

## The Trends and Projections of Head Injuries at Sunyani Teaching Hospital, Ghana, West Africa: A 3-Year Retrospective Study

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### ABSTRACT

**Introduction:** Head injuries are a major public health problem with high morbidity and mortality. Sunyani Teaching Hospital is a major referral hospital in the Bono Region, making it an ideal location to study head injury trends and treatment outcomes. The study retrospectively analysed cases of head injuries from 2022 to 2024, examining demographic patterns, etiological factors, and anticipated future trends.

**Objective:** The study aims to examine and predict trends of head injuries at Sunyani Teaching Hospital and identify factors such as the leading causes, types of injury, and treatment outcomes.

**Methods:** A retrospective, cross-sectional, descriptive design was employed, utilising patient records from the accident and emergency department. Statistical Package for the Social Sciences was used for analysis in comparison of demographic profiles, causes, results of treatment, and trends, with 2025 and 2026 projections forecasted by using forecasting formulas. Ethical permission was gained, and confidentiality was maintained.

**Results:** Among the 114 cases carefully selected, 84.2% were male and had a mean age of 33 years. The age group most impacted was 21–30 years (36.8%). The leading cause was road traffic accidents (74.6%), followed by falls (11.4%) and assault (7.9%). The most common type of injury was laceration (59.7%), and intracranial fracture was rare (0.9%). Discharges were 81.6%, referral was 11.4%, and death was 5.3%. Data indicated a rising trend in cases, with projections indicating more increases in 2025 and 2026, particularly in May, August, and the last quarter.

**Conclusion:** The study documented a rising incidence of head injuries among young males, disproportionately caused by road traffic accidents. Upgrading road safety measures, public awareness, injury prevention measures, and trauma care facilities must be done to help contain and reverse this trend. Policymakers need to consider demographic susceptibilities in resource allocation and preventive interventions.

### Keywords

Trends, Projections, Head injury, Sunyani Teaching Hospital.

### Introduction

#### Background of the Study

Head injuries are a leading cause of morbidity and mortality worldwide [1,2]. Every year, injuries caused by violence, road traffic accidents, falls, drowning, and burns, among others, result

in over 5 million deaths in the world [3]. Sub-Saharan Africa is a region with some of the highest rates of injuries in the world and limited prehospital and rehabilitation care [4]. In Ghana, they are a major public health concern, with the incidence often linked to road traffic accidents, falls, and violence [2]. Also in Africa, Tanzania is one of the countries with high rates of road traffic accidents [1]. Nearly 2000 people are killed annually in road crashes, and about 9% of the fatal crashes are head-on collisions

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[5]. According to Gerritsen H [6], patients presenting with head injury in primary care challenge general practitioners (GPs) to differentiate between those who may be reassured and those who are at risk of serious intracranial injury. Intracranial injuries such as epidural and subdural haematomas or skull fractures may lead to death or permanent damage if left untreated. In Europe, the annual incidence of head injury presenting in hospital emergency departments (EDs) is 2.3 per 1000 person/years [6]. The greatest burden of injury occurs in low and middle-income countries (LMICs), which collectively account for most of all injury deaths [7]. In developed countries, severe head injury, with or without peripheral trauma, is the commonest cause of death and/or disability up to the age of 45 years [8]. In England, it has been estimated that 6.6% of those attending Accident and Emergency in any given year have a head injury, and over 100,000 people are admitted consequently [9]. According to Frank Baiden [10], much of the literature on head injury (HI) prevalence comes from high-income countries (HICs), despite the disproportionate burden of injuries in low to middle-income countries. The Sunyani Teaching Hospital, located in the Bono Region of Ghana, is a key referral centre that handles numerous cases of head injury, contributing significantly to understanding the trends and projections in the region. Despite the widespread occurrence of these injuries, comprehensive data specific to the Sunyani Teaching Hospital is limited. This necessitated an in-depth analysis of the trends and projections of head injury at the Sunyani Teaching Hospital.

### **Problem Statement**

The incidence of head injuries in Ghana has been on the rise due to increased traffic, construction activities, and interpersonal violence. However, the trends and the factors that contribute to the high rate of head injuries at Sunyani Teaching Hospital are under-researched. Without robust data on the trends and causes of head injuries in the region, it is difficult to formulate effective prevention and management strategies. This study seeks to fill this gap by investigating the trends and projections of head injuries at the hospital.

