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Epidemiology and Clinical Characteristics of Traumatic Brain Injury Patients Managed at a Tertiary Hospital in Ghana

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Research Article

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Abstract

Background

Traumatic brain injury (TBI) is a major public health issue, especially among young adults in low- and middle-income countries (LMICs). Sub-Saharan Africa faces a high TBI burden due to road accidents and limited emergency care. In Ghana, scarce data on TBI patients hampers prevention and health planning efforts. This study aimed to describe the socio-demographic characteristics, injury mechanisms, and clinical profiles of adult patients presenting with TBI at a tertiary referral hospital in Ghana.

Method

A cross-sectional quantitative study was conducted at the Accident and Emergency Centre of Korle-Bu Teaching Hospital, Accra. Adult patients (≥ 18 years) admitted with a diagnosis of TBI were consecutively recruited using convenience sampling. Data were collected using a structured electronic questionnaire, supplemented by clinical information extracted from electronic medical records.

Results

A total of 175 patients were included, with a mean age of 38.5 ± 13.5 years; 40.6% were aged 18–33 years. Most patients were male (89.1%) and had no pre-existing comorbidities (84%). Prehospital ambulance transport occurred in only 38.3% of cases. Road traffic accidents accounted for 73.1% of TBIs, with motorcycles involved in over half of these cases. Helmet and seatbelt use were low (19.4% and 7.4%, respectively). Most patients (n = 107) had mild TBI based on the Glasgow Coma Scale, though 34.9% were triaged as Red. Brain contusions were the most common CT finding. Approximately one-third of patients (30.29%) had severe injuries based on the Injury Severity Score, whereas the majority (70.29%) were classified as having mild injuries using the Kampala Trauma Score.

Conclusion

TBI at this tertiary centre predominantly affected young males and was largely due to motorcycle-related road traffic accidents, with limited prehospital care and low use of protective devices. These findings highlight the urgent need for strengthened road safety enforcement, improved prehospital emergency services, and context-specific trauma care strategies in Ghana.

Background

Traumatic Brain Injury (TBI) is a major global public health concern and ranks among the top three neurological conditions worldwide, contributing substantially to long-term disability and death (1). It is a leading cause of morbidity and mortality among young people, particularly those in their most

economically productive years (2). In high-income countries, the burden of TBI is well documented; for example, approximately 1.7 million cases occur annually in the United States, where TBI accounts for about 25% of all injury-related deaths (3)(4). In Europe, an estimated 200 per 100,000 individuals are hospitalised each year with TBI, with an average in-hospital fatality rate of 3% (2).

Traumatic Brain Injury refers to an alteration in brain function or other evidence of brain pathology caused by an external force, and is neither congenital nor degenerative (1)(3). It commonly results in impaired consciousness and may lead to cognitive, behavioural, and physical deficits (3)(5). TBI is a heterogeneous condition with varying mechanisms, injury patterns, and clinical presentations, resulting in diverse clinical courses and outcomes (1). Clinically, TBI severity is commonly classified using the Glasgow Coma Scale (GCS) into mild, moderate, and severe categories (1)(3). Mild to moderate TBIs constitute the majority of cases globally, while severe TBI is associated with high mortality and substantial long-term disability (1)(6).

Road traffic accidents are the leading cause of TBI globally and are particularly dominant in LMICs (3)(7). Studies from Africa consistently demonstrate this trend. In Tanzania, road traffic crashes accounted for nearly half of all injuries and over 60% of injury-related deaths (8). In Nigeria, up to 80% of TBIs were attributed to road traffic accidents (9). Road traffic injuries are among the leading causes of hospitalisation, disability, and mortality, with profound socioeconomic consequences (10). Effective TBI management relies on multidisciplinary care and preventive measures that are widely available in high-income countries and associated with improved outcomes and declining TBI rates (11). In contrast, LMICs continue to face major barriers, including limited infrastructure, workforce shortages, delayed access to care, and inadequate rehabilitation services (12).

