ENSIGN GLOBAL UNIVERSITY,

KPONG - GHANA

EPIDEMIOLOGY OF INJURIES PRESENTING TO THE EMERGENCY DEPARTMENT OF THE KORLE BU TEACHING HOSPITAL: A 2024 REVIEW

BY

JOSHUA TETTEH AHUAHEY

(247100301)

A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH IN THE FACULTY OF PUBLIC HEALTH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

MASTER OF PUBLIC HEALTH

NOVEMBER 2025

DECLARATION AND CERTIFICATION

I, Joshua Tetteh Ahuahey, hereby declare that this submission is my own work towards the Master's Degree in Public Health and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the college, except where the acknowledgment has been made in the text.

Joshua Tetteh Ahuahey

(ID- 179100148) **……** **7th November, 2025**

(Student) **Signature** **Date**

(Certified by)

Dr Edward K Sutherland **……** **……**

(Supervisor) **Signature** **Date**

(Certified by)

Dr Stephen Manortey **……** **……..**

(Head of Academic Program) Signature **Date**

DEDICATION

I dedicate this thesis to God, my strength and my inspiration. To my beloved wife, Barbara Sekyi Yorke, for her unwavering love and support. And to the memory of my dear father, the late Rev. Daniel Teye Ahuahey.

ACKNOWLEDGEMENT

I would like to express my deepest gratitude to my wife and children, whose love, patience, and unwavering support have been my constant motivation.

I am also profoundly grateful to my parents and siblings, whose love and sacrifices have shaped me.

A special thank you to my supervisor, Dr. Edward K. Sutherland, for his guidance, invaluable insights, and dedicated mentorship throughout this journey.

Finally, I would like to thank my colleagues, Dr. Abigail Marnarh, Miss Kerzia Jacobell Owusuwah, Mr. Joseph Zakariah, and Miss Malwine Obuobisah for their collaboration and support.

DEFINITION OF TERMS

Epidemiology: The study of the distribution and determinants of health-related states or events (including injuries), and the application of this study to the control of diseases and other health problems.

Morbidity and Mortality: Morbidity refers to the state of being diseased or unhealthy within a population, while **mortality** refers to the number of deaths in a given population.

Injury: A (suspected) bodily lesion resulting from acute overexposure to energy (mechanical, thermal, electrical, chemical, or radiant) interacting with the body in amounts or at rates that exceed the threshold of human tolerance.

Haddon Matrix: A conceptual framework used in injury prevention to analyze injury events by considering the interaction of the host (person), agent (vehicle), and environment across three phases: pre-event, event, and post-event.

Injury Surveillance System: An ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding injuries for use in public health action to reduce morbidity and mortality.

Trauma Registry: An organized system for collecting and analyzing data on injured patients, typically from the time of injury to discharge, to monitor trends and improve patient care.

Prehospital Care: Medical care provided to a patient before they arrive at the hospital, often delivered by emergency medical services personnel at the scene of the injury

Absconded: A patient is considered absconded when they leave the emergency department without being formally discharged or without the knowledge or approval of medical staff. These are patients who depart before their treatment is completed or their final disposition has been determined.

Admitted: A patient is admitted when they are formally allocated to a bed and seen at the ED as an in-patient for resuscitation and stabilization, pending specialized care or monitoring.

Discharged: A patient is discharged when they are treated on out-patient basis at the casualty reception, released shortly from the emergency department after their medical evaluation and treatment are complete.

Trans-out: Trans-out (or transferred out) refers to a patient being formally transferred from the emergency department to an inpatient ward or unit within the hospital for further medical care.

Died: A patient is categorized as died when they expire within the emergency department.

Red (Immediate): This category is reserved for patients facing life-threatening conditions who require immediate intervention within minutes to ensure survival.

Orange (Very Urgent): These patients are in a serious condition with a high risk of deterioration, meaning they require a rapid assessment and treatment in the Emergency Department, typically within 10 to 15 minutes, even though their life is not in imminent danger.

Yellow (Urgent/Delayed): This category is for patients with serious but stable injuries or illnesses who require medical treatment but can safely be delayed (often 30 to 60 minutes).

Green (Standard/Minor): Designated for the "walking wounded," these patients have minor injuries or illnesses that are not life- or limb-threatening, meaning their treatment can be deferred for several hours without significant risk of a negative outcome. These patients were treated at the casualty reception of the ED.

LIST OF ABBREVIATIONS

A&E: Accident & Emergency

CHWs: Community Health Workers

DALYs: Disability-Adjusted Life Years

ED: Emergency Department

EMS: Emergency Medical Services

ENT: Ear, Nose & Throat

GBD: Global Burden of Disease

GNAS: Ghana National Ambulance Service

IRB: Institutional Review Board

KATH: Komfo Anokye Teaching Hospital

KBTH: Korle Bu Teaching Hospital

LMICs: Low- and Middle-Income Countries

MoH: Ministry of Health

NRSA: National Road Safety Authority

RTAs: Road Traffic Accidents/Injuries

RTCs: Road Traffic Crashes

SMHS: School of Medicine and Allied Health Sciences

TBI: Traumatic Brain Injury

WHO: World Health Organization

ABSTRACT

Background: Injuries are a leading cause of morbidity and mortality globally, with low and middle-income countries (LMICs) bearing a disproportionate burden. Injuries directly lead to 5 million deaths every year, accounting for 9% of all deaths worldwide. Annually, about 800,000 deaths are recorded among children and adolescents under 20 from injuries of any kind. Low and middle-income nations account for 95% of childhood injury mortality. The highest injury rate is 94 per 100,000 in low-income countries of Sub-Saharan Africa. In the Volta Region of Ghana, a study analyzing transport-related injuries reported to health facilities from 2019 to 2023 found a cumulative incidence of 387 injuries per 100,000 population, with the highest incidence recorded in 2021. Most cases involved males (66.0%), and the highest proportion of injuries (35.8%) occurred among individuals aged 20–34 years.

Methodology: This study utilized a retrospective cross-sectional study design to analyze a complete enumeration of 2,874 de-identified patient records presenting with injuries to the Korle Bu Teaching Hospital's Emergency Department from January 1 to December 31, 2024. The methodology relied on secondary data retrieved from hospital records. Variables collected included patient's socio-demographics (age, sex, place and location of injury), clinical data (mechanism of injury and diagnosis), severity, mode of transportation and clinical outcome as well as referral and temporal patterns. The data was then subjected to descriptive and inferential statistical analysis after a rigorous data cleaning process.

Results: Data from the Emergency Department revealed distinct demographic and mechanism patterns in injury presentations. Males were disproportionately affected across most injury types, accounting for 80.8% of assault cases and 68.9% of road traffic accident (RTA) cases. The highest

proportion of injuries occurred in the 25-44 age group, particularly for assaults (60.6%) and RTAs (42.1%). The most common mechanisms of injury were RTAs, followed by falls, assaults, burns, and other forms of trauma. The most frequent diagnoses were lacerations (30.9%) and fractures (19.0%).

The mortality rate for patients was 1.7%. Injury severity, primarily assessed by triage, indicated a high volume of green cases (78.3%). Temporally, presentations peaked significantly during weekends and in the afternoons (12-5:59pm). Monthly case flow was highest in September (10.5%) and August (10.1%). Furthermore, the mode of transport highlighted low utilization of ambulance services (1.6%), and most patients (56.9%) were able to walk to the wards upon arrival.

Conclusion: This study provides crucial and up-to-date epidemiological data on injuries at the Korle Bu Teaching Hospital's Emergency Department, highlighting the significant burden of trauma. The findings reinforce that young adult males and road traffic accidents are the most affected and common causes, respectively. The low mortality rate underscores the effectiveness of current trauma management systems and the importance of prompt care. This research successfully fills a significant knowledge gap and offers foundational data for evidence-based interventions and policies. Ultimately, the study's implications can be used to improve hospital preparedness and support the development of a more responsive and effective trauma system in Ghana.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Injuries represent a profound and escalating global public health crisis, contributing significantly to both morbidity and mortality across all demographics. Each year, injuries directly account for an alarming 5 million deaths worldwide, constituting a substantial 9% of all global fatalities (Blankson *et al.*, 2020). This pervasive issue extends beyond immediate fatalities, leading to widespread disability, long-term physical and psychological impairments, and immense socio-economic burdens on individuals, families, and healthcare systems (WHO, 2022).

The disproportionate impact is acutely felt in low- and middle-income countries (LMICs), which, despite having fewer resources, bear a staggering 95% of the global burden of childhood injury mortality (Saulnier, 2020). This disparity highlights a critical inequity in global health, as healthcare infrastructure in many LMICs is frequently under-resourced and ill-equipped to effectively manage the escalating volume and complexity of trauma cases (Lindemann *et al.*, 2020). The World Health Organization (WHO) has consistently emphasized the urgency of addressing this crisis, advocating for robust injury surveillance systems and evidence-based prevention strategies to mitigate its devastating effects, particularly in vulnerable populations (WHO, 2022).

Within this global context, low-income countries in Sub-Saharan Africa record the highest injury rates, standing at an alarming 94 per 100,000 population (Saulnier et al., 2020). This underscores the severe challenges faced by healthcare providers and public health officials in the region. The

far-reaching consequences of injuries necessitate a comprehensive understanding of their epidemiology to develop targeted and effective interventions.

In Ghana, a West African nation experiencing rapid urbanization and development, injuries have emerged as a significant public health concern, consistently ranking among the leading causes of Emergency Department (ED) visits and hospital admissions. The primary drivers of these injuries are diverse, frequently stemming from a combination of traffic accidents, occupational hazards in various industrial and agricultural sectors, falls, and interpersonal violence (Acheampong *et al.*, 2019; Mock *et al.*, 2021). The country's burgeoning population and evolving infrastructure present unique challenges that exacerbate the risk of injuries. For instance, the increase in vehicular traffic, often coupled with inadequate road safety measures and adherence to traffic laws, contributes significantly to the high incidence of road traffic accidents (RTAs).

A recent study conducted in the Volta Region of Ghana, which analyzed transport-related injuries reported to health facilities between 2019 and 2023, revealed a cumulative incidence of 387 injuries per 100,000 population, with the highest incidence documented. This regional data further illustrated that the majority of cases involved males (66.0%), and the highest proportion of injuries (35.8%) occurred among individuals aged 20–34 years, highlighting specific demographic groups at heightened risk (Afrane *et al.*, 2024).

Despite the evident severity and prevalence of injuries across the nation, there remains a critical vacuum in current, consolidated, and detailed epidemiological data. Data particularly at the tertiary and quaternary facility levels, where the most severe and complex injury cases are managed are usually outdated and not well consolidated. Without precise, up-to-date information on injury

patterns at these crucial referral centers, efforts to formulate effective public health strategies and clinical protocols are significantly hampered.

The Emergency Department of the Korle Bu Teaching Hospital (KBTH), situated in Accra, stands as Ghana's largest and most prominent tertiary healthcare institution, serving as a vital referral center for injury cases from across the entire country. This ED, therefore, manages a high volume and wide spectrum of trauma patients, making it an indispensable hub for understanding the true burden of injuries in Ghana (Aryee *et al.*, 2024). However, despite its pivotal role, available information regarding the epidemiological patterns, treatment processes, and patient outcomes of injuries reported to the KBTH ED is largely outdated and not systematically consolidated or routinely analyzed to provide a holistic and real-time picture of injury patterns.

This significant incompleteness and outdated nature of the data limit the capacity of various stakeholders, including health officials, hospital managers, and frontline emergency care clinicians, to make informed decisions. Specifically, the absence of current epidemiological insights impedes the development of evidence-based interventions, restricts the efficient allocation of scarce resources, and hinders the establishment of robust trauma systems that are truly responsive to the actual load and diverse types of injuries encountered within the facility. Furthermore, this knowledge gap complicates efforts to implement effective injury prevention strategies and to advocate for policy changes based on local evidence.

This study is therefore timely and aims to bridge this essential information deficit by comprehensively determining the epidemiology of injuries presenting to the Emergency Department at Korle Bu Teaching Hospital throughout the year 2024. By doing so, it seeks to

provide foundational data for improved public health interventions and enhanced clinical management of trauma.

1.2 Problem Statement

Despite Ghana's high injury rate, there remains only outdated information on the epidemiology of injuries presented to the Korle Bu Teaching Hospital's Emergency Department. This dates back to 2019 where the most recent epidemiological data was consolidated and published (Blankson *et al.*, 2020). The lack of current and up to date data impedes the creation of evidence-based policies and interventions to prevent and treat injuries, thereby influencing patient outcomes and healthcare resource allocation. This study intends to fill this knowledge vacuum by characterizing the epidemiology of injuries seen in the ED at Korle Bu Teaching Hospital in the year 2024, including socio-demographics, mechanism of injuries, diagnosis, severity, mode of transportation, patient outcomes as well as referral and temporal patterns.

Injuries are a major public health concern worldwide, causing approximately 5 million deaths each year and significantly increasing disability and healthcare expenditures, particularly in low- and middle-income countries (WHO, 2022). In Ghana, injuries are among the primary causes of morbidity and death, yet there is a crucial gap in the availability of current, comprehensive epidemiological data analysis to influence prevention and management efforts, particularly at large referral institutions such as the Korle Bu Teaching Hospital (KBTH).

The emergency department of the KBTH is the principal site of care for trauma patients within the Greater Accra Region and beyond. However, available information on the epidemiological patterns, processes, and outcomes of injuries reported to this department is out of date and are not routinely consolidated and analyzed to provide a holistic picture of injury patterns. This constraint

limits the ability of health officials, hospital managers, and emergency care clinicians to devise effective interventions, distribute resources, and create trauma systems that are responsive to the real load and types of injuries faced (Lachs *et al.*, 2022).

The trauma system in Ghana is evolving, with the gradual development of an effective emergency medical system (EMS) and prehospital system. However, there is currently a wide gap in access to timely prehospital care and EMS epidemiological information. Understanding the current nature and distribution of injuries will provide baseline data and contribute significantly to the formulation and direction of national policies regarding injury management and injury prevention, in reducing its social and economic impact on countries such as Ghana (Blankson *et al.*, 2020).

Furthermore, the lack of a systematic injury surveillance system at KBTH impedes efforts to conduct rigorous epidemiological assessments. Without a thorough understanding of the demographic distribution, etiological variables, and clinical outcomes of emergency-treated injuries, efforts to enhance emergency response, injury prevention, and post-injury treatment are severely limited (Torgbenu *et al.*, 2020). As Ghana's urbanization and motorization continue to develop, the prevalence of injuries particularly road traffic crashes and interpersonal violence is predicted to rise, worsening the problem (Kpe *et al.*, 2024).