### **Aim**

This study aims to examine and project the trends of head injuries at Sunyani Teaching Hospital and identify associated factors.

### **Specific Objectives**

The specific objectives of the study are to:

1. Examine and project the trends of head injuries at Sunyani Teaching Hospital between 2022 and 2024.
2. Identify the demographic characteristics (age, gender, occupation) of patients with head injuries.
3. Analyze the leading causes of head injuries (e.g., RTAs, falls).
4. Assess the mechanism of head injury and types of head injuries
5. Examine the treatment outcomes (discharged, transferred, or deceased) of patients with head injuries.

## **Method and Materials**

### **Research Design**

This study used a retrospective, cross-sectional and descriptive design to assess the trends and projections of head injuries at Sunyani Teaching Hospital. Data was collected through patient records from the health information management department at the hospital.

### **Research Setting**

The study was conducted at Sunyani Teaching Hospital, which is one of the major hospitals in Ghana serving the Bono Region and beyond, as it is the leading referral centre and busiest hospital in the area. The hospital has standard facilities in terms of infrastructure. The geographical location of the hospital, the road network of the country and the commercial and cosmopolitan nature of the region make the hospital accessible to all the areas that share boundaries with the region and others farther away. Within the hospital, there is the health information management department, where data about head injury patients will be collected. Considering data diversity, the population of patients will be diversified since the hospital receives different patients all over the region and others farther away, hence a good reason for the selection of the hospital.

### **Study Population**

The study population included all patients who were admitted to Sunyani Teaching Hospital with a diagnosis of head injury over the 3 years.

### **Sample Size**

The sample size was determined based on the average number of head injury cases admitted annually to the hospital.

### **Sampling and Participant Selection (Inclusion and Exclusion Criteria)**

The study participants included patients of all ages and genders diagnosed with head injury during the 3-year study period. Based on available health records from the health information management departments, all patients who were not diagnosed with head injury or patients with incomplete medical records or missing data on head injuries within the 3-year study period were excluded from the study. Hence, patient data were retrieved and analysed retrospectively.

### **Tools for Data Collection**

The health information management departments of Sunyani Teaching Hospital have well-documented data on patients with head injury at the facility. The data was then collected using a structured tabular format with all patients' details from the hospital records and analysed.

### **Procedure/Method**

The researcher reviewed patient records to collect data on demographic factors, causes of head injuries, and clinical outcomes.

## Data Analysis Method

Data was analysed using statistical software such as SPSS to compute descriptive statistics, including prevalence rates, and to perform correlation tests to identify associations between demographic factors and injury severity. To generate forecasts for the years 2025 and 2026, a forecast estimation formula was employed. Initially, the average growth was calculated by subtracting the value in 2022 from the value in 2024 and dividing the result by two, thereby yielding a linear growth rate. Subsequently, the forecast for 2025 was derived by adding the average growth for each month to the values in 2024. Similarly, the forecast for 2026 was determined by adding the average growth for each month to the values in 2025. The leading causes of death and types of injury were identified by ranking categories based on percentages, and various figures were generated from the ranked data.

### 1. Trend per month (linear growth)

For each month, we calculated the annual growth using this formula: Average Growth (Value in 2024- Value in 2022)/2

(This assumes linear growth over 2 years: 2022 to 2024)

