# TRAFFIC CONGESTION ON HIGHWAYS IN NIGERIA ROAD CAUSES, EFFECTS AND REMEDIES
## (A Case Study of Polytechnic Road Tudun Wada Kaduna)

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### ABSTRACT

This aim of this study was investigates the causes, effects, and remedies of traffic congestion which has become a common sight in most highways in Nigeria. Polytechnic road Tudun Wada Kaduna was used as the case-study. The methods used in data collection are GIS used in mapping the congested area, used of questionnaire and oral interview. One hundred and ten (110) copies of questionnaires were administered to drivers (private and commercial), passengers, pedestrians and traffic officers using the road. 110 questionnaires were given out; 100 well completed returned questionnaires formed the basis of the study and was analyzed by cross-tabulation and Relative Importance Index (RII). The result from the study showed the main causes of traffic congestion along this road to be poor traffic management, poor parking habit, poor road pavement, inadequate road capacity, lack of parking facilities lack of bus stop too much of buses/taxis on the road, and poor design. Effects of road congestion from the study are waste of time, delay movement, stress, accident, inability to forecast travel time, fuel consumption, night driving and environmental pollution. To drastically reduce these negative effects, there must be provision for adequate parking space, dualizing the road, provision of lay-bay or shy-way, proper maintenance of the road, public enlightenment, traffic education, hack down all facilities built on the right of way (ROW), ban all form of road trading/hawking. It is hoped that this study will become the foundation of further research in the area to improve road traffic management on our road.

**Keywords:** Road, congestion, traffic, traffic congestion, traffic management, Nigeria.
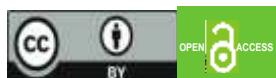
## I. INTRODUCTION

Road became important means of transportation during the reign of Roman Empire. Romans kingdom modernized the use of road effectively compared to the existing usage of road whereby ox, man, chariot, camel, and bull were used as major carrier in road transportation. But the invention of the motor vehicle meant that roads were no longer meant for pedestrians, chariot and animals. The invention called for improvement of the state of the roads, which led to increased speeds and danger to road users. This then called for a proper construction and control of traffic to increase efficiency of the roads in traffic performance. Demand for highway travel by people continues to grow as population increases, particularly in the metropolitan area and the construction of new highway capacity to accommodate this growth in travel has not kept pace. Congestion results when traffic demand approaches or exceeds the available capacity of the road system (Raheem *et al.,*2015).

Traffic congestion is a situation in which demand for road space exceeds supply (Joseph and Anderson, 2012). Traffic congestion is one of the numerous genuine worldwide issues for both developed and developing nations. It has become a serious problem in many cities, especially in large cities. Traffic congestion is one of the intolerable problems of urban area emerging due to a sudden increment in the private transport, affecting urban society, economy (Shawakha *et al.,*2018).

Traffic congestion along a lot of roads sections in Nigeria became order of the day, these sections of roads could be within cities or such other critical sections in suburb areas resulting from lots of reasons thus; inadequate road capacity, poor road pavement, poor traffic management, poor drainage system poor driving habit, poor parking habit, poor design junctions/round-about, presence of heavy trucks, lack of pedestrian facilities, lack of road furniture, lack of parking facilities and others (Popoola *et al.,*2013).

Polytechnic Road Tudun Wada Kaduna is located in Kaduna metropolis and is not left out of this issue. This research is aimed at finding out the factors responsible for the present situation, its effects as well as remedies within the research area.

The research became necessary because the present situation of traffic congestion along the road is negatively affecting the road users and dwellers of the area economically and health wise. This is because of the time wasted on go slow by the road users which maybe mostly students, civil servants, hospital patients, market people and other category of persons using the road (depending on research findings), that result in consuming more fuel, spending more travel time, discharge of more automobile exhaust gasses and noise pollution which is

capable of making residents of the area uncomfortable.

The problem of traffic congestion has reached an alarming rate in Nigeria especially in many cities. However, there is a general feeling that the traffic flow should be free to allow free movement of goods and service but reverse is the case own to the overcrowding of the road users (vehicles) on the road and this manifest through a number of problems which include:

- Delay: this is the time lost while traffic flow is impeded
- Inability to forecast travel time accurately, leading to drivers allocating more time to travel and less time on productive activities.
- Wastage of fuel and increasing air pollution: releasing of CO (carbon monoxide) and other pollutant by congested car account for environmental and health problem which range from nose running to global warming.
- Wear and tear on vehicles as a result of idling in traffic and frequent acceleration and braking, leading to more frequent repairs and replacements.
- Stressed and frustration: discomfort that comes from stop and go condition of the traffic congestion cause discomfort and weakness of passengers and motorists. More so, congestion increases the tendency of

collision which may lead to series of injuries and fatality.

- Perishing of some agricultural produce: Many agricultural products such as tomatoes, mangoes etc (Shawakha *et al.,*2018).

## II.    LITERATURE REVIEW

A number of studies have been conducted in Nigeria and elsewhere concerning traffic congestion and its causes. (Ogunbodede, 2002) In a study of traffic congestion in Akure Nigeria using GIS approach. It was argued that traffic congestion is as a result of the increasing growth in motor vehicles without a corresponding improvement in transport facilities such as road network, traffic management techniques. The study also highlighted illegal roadside parking and lack of geospatial information necessary to tackle the spatial problem as other causes of traffic congestion.

Also, in a study, in Abuja Nigeria it was found that only 18.57% of the sampled commuting population lived within the city centre. This indicates that the location of major government offices with respect to the spread of residential areas, where this is not properly considered in town planning and development of master plans for major urban cities, can cause serious congestion problem due to mass movement within the same period as in the case of civil servants moving to and from work around the same period of time. This is confirmed by the study as the worst congestion in Abuja occur

in the morning (8.00 am) and evening (6.00pm) respectively (Popoola *et al.,*2013).