Given KBTH's prominent role in trauma care in Ghana, there is an urgent need to conduct a comprehensive investigation into the epidemiological profile of injuries presented to its emergency department. Such study is critical for developing evidence for targeted policymaking, improving hospital preparation, and eventually lowering the burden of injury-related morbidity and mortality.

1.3 Rationale of the study

Injuries are a major public health issue, particularly in low- and middle-income countries (LMICs), where healthcare systems frequently confront serious resource constraints. According to the (WHO., 2022).

The Korle Bu Teaching Hospital (KBTH) is Ghana's largest tertiary and referral medical institution, receiving a significant volume of trauma cases from the Greater Accra Region and throughout the country. Despite this critical role, the existing analysis of epidemiological data on injuries presenting to the emergency department is outdated and lacks currency. This paucity of contemporary data critically impedes the development of evidence-based injury prevention programs, effective resource allocation, and optimized clinical care regimens tailored to the specific needs of the population.

This research on the epidemiology of injuries presenting to the ED of the Korle Bu Teaching Hospital has justification on multiple levels. First, it provides evidence on the most current prevalence, characteristics, trends, as well as outcomes of traumatic injuries managed at the KBTH. This data is essential for identifying intervention priorities, such high-risk populations, common mechanisms of injury, modes of transportation of patients to the hospital, and the seasonal variations of traumatic injuries presenting to the ED.

Second, the findings help to develop a more effective trauma care system, including triage protocols, staff training, and emergency readiness. Also, it helps to build a national injury surveillance system and trauma registry, which are currently absent in Ghana (Osei-Ampofo *et al.*, 2020).

Furthermore, studying the epidemiology of injuries at a major referral center provides insights useful to other healthcare facilities in comparable circumstances, contributing to broader public health goals such as reducing injury-related disability and death. The study's findings also provide vital evidence for health officials, physicians, and researchers trying to improve emergency and trauma care in Ghana.

1.4 Conceptual Framework

Table 1.1: Conceptual framework

Phase →	**Pre-event**	**Event**	**Post-event**
Host (person)	Age, sex, occupation, alcohol, helmet/seat-belt use	Physiological tolerance, protective gear actually worn	Physiological reserve, comorbidities, access to acute care
Agent (Vector)	Vehicle type, weapon, fall height, energy transfer potential	Speed at impact, penetrating vs blunt force	Residual kinetic energy, fire, chemical exposure
Environment	Road design, lighting, weather, home/work safety features	Crash scene factors, crowding in ED triage	Time to definitive care, ward capacity, rehab services

Conceptual framework of epidemiology of Injury (Allan F. Williams, 1999)

This research employed the Haddon Matrix as the principal conceptual framework to facilitate a more comprehensive understanding of the causes of injuries and their resultant outcomes. This model informed the systematic identification, categorization, and analysis of the different factors associated with injuries that present to the emergency department of the Korle Bu Teaching Hospital (KBTH).

The Haddon Matrix conducts an examination of injuries through three distinct temporal phases (pre-event, event, and post-event) and three interrelated domains (host, agent, and environment). This model ensured a methodical investigation of injury patterns, risk determinants, and possible opportunities for prevention and intervention.

To enhance the practical applicability and data-driven insights of this framework, principles from the World Health Organization (WHO) Injury Surveillance Logic were integrated. The WHO framework provided a robust structure for systematic data collection, analysis, and dissemination, crucial for identifying patterns, trends, and risk factors associated with injuries. By combining the analytical depth of the Haddon Matrix and the WHO Injury Surveillance Logic, this conceptual framework offers a comprehensive lens through which to investigate the epidemiology of injuries, inform targeted interventions, and facilitate continuous improvement in injury prevention and control efforts.

1.5 Research Questions

i. What is the socio-demographic distribution of injury cases presenting to the emergency departments of Korle Bu Teaching Hospital in the year 2024?

ii. What are the common trauma related diagnoses and mechanisms of injury presenting to the Korle Bu Teaching Hospital ED in 2024?

iii. What is the severity, mode of transportation (post injury) and clinical outcomes of injuries presenting to the ED of the KBTH, including mortality, hospitalization and discharge pattern in the year 2024

iv. What are the referral and temporal patterns (time of day, day of week, month of year) of injury cases presentations to the Korle Bu Teaching Hospital ED in the year 2024.

1.6 General Objective

To determine the epidemiology of injuries presenting to the ED at Korle Bu Teaching Hospital in the year 2024.

1.7 Specific Objectives

i. To determine the socio-demographic distribution of injury cases presenting to the emergency departments of Korle Bu Teaching Hospital in the year 2024.

ii. To identify the common trauma related diagnoses and mechanisms of injury (e.g.RTA, Fall, Assault, Burns, Animal Bite etc) presenting to the Korle Bu Teaching Hospital ED in the year 2024,

iii. To analyze the severity, mode of transport of patients (post injury) and clinical outcomes of injuries presenting to the ED of the Korle Bu Teaching Hospital, including mortality, hospitalization and discharge patterns in the year 2024.

iv. To analyze the referral and temporal patterns (time of day, day of week, month of year) of injury cases presentations to the Korle Bu Teaching Hospital ED in the year 2024.

1.8 Profile of Study Area

The study was conducted at the Korle Bu Teaching Hospital, a premier tertiary healthcare facility. It is the only tertiary hospital in the Greater Accra region of Ghana located at Ablekuma South

Metropolitan District on the Dansoman-Agbogbloshie road, with a total land surface area of 590,000 square meters. The hospital was established in 1923 as a medical referral center and now serves as the major referral health facility. The hospital also takes care of clients from neighboring countries such as Burkina Faso, Nigeria, Benin, Egypt, Togo and La Cote D'Ivoire. The hospital is situated in a catchment area with a projected population of 4.1million people.

Korle Bu Teaching Hospital, the premier tertiary healthcare facility in Ghana, was established on October 9, 1923. The facility was built under the administration of Sir Frederick Gordon Guggisberg, then, the Governor of the Gold Coast, as a General Hospital to attend to the health needs of the people. Korle Bu, in the local Ga parlance means 'the valley of the Korle Lagoon'. Shortly after its establishment, Korle Bu witnessed an increase in hospital attendance as a result of the proven efficacy of hospital-based treatment. This surge in accessing the Hospital's services used to result in serious congestion compelling the Government to set up a committee to assess and make recommendations for its expansion in 1953.

The Task Force's recommendations were accepted and new structures such as Child Health, Maternity, the Medical and Surgical Blocks were added to the Hospital. This increased Korle Bu's initial 200-bed capacity to 1,200.

The Hospital gained teaching hospital status in 1962 when the School of Medicine and Dentistry, formerly University of Ghana Medical School, was established to train doctors.

Currently, the Korle Bu Teaching Hospital is the third biggest referral center in Africa and has 2,000 beds capacity, 21 clinical and diagnostic departments and three Centers of Excellence. It also has an average outpatient attendance of 1,500 with about 250 inpatient admissions.

The clinical and diagnostic departments include Internal Medicine and Therapeutics, Child Health, Surgery, Obstetrics and Gynecology, Anesthesia, Family Medicine/Polyclinic, Accident & Emergency, Psychiatry, Reconstructive Plastic Surgery and Burns Centre and Accident & Orthopedics. Others are Pharmacy, Pathology, Laboratory and Radiology.

The Hospital also provides sophisticated scientific treatment procedures in various subspecialties such as Neurosurgery, Pediatric surgery, Dental/Oral maxillofacial, Ophthalmology, Ear, Nose & Throat (ENT), Renal, Orthopedics, Oncology, Dermatology, Reconstructive Plastic Surgery, Cardiothoracic Surgery and Radiotherapy & Nuclear Medicine.

The Korle Bu Teaching Hospital is also the main teaching hospital for the School of Medicine and Allied Health Sciences (SMHS) of Accra after accreditation was secured.

1.9 Scope of Study

This study focused on the epidemiology of injuries presenting to the Emergency Department of the Korle Bu Teaching Hospital, a major referral center in Ghana, throughout the year 2024. It also looked at the patterns of these injuries, including their mechanism of injury and the socio-demographic characteristics of the patients. The study further compared various outcome variables among the patients, such as the severity of injury and mortality rates, to inform public health policy and resource allocation.

1.10 Organization Of Report

This report is presented in six chapters, each of which addresses a specific aspect of the study. Chapter One provides the introduction, including the background, problem statement**,** objectives, and scope of the study. Chapter Two is a comprehensive literature review on the epidemiology of injuries, while Chapter Three details the methodology, covering the research design and data

analysis methods. Chapter Four presents the findings of the study, and Chapter Five provides a discussion of those findings, drawing inferences and relating them to existing research. Finally, Chapter Six summarizes the conclusions and offers recommendations for key stakeholders regarding the future control and management of injuries.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Demographic Distribution of Injuries

Injuries remain an important global health problem, contributing considerably to early deaths and long-term impairments globally. According to the World Health Organization (WHO), over 4.4 million people die annually from injuries, accounting for about 8% of all global deaths, with millions more suffering from non-fatal injuries that result in temporary or permanent disability (WHO, 2023). While most of these injuries are avoidable, they disproportionately impact people in low and middle-income countries (LMICs), where healthcare systems frequently lack the necessary resources to adequately handle trauma cases (Haagsma *et al.*, 2020). Road traffic injuries (RTAs) are a major public health priority since they are known to be the primary cause of injury-related deaths, especially for those between the ages of 5 and 29 (WHO, 2023). Falls, burns, drowning, and interpersonal violence are also significant causes of injury-related morbidity and mortality, and their contributions vary depending on the demographic and socioeconomic environment (Haagsma *et al.*, 2020).

Additionally, injuries continue to play a significant role in disability-adjusted life years (DALYs), especially in LMICs where almost 90% of injury-related deaths take place, according to ((GBD 2019 Diseases and Injuries Collaborators, 2020). This burden is made worse in many nations by a lack of prehospital treatment, lax enforcement of safety laws, and insufficient trauma care resources. Significant regional differences are also seen in injury patterns worldwide.

The Global Burden of Disease Study reports that age-standardized death rates from RTAs are among the highest in sub-Saharan Africa (GBD 2019 Diseases and Injuries Collaborators, 2020). Numerous variables are responsible for the region's injury burden:

- Poor road infrastructure and rapid urbanization have increased road traffic volumes without corresponding safety improvements.
- Weak enforcement of traffic laws, such as helmet and seatbelt use, exacerbates the risk of fatal injuries.
- Limited emergency medical services (EMS) and prehospital care lead to delays in treatment, worsening outcomes for trauma patients (Osei-Ampofo *et al.*, 2020).
- Occupational injuries are also common, particularly in informal sectors with minimal safety regulations.
- Interpersonal violence, including assaults, represents a significant portion of injury presentations in emergency departments (Banson *et al.*, 2024).

According to national statistics, RTAs alone account for over 60% of injury-related presentations at KBTH's Accident & Emergency Department (Osei-Ampofo *et al.*, 2020). Males and young adults between the ages of 15 and 49 make up the largest demographic group, mostly as a result of work exposure, risk-taking tendencies, and increased traffic involvement (Cholo et al., 2023). This age group contributes significantly to home financial loss and the national economic burden since they are economically productive.

Ghana has a number of serious shortcomings in its injury data and management systems, despite the obvious burden:

- Lack of a national trauma registry and weak data capture systems within the ED

- Underreporting from district and regional hospitals.
- Limited injury surveillance beyond road traffic crashes (Awuah *et al.*, 2025).

These data gaps restrict hospitals like KBTH's capacity to efficiently organize resources and handle trauma, as well as the creation of comprehensive injury prevention plans. In order to provide context-specific data that informs clinical care, public health initiatives, and national policy reforms aimed at injury prevention and trauma care enhancement, hospital-based epidemiological studies are essential. Thus, Ghana's ability to address its increasing injury burden would be greatly improved by enhancing hospital-based data systems, including by establishing electronic trauma registries and standardizing injury documentation procedures.

2.2 Types and Causes of Injuries

Every year, injuries cause over 4.4 million deaths worldwide, accounting for around 8% of all fatalities and placing them in the top 10 causes of death (WHO, 2022). Road traffic accidents (RTAs), falls, assaults, burns, and injuries from animals are the main mechanisms among others.

1. Road Traffic Accidents (RTAs): Road traffic accidents are one of the top causes of death and disability around the world, killing about 1.3 million people each year (WHO, 2023). Accounts for 39.1% of total injuries (Blankson*et al.*, 2020). In low- and middle-income countries (LMICs), like Ghana, more than 90% of deaths caused by road traffic are due to bad enforcement of traffic laws, dangerous roads, and a lack of emergency response systems. RTAs are the most common cause of trauma-related admissions at KBTH and other major urban hospitals in Ghana. The groups that are most affected are: Young men between the ages of 15 and 44, who are often motorcyclists, commercial drivers or pedestrians. These victims usually have polytrauma, which includes broken bones,

traumatic brain injuries, damage to internal organs, and bleeding. The Greater Accra Region was responsible for the greatest number of road traffic fatalities in 2023, with over 2,200 documented in Ghana, according to the National Road Safety Authority (National Road Safety Authority, 2024).

2. Falls: Second most common leading cause of unintentional injury deaths worldwide, representing 19.7% of cases (Blankson, Amoako, *et al.*, 2020) especially affecting elderly over 60 and children under five (WHO, 2022). Falls are common in Ghanaian home environments and occupational settings such as construction sites and informal working environments.
3. Assault: In Ghana's tertiary institutions, a large percentage of emergency cases are related to intentional injuries, especially assaults. Among them are Blunt trauma from physical altercations, Penetrating injuries from knives, machetes, or firearms, Head and facial injuries.
4. Burns: One important but frequently unreported trauma category in Ghana is burn injuries. Usually, they are caused by: Fire accidents in homes, Explosions or chemical exposure in industrial or artisanal settings, Scalding injuries among children. A disproportionate number of women and children are impacted, especially in lower-income homes where access to emergency care and burn safety precautions is restricted.
5. Animal Bite: Animal bites, especially those from dogs, are a major public health concern in Africa because of the high risk of rabies, even though they are less common worldwide than other mechanisms. According to WHO estimates, Africa accounts for a significant share of the tens of thousands of rabies-related deaths that occur each year.

