribution of the entire sample is listed in the appendix.

4.1.1 RESEARCH QUESTIONS

i. What is the level of understanding of Traffic signs and Markings by motorists.

Table 4.3: Frequency Distribution of Respondents Level of understanding of traffic signs and markings.

How Well Do You Know The Meaning Of Road Signs And Markings	Freq.	Percent	Cum.
Very Well	15	18.07	18.07
Well	35	42.17	60.24
Fairly Well	27	32.53	92.77
Not Well	6	7.23	100.00
Total	83	100.00	

Source: Field Survey (2010)

The frequency distribution of the respondents in table 4.3 indicates that more than 93% (Cumulative figure) of sample population stated that they understand Traffic signs and Markings. However, this claim will be subsequently verified by results of hypothesis test on traffic signs and Road markings administered to the respondents.

ii. What is the level of obedience of Road signs and Markings by the motorists?

Table 4.4: Distribution of Responses on the Level of obedience to Traffic signs and markings.

Do You Obey Road Signs And Markings	Freq.	Percent	Cum.
Always	12	14.46	14.46
Not Always	48	57.83	72.29
Rarely	23	27.71	100.00
Total	83	100.00	

Source: Field Survey (2010)

In table 4.4, 14% of the respondents who were asked how well they obeyed traffic signs and markings said they obeyed always. About 58% of them do not always obey while 28% of them rarely obeyed what the signs and markings prescribe. Therefore from the results, it appears that most road users (drivers) show indifference to traffic signs and markings.

iii. How has driving experience affected drivers' awareness of Road Signs and Markings?

Table 4.5: Frequency Distribution: Driver experience and awareness of traffic signs and markings.

How Has Your Driving Experience Affected Your Awareness Of Road Signs And Markin	Freq.	Percent	Cum.
Very Well	26	31.33	31.33
Well	27	32.53	63.86
Fairly Well	21	25.30	89.16
Not Well	4	4.82	93.98
None	3	3.61	97.59
.	2	2.41	100.00
Total	83	100.00	

Source: Field Survey (2010)

In table 4.5, about 89% of the respondents say that their driving experience has enhanced their awareness of traffic signs and markings.

iv. How important is Drivers' education on Road signs and Markings.

Table 4.6: Frequency . Distribution: Importance of Drivers' Education on Road signs and Markings.

How Important Is Driver's Education On Road Signs And Markings	Freq.	Percent	Cum.
Very Important	40	48.19	48.19
Important	38	45.78	93.98
Fairly Important	5	6.02	100.00
Total	83	100.00	

Source: Field Survey (2010)

Table 4.6, all the respondents assert that education of drivers on road signs and markings is important.

v. How Has Non-Provision of Infrastructure Affected Road Traffic Accident In Nigeria?

Table 4.7: EFFECTS OF INFRASTRUCTURE PROVISION ON ROAD TRAFFIC ACCIDENT.

b6 (How Has The Non-Provision Of Road Signs And Markings Affected Road	Freq.	Percent	Cum.
Not well	82	98.80	98.80
Very Well	1	1.20	100.00
Total	83	100.00	

Source: Field Survey (2010)

In table 4.7, 99% of the sample population is of the opinion that infrastructure provision has not reduced road accident.