This study has brought into focus the issue of traffic congestion in major urban cities of Nigeria. The main causes of congestion have been considered indication that poor driving habits, poor road network, inadequate road capacity and lack of parking facilities are the greatest causes of traffic congestion in Nigeria. The study has also show that Lagos, Port Harcourt and Abuja cities are most affected by traffic congestion, among other major cities in Nigeria (Joseph and Anderson, 2012).

The conclusion for this research work is based on the results obtained in the experiments as follow:

- The case study road operated under level of service F (in most time) which is generally unacceptable and level of service E during low traffic period.
- Defects on the road also constitute significantly to congestion
- The case study road lack parking bay and thus parking vehicles inhibit the free-flow of traffic
- Average delay on case road 6 minutes which is unacceptable as ideal time on that road course is 15 seconds
- The peak hourly traffic is found between 7:45 am and 8:30 am and 4:00 pm and 4:45 pm for morning

and evening peak period respectively.
- Private cars are the most vehicular type that ply the road.
- Most congested section of the road was found between Yanbule and General Gas.
- Morning congestion (coming) exceeded afternoon congestion (going)
- Factors such as bad road (pothole) responsible for congestion (especially between general gas and Olopomeji junction. (Raheem *et al.,*2015)

This study has brought into focus the issue of traffic congestion on major highways in Nigeria, Lagos-Ibadan expressway being the case studies area. The main causes of congestion have been considered indicating that inadequate road capacity, poor road pavement, poor drainage system, poor driving habit, poor road network, poor parking habit, religious/special event along the road and presence of heavy trucks are the greatest causes of traffic congestion in Nigeria.(Joseph and Anderson, 2012).

The analysis showed high level of traffic congestion in the cities of Nigeria which affect negatively the socioeconomic well-being of the citizens in the country. Also, there was significant indication that the number of vehicles in some states like Lagos, Edo and Osun states was higher than expected. It indicates that western part of

Nigeria experience huge congestion than other areas (Casmir, 2018).

Not all road users are aware of traffic rules which are capable of causing accidents at junctions and intersections. Due to this knowledge gap and unwillingness to follow traffic rules, people violate traffic rules which cause traffic congestion.

Kaduna south is one of the 23 Local Governments of Kaduna State and is where this research area situated. As at 21st March 2006 census this Local Government recorded 402,731 populations with a ten years expansion to 543,600 as projected to 21st March 2016 instant. It is very apparent that due to heavy population in Tudun Wada, Tadun Nupawa, Unguwan Sunusi, Kasuwar Barchi and significant part of Rigasa and Unguwan Mu'azu areas trooping the road, to access part of Central Market, Panteka Market, Yusuf Dan Tsoho Memorial Hospital, Kaduna State College of Midwifery, Kaduna Polytechnic and many other places resulted in huge traffic on the road which makes traffic congestion along the road a common affair.

If city roads are not well planned or implemented, by providing adequate road width, links and parking facility etc, suffering from incessant traffic congestion could be one of the outcomes.

The overall effects of traffic congestion can broadly be categorized under; Health effects, Environmental effects, and Economy effect.

Nigeria vision of becoming one of the first 20th strongest economy in the world cannot be achieved unless the spate of traffic congestion on our road is nullified. This is due to the facts that ineffective transportation system dwarfed the economy. Major challenge in road transportation as congestion results to immeasurable impact on country's economy, if congested free road will enhance efficient mobility of goods and services and make road transportation a most preferred transportation mode (Raheem *et al.,* 2015).

A study on traffic congestion suggest that good road network/improvement, encouragement of public mass transport, proper traffic planning/management, regular road maintenance, construction of interchanges and regular education of road users are among the major remedies (Popoola *et al.,*2012)

Kaduna metropolis lies between Latitudes 10º 26' - 10º 36' N of the Equator and Longitudes 7º 22' - 7º 30' E of the Greenwich Meridian. It is made up of Kaduna north and Kaduna south, as well as parts of Igabi and Chikun local government areas. The city formerly occupied a land area of 21.10km$^2$ in 1960 which increased significantly to 181.01km$^2$ in 2009 due to spatial expansion (*Ndabula  et al., 2012*).

## III.    METHODOLOGY

The data for general cause, effects and remedy to traffic congestion on Nigeria road

was elicited from the road users comprising drivers (private, and commercial) passengers, pedestrians, traffic officers and other users of the road on. The general causes, effects and remedies to traffic congestion on highways were listed in well-structured questionnaire and administered to the users using the road. 110 questionnaires were distributed randomly among the road user at polytechnic road Tudun Wada Kaduna, Nigeria. 100 questionnaires were returned. Data obtained from the respondents were presented on tables, analyzed and interpreted accordingly with the aid of descriptive statistical techniques such as mean score and simple percentage.

i.     Simple Percentage: This was used in the analysis of each of the questions relating to respondents' demographic variables.

ii.    Mean score: This was adopted in analyzing each variable in the questionnaire to weigh the degree of responses.

3.0 is regarded as the cut-off point, any item that falls below 3.0 is considered Disagreed response while any item above 3.0 is considered as an Agreed response (Accept). The cut-off point for the 5-points scale is arrived at using the formula:

$$\text{Mean Score} = \frac{\sum FX}{\sum F} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(I)}$$

Where: $\sum$ = Summation, F = Frequency, x = Variables

$$Mean\ Scores = \frac{5 + 4 + 3 + 2 + 1}{5} = 3.0$$

Each value of the acronyms on the five points scale was multiplied by the corresponding frequency of the variable. The frequency (f) column was multiplied by (x) to get (fx). The mean score of each of the variable was obtained by dividing the sum total of (fx) by the sum of (f).