Road traffic Accidents (RTAs) are the leading cause of trauma presenting to tertiary emergency rooms, followed by falls, assaults/interpersonal violence, burns, and occupational injuries, according to studies conducted in Ghana. According to a multi-year assessment conducted at Korle-Bu Teaching Hospital (KBTH), RTAs are a top source of hospital trauma presentations and a significant contributor to serious injuries such polytrauma and traumatic brain injury (TBI). According to KBTH's prospective and retrospective investigations, motorcycles and other motor vehicles are frequently involved in traffic-related TBI crashes, and the prevalence of these injuries is significant (Blankson *et al.*, 2020). RTAs are also identified as the predominant cause of severe head injuries and deaths in Kumasi (Komfo-Anokye Teaching Hospital, KATH) by assessments of trauma and preventable trauma deaths. These deaths are frequently caused by gaps in prehospital stabilization or delays in final care. KATH studies show that although the mix of causes (falls, assaults, and RTAs) is similar to that in Accra, local patterns reflect occupational practices and regional transportation (e.g., more agricultural/industrial and commercial-vehicle injuries in specific catchment regions) (Bree et al., 2019).

In Ghana. Road traffic incidents accounted for 39.1% of injuries, according to a retrospective study conducted at KBTH from 2016 to 2017, with motorbikes being a major contributing factor (Blankson *et al.*, 2020). The percentage of vehicles registered nationwide has changed significantly, with powered two- and three-wheelers (motorcycles and tricycles) accounting for about 24.9% of all vehicles in 2021. This represents a substantial rise in exposure and related risk (Mesic *et al.*, 2024). Further detailed breakdowns reveal that over 60% of RTA-related injuries that present to hospitals are caused by motorcycles and commercial vehicles (minibuses/trotros), while 20–30% of deaths in some situations are pedestrian casualties, which frequently involve buses and motorcycles (Blankson *et al.*, 2020). Interestingly, despite having a smaller percentage of vehicles

on the road, bus and truck occupants make up the second-highest fatality category, with pedestrians accounting for 46.2% of RTA fatalities (Afukaar et al., 2003).

The KBTH injury epidemiology emphasizes the critical need for evidence-based public health and policy interventions that focus on high-burden causes like falls, assaults, and traffic accidents (RTAs).

1. Road Safety Laws & Enforcement: The Road Traffic Act 683 and its amendments, which make up Ghana's current road safety framework, need to be strictly enforced and expanded in specific areas because motorcycles and commercial vehicles are responsible for a disproportionate number of RTA injuries and fatalities (Blankson, *et al.*, 2020). That comprises: Mandatory helmet uses; in certain Ghanaian cities, helmet compliance is still around 40%, therefore enforcement is aimed at both riders and passengers (Awuah *et al.*, 2025), given their high rate of pedestrian casualties, commercial vehicle drivers' training and licensing should be regulated, Speed management; measures in cities where pedestrian casualties are high, especially close to marketplaces and schools
2. Violence Prevention Programs: Prioritizing community-based violence prevention programs, such as conflict resolution training, alcohol misuse therapies, and youth mentorship, is necessary since interpersonal violence, such as assaults, accounts for a major portion of emergency trauma caseloads.
3. Strengthening Data Systems: A national trauma registry is necessary to monitor injury patterns, assess the effects of policies, and direct the distribution of resources, according to the KBTH findings.
4. Community Education & Engagement: Road user education for motorcyclists, commercial drivers, and pedestrians on safe practices.

2.3 Injury Severity and Clinical Outcomes

In order to triage patients, guide therapeutic decisions, forecast outcomes, and standardize data for epidemiological research, it is essential to accurately quantify the severity of injuries. Around the world, a number of injuries scoring systems have been created. One of the most popular in emergency rooms, including tertiary hospitals like Korle-Bu Teaching Hospital (KBTH), is the Injury Severity Score (ISS) (Dehouche et al., 2022). In order to assess emergency care performance and influence policy, it is essential to comprehend the clinical outcomes of accident patients. Research indicates that between 7% and 15% of deaths in Ghanaian emergency rooms are connected to trauma, with the majority of these deaths being caused by serious head injuries and delayed access to care (Osei-Ampofo *et al.*, 2020). Patients' clinical results provide important information on the quality of emergency care and the resources required. The most significant predictors of death in a recent study at KBTH were serious head injuries and delayed presentation, which resulted in an overall in-hospital trauma mortality rate of about 9%. In about 55–60% of trauma cases, hospitalization was necessary, especially those involving penetrating injuries and traffic accidents (Serwaa *et al.*, 2020). Depending on the mechanism, severity, and availability of resources, the inpatient pathway for injured patients varies greatly after emergency department (ED) assessment. 10–25% of trauma patients worldwide need to be admitted to an intensive care unit (ICU), according to research (Van -Ditshuizen *et al.*, 2023). This is especially true for patients who have multiple organ involvement, polytrauma, or severe traumatic brain injuries. Improved critical care protocols have reduced ICU trauma mortality in high-income countries (HICs), but in low- and middle-income countries (LMICs), ICU mortality rates are still high, ranging from 18 to 35%, primarily because of delayed presentation, a lack of critical care beds, and a lack of equipment (Osei-Ampofo *et al.*, 2020).

The majority of hospitalized injury cases include ward admissions. According to data from sub-Saharan Africa, orthopedic, surgical, or general wards account for 40–60% of trauma admissions, with an average length of stay of 5–14 days (Razek, Grushka and Deckelbaum, no date).

Orthopedic fixation, craniotomies, laparotomies, and debridement are the most prevalent surgical procedures performed on hospitalized injured patients in LMIC settings, with rates ranging from 30 to 55% (Graham *et al.*, 2025). While major trauma cases, particularly those resulting from traffic accidents, often require operative management within the first 48 hours of admission at Korle Bu Teaching Hospital, surgical delays are not unusual due to theater congestion, resource shortages, or the need for specialist consultation, according to unpublished records and previous studies (Adanu *et al.*, 2023).

These hospitalization trends have significant ramifications for Ghana's trauma system design, highlighting the necessity of:

- Increased ICU bed capacity
- Efficient triage systems to prioritize severe cases
- Improved perioperative planning to reduce surgical delays
- Enhanced post-discharge rehabilitation services to optimize recovery

Most injured patients who survive initial resuscitation in Ghanaian tertiary centers are sent home following ED or ward care, while a smaller percentage are transferred for specialized services, leave against medical advice (LAMA/AMA), or pass away in-hospital—patterns that differ depending on the mechanism and severity. Road-traffic-related orthopedic injuries have a significant longer-term functional impairment after discharge. Following a road traffic orthopedic injury, 36.1% of patients in a two-year follow-up study in Ghana had moderate-to-severe disability

(WHODAS >25), highlighting ongoing post-discharge restrictions in mobility, self-care, and engagement (two-year RTOI cohort, Ghana) (Ingabire *et al.*, 2023).

2.4 Temporal and Seasonal Patterns of Injuries

Emergency room injury presentations frequently exhibit clear time patterns that are impacted by traffic density, environmental factors, social norms, and cycles of human activity.

Time-of-Day Patterns: Research from sub-Saharan Africa, including Ghana, consistently shows that the late afternoon to evening hours (15:00–21:00) are when the most injuries occur. This is because of increased traffic and pedestrian activity, social gatherings, and after-school/work activities (Mock *et al.*, 2021). Additionally, nighttime injuries are more severe and are frequently associated with worse visibility, drunk driving, and slower emergency response times.

Day-of-Week Trends: Weekend peaks, particularly on Fridays and Saturdays, have been linked to assault-related injuries and traffic accidents. These findings are indicative of increased intercity travel, social interaction, and alcohol use (Blankson *et al.*, 2020). On Saturday evenings and early Sunday mornings, assault-related injuries tend to be concentrated, whereas occupational injuries occur more frequently during regular business hours on weekdays (Ofosu-Amaah et al, 2003).

Seasonal Variations: Seasonal injury trends in Ghana are influenced by both festive times and rainfall patterns: 1. Rainy Seasons; April through June and September through November are linked to a higher number of motorcycle and pedestrian injuries because of slick roads and poor visibility (Ofosu-Amaah, 2003).

2. Dry Season; (December–February) frequently coincide with celebratory events like Christmas and New Year's, which lead to more road travel, more alcohol use, and higher rates of RTAs and interpersonal violence (Blankson *et al.*, 2020).

Public Health and Planning Implications: Road safety campaign scheduling, police patrol intensity during high-risk periods, and emergency department resource allocation all depend on an understanding of these periodic fluctuations. Response times and patient outcomes could be enhanced for KBTH by implementing staffing changes and focused prehospital treatments during designated peak times.

Ghana-Specific Temporal Trends in Injury Presentations: In Ghana, holiday seasons, traffic jams, and seasonal weather all have an impact on the temporal patterns of injury presentations to emergency rooms.

- Time-of-day: According to data from the Korle-Bu Teaching Hospital (KBTH) and Komfo Anokye Teaching Hospital (KATH), the highest injury incidence occurs between 16:00 and 21:00 in the late afternoon or evening. This is primarily due to increased pedestrian activity and commuter traffic congestion (Aryee *et al.*, 2024). Alcohol-related assaults and more serious RTAs are frequently the cause of injuries sustained at night.
- Day-of-week: Social gatherings, nightlife, and intercity travel are some of the factors contributing to the documented increases in RTAs and interpersonal violence during weekend surges, particularly from Friday to Sunday (Mock *et al.*, 2021).
- Seasonal/festive patterns: A noticeable increase in injuries, especially RTAs, occurs during the December–January holiday season as a result of heavy traffic, speeding, and drunk driving. Furthermore, there is a correlation between an increase in assault-related injuries and national holidays and significant events (such as football games or political demonstrations).
- Weather-linked patterns: Potholes, slick roads, and poor visibility are some of the reasons why motorcycle and pedestrian injuries are more common during the rainy season (April–

July). In contrast, high-speed collisions and increased intercity traffic volumes are linked to the dry season (Ofosu-Amaah et al, 2003).

2.5 Emergency Preparedness

- Pre-positioning emergency supplies such blood products, surgical kits, and airway management equipment is necessary due to seasonal increases in accidents, particularly during the rainy season and festive holidays (Quansah et al., 2020).
- To enhance prehospital response times at high-risk times, greater cooperation between hospitals, the Ghana Police Service, and the National Ambulance Service has been suggested (Ahmad *et al.*, 2021).

2.6 Seasonal and Event-Based Safety Campaigns

- It has been demonstrated that in certain regions of Sub-Saharan Africa, road safety enforcement measures, such random breathalyzer checks and stringent speed limit monitoring, lessen traffic accidents during Christmas and Easter (Ahmad *et al.*, 2021).
- During festival times, alcohol-related assaults and crowd-related injuries can be addressed by community-based violence prevention programs (Osei-Ampofo *et al.*, 2020).
- The National Road Safety Authority (National Road Safety Authority, 2024)states that public education initiatives focusing on pedestrian safety, rainy-season road hazards, and weather-related driving risks can lower seasonal crash rates.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Research Methods and Design/Data Collection Techniques and Tools.

Using secondary data that already existed, this study used a retrospective cross-sectional design to investigate trends and correlations related to the chosen public health concern. The researcher saved time and money by utilizing real-world data and analyzing data that has already been gathered, arranged, and stored in Emergency Department's health information systems. Without changing any variables, the cross-sectional technique enabled the study to evaluate the state of important health indicators at a particular moment or during a predetermined time period in the past. Studies that seek to characterize the frequency of traumatic injuries, service use, or behavioral patterns in a particular community, as well as finding possible correlations between variables are best suited for this design. Data for the period 1st January 2024 to 31st December 2024 was taken from the hospital records at the trauma unit of the Emergency Department. Socio-demographic variables such as Age, Sex, as well as Clinical variables such as Diagnosis, Mechanism of injury, Severity of diseases and outcome was among the variables of interest, and when appropriate, descriptive and inferential statistical methods were used in the study. For this retrospective epidemiological study, primary data collection techniques like interviews or surveys were inappropriate, as the focus was on analyzing historical injury events. Therefore, the core methodology relied on Medical Record Review and Abstraction using the Structured Data Abstraction Form.

3.2 Study Population

All patients that presented with injuries to the Emergency Trauma Departments of Korle Bu Teaching Hospital within the study period 1st January 2024 to 31 December 2024.

Study Variables

The following are the variables that were investigated in the study

Dependent Variable

- Injury Outcome/Severity: The clinical status and final patient disposition upon completion of management in the Emergency Department. This variable is measured nominally (e.g., Discharged, Admitted, Referred, trans-out or died).

Independent Variables

- Socio-demographic Factors: Age, Sex (Male/Female), and location and place of injury
- Injury Characteristics: Mechanism of Injury (e.g., Road Traffic Crash, Fall, Assault), and Diagnosis
- Clinical Variables: Triage Category and referral status, Time/period of Presentation.

3.3 Sampling

A total of 2,874 patient records from the secondary dataset was used in the investigation. All eligible records were included in the analysis without the requirement for sampling because the population size is known and is within a tolerable range. By guaranteeing thorough coverage of the available data, this method improves the validity and dependability of the results. Additionally, reviewing the complete dataset removes sample bias and offers enough power for subgroup analysis, if necessary. When complete enumeration is possible, the choice to use the entire dataset aligns with best practices in retrospective secondary data analysis.

3.4 Pre-Testing

The secondary nature of this study does not warrant pretesting. The validity and reliability of the data obtained from the Emergency Department's health information system has been thoroughly assessed by examining the dataset for any inconsistencies and errors such as missing variables or incomplete documentation. Data was then cleaned and rid of inconsistencies to enhance the integrity of the data before analysis.

3.5 Study Site

The study was conducted at the Accident & Emergency (A&E) and the Casualty unit of the Korle-bu Teaching Hospital. The A&E of the Korle Bu Teaching Hospital is the critical care point for trauma, medical, and surgical emergencies. The A&E working in collaboration with the Trauma department, receives both referred and self-presenting emergencies across the Greater Accra Region, other regions in Ghana, and even the West African subregion. Serving as the primary entry point for in-patient admissions, these departments serve as a vital gateway for patients who require specialized care such as Surgery, Internal Medicine and Therapeutics, Trauma, Accident, and Orthopedic cases across all age groups. The departments provide comprehensive emergency care, including resuscitation and stabilization of patients with a variety of surgical, trauma, and medical conditions. These departments perform a wide range of emergency procedures such as resuscitation, suturing, intubation, chest tube insertion, central line insertion, point-of-care ultrasound and Immediate intervention for trauma patients from accidents and injuries.

