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AGE, GENDER, AND DIFFERENCES IN RISK-BASED BEHAVIOR IN ROAD TRAFFIC ACCIDENTS IN LAGOS STATE, NIGERIA

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Abstract

The role of gender and age differences in the risk of road traffic injury (RTI) has not been fully explored, and there are still significant gaps with regards to violations, errors, and lapses. The aim of this research paper is to assess drivers' age, gender, and differences in risk-based behavior in road traffic accidents in Lagos State. A multi-stage stratified cluster sampling was performed. A total of 1,800 drivers aged 20 years and above were approached; 1,576 drivers agreed to participate in the survey (88%). The study was based on a face-to-face interview with a designed questionnaire, including the Driver Behavior Questionnaire (DBQ) along with socio-demographic variables. Of the studied drivers, 69.8% were males and 30.2% were females. The majority of the drivers were in the age group 30-39 years (41.2%), followed by drivers below 30 years (31.7%). The use of mobile phones while driving (73.6%) and over speeding (75%) were significantly higher in male drivers (p=0.001) as compared to females. However, no significant difference was observed in items of violation between both the genders, except items on "disregard the speed limit especially at night" (47.8% against 23.1%, p=0.052) and excessive speeding on highway (42.8% against 18.1%, p=0.012). TV (89.1% against 48.3%; p=0.018) and radio (90.9% against 42%; p=0.004) were reported as an effective source of road safety campaign by male and female drivers. Also, gender, driving experience, DBQ items such as violations, lapses, and errors showed significant correlation with accident involvement.

Keywords: Road traffic crashes; Risk behavior; Age; Gender; Differences; Over speeding

1. Introduction

Early morning highway accidents are disproportionately reported by age and gender, with young male drivers being particularly at risk. Young drivers, especially males, tend to engage in more risky driving behaviors and are more likely to be involved in accidents during the early morning hours in Lagos State (Atubi, 2023a).

Road traffic injuries were the second leading cause of death worldwide among adults aged 15-44 years (WHO, 2021). The worldwide data revealed that 1.2 million people are killed in road traffic crashes each year and 50 million are injured (WHO, 2018). Risk-taking behavior and socio-economic factors are involved in relation to road traffic accidents. Men are more often the victims of accidents than women. In Lagos State, men are three times more likely as women to be involved in fatal car accidents (Atubi, 2023b, 2023c, 2023e). Men have higher exposure to risk of road traffic deaths/injuries because they are more employed as drivers and they are more likely to own cars than women.

Studies have typically shown that the youngest and oldest drivers have much higher fatal and non-fatal crash risks than drivers in the middle-age ranges (Lam, 2002; Ma and Yan, 2014; Zhou et al., 2015; Regev et al., 2018).

Several studies have also found differences in fatal and non-fatal crash risks among subgroups of older drivers. For example, there is evidence that drivers aged 70-74 exhibit lower crash risk relative to drivers aged 75-79, with the higher risk seen in drivers aged 80 and older (Cheung and McCartt, 2011; Cicchino, 2015; Cicchino and McCartt, 2014).

Road safety research has also addressed associations between driver gender and elevated crash risk. In general, female drivers are considered safer than male drivers. However, some studies suggest that while women tend to have fewer fatal crashes than men do, their risk of injury crashes may be higher (Massie et al., 1995; Santamarina-Rubio et al., 2014; Zhou et al., 2015; Ma and Yan, 2014; Youssef et al., 2023).

In addition to crash involvement, drivers' age and gender have also been shown to affect the severity of crash outcomes (i.e., the risk of fatal injury given a crash). Male and elderly drivers are more likely to be fatally injured in a crash than female drivers and drivers in the younger age ranges (Kim et al., 2013; Atubi, 2023e).

The risk of crash involvement also appears to vary with environmental factors, such as time of day. Crash risk is higher for early morning compared with other times of day in Lagos State, with the difference being more pronounced for male drivers and at younger ages. Time of day has also appeared to be associated with crash severity, as drivers are unlikely to sustain a fatal injury during early morning crashes compared to nighttime crashes, particularly among younger age groups (Atubi, 2023e; Atubi, 2012a; Atubi, 2023a).

