



ORIGINAL RESEARCH ARTICLE

## Prevalence, effects, and factors associated with road rage among drivers in Owerri City, Imo State, Nigeria

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### Abstract

Road rage and aggressive driving play key roles in road traffic accidents and therefore constitute a public health concern. In spite of the perceived daily exhibition of road rage in Owerri city, no published study has documented the impacts of road rage among drivers. This study therefore aims to assess the prevalence, effects, and factors contributing to road rage among commercial and non-commercial/private drivers in Owerri, Imo state, Nigeria as well as presents possible solutions to road rage in Owerri. A total of 252 drivers (127 commercial drivers and 125 non-commercial/private drivers), were interviewed. A Semi-structured questionnaire was used to obtain information on socio-demographics, prevalence, effects, factors associated with Road Rage, and possible solutions to prevent road rage from the participating drivers. Data collected was analyzed using SPSS Version 26.

Majority (88%) of the drivers were males (96% male commercial drivers and 79% male private drivers). Most of the drivers did not go to driving school (95% of commercial, 58% of private). The mean ages of the drivers were  $31 \pm 8.8$  and  $46 \pm 7.2$  years for commercial and private drivers respectively. The prevalence of road rage was 88.2% (commercial 88% and private 59%). The common expression of road rage includes rude gestures, arguments, and spitting on another drivers. The common effects of road rage include body aches/headaches, chest tightness/palpitation, regret/remorse, and transfer of anger to other road users.



Main factors contributing to road rage include poor road maintenance and discourteous driving. The findings of this study provide a scientific basis crucial to devising appropriate intervention to reduce road rage in Owerri city. We recommend implementing public education on courteous driving, especially among commercial drivers as well as adequate and regular road maintenance.

**Key words:** *Road rage, road safety, aggressive driving, Owerri, Nigeria*

## **Background**

Driving a car continues to be a fundamental means of transportation worldwide and involves risks that can lead to road traffic accidents; one of such risks is road rage. Road rage is commonly characterized by aggressive driving. Road rage occurs when a driver experiences extreme aggression or anger intending to create or cause physical harm, while aggressive driving is when an individual commits a combination of moving traffic offenses so as to endanger other persons or property (Lipaz, 2022). It is important to note that aggressive driving and road rage are not the same, although aggressive driving contributes to road rage. Aggressive driving and road rage can be difficult to quantify. They play roles in road traffic accidents but are not always the main reason for an injury or death. A study by World Health Organization (WHO) in 2023 revealed that globally, about 1.19 million people die each year as a result of road traffic accidents/crashes, and 92% of the world's fatalities on the roads occur in low- and middle-income countries. Over 50% of all road traffic deaths include vulnerable road users e.g. pedestrians, cyclists, and drivers. Road traffic injuries are the leading cause of death for children and young adults aged 5–29 years (WHO, 2023). Furthermore, Road traffic accidents/crashes cost most countries 3% of their gross domestic product. To these effects, the United Nations General Assembly has set an ambitious target of halving the global number of deaths and injuries from road traffic crashes by 2030 (WHO, 2023).

In Nigeria, according to government statistics, in 2019, there were 5483 reported fatalities and 41,464 reported casualties as a result of road traffic crashes in Nigeria. However, the WHO estimates that around seven times more fatalities are occurring, and that the number of fatalities continues to increase. It is recognized that not all road traffic fatalities and injuries are being reported through to the government -Federal Road Safety Corp (FRSC) (Farhad, 2021). In 2023, a data management organization Statista, reported that on the average, more than 11,000 road traffic casualties are reported quarterly, and about 2,000 of the casualties result in deaths quarterly. Most road casualties/accidents occurring in Nigeria are classified as serious (Statista, 2023). Recently, the number of motor vehicles in use is estimated to have increased by 33% over a ten-year period and a growing proportion of motorcycles. This means a disproportionate increase in road traffic crashes (Farhad, 2021).



In 2017, the Global Burden of Disease study estimated that road traffic injury is the 15th highest cause of death and disability in Nigeria, the 10th highest cause of disability for 5–14-year-old children and the 7th highest cause of death for 15-49-year-old adults. In addition, the World Bank estimated that road crashes costed Nigeria 7% of her 2016 GDP which is \$29 billion in 2016 alone. Over the years, the Nigerian Federal Road Safety Corp (FRSC) has taken and is taking regular steps to improve safety on our roads. These statistics give a deeper insight into the grave consequences of road rage which can cause road traffic accidents. Therefore, road rage is now a public health concern.

Aggressive driving is considered in most cases a traffic violation, while road rage or road anger is not necessarily a traffic offence, but rather an emotion resulting from an incident or event while driving (Dula and Geller, 2003). Researchers have specifically pointed out the importance of identifying expressions of hostile aggression while driving, which is more associated with drivers' rage (Lipaz, 2023).

Road rage is a social phenomenon that has an important impact on road safety because it is a risk for the driver. Drivers' road rage is one of the major causes of road accidents (Lipaz, 2022). Although the term “road rage” is relatively new, the phenomenon of road rage is actually decades old (Lyle, 2019). Road rage, in its simplest form, occurs when a driver reacts angrily to other drivers, cutting them off, tailgating, gesturing, or waving a fist. At its worst, the angry driver may become more aggressive and try to kill or injure another driver. Road rage is an expression of an underlying problem with a driver (Lyle, 2019) in which the driver is not able to control his anger. It is not the surrounding incidence that brings out the aggressive nature. It is inside the person who, regardless of the settings, fails to control his/her temper and simply explodes. There is also a term known as Road Rage disorder. Road Rage disorder occurs when a vehicle's environment increases a driver's level of stress, anxiety, or hostility. The individual may use their vehicle in an aggressive fashion that places their own lives in danger and society at risk (Ayar 2006).

