



ASSESSMENT OF VEHICULAR TRAFFIC FLOW ALONG GWAGWALADA-GIRI ROAD, FCT ABUJA, NIGERIA

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Abstract

This study is aimed at assessing the effects of traffic flow along Gwagwalada-Giri road, FCT Abuja. Primary and secondary data was used for the study. One hundred and fifty (150) copies of structured questionnaire was administered to 150 respondents in the study area. Information on the causes volume of vehicular flow and accident rate were obtained from federal road safety corps and road traffic department of Nigeria police of Gwagwala division. Findings revealed that wrongful parking along the road by commercial drivers is the main cause of traffic congestion in the area. the study further revealed that the road an average vehicular flow of 141426 vehicle on daily basis. It was observed during fieldwork that Tuesday and Fridays usually have heavy traffic flow. The findings also revealed that a total of 271 accidents casualties have been recorded along the road between 2010-2016. These casualties comprised of 62 deaths and 209 injured persons. This road traffic congestion along Gwagealada-Giri road is one of the main obstacle for all activities whose attainment depend transport being public, government or individual. The government should provide more funds to municipal council to rehabilitate their road which feed the main roads to bituminous standard so as to reduce the congestion.

Keywords: *Traffic, vehicular flow, accidents, congestion, control measures*

Introduction

Nigeria is one of the developing countries in the world with rapid urbanization and fast growing cities. Urbanization has been one factor contributing significantly to urban transportation problems such as traffic congestion especially in Nigeria and Abuja in particular. Although urbanization is a global phenomenon, yet 90% of urban population increase occurs in developing countries which place intense pressure on urban infrastructures, particularly transportation. Since 1950, the world's urban population has more than doubled, reaching 3.5 billion in 2010 (50.6% of the global population) (Rodrigure, 2009). This is the outcome of natural increase, rural-urban migration and international migration.

In addition to urbanization, increased motorization puts Abuja at risk for higher levels of emission. According to the Vehicle Inspection Officer report, roughly 900 vehicles are registered per week in Abuja (Akoni 2008). Although there is no data on the total number of vehicles registered in the city, there are records on the number of vehicles in the county. In Nigeria, the total number of vehicles increased substantially from 38,000 to 1.6 million between 1950 and 1992 (Enemari 2001), the number of used vehicles imported from abroad is estimated to have represented 30 percent (%) of the increase in vehicles numbers from 2001 to 2005 (Ajayi and Dosunmu 2002). Taking into account the increased vehicles registration in Abuja, the total increase in the number of vehicles in Nigeria, the likely proportion of super-emitters, and the concentration of vehicles in urban areas, it is likely that, vehicles emissions in Abuja are very high by any standard.

Moreover, the fuel composition makes it likely that the vehicles in use in Abuja will release high levels of pollutants.

Growing cities are economic, social, cultural, academic and sometimes administrative centers which encourages rural-urban migration. The same forces that draw inhabitants to congregate in large urban areas also lead to sometimes intolerable levels of traffic congestion on urban streets and thoroughfares. Thus, traffic congestion in urban areas is often the outcome of successful urban economic development, employment; housing and cultural policies that make people want to live and work relatively close to each and attract firms to benefit from the gains in productivity derived (Aderamo, 2002).

Road traffic congestion is a phenomenon that is common in mega cities all over the world.

Relevant to this study is the traffic flow theory, which describes the theoretical principles governing the movement of vehicles over the highway and street systems as seen in the works of Wolh and Martins (1969). This could be why Adenle (1977) argues that traffic flow theory is concerned particularly, with the composition, volume and quality of traffic. Principles variable used to describe this include volume or flow rate, density or concentration, speed, space mean – speed, time, mean speed, travel time, unit travel, time head – way and distance. Traffic flows along major roads in our cities need to be monitored regularly so that the design capacities of those roads are not exceeded. Traffic congestion occurs when transport demand exceeds transport supply at a specific point in time and in a specific location. Under such circumstances, each vehicle impairs the mobility of other. This is now a common feature of most urban centers in Nigeria and most especially in Abuja, the administrative centre of the county (Aderamo, 1998). The problem of traffic congestion in cities of Nigeria has its roots partly in the structural pattern of the roads especially in the traditional area of cities and the unplanned growth and haphazard land-use distribution.

The Organization for Economic Cooperation and Development (OECD) and European Conference of Transport Ministers (ECMT) Joint Transport Policy Research Center report on Managing Urban Traffic Congestion (2007) defines traffic congestion as involving queuing, slower speeds and increase travel times, which impose costs on the economy and generate multiples impacts on urban regions and their inhabitants.

