ORIGINAL ARTICLE

Predictors of Road Traffic Accident, Road Traffic Injury and Death among Commercial Motorcyclists in an Urban Area of Nigeria

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Abstract

Background: *Road traffic accidents, injuries and deaths remain important public health problems in both developed and developing countries. These problems have since escalated with the introduction of the new phenomenon of commercial motorcycle transportation such as is found in the urbanizing slum of Nnewi, Anambra state of Nigeria.*

Method: *Using a semi-structured, interviewer-administered questionnaire, relevant data on socio-demographic and motorcycle characteristics were collected from a sample of 291 commercial motorcyclists selected by systematic sampling technique. Data on RTA, RTI and death were also collected from them over a period of three months.*

Result: *The result showed that young commercial motorcyclists {<30 years of age}, experienced higher fatal injury rate than older ones {≥30 years of age}, {p<0.01}. Motorcyclists with some formal education experienced RTA and RTI incidence rates that were significantly lower than those of motorcyclists with no formal education, {p<0.01}. In the same vein, medical condition and social vices such as alcohol intake among the motorcyclists were found to be obvious predictors of RTA, RTI and death. Furthermore, motorcyclists who used >100cc engine capacity motorcycles had significantly higher RTA incidence rate {478.8/100 MCY}, RTI rate {223.2/100MCY}and FIR {410/100MCY} than users of <100cc engine motorcycles who recorded RTA incidence of 258.9/100MCY, RTI rate of 49/100MCY and zero fatal injury respectively {p<0.01, p<0.001, p<0.001 respectively}.*

Conclusion: *A careful consideration of all these predictors individually and collectively, will enable stakeholders in transport industry plan effective RTA, RTI and death control measures. Rather than an outright ban of motorcycle transportation, evening classes can be organized for the motorcyclists at subsidized rates to improve their literacy levels to run side by side with road safety informational lessons delivered at their places of work.*

Key Words: *Predictors, RTA, RTI, death, commercial motorcyclists, urban areas.*

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Introduction

Road Traffic Accident (RTA) represents a major epidemic of non-communicable disease in the country and it is part of the price we have to pay for technological progress[1]. It has been recognized as an important public health problem in both developed and developing countries[2,3]. RTA follows the same epidemiological pattern as many other diseases; that is agent, host and the environment interacting to produce injury or damage[4]. A large proportion of vehicles involved in accidents are two-wheelers[5]. Compared to cars, they are unstable and provide little protection for their riders in accidents[3]. Among the fatal accidents, motorcycle accidents rank first globally[3]. In some countries one-third of all traffic deaths occur among two-wheeled vehicles[3].

RTAs have been attributed to a multiplicity of causes which may be a combination of human errors and failures, poor road signs and adverse road conditions, and vehicle defect,[6,7]. The motorcyclist with his pillion passenger is second only to the pedestrian in having high accident risk[4]. The risk of RTA,

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Road Traffic Injury (RTI) and death among the motorcyclists is further heightened by their tendency to meander recklessly in the traffic stream, speeding and showing little regard for other road users[4]. Also crash helmet is hardly used either as a rider or passenger and where a helmet is used, the wrong type or size is worn[4]. Some of the motorcyclists ride under the influence of alcohol and sedative[4,8,9]. Perhaps in the same spirit of competition, showmanship and youthful exuberance, the commercial motorcyclists often ride two abreast[1], thereby exposing themselves and their passengers to the risk of fatal accident. Apart from human nature and youthful exuberance, it has been shown that motorcycles with more powerful engines are more prone to accidents[4] and should be discouraged. It is important to investigate the socio-demographic predictors of RTA, RTI and death among commercial motorcycle riders in Nigeria, hence this investigation. It is hoped that this infomation will lead to a better understanding of the situation.

Subjects And Methods

Nnewi is a rapidly urbanizing slum in Anambra State and because of the phenomenal growth in business opportunity especially in the area of distributive trade, the town has witnessed a tremendous influx of people from neighboring villages, towns and states. Nnewi has often been referred to as the 'Japan' of Africa because of the people's ingenuity in the fabrication and sale of auto spare parts. There is a palpable sense of urgency in everybody leading to the usual hustle and bustle of business life and making the motorcycle a most sought after means of transportation available. Motorcycle transportation is very popular among the people especially among the young and productive age group. The total number of motorcyclists registered for business within the town was approximately 800[10] as at January 2002. There is a wide network of roads within the town {total length of motorable roads is approximately 150km}[11], yet a large proportion of roads are not motorable. This again is one more reason why motorcycle transportation remains a more viable option than four-wheeled vehicles for shuttles within the town.