In Ghana, as in many sub-Saharan African countries, the burden of TBI is increasing, driven largely by rapid motorisation, poor road infrastructure, and limited injury surveillance systems (5). There is a critical gap in data describing the socio-demographic characteristics and clinical profiles of patients with TBI in resource-limited settings (13). Understanding these patterns is essential for identifying vulnerable populations, determining key risk factors, optimising triage and management protocols, and improving patient outcomes (14)(15). This study, therefore, aims to describe the socio-demographic trends and clinical profiles of patients presenting with traumatic brain injury at a tertiary referral hospital in Ghana, providing evidence to support improved trauma care and policy development tailored to the local context.

Methodology

Study site

The study was conducted at the Accident and Emergency Centre of Korle-Bu Teaching Hospital (KBTH) in Accra, Ghana. KBTH is the largest tertiary referral hospital in the country, with an estimated 2,000-bed capacity, serving the southern sector of Ghana. The Accident and Emergency Centre serves as the

primary entry point for medical, surgical, and trauma emergencies. Patients are triaged using the South African Triage Scale (SATS), which categorizes patients into colour-coded acuity levels. Care is provided by emergency medical officers and residents under the supervision of emergency medicine specialists and fellows, with referral to specialty services as required.

Study Design and participants

This was a cross-sectional study and included adult patients who presented to the Accident and Emergency Centre of KBTH with TBI and were admitted for further management.

Patients were eligible for inclusion if they were aged 18 years or older and had a diagnosis of traumatic brain injury based on referral documentation, clinical findings (including loss of consciousness following trauma or visible head injury), Glasgow Coma Scale (GCS) score of 15 or less following head trauma, and/or radiological confirmation on computed tomography. Only patients admitted through the Accident and Emergency Centre and who provided informed consent (or whose next of kin consented in cases of impaired consciousness) were included.

Patients were excluded if they presented with non-traumatic medical or surgical emergencies, had head injuries without evidence of traumatic brain injury, or declined participation in the study.

Sampling and Data Collection

In 2021, a total of 253 patients with TBI were admitted to the Accident and Emergency Centre of the Korle-Bu Teaching Hospital (KBTH). Using the Yamane formula and a target population of 253, a sample size of 175 participants was calculated. Participants were recruited using convenience sampling, whereby all trauma patients diagnosed with TBI who met the inclusion criteria were consecutively enrolled until the required sample size of 175 was achieved.

The study was conducted over five months, from mid-December 2023 to mid-May 2024. Trained research assistants were stationed at the triage area of the Accident and Emergency Centre to identify eligible participants. Recruitment occurred after patients had been stabilised and initial emergency management initiated.

Conscious patients who met the eligibility criteria were informed about the study and written informed consent was obtained prior to enrolment. For unconscious patients, consent was obtained from relatives or next of kin after adequate information was provided. In addition, eyewitnesses or bystanders present at the time of injury were briefly interviewed to obtain relevant information regarding the mechanism and circumstances of injury.

Data were collected using a structured, web-based questionnaire administered via JotForm on electronic tablet devices. Clinical data, including triage and post-resuscitation vital signs, were extracted from the

electronic medical records which is the LightWave Hospital Information Management System (LHIMS).

Ethical considerations

Ethical approval

was obtained from the Scientific Technical Committee and the Institutional Review Board of Korle-Bu Teaching Hospital before data collection (IRB number: KBTH-IRB 00019/2023). This study adhered fully to the ethical standards outlined in the Declaration of Helsinki. Written informed consent was obtained from conscious patients or next of kin for unconscious patients, and eyewitnesses were interviewed when available. Participation was voluntary, and participants could withdraw at any time without affecting their care. The study posed minimal risk, involved no financial compensation, and refusal to participate did not influence clinical care.

Data Management and Analysis

Data were collected using JotForm, a secure web-based data collection platform. The data were exported into Microsoft Excel for cleaning and validation before analysis. Cleaned data were analysed using STATA version 17. Descriptive statistical analyses were performed, and the results were presented in tables. Continuous variables were summarised as means with standard deviations, while categorical variables were presented as frequencies and percentages.

Results

A total of 175 participants were included in the analysis. The mean age was 38.51 ± 13.45 years, with 71 participants (40.57%) aged 18–33 years. Most participants were male (n = 156, 89.14%) and single (n = 87, 49.71%). Educational attainment was generally low, with 71 participants (40.57%) having completed junior high school, while 24 participants (13.71%) had tertiary education. The majority were Christians, with 28 participants (16.0%) identifying as Muslim, as shown in Table 1.