**SAMPLING TECHNIQUES AND SAMPLE SIZE**

Sample size according to (Osuala, 2009)] is the representative of the entire population for a study, and from whom the findings can be generalized for the entire population, thereby making inference for a valid judgment and research conclusion. The required sample size is determined using the Slovin's formula for calculating sample size. The Slovin's formula is given as:

$$n = \frac{N}{3 + N(e)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(II)}$$

Where: n = desired sample size,      N = population size,   e = margin of error

## IV.    CHARACTERISTICS OF RESPONDENTS

In order to determine the characteristic of the respondents, respondents were asked to classify themselves according to the following: Sex, age, sector of economy, employment status, and frequent passage of the road. The results are presented in Tables I to

The data collected for this research study was presented in tabular form. The data showed the frequencies and percentages of response to all the questions asked in the questionnaire. The data interpretation will show the distribution of demographic factors and respondents' responses and opinion on the traffic congestion along Polytechnic road Tudun Wada Kaduna in terms of its causes, effects and remedies**.**
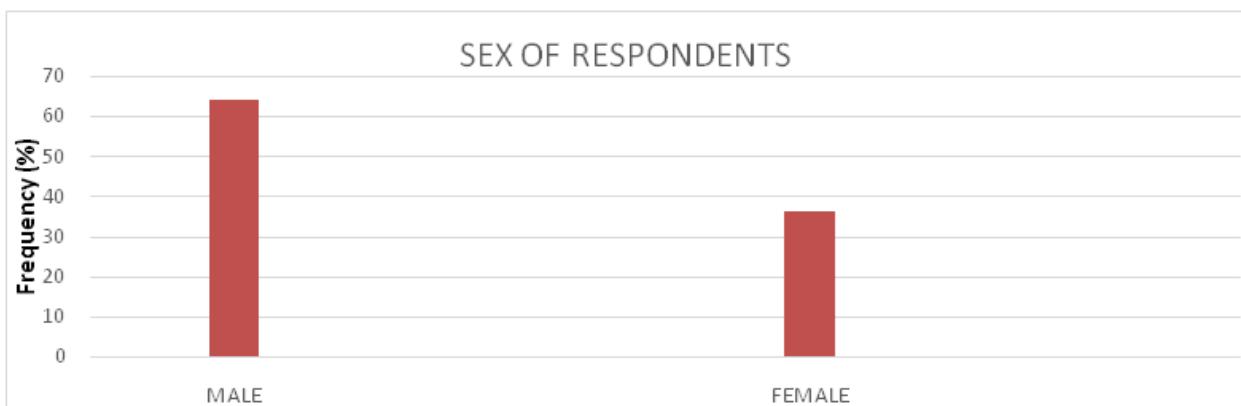


*Fig. 1. SEX OF RESPONDENTS*

*Fig. I above shows that 64% of the respondents are male and 36% of the respondents are female.*
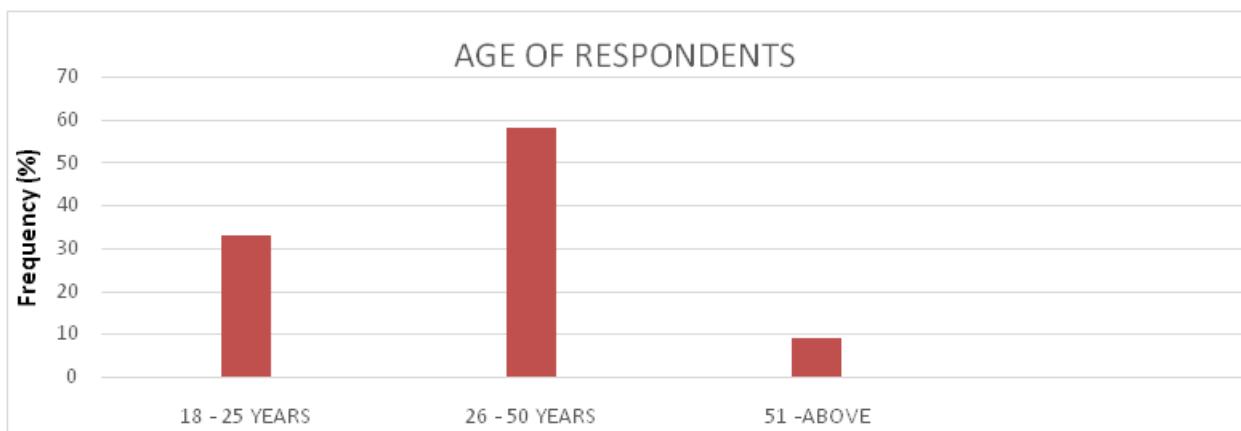