There are countless cases of loss of temper and resulting violence amongst road users all over the world (Ngboawaji *et al*, 2008). Road rage has reached epidemic proportion in major cities of the world with almost half of all drivers experiencing some form of attack in the course of driving (Ngboawaji *et al*, 2008). Daily in the city, we are confronted with exhibitions of aggression on our roads by road users, ranging from pedestrians, motorcyclists, other vehicle drivers and truck drivers (Ngboawaji *et al*, 2008). This phenomenon is seen both in poor and advanced countries in varying dynamic, frequency, perception, and nature.

Road rage can happen to anybody at any time and varies from aggressive gestures to full physical attack (Lyle, 2019). There is a link between human health (physical and mental) and transportation. Road rage has been classified as a medical condition of mental health variety called intermittent explosive disorder (Sean *et al*, 2013; Lyle, 2019). Hence, mental health problems in driving can be



considered a potential hazard and a danger to the efficient, effective, and safe operation of our transportation system. Mental health problem in driving (intermittent explosive disorder) refers to violent incidents resulting from stress or incidents on the roadways (Lyle, 2019). It is a natural extension of aggressive driving and a learned cultural habit of retaliation. When we are frustrated in heavy traffic, we have a choice of how we respond. (Lyle, 2019).

Nigeria's roads form the backbone of the country's transport network, the roads handle 90% of all passenger and freight traffic (Oxford Business Group 2023; Ferhad 2021). This heavy use of the road has its consequences. Nigeria's road traffic system is under extreme pressure (Ferhad 2021; NIIMP, 2020). In Owerri (like in other Nigerian cities), road transportation is the major form of transportation within and out of the city. People are stressed up waiting too long during congestion which is frustrating. Hence, they get angry, and some lose control and drive aggressively (Lipaz, 2023). In spite of the daily occurrence of road rage in the city of Owerri, no published study has looked at contributing factors to road rage among drivers. Road rage is a social phenomenon that has an important impact on road safety. Drivers' road rage is one of the major causes of road accidents. Therefore, it is important to investigate this social phenomenon in Owerri city. The objectives of the study were to assess:

- a) Prevalence of road rage
- (b) effects of road rage
- (c) factors that have the potential to increase road rage during driving.

## **Methods**

### **Study location**

The study was conducted in three study locations (Wards) in Owerri, the capital of, Imo state, Nigeria. Owerri is located in the South-East geopolitical zones of Nigeria. Owerri municipal local government area (LGA) (also known as Owerri city) has 15 Council wards. Figure 1a presents a map of Nigeria showing the six geopolitical zones in Nigeria, including south-east zone where Imo state is located. Figure 1b presents a map of Imo state showing Owerri municipal/city. Owerri municipal LGA has commercial and private drivers. There are two major motor parks (Mbaise park and Arugo park) and several loading bays which serve the LGA. The major parks which have amenities like toilets and shops take care of distance services of people in and out of the municipal while the loading bays serve the movement of people within the municipal and LGAs at the boundaries of the municipal namely Owerri North LGA, Owerri west and Owerri South LGA. The loading bays have no amenities like toilets. The Study population were the commercial and private drivers in Owerri city.

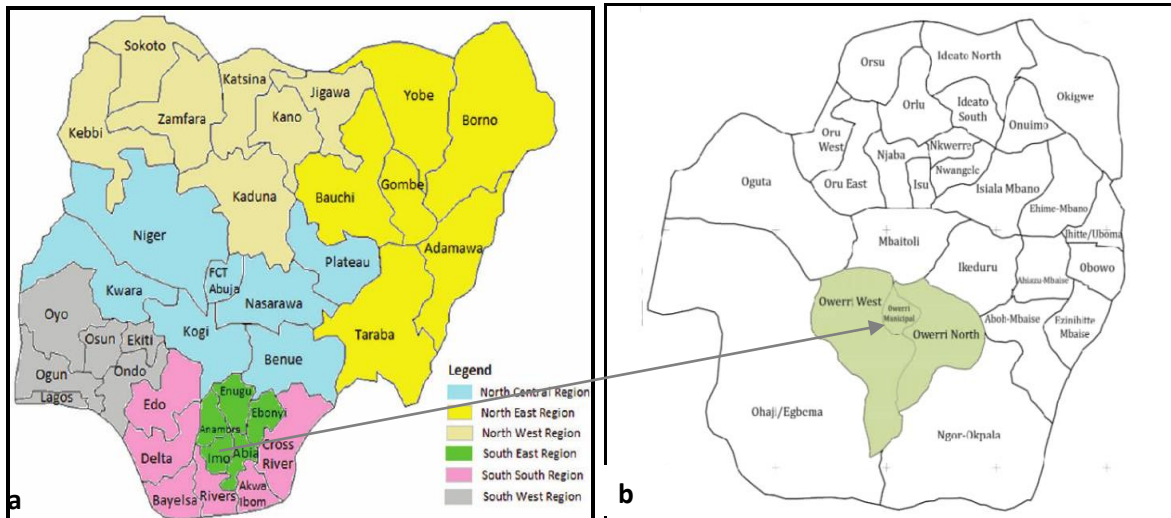


Figure 1 a & b: Map of Nigeria showing Southeast zone, Imo state and Owerri city

### Study design

A cross-sectional study design was adopted to assess the prevalence, impacts, and factors associated with road rage in Owerri city. We also documented recommendations to militate against road rage among commercial and private drivers in Owerri.