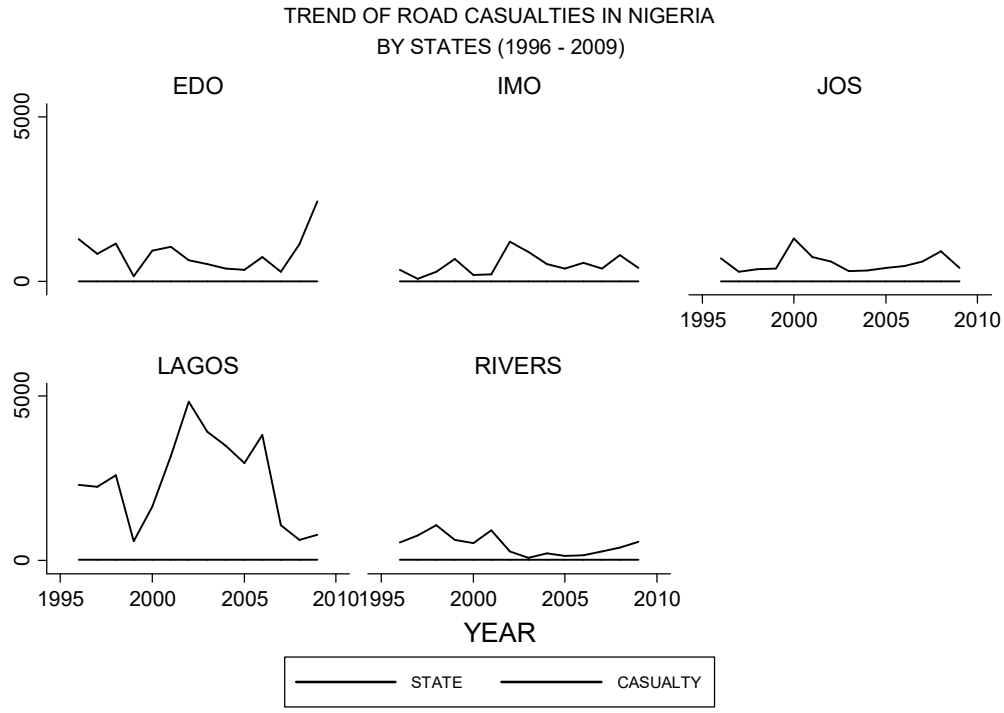

Fig.4.1 TREND OF ROAD CASHES BY STATES OF THE RESPONDENTS.

SOURCE:FREDERAL ROAD SAFETY COMMISSION ISSUES..(2010) :ROAD CRASHES DATA IN NIGERIA (1996 -2009),ABUJA:FRSC

In figure 4.1, the trend of road crashes in three of five states for the period 1996 – 2009 as shown above is on the increase. These states; Edo, Lagos and Rivers are part of the states in which opinion of the respondents was sampled. The trend is consistent with the observation of respondents in these states who stated that infrastructure provision (if any) has not yielded any fruitful results in reducing the trend of road crashes.

4.2 TEST OF HYPOTHESES.

i. H_0 : **There is no significant correct identification of Traffic signs by motorists (at α = 0.05).**

Thus, we test the null hypothesis that the proportion of successes is less than or equal to the hypothesized proportion (i.e. 50%), against the alternative hypothesis that the proportion is greater than the hypothesized value. Statistically, we test the null hypothesis; $H_0 : P < 0.5$ against the alternative hypothesis; $H_1 : P > 0.5$ or 50%.

Table 4.8: Distribution of Responses on Test of Traffic sign identification by motorists.

Sign_Test	Freq.	Percent	Cum.
Wrong	2	2.41	2.41
Correct	81	97.59	100.00
Total	83	100.00	

In table 4.8, about 2% of the respondents made wrong identification of traffic signs while 98% of them identified the signs correctly. To check for statistical significance of these values, a test of proportion is conducted as shown below.

Table 4.9: Test of Proportion Result.

VARIABLE	Proportion	Std. Err.	Z_cal.	Z_tab.	Sig. evidence against Ho
SignTest	0.98	0.02	8.67	1.65	Yes

In table 4.9, the sample proportion of successes (81/83) is 0.98. This is equivalent to a z – value of 8.67 (using equation 1). Since the calculated z value is greater than the tabulated z – value 1.65, there significant evidence to reject the null hypothesis and accept the alternative hypothesis. It is therefore evident that many of the sampled motorists identified the traffic signs correctly.

ii. H_0 **:There is no correct significant identification of Road Markings by the motorists (at α = 0.05).**

Thus, we test the null hypothesis of $Ho: p = 0.5,$ against the alternative hypothesis that $Ho: p > 0.5.$

Table 4.10: Identification of road markings by Motorists

Markngs_Test	Freq.	Percent	Cum.
Wrong	36	43.37	43.37
Correct	47	56.63	100.00
Total	83	100.00	

In table 4.10, it can be seen from the frequency distribution that 43% of the sampled motorists made wrong identification of road markings while 57% of them made correct identification. To test the statistical significance of these results, a test of proportion is also conducted as shown below.