Ogunsanya A. A (1993) conceives traffic congestion as the impedance vehicles impose on each other, due to the speed-flow relationship, in condition where the use of a transport system approaches capacity.

Traffic flow in mathematics and engineering is the study of interactions between vehicles, drivers and infrastructure with the aim of understanding and developing an optimal road network with efficient movement of traffic and minimal traffic congestion, pollution and accident rate (Olukaejirem 2008). Mathew (2002) argues that rush hour traffic congestion is inevitable because of the benefit of having a relatively standard work day.

Ayantoyinbo B. B. and Fadare S. O (2010), noted that traffic congestion problem becomes so manifest when measures in terms of delays, which can be

defined as the time lost vehicles inefficiencies or ineffective as in the case breakdowns, accidents parking and maneuvering problems, Whenever the total input rate is greater than the output link capacity, congestion occurs. When the network becomes congested, the queue lengths may become very large in a short time, resulting in buffer overflows and cell loss.

Traffic congestion prevents us from moving freely and it slows and otherwise disrupts the conduct of business within urban areas. However, it is important to note that unfettered movement is not the primary benefit we derive from living in urban areas. Cities provide access to a wide range of people, activities, services, goods, markets, opportunities, ideas and network. These benefits can be delivered either through speed or through greater proximity.

Traffic congestion may affect travel speed but in some circumstances in dense urban cores, it may both be expected and, to some degree, accepted. In these cases cities have come to accept a degree of traffic congestion at specific time of the day and continue to get along relatively well as long as overall accessibility is high. Traffic congestion also has a range of indirect impacts including the marginal environmental and resource impacts of congestion, impacts on quality of life, stress, and safety as well as impacts on non-vehicular road space users such as the users of sidewalks and frontage properties.

Cities have grown as they attracted more people and activities, they have produced more wealth and, as a by-product, their roads have become more crowded with traffic.

Little attention has been given to the traffic congestion along Gwagwalada-Giri Road. Thus, the researcher deems, it fit to carry out an assessment of traffic flow along Gwagwalada-Giri Road in Gwagwalada Area Council of the Federal Capital Territory (F.C.T). This justifies the need for this research work.

Problem Statement

Urban settlements with population of over one (1) million people are usually called megalopolises. Usually, megalopolises are administrative centres, major regional industrial, financial and cultural centres with the highest living standard. One of the main challenges under the development of megalopolises is how to maintain the transport system under the growing motorization, that is to say, the process of uncontrolled growth of private cars. However, initial motorization stages showed mainly positive aspects: time saving significant

increase in transport accessibility and mobility, regular and accurate delivery of passengers and cargo etc. but this vehicular increase has accentuated the problem of traffic congestion, traffic delays, parking problems, death due to traffic accidents, difficulty to protect public transport as well as environmental pollution and urban land use surveillance.

Considering the enormous economic opportunities in Abuja city, people living in remote sub-urban areas drive down to work in Abuja as well as to carry out other economic transaction. The fact that all travelers from the southern eastern and western states in Nigeria come to Abuja through the Lokoja-Gwagwalada Road and all vehicles from the northern part of Nigeria play this single lane to other parts of the country leaves the road crowded with various kinds of vehicles which results in traffic flow along Gwagwalada-Giri Road.

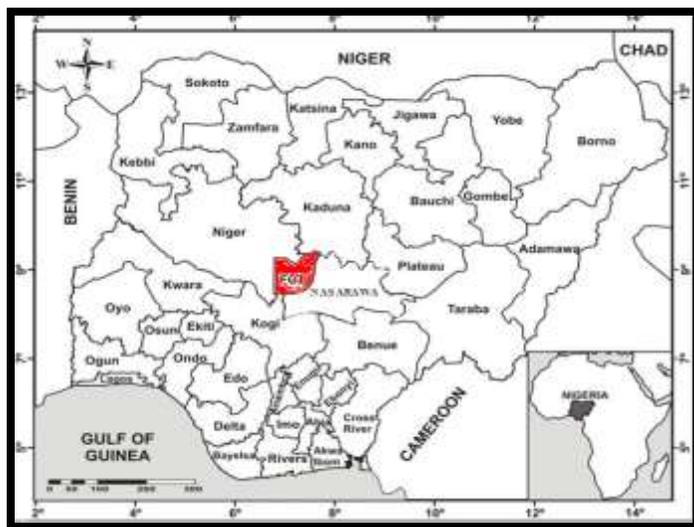
In recent years, the growing problem of traffic flow in along Gwagwalada-Giri Road in FCT has perhaps attracted more public attention than any other transport problem. However, not much attention has been given to the flow of traffic with respects to the volume and nature of vehicles plying Gwagwalada-Giri Road as well as factors that trigger traffic congestion along the route. This forms the research gap.