*Fig. II: AGE OF RESPONDENTS*

*Fig.  II shows that much of our respondents fall within the age of 18years and 50years, 33 % lies between ages of 18 – 25 years, 58 % lies between ages of 26 – 50 year and 9.0% are 50 years above.*
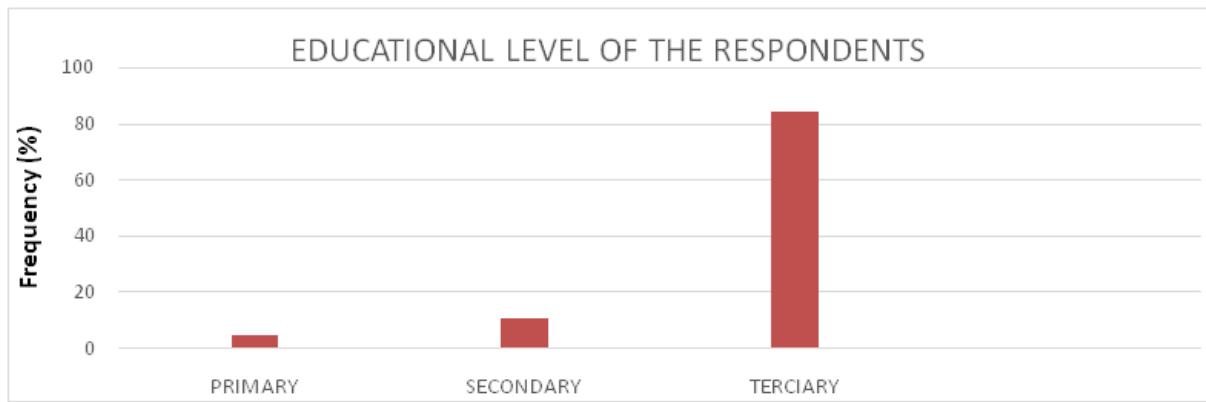
*Fig. III: EDUCATIONAL LEVEL OF RESPONDENTS*
*Table III shows that 84% of the respondents have tertiary educational level, 11% of the respondents have secondary and 5% of the respondents have primary educational level. Based on this obvious situation, it implies that majority of the road users are highly educated.*
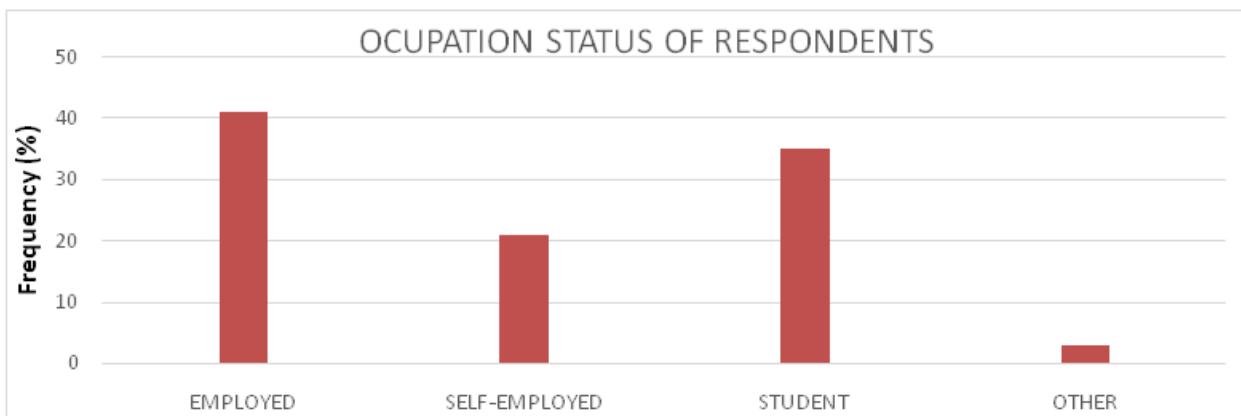


*Fig. IV: OCCUPATION STATUS OF RESPONDENTS*
*Table IV shows that 41% of the respondents are employed, while 21% are self-employed. 35% are students, while 3% are in-dispose.*
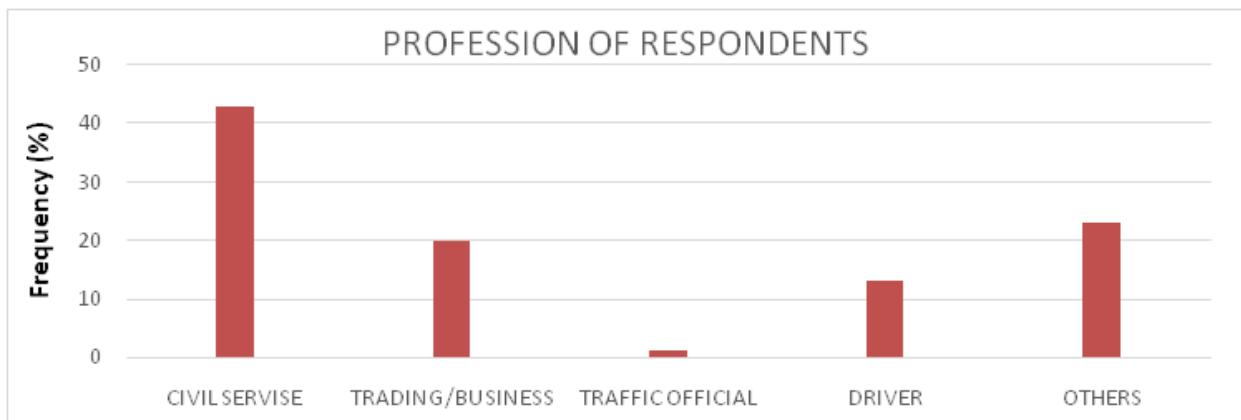
*Fig. Fig. V: PROFESSION OF RESPONDENTS*
*Table V shows that among the respondents, civil service constitute 43%, trading/business 20%, traffic officials 1% drivers 13% and 23% are indisposed.*
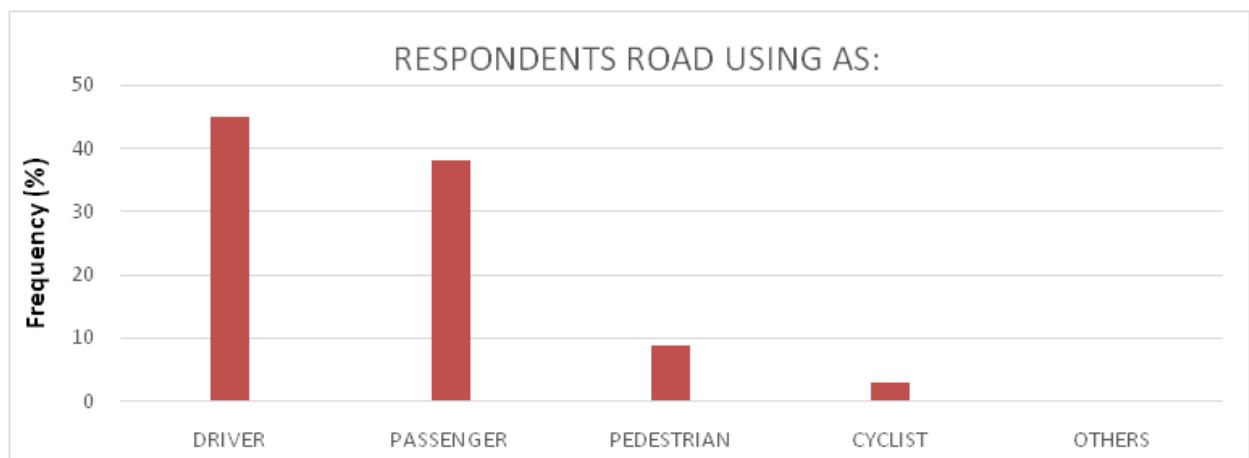