Driving behaviors are grouped into three categories: lapses, errors, and violations. Driver aggression has been defined as any behavior intended to physically, emotionally, or psychologically harm another driver within the driving environment. Driver aggression represents a potential danger to all road users due to traffic violations and traffic collisions (Peden et al., 2005; Bener et al., 2013). Under conditions of stress, drivers are more likely to exhibit all forms of driver aggression at others. It was reported that the increase in evidence of aggressive driving is because of the steady increase in vehicles and road congestion that caused stress in drivers (Atubi, 2012b; 2013c; 2022b; 2022c). Few previous studies conducted in Nigeria by Atubi (2012j, 2012m, 2012n, 2013c) revealed that road traffic crashes and injuries (RTIs) were high in Nigeria/Lagos and human behavioral factors are one of the main causes of RTIs.

Past studies reported that individual characteristics such as age and gender are related to driving behavior (Atubi, 2023b; 2023c; 2023e). Men and women exhibit different driving behaviors that affect their attitudes and safety; differences appear between male and female drivers in terms of crash rates and are evident in a wide range of countries (Mesken et al., 2002; Haynes et al., 2004; Bener et al., 2009; Atubi, 2023e; Olawole et al., 2022). Whereas few studies have reported similar rates between the genders, the present study pursues a similar approach to explore the gender and age-related differences in driver behavior of male and female drivers in Lagos State, Nigeria.

2. Study Area

Lagos is one of the world's megacities and is the most populous city in Africa, ahead of Cairo. Lagos city in Lagos State is Nigeria's largest city and its economic capital; it is located in the southwest of Nigeria along the Atlantic Ocean. According to the 2014 report by the National Population Commission of Nigeria, Lagos is the 7th fastest-growing city in the world with a population of 21 million. Lagos is a megacity with a population of over double the required 10 million people.

Its geographic location (see Figure 1) is very significant, as it is on the Atlantic coastline of Nigeria, allowing for excellent trade routes. It also has a major airport and is connected to other Nigerian cities via railway and road links.

Lagos State provides primary health care services through a network of over 600 public Primary Health Centers (PHCs), organized into six administrative districts. These centers focus on delivering services such as immunizations, maternal and child health, disease prevention, and treatment of minor ailments. Key initiatives include digitizing healthcare services, strengthening community participation through the Primary Health Care Board, and expanding human resources by introducing family medicine training to improve access and quality of care for all residents.

