Original Research Paper

# Causes of Traffic Congestion; a Study of Owerri Municipal Area of IMO State

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**Abstract:** This research is concerned with the causes of road traffic congestion, a study of Owerri municipal. To achieve this, data was from primary and secondary sources. Primary data was from questionnaires while the secondary data were from journals and previous academic works of other researchers. The survey method of research was adopted for this study. Taro Yemane's method of calculating sample size was used to arrive at the sample size used which was 400 respondents. The questionnaire was distributed in parts of Owerri municipal which include Imsu junction axis = 100, Wetheral = 50, Ikenebu = 50, Control post = 50, Douglas = 50 and Alvan axis = 50. From the field survey and questionnaire, it was deduced that 66% of traffic in Owerri municipal is caused by drivers' impatient behavior, wrong parking, and disobedience to traffic rules (human factor) while 34% are caused by bad roads (physical factor). Traffic congestion cannot be analyzed without time of occurrence which was analyzed using Simple percentage analysis. It was discovered that 31.75% of traffic jam occurs during morning hours, from 7-9 am while 33.75% of traffic occurs from 5-7 pm. Inflow and outflow of traffic were also analyzed to observe the vehicular activity of the city and it made us understand the reasons for traffic congestion within Owerri municipal. This study recommended that an active traffic law enforcement agency be enacted to monitor reckless drivers and prosecute them accordingly an effective and efficient road maintenance culture.

**Keywords:** Traffic, Vehicle, Congestion and Roads

## Introduction

Efficient transport brings facilities within man's reach. It also allows man to have physical access to remote areas. Increased mobility continues to change the pattern of man's social life especially as societies grow and are integrated. The economic development of a nation reflects the development of a transport system. This is particularly true in Nigeria where the road transport system is by far the most widely used (Momoh, 2011).

Traffic congestion is one of the consequences of overpopulation (Ogunsanya, 2002), this is because more people are using the road facilities meant for a limited number of people. It is one of the greatest problems of urbanization generally in Nigeria and Owerri. Almost all the urban centers in Nigeria experience one form of traffic congestion to another (Iloeje, 2001). Traffic congestion occurs when a city's road network is unable to accommodate the volume of traffic that uses it. This situation is caused by rapid growth in motorization and with less than the corresponding improvement in the road network, traffic management techniques, and related transport facilities. Thus, traffic congestion is a phenomenon that is associated with the urban environment all over the world. This is because we need transport to move from one place to another, especially when trekking becomes inefficient. While traffic congestion has been managed very well in some developed countries, it has continued to defy solutions in the developing world. According to Aworemi *et al.* (2009) virtually every city is developed to perform a specific function. The study added that efficiency in the performance of a city is justified by its ability to meet up with the initial purpose for which it is developed to serve. The present-day road transportation in Owerri is such that there is a tremendous increase in the number of car ownership, inadequacy in facilities provided as well as a poor maintenance culture this, in turn, gives rise to an ugly phenomenon called traffic congestion, which is experienced in Owerri. As a result of traffic congestion,

people are stuck in traffic hold-ups; hence, a lot of working time is wasted, a lot of disappointments are experienced by travelers as well as psychological discomfort as people wait on the road where they got stuck in the road traffic jams.

## Statement of the Problem

We all have experienced traffic jams in one way or the other while going about our daily activity on the road, especially those of us in urban areas. A major characteristic of most urban centers in Nigeria today is the increasing inadequacy of infrastructural facilities such as water, electricity, and transportation to cope with the increasing demand of the urban population. One of the most serious of these problems is the problem associated with congestion and environmental pollution amongst others. (Agbaeze, 2003; Agbonika, 2011).

In Owerri, we have more traffic on some routes than others. For instance, Wetheral road seems to be less busy because it has little or no schools, and markets and it has no big government institution along with its core establishment such as the secretariat (Osuji and Onyenechere, 2013).

Contrastingly, we see that other major roads like Douglas have nearly all commercial activities on them for example markets like Eke Onunwa and new market, banks, illegal roadside shops, schools, fuel stations, churches, and so on. It can therefore be unarguable that Wetheral road has lower traffic density than that of Douglas Road due to the reasons mentioned above.

Many of the streets in Owerri are narrow concerning the number of vehicles that seek to use them. In areas where they are wide, they have been narrowed down by unauthorized extensions and building facades, projections in front of buildings as well as illegal shops and motor parks, refuse dumps, and so on.