### 2. 2025 Forecast

Forecast<sub>2025</sub> = Value<sub>2024</sub> + Average Growth

### 3. 2026 Forecast

Forecast<sub>2026</sub> = Forecast<sub>2025</sub> + Average Growth

Values: 2022: 0; 2024: 2

Step1: Growth

Growth<sub>Jan</sub> = (2-0)/2 = 1

Step 2: Forecast 2025

Forecast<sub>2025</sub> = 2+1 = 3

Step 3: Forecast 2026

Forecast<sub>2026</sub> = 3+1 = 4

## Results

A total of 11,108 cases were reported to the Accident and Emergency Department of Sunyani Teaching Hospital within the study period. Of these, 114 cases were carefully assessed and included in the study. The majority (84.2%) of these patients were males, and only 15.8% were females. The age range of these patients was 2–89 years, with a mean age of 33 years and a standard deviation of 16 years; more than a quarter (36%) were within the ages of 21-30 years. Approximately 21.1% were within the ages of 31-40 years, with only 5.3% being 60 years and above. The study was dominated by patients who were not insured under the national health insurance scheme (NHIS) or any private insurance. Only 33.3% of respondents were insured. Close to half (42/1 %) of the patients had not been to school, with 25.4% attending basic school. Only 9.7% had a tertiary education. Concerning employment, about half (51.8%) were unemployed and more than a quarter (39.5%) were self-employed. Only 8.8% of the patients were formally employed. These are shown in Table 1.

Variable	Freq.(n=114)	Percent
<b>Age groups</b>		
0 -10yrs	9	7.9
11 - 20yrs	7	6.1
21 - 30yrs	42	36.8
31 - 40yrs	24	21.1
41 - 50yrs	16	14.0
51 - 60yrs	10	8.8
>61yrs	6	5.3
<b>Mean age / St dev</b>	<b>33yr/ 16.0</b>	
<b>Gender</b>		
Male	96	84.2
Female	18	15.8
<b>Employment status</b>		
Unemployed	59	51.8
Self-Employment	45	39.5
Civil Servant	10	8.8
<b>Educational level</b>		
Tertiary	11	9.7
None	48	42.1
Basic	29	25.4
High School	26	22.8
<b>Insurance Status</b>		
No	76	66.7
Yes	38	33.3

## Trends and Projections of Head Injuries in the Sunyani Teaching Hospital

This study covers the period from January 2022 to December 2024. The results of the study are indicated in the Figure 1 below.

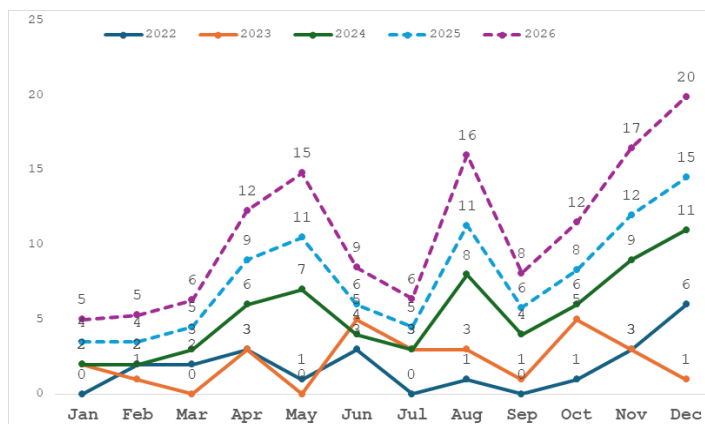


Figure 1

Findings from this study revealed an uptrend of head injuries in 2022, with minimal records in January, July, and September. With similar patterns in early 2023, there was a surge in June and a declining trend towards the end of the year. In 2024, there was another surge in May, August, and the last quarter of 2024. Based on existing data patterns, 2025 and 2026 were projected to have an increase in the number of cases, indicating a continuous upward trend, with estimates for May, August, and the last quarter of the year.

## The Leading Cause of Head Injury

The study sought to determine the leading cause of head injuries in the study site, and the results are indicated in Figure 2 below.

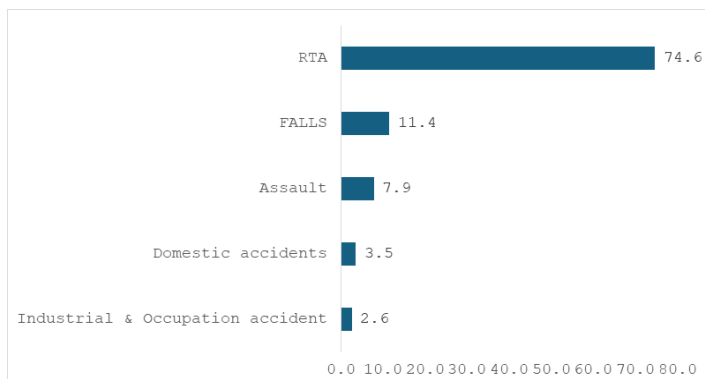


Figure 2

The results of the study revealed that the majority (74.6%) of all cases were attributed to road traffic accidents (RTA). It was observed that about 11.4% were a result of falls and 7.9% were assaulted. Only 2.6% of the cases recorded were a result of industrial and occupational accidents.

