

# 1 Determining Injury Severity Amongst Victims of Motorcycle 2 Accidents in Sokoto, North West Nigeria

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## 7 **Abstract**

8 Background: Injuries from motorcycle accidents are a major contributor to mortality and  
9 morbidity in Nigeria. Injuries are varied amongst victim from bruises to severe head injuries.  
10 We therefore sought to determine the degree of severity of injuries sustained by motorcycle  
11 accident victims in our environment. Methodology: A prospective study of motorcycle accident  
12 victims including riders, passengers, and pedestrians was undertaken over a one year period  
13 from January 2012 to December 2012 at the trauma Centre of a tertiary hospital in Sokoto,  
14 North-West Nigeria. Information obtained from the trauma register included the age and sex  
15 of victims, use of protective helmet, and nature of collision, injury severity, determined by the  
16 injury severity scores and outcome.

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18 **Index terms**— injury; severity; score; motorcycle; victims.

## 19 **1 Introduction**

20 The motorcycle has evolved over the years as a means of transportation. In developing countries it serves as a  
21 mode of commercial transportation ferrying passengers from place to place. Their operators are mainly youths  
22 who are untrained and sometimes drive under the influence of alcohol. Safety and security concerns have been  
23 raised by stakeholders and this has led to the total ban of motorcycles as mode of transports in some major  
24 Nigerian cities like Lagos and Calabar. The incidence of motorcycle accident in cities like Lagos and calabar is as  
25 high as 27% 1,2. In Sokoto metropolis, motorcycle accidents constituted 40% of road traffic accidents in 2009 3.

26 In the United States available statistics indicates that motorcyclist are 35 times more likely to experience a  
27 deadly accident on the road than those in passenger car and 11% of all road accidents involves motorcycles 4.  
28 The vulnerability of users of motorcycle as means of commercial transportation makes them a target audience in  
29 injury prevention strategies 5, 6, 7.

30 The pattern of injuries resulting from motorcycle accidents is varied with musculoskeletal and head injuries  
31 being the most common. Sokoto is a cosmopolitan city in Northwestern Nigeria and has a population of 427,760 as  
32 of the 2006 census. Sokoto lacks a public transport system and it is easier to commute by the aid of a motorcycle  
33 as is the case in some Nigerian cities. Patronage of commercial motorcyclist cuts across social economic status  
34 as some do use them to navigate the poor road network and sometimes to beat traffic. Stakeholders in road  
35 safety have raised concerns about the safety of this mode of transportation. Efforts at enforcing safety measures  
36 through the use of crash helmets have been largely unsuccessful. It is against this background we sought to  
37 determine the injury severity in victims of motorcycle accidents in Sokoto, North Western Nigeria.

## 38 **2 II.**

## 39 **3 Methodology**

40 This was a prospective descriptive study of victims of motorcycle accidents carried at the trauma Centre of  
41 a tertiary hospital in Sokoto, North-West, Nigeria over a period of one year from January 2012 to December

## 6 DISCUSSION

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42 2012. The trauma Centre caters for patient from Sokoto metropolis, neighboring cities and states. Trauma  
43 records of victims of motorcycle accidents (MCA) were recorded in a proforma that included the age and  
44 sex, class of victim in terms of rider, passenger or pedestrians. Other information gathered was the nature  
45 of collision motorcycle-motorcycle collision (MMC), motorcycle-car collision, lone motorcycle accidents (LMA)  
46 and motorcycle-pedestrians' collision. The use of helmets amongst rider and passenger, the injury severity score  
47 and outcome were also recorded. The injury severity score (ISS) system is a process by to a single number. It is  
48 an anatomical scoring system and can be determine by the attending casualty doctor. Each injury was assigned  
49 an abbreviated injury scale (AIS) in the six body region of Head and Neck, Face, Chest, Abdomen, Extremity  
50 and External. AIS range from 1 to 5 depending on the severity of injury. Minor injuries were assign 1, moderate 2  
51 and severe 5. The 3 most severely injured body regions have their scores squared and added together to produce  
52 the ISS. The least ISS is 1 and the highest is 75. Score reflective of injury severity include 1 to 9 as Minor, 10 to  
53 15 as Moderate, 16 to 24 as Moderate to Severe and 25 an above as Severe to critical.