The congestions have other social, economic, and physiological problems associated with them. Congestion in Owerri urban causes lateness to work due to delays by traffic, it reduces man working hours, staffs that live far from their places of work, go late. This amounts to less revenue and labor productivity.

Traffic congestion also has a direct effect on the health of the people. The long hours of being held up in the traffic indulge stress and anxiety, especially for older people who are hypertensive. These classes of people are at greater risk. (Ogunbodede, 2008).

The most glaring problem to health is the emission of carbon monoxide derived mainly from incomplete combustion of gasoline in automobiles, carbon imposes a burden on those already suffering from anemia, overactive typhoid, chronic lung diseases, and so on. Long exposures at approximately 8 h can affect one's mental performance. The problems mentioned above are very glaring and the attempt to find solutions to them makes this research a purposeful study. The researcher intends to solve this problem by observing the traffic flow, observing traffic jams, and then discovering the causes. The researcher will also distribute a questionnaire to road users. This research will also recommend possible solutions which include introducing mass transit buses to reduce the number of smaller vehicles that emit carbon monoxide, thereby transporting a large number of people efficiently. Another solution is the creation of rail lines and improves rail transport.

## Limitations of this Research Paper

Distributed questionnaires took time to retrieve from the drivers and passersby and when they are retrieved, some of them are mutilated and torn.

The nature of the research work did not allow for the use of Geospatial technology because oral interviews and observations are made which are not possible to be associated with a particular location.

Some of the interviewees were not forth cooperating and required the author to plead with them for an audience.

## Study Area

Owerri municipal is one of the local governments' areas in Imo State, Nigeria, set in the heart of Igboland. It is also the state's largest city followed by Orlu and Okigwe as second and third respectively. The commercial part of Owerri municipal includes Douglas, Ikenebu, Wetheral, and Warehouse. It has an estimated population of 1,401,873 as of 2006 and is approximately 100 square kilometers (40 sq mi) in the area (NPC, 2006). Owerri is bordered by the Otammiri river to the East and Nworie river to the south (Iro, 2015).

Owerri Municipal is located at latitude 5°21'N to 5°28' North and 6°52' to 7°01' East. The region extends from the coast to roughly 130 to 160 km. it is surrounded by Orji at the northern edge, Amakohia/Akwakuma at the western edge, the eastern side by Uratta, and on the south by Umuoguma and Obinze. The inflow of people from the hinterlands into Owerri from time to time brings about variation in this population. The population of Owerri in 1963 according to the 1963 census was about 102,800 people but as of 2017, the population is estimated to be about 4,927,563 people. (NPC, 2006).

## Climate

The rainy season begins in April and lasts until November, with annual rainfall varying from 1,500 mm to 2,200 mm (60 to 80 inches). An average annual temperature above 20°C (68.0°F) creates an annual relative humidity of 75%. With humidity reaching 90% in the rainy season (Iloeje, 2001). The dry season experiences two months of harmattan from late December to late February. The hottest months are between January and March. With high population density and overfarming, the soil has been degraded and much of the native vegetation has disappeared (Iro, 2015).

## *Vegetation*

A tropical rainforest is dominant vegetation in the Owerri area although its density has drastically reduced due to anthropogenic activities such as urbanization, deforestation, and agricultural activities (Iro, 2015). The vegetation is arranged in stories with herbaceous plants forming the forest floor. (Olowokere *et al.*, 2014).

# Materials and Methods

## *Data Types and Collection*

The primary data were gotten from fieldwork utilizing questionnaires, oral interviews with road users and traffic agencies, and observation. The secondary data were obtained from already existing literature, textbooks, and journals.

The questionnaire method was used to collect data from road users which includes commercial drivers, private drivers, and a few passersby. The researcher distributed the questionnaire in the major road areas of the city. Also, the interview method was used to obtain information from people who didn't have the patience or time to complete the questionnaire.

## *Population/Sample Size*

The metro area population of Owerri in 2019 was 839,000, a 4.09% increase from 2018. The metro area population of Owerri in 2018 was 806,000, a 4% increase from 2017. Presently, the population of Owerri metropolis is about 908,000 (NPC, 2006).

For the sample size, the Taro Yemane method of sample size calculation was used.

