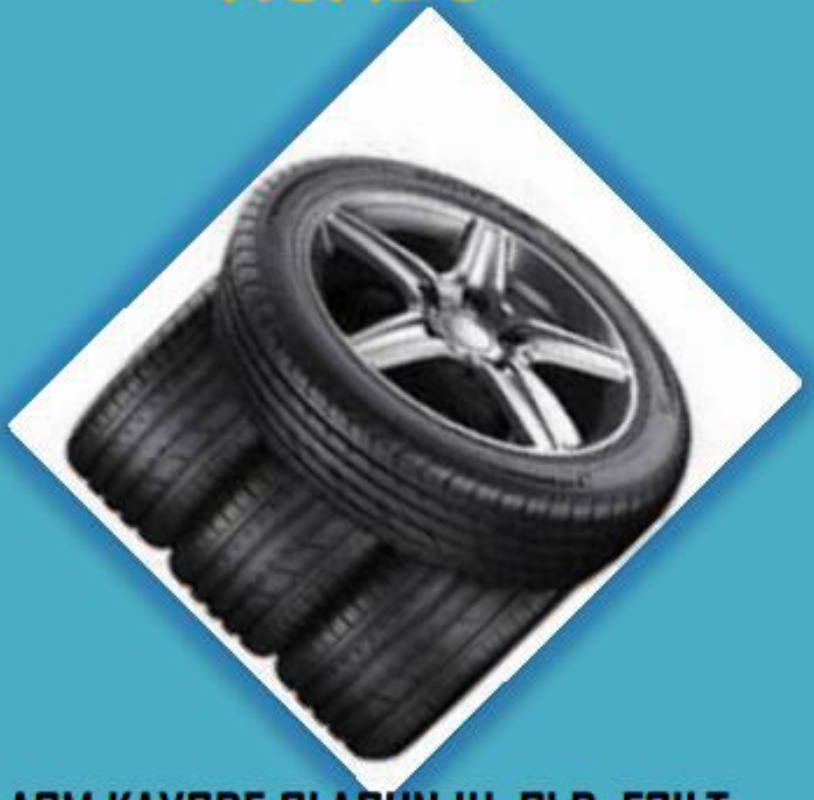
CONDITIONS OF VEHICLE TYRES ON NIGERIAN ROADS



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A PRESENTATION TO THE FRSC MANAGEMENT

ON TUE, 28TH MARCH, 2017

ABSTRACT

The task of selecting and use of a good tyre is enormous and quite important. Wrong tyre usage or selection portends danger to motorists, pedestrians and indeed all road users. The overall purpose of the National Survey on tyre was to propose policy options concerning the use of tyres for improvement of traffic safety. Centrally to this is the idea that end users need to make correct assessment in relation to the tyre condition in order to achieve a high level of safety. Within this context, the tyre condition is considered in relation to technical elements (tyre inflation pressure, tyre tread depth, tyre damage, tyre age, weather and other influences). This survey revealed that despite the awareness on the danger inherent in the use of fairly use tyres (tokunbo) the practise still thrives and it also revealed the lack of understanding of tyre education on the manufacture date of tyre, life span, reasons for wear and tear and lack of tyre maintenance culture.

INTRODUCTION

Soon after man invented the wheel he realised that it wore out as he used it. A piece of material was then wrapped around the outside of the wheel either to rebuild it or prevent it from wearing out. This material wrapped around the outside of the wheel became known as a "tyre".

BRIEF HISTORY OF TYRES

The very first tyres were bands of iron placed on the wooden wheels of carts and wagons (blackcircles.com, 2015). Luckily, with the discovery of rubber, things changed. It was in the mid 1800's that the first tyres made using rubber was produced. They were simple tyres; the rubber carried the load entirely.

It was in 1845 that the pneumatic or air-filled tyre - which works by air within the tyre absorbing the shocks of the road - was invented and patented by RW Thomson (blackcircles.com, 2015). His design used a number of thin inflated tubes inside a leather cover. This meant that it would take more than one puncture before the tyre gets deflated. However, despite this new breakthrough in tyres, the old solid rubber variety was still favoured by the public, leaving the pneumatic tyre out in the wilderness.

It wasn't until 1888 that John Boyd Dunlop, "unbeknownst" to him, reinvented the pneumatic tyre whilst trying to improve his son's bike. Dunlop's tyre, like Thomson's, didn't seem to sell at first - until a bike race in Belfast was won by a rider using his tyres. With that victory, people began to take notice of the pneumatic tyre (Dunlop.eu/Dunlop_euen, 2014).

In 1895 the pneumatic tyre was first used on automobiles, by Andre and Edouard Michelin. It was also around this time that legislation was put into effect that discouraged the use of solid rubber tyres. All over the world companies sprang up to meet the new demand for the new tyres. The age of the pneumatic tyre had begun!(blackcircles.com, 2015).

Tyres remained fundamentally unchanged throughout the 1920s and 30s until Michelin introduced steel-belted radial tyres in 1948 (TyreBlog.co.uk,2015). This new type of pneumatic tyre meant that they would have a longer life span thanks to ply cords that radiate from a 90 degree angle from the wheel rim. It also allows the tyre to have less rolling resistance – increasing the mileage of a vehicle. One drawback was that these tyres required a different suspension system on the vehicle.

This new radial tyre was very successful outside of the US, with companies in Italy, France, Japan and Germany producing them in large numbers. In the US however, a battle commenced. American car manufacturers were afraid that the cost to redesign their cars in order to use these radial tyres was too much and so stuck to the older bias ply tyres.

It was in the 70's – when there was a fuel crisis – that the American public, because of the rising cost of petrol, demanded more economical cars. This led to the introduction of cars that could easily fit the high mileage radial tyres. By 1983 all new American cars came fitted with steel radial tyres. Today there are two types of tyres: **solid** and **pneumatic**.

SOLID TYRE

Solid tyres were the original type of tyre used. As the name suggests they are made up of some type of solid material that is wrapped around the wheel. There are many different types of solid tyres.

PNEUMATIC TYRE

Pneumatic tyres have air pressure inside the tyre. The pneumatic tyre must be fitted to the outside of the wheel and inflated with air pressure. There are three types of pneumatic tyres: bias ply, bias belted and radial ply.

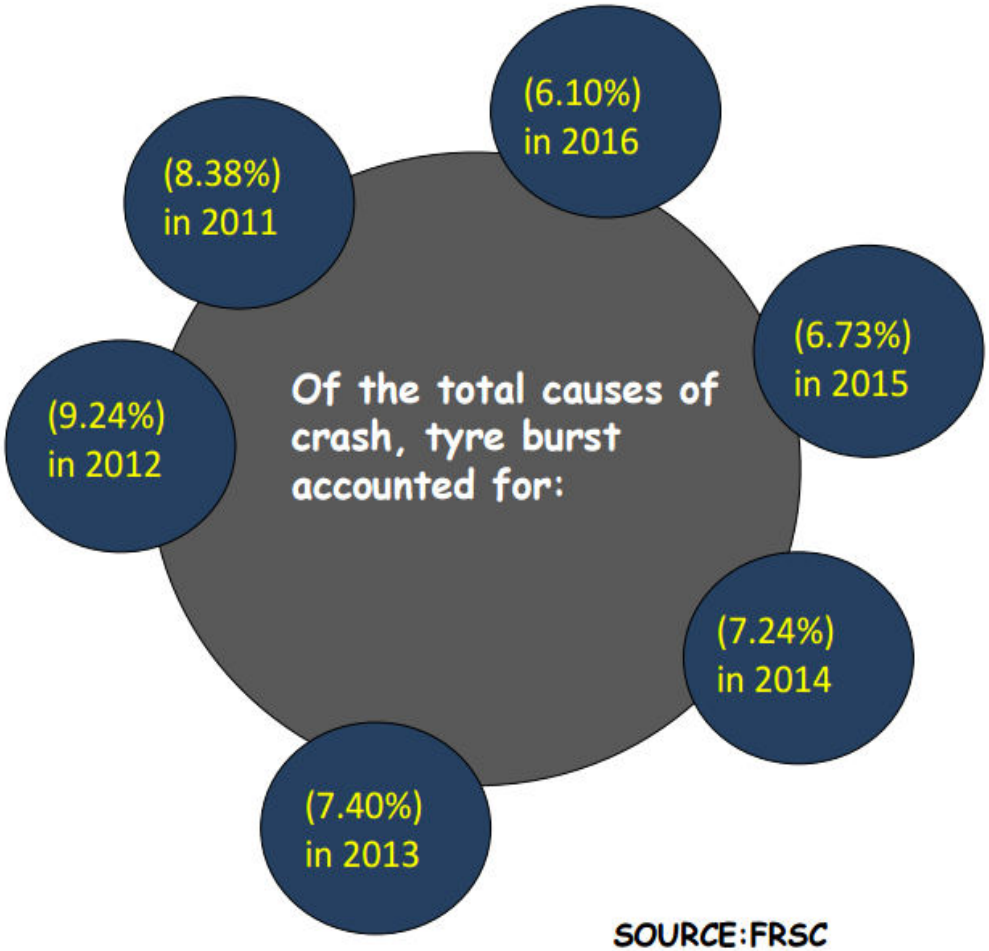
There is one simple difference between the solid tyre and the pneumatic tyre: A solid tyre **pushes** into the road surface and the pneumatic tyre **sits on top** of the road surface.