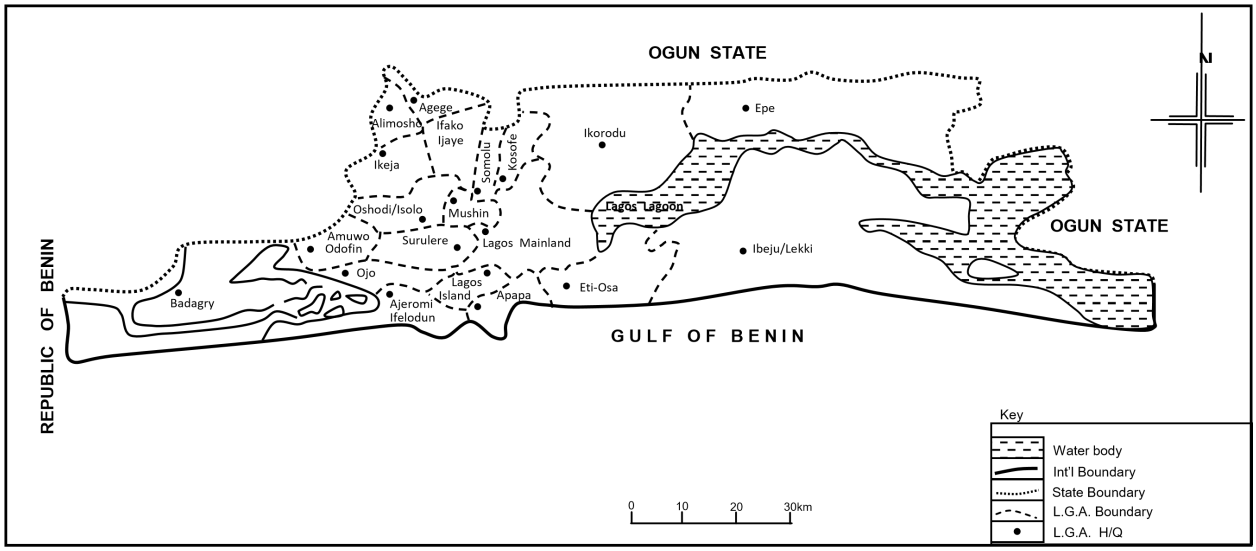

FIG. 1: MAP OF LAGOS STATE SHOWING THE 20 L.G.AS

The physical geography of Lagos is dominated by its system of islands, sandbars, and lagoons. The islands are connected by bridges and the land is low-lying. Lagos has one of the highest population densities in Africa, with the average density estimated at around 6,871 people per square kilometer in the city and significantly higher in some densely populated areas, reaching over 20,000 people per square kilometer in certain high-density zones. The population continues to grow rapidly, with urban areas expanding at a rate close to 3% annually since 2000.

Unlike other states dependent on oil revenues, Lagos' economy is diversified into manufacturing, transport, construction, services, wholesale, and retail sectors. Lagos is one of the most important cities in Nigeria and indeed in Africa, both economically and culturally.

3. Subjects and Methods

3.1 Participants

A multi-stage stratified cluster sampling was applied by using the administrative divisions of Lagos State primary health care facilities in six administrative districts (i.e., over 60 public primary health centers, PHCs) clinics of Lagos State government. The participants were selected among patients registered and attending the six administrative PHC centers in both (urban and rural areas) of Lagos State. Research assistants were instructed to strictly interview and complete a questionnaire for four randomly selected eligible driving men and women during the period from August 2024 to May 2025 (see Table 1).

Table 1: The Six Districts of *Primary Health Care (PHCs) in Lagos State*

PHC District	***Local Government Areas***
District 1	Agege, Alimosho, Ifako-Ijaiye
District 2	Ikorodu, Kosofe,and Shomolu
District 3	Epe, Eti-Osa, Ibeju-Lekki, and Lagos Island
District 4	Apapa, Surulere, and Lagos Mainland
District 5	Badagry, Ojo, and Amuwo-Odofin
District 6	Oshodi-Isolo, Mushin, and Ikeja

***Source**: Lagos State Ministry of Health, 2024*

A cross-sectional survey was conducted. In order to ensure a representative sample of the study population, the sampling plan was stratified with proportional allocation according to stratum size. The stratification was based upon geographical location. With 2.5% error bound and 99% (0.99) confidence limit, the required sample size was estimated as 1,800 drivers. The participants were sampled from each region so that the sample size in each district was proportional to its share of the total population in the state. Research assistants recorded data of each subject on a standardized questionnaire. A representative sample of 1,800 drivers was selected and approached for the data collection. The sample included males and females aged 20 years and above. 1,576 drivers out of the total 1,800 participated in this survey, giving a response rate of 88%. All participants had driving licenses and were assured of anonymity and utmost confidentiality. The participants filled out the Driver Behavior Questionnaire (DBQ) and items related to drivers' driving records and demographic variables.

3.2 Measures

3.2.1 Aberrant Driver Behaviors

Driver Behavior Questionnaire (DBQ) with extended violations was used to measure aberrant driver behaviors (Arisabor and Atubi, 2023; Bener et al., 2013). Participants were asked to indicate how often they committed each of the 26 behaviors in the previous year on a six-point scale (0=never, 1=hardly ever, 2=occasionally, 3=quite often, 4=frequently, and 5=nearly all the time).

3.2.2 Demographic Variables

Respondents were asked to report their age, gender, marital status, educational level, occupation, place of living, driving experience, type of car, frequency of seatbelt use, reasons for not wearing a seatbelt, speed choice on different roads, traffic offenses, history of accident and injury involvement. The questionnaire also included questions about accident involvement during the last 2 years as well as demographic questions (age, gender, years of holding a driving license, and mileage driven since obtaining a driving license (measured in kilometers).

3.2.3 Statistical Analysis

The analyses were performed using the Statistical Package for Social Sciences (SPSS-version 21). Student's t-test was used to ascertain the significance of differences between mean values of two variables and confirmed by non-parametric Mann-Whitney (U) test. Chi-square and Fisher's g1 and g2 tests (two-tailed) were performed to test for differences in proportions of categorical variables between two or more groups. The Pearson's correlation coefficient was used to evaluate the strength of association between more than two variables. The alpha level $p<0.05$ (95%) was considered as the cut-off value for significance.

