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Epidemiology of Road Traffic Crash Injuries as Seen in the Emergency Room of a Tertiary Hospital in Delta State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors DOOO and AABO designed the study and wrote the initial protocol. Authors RETE, CIO and GCI managed the literature searches and wrote the first draft of manuscript. Authors MOO, EA and DOOO performed the collation of data and the statistical analysis. All authors read and approved the final manuscript.

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ABSTRACT

Background/Objective: Road traffic crashes are an important source of frequent trauma with resultant morbidities and mortalities in Nigeria and worldwide. We aim to highlight important epidemiological characteristics and injury patterns in road traffic crash victims presenting at our centre and make suggestions on possible ways to alleviate the problem.
Patients and Methods: Consecutive adult road traffic crash victims who presented with various injuries at the emergency room in our health facility within the study period and agreed to participate in the study were included. Data on age, sex, type of vehicle and circumstances of crash, types of injuries etc were collected on already prepared forms by attending emergency room

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physicians. Data analysis was carried out using SPSS version 17 (SPSS Inc. Chicargo, Illinois. USA).

Results: Data were collected for 88 eligible adult road crash victims during the study period. There were 53 males and 35 females (M:F = 1.5:1). Mean age was 37 ± 14 years. Most of the victims fell within the age groups of 20 -29 years (33.3%) and 30 – 39 years (22.7%). Motorcycles were the most commonly involved (40.4%). Sixty five point two per cent (65.2 %) of the crashes involved commercial vehicles. Over speeding was adjudged as the most probable cause of crashes by 30.1% of victims. Passengers were the victims in 46.6% of cases and drivers in 37.5% of cases the rest being pedestrians. The head was injured in more than 40% of cases followed by lower extremity injuries. The victims sustained a total of 58 fractures the tibia and fibula being the most frequently fractured bones. Most of the victims (70.5%) were conscious and stable at presentation. Nearly all the victims (95.5%) were rescued and brought to hospital by other road users, fellow passengers and relatives.

Conclusion: Road traffic crashes frequently affect males and the most productive age groups with its attendant dire consequences on the socio-economic life of the people. Human related factors such as over speeding significantly contribute to its occurrence. There is almost non-existence of rescue and pre-hospital care in our environment. The need for drivers / road user's education, road maintenance and putting in place a well organized rescue and pre-hospital care team is emphasized.

Keywords: Road traffic crashes; crash victims; motor vehicles; injuries.

1. INTRODUCTION

"Two deaths in 1896 in Great Britain were due to motor vehicle accidents and one death was registered in the US in 1899 from vehicular accident. From these little beginnings, a terrible stream of death and injuries has followed" [1].

A road traffic crash can be defined as an event that produces death, injury and /or property damage that involves a motorised vehicle in transport or occur on a traffic way or while the vehicle is still in motion after running off the traffic way [2]. It can also be defined as an accident which occurred or originated on a way or street open to public traffic; resulted in one or more persons being killed or injured, and at least one moving vehicle was involved. These accidents therefore include collisions between vehicles, between vehicles and pedestrians and between vehicles and animals or fixed obstacles [3].

Road traffic accidents have become a growing public health and developmental problem. It is estimated that about 1.2 million people die annually from road traffic crashes and about 50 million others sustain varying degrees of injury worldwide More than 26,000 persons lost their lives from road traffic in the EU countries in 2015. It is now recognized as a neglected pandemic, [2,4,5,6].

The WHO predicts that road traffic injuries will rise to become the fifth leading cause of death by the year 2030 [7].

In economic terms, deaths, injuries and disabilities as a result of road traffic accidents place a huge financial burden on the budget of developing countries. It is a major burden on the world's economy causing a yearly loss of about $518 billion US dollars [8,9].

It affects mainly young persons below the age of 45 years who are largely bread winners for their families [5].

Ninety one per cent of the world's fatalities on the road is said to occur in the low and middle income countries even though these countries have approximately half of the world's vehicles. The risk of road traffic death is highest in the African sub-region [7,10].