The pneumatic tyre is very sensitive to the air pressure inside the tyre where the solid tyre is very sensitive to surface it is running on – this is the primary difference between solid and pneumatic tyres.

All pneumatic tyres are made of rubber reinforced with tyre cord. The three different types of pneumatic tyres - bias, bias-belted and radial - explain the different ways in which the tyre cord is place inside the tyre. The way in which this tyre cord is placed inside the tyre determines its type. The tyre cord inside them holds the tyre's shape and determines what type of pneumatic tyre it is. (National Automotive Council, 2015)

Fig. 1 TYRE RELATED CRASHES (2011-2016)

According to available data……



SOURCE:FRSC

AIM

The aim of the research is to assess the conditions of tyres on Nigerian roads for informed decision on road safety

OBJECTIVES

The objectives are:

- To ascertain the level of awareness on tyre usage
- To identify the condition of tyres being used in the country.
- To evaluate the level of correct tyre usage and identify the combination of new and expired tyres.

THE STUDY AREAS

The survey was conducted in all the states and Federal Capital Territory.

METHODOLOGY

- Questionnaires were randomly distributed to private, commercial and government drivers by the FRSC field commands nationwide. Tyres of the vehicles being driven by the drivers were examined and pressure (PSI) also measured. A total of 30,124 vehicles were checked with a total of 124,235 tyres.
- Simple descriptive statistics and charts were employed in the analysis.
- Statistical packages like SPSS and Microsoft Excel were used in running the analysis.

CHALLENGES

The following challenges were encountered:

- ❖Impatience of some drivers, especially the commercial drivers when stopped for the survey
- ❖Omission of some of the variables in the questionnaire.
- ❖Despite the challenges, the exercise is still a good way of evaluating the level of awareness on tyre usage.

ANALYSIS

A total of 30,124 vehicles drivers were stopped and tyres checked. 124,235 tyres were checked from randomly stopped vehicles. 55% of the surveyed tyres were from private vehicles, 42% from commercial vehicles, while 3% were from Government vehicles.

TABLE 1: SUMMARY OF NATIONAL TYRES SURVEYED

S/No.	PARTICULAR	PRIVATE	COMMERCIAL	GOVERNMENT	DIPLOMAT	TOTAL
1	Number of Expired tyres	25975	22630	915	0	49520
2	Number of Non-Expired tyres	42660	29030	3025	0	74715
3	Number of tyres purchased as Tokunbo	24635	29270	1045	0	54950
4	Number of tyres purchased as Rebore	425	720	0	0	1145
5	Number of tyres purchased as New	43840	21310	2990	0	68140
6	Number of tyres with Correct PSI	23725	12700	2515	0	38940
7	Number of tyres with wrong PSI	44570	37545	3180	0	85295
8	Number of Under inflated tyres	21765	19500	1260	0	42525
9	Number of over inflated tyres	22805	18045	1920	0	42770
10	Number of Tyres with Good Thread or Grid level	49255	27710	3565	0	80530
11	Number with Fair Thread or Grid level	15625	15685	525	0	31835
12	Number with Bad Thread or Grid level	4730	7035	105	0	11870
13	Number of tyres with Burge/damage or cut	5225	6475	260	0	11960
14	Number of tyreswithoutBurge/damage or cut	65085	42720	4470	0	112275
15	Number of Drivers with knowledge of tyre expiration	14185	8160	935	0	23280

ANALYSIS OF EXPIRED/NON-EXPIRED TYRES

A total of 124,235 tyres were surveyed from various categories of vehicles. 55% of the surveyed tyres were from private vehicles, 42% from commercial vehicles, while 3% were from Government vehicles

As showed in chart below, 60% of the total tyres surveyed from vehicles had not expired while 40% of the tyres had expired. Analysis also revealed high percentage of good tyres among government vehicles as only 23% of their tyres were recorded expired. See the details in table 2 and chart 1 & 2 below

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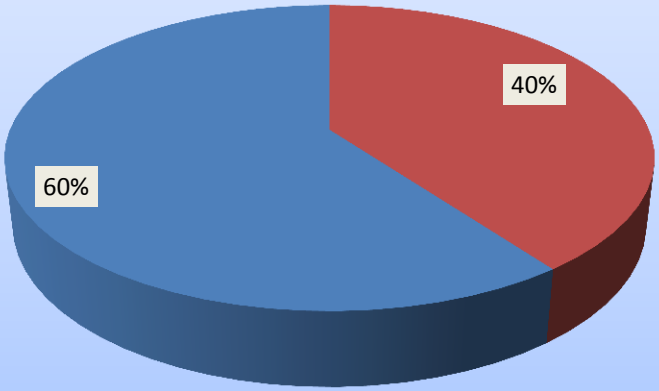
CHART 1: PERCENTAGE OF EXPIRED/NON-EXPIRED TYRES FOR ALL VEHICLES TYRES SURVEYED



NUMBER OF EXPIRED TYRES NUMBER OF NON-EXPIRED TYRES

Chart 2 below indicated that 44% of commercial vehicles tyres had expired while the remaining 46% had not expired.

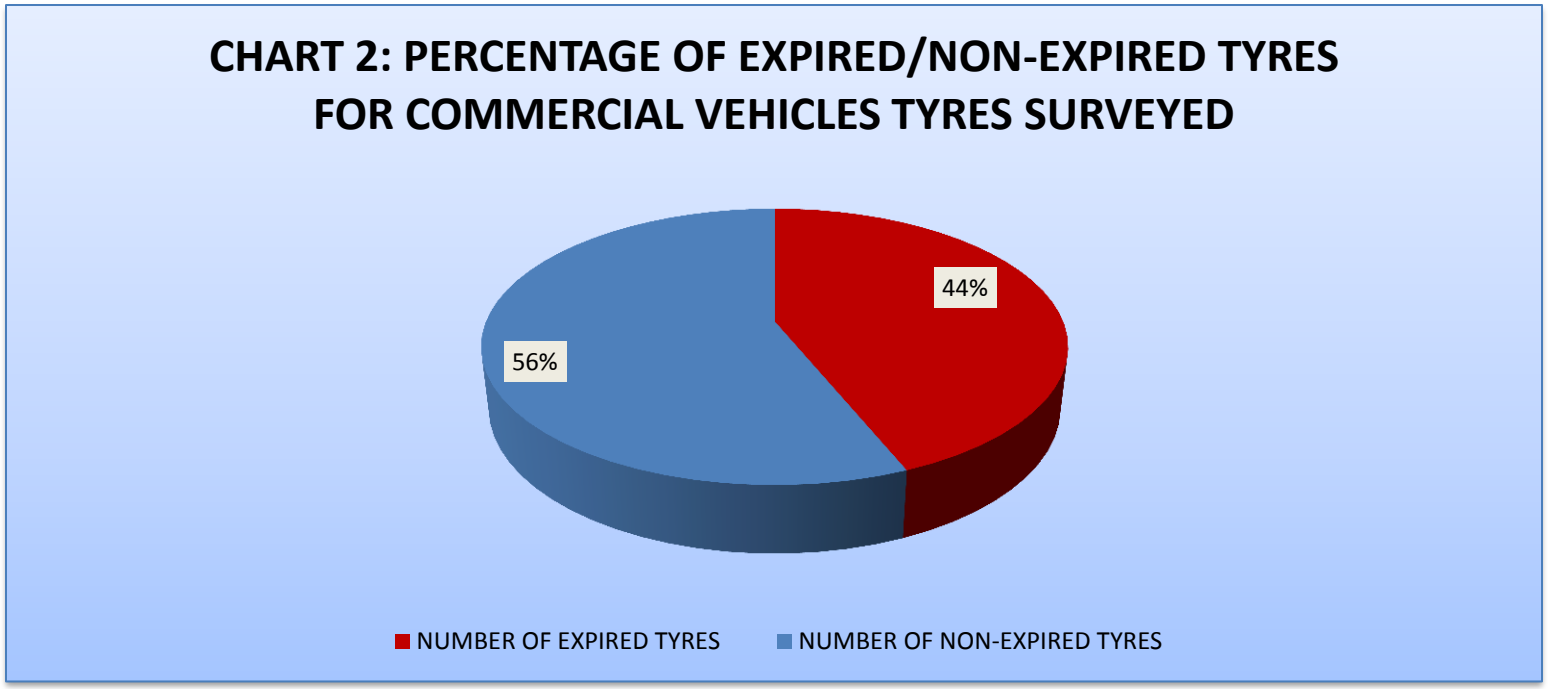


Table 2: ANALYSIS OF EXPIRED/NON-EXPIRED TYRES

CATEGORY OF VEHICLE	NUMBER OF EXPIRED TYRES	NUMBER OF NON-EXPIRED TYRES	TOTAL NUMBER OF TYRES SURVEYED	PERCENTAGE
PRIVATE	25975	42660	68635	55%
COMMERCIAL	22630	29030	51660	42%
GOVERNMENT	915	3025	3940	3%
DIPLOMAT	0	0	0	0%
TOTAL	49520	74715	124235	100%