Table 4.11: Test of Proportion

Variable	Proportion	Std. Err.	Z_Cal	Z_tab	Sig. evidence against Ho
Markings Test	0.57	0.05	1.21	1.65	No

In table 4.11, the test proportion result indicates that the calculated z value (or the test statistic) is 1.21. This is less than the critical or tabulated value (i.e

1.65). Thus, there is no significant evidence to reject the null hypothesis (at $\alpha = 0.05$). We therefore accept the null hypothesis against the alternative hypothesis that significant proportion of the motorists did not make correct identification of Road markings. Although table 4.10 indicates that 57% correct identification of Road markings were made as against 43% of wrong identification, yet statistical evidence is not 'strong enough' to suggest that there is difference in the percentage values. Results therefore show that the motorists performed clearly well in identification of Traffic signs than in Road markings.

iii. H_0 :There is no significant relationship between Driving experience of motorists and Awareness of Road signs and Marking (α=0.05)

Table 4.12: Driving Experience of motorists and traffic signs & markings identification.

	DRIVING EXPERIENCE			
Traffic Test	**< 5yrs**	**5-10yrs**	**Abv 15yrs**	**Total**
Wrong	1	2	0	3
	33.33	66.67	0.00	100.00
Correct	12	50	18	80
	15.00	62.50	22.50	100.00
Total	13	52	18	83
	15.66	62.65	21.69	100.00
	Pearson chi2(2) =		6.3035	Pr = 0.031
	Fisher's exact =			0.04

In table 4.12, 62.5% of the sampled drivers who have driving experience of between 5 to 10 years correctly identified the traffic signs and road markings. 22.5% of them who have driving experience spanning over 10 years also made correct identification. The value of chi-square test of independence statistic is 6.3035. Its p-value of 0.031 is significant (at α = 0.05). Fisher's exact test statistic also has a p-value of 0.040 and is also significant at α value of 0.05.

We therefore reject the null hypothesis and accept the alternative hypothesis that significant relationship exists between driving experience and ability to identify traffic signs and road markings. The implication is that driving experience has a role to play in driver's ability to recognize traffic signs and road markings.

iv. H_0 :There is no significant relationship between Class of Driver and level of understanding of Traffic signs and markings.

Table 4.13: Category of Driver and level of understanding of Traffic signs and markings.

Key
Frequency
Row Percentage

	TYPE OF RESPONDENT		
Traffic Test	**Comm Driver**	**Private Driver**	**Total**
Wrong	1	2	3
	33.33	66.67	100.00
Correct	54	26	80
	67.50	32.50	100.00
Total	56	27	83
	67.47	32.53	100.00
	Pearson chi2(1) = 7.762		Pr = 0.005
	Fisher's exact =		0.015

In table 4.13, the test of association result shows that eighty (80) of the respondents passed the traffic test (i.e. made correct identification of the traffic signs and Road Markings) when disaggregated by driver class. Out of this number, 54 are commercial drivers while 26 of them are private road drivers. The test statistic value is 7.762 with a p value of 0.005. This is significant and hence we reject the null hypothesis in favour of the alternative that significant relationship exists between the class of vehicle driver and ability to identify correctly traffic signs and road markings. The result suggests that commercial drivers, who are always on the move, may become very familiar with traffic signs and road markings over time.

4.3 Discussion of Results

The need to understand and obey traffic signs and markings at all times cannot be overemphasized. This is because adhering to it especially while driving will help reduce road traffic accident in the country. The issues discussed in this research includes

2. Understanding and identifying road signs and pavement markings by all motorists and road users.
3. The relationship between driving experience of motorists and awareness of road signs and markings.

4. The relationship between category of driver and level of understanding of traffic signs and markings.

The study used descriptive and inferential analysis as approaches to arrive at several conclusions. Relative to the research sample where the population is unknown, the research has to rely on judgmental approach to determine which groups of people (Respondents) are relevant to the study. Exploration of the views and perception of the respondents relative to understanding road signs and pavement markings was the aim of the survey. Empirical data from the survey were analyzed and the interpretations of the results actually assisted the conclusions made in the research.