*Fig. VI: RESPONDENTS ROAD USING AS:*
*Fig. VI shows that among the respondents using the road, 45% are drivers, 38% are passenger, 9% are pedestrian 5% are cyclist and 35 are indisposed*
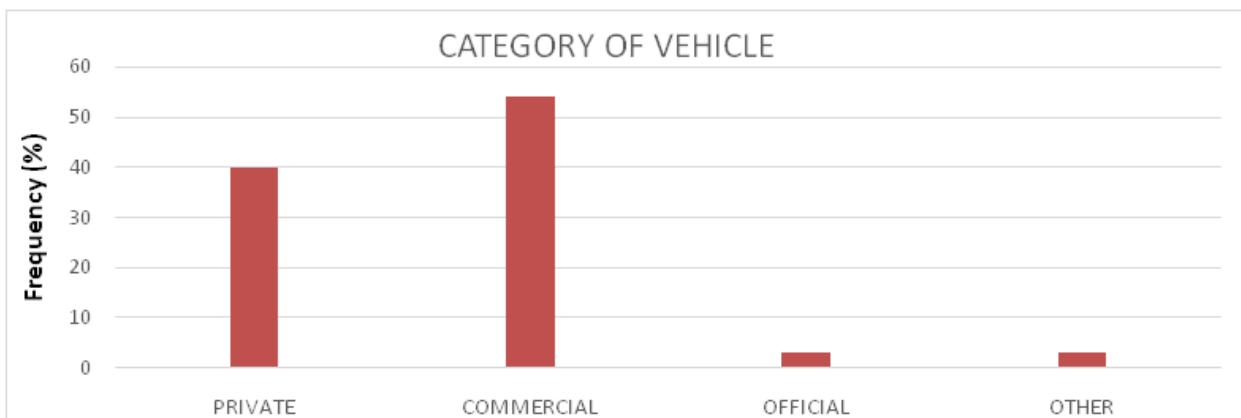


*Fig. VII: CATEGORY OF VEHICLE*
*Fig. VII shows that 40% of the vehicles using the road are private, 54% are commercial, 3% are official and also 3% are indisposed.*
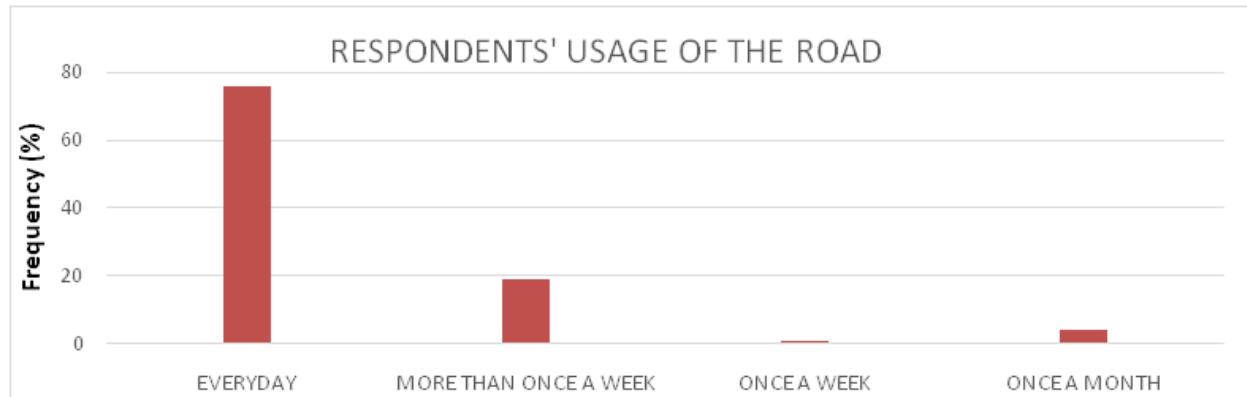
*Fig. VIII: RESPONDENTS' USAGE OF THE ROAD*

*Fig. VIII shows that most of the respondents travels every day, the table indicate that 76% of the respondent travel every day, 19% ply the road more than once a week, 4% ply the road once a week and 1% ply the road a week.*
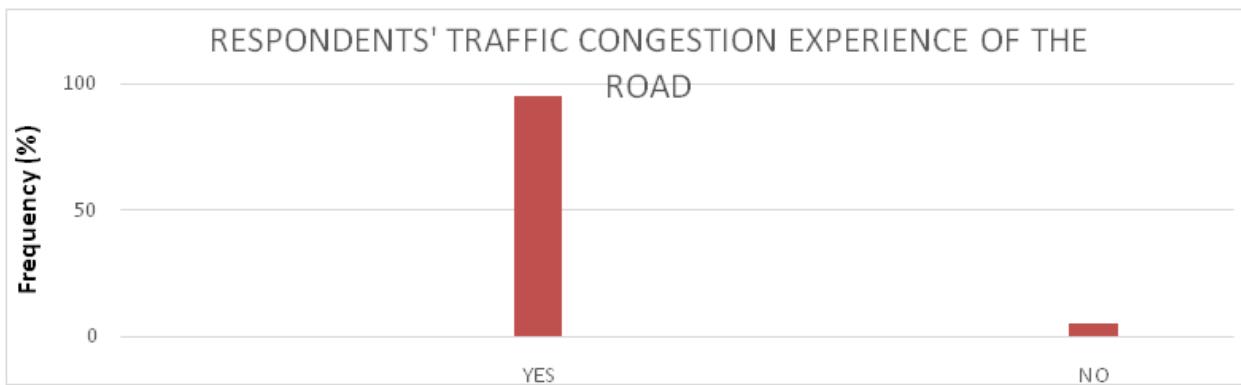


