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Epidemiology and Management of Long Bone Fractures from Road Traffic Accidents in Trauma and Specialist Hospital, Winneba, Ghana: A Four-Year Study (2019-2022)

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ABSTRACT

Background: Road traffic accidents (RTAs) are a leading cause of long bone fractures in Ghana, particularly in developing regions, such as Winneba. This study investigated the epidemiology and management of long bone fractures resulting from RTAs at the Trauma and Specialist Hospital Winneba (TSHW) between 2019 and 2022.

Materials and methods: A quantitative descriptive design was employed to analyze data from 637 patients who underwent surgical treatment for RTA-related long bone fractures at the TSHW during the study period. Descriptive statistics were used to examine trends according to sex, body region, and surgical procedure.

Results: Males accounted for 61% of the cases, and lower limb fractures were the most common injuries, representing 69% of all surgeries. Open Reduction and Internal Fixation (ORIF) are the primary surgical interventions. A general decline in surgical cases was observed from 191 in 2019 to 100 in 2022. Sex-based differences were noted in the distribution of less common procedures, and a shift towards fewer invasive surgeries was evident in later years.

Conclusion: While RTA-related long bone fractures remain a significant burden in Winneba, the declining trend suggests potential gains from ongoing road safety and public health interventions. However, the sustained predominance of injuries among young males underscores the need for targeted prevention efforts. Recommendations include strengthening road safety enforcement, bolstering trauma care and rehabilitation services, and promoting safer road use through public campaigns. Future research should adopt a broader scope to capture the full impact of RTAs in Ghana.

Keyword: Road traffic accidents, Epidemiology, Long bone fractures, Morbidity and Surgical intervention

Introduction

Road traffic accidents (RTAs) are predominant in Ghana and contribute substantially to long bone fractures globally, affecting morbidity and mortality, particularly in developing countries.[1,2] In Ethiopia, RTAs are the second most prevalent cause of accidents and injuries, accounting for 22.8% of incidents and 43.8% of fatalities secondary to accidents and injuries.[1] In Saudi Arabia, RTAs cause approximately 7,000

deaths and over 39,000 injuries annually.[3] The epidemiology of long bone fractures due to RTAs varies across regions and age groups. In Western Uganda, a prospective cohort study showed that most RTA victims were male (85.8%), aged 15-45 years (76.3%), with motorcyclists being the most common road users (48.8%).[4] A Swedish study reported a lower ratio between boys and girls (1.8:1) for femoral fractures, with a bimodal age distribution peak in boys aged 2-3 and 16-19 years.[5]

The management of long bone fractures from RTAs requires hospitalization and significantly impacts patients' lives. Treatment approaches vary by patient age and injury severity. In pediatric cases, non-surgical treatment prevails among younger children, while surgical treatment increases with age.[5] Long bone fractures affect physical health, psychological, social, financial, and occupational aspects of patients' lives.[6] This emphasizes the need for comprehensive care and rehabilitation strategies for RTA victims. Despite understanding RTAs' global impact, specific data on long bone fractures in the Winneba region remain scarce. This study aims to bridge the knowledge gap regarding their epidemiology and management in Winneba, Ghana. Understanding these patterns at TSHW could inform targeted interventions, optimize treatment protocols, and reduce RTA burden in the region.

Despite the globally recognized burden of RTAs and their impact on long bone fractures, there is a significant gap in comprehensive data regarding the epidemiology and management of these injuries in Winneba. This hinders the development of effective prevention and management strategies in Ghana. The lack of detailed data on long bone fractures due to RTAs in Winneba leaves health policymakers and practitioners without information to effectively tailor their prevention and intervention strategies. Understanding the specific management protocols and their outcomes is crucial for identifying potential improvements in patient care. Critical missing data included demographics of those most affected by long bone fractures from RTAs, injury patterns, and outcomes of current management strategies, including surgical interventions, recovery times, and rehabilitation efforts.

Filling these knowledge gaps is essential to formulate effective public health interventions, reduce morbidity and mortality associated with long bone fractures from RTAs, and improve survivors' quality of life. Winneba's unique socioeconomic and healthcare landscape makes it imperative to study this locale, as findings from other regions may not apply directly. Local data are essential for creating appropriate interventions for the Winneba population and similar settings. Previous studies have provided insights into the global and regional epidemiology of long bone fractures from RTAs. However, they often lack specificity for localized intervention in Ghana, or fail to capture the full spectrum of management strategies and outcomes.

This study aimed to identify demographics of patients with long bone fractures from RTAs in Winneba, analyse incidence trends, and evaluate current management strategies. The study sought to bridge existing gaps by generating evidence to inform clinical practice and guide policy formulation for improving trauma care outcomes in Ghana.

This paper has six main sections. Following this introduction, the next section reviews literature to provide context for the epidemiology and management of long bone fractures due to RTAs. The methodology section outlines the research design, data sources, and analytical procedures. The Findings section presents key results from the analysis. The discussion section interprets these findings, relating them to existing knowledge and highlighting implications for practice and policy. The paper concludes with main insights and recommendations for improving prevention and management of long bone fractures in Winneba and similar contexts.

Literature Review

RTAs remain a global public health crisis, with 1.35 million fatalities and up to 50 million injuries annually, according to the World Health Organization's Global Status Report on Road Safety 2018. Among severe injuries from RTAs, long bone fractures, particularly affecting the femur, tibia, and humerus, are highly prevalent and contribute substantially to the global trauma burden. Court-Brown and Caesar [7] provided an epidemiological review showing that long bone fractures account for about one-third of skeletal injuries requiring hospital admission, with RTAs as a primary cause among young adults, particularly males aged 15-49 years. In high-income countries, advancements in trauma care have improved the management and outcome of these injuries. Intramedullary nailing has become the standard of care for diaphyseal fractures, offering better union rates and fewer complications than conservative management. Giannoudis et al. [8] introduced the "diamond concept" for bone healing, integrating mechanical stability with biological stimulation through osteogenic cells, scaffolds, and growth factors, advancing treatment protocols. In polytrauma cases, the paradigm has shifted from early total care (ETC) to damage control orthopaedics (DCO). Pape et al. [9] emphasized the benefits of staged fracture fixation in patients with severe concurrent injuries, reducing mortality and complications.

