The Prevalence of Crash and Associated Factors Among Commercial Motorcyclist in Owo, Western Nigeria

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▷ ABSTRACT

Objective: To determine the prevalence of crash and associated factors among commercial motorcyclists in Owo, Ondo State, Nigeria.

Methods: This study is a descriptive cross-sectional study. Data was collected by using pre-tested structured questionnaires administered to commercial motorcyclists. Collected information was socio-demographic characteristics of the respondents, riding experience, formal training, possession of valid drivers' licence, motorcycle ownership status, mobile phone usage, history of crash in the previous one year, riding hours per day, helmet use, carrying more than one passenger, riding against traffic and daily income.

Results: The study were enrolled 502 individuals with a mean age of 31.5±8.7. The ratio of men to women was 250:1. All respondents who admitted to engage in the study had at least one risky behaviour in the past (95.4% admitted to transporting one passenger more than the legal) and 56.6% admit to a prior history of traffic offences. The crashes' predictive factors include respondent age, cell phone use while riding, prior traffic offences, carrying more than one pillion rider, use of stimulants such as kolanut and bitter kola, alcohol drink riding, and admission of fault in the prior of crashes.

Conclusion: Commercial motorcyclists in Owo, Ondo State Nigeria engaged in risky behaviours that raised their likelihood of being involved in crashes. The objectives of public enlightenment and driver education at these behaviours could help to reduce the occurrence of crashes among them.

Keywords: Motorcyclists; Crashes; Risk taking; Behaviours.

Introduction

The economic downtown in most nations of the world especially in developing countries like Nigeria (coupled with lack of gainful employment after graduation from school) has made an alternative, cheap, and sustainable source of income to find a necessity. This is a widely available choice due to the ease of purchasing and maintaining a commute motorcycle. This type of transportation has also gained widespread acceptance due to its ease of use, capacity to handle rough terrains, and ability

to avoid traffic jams on congested highways in highly populated metropolises [1, 2]. In some countries of Africa like Uganda, Sierra Leone, and Nigeria, it is the primary type of transportation [2-4]. An increased using of motorcycles for commuting would bring an increase in motorcycle-related crashes. Motorcyclists are 16 and 3 times more likely to die and to be injured than car occupants, respectively, because the riders absorb both compressive and kinetic energy from the crash. Similarly, the reports of an American National Highway Traffic Safety Administration (NHTSA) indicated that roughly 80% of all motorcycles related crashes concluded to an injury or death in comparing with 20% of vehicles' passenger. Additionally, it was reported that motorcycle riders like to die in an accident more than 27 times with approximately 5000 fatalities that occur annually in the United States alone which accounts for 14% of traffic fatalities in 2019 [5]. According to the Federal Road Safety Corps (FRSC), there was 38,619 motorcycle-related crashes in Nigeria, in 2019, with a death rate of 16.1% [6]. Motorcycle related injuries (MCRI) have become a major but often overlooked public health problem that has reached epidemic proportions contributing significantly to overall road traffic injuries. This related injury has remained as a leading cause of disability and deaths among the young and economically productive groups of population. MCRI brings the huge socio-economic burden to the injured, their family and society. When the epidemiological triad of host (road user), agent (motorcycle), environment (road type, traffic conditions, and weather conditions), and human is applied to motorcycle-related crashes, human factors account for more than 80% of the reasons for the unacceptably high prevalence of reported crashes [4]. Thus, identify the modifiable human factors would help intervention programs' development to minimize MCRI. To the end, identifying rider's behavior that increase the likelihood of crash, should be the focus of studies which help to provide information for the MCRI control. Some of riding behaviors found to increase the risk of crash includes riding too fast, drunk-riding, poor observation and signaling at junctions [7-9]. The objectives of the study were to determine the prevalence of crash and associated factors among the commercial motorcyclists and to determine their association with crashes.