Study Area

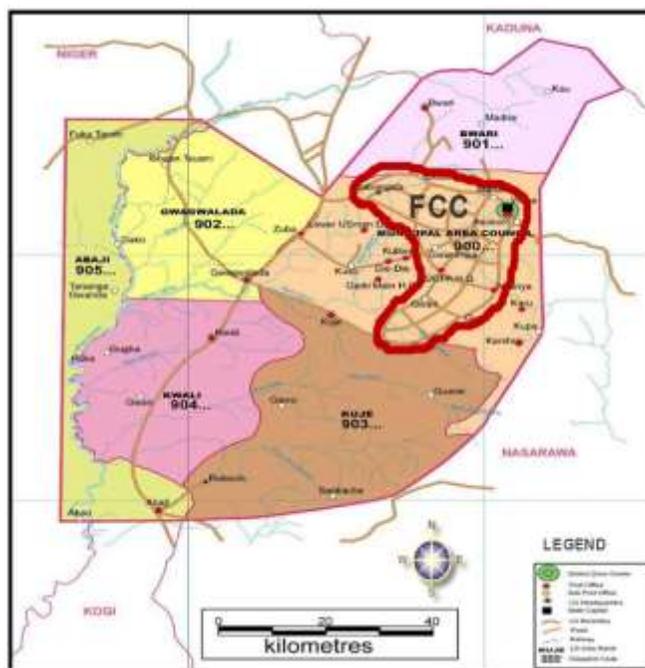
Gwagwalada town is located about 55 kilometers away from the Federal Capital City, and it is centrally located within the FCT. The Gwagwalada urban area is located between latitude $8^{\circ} 55'N$ and $9^{\circ} 00'N$ and longitude $7^{\circ} 05'E$. The Gwagwalada Area council where Gwagwalada urban area is located is bounded by Kuje Area Council to the East, and Abaji Area Municipal Area Council to the North-East and Suleja Local Government of Niger State to the North (Balogun, 2001). The study area has a total landmass of about 6,500 hectares ($65km^3$) and with the rapid rate of urbanization, development processes are now taking places even outside the urban area boundary.

The study area is selected horizontally to two parts by the river Usuma and vertically by the Lokoja-Kaduna express road. To the west of the study area lays Gurara River, while the Abuja hills lies to the North. The old village of Gwagwalada urban area. The Gwagwalada urban area constitute area like phase 1, phase 2, phase 3, Kotongora Estate, Haji Camp which constitute the well

planned area within the town. Other parts include new Kutunku, Dagiri, Ungwan-Dodo, and Ungwan Shanu, these constitute less or unplanned areas of the town.



Source: AGIS 2021
Figure 2.1 Nigeria showing F.C.T



Source: AGIS 2021
Figure 2.2 F.C.T showing the study area

Methodology

The data obtained from the field survey and questionnaire administration were presented using simple descriptive statistics such as tables, percentages and graphs. Student T-test was used to test the variation in the temporal and spatial occurrence of road traffic jam in the area.

Results and Discussion

Causes of Vehicular Traffic Flow along Gwagwalada-Giri Road

Table 4.1 Causes of Vehicular Traffic in the Study Area

S/N	Causes	No. of Respondents	Percentage (%)
1	Ignorance of traffic signs	15	6.82
2	Violation of road traffic signs	29	13.18
3	Wrongful Parking	58	26.36
4	Inadequate/poor road network	45	20.45
5	Poor traffic planning and management	36	16.36
6	Military check points	37	16.82
	Total	220	100

Source: Fieldwork 2021

Table 4.1 shows the various opinion of the respondents on their perceived causes of vehicular traffic congestion along Gwagwalada-Giri road. The table revealed that majority of the respondents (58 persons) constituting 26.36% were of the opinion that wrongful parking along the road by commercial drivers is the main cause of traffic congestion in the area. It was further observed through field survey that most commercial drivers often park their vehicles in ways that hinders free flow of traffic along the study road. 20.45% of the respondents believed that inadequate/poor road network is the main cause of traffic congestion in the area, 16.82% said that the traffic congestion along the road is due to military check points and another 16.36% opined that is due to poor traffic planning and management. However, 13.18% and 6.82% of the respondents suggested that the causes of traffic congestion along the road can be attributed to violation of traffic signs and ignorance of traffic signs respectively.