Despite these advancements, the epidemiology and management of long bone fractures in Africa differ. Sub-Saharan Africa bears a disproportionate burden of RTAs, with the highest road traffic mortality rates worldwide. Mock et al. [10] highlighted limitations faced by many low- and middle-income countries (LMICs) in Africa, where underdeveloped trauma care infrastructure leads to suboptimal outcomes. In Nigeria, Kazemian et al. [11] found that due to resource constraints, skeletal traction and external fixation remain the primary treatment modalities for femoral shaft fractures, while intramedullary nailing is often inaccessible. Evidence from East Africa by Birkenhead et al.,[12] showed significant delays in femoral fracture management, with over 60% of patients waiting beyond 48 hours for definitive care. Such delays increase complications risk, including malunion and deep infections, worsened by open fractures from high energy mechanisms. The timing of major orthopaedic interventions is guided by knowledge of post-injury immune response. Young adult males remain the most affected group, with motorcycle crashes and pedestrian-vehicle collisions as dominant injury mechanisms. These challenges are compounded by socioeconomic barriers limiting surgical care access and scarce trauma services in rural and semi-urban areas.

Based on the context provided, there is limited information addressing long-bone fractures in road traffic accidents (RTAs) in West Africa. A general overview of RTA-related injuries and their management can be presented from available information. Road traffic accidents are a significant cause of injuries and fatalities globally, particularly in low- and middle-income countries. RTA incidence is increasing in developing countries due to suboptimal road infrastructure and traffic conditions.[14] In sub-Saharan Africa, RTAs are a leading cause of maxillofacial injuries, with 59% from motorcycle collisions.[15] This suggests long bone fractures may also be prevalent. Studies have found high-energy open fractures are more common in younger males, while low-energy open fractures occur more in older females.[16]

The incidence of fractures is increasing in the elderly population, especially in developed countries.[17] Literature indicates many patients with fractures require surgical intervention. In a study of pelvic fractures, 69.3% of patients received surgical treatment.[14] The average hospital stay for maxillofacial fractures was 7.3 days,[18] potentially comparable to long bone fractures. While specific data on long bone fractures from RTAs in West Africa are lacking, evidence suggests RTAs are a significant cause of injuries. Further research on epidemiology and management of long bone fractures in West African countries is

needed to develop prevention strategies and improve treatment protocols. This pattern demonstrates the healthcare burden of fracture management and importance of surgical capacity.

In Ghana, the pattern mirrors broader African trends but shows distinct national characteristics. Blankson and Lartey[19] and Afukaar et al.[20] confirmed RTAs are the primary cause of long bone fractures, mainly affecting the femur and tibia. Data showed road traffic incidents caused over 60% of such fracture admissions in Ghana. Despite legislative efforts for road safety, inconsistent enforcement contributes to high injury rates, as documented by WHO.[21]

Long bone fracture management in Ghana faces resource constraints. Urban centers like Korle-Bu and Komfo Anokye Teaching Hospitals use locked intramedullary nailing for femoral shaft fractures, adopting global practices. However, district and regional hospitals mainly use skeletal traction and external fixation due to equipment scarcity and financial limitations. Delayed presentation remains critical, affected by transportation difficulties, out-of-pocket payments, and referral system inefficiencies, which hinder timely surgical intervention and increase complications like nonunion and chronic osteomyelitis. The confluence of global, continental, and national perspectives underscores the need for context-specific interventions to improve epidemiological trends and management outcomes of long bone fractures from RTAs. In Ghana, the challenge lies in bridging the gap between available resources and ideal fracture care standards, while addressing socioeconomic and infrastructural factors that perpetuate high injury rates and suboptimal outcomes.

Methodology

The methodology is presented under subheadings to provide a structured account of the research design, data collection, and analytical procedures. This study used a quantitative research approach to address its objectives.

Study Design: This study employed a quantitative descriptive design to examine long-bone fractures from road traffic accidents (RTAs). This approach used hospital records to analyze patterns and treatment practices over a defined period.

Location of the Study: The research was conducted at Winneba Trauma and Specialist Hospital in the Effutu Municipality, Central Region of Ghana. The hospital serves as a major referral center for trauma and orthopaedic cases, particularly for traffic-related injuries.

Study Duration: The study covered January 2019 to December 2022, capturing all relevant surgical cases.

Sample Size: The final sample comprised 637 patients who underwent surgical treatment for long bone fractures at the hospital between 2019 and 2022, after removing incomplete records.

Subjects and Selection Method: All patients recorded in the hospital's Lightwave Health Information Management System (LHIMS) who had surgery for long bone fractures during the study period were included. A census approach was used, involving all eligible cases.

Inclusion Criteria

Patients were included if they:

1. Sustained long bone fractures from road traffic accidents
2. Underwent surgical treatment at Winneba Trauma Hospital between 2019 and 2022
3. Had complete records in the LHIMS database.

Exclusion Criteria

Cases were excluded if they:

1. Involved injuries to head, spine, trunk, or soft tissues only
2. Were non-traffic related injuries
3. Had incomplete records or missing key variables.

