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Research Article

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Prevalence and Patterns of Orofacial Injuries at Chalinze District Hospital, Tanzania

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Abstract

Background: *Orofacial injuries are a common consequence of accidents and constitute a significant public health burden in Tanzania. Despite their clinical and socioeconomic impact, there is limited documentation on their prevalence, patterns, and management in district-level hospitals situated along major highways. This study aimed to determine the prevalence, demographic distribution, causes, injury patterns, diagnostic modalities, and treatment needs for orofacial injuries among the population in Chalinze District, Tanzania*

Keywords: Maxillofacial Injuries, Road Traffic Accidents, Mandibular fractures, Open Reduction and Internal Fixation, Retrospective Study, Tanzania.

Introduction

Orofacial injuries represent a significant public health challenge due to their high incidence, associated morbidity, and socioeconomic impact [1]. The World Health Organization (WHO) reports that the rapid expansion of motorized transport, particularly in low- and middle-income countries, has contributed to an alarming rise in trauma cases, with the maxillofacial region being among the most affected [2]. The anatomical prominence of the face makes it highly susceptible to injury, and the aetiology often varies according to cultural, economic, social, and environmental factors [3].

Globally, road traffic accidents (RTAs) are the leading cause of maxillofacial injuries, followed by falls, assaults, and occupational hazards [4]. In sub-Saharan Africa, RTAs dominate the etiological profile, largely due to rapid urbanization, inadequate road safety enforcement, and increased use of motorcycles as a primary mode of transport [5]. These injuries range from minor soft tissue lacerations to complex facial fractures, often resulting in functional impairment, aesthetic deformity, and profound psychosocial consequences [6].

Soft tissue injuries—such as lacerations, contusions, and abrasions—frequently occur alongside fractures involving the mandible, maxilla, zygomatic complex, and nasal bones [7]. Mandibular fractures are the most commonly reported, with the condylar, angle, and body regions being the most frequently affected sites [8]. Diagnostic evaluation commonly employs orthopantomography (OPG) for mandibular injuries and computed tomography (CT) for midfacial fractures, while treatment ranges from conservative management to surgical interventions such as open reduction and internal fixation (ORIF) [9].

Tanzania has one of the highest RTA-related injury burdens in East Africa, with major highways acting as high-risk zones for both vehicle occupants and pedestrians [10]. Chalinze District Hospital, located along the busy Dar es Salaam–Morogoro highway, serves as a primary referral point for trauma victims, including those with maxillofacial injuries. Despite its strategic role, there is limited documentation on the prevalence, patterns, and management of orofacial injuries in such district-level facilities.

This study therefore aimed to determine the prevalence and patterns of orofacial injuries among patients presenting at Chalinze District Hospital, focusing on demographic characteristics,

causes, injury distribution, associated soft tissue injuries, diagnostic modalities, and treatment approaches. The findings will inform targeted preventive measures and guide improvements in district-level trauma care capacity.

Materials and Methods

Study Design and Setting

This was a retrospective, descriptive, hospital-based study conducted at Chalinze District Hospital, Tanzania. The hospital, located along the Dar es Salaam–Morogoro highway, is a primary-level facility and the main hospital, located along the Dar es Salaam–Morogoro highway, is a primary-level facility and the main trauma care center in the district. It receives a high volume of road traffic accident (RTA) victims due to its strategic position along a busy transport corridor. Complex maxillofacial injury cases are referred to tertiary-level facilities, but the hospital still manages the majority of initial trauma presentations in the district. The study was carried out within the Emergency Department and the Dental/Oral Health Unit of Chalinze District Hospital, and patient records from January 2022 to December 2024 were reviewed for eligibility.

Study Population and Sampling

A total of 500 patient records of injury cases were reviewed during the study period. Of these, 248 records met the inclusion criteria for confirmed orofacial trauma and were included in the final analysis. Patients were eligible for inclusion if they had clinically or radiologically confirmed orofacial injuries sustained in accidents, had records containing complete socio-demographic, diagnostic, and treatment data, and were residents of Chalinze District. Records were excluded if they contained incomplete demographic or clinical information, if the injuries were isolated and unrelated to the orofacial region, or if they were recurrent visits for the same injury episode.