These findings are in correspondence with the work of Akinmade (2012) who noted that road traffic congestion can be attributed to factors such as drivers behaviour, transport system and social problem.

Similarly, Adefolabi (1977) who asserted that the causes of traffic congestion in Nigerian cities is attributable to inadequate/poor road infrastructure and infrastructural decay which have failed to accommodate the rapidly increasing number of vehicles in the country.

Furthermore, Ogunsaya (2004) stated that traffic congestion are mere symptoms of a malfunctioning urban traffic system. According to him, the basic reasons for urban traffic problems are route inadequate, human misuse of available road infrastructure, poor traffic management, absence of effective traffic and transportation planning and the unprecedented surge in urban traffic demand.

Volume of Vehicular Flow along Gwagwalada-Giri Road

Table 4.2 Daily Average of Vehicular Flow along Gwagwalada-Giri Road-2016

<i>Category of Vehicles</i>	Volume	Percentage (%)
<i>Private car</i>	295427	52.22
<i>Buses</i>	173211	30.62
<i>Trucks</i>	26390	4.66
<i>Motorcycle</i>	70676	12.49
Total	565704	100
Average Daily	141426	

Source: Field survey 2021

Table 4.2 presents information on the daily average of vehicle plying Gwagwalada-Giri road of Abuja. The table revealed that the roads record an average vehicular flow of 141426 vehicles on daily basis. It was observed during fieldwork that Tuesdays and Fridays usually have heavy traffic flow. Table 4.3 further revealed that private cars plying the axis constitutes about 52% of total daily vehicles plying the area, this is followed by buses with 30.62%, motorcycle with 12.49% and trucks recorded the least flow on the axis with 4.66%. This implies that there are more private cars plying the route compared to other vehicles. The use of private cars by most city residents is due to its convenience, comfort and accessibility during early hours when going to work

and late hours when returning from work.

Accident Casualties Associated with Vehicular Traffic Flow along Gwagwalada-Giri Road

Table 4.3 Number of Persons Killed and Injured in the Area

S/N	Location	Casualty Classification (2010 - 2016)				Total Casualty	
		Killed	(%)	Injured	(%)	Number	(%)
1	Gwako	10	16.13	35	16.75	45	16.61
2	Giri	6	9.68	24	11.48	30	11.07
3	Ido	5	8.06	19	9.09	24	8.86
4	University Junction	22	35.48	62	29.67	84	31.00
5	Airport Junction	15	24.19	42	20.10	57	21.03
6	Army Check point	4	6.45	27	12.92	31	11.44
	Total	62	100	209	100	271	100

Source: FRSC, Gwagwalada 2021

Table 4.3 presents information on the accident casualties associated with vehicular traffic congestion along Gwagwalada-Giri road and the locations of occurrence. It was revealed that a total of 271 accident casualties have been recorded along the road between 2010 and 2016. These casualties comprised of 62 deaths and 209 injured persons. The highest casualty within this period was recorded at the University Junction with victim number being 84 persons representing 31% of the total casualties. 10 persons have been killed at this location while 35 only sustained injuries. The next highest casualty along the road was recorded at the airport junction with a total number of 57 representing 21.03% of the total. Out of the 62 deaths along the road, 24.19% occurred in the area while 20.10% of the injured victims also occurred at this junction. These high accident rate recorded at these two junction could be attributed to poor traffic planning and management which had been highlighted by many scholars as a major cause of traffic congestion in Nigeria (See section 4.3.1). A total casualty of 45 representing 16.61% was recorded at Gwako, 31 (11.44%) at army check point, 30 (11.07%) at Giri and the least casualty 24 (8.86%) occurred at Ido area.

Relationship between Vehicular Traffic Flow and the Social-Economic Activities

The research findings show that, there is a direct relationship between the road traffic congestion and the carrying of various daily activities. This objective was

assessed through various indicators as presented below:

Delays

The research findings depicted that, delays due to vehicular traffic congestion results in late arrival to any place where a person is going.

About 134 (60.9%) of the whole respondents strongly agreed, 78(35.5%) agreed and 8(3.6%) were neutral, that is they neither agreed nor disagreed with the proposition above.



Figure 5.1 Delays

Source: Fieldwork 2021

Lateness

Data from the field show that lateness to work reduce hours of performance of an individual and organizations. About 116(52.7) of the responded strongly agreed with the affirmation above, while 80(36.4) agreed, 14(3.6) were neutral, 8(0.9) disagreed and 2(0.9) strongly disagreed.

