

## Epidemiological Patterns of Head Injury in Bauchi, North-Eastern Nigeria

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### Abstract

**Introduction:** Head injury is the leading cause of death and disability among young adults. It constitutes close to 50% of all injuries. Data have shown that a significant proportion of the world's population, over 57 million are living with neurological sequelae of head injury. The study aimed to describe the epidemiology of head injury in a center with no previous neurosurgical services in North Eastern Nigeria.

**Materials and Methodology:** A prospective study that involved all patients managed with head injury between September 2018 and August 2019. Demographic, clinical radiological details obtained and patients categorization made using Glasgow coma scale (GCS) and the treatment offered based it. The outcome was measured with Extended Glasgow Outcome Score (GOSE). Descriptive statistics were obtained Mean Standard deviation SD, Frequencies, Percentages.

**Results:** Eighty-four percent were males with male to female ratio of 5:1. The most prevalent cause of head injury was road traffic accident (89%). Moderate of head injured patients were the majority (42%) while 59% of the patient has injury severity score (ISS) of  $\geq 25$ . Favourable outcomes were recorded in most of the patients (89%).

**Conclusion:** The burden of head injury on patients, patient's relatives/care-givers and health care services in our environment is worrisome though our study recorded favourable outcomes in most of the patients. Public health awareness is the key to prevention.

**Keywords:** Trauma; Head Injury; Pattern

### Introduction

Head injury (HI) is defined as physical damage to the brain or skull caused by external forces [1]. It encompasses a wide variety of injuries with differing severities, ranging from trivial head wounds to traumatic brain injuries (TBIs).

Head injuries have been shown to constitute almost 50% of all injuries. Head injuries are a major cause of loss of life and disabilities among young adults [2-4]. Head injury has caused more than 57 million people in the whole world to be living with the neurological problem as sequelae of traumatic brain injury (TBI), in which 10 million people require hospital based care [5].

TBIs are significant causes of deaths and disability irrespective of age groups. Data from the epidemiological findings from the last ten years, have helped to put forth some effective preventive measures, such as the most appropriate health care provision for both acute care and rehabilitation of disabled survivors [6]. Head injury accounted for over 60% of in-hospital trauma deaths. TBI is higher in North America and Europe. On average, 2.8 million people had a TBI annually [6]. TBI also affected the economy of the countries, produced some financial losses, and reduced the productivity. Almost US\$60 billion was used to overcome the damages of TBI in year 2000 [7,8].

In Nigeria, head injury was observed to be the most common among all injuries [9]. An incidence rate of 2710/100,000 per year has been reported in a Nigerian study [10]. Among Malaysians, 4.75% of emergency patients had head injuries [11]. Another study stated that 69 million individuals worldwide were estimated to suffer from TBI [12]. The estimated population incidence of traumatic brain injury in the United States was 73.5/100,000. It was reported that head injuries were most common among young adult [13,14].

In the developing nations, including Nigeria, head injury is on the increase due to increasing incidence of road traffic accidents. Though other regions in our country has data on epidemiology of the traumatic brain injury. The commencement of standard neurosurgical services in this center to patients from various states across North Eastern part of the country will add to the data on epidemiology of traumatic brain injury in Nigeria.

### Aim of the Study

The aim of this study was to investigate and describe the epidemiology of TBIs in our facility, which is in North Eastern Nigeria.

### Methodology

This was a prospective study of patients admitted with traumatic brain injury who met inclusion criteria. Abubakar Tafawa Balewa University Teaching Hospital, Bauchi is a tertiary hospital located in Northeastern part of Nigeria with neurosurgical services being rendered to her primary and referred patients from within and neighboring states. The study was approved by the ethics committee of our institution, and the principles of the Helsinki declaration were observed during data collection.

The study included all patients with head injuries managed between September 2018-August 2019. The variables gathered for the study included patients' age, gender, etiology, time of presentation, the severity of injury (based on Glasgow coma scale, GCS), haematological and radiological investigations, treatment offered and the outcome using Extended Glasgow Outcome Score (GOSE). The severity category was based on the assessment of GCS 14 - 15 was regarded as mild TBI, GCS 9 - 13 as moderate TBI, and GCS ≤8 as severe TBI.