54 Statistical analysis was done with SPSS 17 and results presented as graphs.

### 55 4 III.

### 56 5 Results

57 A total of 803 victims of motorcycle accidents were seen over the 12 months period with majority of victims in  
58 the age range of 21-30 years representing 44.3% follow by those within the age range of 11-20 and 31-40 with  
59 21% and 15% respectively as shown in figure 1. Time of arrival in hospital from the accident site showed that  
60 79.8% of victims arrived at the hospital in less than 2 hours while 20.2% arrived between 2 to 6 hours. The  
61 male to female ratio is 7:1. Most of the accidents occurred in the months of October 13.8%, May 13.2%, June  
62 11.7% and April 11.0 % as shown in figure ???. Fifty-five per cent of victims were the riders while passengers and  
63 pedestrian constituted 34.8% and 9.8%. The nature of accident was such that 43.6% were victims of motorcycle  
64 versus motorcycle collision while 24.2% were victims of lone motorcycle accidents. Lone motorcycle collisions  
65 are crashes with stationary objects or where there is loss of control. Victims from motorcycle and car collision  
66 were 21.9 %. Motorcycle-pedestrian collision resulted in 10.3% of victims. None of the riders and passenger used  
67 protective helmet. Eighty-one per cent of victims had injury severity score ISS of 4 and below while the highest  
68 ISS of 29 was seen in one victim as shown in figure ???. Eighty four per cent of victims were treated and discharge  
69 while nine victims died. Twelve per cent of victims were admitted for further management while 3% signed and  
70 left against medical advice.

71 IV.

## 72 6 Discussion

73 Majority of our patients were below 40 years with a peak at 21-30 years and this was similar to findings in North  
74 Central Nigeria 8. These are the productive age group in the society: and with increasing unemployment the  
75 business of commercial motor transportation becomes a ready alternative. There was a preponderance of male  
76 victims as is in some other studies 1, 5, 8.

77 The female victims are either passengers or pedestrian as none was a rider. The practice of commercial  
78 motorcycle transportation is usually the exclusive preserve of the men. Sociocultural and religious considerations  
79 are major determinants of economic adventures in this part of the world.

80 Majority of the victims arrived at the Centre within 2 hours and delays usually results from the absence of  
81 ambulance service and lack of a prehospital emergency preparedness plan 9. It is also not unusual to have delays  
82 from arguments among riders and drivers of commercial vehicles trying to establish who is at fault rather than  
83 see to the rescue of affected victims to hospital.

84 Our study noted that the highest numbers of patients were seen at the beginning and in the peak of the dry  
85 season. Rain and poor weather conditions affect outdoor activities and for motor cycle transport business, this  
86 may be far reaching. This could explain the increased numbers seen during the dry season.

87 Majority of the victims were the riders while most victims were from a motorcycle to motorcycle collision. This  
88 goes to show the level of training and recklessness of some of these riders. The business of commercial motorcycle  
89 transportation is an all comers affair. Riders are not licensed and they do not have regards for road signs. In  
90 a study in Ilorin, North central, Nigeria, motorcycle-vehicle collision produced the largest amount of victims  
91 10. The number of victims was almost twice as high in motorcycle-motorcycle collision as in motorcycle-vehicle  
92 collision in our study. This may be an indication that the numbers of motorcycle plying the roads are high. This  
93 may also be an indication of the level of impatience associated with some of these riders. Reasons adduced for  
94 the high number of motorcycles on our roads include cheaper cost of acquisition compared to cars, increasing  
95 fuel cost and sometimes these motorcycles are given out to youths as gratifications by politicians. Other reasons  
96 are that most of our cities lack good road network and public transport system and for the inpatient individuals  
97 the motorcycles serves as a means of navigating traffic 10, 11, 12.

98 Another worrisome trend is the number of victims from lone motorcycle accidents. From the mechanism  
99 described earlier it shows that some of these riders are either under the influence of drugs or they are too reckless  
100 or they are not trained. Studies in Zaria, a city about 450 km South-east from our study city indicated a high  
101 prevalence (59.5%) of use of psychoactive drugs amongst motorcycle riders involved road traffic accidents13.

102 The use of helmet has been a difficult safety measure to enforce in most Nigerian cities especially in the  
103 northern part where cultural and religious reasons have been adduced for their non-compliance. While the as a  
104 result of legislation, that cannot be said of developing countries. A study in Thailand showed a high number of  
105 helmet use in riders of about 60% while only 28% of passengers reported they always wore helmet 14. Reports  
106 from some Nigerian cities show the near absence of helmet use either by the riders or passengers 10, 15.