Procedure Methodology

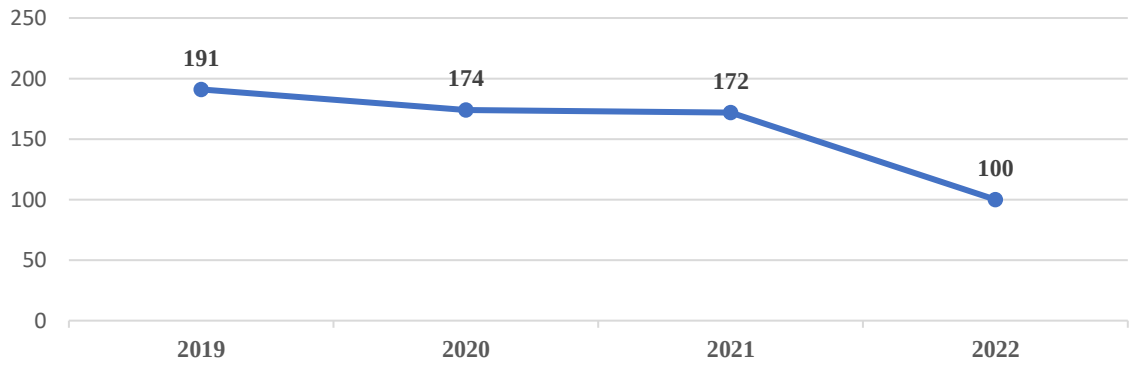
Primary data were retrieved from the hospital's LHIMS database, a government-mandated system used nationwide in Ghana for health information management. The dataset was cleaned to exclude irrelevant variables and incomplete records. The focus was on demographic characteristics, injury type, surgical procedures, and trends during the study period. Only cases meeting inclusion criteria were included in this analysis.

Statistical Analysis Data analysis used descriptive methods to summarize patterns and trends of long bone fractures from road traffic accidents. Frequencies and percentages were calculated for categorical variables such as sex, body region, and surgical procedure type. Trends over the four-year period were examined by comparing annual cases to highlight patterns in injury occurrence and surgical management. Visual tools, including line graphs, bar charts, and pie charts, were used to provide graphical representations of the data, enabling interpretation of trends such as the predominance of lower limb injuries and year-on-year decline in surgical cases. The analysis explored variations in injury and surgical patterns between male and female patients across different body regions. Although inferential statistics were not applied given the census-based approach and descriptive focus, the analysis provided a comprehensive overview of the burden, demographics, and treatment patterns of long bone fractures at the hospital.

Findings & Analysis

Data from the Trauma and Specialist Hospital, Winneba, show that between 2019 and 2022, 637 surgical cases were recorded, with 97 cases involving 45 individuals who had multiple surgeries, representing 15.2% of all cases. In 2019, 17 patients needed multiple surgeries: 13 had two surgeries, three had three surgeries, and one had four surgeries. In 2020, 11 patients underwent two surgeries, while in 2021, 13 patients needed multiple surgeries, 12 having two surgeries and one having three surgeries. In 2022, four patients had multiple surgeries, three having two surgeries and one having three surgeries. The decline in multiple surgeries suggests possible improvements in surgical procedures, better postoperative care, or changes in case severity at the hospital.

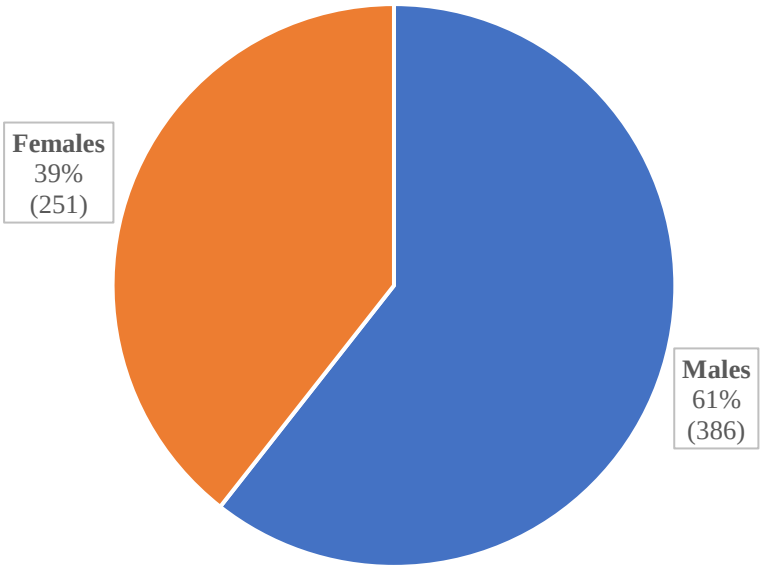
Figure 1: Trend of Surgical Cases at Winneba Trauma and Specialist Hospital (2019–2022)



Data show 637 long bone fracture cases recorded from 2019-2022 at Winneba Trauma and Specialist Hospital. The data revealed a decline in annual surgeries. In 2019, there were 191 cases, 30% of the total over four years. This declined to 174 cases in 2020, 27% of the total. A similar pattern continued in 2021, with 172 cases (27% of total). However, by 2022, there was a significant drop to 100 cases (16% of total), a 42% drop from the previous year.

This trend suggests reduced incidence of long-bone fractures treated at hospitals. Factors may include improvements in road safety, public health interventions, and healthcare-seeking behaviours during COVID-19. The sharp drop in 2022 could reflect changes in traffic regulations, increased road safety awareness, or enhanced emergency response in Winneba municipality. The findings highlight a positive decline in cases, though the burden in 2019 and 2020 remained high.