Materials and Methods

This was a descriptive cross-sectional study that conducted among commercial motorcyclists in Owo, Ondo State of Nigeria. The sample size was calculated using the Leslie Fisher's formulae for single proportion. Because no prior study had identified behaviors associated with collisions among commercial motorcycle riders in Owo, we used a 50% prevalence as recommended in such

instances. $N=Z^2pq/E^2$ (for a target population of less than 10,000) where Z=1.96

P=proportion of those with behavioral risk for crash

q=proportion of those without behavioral risk for crash

Z=1.96 at 95% confidence interval

E=margin of error rate 5% or 0.05

$N=1.96^2 \times 0.5(1-0.5)/0.05^2$

N=384.16

Then it was added 10% of the estimate to increase internal validity and exclude those forms that were not probably filled. As a result, the total sample size was 422.6 which was rounded to 423.

Study Population

The study population consisted of commercial motorcyclist in Owo. The association which oversees their operations in Owo is the Amalgamated Commercial Motorcycle Owners and Riders' Association of Nigeria (ACOMORAN). The state deputy president who oversees ACOMORAN in Owo local government was contacted to ascertain the number of branches and units within the town. It was found that there are six major branches in Owo local government that name Oke- Owo, Ijebu Owo, Owo central, Emure, Uso, and Ipele branches. Each of these branches has various number units ranging from 4 to 11 with Oke Ogun Owo branches that have the highest number of units and Ipele branch has the fewest which will be 38 units in total. Each branch is overseen by a chairman and secretary who report to the deputy state president. Each unit has between 30 and 75 members. This showed that the entire population of commercial riders in Owo local government was roughly 1520 under the aegis of ACOMORAN. Each unit has its own designated parks where members re-treat during off-peak periods. Every member of the selected units is eligible to take part in the study as long as he gives his consent.

Sampling Technique

A two-stage sampling technique was used for this study. In the first stage, we selected three branches from a box containing the names of all six branches written on six pieces of paper in an envelope using simple random technique by balloting without replacement. Three branches were selected. These were Oke Owo, Ijebu Owo and Owo Central with a total of 25 units. In the 2nd stage, 10 trained research assistants were assigned to each unit's designated pack. The sampling framed used was determined by dividing the average total number of registered members in Owo local government by the sample size i.e., 1520 divided by 423. This equaled 3.6. Then, it was translated to approximately one out of every 4 persons and concluded in a total of 380, which is less than the required sample size. As a result, one member of every three who visited the park during the off-peak period were chosen.

The off peak is between 12 and 1p.m. when commercial motorcyclists retire to their parks, as a passenger flow is reduced. The index respondent was chosen by interviewing the 3rd motorcyclist that arrived in the park following of the research assistance's arrival. The index respondent was taken as first commercial motorcyclist who consented to participate in the study. Data were collected every day of the week in the month June.

Data Collection

Ten trained research assistants collected data on prevalence of crashes and associated factors among the respondents using a structured questionnaire and validated Motor Riders' Behavioral Questionnaire [10]. Prior to data collection process, the questionnaire was pretested among the respondents. Each assistant conducted at least 5 questionnaires in different parks of Owo. A total of 50 conducted questionnaires was used in the pilot study which allowed to detect any gap in the questionnaire for informing possible modification.

Statistical Analysis

The data collected was edited, collated, and manually entered into the computer and analyzed with the IBM-SPSS version 20. Frequencies, mean and standard deviation of continuous variable was determined and Chi square was used to compare categorical variables. *P* value was considered as $p<0.05$. The primary of previous crashes' analysis in the last one year was dichotomized as "O" for No crash and "1" for Yes in the reported crash. All the variables of interest associated with crash in previous studies were reverse coded. All the variables were statistically significant with $p<0.02$ at 95% confidence interval on binary logistic regression level were subjected to multiple logistic regression analysis and to provide information on factors associated with crashes using the backward elimination regression method.