3.6 Data Handling

Prior to analysis, all patient data utilized in this study was de-identified to maintain anonymity. Individual identities were protected by assigning unique codes and removing personally

identifiable information from the dataset. Only the study team had access to the password-protected folders on the encrypted devices where the data was kept. The Korle-bu Teaching Hospital Ethics Review Committee provided ethical approval, and all access control, data security, and disposal procedures that closely followed institutional and national ethical standards.

3.7 Data Analysis

Data were analyzed using Microsoft Excel 2019. Both descriptive and inferential statistical methods were employed in line with the study's specific objectives. Results were presented in tables, charts, and graphs, with statistical significance set at $p < 0.05$ and a 95% confidence level.

Objective 1: Descriptive statistics (frequencies, percentages, mean ± SD) were used to summarize socio-demographic variables such as age, sex, and location. Associations between demographics and injury type were tested using the Chi-square test of independence.

Objective 2: Common trauma-related diagnoses and mechanisms of injury were analyzed using frequency distributions and cross-tabulations. The Chi-square test was applied to determine relationships between mechanism of injury and demographic factors.

Objective 3: Injury severity, transport mode, and clinical outcomes were summarized with frequencies and percentages. Cross-tabulations and Chi-square tests assessed associations between mechanism and outcome, while binary logistic regression identified predictors of adverse outcomes (e.g., death or admission).

Objective 4: Referral and temporal patterns (time of day, day of week, and month) were analyzed using descriptive statistics and visualized with bar and line charts. The Chi-square test for trend was used to assess differences in injury presentation across time periods.

3.8 Ethical consideration

This study closely followed the ethical guidelines that regulate research involving human subjects. The Institutional Review Board (IRB) at Korle Bu Teaching Hospital and Ensign Global University was consulted for ethical approval. A retrospective review of medical records may eliminate the need for informed permission; nonetheless, appropriate consent processes was followed if direct patient engagement were required. By making patient data anonymous and limiting access to only approved research staff, confidentiality was guaranteed. Both lockable physical storage and password-protected digital files were used to safely keep all data. Participants in the study faced very little risk because it is non-invasive. The study adhered to the ethical standards of responsible data processing, confidentiality, and respect for individuals at all times.

3.9 Limitations of the Study

The study's reliance on secondary data extracted from the Casualty Reception Registry and specialized ward "changes books" introduced inherent limitations related to data completeness and quality. A substantial number of variables had missing entries due to the disparate nature of the source documents. Core epidemiological and clinical variables including age, sex, date of injury, diagnosis, and patient outcome were fully completed in both sources, allowing for comprehensive analysis using the merged dataset. Conversely, several critical injury-specific variables, such as mode of transportation to the hospital, intra-facility transport means, location of incidence, time of arrival, and mechanism of injury, were often incomplete in the ward's changes book, as these fields were not mandated for clinical documentation by nursing staff. Consequently, analyses involving these specific variables were restricted only to the records from the complete Casualty Reception Registry. Furthermore, due to an excessively high proportion of missing entries, data pertaining to vehicles involved in RTA related trauma were excluded from the analysis entirely. Availability of

complete data is very essential as it could make for a more detailed study. Data collected in the future on the emergency ward's changes software should make these fields mandatory such that a complete save cannot be made unless these mandatory fields are completed to enable future research prospects.

3.10 Assumptions

It was assumed that the medical personnel who entered data into the casualty reception's registry and emergency ward's changes books, filled in the closest and accurate information from the LHIMS.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This section presents the analysis and key findings of the study. The purpose of the study was to investigate the *"Epidemiology of Injuries presenting to the Emergency Department of the Korle bu Teaching Hospital"*. This study was conducted using an already existing data, dated from January1st 2024 to December 31st 2024. The data obtained has been summarized in tables and charts.

In this study, data was analyzed from a total of 2874 patients. Out of this, some variables did not have complete entries captured on the extracted data. Data from the casualty reception (2250) had all variables intact, whereas data from the emergency wards (624) had some missing variables.

For this reason, complete data available from the emergency wards were added in some analysis to give a holistic picture whereas in other analysis only data from the casualty reception was used.

4.2 Socio-demographic distribution

4.2.1 Sex

This study reviewed 2,874 patient records from the 2024 secondary data at the Emergency department of KBTH. 68.9% (1981) involved male patients, while 31.1% (893) involved female patients as shown in table 4.1 & figure 4.1.

4.2.2 Age Groups

The trauma cases show a consistent trend of higher male involvement across all age groups as illustrated in Table 4.2a and figure 4.2. Out of all (2874) trauma cases recorded, the highest number

of injury cases occurred in the 25–44-year age group (1,091), accounting for 38.0% of all presentations, with 831 males and 260 females affected. Within Children aged 0–14 years making up 22.7% (651) of the total, males also outnumbered females (396 vs. 255). This pattern continues through adolescence and adulthood, with males consistently experiencing more trauma cases than females.

Interestingly, the gender gap narrows significantly in the 65+ age group, where the numbers are nearly equal, 73 for males and 71 for females.

4.2.3 Location of Incidence

The data from the casualty reception on the location of incidence as depicted in table 4.1, revealed that trauma cases occurred across a variety of settings, with the highest proportion of 995 cases (44.2%) taking place in other public spaces such as football pitches, markets, streets, screening centers, lorry stations, and neighborhoods.

Home-based incidents accounted for 747 cases (33.2%). Workplace injuries also recorded 403 cases (17.9%). Schools recorded the fewest cases of 105 (4.7%).

4.2.4 Places of Incidence

Among the top 10 places of incidence of injuries reporting to the casualty reception of the ED, Dansoman recorded the highest number of cases among named locations with 222 cases (9.9%). Other notable areas include Korle Gonno (102 cases, 4.5%), Korle Bu (99 cases, 4.4%), and Kasoa (94 cases, 4.2%). Central urban zones like Accra Central (3.5%), Abossey Okai (3.3%), and Mamprobi (3.2%) also featured prominently. Smaller contributions came from Weija (2.7%), James Town (2.4%), and Chorkor (2.3%), while the largest portion of 1,342 cases (59.6%) were

the cumulative data of other communities which includes a wide range of locations ranked outside the top 10 places of incidence. (Table 4.1).

Table 4.1 - Socio-demographic data

		Frequency	**Percentage**
Age	0 - 14	651	22.7%
	15 - 24	530	18.4%
	25 – 44	1091	38.0%
	45 – 64	458	15.9%
	65+	144	5.0%
	TOTAL	**2874**	**100%**
Sex	Female	893	31.1%
	Male	1981	68.9%
	TOTAL	**2874**	**100%**
Location of incidence (Casualty Reception)	School	105	4.7%
	Work	403	17.9%
	Home	747	33.2%
	Other* (Public Spaces)	995	44.2%

	TOTAL	**2,250**	**100%**
Top 10 places of incidence (Casualty Reception)	Dansoman	222	9.9%
	Korle gonno	102	4.5%
	Korle bu	99	4.4%
	Kasoa	94	4.2%
	Accra central	79	3.5%
	Abbosey okai	74	3.3%
	Mamprobi	72	3.2%
	Weija	61	2.7%
	James town	53	2.4%
	Chorkor	52	2.3%
	Others*	1342	59.6%
	TOTAL	**2250**	**100%**

Other (Public Spaces)- include football pitches, markets, streets, screening centers, lorry stations, and neighborhoods.*

Others- indicate cumulative places of incidence ranked outside the top 10 places of incidence.*

Casualty reception cases totaled 2,250

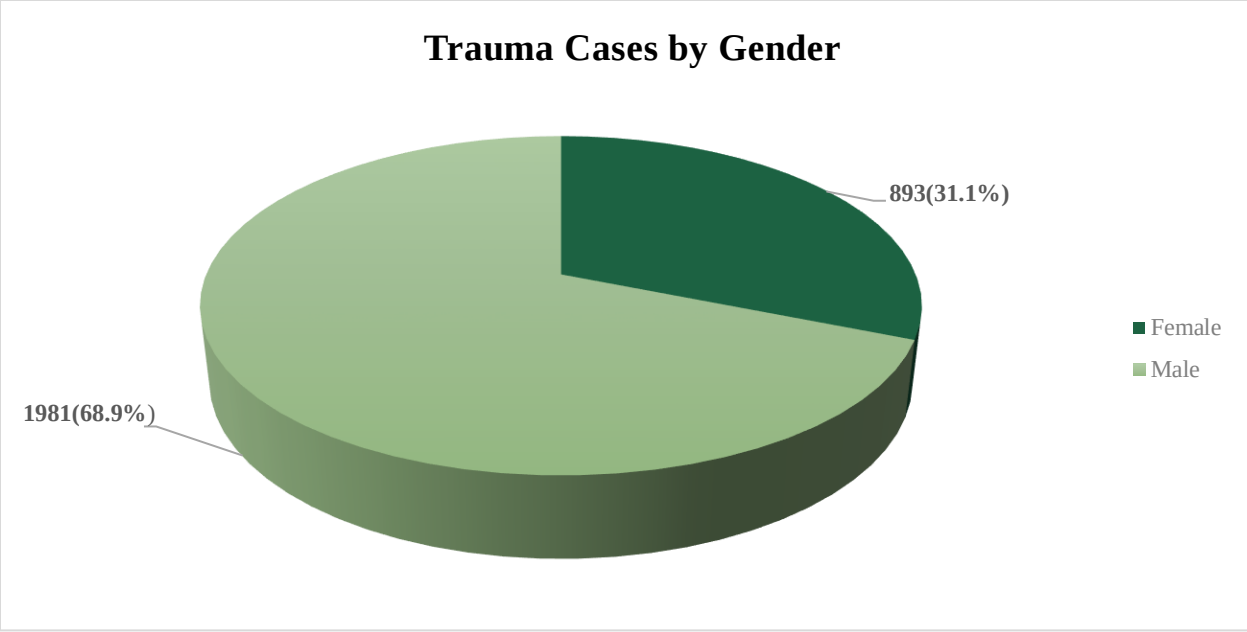


Figure 4.1: Trauma Cases by Gender in the ED

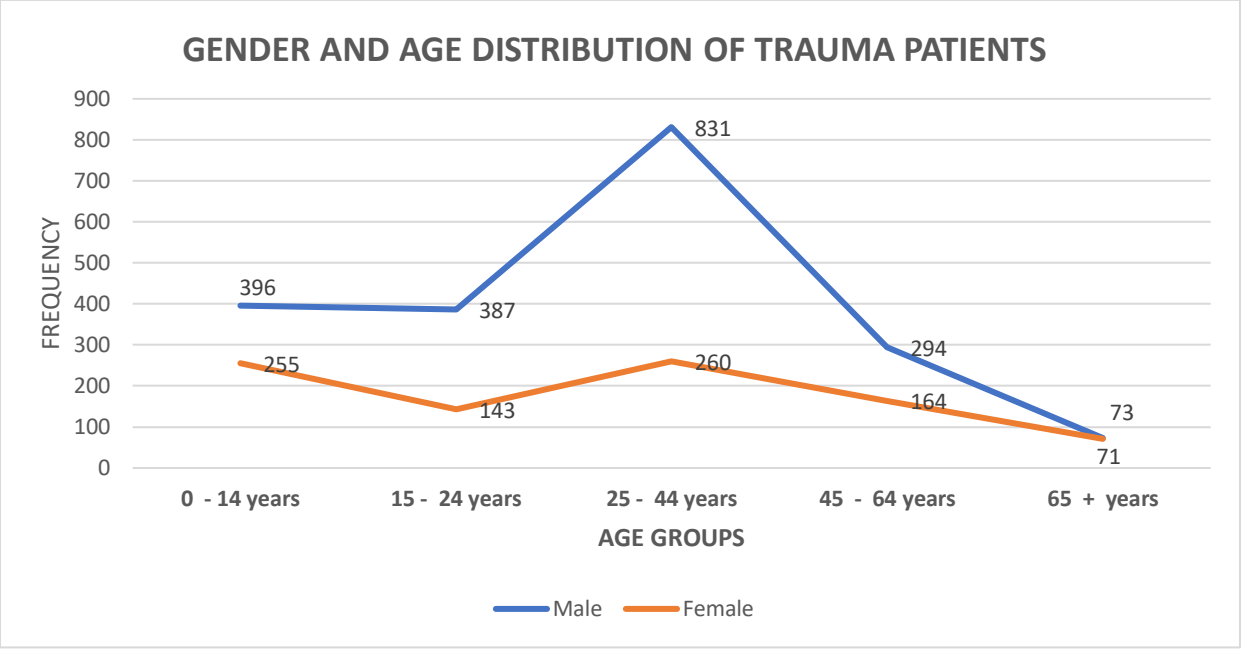


Figure 4.2: Age- and Gender-Specific Incidence of Trauma in the Emergency Department

4.3 Common diagnosis and Mechanisms on Injury

4.3.1 Diagnosis

Out of a total of 2,874 trauma cases, the most frequently reported diagnosis as shown in table 4.2 was laceration, accounting for 888 cases (30.9%). Fractures followed as the second most prevalent diagnosis, with 547 cases (19.0%).

Other notable diagnoses included burns 246 cases (8.6%), head injuries 216 cases (7.5%) and abrasions 193 cases (6.7%).

Less frequent but serious conditions included polytrauma 103 cases (3.6%), involving multiple injuries across body systems, avulsion injuries 91 cases (3.2%), where tissue is forcibly detached, while dog bites and traumatic amputations 68 cases each (2.4%).

The "Others" category comprised 224 cases (7.8%), encompassing a mix of less common or other trauma types (Cat bite, Chest Injury, Degloving injury, dislocation, gunshot, hemothorax human bite, nail prick, locked jaw, Pneumothorax, nail prick, punctured wound, stab wound, scorpion bite, swelling etc.).

Table 4.2: Top 10 trauma diagnosis in the ED of the KBTH

DIAGNOSES	TOTAL NUMBER	PERCENTAGE (%)
LACERATION	888	30.9
FRACTURE	547	19.0
BURNS	246	8.6
BODILY PAINS	230	8.0
HEAD INJURY	216	7.5

ABRASION	193	6.7
POLYTRAUMA	103	3.6
AVULSION INJURY	91	3.2
DOG BITE	68	2.4
TRAUMATIC AMPUTATION	68	2.4
OTHERS*	224	7.8
TOTAL	**2874**	**100.0**

Others*- Other diagnosis comprising of 224 cases (7.8%), consisted of Cat bite, Chest Injury, Degloving injury, dislocation, gunshot, hemothorax human bite, nail prick, locked jaw, Pneumothorax, nail prick, punctured wound, stab wound, scorpion bite, swelling etc.)