4. Discussion of Results/Findings

Table 2 compares the socio-demographic characteristics of the drivers surveyed according to gender.

Table 2: Socio-Demographic Characteristics of the Drivers Surveyed According to Gender (N=1,576)

Variables	Total n (%)1576	Male n=1,100 n(%)	Female n=476 n(%)	p-value
Mean age (mean ± SD)	37.5=10.3	37.7 = 10.3	36.4 = 9.8	0.014
Age Group (years)				
<30	500 (31.7)	400 (36.4)	100 (21.0)	
30-39	650 (41.2)	450 (40.9)	200 (42.0)	0.118
40-49	376 (23.9)	250 (22.7)	126 (26.5)	
≥50	50 (3.2)	0 (0)	50 (10.5)	
Marital Status				
Single	500 (31.7)	350 (31.8)	150 (31.5)	
Married	900 (57.1)	600 (54.5)	300 (63.0)	0.334
Divorced/Widowed	176 (11.2)	150 (13.6)	26 (5.5)	
Education				
Illiterate	198 (12.6)	180 (16.4)	18 (3.8)	
Primary	220 (14.0)	225 (20.5)	88 (18.5)	0.014
Secondary	850 (53.9)	295 (26.8)	209 (43.9)	
University	308 (19.5)	400 (36.4)	70 (14.7)	
Vehicle Type Owned				
Small Car	1,050 (66.6)	700 (63.6)	226 (47.5)	
Mini Bus	400 (25.4)	290 (26.4)	180 (37.8)	0.038
SUV/4WD	126 (8.0)	110 (10.0)	70 (14.7)	
Seatbelt Use				
Never	780 (49.5)	709 (64.5)	202 (42.4)	
Some of the Time	475 (30.1)	100 (9.1)	101 (21.2)	0.401
Most of the Time	171 (10.9)	201 (18.3)	156 (32.8)	
All the Time	150 (9.5)	90 (8.2)	17 (3.6)	
Using Mobile Phone While Driving				
Yes	551 (35.0)	810 (73.6)	183 (38.4)	<0.001
No	1,025 (65.0)	290 (26.4)	293 (61.6)	
Excessive Speeding				
Yes	1,001 (63.5)	825 (75.0)	176 (37.0)	
No	575 (36.5)	275 (25.0)	300 (63.0)	<0.001
History of Injury in a Road Crash				
Yes	421 (26.7)	425 (38.6)	131 (27.5)	<0.001
No	1,155 (73.3)	675 (61.4)	345 (72.5)	
Driving Experience				
<2 years	163 (10.3)	100 (9.1)	145 (30.5)	
3 years	400 (25.4)	240 (21.8)	226 (47.5)	<0.001
5-10 years	311 (19.7)	150 (13.6)	35 (7.4)	
>10 years	702 (44.5)	610 (55.5)	70 (14.7)	

Source: Author's computation, 2025

It is observed that a good proportion of male (64.5%) and female (42.4%) drivers were not using seatbelts while driving. Significantly higher proportion of male drivers was using mobile phones (73.6%) than females (38.4%; p<0.001) and involved in excessive speeding (75%) than females (37%; p<0.001). The reported history of road injury in a road crash was significantly higher in male drivers (38.6%) than in females (27.5%; p<0.001).

Table 3 shows the mean violations, errors, and lapses in the DBQ scale according to gender in Lagos State.

Table 3: The Mean Violations, Errors, and Lapses in the DBQ Scale According to Gender (N=1,576)

Variables	Male n(%)1100	Female n(%)476	p-value
Violations			
Drive close to the car in front as a signal for its driver to go faster or get out of the way	422 (38.4)	100 (21.0)	0.279