The study design was cross-sectional with a prospective component in which the selected motorcyclists were followed over a period of three months to record their accident, injury and death rates. The study population in this study was commercial motorcyclists operating within the urban center of Nnewi. The exclusion criteria were non-commercial motorcyclists as well as those who were not registered with the commercial motorcyclists' union. The minimum sample size required for this study was obtained using the formula $(u+v)^2 \mu / (\mu-\mu_o)$,[2] where u =power of study (1.28), $v = 1.96$, μ = accident rate expected (30/10MCY), μ_o = accident rate from pilot study (28.8/10MCY). The minimum sample size then became 261, but 291 were selected to take care of envisaged attrition.

The town's commercial motorcyclists have a strong union, with a committed leadership. The members are obliged to make daily contribution of money to the leadership, for the day's business, and this way, an authentic list of members is readily available at the union headquarters. The systematic sampling technique was employed to select the required number of participants {291}for the study. The first ten motorcyclists who came to the union headquarters were given numbers and by means of a simple random sampling technique the first participant was selected. Subsequently, every alternate motorcyclist that came for registration was recruited until the total required sample size of 291 was reached. The study instrument was a semi-structured, interviewer-administered questionnaire, used to obtain baseline socio-demographic data like age, marital status, educational level, social habits, medical conditions and brand of motorcycles used. A record of road traffic accident, injury and death, among the selected commercial motorcyclists was scrupulously kept for three months. The researcher created five observation / treatment points and the subjects were encouraged through their union management to report cases of RTA to the nearest observation point and subsequently to the investigators' team, who promptly cared for them and offered free medical attention. By this method, the RTA reporting was enhanced and fairly accurate data were surely kept.

Data were presented in tables, figures and a diagram

Limitation Of Study

Apparently progressive loss of enthusiasm was observed among the motorcyclists as the study progressed. The design was difficult to execute because the reporting of RTA has never been a common practice by commercial motorcyclists. Effort to make them adopt an appropriate culture of RTA reporting constituted a herculian task. These difficulties were however overcome by using the authority of the motorcyclists' leadership, recruiting much more than minimum sample size calculated and giving them free medical treatment if they sustained any injuries.

Result

The ages of the 291 respondents ranged from 15 to 63 years with mean age of 29.7 years±7.4 (Table 1). Table II shows that 48 (16.5%) had no formal education, whereas 69 (23.3%) attained up to secondary education and above. Also while 32 (11%) made use of ≤ 100cc engine capacity motorcycles, 89% (259) rode on <100cc engine capacity motorcycles (Table III). Table IV shows statistically significant influence of educational status, medical condition and social habits of the motorcyclists on the RTA / RTI incidence rates, with medical condition also significantly affecting fatal injury rates. Similarly, there is a statistically significant increase in all the four parameters under study, as the motorcycle engine capacity increases. Furthermore the motorcycle ownership status influenced significantly, the RTA incidence rate. Figure I shows the distribution of the motorcyclists according to marital status and number of children while Figure 2 shows their distribution according to social habits. Also the distribution of the subjects according to medical status is depicted in Figure 3.

Table I: Age distribution of motorcyclists

Age group	Number (%)	
	Number	%
15-19	15	5.2
20-24	62	21.3
25-29	78	26.8
30-34	58	19.9
35-39	49	16.8
40-44	18	6.2
45-49	9	3.1
>50	2	0.7
Total	291	100
Mean Age	29.7years	
S.D	7.4 years	

Table II: Distribution of motorcyclists according to educational status

Educational status	Number (%)	
	Number	%
No formal education	48	16.5
Primary education	174	59.8
Secondary education	59	20.3
Post-secondary education	10	3.4
Total	291	100

Table III: Distribution of motorcyclists according to machine engine capacity

Engine capacity	Number (%)	
	Number	(%)
≤100cc	259	89
>100	32	11
Total	291	100

Table IV: Influence of socio-demographic variables on road traffic accident incidence