The Taro Yemane method for sample size calculation was formulated by the statistician Taro Yemane in 1967 to determine the sample size of a given population. The formula is:

$$n = N / (1 + N (e)2)$$

where:

n  = sample size
N = signifies the population under study which is 908,000
e  = signifies the margin error (it could be 0.10, 0.05, 0.01) 0.05 will be used for this study
n  = 908,000/(1+908,000 (0.05) 2)
n  = 908,000/(1+908,000(0.0025)
n  = 908,000/ (1+2270)
n  = 908,000/2271
n  = 399.82
n  = 400

So, the sample size for this research is 400.

## *Sampling Technique*

The sampling technique adopted for this research was simple random sampling. Simple random sampling is a type of probability sampling in which the researcher randomly selects a subset of participants from a population. Each member of the population has an equal chance of being selected. Data is then collected from as large a percentage as possible of this random subset. Therefore, a total of 400 questionnaires were randomly distributed to road users (commercial and private drivers and pedestrians) in seven areas of the Owerri metropolis. The areas were IMSU junction axis = 100 questionnaires of the peculiarity of the axis, Wetheral by MCC 50 questionnaires, Warehouse to Control 50 questionnaires, Douglas 50 questionnaires, Ikenebu/Aladinma 50 questionnaires, Wetheral by fire service 50 questionnaires, Alvan axis = 50 questionnaires making a total of 400 samples.

# Results

This section looks at the data collected and how it is analyzed statistically and presented using a table and graph.

## *Characteristics of Respondents*

The characteristic of respondents was done to determine their age, gender, and employment status of respondents and was gotten from the questionnaire. The data gotten is represented.

## *Traffic Flow*

According to the free dictionary, traffic flow is the number of vehicles, passing a given point at a given time. This is the number of vehicles in motion in Table 1 to 3.

These figures were derived by the author in March 2021. Inflow means the flow of vehicles coming into the city from other parts of the state while outflow is seen as the vehicles going out or leaving the city. This table represents the traffic flow of vehicles during morning hours and the amount got was cumulated from 7 am to 12 pm. Wetheral by Fire service had the highest number of inflows on Wednesday with 8,876 vehicles while MCC had the lowest number of inflows on Sunday with 4,481 vehicles.

Wetheral by Fire service still had the highest number of outflows on Friday with 7,692 vehicles while Ama JK to wetheral junction had the lowest number of outflows on Sunday with 5,217 vehicles.

## *Traffic Flow During Evening Hours*

This looks at the inflow and outflow of vehicles in a week from 3 to 7 pm and is presented thus.

From Table 4 above, we can see that Imsu to Orji had the highest number of inflows on Monday with 9,058 vehicles while Ama JK to wetheral junction had the lowest number of inflows on Saturday with 7,215 vehicles.

Wetheral by Fire service had the highest number of outflows on Monday with 8,983 vehicles while Ama JK to wetheral junction had the lowest number of outflows on Sunday with 6,315 vehicles.

## Discussion

### Summed up Traffic Flow

From Tables 5 and 6, it is incredible the number of vehicles that troop in and out of Owerri municipal considering the size and space of the area they operate in. Owerri is quite small compared to the vehicular activity in it.

It is observed that vehicles from other surrounding cities and villages move into the road segment in the city causing serious congestion in some parts and others minimal congestion as people move about their daily activities. Traffic flow was analyzed so we can have insight into the vehicular activity of Owerri municipal leading to traffic congestion. And this study is aimed at determining the causes of traffic congestion.

### Causes of Traffic Congestion

After making observations and distributing the questionnaire, it was deduced that the causes of traffic congestion in Owerri metropolis can be grouped into two. The physical factors and human factors.

The physical factors that cause traffic in Owerri Municipal are bad roads, narrow roads, poor road network/intersections, and roadblocks which are represented as x. The human factor represented as y, include drivers' attitude, absence/ unprofessional traffic warders, wrong parking, dumping of refuse, and traders' encroachment. From the study, it was observed that most vehicle drivers in Owerri municipal appear to be in a hurry, lack patience, and are intolerant when driving which led to traffic bottlenecks. This leads to a high incidence of violations of traffic rules and regulations. They are also manner less and disciplined and thus likely to disobey traffic wardens. There is also the problem of inadequate traffic wardens and even the few existing ones appear to compromise ethics and thus ignore careless parking of vehicles along a busy road. This can be seen at Maris junction, Ikenebu. The values got from the questionnaire are presented in Table 7 below.