In Nigeria, road traffic crashes are a major cause of morbidity and mortality. It is said that Nigeria has the second highest rate of road traffic accidents among 193 countries of the world [2,10].

The aim of this study is to document the pattern of road traffic injuries which present to the Delta State University Teaching Hospital, Oghara, Nigeria and further highlight the gravity of the problems, possible risk/causative factors and make recommendations on ways to possibly alleviate the problem.

2. MATERIALS AND METHODS

This was a prospective cross-sectional study of consecutive adult patients (16 years and above)

who presented at the emergency room of the Delta State University Teaching Hospital (DELSUTH), Oghara, Nigeria with injuries sustained in road traffic crashes. DELSUTH is a 220 bed multi-specialist tertiary health facility in Delta state, Nigeria that trains medical students and also postgraduate doctors in various specialties. It is the only type of its kind in Delta state and it serves as a referral centre for lower level health facilities in the state and neighbouring states.

The study spanned a period of 9 months (1st April to 31st December 2015). Patients who died before arrival at the hospital were excluded from the study. Pre-designed forms were used to collect data from victims of road traffic crashes and relatives by emergency room physicians after stabilization. Information on bio-data, circumstances leading to accidents, number or persons and vehicles involved, type of injuries sustained and severity including fatalities at the accident scene, rescue and pre-hospital care, etc were entered into the forms. Additional information was gotten from patients' case notes and records. The essence of the study was explained to patients and their relatives. Consent was given by patients agreeing to participate in the study.

Forms not properly or completely filled with relevant information were rejected.

Data were analysed using SPSS version 17 soft ware and results presented in form of means, standard deviations, tables and charts.

3. RESULTS

Data were collected from 88 adult victims of road traffic crashes who presented at the adult emergency room of our health facility during the study period.

There were 53 males (60.2%) and 35 females (39.8%) giving a male to female ratio of 1.5 : 1. The average age of victims was 37±14.3 years, the youngest victim being 16 years and the oldest 76 years. The highest number of victims were in the age group 20-29 years (33%), followed by those in the age group 30 – 39 years (22.7%) Table 1.

In terms of educational level, 42 victims (47.7%) had secondary education, 22 (25%) had primary education, 20 (22.7%) had tertiary education and 4 (4.5%) had no formal education.

The occupational distribution of patients is as shown in Fig. 1. Many of the victims were business persons and traders.

Table 1. Age distribution of victims of road traffic crashes

Age group	No. of persons	Percentage
<20 years (16 – 19)	6	6.8%
20 – 29 years	29	33.0%
30 - 39 years	20	22.7%
40 – 49 years	16	18.2%
50 – 59 years	9	10.2%
60 - 69 years	4	4.5%
70 - 79 years	4	4.5%

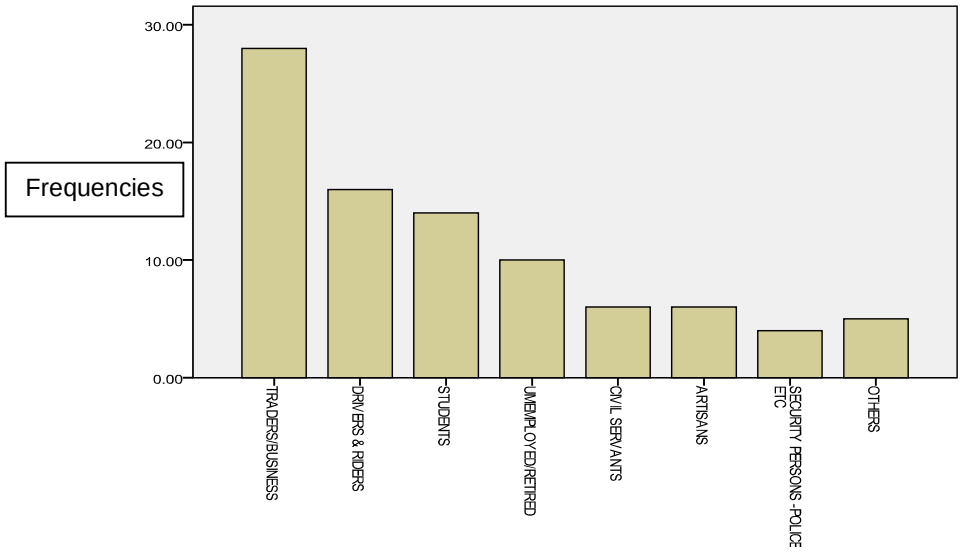

Fig. 1. Occupational distribution of victims

A large proportion of the crashes involved motorcycles (40.2%) Table 2.