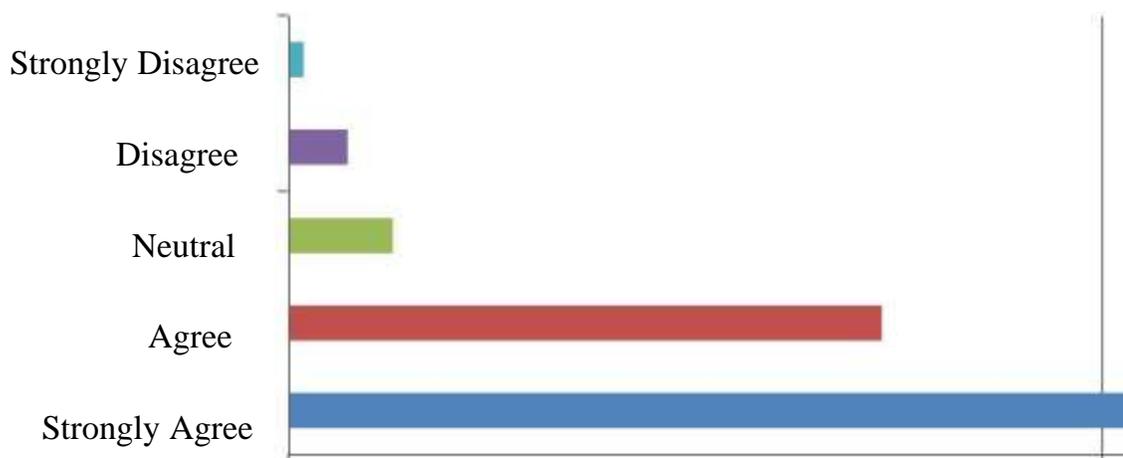


Figure 5.2 Lateness

Source: Fieldwork 2021

Wastage of time

Research findings demonstrated that many working hours are lost daily on the way during traffic jams. Out of 220 respondents, 124(56.4%) strongly agreed, 82(37.3%) agreed, 14(6.4) neither agreed nor disagreed.

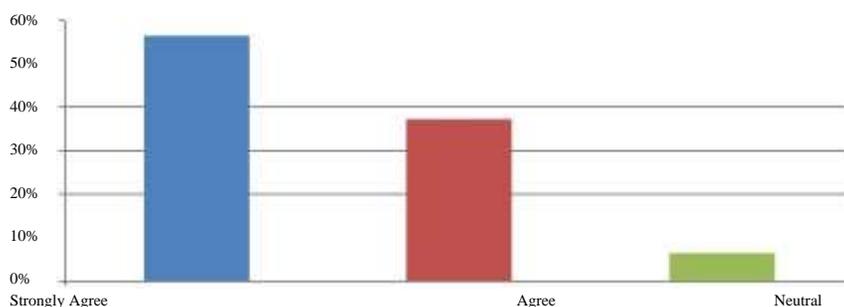


Figure 5.3 Working Hours are lost Daily on the Way

Source: Fieldwork 2021

Conclusion

This research has evidently portrayed beyond doubt that road traffic congestion along Gwagwalada-Giri road is one of the main obstacles for all activities whose attainment depends on transport being public, government or individual. There is a big loss in general and in special way in all aspects pertaining to social and economic sector. Researches show that congestion along the road is changing from bad to worse; more importantly, it is getting worse year by year. The contribution of transportation systems to the economy and the welfare of the society are very significant and must play a major role in the development programmes of a nation. Poor transportation systems and networks cause enormous losses due to traffic congestion and the road accidents far beyond the cost of the development of efficient systems. Looking for the challenges at hand, future growing requirements and experience from other developed countries can help in saving lives, avoiding injuries and enormous social economic losses along the studied road. Consequently, there is a need for collaboration among the government and the related stakeholders to alleviate this problem, and if possible to eradicate it completely.

Recommendations

Based on the findings of this research, the following recommendations have

been made to enable government, the masses and all concern stakeholders come up with plans that would help curtail the menace of vehicular traffic congestion along the studied road.

- i. The government should provide more funds to municipal councils to rehabilitate their roads which feed the main roads to bituminous standard.
- ii. They should synchronize traffic signals to have green wave length for main roads in the city roads.
- iii. Introduction of cameras along road for easy monitoring and removal of defective vehicles along the routes.
- iv. Introduction of modern and mandatory vehicles inspections to allow only roadworthiness vehicles to pass on the roads
- v. Enhance effectiveness and modern enforcement procedures to the traffic police
- vi. Improvements of roads should take into consideration separating the road users. This is due to the fact that mixed traffic in one route is also a cause of congestions.
- vii. More effective maintenance of roads by providing enough funds. This means that maintenance needs to be done in time and professionally.

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