Socio-demographic variables	RTA incidence rates/100 MCY		RTI rates / 100MCY		Fatal injury rates/ 1000MCY		Case fatality rates (%)	
	Rates	z-sore p-value	Rates	z-sore p-value	Rates	z-sore p-value	Rates	z-sore p-value
Age: <30yrs vs >30yrs	304.6 vs 283	z=1.03 p>0.05	66.5 vs 70	z=0.29 p>0.6	76.8 vs 0	z=2.70 *p<0.001	11.5 vs 0	z=4.5 *p<0.003
ES[1]: NFE[2] Vs SFE[3]	446.3 vs 264.3	z=5.4 *p<0.01	148.8 vs 52.2	z=7.25 *p<0.01	82.7 vs 32.7	z=1.2 p>0.2	5.6 vs 6.3	z=0.2 p>0.8
MC[4]: Sick vs Aparently Well	826.5 vs 271.3	z=11.6 *p<0.01	231.4 vs 61.1	z=5.4 *p<0.01	330.6 vs 28.4	z=4.7 *p<0.03	14.7 vs 4.7	z=0.9 p>0.8
MS[5]: Married vs Single	291.6 vs 297.6	z=0.26 p>0.9	52.5 vs 85	z=2.28 *p<0.05	23.3 vs 56.7	z=0.99 p>0.3	5.0 vs 6.7	z=0.6 p>0.5
SH[6]: vices vs no vices	319 vs 63.9	z=9.2 *p<0.001	76.1 vs 25.9	z=3.7 *p<0.01	48.6 vs 0	z=1.10 p>0.2	6.4 vs 0	z=4.1 *p<0.001
MEC[7]: <100cc vs >100cc	258.9 vs 478.8	z=5.3 *p<0.01	49 vs 223.2	z=10.6 *p<0.001	0 vs 410.4	z=9.9 *p<0.001	0 vs 16.7	z=2.4 *p<0.02
MOS[8]: owns it vs Someone elses	266.8 vs 35.7	z=3.3 *p<0.01	61.6 vs 78	z=1.59 p>0.05	22.8 vs 67.8	z=1.57 p>0.05	3.7 vs 8.7	z=1.68 p>0.05

Statistically significant

Key:
1. ES Educational status
2. NFE no formal education
3. SFE some formal education
4. MC medical condition
5. MS marital status
6. SH social habit
7. MEC motorcycle engine capacity
8. MOS motorcycle ownership status

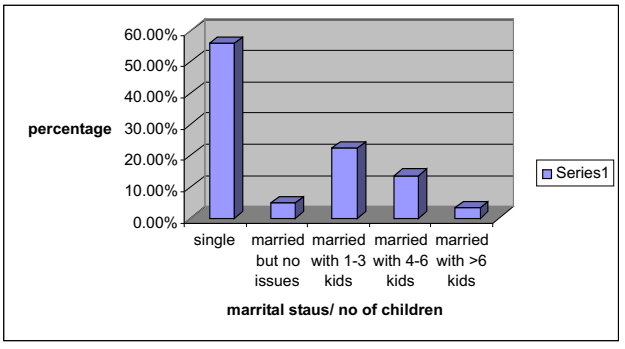

Fig 1: Distribution of motorcyclists according to marital status and number of children.