From Table 7 above, 6.5% of traffic congestion in the IMSU junction axis is caused by a physical factor which is the narrow road. The capacity of the road is below the demand, especially towards the layout of the works. 18.5% is caused by human factors, particularly drivers' impatience. On Okigwe road (fire service to the library), traffic occurs when there is road blockage due to unrest within the city. This blockage is usually ordered by the government because of the facilities along the road.

Wetheral/MCC road: 8% Of traffic congestion is caused by the human factor in Wetheral/MCC according to the results from the questionnaire while 4.5% is caused by a physical factor that leads to slow movement of

vehicles. Warehouse to Control: In Warehouse to control, 8.5% is caused by a human factor which is drivers' attitude (impatience). Most drivers in Owerri municipal are always in a hurry and the process, they create a traffic jam. Douglas: In Douglas, 11% of traffic is caused by human factors which are traders' encroachment due to the market, drivers' impatient attitude, and dumping of waste along the road by traders. Ikenebu: In Ikenebu 9.5% is caused by drivers' impatience. The commercial activity there includes shopping malls, eateries, etc. Wetheral by fire service: In wetheral/fire service, traffic is caused by drivers' attitude as well as bad road. This is because of the commercial activities that are carried out there. There are offices, shops, eateries, and banks. Amakohia: In Amakohia, traffic is caused by a physical factor which is a bad road.

### Time of Occurrence

To determine the time of occurrence of traffic congestion, this study uses a simple percentage ratio. The results are gotten from the distributed questionnaire. This analysis is done to determine when traffic occurs, and at what time to what time does Owerri experience traffic? The result is presented on a pie chart.
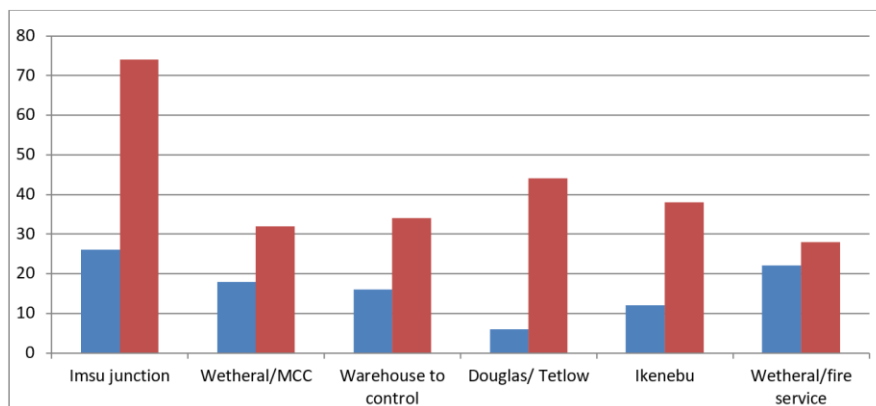
The time of occurrence of traffic congestion was categorized together as a whole. This is because traffic usually occurs at a particular time in the city. The timing is similar in every part of Owerri municipal. Two hours interval was used to space the timing in a day.

From Table 8 above, 31.75% of traffic jam occurs at about 7-9 am. This is so because a lot of people are rushing to work, students are going to school, businessmen and women, traders, market women, etc. are all going to their businesses. We can see that traffic congestion seldom occurs from 11 am to 3 pm because a higher number of people making use of the road must have got to their places of work so there's no rush hour and not much vehicular activity except for commercial vehicles going about their business. From 3 pm, congestion begins to occur but at a minimal amount which can be called Synchronized flow. But by 5-7 pm, another rush hour occurs because all those that went to work in the morning are returning home. 7 pm to 9 pm traffic jam occurs because of people that love nightlife and those who dismiss late from their place of work.

It is evident that traffic congestion exists in Owerri municipal and both human behavior and road pattern have a role to play in creating traffic congestion.

From the analysis done, it is evident that the number of vehicles trooping in and out of Owerri is way higher than the road capacity. Owerri has many bad roads. Aside IMSU junction where traffic jam is caused by physical factor, which as narrow road and many road intersections, the majority of traffic problem is caused by human factors and traffic mismanagement. From the simple percentage analysis, it was deduced that 34% of traffic congestion is caused by physical factors while 66% of traffic is caused by human factors Fig. 1 to 4.