Data were analysed with the SPSS Version 20 software. Descriptive statistics were obtained Mean Standard deviation SD, Frequencies, Percentages.

## Results

A total of 537 patients with head injury were managed within the study period. We observed that the Mean  $\pm$  SD of age was 37.02  $\pm$  17.21. Figure 1 showed the age ranges of the study group, the age group with the highest number of patients (20%) is 21-30yrs while those in the first five decades of life accounted for 80.4%. There were 451 (84%) males and 86 (16%) females with ratio 5:1 (Table 1).

Table 1 showed that 83.3% of the patients presented primarily to our facility, Car was the major mode of transportation of these patients (76.5%) and most of the patients (74.7%) presented within the first 12hrs of the injury.

Variables	N (%)
Gender	
Male	451 (84)
Female	86 (16)
Mode of presentation	
Referral	87 (16.2)
Primary	450 (83.8)
Mode of transportation	
Tricycle	54 (10.1)
Van	21 (3.9)
Car	411 (76.5)
Ambulance	51 (9.5)
Time of presentation	
< 12hrs	401 (74.7)
>12 - 24hrs	80 (14.9)
>24hrs	56 (10.4)

**Table 1:** Demographic and basic variables of patients in this study.

### In-Hospital clinical assessments' findings

Road traffic accident accounted for 84.9% of all the causes of head injuries in this study, assault was second with 6.1% while 2% was due to Gunshot (Figure 2). The accidents that were related to motor vehicular accident, about 41% were Car passengers, while those related with Motorcycle, motorcyclist and motorcycle passenger were affected equally with 19% each (Figure 3). There were (134) 25% mild, 223 (41.5) moderate and 180 (33.5) severe head injuries. Three hundred and fourteen patients had injury severity

score (ISS)  $\geq 25$  while Brain CT Rotterdam score of  $\geq 3$  was seen in 192 (35.8%) patients as shown in table 2.

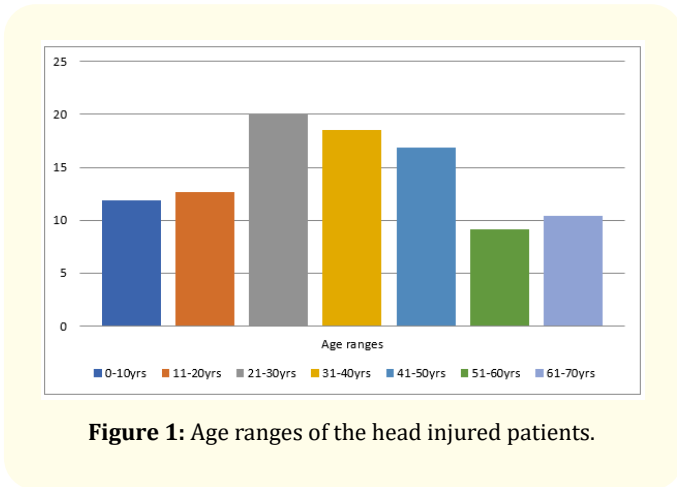


Figure 1: Age ranges of the head injured patients.

**IN-Hospital care and outcomes**

Four hundred and forty-four patients (82.7%) were managed non-operatively while 93 (17.3%) patients had operative intervention. The outcomes in this study were measured using Extended Glasgow outcome score (GOSE) which showed 61 (11%) had poor outcome (Death, vegetative, lower and upper disability) and 476 (89%) had good outcome (moderate and full recovery) as shown in table 3.

Outcome(GOSE)		Proportions N = 537 (%)
Poor Outcomes	Death	55(10)
	Vegetative	0(0)
	Lower severe disability(LSD)	6(1)
	Upper severe disability(USD)	0(0)
Good Outcomes	Lower moderate disability(LMD)	81(15)
	Upper moderate disability(UMD)	36(7)
	Lower good recovery(LGR)	85(16)
	Upper good recovery(UGR)	274(51)

Table 3: Outcomes of head injuries.  
GOSE: Extended Glasgow Outcome Score.