However, the problem with the study is the ability to determine the size of the population. The population of the motorists is not static, more people learn how to drive everyday. For the adoption of a random approach in the determination of a sample size for a research of this nature, an estimated knowledge of the population is suggested in future effort in this area.

In comparison to the research carried out by University of Lagos Consult and ITI Projects services limited (2008),Income and Age are important factors contributing to understanding of road signs and markings, but from our research Driving experience and class of driver(commercial or private) are also

significant factors contributing to understanding of road signs and markings .The number of years one has been driving and how often a driver is on the road contributes to how much the person will be able to identify and understand these signs and markings. motorists tend to become accustomed to the signs they see everyday and which they have been seeing for a number of years.

Most road users from this survey said that they are aware of traffic signs some of the time and then driving experience has also helped to influence this behaviour. This also applies to road markings as most road users also consider the markings on our roads to be inadequate and where they exist are not clear enough. So many things has to be done to slim the tide or reduce trend of accident including improving our road infrastructure. For drivers who identify but do not obey, there should be some level of enforcement. Also most enforcement agents do not understand these road signs and markings, for them, there should be adequate training to enable them understand what these mean so that they can be able to enforce and correct motorists and other road users.

The Federal Road safety commission has a lot to do in this aspect, they should emphasize training to help motorist acquire sufficient experience, if experience makes them aware of road signs. Also, there should be some form of test for

potential drivers whether private or commercial operators before lincences are issued to them. Tests that has to do with proper use of the road signs and markings and obeying them at all times.

4.4 Assessment of Road Signs and Markings in Nigeria

What happened to the vehicle inspection officers? Where are our testing grounds? Are people still tested before they get driver's licenses? Where are our road signs and pavement markings? Why are most of our roads unmarked? How many roads in the country can pass tests on accurate marking for relevant road signs? Is the FRSC aware of the rising number of minors who drive cars and ride motorcycles with impunity?

In Nigeria, the agencies responsible for the provision of the road infrastructure are not coordinated at all. Rather each agency works unilaterally. This however, has made it cumbersome to attain better road safety in the road traffic environment in Nigeria. According to Odeleye (2000), the Federal Ministry of works and Housing provides the roads and roads infrastructure, while the Federal Ministry of transport engineers the national policy that guides the vehicular traffic operations on these roads.

Furthermore the Federal Road Safety Commission manages road safety along the federal roads in Nigeria, while the traffic department of the Nigerian police force takes charge of prosecution of erring road users. Other agencies are the traffic warden, vehicle inspection official and other informal private initiatives such as special marshal corps, Red cross, man-O-war. However, problems of overlapping objectives, responsibility and self esteem amongst these agencies have made their existence sometimes meaningless in alleviating the poor state of the road traffic environment in Nigeria.

Road signs and markings are particularly very bad in Nigeria. Most of them are dysfunctional, ineffective, inadequate, or not enforced or obeyed, the roads translates literarily to uncontrolled junction. The absence of road signs and markings for effective control of traffic makes them very rowdy. The implications of these are not far fetched - delays, high accident potential and risks to vehicles and pedestrians, bottlenecks or traffic hold-ups especially at peak periods.

- There is absence of functional street lights for clear visibility and safety at night
- Absence of traffic signs
- Absence of lane markings and worded messages

- Absence of pedestrian crossing on roads which encourages uncontrolled pedestrian – vehicle conflict and accident risks.

Road signs in Nigeria are particularly bad, there are standard signs defined but various authorities each use different ones instead.The FRSC should really seek to extend its function. Mass procurement of the highway code is desirable (as they are proposing to do), making its possession mandatory for all motorists is sound.

But how many of those who drive can read? Will possession of the Highway Code make drivers better road users? Will possession of the Highway Code wipe out illiteracy? The FRSC has a huge battle ahead of it. The code is not the answer, where one is dealing with illiteracy. The code would not be able to take care of only the corruption that hands out drivers' license to people without being able to verify their fitness to be drivers.

Road safety cannot be divorced form the standards of the larger society. Roads riddled with pot holes, unit streets, often without signs to warn about dangerous curves, are all ingredients that produce the mindless decisions most drivers make. The number of accidents and their fatalities should worry government enough for them to tackle the issue around safety on our roads with particular interest on our road signs and markings.