A Systematic sampling technique was used to select 256 drivers (127 commercial and 125 non-commercial/private drivers). The commercial drivers were randomly selected from the two major loading motor parks in Owerri city - Mbaise motor park and Arugo motor park. As they wait for their turn to load their passengers, one out of every three commercial drivers were selected. The non-commercial/private drivers were randomly selected from drivers who came to drop off their children in the morning or pick up their children in two selected schools. Out of about 150 schools in the city, two private schools in the same wards of study location were randomly selected namely Alvan Ikeoku College of Education Staff Primary School and Madonna Primary School, Works Layout Owerri.

### Data collection

A validated and pre-tested semi-structured interviewer-administered questionnaire containing open- and closed-ended questions was used to obtain information from the respondents in September 2022. The questionnaire was segmented into six sections: Socio-demographic characteristics, use of psychoactive substances, prevalence of road rage, factors contributing to road rage, effects of road rage and possible solutions to road rage. For the commercial drivers, the questionnaire was interviewer-administered, while for the private drivers, questionnaires were self-administered except for those who could not fill the questionnaire, illiterates interviewer administered method was used. Daily monitoring and evaluation were carried out to ensure accurate data collection. In addition, focused group discussions (FGD) were conducted for the executives of the two commercial motor parks and the executives of the Parents



Teachers Association (PTA) of two selected schools. To assess some possible solutions (questions) that would reduce road rage among the drivers, we used the Likert scale. Solutions with 50% and above were considered as possible solutions.

### **Data analysis**

Prior to data collection, data collection tools were pre-tested in a different ward, feedback was incorporated. Before data was analyzed, all questionnaires were reviewed for completion and accuracy and compiled in a SPSS database version 26. The socio-demographics was analysed using descriptive statistical analysis. Descriptive statistics were used to summarize the data, with P-value set at less than 0.05. Data are presented in tables.

### **Ethical considerations and informed consent**

An ethical approval for the study was obtained from the Nnamdi Azikiwe University Teaching Hospital Ethics Committee. Informed Consent to the study was sought and obtained from heads of the commercial motor parks association, and the selected schools, and individual drivers selected for the study. Verbal and written consent was obtained from each respondent at the start of the interview, after explaining to them their full rights to refuse and to withdraw at any time during the interview. To ensure that the respondents remain anonymous each questionnaire was coded with number identifiers. They were also assured that the data will not be used for other purposes than for research purposes and for the development of road safety promotion programs.

## **Result**

### **Socio-demographic and occupational characteristics of the respondents**

A total of 252 drivers (127 commercial and 125 non-commercial/private) were interviewed. Majority (88%) of the drivers were males (96% male commercial drivers and 79% male private drivers) and 12% were females (4% commercial and 21% private). The mean age of the commercial drivers was  $31 \pm 8.8$  years, while the mean age of the private drivers was  $46 \pm 7.2$  years. The years of driving experience for the commercial drivers was  $2 \pm 1$  years, while for the private drivers it was  $11 \pm 5$  years. The working hours for commercial drivers were  $9 \pm 2$ . All the drivers interviewed were of Igbo ethnic group in Nigeria. In the commercial driver's subgroup, 57% of respondents have at least primary school education and 43% of them have obtained tertiary education. For the private drivers, 10.6% had at least primary school education while 89.4% of respondents had tertiary education. Less than five percent (4.7%) of commercial drivers attended driving school compared to 41% of non-commercial/private drivers that went through driving school. Regarding substance use, alcohol was the predominant substance being used by both commercial and private drivers. Interestingly, a higher proportion (48%) of private drivers indulge in drinking alcohol compared to 39% commercial drivers, 12% of private drivers use illicit psychoactive substances (methamphetamine, also known as Mkpuru mmiri) compared to 9% of commercial drivers. However, more