**Fig. 1:** Nigeria map showing Imo State (Iloeje, 2001)



**Fig. 2:** Map of Imo state showing LGA with the study area outlined in context (Iro, 2015)



**Fig. 3:** Map of Owerri municipal (Iro, 2015)

**Fig. 4:** Graphical representation of the causes of traffic congestion in Owerri municipal blue row-represent physical factors and red row-represent human factors

**Table 1:** Age of respondents to determine the age, gender and employment status

| Age | Number | Percentage |
|---|---|---|
| 18-25 years | 92 | 23% |
| 26-35 years | 87 | 21.75% |
| 36-45 years | 112 | 28% |
| 46 years and above | 109 | 27.25% |
|  | = 400 | = 100 |

From the table above, 23% of respondents are between the age of 18-25 years, and 36-45 years are the highest number of respondents with 28%. 21.75% are between the ages of 26-35 years

**Table 2:** Gender of respondents

|  | Number | Percent |
|---|---|---|
| Male | 237 | 59.25 |
| Female | 163 | 40.75 |
|  | = 400 | = 100.00 |

From the table above, 59.25% of the respondents are male while 40.75% of the respondents are female

**Table 3:** Traffic inflow and outflow during morning hours

| Area | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| Wetheral by fire service | Inflow-8,871 | Inflow-8,874 | Inflow-8,876 | Inflow-8,862 | Inflow-8,760 | Inflow-8,571 | Inflow-7,483 |
|  | Outflow-7,517 | Outflow-7,404 | Outflow-7,319 | Outflow-7,516 | Outflow-7,692 | Outflow-7,641 | Outflow-7,312 |
| Ama JK to wetheral junction | Inflow-5,948 | Inflow-5,812 | Inflow-5,718 | Inflow-5,631 | Inflow-5,861 | Inflow-5,311 | Inflow-5,421 |
|  | Outflow-5,816 | Outflow-5,712 | Outflow-5,634 | Outflow-5,817 | Outflow-5,941 | Outflow-5,322 | Outflow-5,217 |
| Ikenebu/wetheral axis | Inflow-6,899 | Inflow-6,821 | Inflow-6,743 | Inflow-6,692 | Inflow-6,528 | Inflow-6,521 | Inflow-6,321 |
|  | Outflow-6,865 | Outflow-6,742 | Outflow-6,921 | Outflow-6,631 | Outflow-6,740 | Outflow-6,821 | Outflow-6,482 |
| Imsu junction-Orji junction | Inflow -6,229 | Inflow-6,312 | Inflow-6,452 | Inflow-6,589 | Inflow-6,721 | Inflow-6,634 | Inflow-6,529 |
|  | Outflow-5,794 | Outflow-5,621 | Outflow-5,341 | Outflow-5,784 | Outflow-5,543 | Outflow-5,671 | Outflow-5,386 |
| MCC axis | Inflow-7,491 | Inflow-7,321 | Inflow-7,582 | Inflow-7,324 | Inflow-7,573 | Inflow-5,411 | Inflow-4,481 |
|  | Outflow-7,108 | Outflow-7,284 | Outflow-7,125 | Outflow-7,387 | Outflow-7,492 | Outflow-7,212 | Outflow-6,892 |

Author's field work (2021)

**Table 4:** traffic inflow and outflow during evening hours

| Area | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| Wetheral by fire service | Inflow-8,687 | Inflow-8,734 | Inflow-8,935 | Inflow-8,722 | Inflow-8,792 | Inflow-7,621 | Inflow-7,312 |
|  | Outflow-8,983 | Outflow-8,821 | Outflow-8,734 | Outflow-8,875 | Outflow-8,321 | Outflow-8,219 | Outflow-8,092 |
| Ama JK to wetheral junction | Inflow-7,334 | Inflow-7,521 | Inflow-7,524 | Inflow-7,784 | Inflow-7,721 | Inflow-7,215 | Inflow-7,347 |
|  | Outflow-6,964 | Outflow-6,784 | Outflow-6,777 | Outflow-6,640 | Outflow-6,855 | Outflow-6,432 | Outflow-6,315 |
| Ikenebu/wetheral axis | Inflow-8,283 | Inflow-8,421 | Inflow-8,355 | Inflow-8,734 | Inflow-8,946 | Inflow-8,217 | Inflow-8,369 |
|  | Outflow-7,878 | Outflow-7,924 | Outflow-7,867 | Outflow-7,535 | Outflow-7,684 | Outflow-7,450 | Outflow-7,332 |
| Imsu junction to Orji junction | Inflow-9,058 | Inflow-8,927 | Inflow-8,847 | Inflow-8,923 | Inflow-8,749 | Inflow-8,638 | Inflow-8,446 |
|  | Outflow-8,962 | Outflow-8,743 | Outflow-8,625 | Outflow-8,841 | Outflow 8,973 | Outflow-8,622 | Outflow-8,258 |
| MCC axis | Inflow-8,210 | Inflow-8,314 | Inflow-8,572 | Inflow-8,924 | Inflow-8,847 | Inflow-8,219 | Inflow-8,324 |
|  | Outflow-8,487 | Outflow-8,531 | Outflow-8,848 | Outflow-8,776 | Outflow-8,899 | Outflow-8,342 | Outflow-8,116 |