## Injury Type

This study assessed the injury type from the recorded cases, and the results are indicated in Figure 3 below.

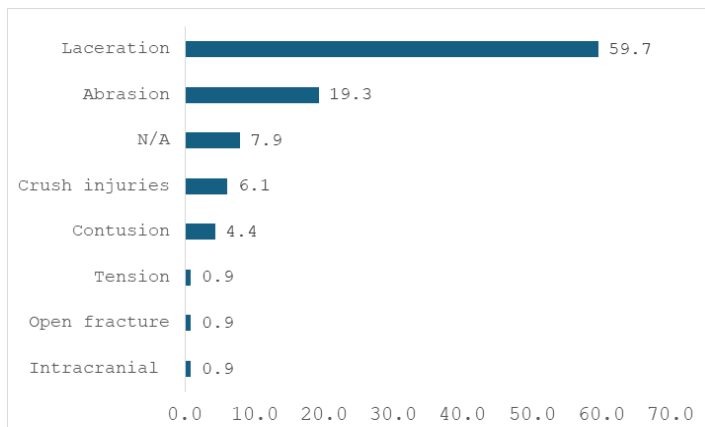


Figure 3

The results of this study showed that more than half (59.7%) of the injuries were attributed to lacerations, which were prominent among various injuries. Approximately 19.3% were the result of abrasion. However, only 0.9% were a result of tension, open fracture, and intracranial fracture, respectively.

The study results also revealed that a good majority (81.6%) were successfully treated and discharged. About 11.4% of patients were referred, with a death percentage of 5.3% among patients with head injuries. This is indicated in the Figure 4 below.

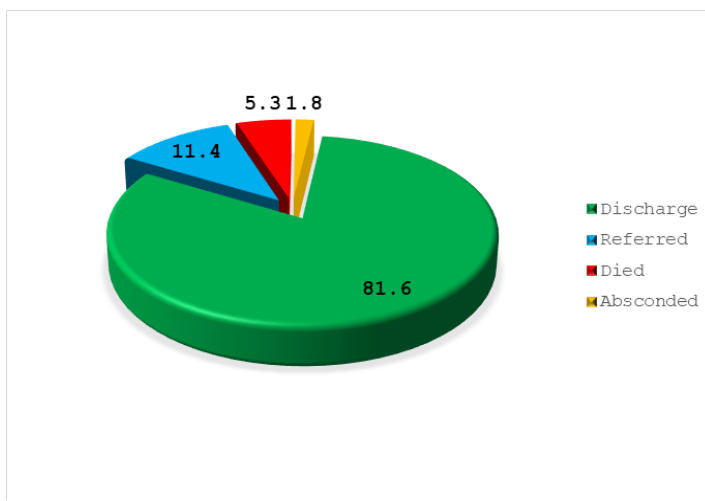


Figure 4

## Discussion

This study offers vital epidemiological insights into the patterns, trends, and determinants of head injuries at the Sunyani Teaching Hospital between January 2022 and December 2024. The results highlight a demographic skew toward young, uninsured, unemployed males, a finding that resonates with the broader literature on trauma epidemiology in low- and middle-income countries (LMICs), especially within Sub-Saharan Africa (SSA). A considerable proportion of injuries stems from road traffic accidents (RTAs), underscoring the urgent public health challenge RTAs pose in Ghana and comparable settings globally.

## Demographic Patterns and Socioeconomic Characteristics

This study found that males accounted for more than 84% of head injury cases, a trend that is similar to reports in Sub-Saharan Africa (SSA). In a retrospective review from Nigeria [11], found that 80.5% of the patients with head trauma were male, indicating that exposure of males to risk factors (greater involvement in vehicular driving, occupational hazards, and high-risk behaviours). Similarly, [12] also demonstrated a negative relationship between sex and the risk of disease in Kenya, concluding that sociocultural- and mobility-related behaviour of males could explain their increased susceptibility.