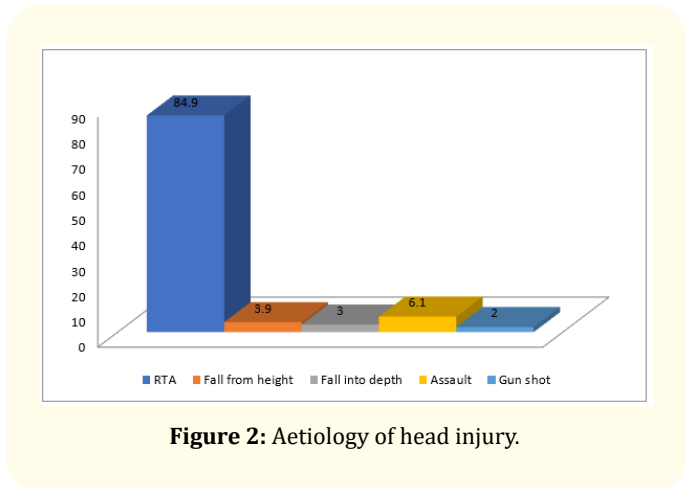


Figure 2: Aetiology of head injury.

Variables	N (%)
Glasgow Coma Score (GCS)	
Mild (13-15)	134 (25)
Moderate (9-12)	223 (41.5)
Severe (3-8)	180(33.5)
Injury Severity Score (ISS)	
ISS 1-24	223 (41.5)
ISS $\geq 25$	314 (58.5)
Brain CT Rotterdam Score	
1-2	345 (64.2)
$\geq 3$	192(35.8)

Table 2: Severity of the injury.

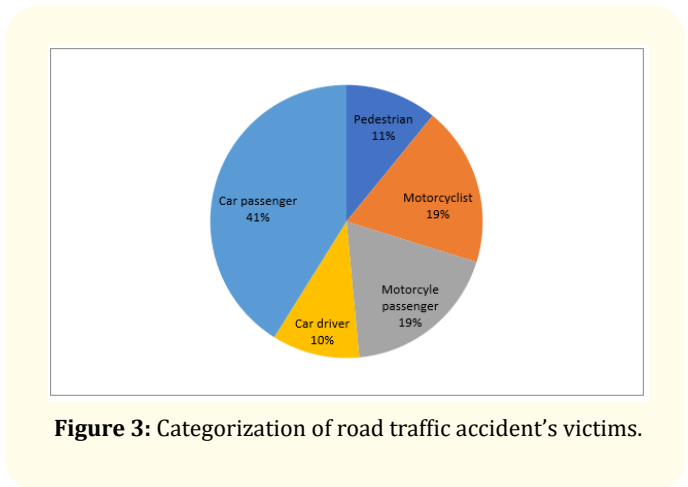
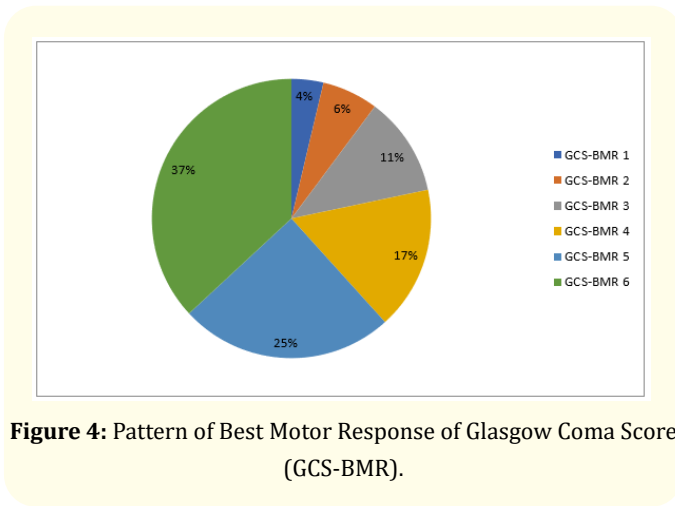


Figure 3: Categorization of road traffic accident's victims.



**Figure 4:** Pattern of Best Motor Response of Glasgow Coma Score (GCS-BMR).

### Discussion

Head injury is now an emerging epidemic and it is growing public health concern. The consequences of head injury among patients and their relatives are devastating, these challenges ranges from emotional, psychological and financial burden on the part of the caregivers’ while residual disabilities and poor quality of life by the survivors.