Author's Field survey (2021)

**Table 5:** Total traffic flow during morning hours

| Area | Inflow | Outflow | Total | Percentage |
|---|---|---|---|---|
| Wetheral by fire service | 60,314 | 52,374 | 112,688 | 23.91% |
| Ama JK to wetheral junction | 39,702 | 39,459 | 76,161 | 16.16% |
| Ikenebu/wetheral axis | 53,053 | 47,202 | 100,255 | 21.27% |
| Imsu junction to orji | 45,466 | 39,131 | 84,597 | 17.94% |
| MCC axis | 47,183 | 50,494 | 97,677 | 20.72% |
| Total | 245,718 | 228,660 | 471,378 | 100 |

Author's field survey 2021

**Table 6:** Total traffic flow during evening hours

| Area | Inflow | Outflow | Total | Percentage |
|---|---|---|---|---|
| Wetheral by fire service | 58,803 | 60,045 | 118,848 | 20.75% |
| Ama JK to wetheral junction | 52,248 | 46,767 | 99,015 | 17.28% |
| Ikenebu/wetheral axis | 59,385 | 53,670 | 112,995 | 19.72% |
| Imsu junction to orji | 61,580 | 61,051 | 122,631 | 21.41% |
| MCC axis | 59,409 | 59,999 | 119,408 | 20.84% |
| Total | 291,365 | 281,538 | 572,894 | 100% |

Author's field work

**Table 7:** Physical and human causes of traffic within Owerri municipal

| Areas | Physical factors (x) | Human factors (y) | %x | %y | Ex + y |
|---|---|---|---|---|---|
| IMSU junction axis | 26 | 74 | 6.5 | 18.5 | 100 |
| Wetheral/MCC | 18 | 32 | 4.5 | 8.0 | 50 |
| Warehouse to control | 16 | 34 | 4.0 | 8.5 | 50 |
| Douglas | 6 | 44 | 1.5 | 11.0 | 50 |
| Ikenebu | 12 | 38 | 3.0 | 9.5 | 50 |
| Wetheral/fire service | 22 | 28 | 5.5 | 70.0 | 50 |
| Alvan axis | 36 | 14 | 9.0 | 3.5 | 50 |
| | | | = 34.0 | = 66.0 | = 400 |

Source: Field survey, 2021

**Table 8:** Time of traffic occurrence (what time to what time does Owerri experience traffic)

| Time | Sample size | Amount gotten | Percentage |
|---|---|---|---|
| 7 am-9 am | 400 | 127 | 31.75 |
| 9 am-11 am | 400 | 10 | 2.50 |
| 11 am-1 pm | 400 | 5 | 1.25 |
| 1 pm-3 pm | 400 | 12 | 3.00 |
| 3 pm-5 pm | 400 | 34 | 8.50 |
| 5 pm-7 pm | 400 | 135 | 33.75 |
| 7 pm-9 pm | 400 | 77 | 19.25 |
| | | = 400 | = 100.00 |

Author's field survey, 2021

Looking at the time of occurrence, we can see that traffic occurs mainly during rush hour. Many private cars and commercial minibuses are on the increase at that time, all rushing to get home in time.

*Recommendation*

*Individual Contributions*

All road users should abide by traffic rules and regulations. Drivers most importantly should follow traffic laws judiciously. They should also drive carefully to avoid accidents. Pedestrians should also be mindful when crossing the road to avoid being knocked down. Respect traffic wardens and follow their lead so we all can get to our destination. Also, traffic wardens should dutifully carry out their task of controlling traffic and stop looking for money from commercial drivers.