Table 1
Socio-demographic characteristics of participants

Socio-demographics			**Occupation**		
Age	**Mean**	**Sd**		**N**	**Percentage (%)**
	38.51	13.45	Farmers	9	5.14%
	N	**Percentage (%)**	Artisans	37	21.14%
Age Group			Business and services	58	33.14%
18- 33Yrs	71	40.57%	Civil servant/public servant	15	8.57%
34–49Yrs	66	37.71%	Drivers/Okada riders	24	13.71%
50–65Yrs	30	17.14%	Unemployed	24	13.71%
Above 65Yrs	8	4.57%	Unknown	8	4.57%
Sex			**Referral Status**		
Female	19	10.86%	Referred	126	72.00%
Male	156	89.14%	Unreferred	49	28.00%
Religion			**Alcohol use at the time of injury**		
Christianity	147	84.00%	No	149	85.14%
Muslim	28	16.00%	Unknown	4	2.29%
Educational Level			Yes	22	12.57%
Basic school	19	10.86%	**Substance use at the time of injury**		
Junior High School Level	71	40.57%	No	166	94.86%
No formal education	3	1.71%	Unknown	4	2.29%
Senior High School level	52	29.71%	Yes	5	2.86%
Tertiary Level	24	13.71%	**Time of Day of Incident**		
Unknown	6	3.43%	Dawn	20	11.43%
Marital Status			Morning	37	21.14%
Divorced	4	2.29%	Afternoon	37	21.14%

Socio-demographics			Occupation		
Age	**Mean**	**Sd**		**N**	**Percentage (%)**
Married	77	44.00%	Evening	46	26.29%
Single	87	49.71%	Night	16	9.14%
Widowed	2	1.14%	Unknown	19	10.86%
Unknown	5	2.86%	**Transport to the hospital**		
Past Medical History			Ambulance	67	38.29%
None	147	84.00%	Police vehicle	3	1.71%
Hypertension	11	6.29%	Private vehicle	30	17.14%
Peptic Ulcer Disease	4	2.29%	Sprinter	4	2.29%
Diabetes	4	2.29%	Taxi	62	35.43%
Previous surgery	3	1.71%	Tricycle	3	1.71%
Mental Health Issues	1	0.57%	Unknown	6	3.43%
Hepatitis B	1	0.57%			
Unknown	3	1.71%			
Sickle Cell Disease	1	0.57%			

In Table 1, most participants (n = 147, 84%) had no pre-existing chronic medical conditions. Employment was predominantly in the business and service sector (traders, hawkers, waiters, waitresses, businessmen and women) (n = 58, 33.14%). Alcohol use at the time of injury was reported by 22 participants (12.57%), while 5 participants (2.8%) reported substance use. Most patients were referred from other facilities (n = 126, 72.0%). Ambulances were the most common mode of transport (n = 67, 38.29%), followed by taxis (n = 62, 35.43%). The highest incidence of presentation occurred during the evening hours. See Table 1.

The mean systolic blood pressure was 138.88 mmHg before resuscitation and 134.41 mmHg after resuscitation. Before resuscitation, 92 participants (52.57%) had a systolic blood pressure in the range of 91–139 mmHg, increasing to 105 participants (60.25%) post-resuscitation. The mean heart rate was 87.28 bpm, and the mean random blood glucose level was 9.08 mmol/L as shown in Table 2.

Table 2
Vital signs of participants

	N	Percentage (%)
Mean RBS	9.08mmol	
Mean Heart Rate	87.28bpm ± 20.1	
Mean Respiratory Rate	21.36cpm ± 5.2	
Mean Systolic BP (Before Resuscitation)	138.80mmhg ± 29.9	
Systolic BP (Before Resuscitation)		
<90	6	3.43%
91–139	92	52.57%
=>140	77	44.00%
Mean Systolic BP after Resuscitation	134.41mmhg ± 35.0	
Systolic BP (After Resuscitation)		
<90	1	0.6%
91–139	97	60.25%
=>140	63	39.13%
Mean SPO2_Before Resuscitation	96.76%	
SPO2 Before RESUS		
90% and above	164	95.35%
Below 90%	8	4.65%
Mean SpO2 after resuscitation	98%	
SPO2 After Resuscitation		
90% and above	175	100%
Below 90%	0	0

Based on the SATS, 61 patients (34.86%) were triaged as Red seen in Table 3. Most patients (n = 107, 61.14%) had mild traumatic brain injury based on the Glasgow Coma Scale, with a mean admission GCS of 12.06. Half of the patients (n = 90, 51.43%) presented with two TBI-related symptoms. The most common symptoms were loss of consciousness, decreased level of consciousness, confusion, retrograde amnesia, and focal neurological weakness. Twenty-one patients (12.0%) had seizures, while 22 patients (18.49%) had unequal pupillary sizes.