107 Majority of the victims had injury severity that was termed minor and this includes bruises and lacerations.  
108 About half of the victims were from a motorcycle-motorcycle collision and this could explain the severity of the  
109 injuries sustained. MMC results in low energy collision while injuries sustained from a motorcycle-car collision  
110 or from a lone crash or motorcycle-pedestrian collision are likely to be more severe because of the seemly high  
111 energy involved. In all the events, the rider and passenger are vulnerable in the crash because of their lack of  
112 protection. It should be noted cases of fatality from motorcycle accidents occurring at the scene of the accident  
113 were not included in the study, hence the injury severity that appears to be low only tells of those that were  
114 rescued to hospital.

115 Traumatic brain injuries (TBI) and thoracic trauma as well as abdominal injuries are common fatal injuries  
116 sustained in motorcycle accidents 12, 15, 16. While these major traumatic events can be handled in developed  
117 countries with established pre-hospital care, thus reducing mortality to the least, the same cannot be said of  
118 poor and developing countries with absent prehospital care. Deaths from secondary brain injury and hemorrhage  
119 occur from delays in accessing health care and inappropriate triage 11, 16.

120 The injury severity score system was used to assess the degree of injury sustained, the limitation of this  
121 anatomic based system is that it does not reflect the seriousness of the injuries. It was however chosen because  
122 of the simplicity of scoring as various officers were involved.

123 Mortality was quite low and this may be a reflection of the degree of severity and the fact that a dedicated  
124 Centre is involved in the care of traumatic surgical emergencies.

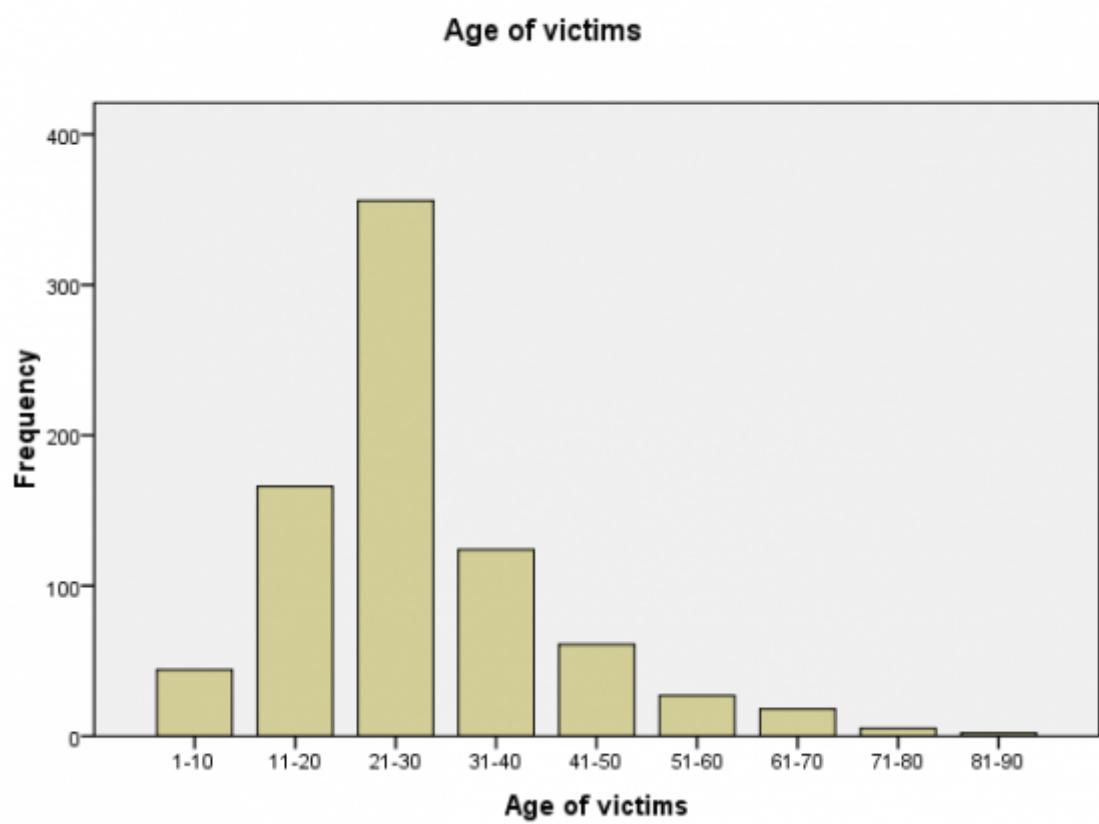
125 V.