*Government Contribution*

Government should try to fix all road networks and repair all damaged roads. They should also try to create a pedestrian walkway for passers-by. Environmental agencies should make sure that traders do not sell by the road in Douglas and other places. Most of the delays in road transport occur at road intersections with narrow approaches that are often poorly located, therefore there is a need to redesign all the road intersections in the study area such that the approach to these road intersections is broad for

about 200 meters so that side turning vehicles are not obstructed by straight moving vehicles (Filani *et al*., 1994).

### *Provide Parking Spaces*

There is no parking space in Owerri municipal and as such vehicles have no alternative but to use the roads as parking spaces for loading and offloading. There is a need for government to provide parking spaces in the urban area, and build motor parks outside the Central Business District and a few bus stops along these roads. NO parking and No waiting sign should be provided along the roads that harbor huge volumes of traffic (Douglas Road) to ensure that vehicles do not park or load and offload along the road. Also, agencies should be created to see to it that vehicles adhere to the no parking and no waiting signs. An agency should be created that oversees that traders do not encroach into the road with their merchandise especially traders along Douglas Road and a routine check should be carried out weekly to ensure traders stick to the rule. Daily refuse evacuation should be carried out by the government. There should be a set of environmental management laws prohibiting the indiscriminate discharge or deposit of any refuse in unauthorized areas. A specific punishment should be outlined for offenders.

### *Road Extension and Creation of Bypass*

Road extension is needed especially in Orji where the main road is narrow and the demand for the road is high. Bypasses should be constructed to decongest the city vehicular traffic from neighboring towns. In this way vehicles passing through Owerri do not have to mix up with the intercity traffic which is a major cause of traffic congestion. The creation of a bypass will help to reduce traffic created because of the poor road network. The available existing roads should be maintained by filling potholes, and dredging of drainage system to facilitate easy flow of runoff to avoid flooding the road and for easy movement of people and vehicles.

### *Development of Suburbs and Hinterland Areas*

Government should facilitate market development schemes in these areas. Places like Orji, Irete, and Obinze, should have developed market facilities as well as other business ventures. The creation of basic incentives like functional electricity, access roads, and portable drinking water at a subsidized rate can go a long way to depopulate the urban centers and reduce traffic.

### *Enforcement of Traffic Rules*

Police patrol vehicles patrol the city to monitor intercity traffic movement. They should be strict laws on traffic hooliganism where specific punishment should be applied to offenders. There should also be continuous enforcement of traffic rules within Owerri municipal which should yield substantial returns.

In an interview with a road user (name withheld), she said the government should provide a traffic law enforcement agency that will be on the lookout for offenders and make sure the fine or punishment as stated in the law book is carried out by the offender. She made this comment because some drivers still go against traffic signals.

### *Provision of Mass Transit*

During that rush hour, big luxury buses can be employed for mass transportation. Such buses can convey a large number of people, thereby reducing too many vehicles on the road. This in turn reduces air pollution as carbon dioxide is reduced, thereby reducing global warming (Banister, 2002).

The government has made an applaudable step to curb traffic congestion by providing traffic light signals in most parts of the city; this will go a long way in reducing traffic congestion.

## Conclusion

This study shows that all road users should abide by traffic rules and regulations. Drivers most importantly should follow traffic laws judiciously. They should also drive carefully to avoid accidents. Pedestrians should also be mindful when crossing the road to avoid being knocked down. Respect traffic wardens and follow their lead so we all can get to our destination. Also, traffic wardens should dutifully carry out their task of controlling traffic and stop looking for money from commercial drivers. it helps to solve the problem of traffic.

This study also has examined the causes of traffic congestion in Owerri municipal. From the research work, we can deduce that many traffic congestions in Owerri municipal are caused by narrow lanes (physical cause) traders' encroachment and drivers' attitudes, and inefficient traffic wardens (human causes). Traffic congestion in Owerri municipal is a very serious problem that needs immediate attention not until it becomes acute. Therefore, Owerri municipal traffic is still beyond control in some areas because little attention was paid at the initial stage. Owerri municipal is rapidly developing into an urban center and should not be allowed to face traffic congestion problems like Lagos and Ibadan (Bashiru and Waziri, 2008).

## Acknowledgment

## Author's Contributions

**Sylvanus Iro:** did the conception of the work and its analysis.

**Edith Chinwe Pat-Mbano:** Distributed the questionnaire and the write-up.

## Ethics

Relevant laws and institutional and governmental policies were obeyed.

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