Cross a junction knowing that the traffic lights have already turned red	604 (54.9)	90 (18.9)	0.351
Excessive speed at night or early in the morning	526 (47.8)	110 (23.1)	0.052
Excessive speed on a motorway	471 (42.8)	86 (18.1)	0.012
Hostile to some class of road users and indicate hostility by any means possible	300 (27.3)	43 (9.0)	0.983*
Impatience with a slow driver and overtake as soon as possible	521 (47.4)	83 (17.4)	0.610*
Unofficial race with other drivers on the road	406 (40.0)	102 (21.4)	0.572*
Angered by another driver's behavior, you then chase after him to instruct him	398 (36.2)	91 (19.1)	0.675*
Sound your horn to show your annoyance to another driver	431 (39.2)	203 (42.6)	0.712*
Remain in a motorway lane that will be closed ahead until the last minute before forcing your way into the right lane	301 (27.4)	240 (50.4)	0.171
Errors			
Wrong overtaking	220 (20.0)	101 (21.2)	0.081
Narrowly avoid colliding with traffic having right of way	444 (40.4)	115 (24.2)	0.061
Fail to notice pedestrians are crossing when trying to enter a street from the motor way.	328 (29.8)	98 (20.6)	0.741*
Underestimate the speed of another vehicle while trying to overtake.	523(45.7)	109 (22.9)	0.784*
Fail to check your rear-view mirror before pulling out of a changing lane.	391 (22.9)	440 (92.4)	0.899*
Apply sudden brakes	456 (41.5)	180 (37.8)	0.901*
After queuing to turn right, you almost hit a car in front of you	400 (36.4)	220 (46.2)	0.807*
Lapses			
Get into the wrong lane when approaching a junction or roundabout	471 (42.8)	202 (42.4)	0.614*
Misread signs and exit from the wrong road	360 (32.7)	94 (19.7)	0.831*
Due to stress you left your car	312 (28.4)	80 (16.8)	0.096*
Suddenly hit something while reversing that you did not see before	371 (33.7)	40 (8.4)	0.141*
Drive away from the traffic lights	601 (54.6)	231 (48.5)	0.058
Intend to drive to destination A and all of a sudden go to destination B	519 (47.2)	315 (66.2)	-
Switch on music while you actually meant to switch the wiper	414 (37.6)	201 (42.2)	0.969*

*(from 0 to 5). Source: Author's computation, 2025

More male drivers than female drivers were involved in traffic violations in Lagos State. Significant difference was observed between genders in few items of violations like "excessive speed at night or early in the morning" (47.8% against 23.1%, p=0.05) and "excessive speed on a motorway" (42.8% against 18.1%; p=0.012) with higher proportion among male drivers than in females in the study area. There was no significant difference observed in terms of errors between males and females. Male and female drivers reported more frequently the same kind of errors such as narrowly avoiding hitting a car (40.4% against 24.2%; p=0.06) and "overtaking wrongly" (20.0% against 21.2%; p=0.081).

The most frequent lapses among both genders was "switch on music while you actually meant to switch the wiper" (37.6% and 37.8%). Most of the lapses were not significant between male and female drivers except one item "drive away from the traffic lights" (54.6% against 48.5%; p=0.05). Table 4 shows the awareness and opinion about role of media in road safety between males and females.

Table 4: Education and Role of Media Related to Road Safety Across Drivers of Different Gender in Lagos State (N=1,576)

Variables	**Total n(%)1576**	**Male n=1,100 n(%)**	**Female n=476 n(%)**	**p-value**
Awareness about Road Safety Campaigns in Lagos State				
Yes	1,208 (76.6)	900 (81.8)	308 (64.7)	0.439
No	368 (23.4)	200 (18.2)	168 (35.3)	

Opinion about Type of Media for Effective Road Safety Campaigns				
TV	1,210 (76.8)	980 (89.1)	230 (48.3)	0.018
Radio	1,200 (76.1)	990 (90.0)	300 (63.0)	0.004
Brochures	1,080 (68.5)	901 (81.9)	179 (37.6)	0.104
Newspaper	920 (58.4)	700 (63.6)	220 (46.2)	0.036
Billboard Messages	1,215 (77.1)	980 (89.1)	235 (49.4)	0.861
Internet	1,241 (78.7)	1,000 (90.9)	241 (50.6)	0.288
Opinion about Most Effective Road Traffic Enforcement.				
Speed Limits/ Control	1,222 (77.5)	800 (72.7)	422 (88.7)	0.690
Seatbelt	1,214 (77.0)	1,000 (90.9)	214 (45.0)	0.565
Traffic Control by Signs	1,115 (70.7)	700 (63.6)	415 (87.2)	0.382
Police Presence on the Spot	1,241 (78.7)	700 (63.6)	541 (87.9)	0.030
Do You Think That Police Should Be Present at Main Junctions?				
Yes	1,280 (81.2)	800 (72.7)	480 (99.1)	0.003
No	620 (39.3)	500 (45.5)	120 (25.2)	
More Road Safety Initiatives Should Be Implemented?				
Yes	1,080 (68.5)	189 (17.2)	891 (53.4)	0.017
No	590 (37.4)	450 (40.9)	140 (29.4)	
All High Peak Roundabouts Should Be Equipped with Traffic Lights?				
Yes	1,210 (76.8)	980 (89.1)	230 (48.3)	0.409
No	1222 (77.5)	700 (63.6)	522 (91.2)	