Figure 2: Distribution of Sex Out of the Total Cases



As illustrated in Figure 2, the sex distribution of 637 recorded cases showed higher prevalence of long bone fractures in males than females. Males accounted for 386 (61%), while females comprised 251 (39%). This male predominance aligns with global patterns in trauma epidemiology, where males face higher risk due to increased exposure to traffic accidents and occupational hazards. The gender gap suggests behavioural and socioeconomic factors, such as males' higher involvement in commercial transport, motorcycle use, and physically demanding jobs, contribute to their elevated risk. Young adult males often represent the most active segment of the population, further predisposing them to road traffic injuries. This finding underscores the need for targeted preventive interventions focusing on high-risk male populations in the Winneba area.

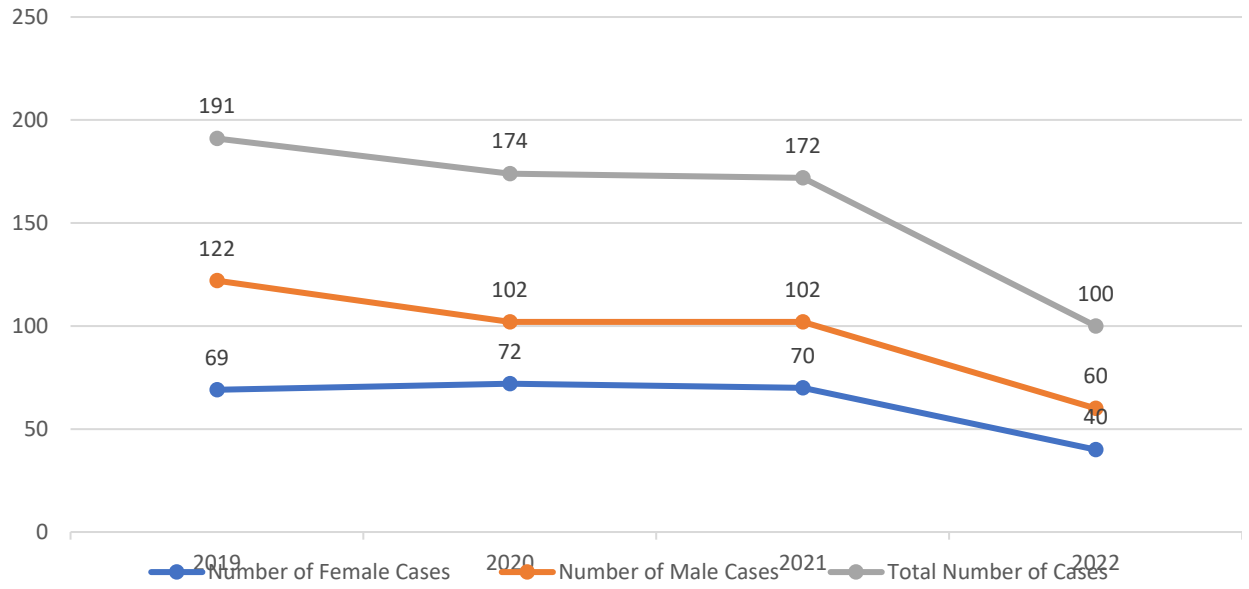
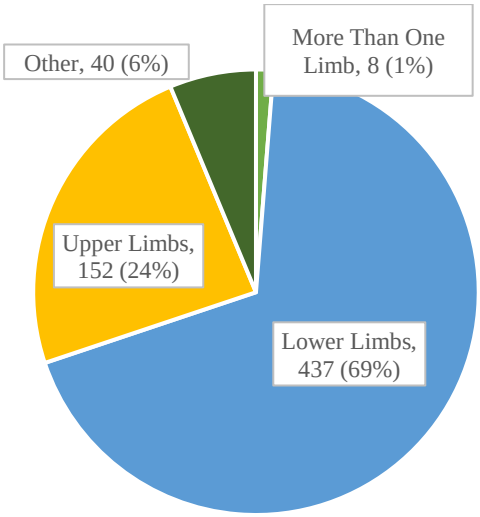


Figure 3: Trends in Surgical Cases at Winneba Trauma and Specialist Hospital (2019–2022)

The figure shows trends in surgical cases of long bone fractures at Winneba Trauma and Specialist Hospital during 2019-2022, by sex. Total cases declined over the period, dropping from 191 in 2019 to 100 in 2022. Male patients outnumbered female patients yearly, with both sexes showing a downward trend. In 2019, male patients accounted for 122 cases, while female patients accounted for 69. By 2022, these numbers decreased to 60 and 40, respectively. The decline among males was more pronounced, though both sexes saw significant reduction, particularly between 2021 and 2022. This drop mirrors the overall decline and may relate to improved road safety enforcement, behavioural changes post-pandemic, or shifting referral patterns. The stable figures from 2019 to 2021, followed by reduction in 2022, suggest significant interventions in traffic safety occurred in the latter year. This analysis highlights the positive reduction in cases while emphasizing the need for sustained efforts to target at-risk groups, particularly young adult males, through evidence-based prevention strategies.