Table 3
Clinical Characteristics of Participants

Clinical Factors			**Performance of CT scan**		
	N	**Percentage (%)**		**N**	**Percentage (%)**
SATS Triage Colour			No Head CT scan done	27	15.43%
Green	23	13.14%	CT scan done	148	84.57%
Orange	42	24.00%	**CT Scan Findings of Participants**		
Red	61	34.86%	No pathology seen	23	15.54%
Yellow	49	28.00%	Brain contusions	54	36.49%
Glasgow Coma Scale at Admission Mean GCS = 12.06			Facial fractures	37	25%%
Severe	36	20.57%	Skull fractures	33	22.30%
Moderate	32	18.29%	Subdural haematoma	29	19.59%
Mild	107	61.14%	Subarachnoid haemorrhage	19	12.84%
No. of Specific TBI Symptoms			Scalp swelling	18	12.16%
0	6	3.43%	Epidural haematoma	13	8.78%
1	55	31.43%	Cerebral oedema	13	8.78%
2	90	51.43%	Intracerebral bleeds	10	6.76%
3	21	12.00%	Intraventricular bleeds	6	4.05%
4	3	1.71%	Pneumocephalus	6	4.05%
Top Five (5) **TBI Symptoms**			Diffuse Axonal Injury	4	2.70%
Loss of Consciousness	142				
Decrease level of consciousness	96				
Confusion	25				
Retrograde amnesia	12				
Neurological Deficit: Weakness	9				
Seizure					

Clinical Factors			Performance of CT scan		
	N	Percentage (%)		N	Percentage (%)
No	154	88.00%			
Yes	21	12.00%			
Pupillary Size Equality N = 119					
Equal Pupil Size	97	81.51%			
Unequal Pupil Size	22	18.49%			

In Table 3, non-contrast head CT scans were performed in 148 patients. Of these, 23 patients (15.54%) had no intracranial or extracranial pathology. Brain contusions were the most common finding (n = 54, 36.49%), followed by subdural haematoma (n = 29, 19.59%) and epidural haematoma (n = 13, 8.78%).

Road traffic accidents were the leading cause of traumatic brain injury (n = 128, 73.14%), as shown in Table 4. Motorcycles were involved in 66 cases (51.56%), with 56 patients (43.75%) being motorcycle riders. Falls from height accounted for 23 cases (13.14%), while other less common mechanisms accounted for 8 cases (4.57%). Helmet use among riders (motorcycle riders, co-riders, bicycle riders, tricycle riders, and tricycle passengers) was reported by 19.39%, while seatbelt use among motor vehicle occupants (driver, front, middle and back seat passengers) was 7.4%. The most common collision type in the RTA was motorcycle vs motor vehicle, accounting for 27.69% of all mechanisms seen in Table 4.

Table 4
Injury characteristics and mechanism of injuries of participants

	N	Percentage		N	Percentage
Mechanism of Injury			**Type of collision N = 128**		
Road Traffic Accident (RTA)	128	73.14%	motor vehicle vs. motor vehicle	18	14.06%
Fall from height	23	13.14%	motor vehicle vs. motorcycle	36	28.13%
Assault	14	8.00%	motor vehicle vs. tricycle	1	0.78%
Unknown Mechanism	2	1.14%	motorcycle vs. motorcycle	10	7.81%
Other Mechanism not specified	8	4.57%	motorcycle vs. tricycle	4	3.13%
RTA-Vehicle Involved			motor vehicle vs. bicycle	2	1.56%
Bicycle	3	2.34%	pedestrian vs. motorcycle	8	6.25%
Motor vehicle	28	21.88%	pedestrian vs. motor vehicle	24	18.75%
Motorcycle	66	51.56%	vehicle vs. road	13	10.16%
Tricycle	8	6.25%	Others (falling off, losing control, inanimate object collision)	5	3.90%
Unknown	23	17.97%	Unknown	7	5.47%
RTA (Position of the Patient) N = 128			**Fall from height N = 23**		
Motor vehicle Driver	9	7.03%	Not work-related	11	47.83%
Motor vehicle Front Seat passenger	5	3.91%	Work-related	12	52.17%
Motor vehicle Middle Seat passenger	4	3.13%	**Assault N = 14**		
Motor vehicle Backseat passenger	4	3.13%	Provoked	8	57.14%
Motorcycle rider	56	43.75%	Unknown	3	21.43%
Motorcycle Co-rider	10	7.81%	Unprovoked	3	21.43%
Tricycle rider	2	1.56%			
Tricycle Passenger	3	2.34%			
Bicycle Rider	3	2.34%			