In Chart 3 which shows private vehicles tyres, showed that 38% of the tyres had expired while 62% were still within the valid period. This is an indication that commercial vehicles have more expired tyres than private vehicles

CHART 3: PERCENTAGE OF EXPIRED/NON-EXPIRED TYRES FOR PRIVATE VEHICLES TYRES SURVEYED

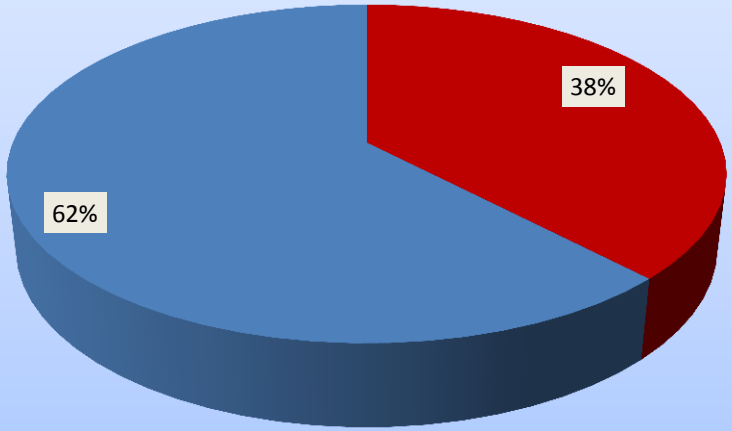
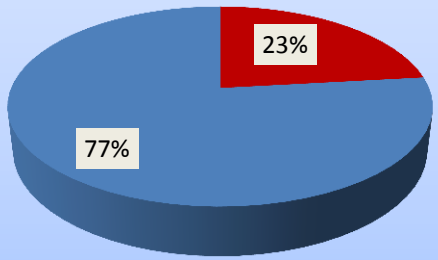
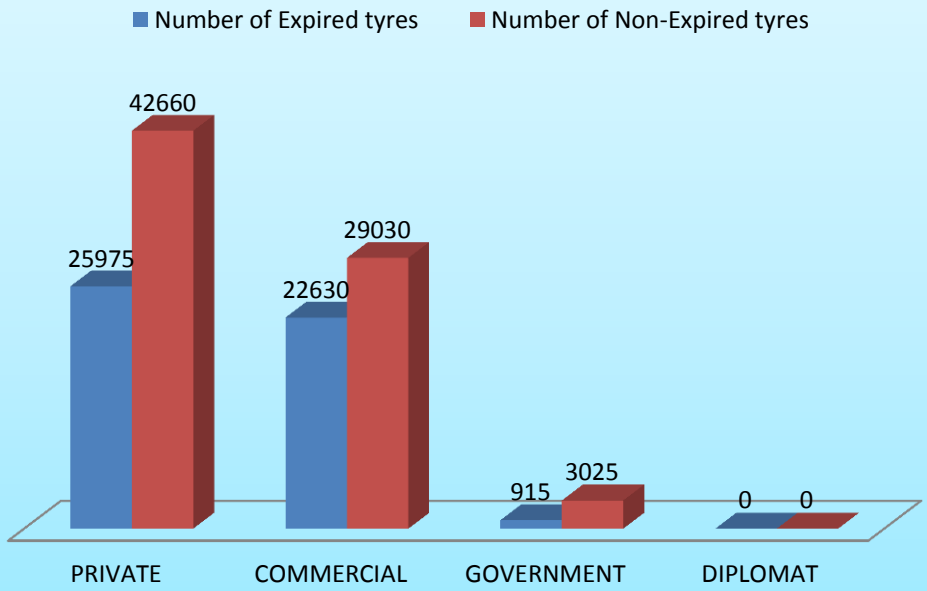


CHART 4: PERCENTAGE OF EXPIRED/NON-EXPIRED TYRES FOR GOVERNMENT VEHICLES TYRES SURVEYED



NUMBER OF EXPIRED TYRES NUMBER OF NON-EXPIRED TYRES

CHART 5: EXPIRED/NON-EXPIRED TYRES BY CATEGORIES OF VEHICLES



TYRES PURCHASED AS TOKUNBO,REBORE AND NEW

This analysis showed categories of tyres used by road drivers, either New, Rebore or Fairly-used tyres popularly known as Tokunbo in Nigeria.

Table 3 and related charts shows that 55% of the total tyres surveyed were brand new, 44% were purchased as tokunbo and 1% were purchased as rebore.

Chart 7 below indicates that 57% of commercial vehicles tyres were bought as fairly used "Tokunbo" while that of Private vehicles stood at 36% as shown in chart 8. This revealed that most commercial drivers used more off tokunbo tyres than new.

Further analysis also revealed that 42% of commercial vehicles tyres were new tyres while that of private vehicle is 63%. This showed that private vehicles owners use bran new tyres than commercial vehicles owners. It is observed from the figures in table 3 below that only 1% of both private and commercial vehicles use rebore tyres.

74% of Government vehicles tyres were new and 26% were Tokunbo.

TABLE 3:TYRES PURCHASED AS TOKUNBO,REBORE AND NEW

CATEGORY OF VEHICLE	Number of tyres purchased as Tokunbo	Number of tyres purchased as Rebore	Number of tyres purchased as New	TOTAL NUMBER OF TYRES SURVEYED
PRIVATE	24635	425	43840	68900
COMMERCIAL	29720	720	21310	51750
GOVERNMENT	1045	0	2990	4035
DIPLOMAT	0	0	0	0
TOTAL	54950	1145	68140	124235
PERCENTAGE	44%	1%	55%	100%