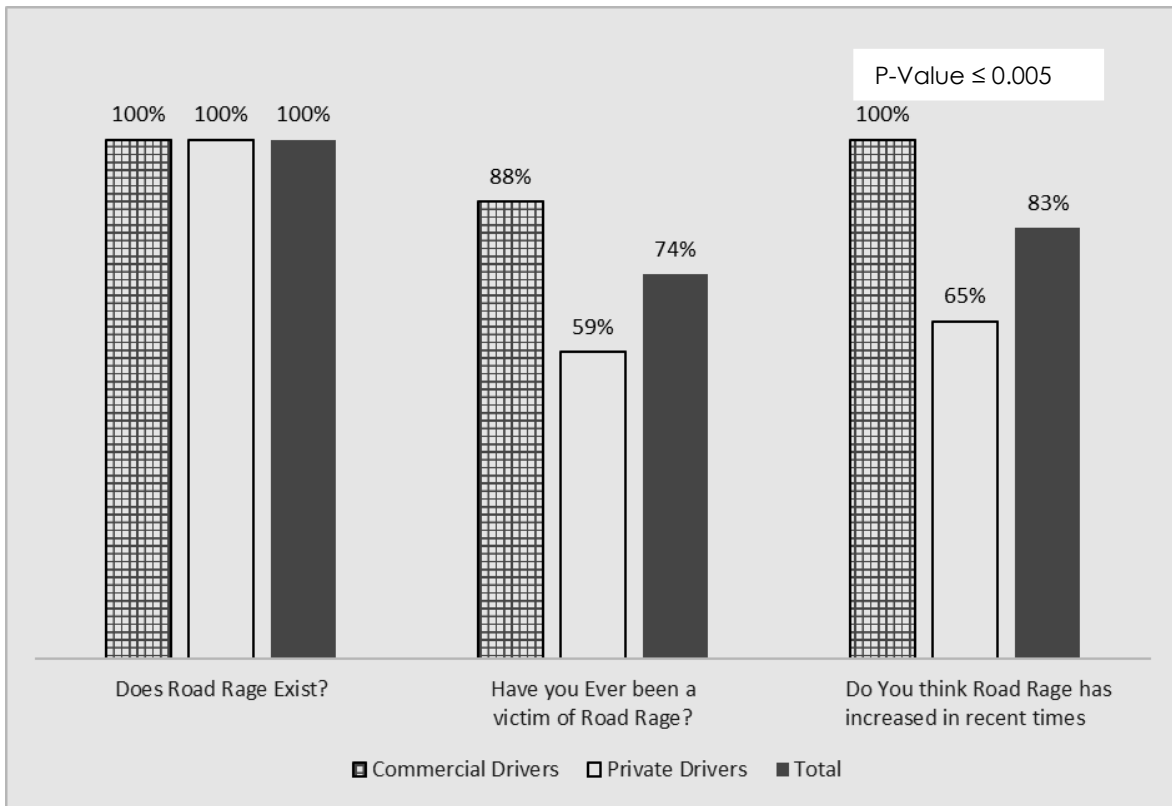
commercial drivers (24%) indulge in Cocaine use compared to 12% of private drivers; table 1.

**Table 1: Socio-demographic characteristics of the drivers in Owerri City**

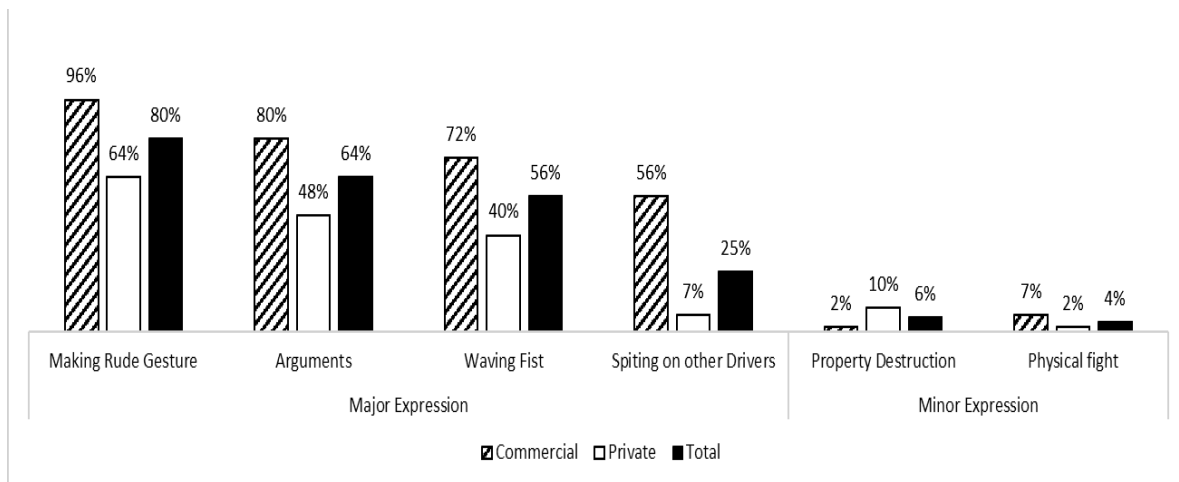
Variable	Commercial n=127	%	Private n=125	%
<b>Gender</b>				
Male	122	96.1	99	79.2
Female	5	3.9	26	20.8
<b>Ethnicity</b>				
Igbo	127	100	125	100
<b>Educational level according to sex</b>				
<b>Primary/secondary</b>				
Male	66	51.9	5	4
Female	3	2.36	8	6.4
<b>Tertiary</b>				
Male	50	41.3	58	47.2
Female	2	1.6	52	42.3
<b>Drug use and driving:</b>				
a. Alcohol	60	39.4	60	48
b. Mkpuru mmiri (methamphetamine)	12	9.4	15	12
c. Cocaine	0	0	10	8
d. Other psychoactive substances	30	23.6	15	12
e. None use of substance	35	27.6	25	20
<b>How driving was learnt, Through:</b>				
a. Family Member	45	35.4	21	18.1
b. friend	35	27.6	47	40.5
b. Driving school	6	4.7	48	41.4
C. Automobile Mechanic	41	32.3	0	0