4.3.2 Mechanism on Injury

Road Traffic Accidents (RTA) were the leading cause of injury at the casualty reception, accounting for 758 cases (33.7%). Other trauma types, which include industrial accidents, sports injuries, or varied causes, contributed to 602 cases (26.8%), making them the second most common category. Falls were responsible for 463 cases (20.6%). Assault-related injuries accounted for 203 cases (9.0%).

Less frequent but still important mechanisms included burns (117 cases, 5.2%) and animal bites (107 cases, 4.8%) as recorded in table 4.3

Table 4.3: Mechanisms of Injury of Trauma Cases Recorded at The Casualty Reception in 2024

MECHANISM OF INJURY	TOTAL NUMBER	PERCENTAGE (%)
RTA	758	33.7%
OTHER TRAUMA	602	26.8%
FALL	463	20.5%
ASSAULT	203	9.0%
BURNS	117	5.2%
ANIMAL BITES	107	4.8%
TOTAL	2,250	100%

4.4 Severity, Mode of Transportation (Post Injury) and Clinical Outcomes.

4.4.1 Severity of Injury

Triage-Based allocation where color codes often correspond to a triage color system is a standard system used in the ED to determine the urgency with which treatment must be administered to patients. This triaging system is used here as a proxy to determine the severity of injuries due to the unavailability of variables needed to calculate the injury severity score (ISS).

As seen in figure 4.3, trauma cases were distributed across various emergency wards. The Casualty Reception handled mainly green cases, which was 2,250 cases (78.29%). Other specialized wards, whose color codes corresponded to a triage color system, received significantly fewer cases: the yellow ward saw 274 cases (9.53%), the red ward managed 240 cases (8.35%), and the orange ward recorded the fewest cases at 110 (3.83%).

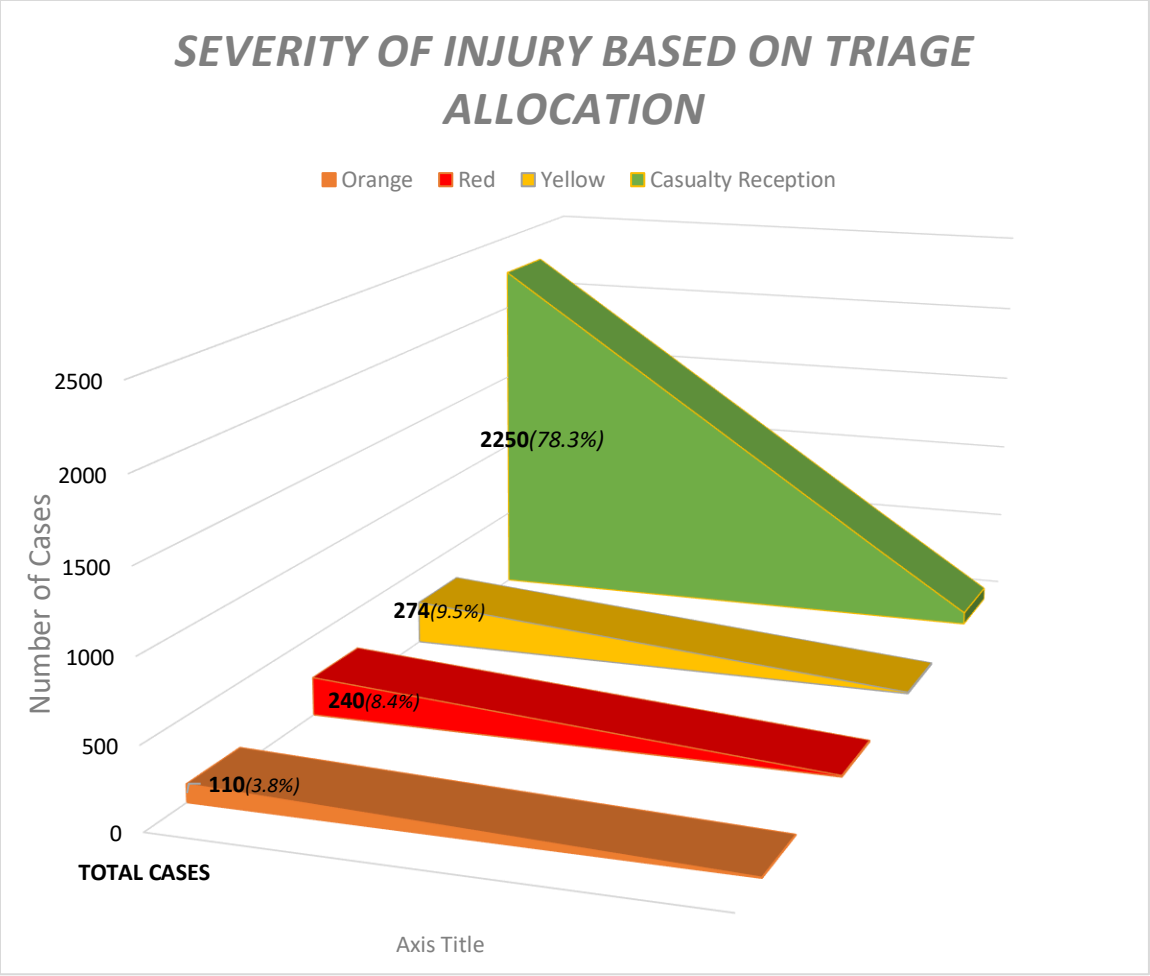


Figure 4.3: ED Space Utilization for Trauma: Triage-Based Allocation.

4.4.2 Prehospital Transport Modality from the Trauma Site and Intra-Facility Movement.

With reference to how patients were transported from the site of injury to the Hospital, table 4.4 highlights that majority of trauma patients arrived at the hospital by taxi, making it the most common mode of transport accounting for 1508 cases (67.0%). Private cars accounted for 492 cases (21.8%). Meanwhile, walk-ins made up 155 cases (6.9%), reflecting individuals. Surprisingly, only 36 patients (1.6%) arrived by ambulance. Other less common modes included motorbikes (51 cases, 2.3%) and tricycles (8 cases, 0.4%).

Table 4.4: Mode of Transportation from the Site of Injury to the ED.

TRANSPORT TO THE HOSPITAL	**TOTAL NUMBER N=2250**	***PERCENTAGE (%) =100%***
AMBULANCE	36	*1.6%*
MOTOR BIKE	51	*2.3%*
PRIVATE CAR	492	*21.8%*
TAXI	1508	*67.0%*
TRICYCLE	8	*0.4%*
WALK-IN	155	*6.9%*

Furthermore, on arrival to the ED a smaller portion (10.1%) were carried, Trolleyed patients made up 4.2%. Only 1.2% of patients limped to the casualty reception.

The data also shows that majority of trauma patients (56.9%) were able to walk to the wards. Another 27.5% were wheeled in as shown in Figure 4.4

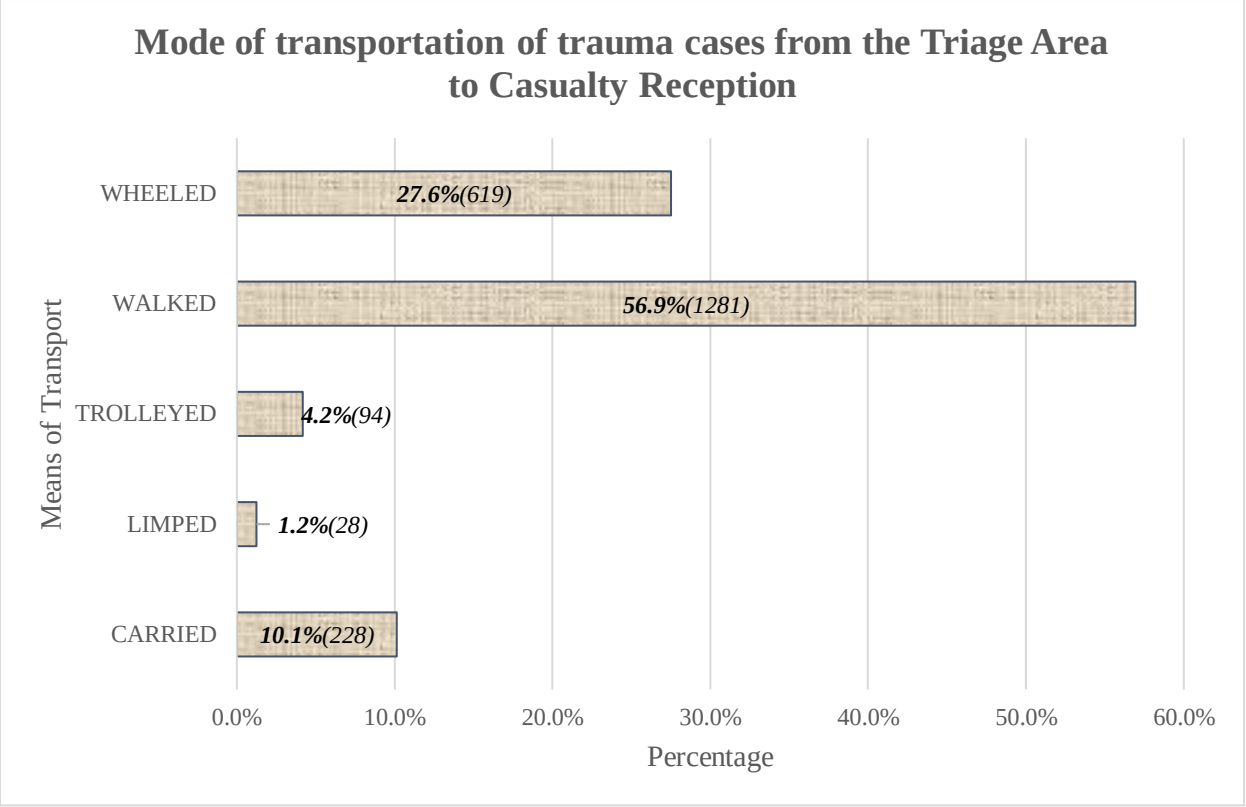


Figure 4.4: Transport Means from ED Entrance to Casualty Reception

4.4.3 Clinical Outcome

The outcome for traumatic injuries in 2024 as shown in figure 4.5 reveals a wide range of patient trajectories following initial treatment. The majority [1,633 (56.8%)] of patients were seen on outpatient basis at the casualty reception and discharged.

A significant number of 575 patients (20%) were admitted for further observation or treatment. Additionally, 543 cases (18.9%) were directed to the casualty theatre. More critical outcomes included 49 deaths (1.7%). 64 patients (2.2%) were transferred out to specialized units for continued management. Less common outcomes involved 8 patients (0.3%) who absconded, leaving the facility before completing treatment, and 2 cases (0.07%) where patients who left against medical advice (DAMA).

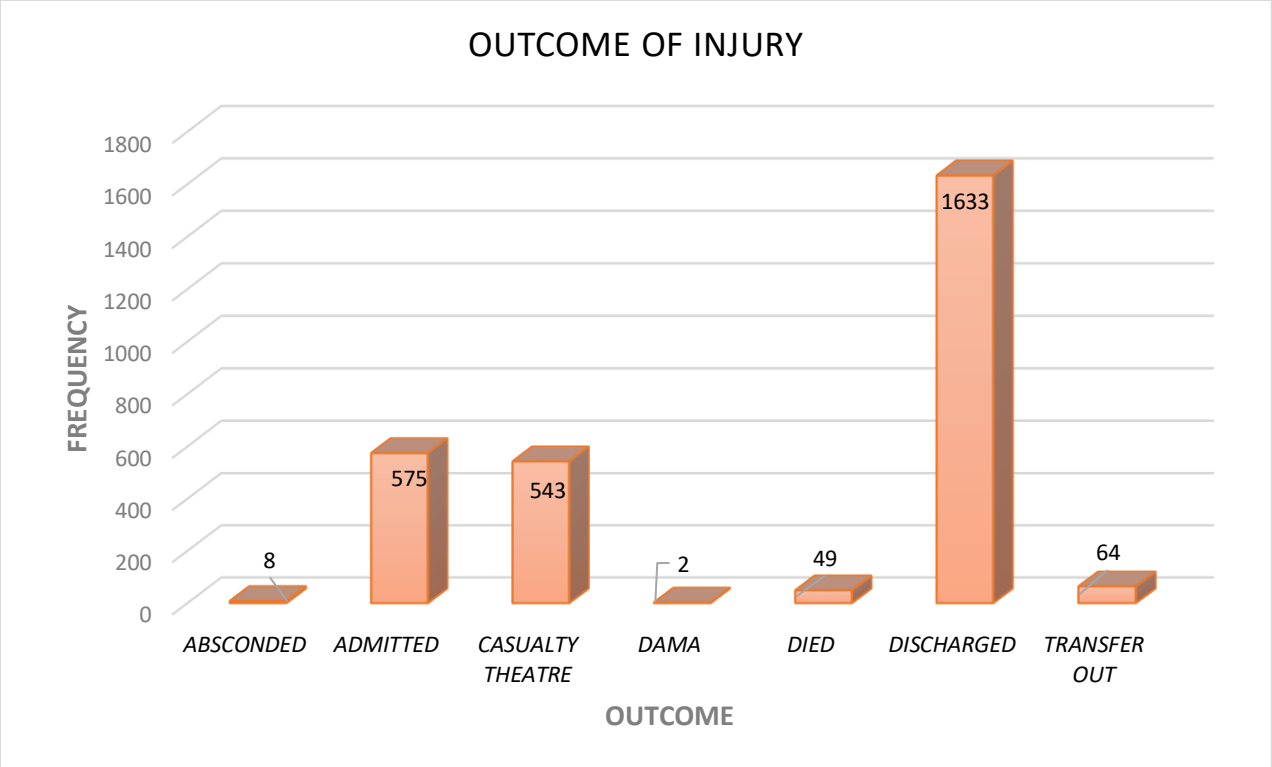


Figure 4.5: Outcome of Cases Seen in the Emergency Department

4.5 Referral and Temporal Patterns

4.5.1 Referral Patterns

Many trauma patients (79.9%) were unreferred, meaning they arrived directly at the emergency department without being transferred from another health facility.