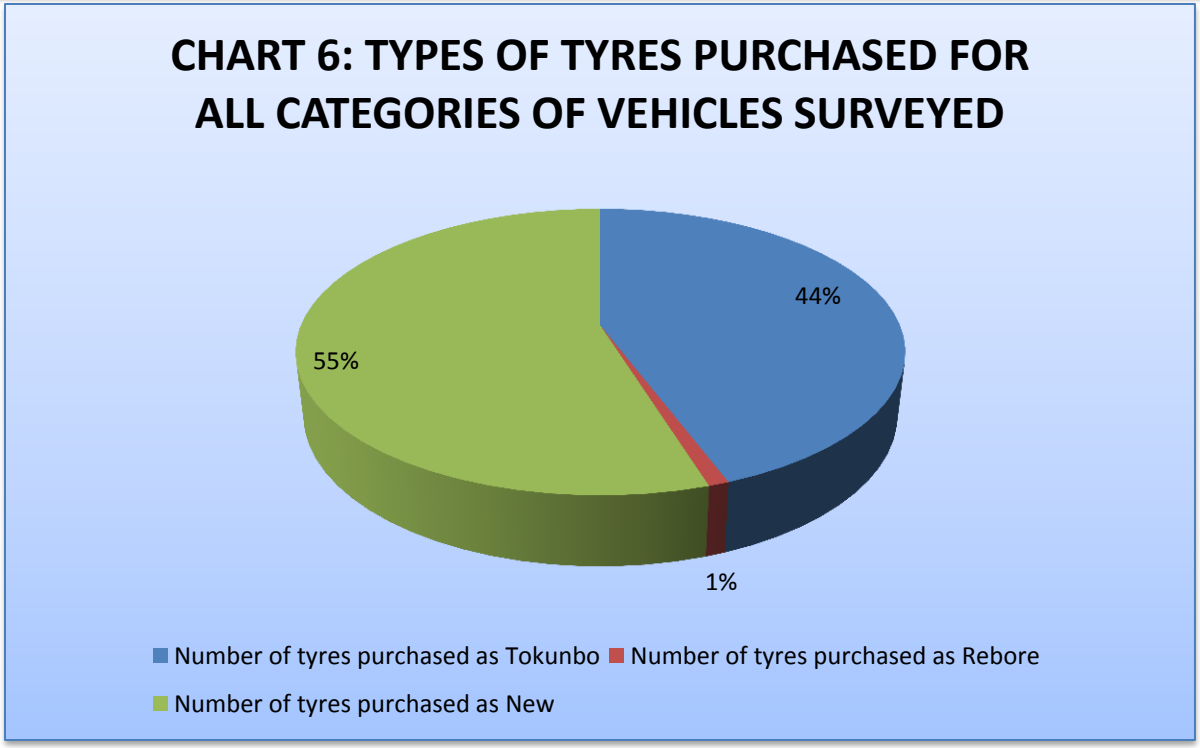


CHART 7: TYPES OF TYRES PURCHASED FOR COMMERCIAL VEHICLES SURVEYED

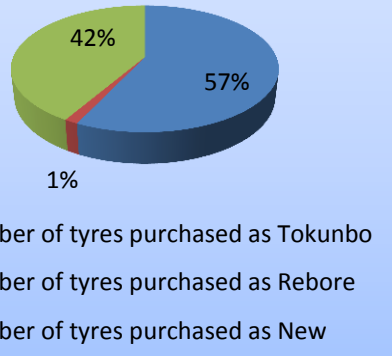


CHART 9: TYPES OF TYRES PURCHASED FOR GOVERNMENT VEHICLES SURVEYED

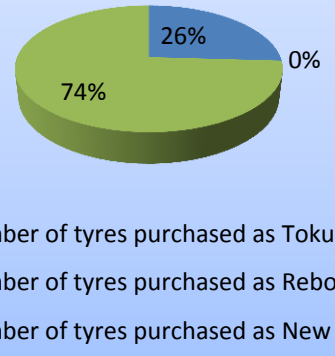


CHART 8: TYPES OF TYRES PURCHASED FOR PRIVATE VEHICLES SURVEYED

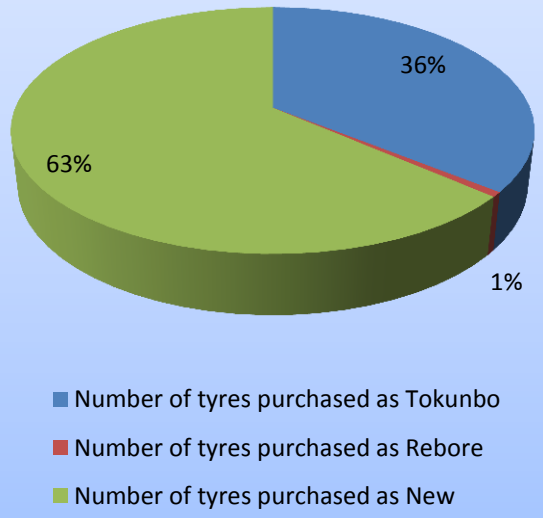
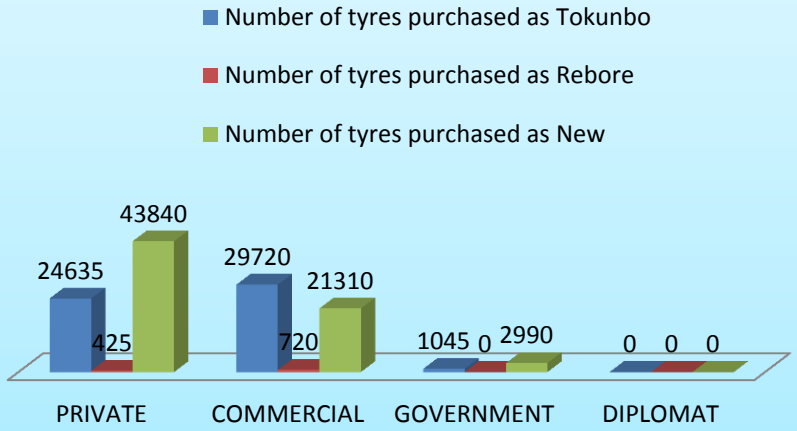


CHART 10: COMPARISON OF TYRES PURCHASED AS TOKUNBO, REBORE AND NEW BY VEHICLES CATEGORIES



VEHICLES WITH CORRECTS PSI (POUNDS PER SQUARE INCH)

Maintaining correct tire inflation pressure helps optimize tire performance and fuel economy. Correct tire inflation pressure allows drivers to experience tire comfort, durability and performance designed to match the needs of their vehicles.
Table 4 below gives relationship between correct and incorrect tyres PSI. It was noted that only 31% of total tyres surveyed had correct PSI while the remaining 69% had wrong PSI.
34% of the private vehicles tyres checked had correct PSI , 25% of commercial vehicles tyres also had correct psi, while 44% of Government vehicles tyres recorded correct psi. This means that governments' vehicles drivers are mindful of their tyres gauge than private and commercial vehicles drivers. The least correct psi was recorded from commercial vehicles with only 25% of commercial vehicle tyres had correct psi.

TABLE 4:NUMBER OF VEHICLES WITH CORRECTS PSI (POUNDS PER SQUARE INCH)

CATEGORY OF VEHICLE	Number of tyres with Correct PSI	Number of tyres with wrong PSI	TOTAL NUMBER OF TYRES SURVEYED	PERCENTAGE WITH CORRECT PSI
PRIVATE	22725	44570	67295	34%
COMMERCIAL	12700	37545	50245	25%
GOVERNMENT	2515	3180	5695	44%
DIPLOMAT	0	0	0	0%
TOTAL	38940	85295	123235	32%
PERCENTAGE	31%	69%	100%	