### **Prevalence of road rage**

The prevalence of road rage among drivers is 74% (commercial drivers 88.2%, and private 59.2%) drivers (Figure 2). All (100%) the drivers agreed that road rage exists. About 74% of all the drivers have been a victim of road rage (commercial drivers 88% and private drivers 41%), this is considered as the prevalence. People between the ages of 20 and 34 exhibit road rage via rude gestures more compared to older people. Receiving rude gestures from other road users was the commonest (80%) road rage experiences reported by both groups of drivers, although is higher among commercial drivers (96%) compared to private drivers (64%), followed by Arguments (64%), (commercial drivers 80% and private drivers (48%), spitting on drivers (25%) and Property destruction (6%) and physical aggression/fight (4%) as the least road rage experienced; figure 3; for more details, see annex table 1



**Figure 2: Prevalence of road rage in Owerri City, Nigeria**

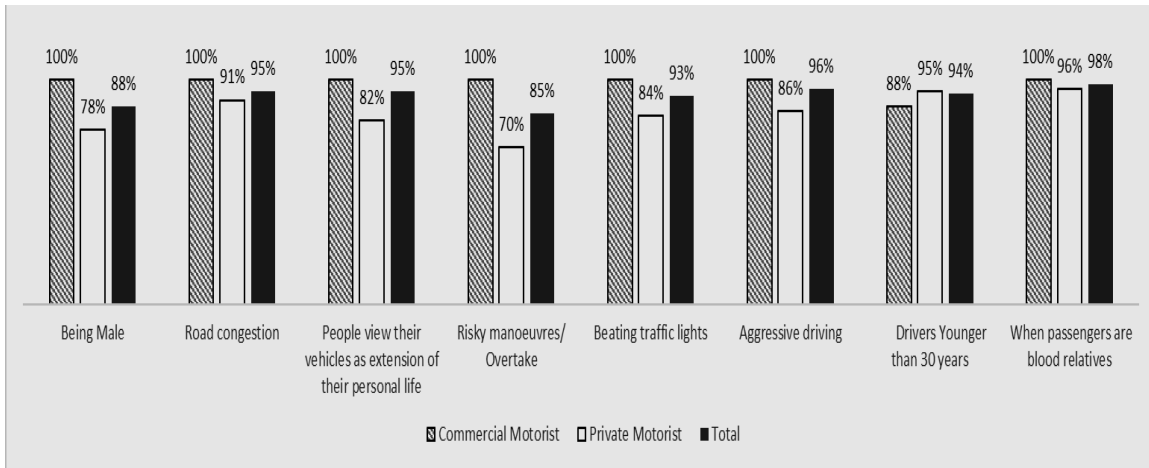


**Figure 3: Expression of road rage among drivers in Owerri City, Nigeria**

### **Factors associated with road rage**

The drivers were of the opinion that the factors contributing to road rage include poor maintenance of roads, younger age (younger male are more like to get angry on the road compared to older people, sex, males are more likely to express an outburst of anger compares to females, road congestion, seeing overtaking as a driving competition, not obeying traffic control lights, impatience waiting for traffic control lights; for details, see figure 4 and annex table 2.

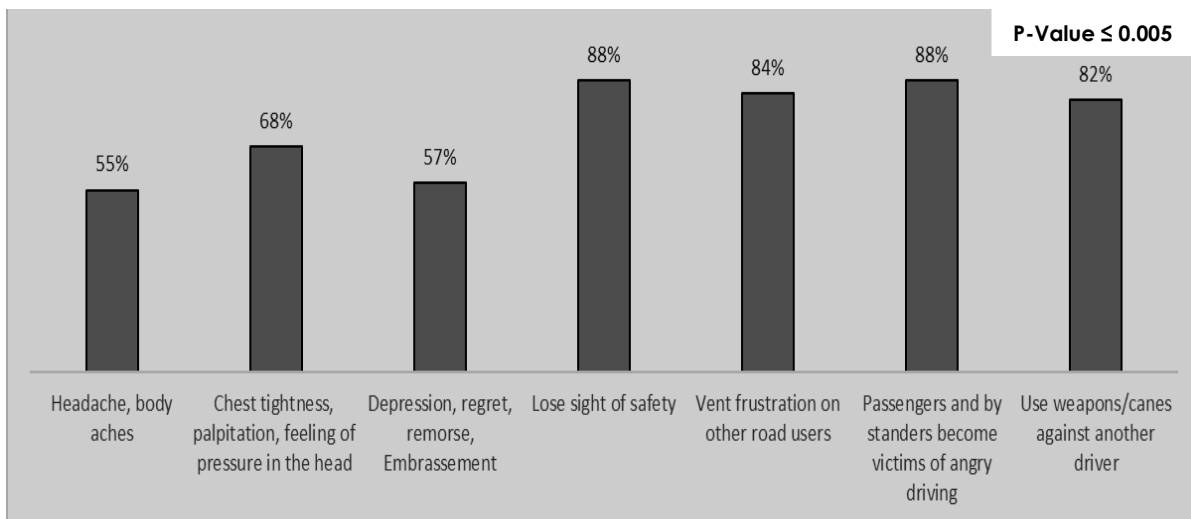




**Figure 4: Factors associated with road rage among drivers in Owerri city**

### Effects of road rage

Among the drivers who reported experiencing road rage, 55% of them mentioned body aches/headaches as one of the effects, 68% experience chest tightness/palpitation, and 57% regretted or felt depressed after the outburst of anger (commercial drivers 68%, private drivers 53%). Other effects included 88% of the drivers losing a sense of safety which can cost road traffic accident (commercial drivers 100%, Private 88%), 84% vent anger on other road users (commercial 100%, private (67%), 82% use weapons/canes stored in their car on other road users (commercial 88%, private 83%). Also, 76% seek revenge on properties (commercial 88%, private 61%) and 69% attack law enforcement agents/police officers (commercial 90%, private 46%) were mentioned, see figure 5 and annex table 3.