	N	Percentage		N	Percentage
Mechanism of Injury			**Type of collision N = 128**		
Pedestrian	30	23.44%			
Unknown	2	1.56%			
RTA Safety device (helmet, seatbelt) N = 98					
Helmeted	19	19.39%			
Unhelmeted	50	51.02%			
Seat belt applied	7	7.14%			
No seat belt applied	12	12.24%			
Unknown	10	10.20%			

Associated injuries were absent in 65 patients (37.14%), while 14 patients (8.0%) sustained multiple injuries. Lacerations were the most common associated injury. Based on the Kampala Trauma Score, 123 patients (70.29%) sustained mild injuries, while approximately one-third (30.29%, n = 53) had severe injuries based on the Injury Severity Score. The mean Injury Severity Score was 15.78, and the mean Kampala Trauma Score was 14.05. See Table 5.

Table 5
Injury severity of participants

	N	Percentage
Injury Severity Score Mean = 15.78		
Minor (< 9)	52	29.71%
Moderate (9–15)	33	18.86%
Severe (16–24)	53	30.29%
Profound (> = 25)	37	21.14%
Kampala Trauma Score Mean = 14.05		
Severe Injury (< 11)	1	0.57%
Moderate Injury (11–13)	51	29.14%
Mild Injury (14–16)	123	70.29%
No. of associated Injuries		
No associated injuries	65	37.14%
One associated injury	62	35.43%
Two associated injuries	34	19.43%
Multiple associated injuries (more than 2)	14	8.00%
Type of Injuries		
Lacerations	54	49.09%
Abrasions	27	24.55%
Lower limb fractures	25	22.73%
Facial fractures	13	11.82%
Upper limb fractures	9	8.18%
Eye injuries	9	8.18%
Spinal and cervical injuries	7	6.36%
Chest injuries	5	4.55%
Clavicular fractures	4	3.64%
Abdominal Injuries	3	2.73%
Facial and scalp swelling	3	2.73%

	N	Percentage
Injury Severity Score Mean = 15.78		
Avulsion injuries	2	1.82%

Discussion

The study population was relatively young (mean age 38.51 years), with a large proportion aged 18–33 years, predominantly male and nearly half single, mirroring patterns reported in other TBI studies from sub-Saharan Africa (1)(7)(8) (16)(17). The low prevalence of comorbidities reflects the predominance of young, economically active males, a group known to be at higher risk of TBI due to engagement in high-risk behaviours such as speeding, alcohol use, and poor adherence to protective measures such as helmet use (8)(17)(18). A substantial proportion of participants had only a basic education, which may limit awareness of road safety practices and injury risk, underscoring the need for targeted public health education about risky driving and its consequences, especially among less educated groups.

A minority of participants reported alcohol use at the time of injury, consistent with prior studies (8)(19). Given the well-established association between alcohol consumption and increased crash risk, even at low blood alcohol levels (20), strengthened enforcement and public awareness strategies remain critical. Educating all road users, especially drivers, about the risks of drunk driving is vital. Key steps include random breathalyser tests, banning alcohol sales at transport stations, and increasing public awareness through targeted ads on the dangers and consequences of drinking and driving.

Despite a high referral rate, most patients were transported to the hospital by private or commercial vehicles rather than ambulances, reflecting limited access to prehospital emergency services in Ghana (21). Similar findings have been reported locally, with concerns that non-medical transport and the absence of trained personnel may exacerbate outcomes in TBI patients (8)(22)(23). These findings highlight ongoing gaps in prehospital care that may contribute to increased morbidity and mortality following traumatic brain injury.