Age distribution analysis showed that patients aged 21-30 were the most affected group (36.8%), followed by those aged 31- 40 (21.1%). This pattern of demographic distribution concurs with reports from Tanzania and Uganda, which found that head injury largely affects the young population [13,14]. The high incidence among economically active populations presents a dual challenge: loss of productivity and increased healthcare costs, given that more than half of the patients (51.8%) were unemployed and 66.7% were uninsured. These socioeconomic indicators highlight systemic healthcare inequities and limited access to social safety nets, a challenge also observed in studies in Ghana and other African contexts [15].

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## Injury Causation and Pattern

The predominance of RTAs (74.6%) as the leading cause of head injuries reaffirms extensive research indicating that RTAs remain major contributors to trauma-related morbidity in LMICs. According to the World Health Organisation [16] over 90% of global road traffic deaths occur in LMICs, despite these countries having only 60% of the world's vehicles. This finding is consistent with that of a Ghanaian study by Paa-Kwesi Blankson [3], which found that RTAs accounted for 78% of head injuries in urban referral hospitals.

Moreover, increases in head injury cases over the three years studied, with estimates of continued ascendancy through 2025 and 2026, reflect more general trends in global and regional head injury-related data. Urbanisation, the rise in population and poor enforcement of traffic safety rules may be contributing to the trend. A multi-country study by [17] also found a comparable annual rise in trauma-related hospital admissions caused by RTAs in West Africa. The implications of these trends on the ability of the current health care system and public safety policy to respond to the increasing trauma burden are explored.

Falls (11.4%) and assault (7.9%) were other significant causes of head injuries, a pattern that is similar to what was reported in analogous hospital-based studies in Ethiopia and Malawi [18,19]. But only 2.6% were caused by industrial and occupational injuries, which may have been under-reported or misclassified. However, the fact that they were reported indicates that there were poor work safety rules and monitoring.

## Injury Types and Outcomes

Lacerations accounted for the majority of injuries (59.7%), whereas abrasions were the second most common (19.3%). This pattern of severity of injury distribution parallels what is found in trauma centres in SSA, which are characterised mainly by superficial injuries, which, however, mask an underlying neurological insult [20]. The relatively low prevalence of intracranial lesions (0.9%) may be related to underdiagnosis or to pre-hospital fatal cases. This is a significant limitation discussed in other African trauma registries that have limited access to neurosurgery and imaging facilities [21].

Fortunately, most (81.6%) of the patients could be cured and discharged through an effective acute care response. Nevertheless, the rates of death at 5.3% and referral at 11.4% are non-negligible and warrant further exploration of critical care capacities and post-discharge outcomes. Compared to international figures, the local mortality rate was a little lower than that reported for similar facilities in Nigeria (7.2%) and Uganda (6.1%), which suggests that our acute stabilisation protocol may have been relatively superior [22-24]. Nevertheless, there is a paucity of data on long-term functional and QOL outcomes, a similar empty gap observed in a review by Alayande B [25] which highlighted the importance of longitudinal head injury research in SSA.

## Comparative and Policy Implications

In comparison to global data, the burden of head injuries in this study had some interesting parallels with the patterns identified in other LMICs. This, however, does not take into account social and structural determinants of health, which include insurance status, education, and formal employment. For example, the insurance coverage rate of 33.3% for respondents was in sharp contrast to an attestation of the WHO for 80% coverage of basic health services [16]. These results support the need for universal health coverage and selective road safety campaigns.

Various evidence point to the fact that institutional quality has a major impact on health outcomes within trauma-care systems [26]. Understanding the magnitude of this burden, there is an urgent need to work across sectors with health ministries, transport departments, and police to develop trauma registries, enforce helmets and seatbelt laws, and enhance prehospital care.

## Conclusion

The findings from this study contribute to the growing evidence base underscoring the burden of head injuries in Ghana, largely driven by road traffic accidents among young, uninsured, and unemployed males. Comparative analysis with regional and global studies confirms similar demographic patterns but also reveals systemic gaps in health financing, injury surveillance, and prevention strategies. Policy interventions should prioritise road safety reforms, expand social health insurance schemes, and strengthen trauma care infrastructure to mitigate the rising trend of head injuries in Ghana.

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