**Figure 5: Effects of road rage among drivers in Owerri City, Nigeria**

### Possible Solution to Reduction of Road Rage

Possible solutions mentioned were by the drivers included: obeying traffic light (96%), ignore angry drivers (90%), listening to your favourite music album (84%),



changing lane safely (79%), not blocking the passing lane (78%) not driving when upset (77%), taking a deep breath and counting up to 10 (75%), not reacting to aggressive driving (75%), tolerating mistakes of other drivers (71%), making enough time to get to your destination (avoid rushing) by 67%, Being patience and cautious on the road (67%), and properly maintained road (53%).

**Table 5: Possible solutions to road rage**

Items		Very Low Extent	Low Extent	High Extent	Very High Extent	P-Value
1	More than enough time to get to your destination prevent rushing which leads to road rage	9 (3.6%)	75 (29.8%)	129 (51.2%)	39 (15.5%)	0.00
2	Listening to your favourite album	18 (7.1%)	23 (9.1%)	185 (73.4%)	26 (10.3%)	0.04
3	Ignore angry drivers help to solve problem of road rage	3 (1.2%)	21 (8.3%)	185 (73.4%)	43 (17.1%)	0.00
4	properly maintained Roads	81 (32.1%)	37 (14.7%)	134 (53.2%)	0 (0.0%)	0.01
5	Taking a deep breath and counting up to 10	43 (17.4%)	19 (7.7%)	154 (62.3%)	31 (12.6%)	0.02
6	Avoiding eye contact help	14 (5.7%)	50 (20.2%)	175 (70.9%)	8 (3.2%)	0.01
7	Not taking aggressive driver personally	43 (17.4%)	19 (7.7%)	154 (62.3%)	31 (12.6%)	0.03
8	Not driving when upset help?	0 (0.0%)	57 (23.1%)	159 (64.4%)	31 (12.6%)	0.01
9	Concerning obeying traffic rules:					
a	Changing lane safely	0 (0.0%)	53 (21.5%)	171 (69.2%)	23 (9.3%)	0.04
b	Not blocking the passing lane	15 (6.1%)	39 (15.8%)	167 (67.6%)	26 (10.5%)	0.00
c	Obeying traffic light prevent road rage?	0 (0.0%)	11 (4.5%)	178 (72.1%)	58 (23.5%)	0.01

## Discussion

Road rage has been defined as a grossly disproportional outburst of aggression by a driver of a motor vehicle in response to a perceived discourtesy or transgression by another road user (Lyle 2019, Lipaz 2022, Lipaz 2023). As far as we are aware, this is the first study that conducted a study on road rage among commercial and non-commercial/private drivers in Owerri city, Imo state Nigeria. The strengths of this study are its focus on both commercial and private drivers which is not commonly studied, determination of the prevalence of road rage, effects of road rage, factors contributing to road rage. among the different groups of drivers (commercial and non-commercial/private drivers). In addition, this is the only study that extracted possible solution from participating drivers.

Despite the international awareness of the negative impacts of road rage, there is a high (74%) prevalence of road rage in Owerri city with commercial drivers



showing significantly higher prevalence at 88% and non-commercial/private drivers at 59%. We found that more males than females and drivers younger than 30 years of age exhibit road rage more. Most commercial drivers did not go to driving school as they learnt to drive from friends and relatives, and this contributed to a higher rate of discourteous driving which leads to road rage. The commonest reaction as a result of road rage was rude gestures by 80% and arguments by 64% of the drivers. This is consistent with a previous study in 2012 where commercial drivers exhibited higher prevalence of road rage (Kolawole and Ekundayo, 2012).

We interviewed a total of 252 drivers (127 commercial and 125 private) who were interviewed. Majority of the drivers were males (96% male commercial drivers and 79% male private drivers). This is in accordance with other studies in Nigeria that recorded majority of the drivers as males (Mefoh *et al*, 2013). Regarding years of driving experience, commercial drivers had lower years of experience (mean years of  $2 \pm 1$ ), compared to private drivers  $11 \pm 5$  years. This could have contributed to the commercial drivers exhibiting road rage. Studies have shown that as driving experience increases, road rage decreases, (Lajunen, *et al.*, 1998; Mefoh *et al*, 2013), this is consistent with our findings which revealed that commercial drivers with lower years of driving experience exhibited higher expressions of road rage compared to private drivers who had higher years of driving experience and lower expression of road rage. Therefore, our finding demonstrated that road rage diminishes with years of driving experience.

Our study is in accordance with another study in south-east Nigeria by Mefoh *et al* in 2018 which revealed that alcohol was the most prevalently used psychoactive substance among commercial drivers, and that alcohol, cocaine, and amphetamine, predicted road rage behaviour. Fierro *et al* 2011 also found similar findings among drivers in Spain where drivers under the influence of alcohol or cannabis perpetrated and experienced serious road-rage behavior and victimization. To an extent, Mefoh *et al* findings is in accordance with our study which revealed that more commercial drivers (24%) indulge in cocaine use compared to 12% of private drivers. However, our findings revealed that although the non-commercial/private drivers exhibited lower road rage behaviour, they indulge more (12% of them) in the use of illicit psychoactive substances (methamphetamine known as mpkuru mmiri) compared to commercial drivers (9%).