*Fig. IX: RESPONDENTS' TRAFFIC CONGESTION EXPERIENCE OF THE ROAD*

*Fig. IX shows that virtually all our respondents have once experienced the traffic congestion along the road, with 95% saying YES, and 5.0% of our respondent are yet to ever experience the traffic congestion.*
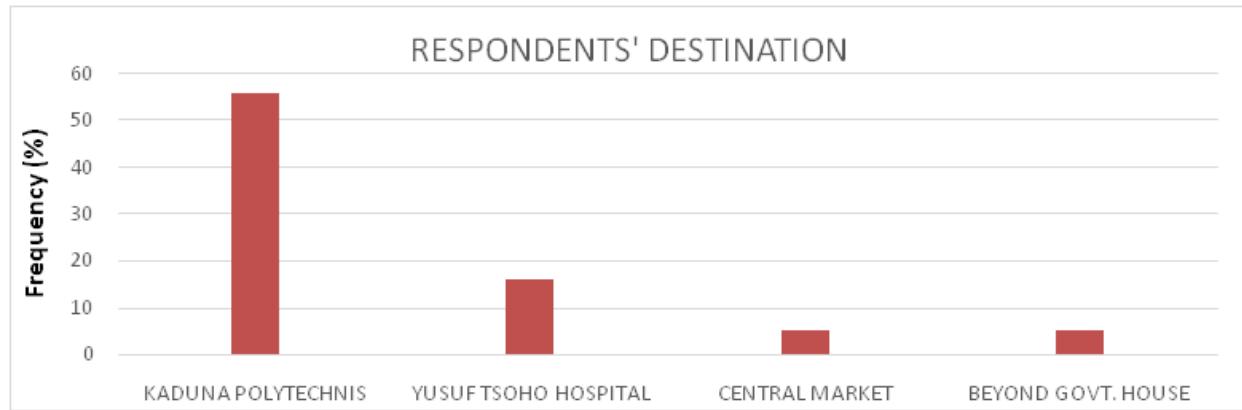
*Fig. X: RESPONDENTS' DESTINATION*

*Fig.  X shows that most of the respondent ply to the Kaduna Polytechnic Tudun Wada campus
with 56%, 16% ply to Yusuf Tsoho Hospital, 5% ply to Central market, 5% ply to Beyond
Government house and 18% are indisposed.*



*Fig. XI: RESPONDENTS' TIME WASTED IN CONGESTION*

*Fig. XI indicate most of the respondent have time wastage in congestion between 20 minutes to 1
hour. The table shows that 78% of the respondents wasted 20-40 minutes in congestion, 12%
wasted 40 minutes – 1 hour in congestion, 1% wastage 1– 1.5 hours,
and 9% are indisposed in congestion.*
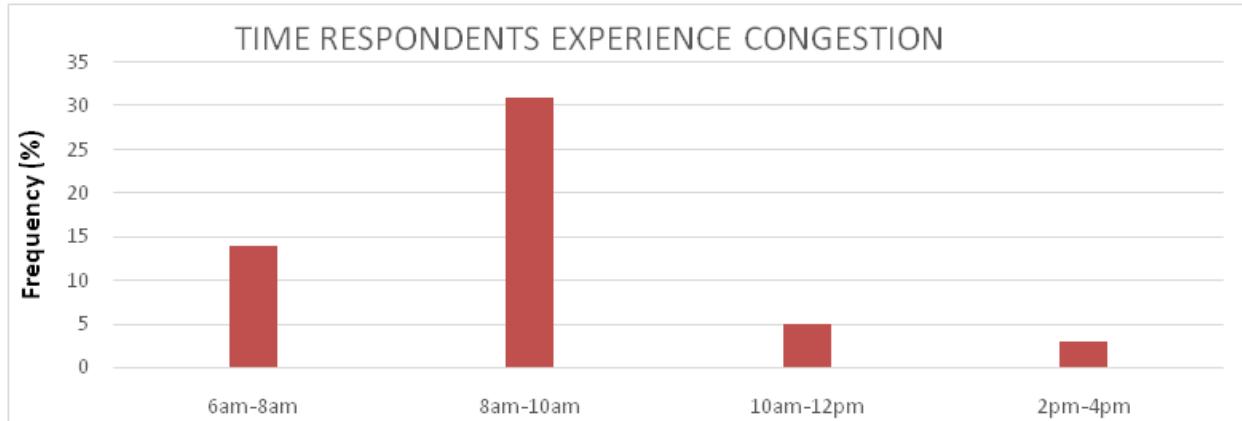
*Fig.  XII: TIME RESPONDENTS EXPERIENCE CONGESTION*
*Table XII shows that 6am-10am and 4pm-8pm are the peak period in which the respondents experienced in congestion. The table indicate that 25% is the highest time experienced in congestion by the respondent between 4pm-8pm, followed by 31% between 8am-10am, then 17% between 6pm-8pm, 14% between 6am-8am 5% between 10am-12pm,*
*3% between 2pm-4pm and also 5% are indisposed.*

## V.     RESULT AND DISCUSSION

This section presents results and analyses of traffic congestion in major cities of Nigeria. Overwhelming 95% of the respondents were discovered to have experienced traffic congestion along the road in one time or the other while 5% did not experience traffic congestion on the road before. 52% of the respondents used to experience congestion on the road every day with 35% more than once a week, 9% once a week and 4% in the others' option category. This appears to agree with (Joseph and Anderson, 2012) who argues that traffic congestion is a problem in most cities in Nigeria.  Also 78%

of the respondents wastes $20 - 40$ minutes in the traffic congestion followed by 12% whom use to wastes 40 minutes to 1 hour, 1% wastes 1 hour to 1 ½ hour and 9% in the category of others' option. The major time of traffic congestion on the road were discovered to be 8am–10am as affected 31% of the road users followed by 4pm-6pm as affected 25% of them. The study revealed the main causes of traffic congestion along this road to be poor parking habit followed by poor road pavement and it has been discovered that waste of time and stress were the major effects resulting from the traffic congestion.