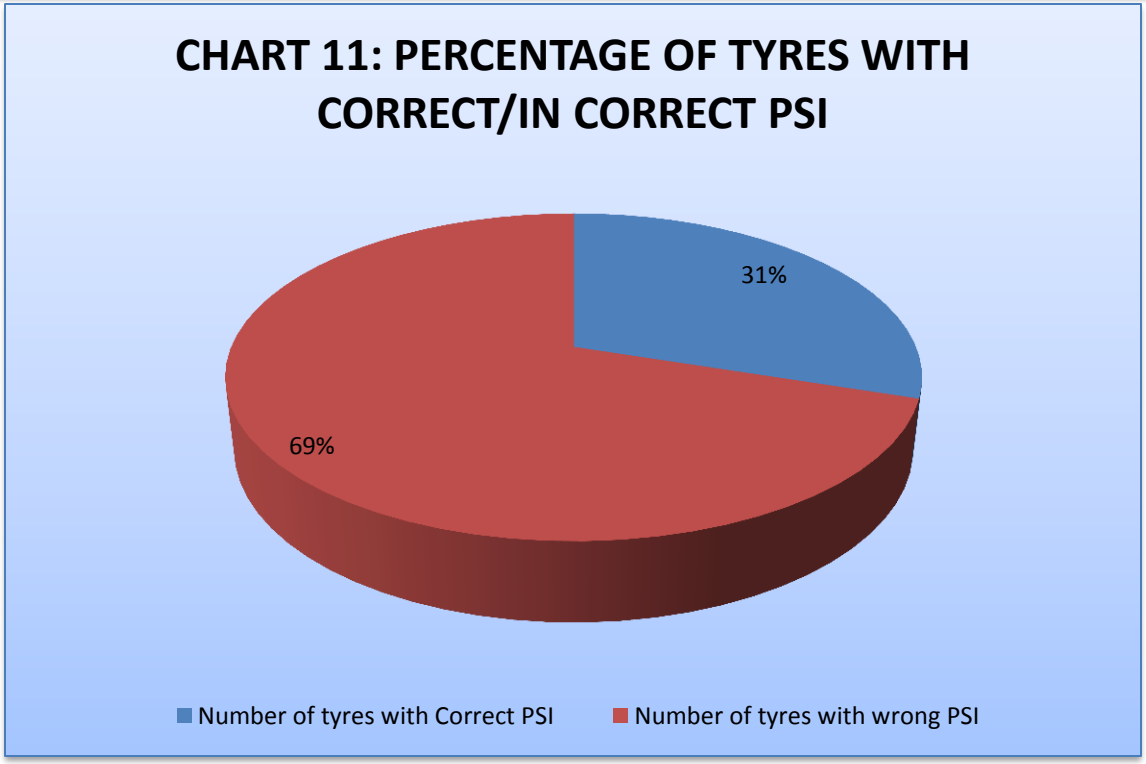


CHART 12: PERCENTAGE OF COMMERCIAL VEHICLES' TYRES WITH CORRECT/IN CORRECT PSI

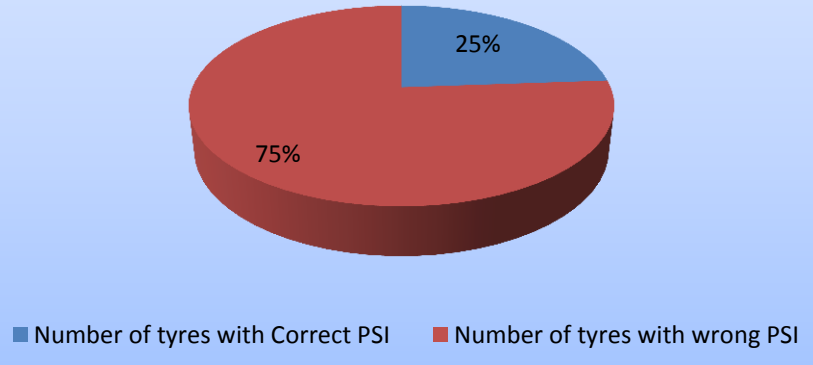


CHART 14: PERCENTAGE OF GOVERNMENT VEHICLES' TYRES WITH CORRECT/IN CORRECT PSI

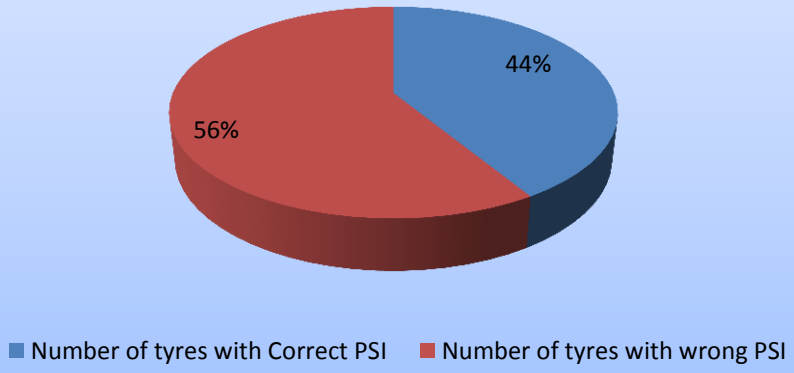


CHART 13: PERCENTAGE OF PRIVATE VEHICLES' TYRES WITH CORRECT/IN CORRECT PSI

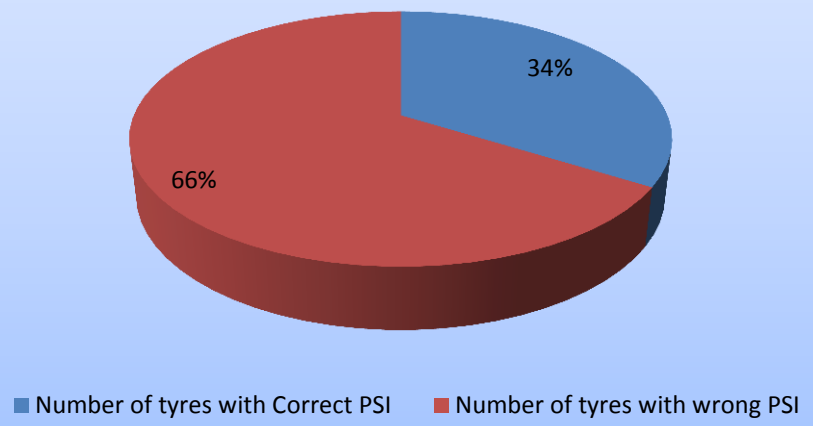
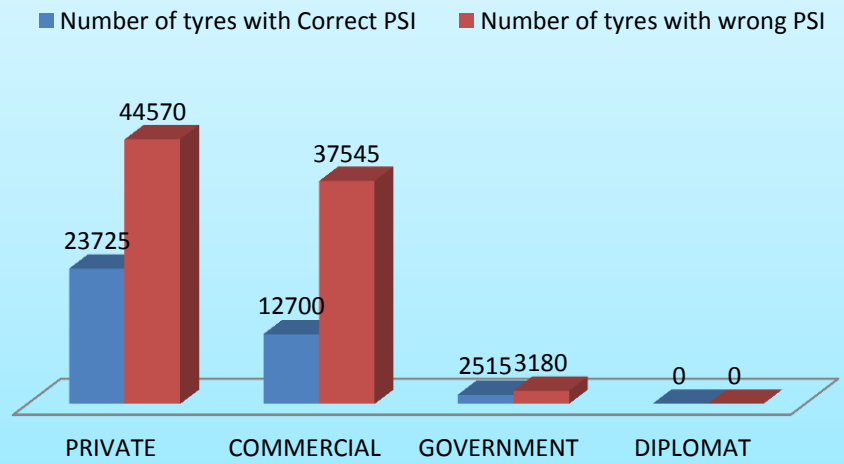


CHART 15: NUMBER OF TYRES WITH CORRECT AND WRONG PSI BY VEHICLES CATEGORIES



WRONG PSI OF VEHICLES TYRES

Analysis of tyres with wrong inflation (PSI) showed that 51% private vehicle tyres are under inflated and 49% over inflated. Further analysis also indicated that 52% of commercial vehicles with wrong inflation are under inflated while 48% are over inflated.

While Government vehicle tyres checked had 39% under inflated, while 61% were over inflated. Details are as shown in the table 5 and charts below.

TABLE 5:NUMBER OF TYRES UNDER/OVER INFLATED

CATEGORY OF VEHICLE	NUMBER OF UNDER INFLATED TYRES	NUMBER OF OVER INFLATED TYRES	TOTAL NUMBER OF TYRES WITH WRONG PSI	PERCENTAGE OF UNDER INFLATED	PERCENTAGE OF OVER INFLATED
PRIVATE	21765	22805	44570	49%	51%
COMMERCIAL	19500	18045	37545	52%	48%
GOVERNMENT	1260	1920	3180	39%	61%
DIPLOMAT	0	0	0	0%	0%
TOTAL	42525	42770	85295	50%	50%