Source: Author's computation, 2025

Male drivers (81.8%) had more awareness on road safety than females (64.7%). Significantly higher proportion of male drivers reported TV (89.1% against 48.3%) and radio (90.9% against 42.0%) as an effective source of road safety campaign as compared to females. Also, significantly higher proportion of females compared to males thought police presence (87.9% vs 63.6%; p=0.030), police should be present at main junctions (99.1% against 72.7%; p=0.003), and speed limit control (88.7% against 72.7%) would be an effective road safety enforcement initiative (see Atubi, 2022a; 2022b; 2023b; 2023e).

Table 5 shows the matrix correlation between different components of DBQ and other main variables. Gender, driving experience, violations and errors showed significant correlations with accident involvement. Using mobile phones while driving was significantly correlated with all the three components of DBQ such as violations, lapses, and errors (see table 5).

Table 5: Pearson Matrix Correlation between the Main Variables (N=1,576)

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Age (years)								
2. Gender (1=male, 2=female)	-.28**	-						
3. Driving Experience	.54**	.28**	-					
4. Crashed Involvement in the Previous Year (1=yes or 2=no)	.03	.03**	.63**	-				
5. DBQ Violations	-.02	.02	-.02	.03**	-			
6. DBQ Errors	-.02	-.03	.02	.02	.21**	-		
7. DBQ Lapses	.28**	.03**	.03	.02	.05**	.38**	-	
8. Using Mobile Phone During Driving	-.02	-.02	-.02	.02	.20**	.57**	.19**	-
9. Road Safety Campaigns	-.27**	.03	-.01	-.03	-.02	.04**	.37**	.27**

*p<0.05,**p<0.01

Source: Author's computation, 2025

Figure 2 displays the comparison of nature of accident between males and females. Rear-end collision (44.5% against 38.2%; p<0.05), head-on collision (33.4% against 24.2%; p<0.05) were significantly higher in female drivers compared to males, while crash into sign (8.9% against 8.5%; p<0.05), vehicle skid (15.1% against 5.3%; p<0.05), and angle collision (17.5% against 5.1%; p<0.05) were significantly higher in male drivers than females (see Figure 2).