In contrast, 20.1% of patients were referred from other facilities as recorded in figure 4.6

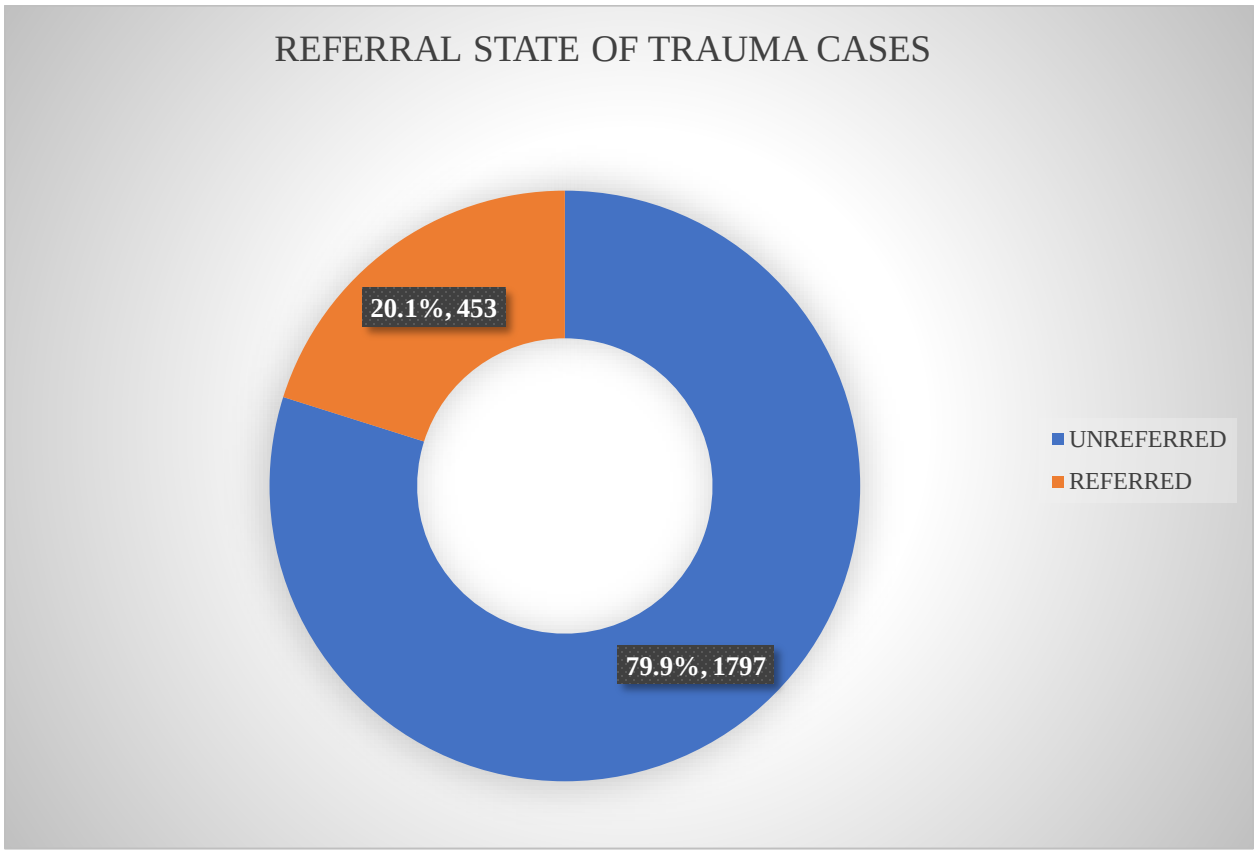


Figure 4.6: Referral Patterns seen at the casualty reception

4.5.2 Temporal Patterns

4.5.2a Time of Day Patients Arrived at the Casualty Reception

Figure 4.7 displays a clear pattern in arrival times, with the afternoon period (12pm–5:59pm) seeing the highest volume of 992 patients (44.1%). Night arrivals (6pm–11:59pm) followed with 608 cases (27%). Morning hours (6am–11:59am) saw 503 cases (22.4%), while the dawn period (12am–5:59am) had the fewest arrivals of 147 cases (6.5%).

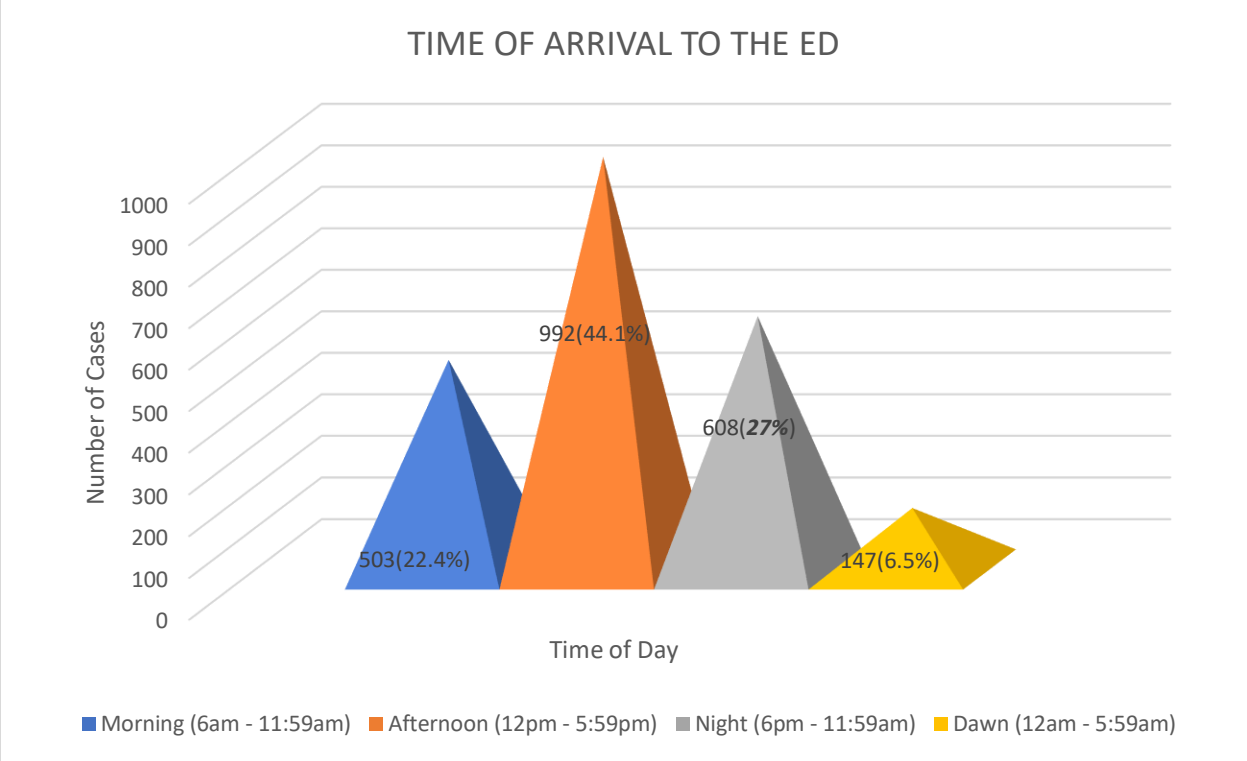


Figure 4.7: Time of Arrival to the casualty reception in the emergency department

4.5.2b The Distribution of Emergency Department Visits by Day of the week

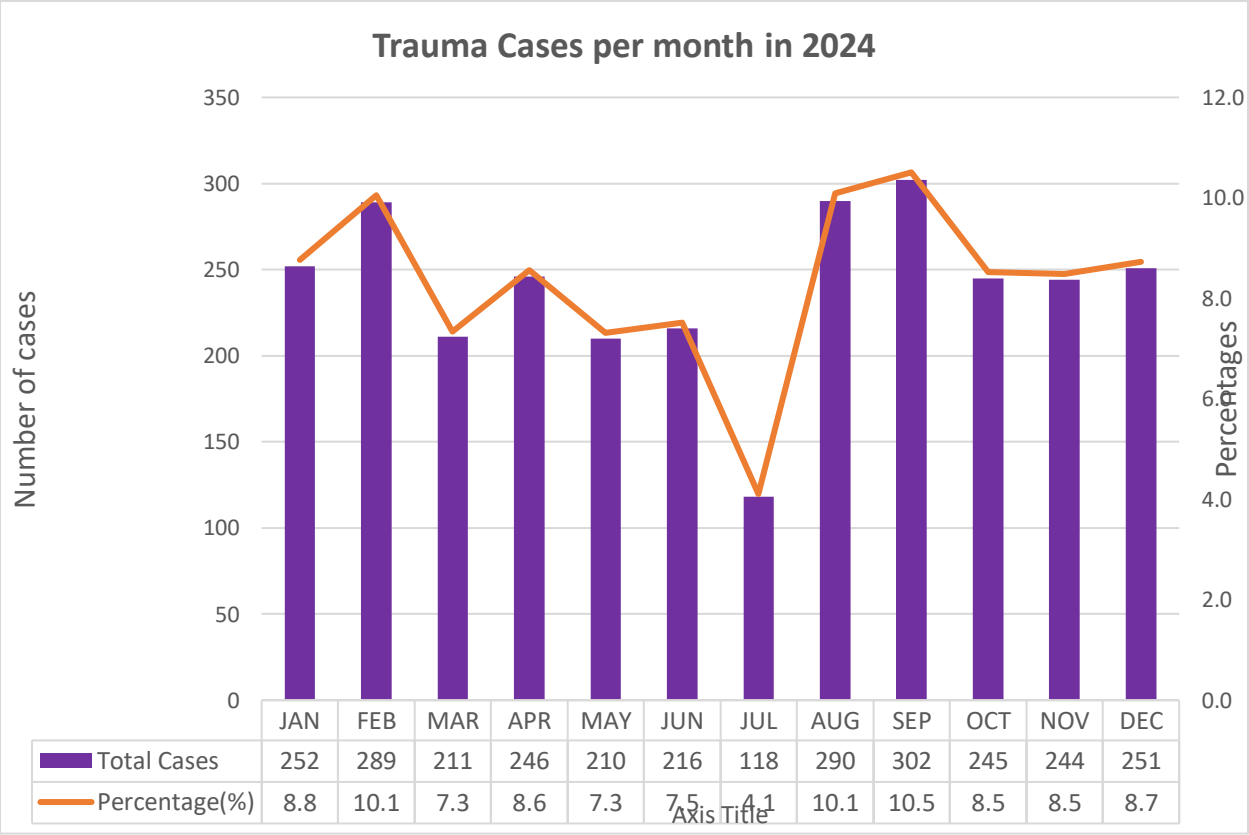
Based on the provided data, the most cases were recorded on Sunday with a frequency of 480 (16.7%), followed closely by Saturday at 466 (16.2%). In contrast, the lowest figures were observed during the middle of the week, with Wednesday having the fewest at 355 (12.4%) and Tuesday at 359 (12.5%). The remaining days, Monday, Thursday, and Friday, saw intermediate numbers of referrals, with frequencies of 371 (12.9%), 417 (14.5%), and 426 (14.8%), respectively as shown in table 4.5.

Table 4.5: The distribution of ED visit by day of week.

		Frequency	**Percentage**
Day of the week	Sunday	480	16.7%
	Monday	371	12.9%
	Tuesday	359	12.5%
	Wednesday	355	12.4%
	Thursday	417	14.5%
	Friday	426	14.8%
	Saturday	466	16.2%
TOTAL		**2874**	**100%**

4.5.2c Monthly Trend

Looking at the monthly trend in figure 4.8, Trauma Cases per month varied throughout the year. The busiest months were September (302 cases, 10.5%) and August (290 cases, 10.1%). Conversely, July had the lowest number of cases (118 cases, 4.1%). Most other months stayed moderately busy, with cases ranging between 210 (7.3%) and 289 (10.1%), showing a generally high flow of trauma incidents across the year, with a significant dip in July.



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total Cases	252	289	211	246	210	216	118	290	302	245	244	251
Percentage(%)	8.8	10.1	7.3	8.6	7.3	7.5	4.1	10.1	10.5	8.5	8.5	8.7

Figure 4.8: Number of trauma cases seen at the ED per month in 2024

4.6 Distribution of Injuries by Mechanism, Sex, Age and Outcome

An analysis of the distribution of injuries by mechanism of injury, sex, age, and clinical outcome reveals significant patterns.

Across most injury mechanisms as shown in table 4.6, males were disproportionately affected. They represented 80.8% (164 cases) of assault cases, 68.9% (522 cases) of Road Traffic Accident (RTA) cases, 64.5% (69 cases) of animal bite cases, and 74.7% (450 cases) of "Other Trauma" cases. In contrast, females were more likely to be affected by burns and falls, making up 54.7% (64 cases) and 43.4% (201 cases) of these respective cases. This highlights a gender-based disparity in injury types.

The age distribution of injuries also showed distinct trends. The 25–44-year age group had the highest percentage of cases for assaults (60.6% or 123 cases), RTAs (42.1% or 319 cases), and animal bites (37.4% or 40 cases). In contrast, children aged 0–14 years were most vulnerable to burns, accounting for 64.1% (75 cases) of such cases, and falls (39.1% or 181 cases). The elderly, aged 65 and above, had the lowest number of cases across most injury types but accounted for 15.1% (70 cases) of fall-related injuries, underscoring the vulnerability of this demographic to falls.

Clinical outcomes varied depending on the mechanism of injury. A very high percentage of patients with animal bites (99.1% or 106 cases) and assaults (81.3% or 165 cases) were discharged after receiving care. For RTAs, 68.4% (518 cases) of patients were discharged, while falls resulted in a 49.2% (228 cases) discharge rate. Admissions were most frequent for burns, with 79.5% (93 cases) of patients requiring further observation or treatment. Falls also had a high admission rate at 49.2% (228 cases). A small number of patients were transferred to other facilities, with the highest rates

seen in assault (4.4% or 9 cases) and burns (5.1% or 6 cases) cases. Absconded and discharged against medical advice (DAMA) cases were minimal.