Results

Socio-demographic Characteristics of the Respondents

A total of 502 commercial motorcyclists were interviewed in the study with a mean age of 31.5 years±8.7SD and median of 30.0 years. The age group with the highest frequency was 20-29 years (Figure 1). The majority of the respondents (286 (57%)) had a secondary education and most were married. The men: women ratio was 250:1 with 64.5% married, 33.5% single and 2.2% divorced. Only 11% lacked a formal educational and most practiced Christianity as seen in Table 1.

Among the commercial motorcyclist, 61.8 % had formal training with the mean duration of training being 3.0±6.6 (months±SD). The mean riding experience of the population studied was 6.4±5.6 (years±SD). The mean riding hours per day was 9.25±2.98 (hours±SD), while the average daily income was two thousand two hundred and twenty-six Naira (₦2226.00±1075.08SD.), and 76.3% owned their motorcycles and 33.7% did not.

Factors Associated with Crashes Among the Respondent

56.6% of the study group had a prior history of traffic violations whereas 43.4% had no such history. Previous crash involvement was reported in 53% of the respondent while 47% had no prior experience; nevertheless, among those who reported previous crash involvement, only 16.9% admitted to being on fault. Carrying more than one pillion rider was the most predominant practice in 95.4% of the respondents followed by riding or attempting to ride against traffic in 64.1%. Around 60% of the respondents had no valid driver license and about 40% used stimulants (chewing kola-nut and bitter kola) to enhance and prolong performance. Distracted riding with use of mobile phones while riding was the least often reported activity, occurring in 31.9% of the respondents Table 1.
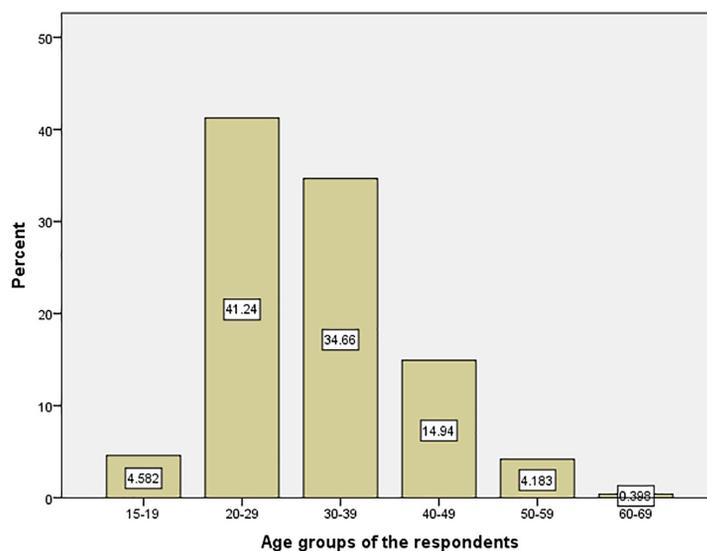

Fig. 1. Age groups of the respondents with percentages

Table 1. Sociodemographic characteristics of the respondents.

Variables		
Gender		
Male	500	99.6
Female	2	0.4
Educational status		
Primary school	96	19.1
Secondary	286	57.0
Post-Secondary	108	21.5
No educational	12	2.4
Marital Status		
Married	321	64.0
Single	168	33.5
Divorced	13	2.6
Formal training		
Yes	311	62
No	174	38
Riding hours per day		
Less than 6hours	105	20.9
6-12 hours	343	68.3
Greater than 12hours	54	10.8
Owner of motorcycle		
Yes	380	75.7
No	122	24.3
Kola-nut/ bitter kola chewing		
Yes	198	39.4
No	304	60.4
Mean income per day in Naira		
≤2000	307	61.2
≥ 2001	195	38.8
Alcohol drinking riding		
Yes	143	28.5
No	359	71.5
At fault admittance for crash		
Yes	85	16.9
No	417	83.1
History of previous crash		
Yes	266	53
No	236	47
Previous traffic violation		
Yes	218	43.4
No	284	56.6
Mobile phone use		
Yes	160	31.9
No	340	68.1

Binary Logistic Regression Analysis

The analysis of the association between previous crashes and associated behaviors

showed that previous traffic violations, drunk riding, possession of a valid driver's license, use of stimulants (kolanut and bitter kola), mobile phone use, admission of fault were all significantly associated with crashes at *p<0.001* and age at *p<0.002* (Table 2).