The majority of the patients from our study were young adults in their first five decades of life, which is the productive age. These findings are comparable with previous studies that reported high incidence of head injuries in young adults [9,10,15-18]. The peak incidence of head injury in this study was in 21 - 30 years which is in contrast with US study that reported high incidence among 15 - 19 years. Male preponderance of 5 :1 as seen was in keeping with report from other studies [6,10,15-18]. In our settings, males are the breadwinner while the young adults represent the economically active population and because of these, they are more engaged in activities involving movement from one place to another and participate in high risk activities which includes car or motorcycle riders. With the recent increase in insecurities; insurgency, banditry etc, they are more predisposed to having head injury than any other group of the population.

Road traffic accident was found to be the most prevalent cause of head injuries in our study which is similar to findings in our previous studies within and outside our countries [10,14,16,18-21]. However, these findings were in variance from reports from developed countries, where fall was reported to be the commonest

cause of head injuries [17,22-24]. This disparity in findings could be due to difference in geographical location, lower rate of RTAs, good road networks, well developed and organised transport system and good observance of traffic rules. In our study area, the bad road networks, poorly developed transport system and poor compliance with the standard traffic measures have increased the risks of head injuries. Assault, fall, gunshot were the other causes of head injuries observed which have been reported in other studies [6,10,18,19,22,25]. Assault and gunshot injuries are on the increase in our environment, this is not surprising due to increase in waves of insurgencies, banditry, communal and interpersonal related violence experiencing.

Motor vehicular accidents were leading cause of road traffic accidents leading to head injuries in this study and other similar studies across the globe [16,25,26]. This finding is in variance with the study by Emejulu., *et al.* in South Eastern part our country which reported motorcycle accidents as the commonest cause of road traffic accidents [10]. Pedestrian and fall (from height or into depth) related head injuries were common among children, this finding in our study is in conformity with studies by Emejulu., *et al.* [10] and Sharma., *et al.* [27]. It is worrisome that children are most affected in pedestrians and fall related head injuries while this could be attributed to various factors; poor supervision, negligence of parents and caregivers, poor parental care and street hawking/begging. Other factors proffered to the involvement of children in pedestrians related road traffic accidents includes; risk behaviours, immature cognitive functions and lack of physical coordination [28,29].

The most prevalent head injury in this study is Moderate head injury (41%) which is in contrast with report from some studies which have reported Mild head injury as the most prevalent [10,18,30] while Ibrahim., *et al.* reported severe head injury as the most prevalent in their study [31]. Though more studies have shown higher prevalence of mild head injury than any other types of head injury, these disparities across studies may be difficult to explain but different geographical region and degree of impact/mechanism of injury may be responsible.

Our study fatality rate of 10% falls within the 19.8%, 5.5% and 6.8% fatality rates of three studies conducted in another region of our country [10,15,18]. East African study by Chalya., *et al.* reported fatality rate of 11.2% which is also comparable with our find-

ings. Surprisingly another study from East Africa reported a fatality rate of 56.2% [32]. It is worth to note that all the studies that reported comparable fatalities with our study had mild head injury as the most prevalent head injury while the high fatality rate from other study can be explained by severity of head injury and other patients' characteristics.

## Conclusion

The risk factors for head injury in North Eastern part of Nigeria includes; male gender, young adults under 50yrs, road traffic accidents, insurgencies, farmer-herders' crisis ethnic/communal and interpersonal violence. Road traffic accident is the major causes of head injury. However, Motor vehicular, motor cycle and pedestrians related accidents are in order of most to less prevalent categories in road traffic accidents. The most active and productive adult in our environment were mostly affected with attending economic burden in the society. Our study recorded significant favourable outcomes, while our morbidity and mortality were comparable to findings of studies from other regions in our country.

The need for concerted public health efforts by the government and non-government organisations should be activated to prevent head injury, the leading cause of death and disability among the productive age groups in our society. Advocacy, enforcement of road safety rules and provision of good road infrastructure and standard public transport system are the keys to curb this scourge in our environment.

## Conflict of Interest

No conflict of interest.

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