Figure 4: Total Surgical Cases by Body Region (2019 - 2022)

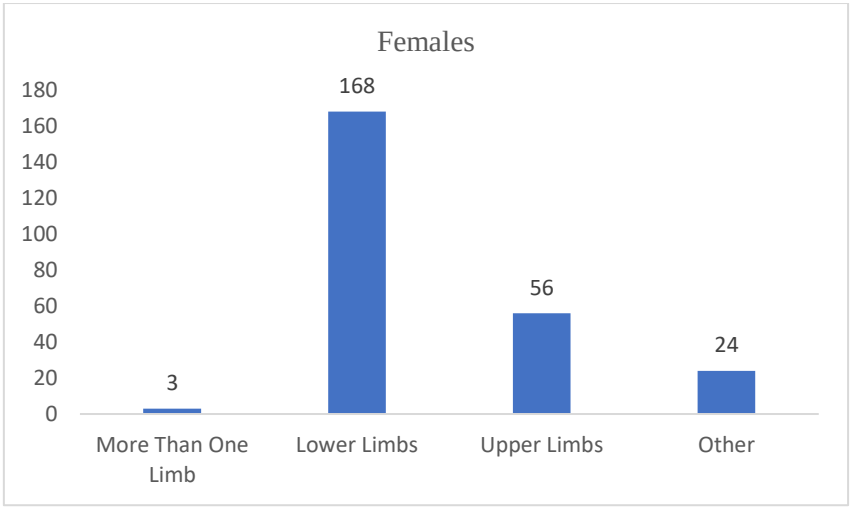


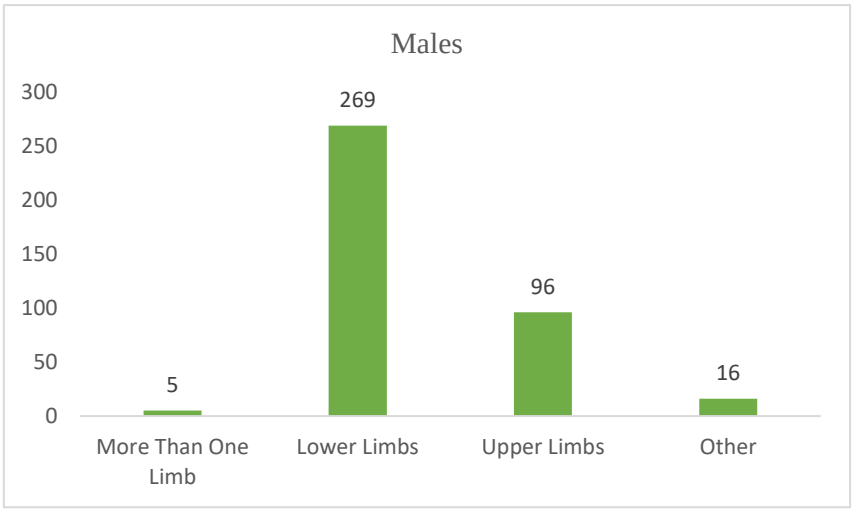
The diagram shows the distribution of surgical cases by body region recorded at Winneba Trauma and Specialist Hospital between 2019 and 2022. Of the 637 surgeries conducted, lower limb surgeries accounted for the majority at 69% (437 cases). This predominance shows that lower limb injuries remain the most frequent cause of surgical intervention in trauma care. The high proportion of lower limb cases aligns with literature highlighting the vulnerability of lower extremities in road traffic accidents, particularly among motorcyclists and pedestrians.

Upper limb surgeries comprised 24% of total cases (152 surgeries), indicating a lower burden than lower limb injuries. Surgeries involving multiple limbs were rare at 1% (eight cases), suggesting bilateral limb injuries requiring operative management are uncommon. Cases of simultaneous upper and lower limb fractures were not recorded. The "other" category, including surgeries on non-limb regions or less frequent orthopaedic interventions, constituted 6% (40 cases).

The distribution pattern reveals the need for targeted preventive strategies focused on mitigating lower-limb trauma, which forms the largest surgical burden. It suggests that resource allocation in trauma care may need to prioritize management of lower extremity injuries, given their significant impact on mobility and quality of life among survivors.

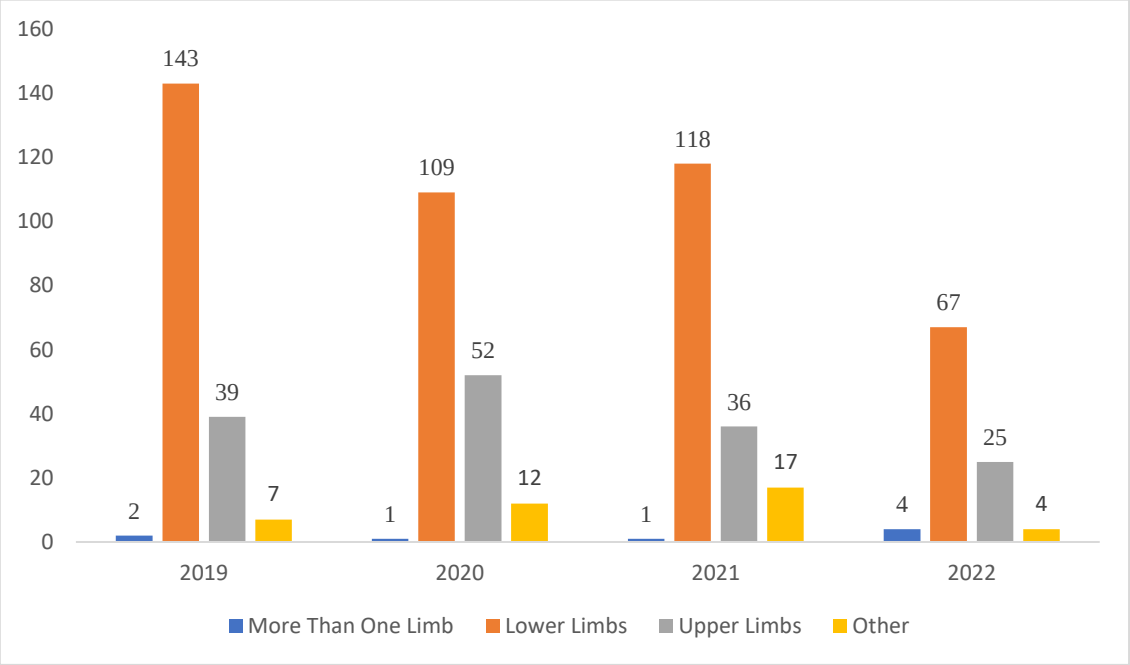
Figure 5: Total Male and Female Surgical Cases by Body Region (2019 - 2022)