In this study, a large proportion of patients were triaged as red on the South African Triage Scale, indicating the need for immediate medical attention and suggesting the presence of severe head injury or other life-threatening conditions. In terms of GCS classification, most patients were classified as having mild traumatic brain injury, with a mean Glasgow Coma Scale (GCS) score of 12.06. This distribution is consistent with the existing literature, which shows that mild TBI constitutes the majority of cases and is generally associated with favourable outcomes (24).

Loss of consciousness was the most frequently reported symptom, followed by reduced consciousness and confusion, findings that are comparable to those in other studies and highlight the importance of early neurological assessment, even in mild TBI (9)(25). Despite the predominance of mild TBI, intracranial pathology may still be present, reinforcing current recommendations for selective

neuroimaging based on clinical criteria and risk factors (26)(27). In this study, most patients underwent non-contrast CT scanning; however, financial barriers limited access for some patients, as the cost of imaging is typically paid out-of-pocket and is not covered by the national health insurance scheme, as reported in other African settings (7).

Brain contusions were the most common CT finding, followed by subdural and epidural haematomas, consistent with several prior studies (7)(9)(28), although variations in dominant lesion types have been reported across different populations. Epidural haematoma has been described as the most frequent finding in some studies (1)(29), while other studies have identified subarachnoid haemorrhage as the leading pathology (10)(30). Cerebral contusions, however, remain a common consequence of blunt head trauma, occurring in up to 43% of cases and typically resulting from coup or contrecoup mechanisms associated with rapid acceleration or deceleration forces (31). Seizures occurred in a minority of patients, at rates comparable to previous reports, and pupillary abnormalities were observed in a notable proportion, both of which have been associated with poor outcomes following TBI (25)(32). Bilateral pupillary abnormalities and anisocoria are linked to worse outcomes after brain injury, highlighting the importance of early neurological assessment (25). Seizures raise cerebral metabolic rate and intracranial pressure, increasing secondary brain injury risk (32). Post-traumatic seizures are more likely with low Glasgow Coma Scale scores, cortical contusions, skull fractures, hematomas, penetrating injuries, or early seizure onset and as such, anticonvulsants are recommended in high-risk patients (32). Together, these findings underscore the heterogeneity of TBI presentation and the importance of timely assessment, imaging, and intervention in improving outcomes.

Road traffic accidents were the predominant cause of traumatic brain injury in this study, accounting for over 70% of cases, with motorcycles being the most frequently involved vehicles. Motorcycle–motor vehicle collisions were the commonest crash type, and riders and co-riders constituted more than half of those injured. This pattern is consistent with findings from Ghana and other low- and middle-income countries, where road traffic injuries are the leading cause of TBI (5)(9)(16)(25)(28). The high burden of motorcycle-related injuries likely reflects socioeconomic factors, including reliance on motorcycles for affordable transport, poor road infrastructure, and inadequate enforcement of traffic regulations (3)(20). The high proportion of motorcycle-related injuries observed in this study may be partly explained by severe traffic congestion in urban areas, particularly in the country's capital, Accra, which has increased reliance on commercial motorcycles ("okadas") as a faster means of transportation. In congested traffic conditions, riders may be more likely to disregard road traffic regulations, thereby increasing crash risk. The low education levels among the study population, along with urban congestion and poor traffic rule compliance, likely contribute to increased motorcycle-related TBI injuries.

Pedestrians also represented a substantial proportion of TBI cases, underscoring the vulnerability of non-motorised road users in settings where pedestrian pathways are limited, and traffic segregation is poor (9)(33). The use of safety gear in this study was markedly low, with fewer than one-fifth of eligible riders wearing helmets and very low seat belt use among passengers. These findings are consistent with earlier studies from Korle Bu and other LMIC settings, indicating persistently poor adherence to road

safety practices (30)(34). Similar studies have reported low helmet use and identified barriers such as limited access, perceived short travel distances, and discomfort in hot climates (30). In contrast, transport-related traumatic brain injury is less common in high-income countries, reflecting the effectiveness of sustained preventive measures, including strict enforcement of helmet and seat belt laws and improved road safety systems (5).