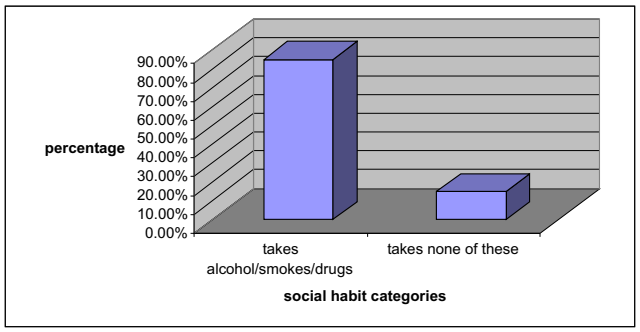

Fig 2: Distribution of subjects according to social habit

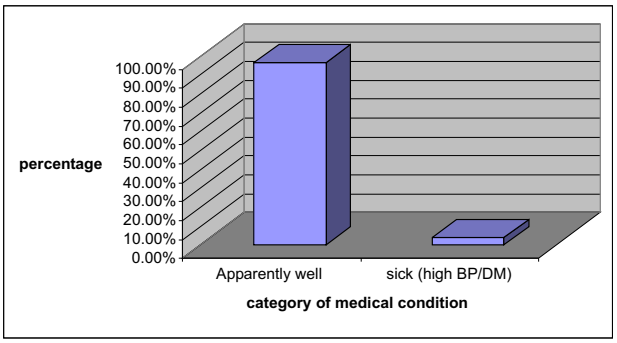

Fig 3: Distribution of subjects according to medical status

Discussion

Motorcycles have come to stay as important means of transportation in many parts of Nigeria. This development has naturally led to very high incidence of RTA, RTI and deaths among motorcyclists and other road users. This study revealed a higher incidence of RTA among motorcyclists aged less than 30years than among those aged 30 years or more. This finding agrees with the result of an RTA study in Ibadan, Nigeria, which reported that young adults were the most vulnerable groups of riders[12]. Furthermore, younger motorcyclists were significantly more likely than older ones to die from road traffic injuries. Similar observations were made in a study which recorded a most striking increase in road traffic accident mortality among youths aged 15 to 24 years[12].

This study also revealed that motorcyclists, who drank alcohol, took drugs or smoked cigarettes, were significantly more likely to get involved in RTA and to die from RTI than those who took none of these. This is in agreement with some studies which established a link between alcohol use and RTA[13,14]. This finding was further corroborated by the fact that the three motorcyclists who died during the study drank alcohol, smoked or took some drugs. It has also been shown in this study that sick motorcyclists such as those with hypertension and diabetes mellitus, were significantly more likely to get involved in RTA, and thus recorded higher incidence rates of road traffic accidents and injuries than experienced by apparently healthy ones. Similar results were recorded in the study of elderly drivers where the high road traffic accident and injury rates observed were strongly suspected to be more as a result of age-related diseases than due to normal age-related changes[15]. Also it was found that some medical conditions such as advanced diabetes, hypertension and some prescribed drugs like tranquilizers and sedatives, stress and diseases that blunt locomotion and sensation, can influence the causation of accidents[16]. The findings thus bring out the strong need to subject commercial motorcyclists to thorough, regular medical examination and subsequent treatment in the course of their work. This becomes even more pertinent in the face of the discovery that human error is the most important cause of motorcycle accidents and it is the main factor in up to 71% of crashes[16]. Also cognitive and perceptive deficits associated with certain illnesses may interfere with riding skills[16].

Participants who used more than 100cc engine capacity motorcycles were found in this study to be more likely to get involved in RTA and to sustain injuries, thus recorded higher incidence of RTIs than those who used less than 100cc engine motorcycles. The high engine capacity motorcyclists also sustained more fatal injuries than those who used less than 100cc capacity motorcycles. These findings call for urgent advocacy campaign in favour of use of only low engine capacity motorcycles for transportation purposes. Motorcycles with big engines are usually faster but less stable than small engine motorcycles[1]. This increases their susceptibility to RTA and fatalities especially when used on bad roads.

Participants who had no formal education were more likely than those with some formal education to get involved in road traffic accident and to sustain road traffic injuries.

Thus incidence of RTA and injuries were higher among the uneducated than among the educated motorcyclists. A similar finding was reported in an African study in 1986[17].
Furthermore single respondents were found to be more prone to road traffic injuries than married ones. This once again highlights the role of youthful exuberance and its attendant hazards like over-speeding as a determinant of road traffic injuries among motorcyclists. Over-speeding is a substantive problem which sometimes has its root in economic hardship. Approaches to tackle economic and over-speeding issues go beyond the individual motorcyclist, who feels a need to gain daily bread for his family[17]. An improved economy will reduce this ugly trend.

In conclusion therefore, a generally close attention should be paid to all these predictors of RTA, RTI and death among commercial motorcyclists with a view to reducing the carnage on our roads. For instance, evening classes can be organized for the motorcyclists at subsidized rates to improve their literacy levels. This should run side by side with informal road safety informational lessons delivered at their places of work.

Commercial motorcycle transportation system is a necessary evil that should not be banned entirely in view of its obvious usefulness in our kind of society. Rather all stakeholders in the transport industry should subject it to a scientific scrutiny with a view to modifying some personal and motorcycle variables thus transforming it into a safe transportation system in the country.

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