## 126 **7 Conclusion**

127 The study found out that injury severity amongst victim of motorcycle accident can be categorize as minor, the  
128 large number of victims however shows that commercial motorcycle transportation is inevitable in developing  
129 society like ours. Regulation of motorcycle riders in terms of licensing, numbers, education and enforcement of  
use of helmet can reduce the number of motorcycle accidents.



Figure 1: Figures



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Figure 2: Figure 1 :

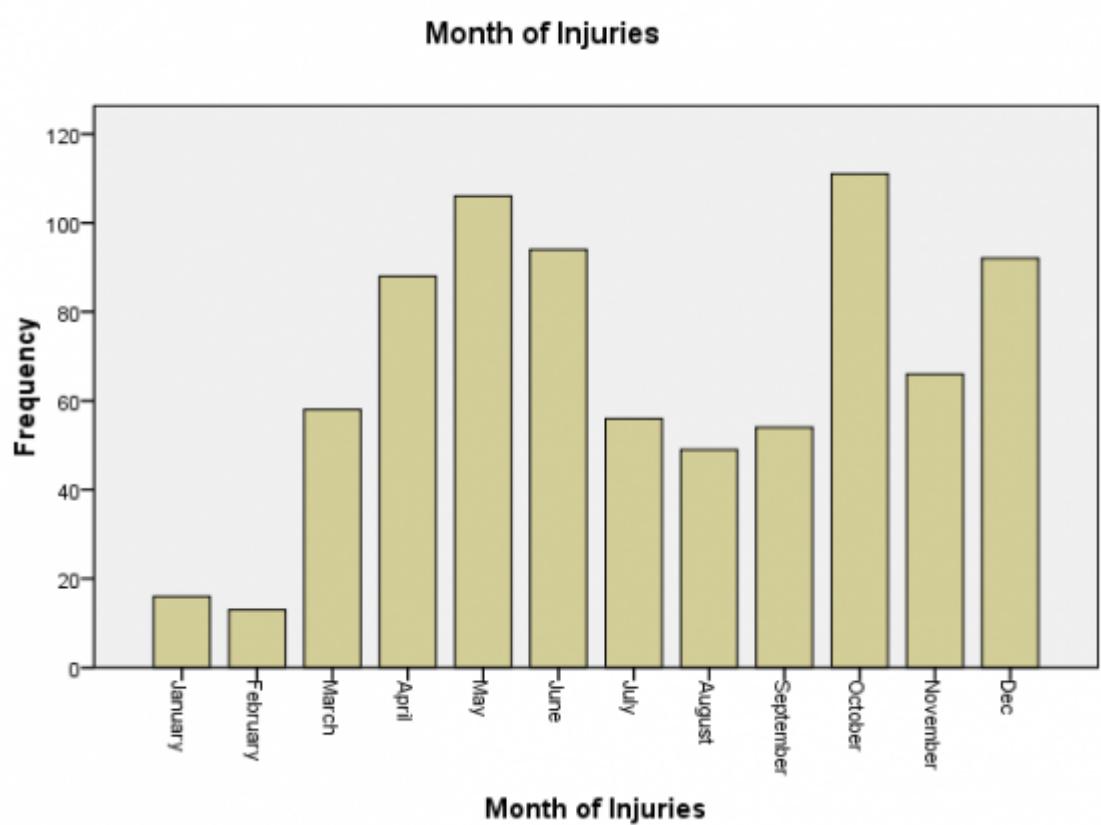


Figure 3:

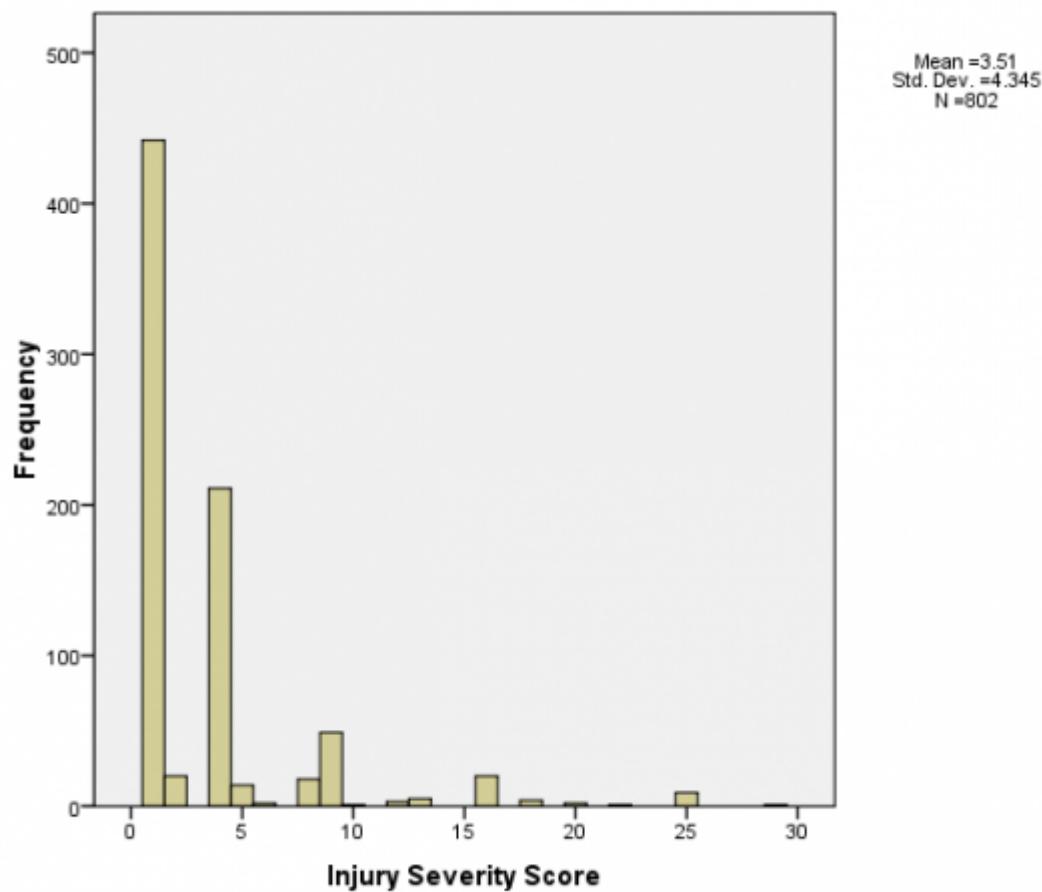


Figure 4:

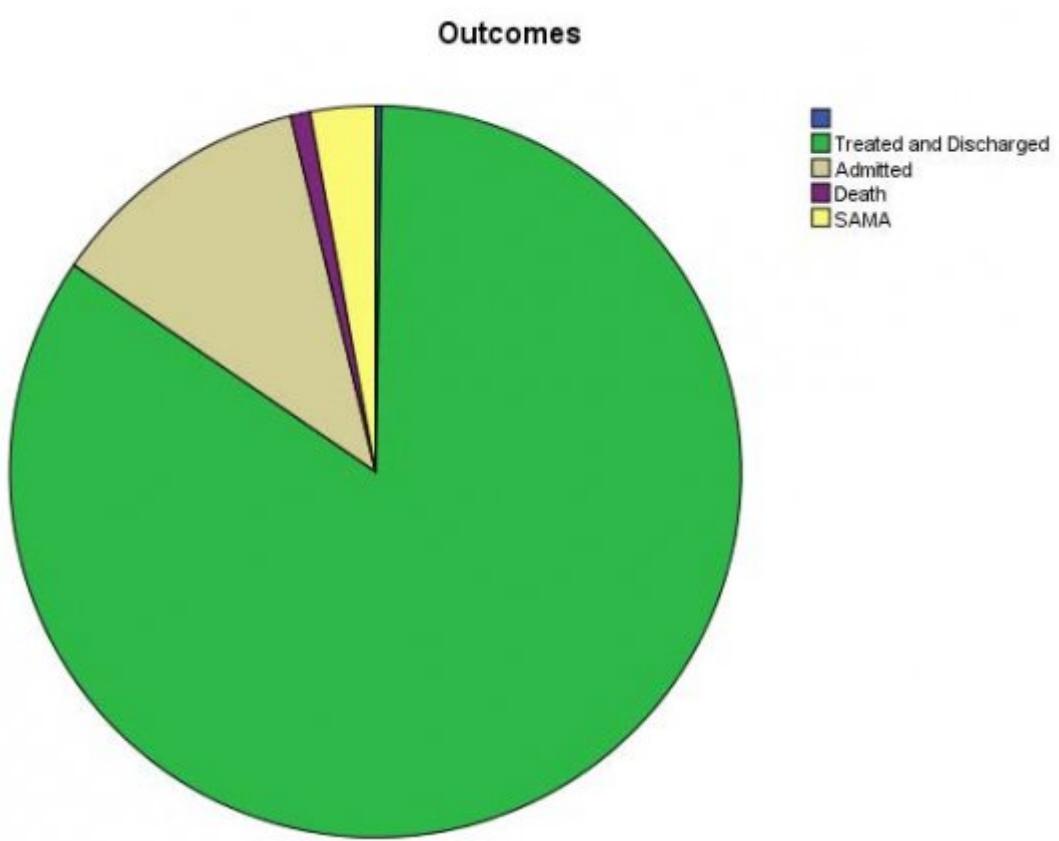


Figure 5:

## **7 CONCLUSION**

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131 [Jiwattanakulpaisarn et al. ()] 'Does law enforcement awareness affect motorcycle helmet use? Evidence from  
132 urban cities in Thailand'. P Jiwattanakulpaisarn , K Kanitpong , S Ponboon , N Boontob , P Aniwattakulchai  
133 , S Samranjit . *Global Health Promot* 2013. 20 (3) p. .

134 [Oyemade ()] 'Epidemiology of road traffic accidents in Ibadan and its environs'. A Oyemade . *Nig Med J* 1973.  
135 3 p. .

136 [Umebese and Okukpo ()] 'Motorcycle accidents in a Nigerian university campus: a one year study of the pattern  
137 of trauma sustained in University of Benin Campus'. Pfa Umebese , S U Okukpo . *Nig J Clin Pract* 2001. 4  
138 p. .

139 [Adegbehingbe et al. ()] 'Motorcycle associated ocular injuries in Ile-Ife'. B O Adegbehingbe , K S Oluwadiya ,  
140 O O Adegbehingbe . *Nigeria. African Journal Trauma*2004. 2 p. .

141 [Solagberu et al. ()] 'Motorcycle injuries in a developing country and the vulnerability of riders, passengers, and  
142 pedestrians'. B A Solagberu , Ckp Ofoegbu , A A Nasir , O K Ogundipe , A O Adekanye , Abdur-Rahman  
143 Lo . *Injury Prevention* 2006. 12 p. .

144 [Nwadiaro et al. ()] 'Motorcycle injuries in North-Central Nigeria'. H C Nwadiaro , K K Ekwe , I C Akpayak ,  
145 H Shitta . *Niger J Clin Pract* 2011. 14 (2) p. .

146 [Oluwadiya et al. ()] 'Motorcycle limb injuries in a developing country'. K S Oluwadiya , I M Oginni , A A  
147 Olasinde , S O Fadiora . *West Afr J Med* 2004. 23 (1) p. .

148 [Pan American Health Organization: Deaths from motor vehicle accidents in selected countries of the Americas *Epidemiol Bull* ()  
149 'Pan American Health Organization: Deaths from motor vehicle accidents in selected countries of the  
150 Americas'. *Epidemiol Bull* 1985-2001. 2004. 25 (1) p. .

151 [Zarga et al. ()] 'Pattern of motorcycle-related injuries in Tehran'. M Zarga , A Khaji , M Karbakhsh . *East  
152 Mediterr Health J* 1990 to 2000. 2006. 12 (1/2) p. . (: a study in 6 hospitals)

153 [Odelowo ()] 'Pattern of trauma resulting from motorcycle accidents in Nigerians: a two-year prospective study'.  
154 Eoo Odelowo . *Afr J Med Med Sci*1994. 23 p. .

155 [Nzegwu et al.] *Patterns of morbidity and mortality amongst motorcycle riders and their passengers*, M A Nzegwu  
156 , J U Aligbe , A A Banjo , C O Nzegwu . Benin-city.

157 [Solagberu et al. ()] 'Pre-hospital care in Nigeria: a country without emergency medical services'. B A Solagberu  
158 , C K Ofoegbu , L O Abdur-Rahman , A O Adekanye , U S Udoffa , J Taiwo . *Niger J Clin Pract* 2009. 12  
159 (1) p. .

160 [Alti-Muazu and Aliyu ()] 'Prevalence of psychoactive substance use among commercial motorcyclists and its  
161 health and social consequences in Zaria, Nigeria'. M Alti-Muazu , A A Aliyu . *Ann Afr Med* 2008. 7 (2) p. .

162 [Oboirien et al. ()] 'Trauma incidence in Sokoto'. M Oboirien , S Ismail , P S Agbo . *Nigeria Journal of  
163 Orthopaedics & Trauma* 2011. 10 (2) p. .