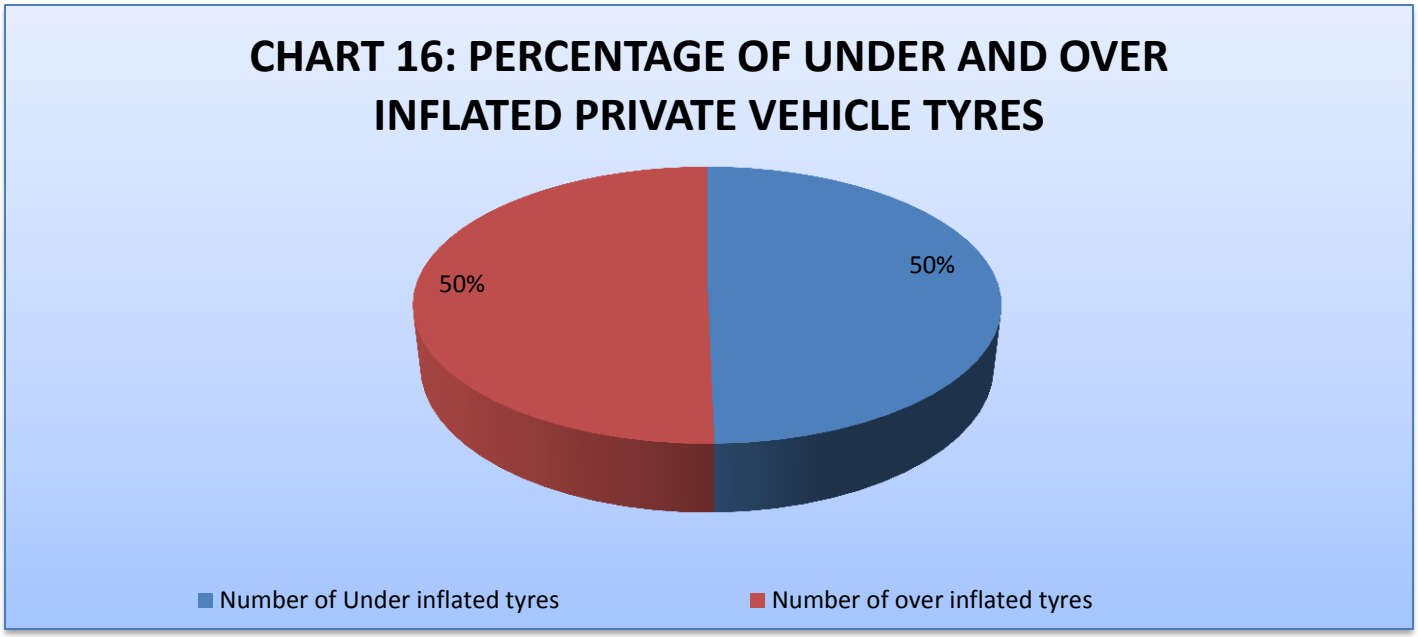


CHART 17: PERCENTAGE OF UNDER AND OVER INFLATED COMMERCIAL VEHICLE TYRES

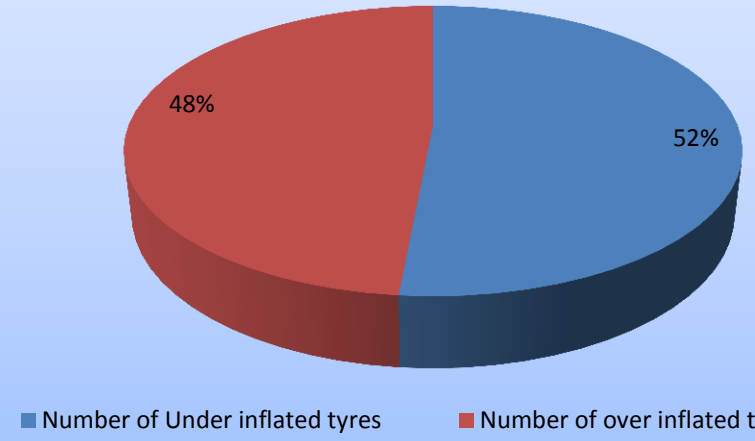


CHART 19: PERCENTAGE OF UNDER AND OVER INFLATED GOVERNMENT VEHICLE TYRES

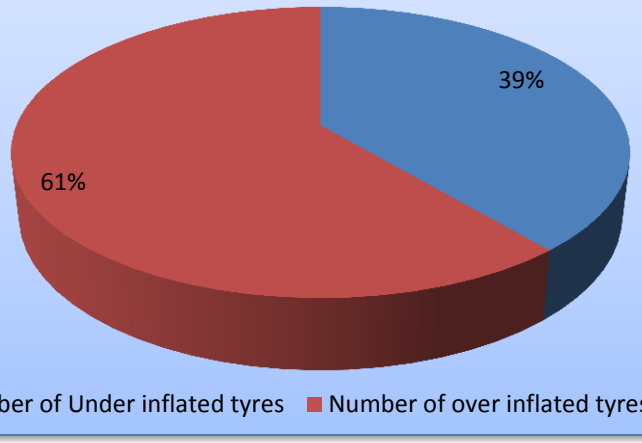


CHART 18: PERCENTAGE OF UNDER AND OVER INFLATED PRIVATE VEHICLE TYRES

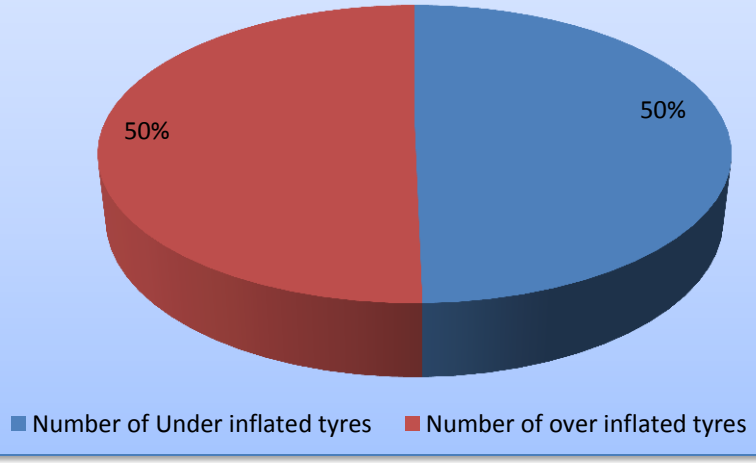
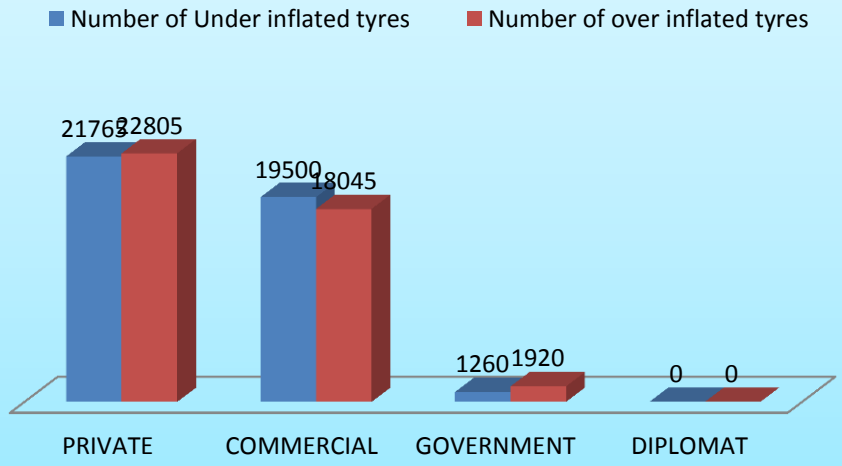


CHART 20: NUMBER OF UNDER/OVER INFLATED TYRES BY CATEGORIES OF VEHICLES



RATING OF TYRES' CONDITION

It is observed that 65% of total tyres checked had good thread/grid level, 26% with fair thread/grid level, while 10% had bad thread/grid level.
71% of private vehicles tyres checked had good thread, 55% of commercial vehicles tyres have good thread/grid level while 85% of government vehicles tyres.
7% of private vehicles tyres checked were bad, 14% of commercial were bad and 2% of government own were bad. This analysis is an indication that commercial vehicles tyres do have high number of bad tyres compared with private vehicles tyres or government vehicles tyres.

TABLE 6a: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID

CATEGORY OF VEHICLE	NUMBER OF TYRES WITH GOOD THREAD OR GRID LEVEL	NUMBER WITH FAIR THREAD OR GRID LEVEL	NUMBER WITH BAD THREAD OR GRID LEVEL	TOTAL NUMBER OF TYRES SURVEYED
PRIVATE	49255	15625	4730	69610
COMMERCIAL	27710	15685	7035	50430
GOVERNMENT	3565	525	105	4195
DIPLOMAT	0	0	0	0
TOTAL	80530	31835	11870	124235
PERCENTAGE	65%	26%	10%	100%

TABLE 6b: PERCENTAGE OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID

CATEGORY OF VEHICLE	NUMBER OF TYRES WITH GOOD THREAD OR GRID LEVEL	NUMBER WITH FAIR THREAD OR GRID LEVEL	NUMBER WITH BAD THREAD OR GRID LEVEL	TOTAL NUMBER OF TYRES SURVEYED
PRIVATE	71%	22%	7%	100%
COMMERCIAL	55%	31%	14%	100%
GOVERNMENT	85%	13%	2%	100%
DIPLOMAT	0	0		0
TOTAL	65%	26%	10%	100%

CHART 21: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID FOR ALL CATEGORIES OF VEHICLES

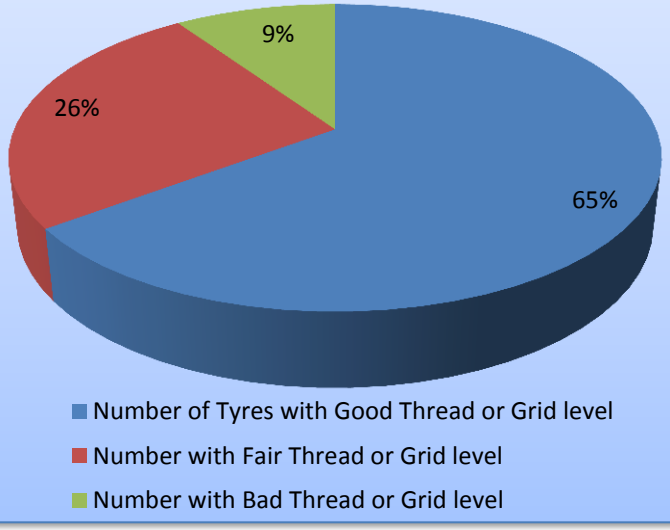


CHART 22: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID FOR COMMERCIAL VEHICLES

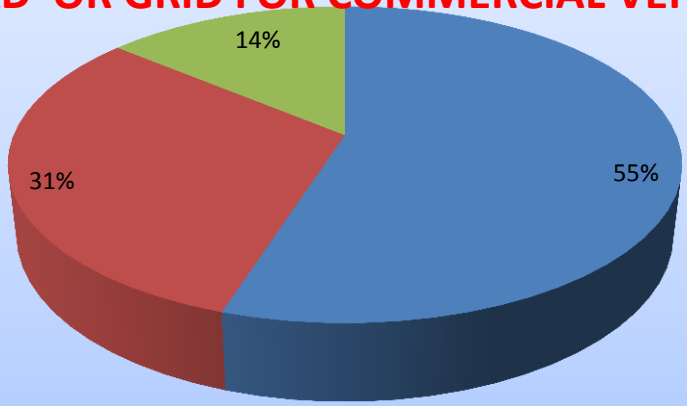


CHART 23: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID FOR PRIVATE VEHICLES