Table 4.6: Distribution of Injuries per mechanism at the emergency department

VARIABLES	ANIMAL BITES	ASSAULT	BURNS	FALL	RTA	OTHER TRAUMA
SEX						
Female	38(35.5%)	39(19.2%)	**64(54.7%)**	201(43.4%)	236(31.1%)	152(25.3%)
Male	**69(64.5%)**	**164(80.8%)**	53(45.3%)	**262(56.6%)**	**522(68.9%)**	**450(74.7%)**
AGE						
0 - 14 years	32(29.8%)	6(3%)	**75(64.1%)**	**181(39.1%)**	121(16%)	119(19.7%)
15 - 24 years	11(10.3%)	48(23.6%)	6(5.1%)	47(10.2%)	154(20.3%)	154(25.6%)
25 - 44 years	**40(37.4%)**	**123(60.6%)**	23(19.7%)	101(21.8%)	**319(42.1%)**	**230(38.2%)**
45 - 64 years	22(20.6%)	25(12.3%)	12(10.3%)	64(13.8%)	143(18.9%)	81(13.5%)
65 + years	2(1.9%)	1(0.5%)	1(0.8%)	70(15.1%)	21(2.7%)	18(3%)
OUTCOME						
Absconded	0%	1(0.5%)	0%	0%	0%	0%
Admitted	0%	26(12.8%)	**93(79.5%)**	**228(49.2%)**	215(28.4%)	133(22.1%)
Casualty Theatre	1(0.9%)	1(0.5%)	0%	0%	1(0.1%)	1(0.2%)
DAMA	0%	1(0.5%)	0%	0%	1(0.1%)	0%
Discharged	**106(99.1%)**	**165(81.3%)**	18(15.4%)	**228(49.2%)**	**518(68.4%)**	**449(74.5%)**
Trans-out	0%	9(4.4%)	6(5.1%)	7(1.6%)	23(3%)	19(3.2%)

Statistical significance: Associations between mechanism of injury and sex, age, and outcome were all statistically significant ($p < 0.001$).

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This chapter discusses the findings from the epidemiological analysis of injury cases at the Emergency Department (ED) of Korle Bu Teaching Hospital (KBTH) in 2024. Key variables are examined in relation to existing literature and interpreted within Ghana's socio-economic and healthcare context. The aim is to understand not just what the data shows, but why these patterns exist and what they imply for public health and trauma care.

Socio-Demographic Distribution of Injuries

Out of 2,874 injury cases presenting to the ED in 2024, males accounted for 68.9% (1,981), while females comprised 31.1% (893). This is consistent with earlier studies conducted in Kumasi (Acheampong *et al.*, 2019) and at KBTH (Blankson *et al.*, 2020), which found that young men were the most at risk of traumatic injuries because of their involvement in traffic, occupational exposures, and risk-taking behaviors. Men in the 25–44 age group (39.4%) were most affected, and this could possibly be reflective of their role in high-mobility and labor-intensive sectors such as transport, construction, and informal trade.

Children aged 0–14 years made up 22.0% of cases, often due to domestic falls and burns. The elderly (65+) showed a near-equal gender distribution (73 males vs. 71 females), suggesting that age-related vulnerabilities such as poor balance, comorbidities, and unsafe home environments contribute to injuries in this group. Internationally, (Giovannini *et al.*, 2024) report similar trends, with older adults increasingly affected by fall-related trauma due to frailty and limited access to assistive devices.

Spatially, Dansoman recorded the highest number of injuries (9.9%), followed by Korle Gonno (4.5%) and Kasoa (4.2%). These areas are densely populated and characterized by informal settlements, poor road infrastructure, and high pedestrian activity. This reason, coupled with the proximity of these highly urbanized areas to the KBTH could explain the high turnout rate of trauma cases. identified similar hotspots in Accra, linking injury risk to urban congestion and inadequate safety enforcement. Public spaces accounted for 44.2% of injuries, homes 33.2%, and workplaces 17.9%, According to the Global Burden of Disease (GBD 2019 Diseases and Injuries Collaborators, 2020), the high percentage of injuries that take place at home also represents the combined burden of work hazards and domestic accidents.

5.2 Mechanisms of injury and Diagnoses

Road Traffic Accidents (RTAs) were the leading cause of injury, accounting for 758 cases (33.7%). This aligns with national data from the National Road Safety Authority (2024), which attributes over 60% of trauma presentations to RTAs. Furthermore, previous Ghanaian studies reveal that RTAs are the primary cause of illness and fatality, especially when they involve motorbikes and commercial vehicles. The high incidence is driven by poor road conditions, limited enforcement of traffic laws, and widespread use of motorcycles and commercial vehicles (Osei-Ampofo et al., 2020).

Falls (463 cases, 20.6%) were the second most common mechanism, particularly among children and older adults. In children, falls may have often occurred during play or in unsafe home environments, while in the elderly, they could have resulted from poor lighting, slippery surfaces, and underlying health conditions. (Blankson *et al.*, 2020) found similar patterns in Ghana, and WHO (2022) ranks falls as the second leading cause of unintentional injury deaths globally.

Assaults (203 cases, 9.0%) could reflect the burden of interpersonal violence, often linked to socioeconomic stress, substance abuse, and inadequate policing. Burns (117 cases, 5.2%) were more prevalent among women and children, typically may have resulted from cooking accidents involving open flames or hot liquids. These domestic hazards are exacerbated by the use of gas stoves and lack of fire safety education. This corroborates findings from (Serwaa *et al.,* 2020), who conducted a national assessment of cooking-related burns.

Animal bites (107 cases, 4.8%) mostly dog bites pose a significant public health risk due to rabies. The persistence of stray animals and limited access to post-exposure prophylaxis could be a contributing factor to this burden. WHO estimates that Africa accounts for a large share of rabies-related deaths, underscoring the need for bite surveillance and vaccination programs (World Health Organization , 2022).

Diagnostically, lacerations were the most common injury (888 cases, 30.9%), followed by fractures (547 cases, 19.0%), burns (246 cases, 8.6%), head injuries (216 cases, 7.5%), and abrasions (193 cases, 6.7%). These patterns mirror trauma profiles at KBTH and Komfo Anokye Teaching Hospital (KATH), where blunt trauma and soft tissue injuries dominate emergency presentations (Osei-Ampofo *et al.,* 2020). The high rate of fractures and head injuries reflects the severity of RTAs and falls, while burns and abrasions are more typical of domestic and occupational accidents (Blankson, *et al.*, 2020)

5.3 Severity, Mode of Transportation, and Clinical Outcomes

The analysis of trauma case distribution across wards reveals a critical insight into patient flow and injury severity, which is essential for resource allocation. The overwhelming majority of cases, 2,250 (78.29%), being managed in the Casualty Reception suggests that most trauma presentations

are likely minor, requiring immediate non-admission care, consistent with triage protocols where the initial reception area handles Green Triage (minor) cases (Kpe *et al.*, 2024).

Conversely, the specialized wards are Yellow (274 cases, 9.53%), Red (240 cases, 8.35%), and Orange (110 cases, 3.83%) received a significantly smaller proportion of patients. Given that this color codes are typically assigned to progressively more severe cases (Green → Yellow → Orange → Red/Resuscitation) this distribution indicates that while the hospital manages a high volume of trauma, only a small fraction of these incidents is severe enough to require critical admission or specialist in-patient care. This necessitates that trauma resource planning should prioritize efficient high-throughput management in the reception area while ensuring that adequate, specialized resources remain consistently available for the relatively few but critical high-acuity cases (Mock *et al.*, 2021).

Transport data revealed that 67.0% (1508) of patients arrived by taxi, 21.8% (492) by private car, and only 1.6% (36) by ambulance. This reliance on informal transport, rather than official Emergency Medical Services (EMS), is consistent with (Aryee *et al.*, 2024), who found that ambulance usage in Ghana remains low due to cost, limited coverage, and public mistrust. However, it's also important to note that a greater proportion of patients were likely triaged as stable or fair, meaning their injuries did not immediately necessitate the use of an ambulance. This suggests that while there may be systemic barriers to transport of emergency cases, many patients could have possibly preferred more available and affordable non-emergency transport options for their injuries. Internationally, Low- and Middle-Income Countries (LMICs) face similar challenges, with EMS systems often underfunded and poorly integrated into primary care, which,

when coupled with the tendency to use informal transport for non-critical cases, still increases overall care delays for critical patients and compromises outcomes (Mock *et al.*, 2021).

Mode of entry data indicated that 56.9% (1281) of patients walked into the casualty reception of the ED, 27.6% (619) were wheeled in, 10.1% (228) carried, and 4.2% (94) trolleyed. These figures strongly reflect the informal nature of pre-hospital care in Ghana,

Over half of the patients (56.9%) walked from the triage area to the casualty reception while the remaining patients (42%) were either wheeled, carried, or trolleyed. This suggests that a significant proportion of injuries were non-critical or stable upon arrival. However, the use of informal transport modes for injured patients suggests a critical deficiency in the number essential mobility aids like wheelchairs and trolleys allocated to the Emergency Department's triage area. This shortage is particularly problematic given the high volume of trauma victims presenting to KBTH. This combined data underscores the dual challenge: the system lacks the capacity to transport the critically injured, while the non-critically injured predominantly rely on personal means (Blankson *et al.*, 2020).

Data on the Clinical outcomes of cases showed that 56.8% (1633) of patients were managed on outpatient basis at the casualty reception and discharged. 20% (575) were admitted, while 18.9% (543) were sent to casualty theatre. 1.7% (49), with deaths primarily linked to head trauma and polytrauma. Compared to earlier KBTH studies reporting trauma mortality rates of 9% (Serwaa *et al.*, 2020), this lower figure may reflect improvements in triage, early emergency medicine intervention, and resuscitation protocols at the ED with the commencement of the Emergency Medicine Specialty training at the KBTH in 2021.

5.4 Referral and Temporal Pattern

Only 20.1% (453) of patients were referred from other facilities, while 79.9% (1797) arrived directly. This underutilization of formal referral systems is consistent with (Mock *et al.*, 2021), who found that delays, cost, and lack of coordination hinder inter-facility transfers in Ghana.

The high rate of patients arriving directly (79.9%), combined with the proportion who are walk-ins, suggests a systemic failure in the referral network. Korle-Bu Teaching Hospital (KBTH) is Ghana's premier tertiary referral center, designed to manage complex cases transferred from lower-level facilities. The overwhelming volume of direct arrivals, many with stable conditions, could have arisen from the assertion that patients often bypassed lower-level facilities due to perceived differences in quality, mistrust of the system, or a belief that their injury warrants immediate specialist care. This pattern places significant, and often unnecessary, strain on the specialized resources of the tertiary center, diverting staff and time away from the severe, complicated cases for which KBTH is primarily intended

Temporal analysis revealed that the afternoon period (12:00–17:59) saw the highest volume of cases (992, 34.5%), followed by night (608, 21.1%), morning (503, 17.5%), and dawn (147, 5.1%). These patterns align with Ghanaian studies showing peak injury presentations during high-mobility hours, when traffic density and occupational activity are highest (Afukaar et al., 2003).

The high volume of patient presentations during the evening hours (4 PM to 10 PM) is a significant and predictable epidemiological trend in urban trauma centers globally (Akorli *et al.*, 2025), posing critical challenges for a major tertiary facility like Korle-Bu Teaching Hospital (KBTH). This peak is largely attributed to concurrent increases in commuter traffic, leading to a spike in severe Road

Traffic Accidents (RTAs) during rush hour under conditions of poor visibility, which aligns with findings that RTAs are the prime cause of trauma in the region (Adanu *et al.*, 2023). The evening surge is also driven by heightened social activities and associated alcohol consumption, a pattern often noted to cause peaks on weekends and around major social events in Ghanaian trauma centers (Blankson *et al.*, 2020).

Weekly data showed that Sundays (16.7%) and Saturdays (16.2%) accounted for the highest caseloads while midweek days like Wednesday (12.4%) and Tuesday (12.5%) were lowest, is a consistent and widely reported epidemiological phenomenon in Ghanaian trauma centers, directly linked to increased social and recreational activities during the weekend, including higher rates of alcohol-related incidents and Road Traffic Accidents (RTAs) (Blankson et al., 2019). The finding that RTA victims and total injuries often peak on Saturdays aligns with the increased propensity for longer-distance commuting for weekly social events such like weddings and funerals, thereby increasing exposure to crash risk (Blankson *et al.*, 2020).

Furthermore, the monthly spikes in September (302 cases, 10.5%) and August (290 cases, 10.1%), along with the high incidence in February (289 cases, 10.1%). The high-incidence months of August and September often coincide with extended summer or school holidays and increased social events, which generally lead to higher levels of travel, outdoor activity, and socialization, thereby may have led to increasing exposure to trauma risks.

Conversely, the significant dip in cases in July (118 cases) suggests a strong seasonal effect. This month falls within the typical major rainy season. While extreme rainfall events are often linked to an increase in the severity of trauma, such as fatal Road Traffic Accidents (RTAs) due to reduced visibility and hazardous road conditions, it is plausible that reduced mobility and self-limiting

outdoor activities during the peak wet period (often June-August) could lead to a temporary decrease in the *total number* of trauma presentations (Blankson *et al.*, 2020).

5.5 Distribution of injuries per mechanism at the casualty reception

Data from the distribution of injuries per mechanism at the casualty reception revealed distinct demographic and mechanistic patterns in injury presentations at Korle Bu Teaching Hospital. Males were disproportionately affected across most injury types, accounting for 164 out of 203 assault cases (80.8%), 522 out of 758 road traffic accident (RTA) cases (68.9%), and 69 out of 107 animal bite cases (64.5%). Females were more likely to suffer burns and falls, comprising 64 out of 117 burn cases (54.7%) and 201 out of 463 fall cases (43.4%). These findings align with (Acheampong *et al.*, 2019), who reported similar male dominance in trauma admissions in Ghana, and with WHO's global injury data (2023), which shows that men in LMICs bear the highest burden of injury-related disability-adjusted life years (DALYs). The age group most affected was 25–44 years, contributing 123 out of 203 assault cases (60.6%) and 319 out of 758 RTAs (42.1%), consistent with (Mesic *et al.*, 2024), which highlights the vulnerability of economically active adults to traffic and interpersonal trauma. Children aged 0–14 years were most affected by burns (75 out of 117 cases, 64.1%) and falls (181 out of 463 cases, 39.1%), while the elderly (65+) accounted for 70 out of 463 fall cases (15.1%), underscoring their susceptibility to domestic and mobility-related injuries.

Clinical outcomes varied by mechanism. Animal bites had the highest discharge rate at 106 out of 107 cases (99.1%), followed by assaults with 165 out of 203 cases (81.3%), and RTAs with 518 out of 758 cases (68.4%). Burns had the highest admission rate, with 93 out of 117 cases (79.5%) requiring inpatient care, while falls also showed a high admission rate of 228 out of 463 cases

(49.2%). These trends mirror findings from (Blankson *et al.*, 2020) in Ghana and (Van Ditshuizen *et al.*, 2023) in South Africa, both of which emphasize the burden of burn and fall injuries on hospital resources. Transfer-out rates were highest for assault (9 out of 203 cases, 4.4%) and burns (6 out of 117 cases, 5.1%), likely reflecting the need for specialized surgical or rehabilitative care. Minimal cases were recorded for absconding and discharge against medical advice (DAMA), suggesting strong patient retention and trust in emergency services. These results reinforce the importance of targeted injury prevention strategies and continued investment in trauma care infrastructure across Ghana and other LMICs.