The crashes involved either single (52% of cases), double (46.7%) or multiple (1.3%) multiple vehicles.

A total of 23 persons were known to have died on the spot at the scene of the crashes.

Sixty five point two per cent (65.2%) of the vehicles involved in the crashes were commercial vehicles, the rest being privately owned.

Excess speed was adjudged by 27 (30.1%) victims to the most likely cause of the crashes See Table 3.

Many of the victims were passengers (41 = 46.6%), 33 (37.3%) were drivers/riders and the rest 14 (15.9%) were pedestrians.

Fifty six point six per cent (56.6%) of the injuries were closed and the rest 43.4% were open injuries.

The head was the most frequently injured part of the body among the victims followed by the lower limbs Fig. 2.

Tables 2. Types of vehicles involved in road traffic crashes

Type of vehicle	No. (frequency)	Percentage (%)
Motorcycles	43	40.2%
Cars	37	34.6%
Buses	15	14.0%
Trailers	7	6.5%
Lorries	4	3.7%
Tricycle	1	0.9%

Table 3. Possible causes of accidents (Victim's view)

Suggested causes	No.	Percentage
Excess speed	27	30.1%
Burst tyres	9	10.2%
Bad road	6	6.8
Sleep driving	5	5.7
Lost of control	9	10.2
Failed brake	8	9.1
Others (Learning, other driver's fault etc)	12	13.6
Unknown/Uncertain	12	13.6

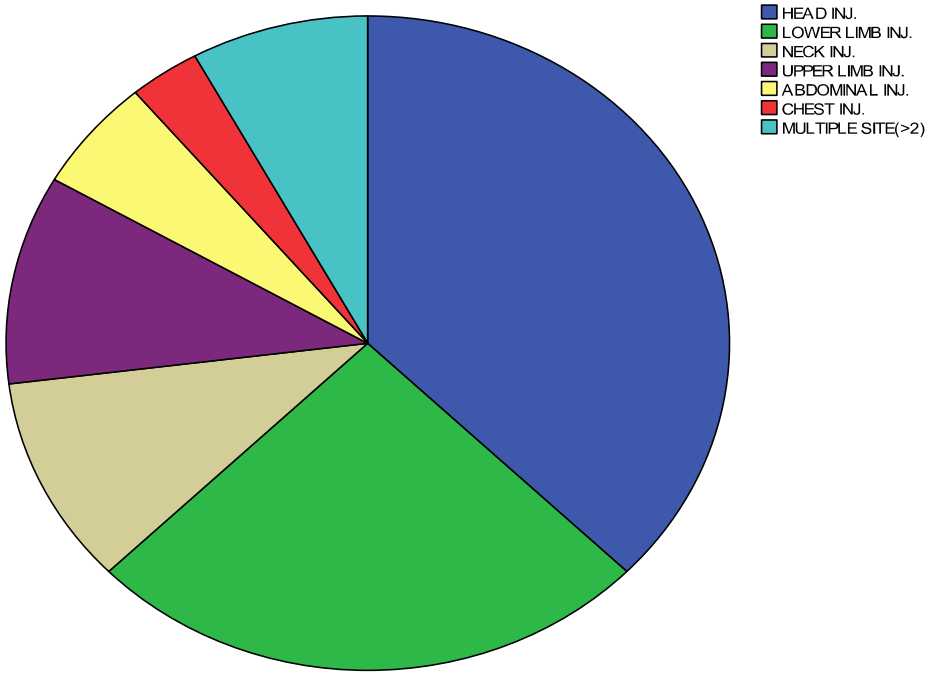

Fig. 2. Frequency of injuries to various parts of the body

Table 4. Pattern of fractures in road traffic crash victims

Bone fractured	Closed fractures	Open fractures	Total
Tibia	4	11	15
Fibula	3	9	12
Femur	6	1	7
Humerus	6	-	6
Facial bones	4	-	4
Radius	4	-	4
Cervical vertebrae	2	-	2
Pelvis	2	-	2
Skull	2	-	2
Foot bones	1	1	2
Clavicle	1	-	1
Ulna	1	-	1
Total	36	22	58