Males underwent more surgeries for long bone injuries than females across body regions, except the "Other" category. Lower limb surgery was most common in both sexes, with 269 cases in males and 168 in females, showing higher prevalence in men. Upper limb surgeries followed this pattern, with 96 cases in males and 56 in females, reinforcing the trend of higher surgical volumes among males. Surgeries involving multiple limbs were rare, with five cases in males and three in females, indicating bilateral long bone injuries requiring surgery are uncommon. The "Other" category recorded more surgeries among females (24 cases) compared to males (16 cases), potentially reflecting sex-based differences in injury mechanisms or treatment practices. Overall, men required surgical intervention more frequently, likely due to exposure to high-risk activities like commercial transport, motorcycling, and labor-intensive occupations, which increase trauma risk.

Figure 6: Distribution of Surgical Cases by Body Region at Winneba Trauma and Specialist Hospital (2019–2022)



The bar chart illustrates the distribution of surgical cases by body region at the Winneba Trauma and Specialist Hospital between 2019 and 2022. Cases were categorized into four groups: more than one limb, lower limbs, upper limbs, and "other." Throughout this period, lower limb surgeries consistently had the highest number of cases, showing a declining trend from 143 cases in 2019 to 67 cases in 2022. This predominance confirms that lower limb injuries remained the leading cause of surgical intervention at the facility, despite the overall reduction in trauma cases.

Upper limb surgeries showed fluctuations, rising from 39 cases in 2019 to 52 cases in 2020, before declining to 25 cases in 2022. Surgeries involving more than one limb remained uncommon, with few cases yearly and a modest increase to four cases in 2022, indicating that severe bilateral injuries requiring surgery are rare. The "other" category, encompassing non-limb orthopaedic procedures or less frequent injury types, maintained low counts, peaking at 17 cases in 2021 before declining. These trends reflect the dominant burden of lower-limb trauma and suggest evolving injury patterns and possible improvements

in road safety. The decline across categories highlights the importance of public health interventions aimed at reducing injuries requiring surgical care.

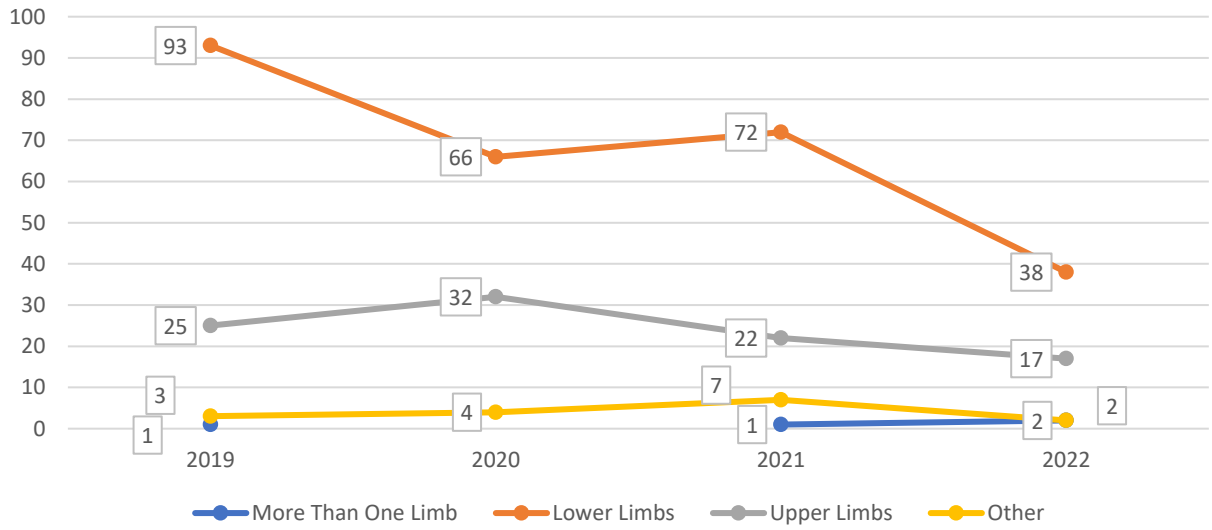
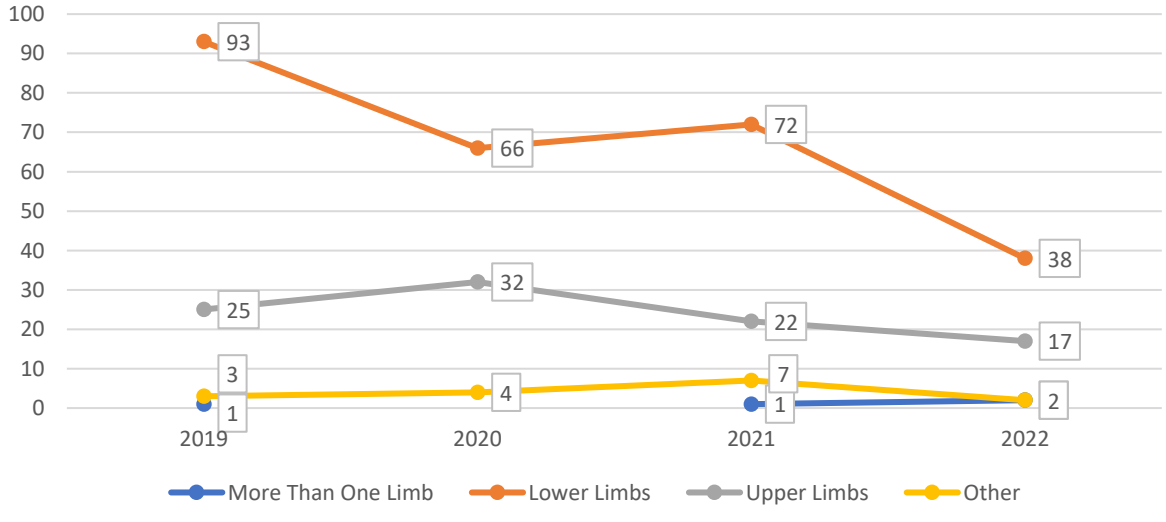