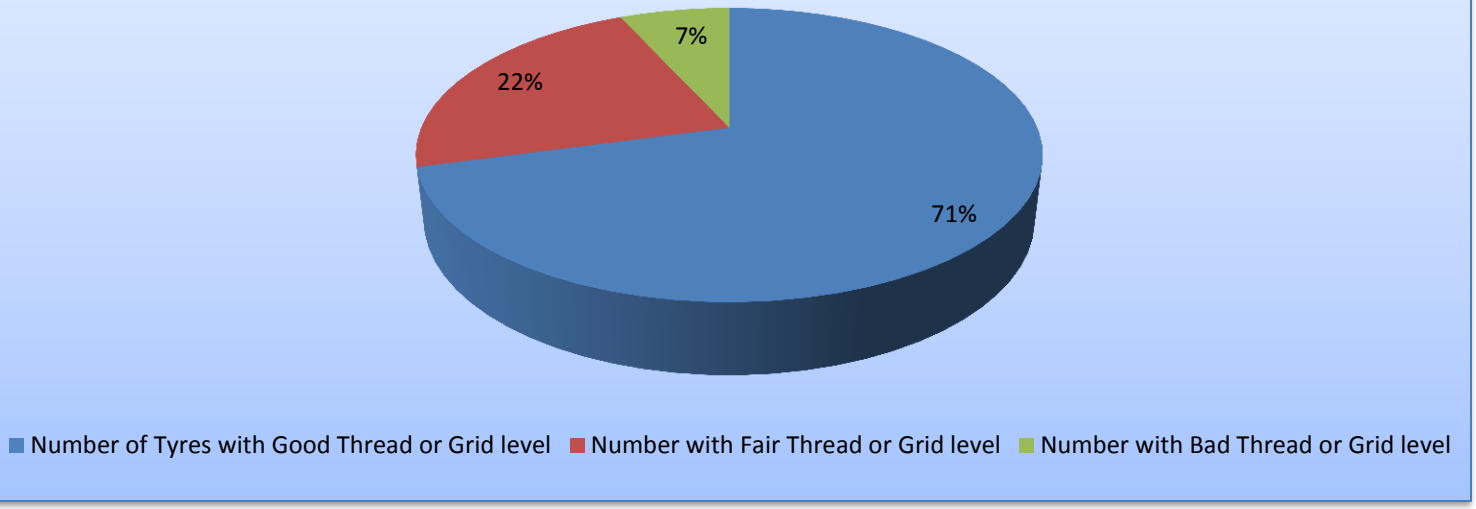


CHART 24: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID FOR GOVERNMENT VEHICLES

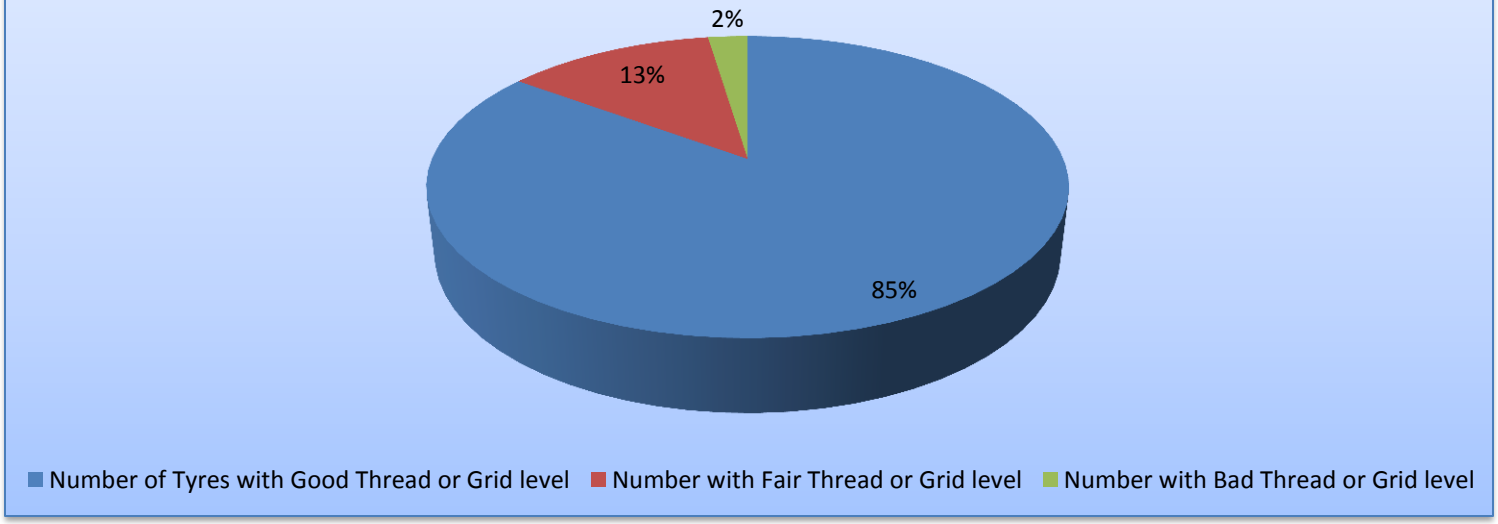
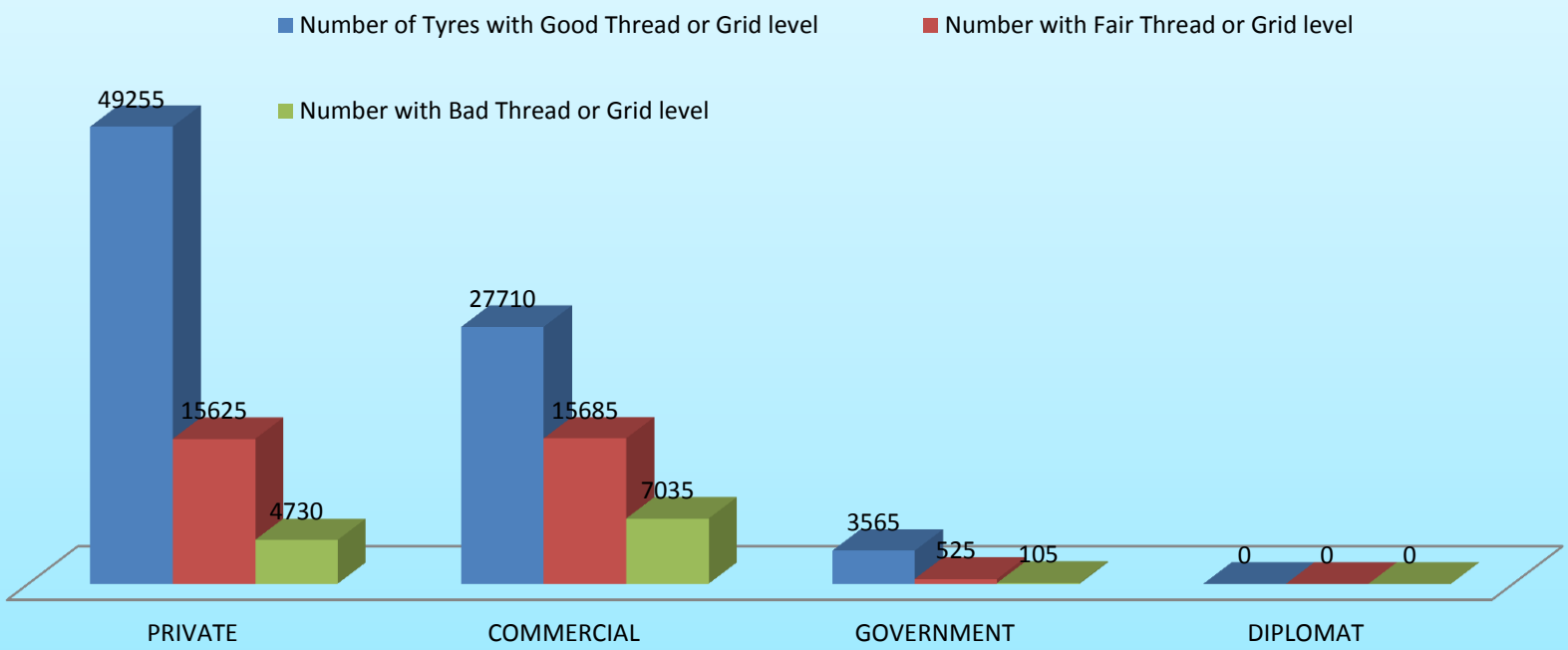


CHART 25: NUMBER OF TYRES WITH GOOD, FAIR AND BAD THREAD OR GRID BY CATEGORIES OF VEHICLES



TYRES WITH AND WITHOUT SWOLLEN/DAMAGE

Table 7 below showed that 8% of total vehicles tyres surveyed were swollen/damaged. Further analysis revealed that commercial vehicles had the highest percentage of damaged/swollen tyres (11%), while government vehicles had the lowest, 2% and private had 6% of tyres checked damaged. See below tale 7 and corresponding charts.