5.6 Implications of the study

The findings of this study on injury epidemiology at KBTH in 2024 present a compelling public health narrative. The data reveals a significant and complex burden of trauma, driven by a combination of socio-demographic, environmental, and systemic factors. The male predominance and high incidence of RTAs underscore the need for a targeted public health approach that views trauma not merely as a safety issue but as a chronic disease of public health importance. This requires a multi-sectoral response involving urban planners, law enforcement, public health educators, and healthcare providers.

The study's findings also expose critical gaps in Ghana's trauma care system, particularly in the pre-hospital and inter-facility referral phases. The reliance on informal transport, coupled with financial and logistical barriers to care, creates a significant delay that directly contributes to poor outcomes and high morbidity The high surgical burden, despite a low observed mortality rate (1.7%) in this study, points to an immense burden of morbidity that extends beyond fatality. This significant morbidity is evidenced by the severe, long-term physical and psychological

impairments (e.g., PTSD, chronic disability) sustained by the predominantly young patient population (Van Ditshuizen *et al.*, 2023). However, the finding of low mortality must be cautiously interpreted alongside the regional context where Road Traffic Accidents (RTAs) have historically accounted for up to 61.5% of emergency department trauma deaths in local studies (Blankson *et al.*, 2020).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The results confirm that injuries continue to be a significant public health concern in Ghana, disproportionately impacting young adult males, who accounted for 68.9% (1,981 of 2,874 cases) and who are at the height of their productivity. The most common cause of injury presentations was Road Traffic Accidents (RTAs), affecting primarily the 25–44-year range (42.1% of RTA cases), with lacerations (30.9%) and fractures (19.0%) playing a major role as the most frequent diagnoses. The majority of trauma cases arrived in stable conditions, evidenced by 78.3% being triaged as "Green. Overall death rate was comparatively modest at 1.7%. Additionally, the survey showed that ambulance services are still underutilized, with utilization recorded at only 1.6%, with private automobiles and taxis being the primary means of patient transportation. Additionally, temporal differences were noted, highlighting the impact of social elements and human activity patterns. Higher injury burdens were noted during weekends and in the afternoons (12:00 PM to 5:59 PM), and seasonal peaks were observed in September (10.5%) and August (10.1%). Overall, the study closes a significant gap by providing a thorough epidemiological picture of injuries at KBTH in 2024, highlighting the pressing need for better prehospital treatment, trauma care systems, and road safety.

6.2 Recommendation

From the findings of the study, these are the recommendations

1. The Korle Bu Teaching Hospital (KBTH) Management and the Ministry of Health (MoH) should prioritize the immediate establishment of a Trauma Registry at the Emergency Department of the KBTH and integrate the data into the national system database. This registry should include comprehensive injury data, including mechanism, severity scores, and outcomes, to enable continuous monitoring of injury trends and accurate evaluation of prevention program effectiveness.
2. National Road Safety Authority (NRSA) and the Ghana Police Service (Traffic) should conduct an evaluation within the peri-urban areas like Dansoman, Korle-Gonno and Kasoa. This should include the examination of regulatory short falls that brings about the high incidence traumatic injuries within these communities and institute control measures to mitigate accident risks.
3. The Ghana National Ambulance Service (GNAS) and the MoH, should prioritize further investigations to explore and understand the causes of low patronage of EMS. This vital research will provide the necessary data to strategically support the scaling up of the ambulance network and substantially increasing public utilization of prehospital Emergency Medical Services.
4. Public Health Authorities and Community Leaders must develop and implement injury prevention programs specifically tailored to the identified high-risk groups (young men within the age of 25 to 44, children (0-14years) and women. Prevention efforts should address risk-taking behaviors in young men to reduce the incidence of most traumatic

injuries. Focus should also be on child care as well as kitchen safety and safe storage of fire materials, to prevent falls and domestic burns in children and women.

5. The KBTH Emergency Department (ED) Management and the Ghana Police Service (Traffic) must consider adjustment of staffing and enforcement protocols to align with temporal injury peaks. The study established that the burden of injury is significantly higher during weekends, late afternoons (16:00 to 21:00), and during the extended summer or school holidays period.
6. Research Institutions, the MoH, and Funding Agencies must collaborate to fund multi-centered research related to injuries. A coordinated effort is required to replicate this epidemiological study across other tertiary hospitals in Ghana. This approach will help assess regional variation in injury mechanisms, provide a robust national trauma profile, and ultimately serve as the evidence base necessary for a National Trauma Policy.

REFERENCES

(GBD 2019 Diseases and Injuries Collaborators, 2020 (2020) 'Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019', *The Lancet*, 396(10258), pp. 1204–1222. Available at: https://doi.org/10.1016/S0140-6736(20)30925-9.

Acheampong, A.O. *et al.* (2019) 'Motorcycle Related Oral and Maxillofacial Injuries Seen at Komfo Anokye Teaching Hospital, Kumasi-Ghana', *Surgical Science*, 10(03), pp. 106–112. Available at: https://doi.org/10.4236/ss.2019.103014.

Adanu, E.K. *et al.* (2023) 'An in-depth analysis of head-on crash severity and fatalities in Ghana', *Heliyon*, 9(8), p. e18937. Available at: https://doi.org/10.1016/j.heliyon.2023.e18937.

Afrane, P. *et al.* (2024) 'Public health implications of increasing trends in the burden of road traffic accidents in Ho and Hohoe Municipalities in the Volta Region of Ghana', *PLOS Global Public Health*, 4(6 June). Available at: https://doi.org/10.1371/journal.pgph.0003238.

Afukaar, F.K., Antwi, P. and Ofosu-Amaah, S. (2003) 'Pattern of road traffic injuries in Ghana: implications for control.', *Injury control and safety promotion*, 10(1–2), pp. 69–76. Available at: https://doi.org/10.1076/icsp.10.1.69.14107.

Ahmad, N. *et al.* (2021) 'Improving Firm's Economic and Environmental Performance Through the Sustainable and Innovative Environment: Evidence From an Emerging Economy', *Frontiers in Psychology*, 12(November), pp. 1–12. Available at: https://doi.org/10.3389/fpsyg.2021.651394.

Akorli, R. *et al.* (2025) 'The impact of climate change on road traffic crashes in Ghana', *International Journal of Biometeorology*, pp. 1–25. Available at: https://doi.org/10.1007/s00484-

025-02964-x.

Allan F. Williams (1999) 'The Haddon Matrix: Its Contribution to Injury Prevention and Control', *3rd National Conference on Injury Prevention and Control*, pp. 15–16.

Aryee, G. *et al.* (2024) 'Predictors of household direct cost of burn injury in adult patients at a tertiary healthcare facility in Ghana: an analytical cross-sectional study in Korle-Bu Teaching Hospital', *Pan African Medical Journal*, 48. Available at: https://doi.org/10.11604/pamj.2024.48.9.38266.

Awuah, R.B. *et al.* (2025) 'Estimating Road Traffic Deaths in Accra, Ghana Using the Capture-Recapture Method', *Transportation Research Procedia*, 89, pp. 669–675. Available at: https://doi.org/10.1016/j.trpro.2025.05.089.

Banson, M. *et al.* (2024) 'Comparative Analysis of Traumatic Brain Injury Severity in Motorcycle and Car Accident Victims Treated at Korle-Bu Teaching Hospital', *Journal of West African College of Surgeons* [Preprint]. Available at: https://doi.org/10.4103/jwas.jwas_188_23.

Blankson, P.K., Amoako, J.K.A., *et al.* (2020) 'Epidemiology of injuries presenting to the accident centre of Korle-Bu Teaching Hospital, Ghana', *BMC Emergency Medicine*, 19(1), pp. 1–6. Available at: https://doi.org/10.1186/s12873-019-0252-3.

Blankson, P.K., Nonvignon, J., *et al.* (2020) 'Injuries and their related household costs in a tertiary hospital in Ghana', *African Journal of Emergency Medicine*, 10(July 2019), pp. S44–S49. Available at: https://doi.org/10.1016/j.afjem.2020.04.004.

Cholo, W., Odero, W. and Ogendi, J. (2023) 'The Burden of Motorcycle Crash Injuries on the Public Health System in Kisumu City, Kenya', *Global Health Science and Practice*, 11(1), pp. 1–

13. Available at: https://doi.org/10.9745/GHSP-D-22-00197.

dan Bree, Dara; levy (2019) '乳鼠心肌提取 HHS Public Access', *Physiology & behavior*, 176(3), pp. 139–148. Available at: https://doi.org/10.1007/s00268-020-05683-z.Preventable.

Dehouche, N. (2022) 'The injury severity score: an operations perspective', *BMC Medical Research Methodology*, 22(1), pp. 1–16. Available at: https://doi.org/10.1186/s12874-022-01528-6.

Van Ditshuizen, J.C. *et al.* (2023) 'Evaluating associations between level of trauma care and outcomes of patients with specific severe injuries: A systematic review and meta-analysis', *Journal of Trauma and Acute Care Surgery*, 94(6), pp. 877–892. Available at: https://doi.org/10.1097/TA.0000000000003890.

Giovannini, E. *et al.* (2024) 'Motorcycle injuries: a systematic review for forensic evaluation', *International Journal of Legal Medicine*, 138(5), pp. 1907–1924. Available at: https://doi.org/10.1007/s00414-024-03250-y.

Graham, S.M. *et al.* (2025) 'Injury: a neglected global health challenge in low-income and middle-income countries', *The Lancet Global Health*, 13(4), pp. e613–e615. Available at: https://doi.org/10.1016/S2214-109X(25)00074-9.

Haagsma, J.A. *et al.* (2020) 'The global burden of injury: Incidence, mortality, disability-adjusted life years and time trends from the global burden of disease study 2013', *Injury Prevention*, 22(1), pp. 3–18. Available at: https://doi.org/10.1136/injuryprev-2015-041616.

Ingabire, J.C.A. *et al.* (2023) 'Prevalence and levels of disability post road traffic orthopaedic injuries in Rwanda', *African Journal of Disability*, 13, pp. 1–10. Available at:

https://doi.org/10.4102/AJOD.V13I0.1251.

Kpe, P.A. *et al.* (2024) 'Household cost of road traffic accident-related injuries: A case study of St. Joseph Hospital, Koforidua in Ghana', *Heliyon*, 10(16), p. e36179. Available at: https://doi.org/10.1016/j.heliyon.2024.e36179.

Lachs, D.K. *et al.* (2022) 'Geriatric Burn Injuries Presenting to the Emergency Department of a Major Burn Center: Clinical Characteristics and Outcomes', *Journal of Emergency Medicine*, 63(2), pp. 143–158. Available at: https://doi.org/10.1016/j.jemermed.2022.01.016.

Lindemann, J. *et al.* (2020) 'Evolution of bile duct repair in a low and middle-income country (LMIC): a comparison of diagnosis, referral, management and outcomes in repair of bile duct injury after laparoscopic cholecystectomy from 1991 to 2004 and 2005–2017', *Hpb*, 22(3), pp. 391–397. Available at: https://doi.org/10.1016/j.hpb.2019.07.009.

Mesic, A. *et al.* (2024) 'Identifying emerging hot spots of road traffic injury severity using spatiotemporal methods: longitudinal analyses on major roads in Ghana from 2005 to 2020', *BMC Public Health*, 24(1), pp. 1–12. Available at: https://doi.org/10.1186/s12889-024-18915-x.

Mock, C. *et al.* (2021) 'Deaths from road-traffic injuries by economic group in selected regions of the world, 2000', 363, pp. 2172–2179. Available at: www.thelancet.com.

National Road Safety Authority (2024) 'Incidence , trend and distribution of transport- related injuries reported to health facilities in the Volta Region of Ghana , 2019 to 2023'.

Osei-Ampofo, M. *et al.* (2020) 'Types de blessures et résultats pour la santé chez les femmes enceintes ayant besoin d'une prise en charge médicale d'urgence à Kumasi au Ghana: défis et opportunités relatifs à l'amélioration des soins', *African Journal of Emergency Medicine*, 6(2), pp.

87–93. Available at: https://doi.org/10.1016/j.afjem.2016.01.003.

Razek, T., Grushka, J. and Deckelbaum, D. (no date) ‘Pr ep rin ot pe er r Pr ep rin t n ot ed’, (c).

Saulnier, D. (2020) ‘From GLOBAL PUBLIC HEALTH Karolinska Institutet, Stockholm, Sweden’.

Serwaa, N. *et al.* (no date) ‘Review of Mortality Patterns in Korle Bu Teaching Hospital ’ s Emergency Department Over One Year’, 25(6).

Torgbenu, E.L. *et al.* (2020) ‘Rehabilitation and management outcomes of musculoskeletal injuries in a major referral hospital in Ghana’, *BMC Musculoskeletal Disorders*, 20(1), pp. 1–9. Available at: https://doi.org/10.1186/s12891-019-2423-5.

WHO (2022) *Global Report on Health Equity for Persons with Disabilities*.

WHO (2023) ‘Mapping global evidence on injuries/trauma due to sexual and gender-based violence for research prioritisation and development of guidelines to mitigate their impact: a scoping review protocol’, *Systematic Reviews*, 12(1), pp. 1–7. Available at: https://doi.org/10.1186/s13643-023-02345-8.

World Health Organization [WHO] (2022) ‘Anti-violence measures developed by ILO and WHO: Analysis of the prevalence of workplace violence and the effects of implementation in a general hospital in China’, *Frontiers in Public Health*, 10. Available at: https://doi.org/10.3389/fpubh.2022.1049832.

Yakubu, H.A. *et al.* (2025) ‘Characteristics and outcomes of geriatric injuries presenting to an urban emergency department in Ghana’, *African Journal of Emergency Medicine*, 15(3), p. 100883. Available at: https://doi.org/10.1016/j.afjem.2025.05.007.

Revised.docx

ORIGINALITY REPORT

5%	4%	2%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to University of Ghana Student Paper	2%
2	bmcemergmed.biomedcentral.com Internet Source	1%
3	kbth.gov.gh Internet Source	1%
4	David Mulenga. "Understanding Public Health in Africa - Issues and Cases", Routledge, 2025 Publication	1%

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		