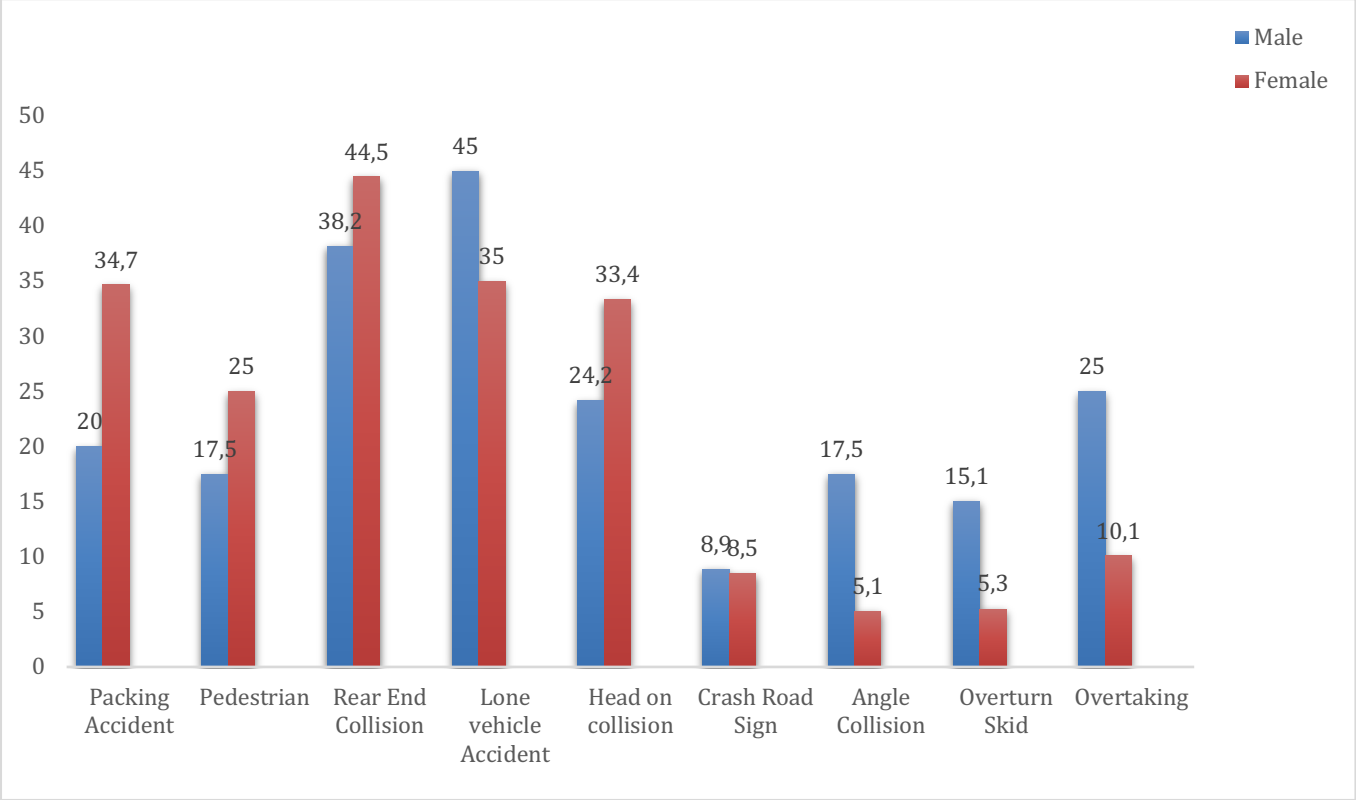

Figure 2: Comparison of the Nature of Accidents among Male and Female Drivers in Lagos State.

The study shows that differences between men and women in terms of their driving behaviors such as violation, lapses, and errors has shown that, overall, there was no significant difference found between male and female drivers in terms of violations except for "disregard the speed limit especially at night" (47.8% against 23.1%; p=0.052) and "excessive speed on a motorway" (42.8% against 18.1%;). Male drivers have reported significantly more aggression level in terms of DBQ items in violations; extreme aggressiveness was shown by 39.2% male drivers and 42.6% female drivers "sound horn to show your annoyance to another driver." More interestingly, female drivers when they become impatient with a slow driver and overtake on the right side, violations always remain in a motorway lane that will be closed ahead until the last minute before forcing their way into the right lane with higher proportion in women (50.4%) than in men (27.4%). Although there was no significant difference between both the genders, men were involved more in most of the violations as compared to women in Lagos State.

It was also observed in this study that most items of errors had more proportion in male than female drivers and all items of errors male drivers had slightly higher proportion for all items of errors, except error items such as queuing to turn right on a main road and almost hitting a car in front without paying attention took the highest proportion in both genders (92.4% and 22.9%). However, there is no significant difference observed between male and female drivers in terms of lapses. Studies of Ulleberg and Rundmo (2003) and Atubi (2023e) found that lapses were more often reported by males than females which is consistent with the results observed in the study sample that most of the items of lapses were reported higher in male drivers in Lagos State. Seatbelt wearing was more frequent among male drivers (90.9%) than females (45.0%) which is consistent with another study of Arisabor and Atubi (2023). Similar to a previous study (Atubi, 2023b), using mobile phone while driving appeared as a significant factor in accident involvement.

5. Conclusion

The results illustrate the extent of important differences in terms of age, gender, and risk-based behavior of Road Traffic Injury (RTI) in Lagos State. Gender, driving experience, using mobile phone while driving, and DBQ items such as violations, errors, and lapses were significantly involved with road traffic crashes in the study area. Although mortality from road traffic accident crashes is known to be higher in males especially among young

drivers between (30-39 years) in Lagos State. Thus, it can be deduced that gender is a significant variable influencing traffic accidents in Lagos State.

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