Multiple Logistic Regression Analysis

At multivariate level of the factors associated with crashes, factors with significant association were backward loaded into the model for multiple logistic regression analysis at bivariate level (Table 2). These

were the respondents' age, mobile phone usage, admission of fault for the crash, carrying more than one passenger, previous traffic violations, possession of a valid driver's license, drunk riding, smoking history, and stimulants use (kola-nut and bitter kola). The odds of being involved in crashes was highest for individuals with previous traffic violations, followed by those who admitted culpability for the crash. Individuals who have a history of previous traffic violations and admissions of fault for a crash, were 20.54 and 32.33-times odds of being involved in crashes (AOR:20.540, 95% CI: 0.101-0.403, *p<0.000* and AOR: 32.329, 95% CI: 0.184-0439, *p<0.000*) respectively.

Table 2. Factors associated with crashes.

Variable	Un Adjusted			Adjusted		
	COR[a]	95%CI[b]	*p* value	AOR[c]	95%CI[b]	*p* value
Age	1.035	1.014-1.057	0.001	1.033	1.007-1.060	0.013
Marital Status						
Single	ref[d]					
Married	1.404	0.965-2.043	0.076			
Divorced	1.803	0.566-5.737	0.319			
Educational status						
Primary	ref[d]					
Secondary	0.811	0.509-1.291	0.378			
Post-secondary	0.838	0.482-1.455	0.529			
None	2.074	0.518-8.301	0.303			
Religion						
Christianity	ref[d]					
Islam	1.241	0.830-1.857	0.293			
Traditional	1.913	0.566-6.465	0.297			
Possession of valid license						
No	ref[d]					
Yes	0.513	0.356-0.738		1.373	0.875-2.153	0.168
Previous traffic violation						
No	ref[d]					
Yes	3.803	2.598-5.565	0.000	3.407	2.205-5.266	0.000
Riding experience						
At fault admittance for the crash						
No	ref[d]					
Yes	5.695	2.989-10.851	0.000	4.752	2.371-9.525	0.000
Carrying more one passenger						
Never	ref[d]					
Occasionally	1.477	0.615-3.547	0.383	2.239	0.793-6.327	0.128
Frequently	2.729	1.111-6.701	0.028	3.350	1.156-9.711	0.026
Nearly all the time	1.390	0.546-3.541	0.490	2.057	0.659-6.421	0.214
Alcohol drinking						
No	ref[d]					
Yes	2.055	1.371-3.080	0.000	1.562	0.908-2.686	0.107
Use of stimulants as kola nut and bitter kola						
No	ref[d]					
Yes	2.262	1.564-3.272	0.000	1.418	0.882-2.278	0.149
Mobile use while riding						
No	ref[d]					
Yes	1.788	1.218-2.625	0.003	1.839	1.124-3.006	0.015
Formal training						
No	ref[d]					
Yes	0.727	0.500-1.058	0.096			
Average income per day						
≤2000	ref[d]					
≥2001	0.762	0.531-0.762	0.140			
Riding hours per hours						
≤ 6	ref[d]					
7-12	0.630	0.325-1.220	0.170			
12-18	0.749	0.420-1.338	0.749			
Ownership of the Motorcycle						
Yes	ref[d]					
No	1.453	0.960-2.199	0.77			
Riding experience in years						
≤ 5	ref[d]					
>5	1.251	0954-1.591	0.068			
History of Smoking						
No	ref[d]					
Yes	2.461	1.415-4.280	0.001	1.122	0.562-2.278	0.751

[a]COR: Crude odds ratios; [b]AOR: Adjusted odds ratio; [c]CI: Confidence Interval; [d]Ref: reference category.