Figure 7: Trend of Surgical Cases Along Body Regions in Females (2019 - 2022)

Lower limb surgeries recorded the highest cases among female patients across all years, showing a declining trend. Cases decreased from 50 in 2019 to 43 in 2020, increased to 46 in 2021, and dropped to 29 in 2022. This indicates that while lower limb injuries remained the most frequent cause for surgery among females, their incidence reduced over time, particularly in the final year. Upper limb surgeries initially increased from 14 cases in 2019 to 20 in 2020, before declining to 14 cases in 2021, and decreasing to 8 cases in 2022. This shows a brief increase followed by reduction in upper-limb injuries requiring surgery. "Other" surgeries showed fluctuation, increasing from 4 cases in 2019 to 8 in 2020, peaking at 10 in 2021, and declining to 2 cases in 2022. Cases involving multiple limbs remained low, with one case in 2019, 2020, and 2022. These trends indicate a general decline in surgical cases among females over the study period, suggesting improvements in injury prevention or changes in risk exposure.

Figure 8: Trend of Surgical Cases Along Body Regions in Males (2019 - 2022)



The graph illustrates surgical intervention patterns in male patients at Winneba Trauma and Specialist Hospital from 2019 to 2022. Lower limb surgeries consistently account for the highest cases, beginning at 93 in 2019, decreasing to 66 in 2020, rising to 72 in 2021, and declining to 38 in 2022. This trend shows lower limb injuries remained the primary reason for surgical treatment among males, despite reduced cases over the period. Upper limb surgeries followed a similar but less pronounced trajectory, peaking at 32 in 2020 before declining to 17 in 2022. Surgeries involving multiple limbs are rare, with maximum three cases in 2019 and about one case yearly thereafter, indicating severe bilateral injuries requiring surgery are uncommon. The "Other" category, including surgeries on less frequently injured regions, remained low, showing a slight increase in 2021 before stabilizing. The data showed a general decline in surgical interventions among males, particularly in limb procedures, reflecting broader trends across the total sample. This reduction may be attributed to improved road safety measures, trauma prevention initiatives, or changing injury exposure patterns in males.

Table 1: Trends in Surgical Procedures (2019 - 2022)

Procedure	**2019**	**2020**	**2021**	**2022**
ORIF	63	67	76	33
POP/Spica	6	4	4	3
Removal of Pins	10	1	4	5
IM Nailing	6			
Removal of Implants	26		23	15
Debridement /Sequestrectomy	12	9	7	4
Osteotomy	1	1	3	3
Pinning & Ex-Fixing	15	7	4	6
Tendon Repair	1			
Reduction	1	12		
Arthroplasty	2			
Removal of Pins		1		
Reduction of Dislocation		12		
Closed Reduction			12	5
Amputation/Disarticulation				3
Excision				5
Total	**143**	**114**	**133**	**82**

Procedural data from 2019 to 2022 showed trends in surgical interventions for long bone injuries at Winneba Trauma and Specialist Hospital. Open Reduction and Internal Fixation (ORIF) accounts for the highest number of procedures, rising from 63 cases in 2019 to 76 in 2021, before declining to 33 in 2022. This reflects ORIF's role as the primary fracture management method, though its frequency decreased in 2022 with the general decline in surgical cases. Plaster of Paris (POP) casting and spica application remained low throughout, decreasing from six cases in 2019 to three in 2022. Debridement and sequestrectomy procedures showed a downward trend, dropping from 12 cases in 2019 to four in 2022, suggesting fewer open fractures or infection-related complications.

Implant removal surgeries showed 26 cases in 2019 and none in 2020, followed by 23 and 15 cases in

2021 and 2022. This pattern could reflect variations in follow-up care or elective procedures during the pandemic. Pinning and external fixation procedures declined overall but increased from four cases in 2021 to six in 2022. Procedures like intramedullary (IM) nailing, tendon repair, osteotomy, and arthroplasty remain low, reflecting specialized indications. Closed reductions became prominent later, with 12 cases in 2021 and five in 2022, while reductions in dislocation peaked at 12 cases in 2020. Amputations, disarticulations, and excisions appeared only in 2022, indicating severe cases that year.

The number of procedures decreased from 143 in 2019 to 82 in 2022, reflecting a broader decline in surgical interventions across the study. This downward trend in cases and procedures may suggest improvements in preventive measures, shifts in injury severity, or changing clinical practices over time.

Discussion

This study examined the epidemiology and management of long bone fractures from road traffic accidents (RTAs) at Trauma and Specialist Hospital, Winneba between 2019 and 2022. The findings confirm existing patterns while revealing divergences that underscore the uniqueness of the TSHW context. Consistent with previous studies, our data showed a clear predominance of male patients, accounting for 61% of total cases. This aligns with Kamabu et al. [4] and Court-Brown et al. [16] who identified males (particularly young adults) as the demographic most affected by fractures due to exposure to high-risk activities like motorcycling and manual labour. This male dominance across surgical categories supports the understanding that trauma and fracture epidemiology disproportionately impact men, especially in low- and middle-income countries where transport-related injuries are prevalent.[2] The predominance of lower limb surgeries, accounting for 69% of cases, matches findings from sub-Saharan Africa where motorcyclists and pedestrians, groups vulnerable to lower extremity injuries, are frequently cited as primary RTA victims.[15,4] This alignment with regional patterns reinforces the study's validity and highlights lower limb trauma as a critical intervention target.