4.5 What must be done?

So much has been said and done about road traffic accident without placing emphasis on the use of road signs and markings in preventing accidents.

From all we have seen, so many people have written on road signs and markings but for us to use it effectively in Nigeria, motorists and road users must be made to understand them. Awareness must be created and also its enforcement made effective.

To determine the level of understanding of road signs and markings by Nigerians, we must be made to know what these road signs and markings means before it could be used. The Federal Road Safety Commission (FRSC) must be able to test and administer questionnaires on road signs and markings to intending motorists before drivers' license is given to them.

Road signs and markings are so many that proper understanding and use of them will go a long way in reducing road traffic accidents. In as much as non adherence to road signs and markings constitute more than 50% of the causes of accident in Nigeria, we have not actually looked into providing and maintaining road signs and markings, making drivers understand them and enforcing them one of our priorities; we must determine the level of understanding of road signs and markings by Nigerians and then know how to enforce it in order to make our roads safe.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of Findings

The condition of paved roads in Nigeria is very poor. Overall, lane markings are considered inadequate, where markings exist they are not clear enough. Only a small percentage of roads with markings are clearly marked. In addition, the road markings are badly positioned and the thickness is largely inadequate. There is room for significant improvements in all categories of roads. There is an urgent need to remark the roads in order for users of high ways to be assisted to drive safely. Road users and motorists are of the opinion that the number of traffic signs on the roads are not adequate and where they exist, they are not clear enough, so it makes reading them difficult. Form the survey, there is need to increase the number of traffic signs as the existing ones are not enough for the roads.

Not having the adequate number of traffic signs on our roads poses serious danger to all motorists and road users alike.

This study sampled many drivers from across the country. These surveys evaluated driver understanding of some traffic signs, symbols, traffic signals

and pavement markings. The research concluded that understanding and obeying them was “generally poor”.

Driving is one of the most hazardous things that people do on a daily basis and we urge all drivers to refresh their knowledge of the road signs and markings to help keep themselves and others safe. Road signs play a central role in mitigating many of the risk on our roads. If motorists don’t understand what a sign is trying to communicate, the risk increases significantly.

5.2 Conclusion

From the above, it can be concluded that proper understanding of road signs and pavement markings will help reduce road traffic accident in Nigeria. Motorists and all road users must be made to understand and obey them at all times; government can also help by making adequate provision of these signs, marking and remarking the roads and making sure these are maintained. Traffic and law enforcement agents must be able to make road users obey and observe these signs at all times. Failure to do all these will lead to more road traffic accidents in future.

5.3 Recommendation

From the foregoing, the following recommendations are made. There is need to better equip and improve road furniture on our roads. Government need to particularly equip our roads in view of the level of urbanization taking place at locations linked by federal roads with the attendant presence of heavy commercial vehicles on these roads. Roads should be marked and remarked in order for users of highways to be assisted to drive safely. Our roads need to be installed with more information signs to improve compliance with traffic regulations and safety of roads. Regular maintenance of road infrastructure is strongly recommended to assure road safety. Greater number of pedestrian lanes and crossings should be provided on all roads and improved provision of road lighting in urban centers. Road users must be educated, trained and retrained on the need to always observe and obey traffic signs when driving**.** There is need for a public campaign to improve both the understanding and awareness of road signs and markings. All road users must have and understand the Highway Code. There should be a level of enforcement of obedience to traffic signs and markings by traffic agents. There is need to raise awareness and encourage road safety education.

Motorists must be educated and trained on the need to understand, observe and obey traffic signs and road markings always.

5.4 Contribution to Knowledge

In this thesis , effort has been made to empirically confirm that being aware of road signs and markings, understanding them and obeying them at all times will help reduce road traffic accident in the country. Establishing that driving experience has a lot to do with awareness of motorists on road signs and markings was achieved in this research.. This means that the more one drives, the more he becomes aware and understands the meaning of road signs and markings.

The research also establishes that class of driver (commercial or private operators) has a lot to do with understanding road signs and markings. Looking at table 4.3, most of the sample population claims that they understand these traffic signs and pavement markings but from table 4.4, one observes that they understand but hardly obey them. Only 14% of the respondents said they obey traffic signs and markings always, the other percentage either do not obey always or rarely obeys.