The majority of drivers have been a victim of road rage; however, it is more prevalent among commercial drivers (88%) compared to non-commercial/private drivers (59%). The drivers reported that they exhibit road rage mostly via rude gestures, aggressive driving, arguments, spitting on drivers, property destruction and physical aggression/fight among others. These expressions of road rage have been reported by other studies by Mefoh *et al* (2013); Dukes *et al* (2001); Ngboawaji *et al* (2008) and Shamo-Nir (2023).



Regarding effects of road rage, the significant effects mentioned by the drivers were - body aches/headaches, chest tightness/palpitation, regret or feel depressed after the outburst of anger, lost a sense of safety which can cost road traffic accident, vent anger on other road users, use weapons/canes stored in their car on other road users etc. These effects are in accordance with other studies in Nigeria and beyond (Mefoh *et.al*, 2018). On comparing the effects between the subgroups, there were more responses by commercial drivers on effects more than the private drivers. This indicates that commercial drivers are affected more than the private counterpart, possibly because the commercial drivers are more involved in road rage. This is in keeping with a previous study which found that individuals with severe forms of road rage had higher scores on psychiatry disorders such as anxiety, depression, somatic symptoms (Moffitt, 1993).

Regarding *factors that contribute to road rage*, our findings are consistent with other studies. The drivers were of the opinion that the factors contributing to road rage include discourteous driving, younger age being a male, road congestion, spending long time on traffic, aggressive driving, seeing overtaking as a driving competition, not obeying traffic control lights, impatience waiting for traffic control lights. These are in line with previous studies that reported that discourtesy caused very much anger in drivers (Kamarudin *et al*, 2017.) This is followed by the presence of police/law enforcement agents (amongst private drivers). This is consistent with a study which showed that police presence causes anger in drivers because it alters their driving style (Beatriz, *et al*, 2012) and illegal driving (amongst commercial drivers). In addition, we found environmental factors like poor road state as a factors for road rage. This is in accordance with a study in Port Harcourt which validated that bad road increases incidents of road Rage (Ngboawaji, 2008). Furthermore, a study by Driver Ed (2023), an organization in the United States of America also listed the similar factors of road rage we found in Owerri city.

Furthermore, we found frequency of feeling of remorse by angry drivers during judgment is higher amongst commercial respondents than non-commercial/private drivers (see table 4). From the literature review, this is a sign of psychological disorder labelled road rage disorder (Ayar 2006, Lam, 2010). Individuals with this disorder do not experience genuine remorse for harm done to others; however, they are good at feigning remorse during judgment (Smart *et al*, 2003). Findings from another study (Sansone *et al* 2010) also showed that the prevalence of Bipolar Personality Disorder was significantly higher among those with road rage compared to those without road rage and are likely to be one of the contributory variables to reckless driving. Individuals who reported road rage appear to be less disciplined drivers and are subject to more types of driving citations, although they do not report greater rates of vehicular crashes or driving while intoxicated (Sansone *et al*, 2010).

We also found a significant difference between the personality of drivers and the prevalence of road rage. The personality of commercial drivers contributes more



to road rage than those of private drivers. In comparison with a previous study, it was shown that transport operators are often in situations that require them to cope with complex working conditions that lead to negative emotions such as anger (Milanko *et al* 2022). Also in another study, it was concluded that mental health and personality especially extraversion traits predict anger driving behaviour among commercial drivers in Lagos Metropolis. This implies that the personality characteristics of drivers interfere with their judgmental decision when driving on the road. (Ilevbare *et al* 2021).

Regarding possible solutions, considering the context of the study location, we found it necessary to obtain possible solutions to reduction of road rage from the participating drivers. This is the only study that extracted possible solution from participating drivers. Solutions mentioned were in this order: obeying traffic light , ignore angry drivers, listening to your favourite music album, changing lane safely, not blocking the passing lane, not driving when upset , taking a deep breath and counting up to 10,, not reacting to aggressive driving, tolerating mistakes of other drivers, making enough time to get to your destination (avoid rushing), Being patience and cautious on the road , increased emotional intelligence, and properly maintained road.

## **Conclusion**

Drivers often underestimate the impact/effects of road rage. There is a dearth of information on prevalence, effects, and factors contributing to road rage in Owerri city. There is high prevalence (88%) of road rage in Owerri city (74% among commercial and 59% among non-commercial/private drivers). The commonest expression of road rage includes rude gestures, arguments, spitting on drivers, property destruction, and physical aggression/fight. It is important that drivers are aware of the potential effects/impacts of road rage and safety measures to be undertaken. Discourteous driving and disobedience to traffic rules ranked highest as the factor contributing to road rage, therefore, we recommend adequate and regular road maintenance, increased public education on recognition and obedience to traffic rules through media that can reach young people the most such as via social media, importance of showing courtesy to other road users, and road safety. In addition to public education on these, increased penalties for destroying properties and disobeying traffic rules. Furthermore, because the majority of the drivers did not go through a driving school, it is important to review the driving school operation guidelines to make the driving schools more attractive. Our findings provide a scientific basis crucial to devising appropriate intervention to reduce road rage in Owerri city and other cities in Nigeria and beyond.