**TABLE XIII: CAUSES OF TRAFFIC CONGESTION ON HIGHWAY**

| S/N | CAUSES | SA | A | UD | D | SD | X | σ | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Poor driving habit | 35 | 48 | 6 | 8 | 3 | 4.04 | 1.96 | Accept |
| 2 | Poor road pavement | 46 | 41 | 3 | 7 | 3 | 4.20 | 2.07 | Accept |
| 3 | On-going construction activities | 21 | 48 | 12 | 12 | 7 | 3.64 | 1.74 | Accept |
| 4 | Poor road network | 28 | 54 | 6 | 10 | 2 | 3.96 | 1.91 | Accept |
| 5 | Inadequate road capacity | 37 | 52 | 4 | 5 | 2 | 4.17 | 2.05 | Accept |
| 6 | Poor parking habit | 46 | 45 | 6 | 2 | 1 | 4.33 | 2.17 | Accept |
| 7 | Lack of parking facilities | 32 | 53 | 8 | 7 | 0 | 4.10 | 2.02 | Accept |
| 8 | Lack of road furniture | 23 | 44 | 18 | 11 | 4 | 3.71 | 1.77 | Accept |
| 9 | Too many taxis/buses on the road | 39 | 41 | 10 | 8 | 2 | 4.07 | 1.98 | Accept |
| 10 | Poor traffic control management | 37 | 51 | 5 | 7 | 0 | 4.18 | 2.06 | Accept |
| 11 | Poor drainage system | 27 | 41 | 19 | 11 | 2 | 3.80 | 1.82 | Accept |
| 12 | Presence of heavy trucks | 28 | 40 | 12 | 15 | 5 | 3.71 | 1.77 | Accept |
| 13 | Excessive speeding | 20 | 21 | 30 | 26 | 3 | 3.29 | 1.61 | Accept |
| 14 | Poor design junctions/round-about | 19 | 46 | 17 | 16 | 2 | 3.64 | 1.74 | Accept |
| 15 | Frequent use of sirens | 13 | 31 | 22 | 25 | 9 | 3.14 | 1.59 | Accept |
| 16 | Lack of effective mass transit | 14 | 32 | 18 | 20 | 16 | 3.08 | 1.58 | Accept |
| 17 | Malfunctioning vehicle | 13 | 43 | 22 | 18 | 4 | 3.43 | 1.65 | Accept |
| 18 | Poor weather | 11 | 25 | 23 | 26 | 15 | 2.91 | 1.58 | Accept |
| 19 | Religious/special event along the road | 20 | 31 | 14 | 29 | 6 | 3.30 | 1.62 | Accept |
| 20 | Work zone | 22 | 43 | 17 | 16 | 2 | 3.67 | 1.75 | Accept |
| 21 | Slow driving | 14 | 41 | 19 | 22 | 4 | 3.39 | 1.64 | Accept |
| 22 | Accidents on the road | 20 | 39 | 16 | 22 | 3 | 3.50 | 1.68 | Accept |
| 23 | Lack of pedestrian facilities | 30 | 43 | 12 | 13 | 2 | 3.86 | 1.85 | Accept |
| 24 | Lack of overhead bridges/fly-overs | 32 | 44 | 15 | 8 | 1 | 3.98 | 1.92 | Accept |

*Source: Field Survey (2019) SA= strongly agree, A = agree, UD = undecided, D = disagree, SD=strongly disagree, X=mean and σ = standard deviation*

## Table XIV: EFECT OF TRAFFIC CONGESTION ON HIGHWAYS

| S/N | Effects | SA | A | UD | D | SD | X | σ | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Waste of time | 58 | 36 | 1 | 3 | 2 | 4.45 | 2.26 | Accept |
| 2 | Inability to forecast travel time | 32 | 55 | 7 | 6 | 0 | 4.13 | 2.02 | Accept |
| 3 | Fuel consumption | 33 | 46 | 12 | 6 | 3 | 4.00 | 1.94 | Accept |
| 4 | Stress | 41 | 46 | 6 | 7 | 0 | 4.21 | 2.08 | Accept |
| 5 | Emergencies vehicle | 22 | 45 | 19 | 11 | 3 | 3.73 | 1.77 | Accept |
| 6 | Spill-over effect | 22 | 51 | 14 | 13 | 0 | 3.82 | 1.83 | Accept |
| 7 | Pollution | 36 | 47 | 9 | 7 | 1 | 4.10 | 2.00 | Accept |
| 8 | Delay movement | 34 | 51 | 8 | 4 | 3 | 4.09 | 2.00 | Accept |
| 9 | Road rage | 22 | 49 | 20 | 7 | 2 | 3.82 | 1.83 | Accept |
| 10 | Accident | 27 | 39 | 19 | 11 | 4 | 3.74 | 1.78 | Accept |
| 11 | Query at work | 26 | 37 | 17 | 18 | 2 | 3.67 | 1.75 | Accept |
| 12 | Night driving | 22 | 39 | 20 | 14 | 5 | 3.59 | 1.71 | Accept |
| 13 | Relocation | 20 | 37 | 22 | 18 | 3 | 3.53 | 1.69 | Accept |
| 14 | Road work | 22 | 40 | 25 | 11 | 2 | 3.69 | 1.76 | Accept |
| 15 | Global warming | 27 | 44 | 17 | 11 | 1 | 3.85 | 1.84 | Accept |

*Source: Field Survey (2019) SA= strongly agree, A = agree, UD = undecided, D = disagree, SD=strongly disagree, X=mean and σ = standard deviation*

**Effect of Traffic Congestion**

This study has shown that waste of time is the most significant effect of traffic congestion on Polytechnic Road Tudun Wada Kaduna. From Table XIII, it can be seen that other major effects of traffic congestion include: Delay movement. Stress, accident, inability to forecast travel time, fuel consumption, query at work. Pollution, night driving, road range and spillover effect are among the major effects suggested from this studies.