Some findings from this study diverge from established literature. While global trends suggest rising fractures in elderly populations, especially in developed countries,[17] the present data from Winneba show a decline in surgical cases over four years. Total surgeries fell from 191 in 2019 to 100 in 2022, inconsistent with global patterns of increasing orthopaedic trauma, but potentially explained by improved road safety enforcement, public health campaigns, and COVID-19's impact in reducing mobility and accidents.[3,2] Further divergence appears in the sex-specific analysis of the "Other" surgery category. Unlike the broader pattern where males dominated injury statistics, this study found females recorded more cases in this category (24 males vs. 16 males). This contradicts male predominance and suggests possible sex-based differences in injury patterns or healthcare-seeking behaviour in Winneba, warranting further investigation. As Court-Brown et al.[16] noted, older females are more prone to low-energy fractures, which may explain their higher representation in less common surgical categories.

ORIF emerged as the most frequent surgical intervention, consistent with Balogh et al.,[13] who identified it as the standard treatment for long bone fractures globally. However, the sharp decline in ORIF cases by 2022 from a peak in 2021 contrasts with literature showing steady or increasing surgical management.[14] This suggests local factors, such as healthcare system strain during the pandemic or shifts toward conservative management, influenced treatment practices. The emergence of amputations and excisions in 2022, though small in number, deviates from global patterns where such interventions are becoming less common due to advances in fracture management and infection control.[13] Their appearance in later study years could indicate isolated cases of delayed presentation or complications, reflecting systemic

gaps in trauma care access. While the study's finding of fluctuating upper limb surgeries partially aligns with reports of variable injury rates,[15] the decline in cases after 2020 contradicts literature suggesting steady incidence of upper extremity fractures, particularly in regions with growing elderly populations.[17]

While many findings confirm established trauma and orthopaedic patterns (particularly male predominance and lower limb injuries), clear inconsistencies exist in the downward trend of cases, sex-based variations in less common procedures, and emergence of severe interventions in later years. These divergences highlight the need for context-specific analysis and suggest that, while global patterns provide a framework, local dynamics in Winneba, including socioeconomic conditions, healthcare capacity, and behavioural factors, shape the epidemiology and management of long bone fractures.

Limitations of the Study

This study had limitations that warrant consideration. First, it does not account for injuries to the head, spine, and trunk, which often result from road traffic accidents (RTAs). Although many patients sustained multiple traumas, this study focused on long bone fractures and dislocations, excluding injuries to other regions that contribute to disability. Additionally, soft tissue injuries and amputations were not included in the analysis, despite their relevance in trauma care. This focus was intentional, as the primary aim was to examine fractures and dislocations of the limbs, which are common and debilitating outcomes of RTAs. Another limitation is that the study relied on hospital-based data, which may have excluded cases managed at other facilities or community settings, potentially underestimating the burden of long-bone fractures in the population. Furthermore, the retrospective nature and reliance on existing records may have introduced reporting biases or missing data, particularly regarding injury mechanisms and outcomes after surgery. Despite these limitations, this study remains relevant as it provides the first detailed epidemiological profile of long bone fractures in the Winneba region. By focusing on limb-related disabilities, it offers critical insights that can inform prevention, clinical management, and rehabilitation efforts, ultimately contributing to improved trauma-care outcomes in Ghana and similar settings.

Conclusion

This study provides an epidemiological analysis of long bone fractures from road traffic accidents (RTAs) at Winneba Trauma and Specialist Hospital between 2019 and 2022. The findings show that males, particularly young adults, are disproportionately affected, with lower limb fractures comprising most surgical cases. While there was a decline in surgical interventions over the study period, trauma-related long bone fractures remained significant among high-risk groups. The study reveals trends in surgical procedures, with Open Reduction and Internal Fixation (ORIF) emerging as the predominant treatment. Despite inconsistencies with global patterns, such as declining cases amid a global rise in fractures, the data provided valuable insights into injury patterns, management practices, and demographic profiles in Winneba. This evidence is crucial for informing targeted interventions, optimizing treatment protocols, and shaping public health strategies to reduce RTA burden and orthopaedic consequences in Ghana.

Recommendations

First, the National Road Safety Authority (NRSA) and Motor Traffic and Transport Department (MTTD) of the Ghana Police Service should intensify road safety interventions, focusing on young male road users, motorcyclists, and commercial transport operators most at risk of long bone fractures. Enforcing traffic

regulations, conducting road safety education campaigns, and promoting behavioural changes are critical for reducing trauma incidents.

Second, the Ministry of Health and Ghana Health Service should strengthen trauma care services at Winneba Trauma and Specialist Hospital and regional facilities. This includes ensuring availability of surgical implants and fixation devices, expanding orthopaedic surgical capacity, and improving access to rehabilitation services essential for recovery from limb injuries.

Third, public health campaigns by the Ghana Health Service, with local government authorities and civil society organizations, should be expanded. These campaigns should promote protective gear use, traffic regulation adherence, and safe road practices, particularly within Winneba municipality and high-risk corridors.

Lastly, academic institutions like the University of Education, Winneba, and health research centers should study soft tissue injuries, head and spinal trauma, and long-term postoperative outcomes. Such research will provide holistic understanding of RTA burden and management, supporting effective policy formulation and resource allocation at district and national levels.

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