The crash victims sustained a total of 58 fractures the tibia and the fibula being the most frequently fractured bones Table 4.

Almost all the victims (95.5%) were rescued from the scene of the crashes and brought to the hospital by either passersby, relatives and other road users or fellow less injured passengers. The remaining 4.5% were rescued by policemen and members of the Federal road safety corps of Nigeria (FRSC). Sixty two (70.5%) of the victims were conscious and stable at presentation, 23 (28.1%) were unconscious while 3 (3.4%) were in shock.

For victims brought directly from the scene of accident to our health facility (64.8%), it took an average of 90 minutes for them to get to the hospital using various types of vehicles ranging from buses, cars, pick-up to even motorcycles. The rest had one form of treatment or the other at various places including private hospitals, other peripherial government hospitals, chemist stores etc where they spent variable times ranging from hours to days before getting to our health facility.

4. DISCUSSION

For several decades now, road traffic crashes have been acknowledged by the United Nations and its affiliate member states to be a considerable challenge to the achievement of health and development goals. The World Health Organization (WHO) has declared the present decade (2011 – 2020) a decade of action for road safety – 'Saving Millions of Lives' [7].

The importance of minimising road traffic crashes and its impact on the economic, health and social life of nations especially in developing countries like Nigeria cannot therefore be over emphasized. The most economically active and productive age groups and sex often form the bulk of the victims of road traffic crashes. [4,11,12]. In this study males form the bulk of the victims (over 60%). This is similar to findings in several other previous studies on road traffic crashes [4,8,12,13,14,15,16,17]. The reasons for the male predominance are not farfetched. Males are usually more adventurous, take vehicle driving as occupation and most times being the bread winners are always on the road looking for ways to earn money in order to fend for their families.

The age groups mostly affected are also the most active in terms of economic productivity. Most of the crash victims in this study fall within the age group of 20 -39 years (56%). Similar findings have been reported in other studies though, percentages vary [4,8,12,13,14,16,18]. The mean age of 37 years observed in our study is higher than 29.45, 31.5 and 30.91 years reported by Chalya et al. [13], Jha et al. [19] and Singh et al. [20] respectively. The higher mean age observed here is likely to be due to the fact that children below the age of 16 years were not included in this study.

The commonest type of vehicle involved in crashes in our study were motorcycles (motorised two wheel vehicles). This is similar to findings by other authors [13,18]. In contrast, other authors [4,19] reported cars as the vehicles most commonly involved in road crashes in their studies. Ours is a suburban health facility and motorcycles form a very important means of transportation which might partially explain the preponderance. This is coupled with the fact that many of the motorcycle riders speed excessively,

are not trained, do not use helmets or other protective gears and seldom observe road safety rules [20].

It was observed that traders and other business persons were the most frequently involved in road crashes in this study. This is similar to the report by Chalya et al. [13], from Tanzania who reported that business persons and students were the most frequently affected. However in other studies, Jha et al. [12] and Maharajan et al. [16] both from India, reported labourers and employees respectively as the most frequent victims of road traffic crashes. In Nigeria, traders and business persons are engaged in frequent road travels to carry out their occupation which might explain the reason for their frequent involvement in road traffic crashes as observed in this study.

This study showed that passengers were the most frequently injured in road crashes constituting about 41%. Similar observations of high passenger involvement have been reported by Emara et al. [8] (40.2%) and Jha et al. [10] (46.6%) from Libya and India respectively. The fact that passengers are usually more in number than drivers of vehicles may explain this. This however, contrasts with the finding by Chalya et al. [13] from Tanzania who reported that 55.4% of the victims of road crashes in their study were pedestrians. The level of development, urbanisation, terrain and road lay-outs including vehicle utilization and safety practices may partially explain this variation.