**TABLE XV: REMEDIES OF TRAFFIC CONGESTION ON HIGHWAY**

| S/N | Effects | SA | A | UD | D | SD | X | σ | Decision |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Provision of parking space | 56 | 36 | 3 | 3 | 2 | 4.41 | 2.23 | Accept |
| 2 | Public enlightenment/traffic education | 37 | 54 | 8 | 1 | 0 | 4.27 | 2.12 | Accept |
| 3 | Parking fees | 20 | 39 | 17 | 16 | 8 | 3.47 | 1.67 | Accept |
| 4 | In-depth training of transport/traffic personnel | 31 | 54 | 7 | 6 | 2 | 4.06 | 1.98 | Accept |
| 5 | Launch more commercial vehicles | 22 | 36 | 25 | 12 | 5 | 3.58 | 1.71 | Accept |
| 6 | Ban all form of road side trading/ hawking | 32 | 35 | 20 | 10 | 3 | 3.83 | 1.83 | Accept |
| 7 | Construction of proper drainage | 38 | 42 | 14 | 5 | 1 | 4.11 | 2.01 | Accept |
| 8 | Hack down all illegal buildings/shops built on the right of way (ROW) | 37 | 32 | 18 | 12 | 1 | 3.92 | 1.89 | Accept |
| 9 | Reduce the number of bus-stop where necessary | 28 | 34 | 23 | 13 | 2 | 3.73 | 1.78 | Accept |
| 10 | Create special commercial transport coordinator | 35 | 45 | 14 | 4 | 2 | 4.07 | 1.98 | Accept |
| 11 | Rehabilitate the road section needing attention | 41 | 49 | 7 | 2 | 1 | 4.27 | 2.13 | Accept |
| 12 | Removal of motorcycles and tricycles on the road | 21 | 18 | 27 | 23 | 11 | 3.15 | 1.59 | Accept |
| 13 | Provision of pedestrian facilities | 48 | 42 | 5 | 5 | 0 | 4.33 | 2.17 | Accept |
| 14 | Create a separate/alternative root for trucks and heavy vehicles | 50 | 35 | 5 | 9 | 1 | 4.24 | 2.24 | Accept |
| 15 | Enlarging the width of the road | 54 | 33 | 8 | 4 | 1 | 4.35 | 2.19 | Accept |
| 16 | Provision of road furniture | 36 | 44 | 12 | 5 | 3 | 4.05 | 1.97 | Accept |

*Source: Field Survey (2019) SA= strongly agree, A = agree, UD = undecided, D = disagree, SD=strongly disagree, X=mean and σ = standard deviation*

## VI REMEDIES TO TRAFFIC CONGESTION

The findings from this study on the possible remedies to traffic congestion in Nigeria with the case study of Tudun Wada Kaduna are presented in Table XV. These show that provision of parking space, enlarging the width of the road, create a separate/alternative root for trucks and heavy vehicles, provision of pedestrian facilities, rehabilitate the road section needing attention, construction of proper drainage, public enlightenment/traffic education, hack down all illegal

buildings/shops built on the right of way (ROW), provision of road furniture, create special commercial transport coordinator, ban all form of road side trading/hawking, in-depth training of transport/traffic personnel, reduce the number of bus-stop where necessary, launch more commercial vehicles, removal of motorcycles and tricycles on the road, parking fees are among the major remedies suggested from this study because their mean are all above the 3.0 cutoff point on a five-point Likert scale used.

## VII. CONCLUSION AND RECOMENDTIONS

This research has brought into focus the issue of traffic congestion on Nigeria road, causes effects and remedy with case study of Kaduna Polytechnic Road Tudun Wada Kaduna. The main causes of congestion have been considered indicating that poor road pavement, poor parking habit, too many taxis/buses on the road, inadequate road capacity, poor traffic control management, poor driving habit, lack of parking facilities, lack of overhead bridges/fly-overs, lack of pedestrian facilities, poor road network,, poor drainage system, accidents on the road, poor junction design, lack of effective mass transit, slow driving, are the greatest causes of traffic congestion on this road.

Overwhelming 95% of the respondents were discovered to have experienced traffic congestion along the road in one time or the other while 5% did not experience traffic congestion on the road before. 52% of the respondents used to experience congestion on the road every day with 35% more than once a week, 9% once a week and 4% in the others' option category. This appears to agree with[4] who argues that traffic congestion is a problem in most cities in Nigeria. Also 78% of the respondents wastes $20-40$ minutes in the traffic congestion followed by 12% whom use to wastes 40 minutes to an hour, 1% wastes 1 hour to 1 ½ hour and 9% in the category of others' option. The major time of traffic congestion on the road were discovered to be 8am–10am as affected 31% of the road users followed by 4pm-6pm as affected 25% of them.

The government should encourage the enforcement of traffic laws on the users of the road, and most especially the use of reliable mass transit buses to reduce the number of vehicles on the road should also be encourage. Proper and consistent bus stops should be sited along the introduction of other forms of transportation such as metros and trains which support mass movement of people from one town to another as dine in major cities globally.

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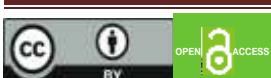
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