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## Annex

**Table 2: Prevalence and expressions of road rage among commercial and private drivers in Owerri City, Nigeria**

Items	Commercial motorist n=12		Private motorist n=125		Total n=252		P-Value
	Yes	No	Yes	No	Yes	No	
1) Does road rage exist	127(100%)	0(0%)	125(100%)	0(0%)	252(0%)	0(0%)	0.02
2) Have you been a victim of road rage (prevalence)?	112(88.2%)	15(11.8%)	74(59.2%)	51(40.8%)	186(73.8%)	66(26.2%)	0.01
3) In what ways have you been involved.							
(a) Physical Fight	9(7%)	118(92.9%)	2(1.6%)	123(98.4%)	11(4.4%)	241(95.6%)	0.02
(b) Property destruction	2(1.57%)	125(98.4%)	12(9.6%)	113(90.4%)	14(5.6%)	238(94.4%)	0.01
(c) Argument	101(79.5%)	26(20.5%)	60(48%)	65(52%)	161(64%)	91(36%)	0.01
(d) making rude gesture	122(96.1%)	5(3.9%)	80(64%)	45(36%)	202(80.2%)	50(19.8%)	0.02
(e) Waving of fist	91(71.7%)	36(28.3%)	50(40%)	75(60%)	141(56%)	111(44%)	0.01
(f) Spitting on drivers	55(43.4%)	72(56.7%)	9(7.2%)	116(92.8%)	64(25.4%)	188(74.6%)	0.04
4) Has it increased in your opinion?	127(100%)	0(0%)	81(64.8%)	44(35.2%)	208(82.5%)	44(17.5%)	0.03



**Table 2: Factors contributing to road rage among commercial and private drivers in Owerri City, Nigeria**

Item	Commercial Drivers n=127		Private Drivers n=125		Total n=252		P- Value
	Yes	No	Yes	No	Yes	No	
Do males involve in road rage than female drivers?	127 (100%)	0 (0%)	97 (77.6%)	28 (22.4%)	224 (87.9%)	28 (11.1%)	0.03
Violation of traffic rules because of congestion?	127 (100%)	0 (0%)	114 (91.2%)	11 (8.8%)	241 (95.4%)	11 (4.4%)	0.02
View personal vehicles as extension of personal life?	127 (100%)	0 (0%)	102 (81.6%)	12 (9.6%)	229 (95.0%)	12 (5%)	0.01
Overtake by another vehicle as a challenge leading to risky manoeuvres?	127 (100%)	0 (0%)	87 (69.6%)	38 (30.4%)	214 (84.9%)	38 (15.1%)	0.01
Competition to get faster at traffic lights?	127 (100%)	0 (0%)	105 (84%)	20 (16%)	232 (93.1%)	20 (7.9%)	0.03
Acquisition of new car influencing ego which results in aggressive driving	127 (100%)	0 (0%)	108 (86.4%)	11 (8.8%)	235 (95.5%)	11 (4.5%)	0.04
Peer pressure influence increase in road rage	112 (88.2%)	15 (11.8%)	119 (95.2%)	0 (0%)	231 (93.9%)	15 (6.2%)	0.02
safe driving when passengers are blood relatives?	127 (100%)	0 (0%)	120 (96.0%)	5 (4%)	247 (98.0%)	5 (2.0%)	0.04



**Table 3: Effects of road rage on commercial and private drivers in Owerri City, Nigeria**

Items	Commercial motorist n=127		Private motorist n=125		Total n=252		P- Value
	Yes	No	Yes	No	Yes	No	
1. Headache, body aches, stomachaches, etc.,	64 (50.4%)	59 (46.5%)	70 (56%)	53 (42.4%)	134 (54.5%)	112 (45.5%)	0.003
2. Chest tightness, palpitation, feeling of pressure in the head	84 (66.1%)	42 (33.1%)	83 (66.4%)	37 (29.6%)	167 (67.9%)	79 (32.1)	0.001
3) Depression, regret, remorse, embarrassment	86 (67.7%)	41 (32.3%)	53 (42.4)	66 (52.8)	139 (56.5%)	107 (43.5%)	0.004
4) Lose sight of safety and cause traffic accident	127 (100%)	0 (0%)	94 (75.2%)	31 (24.8%)	221 (87.7%)	31 (12.3%)	0.003
5) Vent frustration and anger on other road users	127 (100%)	0 (0%)	84 (67.2%)	41 (32.8%)	211 (83.7%)	41 (16.3%)	0.003
6) Innocent passengers and bystanders become victims of angry driving	127 (100%)	0 (0%)	94 (75.2%)	31 (24.8%)	221 (87.7%)	31 (12.3%)	0.003
7) Seek revenge on properties e.g. cars and government properties	112 (88.2%)	15 (11.8%)	76 (60.8%)	43 (34.4%)	188 (76.4%)	58 (23.6%)	0.007
8) May attack police officers with their vehicles	114 (89.8%)	11 (8.6%)	57 (45.6%)	68 (54.4%)	171 (69.5%)	75 (30.5%)	0.006
9) Use weapons/canes stored in their cars or any available object as weapons against another driver	112 (88.2%)	15 (11.8%)	94 (75.2%)	31 (24.8%)	206 (81.7%)	46 (18.3%)	0.002