The age of the respondents was also significantly associated with being involved in crashes with the odds of occurrence increasing by 7.84 (AOR:7.84, 95% CI: 0.941-0.989, *p*<0.005) with every unit increase in age; while those who use their mobile phone during riding, 5.182 odds involved in crashes (AOR:5.182, 95% CI:0.327-0.827, *p*<0.012).

Discussion

The prevalence of reported crash in the last 12 months among the respondents was 53% which quite high in comparing with the Cameroun findings [11]. This could be the result of the respondent's behavior in our study to engage more with increasing propensity for crashes.

This study clarified the factors associated with increasing propensity for commercial motorcyclist crashes in Owo local government area of Ondo State, Nigeria. The mean age of the respondents was 30 years with the 20-29 age group accounting for more than 45% of the studied population which was consistent with earlier studies of commercial motorcyclist in major cities in southwestern Nigeria [8, 10, 12]. In several studies [8, 13], this group had been reported to be the most aggressive in terms of riding behavior with propensity for crashes. This (48.5%) is consistent with the findings of the present study and previous report of crash involvement. The age of the respondents was a significant factor for crashes at all levels of analysis in the present study. Therefore, this finding was in agreement with existing report where age of the commercial motorcyclist was a determine factor for crashes [14, 15]. Further analysis showed that persons aged 25-34 years were the most likely to commit traffic offences. This was consistent with a previous study [16] in one of the southwestern states in Nigeria by Olumide and Owoaje that found young commercial motorcyclists have increased tendency to violate road traffic safety. This may be related to their lack of riding experience and unfamiliarity with road safety rules, as well as their tendency to be more daring and aggressive. The practice of owners subletting motorcycles to riders who are required to deliver a fixed amount of money each day could be also contribute to increase predisposition of traffic violation. This was because they are usually in a hurry to generate several returns to meet the owner's expectations and earn some revenue in the process [8].

The motorcycles use for commuting is a men-dominated occupation, as evidenced by the men to women ratio of 250:1 which is found in this study. This was not surprising because women are home keepers while men work for the family [17].

Amongst the risk factors for crashes, previous traffic violations had the highest odds of occurrence. The odds of occurrence were more than thirty, demonstrating that when road users commit a traffic violation and are not penalized, they are more likely to commit additional infractions. Traffic violations put other road users in danger because they raise the probability of more collisions [18].

In this study, mobile usage was significantly associated with crashes at bivariate and multivariate level of analysis which was similar to the findings by Truong and Nguyen [19]. This is not surprising because mobile phone use is a major cause of distraction while riding, diverting riders' attention away from the road and preventing them from detecting hazards in their path. It also diverts riders' attention away from the activity of riding by increasing reaction times. Motorcycles are inherently unstable; riding with one hand while making or answering a phone call may increase the risk of a crash by impeding proper reaction in an emergency. While this risky behavior has found linked to crashes among people who ride motorcycles for leisure or private use [20], the present study has demonstrated that mobile usage is also significantly associated with reported crashes among commercial motorcyclist.

Additionally, this study also showed that the commercial motorcyclist's admission of fault was associated with crashes. There has been no published study on no-fault admittance by commercial motorcycle riders and crashes while it has been established that no-fault admittance by car drivers related with a worse outcome. There was a statistically significant association between fault admission and crashes in this study with 21 folds increased odd of occurrence [21].

In conclusion, commercial motorcyclists in Owo engaged in behaviors associated with crashes which the most prevalent was traffic violation. There is a need for heightened public awareness directed towards this behavior through rider education, which should help to decrease the occurrence of crashes.

Declarations

of the final paper, interpretation of analyzed data, and result presentation.

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