It is not about being educated, those who are always on the road understand these signs better than those who don't and that leads to the obvious question. If motorists in Nigeria understand these signs and markings, why do they not obey? This is one important area that is open for further research.

Trying to find out why motorists and road users do not always obey road signs and markings. Is it because of poor awareness, improper enforcement, poor attitude of drivers etc.This study is significant since it will help policy markers achieve target development, help motorists and road users maker better use of the roads to reduce crashes and law enforcement agents to look out and correct those who do not understand and obey traffic signs and markings.

The research findings will facilitate and contribute toward ongoing Federal Road Safety commission (FRSC) initiatives and policies towards enhancing the level of understanding of road signs and markings by Nigerians. It is also expected that careful provision of prescribed road signs and markings can make a considerable contribution to the safe and efficient operation of the highway network.

5.5 Areas for Future Research

Further policy research aimed at evolving plans and strategies to promote road users understanding of road signs and markings is needed in Nigeria. it should

be focused on these areas namely Driver Education ,Driver attitude and raising awareness.

5.5.1 Driver Education

The main objective should be to identify possible ways of improving the understanding of road signs and markings by motorists. This could be done from time to time either formally or informally. This is so that motorists will always know that these signs exists and be able to identify them. The rules of the road must be made known to motorists and must be obeyed at all times.

5.5.2 Driver Attitude

From the research, we found out that most of the drivers did well in identification of the road signs but the problem is that they do not obey. There is an urgent need to identify the reasons why motorists do not obey traffic signs and markings and put appropriate measures in place to enforce it on them..

5.5.3 Raising Awareness

After years of public education and information on road signs and markings, education is still identified as inadequate and necessary. The obvious question remains,' what are the best information dissemination mediums?' How can we identify the best ways to make motorists aware that these signs and markings exists and must be obeyed at all times.

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Appendix I A

Percentage of traffic offences committed in 2009

Offences	Total	%
Assaulting marshal on duty (AMD)	1786	.41
Attempting to corrupt marshal on duty (ATCM)	1751	.40
(RSV)	1553	.36
Construction area speed limit violation (CASV)	1832	.42
Dangerous driving (DGD)	1277	.29
Do not move violation (DNM)	1392	.32
Drivers license violation (DLV)	2882	.66
Driving under alcohol /drug influence (DAD)	1196	.28
Driving with worm out tyre (WTV)	2700	.62
Driving without spare tyre (STV)	1395	.32
Excessive smoke emission (ESE)	1914	.44
Failure to cover unstable materials (FCM)	1503	.35
Failure to fix red flag on projected load (RFV)	2039	.47
Failure to move over (FMO)	3665	.84

Failure to report accident (FRA)	2338	.54
Fire extinguisher violation (FEV)	12181	2.8
Hospital rejection of accident victims (HRAV)	3950	.91
Inadequate construction warning sign (ICW)	3649	.84
Light/caution sign violation (LCV)	1864	4.3
(LSW)	6587	1.57
(LSV)	16696	3.84
Mechanically deficiency vehicle (MDV)	3876	0.89
Obstructing marshal on duty (OMD)	4116	0.95
Operate a vehicle with forged documents (OVFD)	2740	0.63
Over loading violation (OLV)	6801	1.56
Passenger manifest violation (PMV)	27741	6.38
Road marking violation (RMH)	119,920	27.58
Road marking violation(RFV)	12162	2.80
Road obstruction violation (ROV)	5355	1.23
Road marking violation (RMV)	3427	0.79
Route violation (RTV)	20231	4.65
Seat belt violation (SBV)	70634	16.25
Speed limit violation (SLV)	13409	3.08
Unauthorized removal/tampering	2801	0.64

with road signs (RTRS)		
Under age driving/riding violation (UDRV)	3217	0.74
Use of phone while driving (UPWD)	4204	0.97
Vehicle license violation (VLV)	5009	1.15
Vehicle number plate violation (NPV)	27453	6.31
Wind screen violation (WSV)	5845	1.34
Wrongful overtaking (WOV)	5788	1.25
	435,659	100

Source: computed by researcher from FRSC Annual Report (2009).