TABLE 7: TYRES WITH AND WITHOUT SWOLLEN/DAMAGED

CATEGORY OF VEHICLE	Number of tyres with Burge/damage or cut	Number of tyres without Burge/damage or cut	TOTAL NUMBER OF TYRES SURVEYED	PERCENTAGE
PRIVATE	5225	65085	70310	6%
COMMERCIAL	6475	42720	49195	11%
GOVERNMENT	260	4470	4730	2%
DIPLOMAT	0	0	0	0%
TOTAL	11960	112275	124235	8%

CHART 26: PERCENTAGE OF TYRES WITH BURGE/DAMAGE

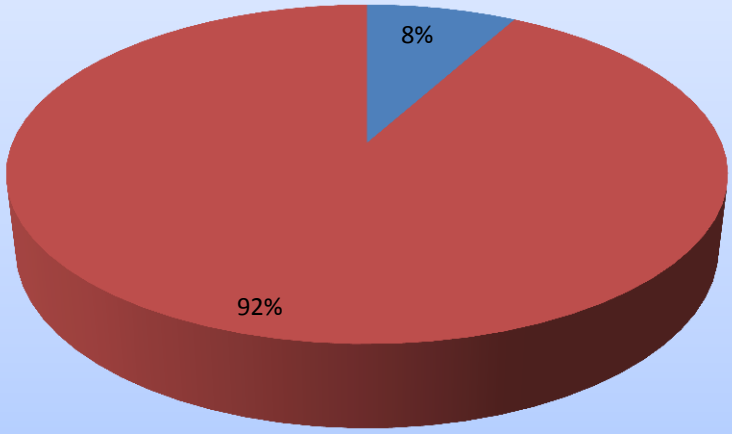


CHART 27: PERCENTAGE OF PRIVATE VEHICLE TYRES WITH & WITHOUT BURGE/DAMAGE

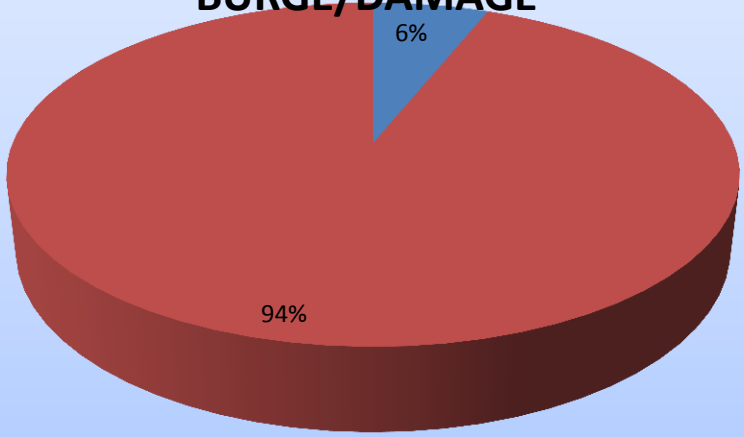
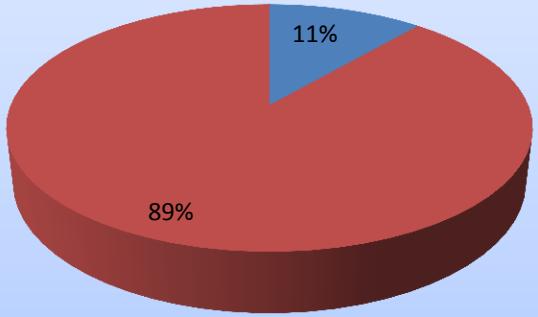


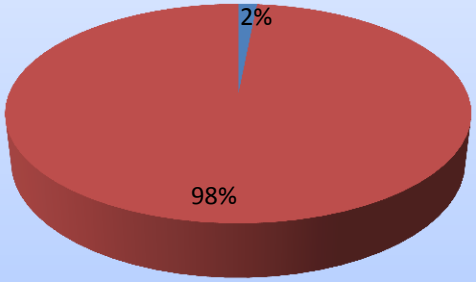
CHART 28: PERCENTAGE OF COMMERCIAL VEHICLE TYRES WITH & WITHOUT BURGE/DAMAGE



Number of tyres with Burge/damage or cut

Number of tyreswithoutBurge/damage or cut

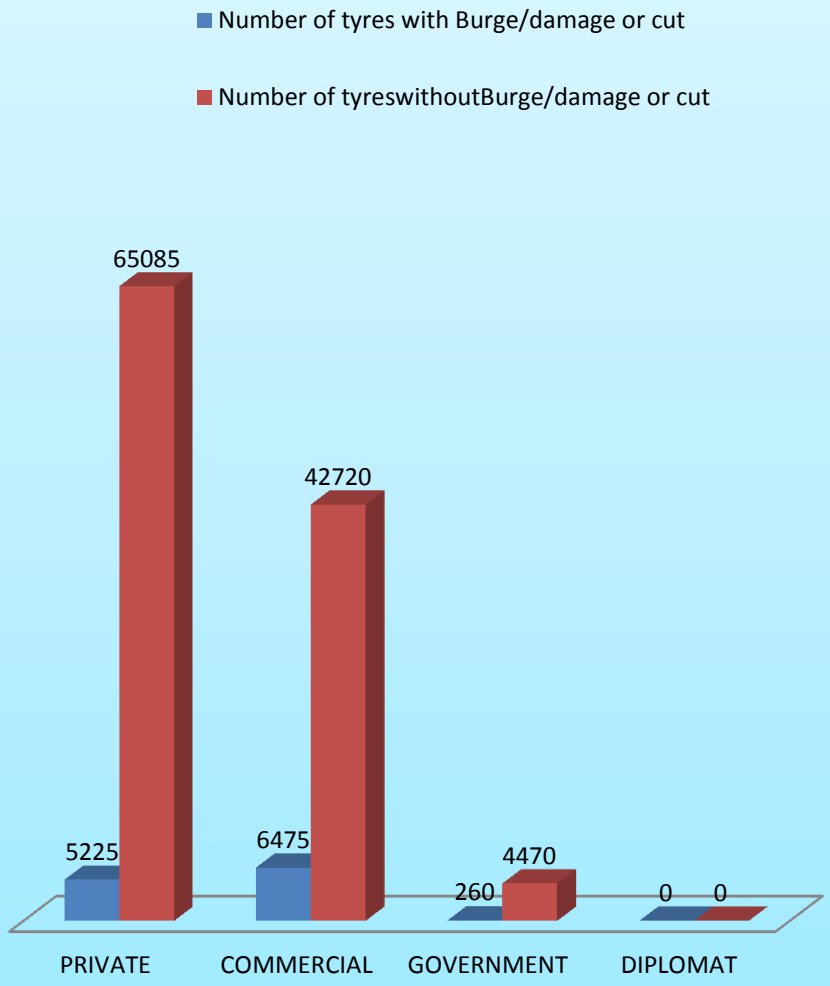
CHART 29: PERCENTAGE OF GOVERNMENT VEHICLE TYRES WITH & WITHOUT BURGE/DAMAGE



Number of tyres with Burge/damage or cut

Number of tyreswithoutBurge/damage or cut

CHART 30: NUMBER OF TYRES WITH BURGE/DAMAGE BY CATEGORIES OF VEHICLES



FINDINGS

The following findings were made;

- Private vehicles had more expired tyres (55%) than commercial vehicles (42%)
- 23,280 out of 30,124 of drivers vehicles interviewed representing 77% had knowledge of tyres expiration .
- 55% of the total tyres surveyed were brand new, 44% were purchased as tokunbo and 1% were purchased as rebore. This showed that private vehicles owners use brand new tyres than commercial vehicles owners. It is observed from the figures in table 3 that only 1% of both private and commercial vehicles use rebore tyres.

- 34% of the private vehicles tyres checked had correct PSI, 24% of commercial vehicles tyres also had correct psi, while 41% of Government vehicles tyres recorded correct psi. This means that governments' vehicles drivers are more mindful of their tyres pressure than private and commercial vehicles drivers.
- Commercial vehicles had the highest percentage of damaged/swollen tyres (11%), while government vehicles had the lowest, 2% and private had 6% of tyres checked damaged.

RECOMMENDATIONS

Consequently upon the above findings the under mentioned recommendations are proffered:

I. Government should strictly enforce the laws on sales of substandard tyres. Importation of such tyres should also be completely banned.
II. There is need for the Corps to intensify check of tyres in major parks and highways nationwide.
III. The FRSC, other agencies of governments as well as Fleet Operators nationwide should step up public enlightenment on use of good tyres, expiration and correct inflation of tyres . The consequences of wrong usage should be brought to the consciousness of all road users.
IV. There should be more collaborating efforts of all stakeholders

v. Presently, there is no tyre manufacturing company in Nigeria, hence all tyres are imported, making regulations on sales and use more difficult. The government should provide conducive environment for the establishment and operations of the manufacturing companies

vi. Efforts should also be made to improve the Nigerian economy as it is presently tough for most vehicle owners to procure brand new tyres for their vehicles, hence the resort to fairly used and substandard tyres which are cheaper but more dangerous.

vii. Packing and Storage of tyres while being imported and at sale points should also attract the regulators attention. These tyres are mostly damaged through wrong packing and storage

viii. Loan facilities as well as other welfare packages should be encouraged by employers to assist their employees to acquire new and standard tyres for their vehicles

THANK YOU FOR LISTENING