A reasonable proportion of the victims (30%) in this study think that excess speed and other human factors were responsible for the road traffic crashes. Similar finding was also reported by Mahajan et al. [16]. According to Bun [21], speeding excessively above speed limits and being too fast for the prevailing conditions is an important factor that contributes to road traffic accidents. He further opined that the risk of being injured increases exponentially with speed more than average and that the severity of injury depends on the vehicle speed change at impact and transfer of kinetic energy.

The need for speed restriction among drivers especially those driving commercial vehicles is therefore, imperative.

The WHO advocates a speed limit of 30 km/hr for residential areas and schools [22].

The recent proclamation and implementation of the installation of speed limiting devices in commercial vehicles in Nigeria by the Federal Road Safety Corps is thus a welcome policy that will go a long in reducing carnage in our roads.

The absence of organised pre-hospital care and rescue services in our environment to take care of road crash victims was quite obvious in our findings in this study. Over 95% of crash victims in this study were rescued and brought to the hospital by other road users/passersby, relatives and other 'good Samaritans' using different means of transportation including taxis, buses, pick-up van, trucks and even in some cases motorcycles. One of the five pillars emphasized in the WHO 'Decade of Action for Road Safety (2011-2020)' advocacy policy is the importance of post-crash response which has development of a good pre-hospital care systems for victims of road traffic crash as a major component [7]. It is thus, necessary that government authorities at various levels in Nigeria should develop a well orchestrated pre-hospital care policy for road crash victims in order to save more lives and reduce morbidities and mortalities from traffic injuries.

Various studies have reported different patterns of body injuries resulting from road traffic crashes. The variations are probably to some extent affected by types of vehicle used, level of industrialization and economic advancement of the country including the state of the roads, safety consciousness and the use of safety gears.

Singh et al. [14] observed that the abdomen was the most frequently injured part of the body in road crash victims in their study from India while Chalya et al. [13] from Tanzania, and Vahdat et al. [17] from Iran reported that extremity injuries were more common in their series.

In contrast, the head was observed to be the commonest site of injury in road crash victims who present to us in this study. This is similar to findings by Emara et al. [8] from Libya. This finding is not totally surprising since ours is tertiary centre (this study being hospital based) and patients with more severe injuries tend to present to us. Also observed is that a reasonable percentage (26%) of the presenting victims were unconscious from head injury at presentation which tend also to bring them to a tertiary centre. In addition motorcycles as already observed are a common means of transport here most of them

operating without safety helmets which also increases the risk for head injuries when crashes occur.

Fractures have been observed to be quite common in road crash victims in this study. There were 58 fractures in 88 victims presenting with various injuries from road crashes, the tibia and the fibula being the most frequently fractured bones. This is similar to reports from some other studies [4,20]. In our environment, fracture is one of the major reasons road crash victims present to tertiary hospitals due to its alarming clinical features.

5. CONCLUSION

Road traffic crashes are a largely avoidable cause of trauma with resultant morbidity and mortality in our environment affecting the most economically productive age groups and sex. Excess speed, poor observance of safety rules and other related factors are thought to be responsible for most of these crashes. Injuries to the head/neck region and the extremities with associated fractures are a frequent occurrence. Organised rescue and pre-hospital care are almost non-existent in our environment.

6. RECOMMENDATIONS

It is recommended that vigorous attempts at driver / public education on road safety measures, enforcement of safety regulations including speed limits, building of standard roads and good road maintenance culture should be implemented by governments at various levels in Nigeria.

In addition a well orchestrated pre-hospital plan coupled with the building and equipping of modern trauma care centres will go a long way in reducing morbidity and mortality from injuries sustained in road traffic crashes.

7. LIMITATIONS OF THE STUDY

Being a hospital based study one has to be wary in trying to generalize our findings.

CONSENT

Patients gave consent by agreeing to participate in the study after thorough explanation and education on the essence of the study.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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