Falls from height accounted for a smaller but significant proportion of TBIs, many of which were work-related, particularly among artisans, highlighting gaps in occupational safety practices (3)(5)(28). Occupational falls remain an important contributor to traumatic brain injury, particularly among artisans such as carpenters, electricians, and masons who often work at heights without adequate protective gear or adherence to safety protocols. Strengthening workplace safety education and enforcing site-level safety measures are essential to reduce fall-related injuries.

Falls are also a leading cause of TBI among the elderly, as consistently reported in the literature (35)(36). Age-related declines in mobility and balance increase vulnerability, highlighting the need for targeted fall-prevention strategies such as home modifications and safer living environments. Assault-related injuries were less frequent but varied across studies, with higher proportions reported in some settings where interpersonal violence is more prevalent (1)(3)(28). A small proportion of TBIs resulted from uncommon mechanisms such as falling objects, highlighting the role of domestic and environmental hazards, and the need for improved safety awareness in both domestic and community settings.

Most patients sustained associated injuries, commonly lacerations, reflecting a high-energy mechanism. Injury severity varied by scoring system, with the ISS classifying more severe injuries than the Kampala Trauma Score, underscoring the differences between the two scores. The ISS is an anatomically based scoring system used to assess injury severity in patients with polytrauma (37) and has been shown to correlate with increased mortality with TBI (38). The ISS, which emphasises anatomical injury burden and the presence of multisystem trauma, identified a substantial proportion of patients as having severe injuries, underscoring the high-energy mechanisms involved in many cases. In contrast, the KTS, which relies more heavily on physiological parameters and is designed for rapid assessment in resource-limited settings (39), classified most patients as having mild injuries. This discrepancy indicates that patients who appeared physiologically stable at presentation may still have significant anatomical injuries. The findings underscore the complementary value of both scoring systems and support the use of multiple assessment tools to better characterize injury severity and inform clinical decision-making in patients with traumatic brain injury and associated injuries.

Limitations of the study

This study employed consecutive sampling to recruit participants, which may have introduced selection bias. Consequently, the findings may not be fully generalizable to the broader population of patients with TBI, particularly in settings with different injury patterns or healthcare access.

In addition, data collection relied primarily on self-reported information obtained from patients, relatives, and eyewitnesses using an online questionnaire. This approach is subject to recall bias, as respondents may have had difficulty accurately recalling details related to the timing, circumstances, and mechanism of injury, especially in the context of acute trauma and emotional distress. In cases where patients were unconscious or cognitively impaired, information provided by eyewitnesses or proxies may have been incomplete or inaccurate.

Lastly, the use of electronic health records for data extraction through the LightWave Hospital Information Management System (LHIMS) may be subject to inaccuracies, missing data, or incomplete clinical documentation, which can lead to information bias and affect data quality.

Conclusion

Traumatic brain injury predominantly affected young males aged 18–33 years, reflecting global patterns associated with high-risk behaviours. Road traffic accidents, particularly motorcycle-related injuries, were the leading cause, accounting for more than 70% of cases and mirroring trends seen across low- and middle-income countries. Pre-hospital care was notably limited, with fewer than one-third of patients transported by ambulance, underscoring significant gaps in emergency medical services. Overall, this study provides important insights into the epidemiology, causes, and outcomes of TBI at a major referral centre in Ghana, highlighting the substantial burden of disease and the ongoing challenges related to the management of TBI in low-resource settings.

List of Abbreviations

KBTH……Korle Bu Teaching Hospital

KTS……..Kampala Trauma Score

LMIC……Low- and Middle-Income Countries

RTA……..Road Traffic Accidents

SATS……..South African Triage Scale

SBP……..Systolic Blood Pressure

TBI……Traumatic Brain Injury

ED……Emergency Department

GCS……Glasgow Coma Scale

ISS……Injury Severity Score

CT……Computed Tomography

BP……Blood Pressure

Declarations

Conflicts of interest

The authors declare no conflicts of interest

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Data availability

Data is available on request from the corresponding author

Authors' contributions

Nana Serwaa Quao – Conceptualisation, design, data collection and analysis, drafting of manuscript, editing and proofreading of final draft

Kwame Ekremet-Conceptualisation, design, drafting of manuscript, editing and proofreading of final draft

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