Data Collection and Variables

Data were extracted from the hospital's paper-based registers and electronic archives using a structured data collection form. Recorded variables included socio-demographic data such as age, sex, and place of residence; accident-related details including the role at the time of injury (pedestrian, passenger, or driver), the type of vehicle involved (motorcycle, car, truck, or other), and the use of protective gear (helmet or seatbelt). Injury characteristics included both soft tissue injuries—lacerations, contusions, abrasions, and incised wounds—and hard tissue injuries, defined as fractures of the mandible, maxilla, zygomatic complex, nasal bones, frontal bone, orbital bones, alveolar bone, and other facial bones. Associated oral injuries such as dental avulsions, dental fractures, and mucosal injuries were also recorded. Diagnostic modalities included orthopantomogram (OPG), plain radiography, computed tomography (CT), or clinical examination only. Treatment modalities comprised open reduction and internal fixation (ORIF), intermaxillary fixation (IMF), wound debridement and suturing, conservative management, and referral to tertiary hospitals. Where available, complications such as wound infection, malunion, or osteomyelitis were documented, as well as the length of hospital stay and patient outcomes at discharge.

Operational Definitions

For the purposes of this study, an orofacial injury was defined as any soft or hard tissue trauma to the face, oral cavity, or jaws. Hard tissue injury referred to a fracture of any facial bone confirmed clinically or radiologically, while soft tissue injury referred to disruption or damage to the skin, mucosa, or underlying connective tissues of the face.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) Version 25 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated for socio-demographic, clinical, and injury-related variables. Associations between categorical variables, such as injury site and diagnostic modality or victim role and injury type, were assessed using Chi-square tests. A p-value of ≤ 0.05 was considered statistically significant. Results were presented using tables and figures to enhance clarity and interpretation.

Ethical Approval

The study protocol was reviewed and approved by the Chalinze District Hospital Research Ethical Committee (Ref. No. CCW/M.10/7/141). All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Permission to access hospital records was obtained from the hospital administration. Patient confidentiality was maintained throughout the study by de-identifying personal information prior to data entry and analysis.

Results

Socio-demographic Characteristics

Out of 248 patients with confirmed orofacial trauma, the majority were male (n = 168, 67.7%), while females accounted for 80 cases (32.3%), giving a male-to-female ratio of approximately 2.1:1. Patient ages ranged from 5 to 74 years, with a mean age of 34.8 ± 12.1 years and a median age of 33 years. The 21–40-year group was the most affected (55.6%), followed by 41–60 years (26.2%) and ≤20 years (14.5%), with those over 60 years being least represented (3.6%).

Most patients (71.0%) resided in urban and peri-urban areas along the Dar es Salaam–Morogoro highway, reflecting higher exposure to traffic-related hazards. The detailed demographic distribution by age group and gender is presented in Table 1,

Table 1: Demographic distribution by age and gender of patients with orofacial injuries (n = 248)

Age Group (years)	Male (n)	Female (n)	Total (n)	Percentage (%)
≤ 20	25	11	36	14.5
21–40	96	42	138	55.6
41–60	39	26	65	26.2
> 60	8	1	9	3.6
Total	168	80	248	100.0

Causes of Injury and Victim Role

Road traffic accidents (RTAs) were the predominant cause of orofacial trauma, accounting for 189 cases (76.2%), followed by workplace accidents (11.3%), falls (7.7%), assaults (3.2%), and other causes (1.6%). Among RTA cases, motorcycles were involved in 48.7%, trucks in 27.5%, cars in 14.8%, and buses in 9.0%. By victim role, pedestrians were most frequently affected (40.9%), followed by passengers (35.5%) and drivers (23.4%). Chi-square testing revealed no statistically significant association between vehicle type and victim role ($p > 0.05$). The detailed breakdown is shown in Table 2.

Table 2: Aetiology breakdown by victim role (n = 248)

Cause of Injury	Pedestrians (n)	Passengers (n)	Drivers (n)	Total (n)
RTA – Motorcycles	52	28	12	92
RTA – Trucks	28	16	8	52
RTA – Cars	12	10	6	28
RTA – Buses	10	8	2	17
Workplace accidents	0	8	20	28
Falls	0	8	11	19
Assaults	0	4	4	8
Others	0	6	0	4
Total	102	88	58	248

Injury Patterns

Site-specific Distribution

Hard tissue injuries were present in 201 patients (81.0%), while soft tissue injuries occurred in 198 patients (79.8%); many cases involved both. The mandible was the most frequently fractured bone (56.0%), followed by the zygoma (14.9%), nasal bones (16.9%), maxilla (10.5%), orbital bones (14.1%), dentoalveolar region (8.1%), and frontal bone (4.8%). Within mandibular fractures, the condylar region was most common (14.1%), followed by the angle (11.3%), symphysis (8.9%), body (8.5%), and parasymphysis (7.7%). Soft tissue injuries were predominantly lacerations (57.3%), followed by contusions (37.1%), abrasions (24.6%), and incised wounds (17.3%). The anatomical distribution of fractures is illustrated in Figure 1

Anatomical Distribution of Fractures

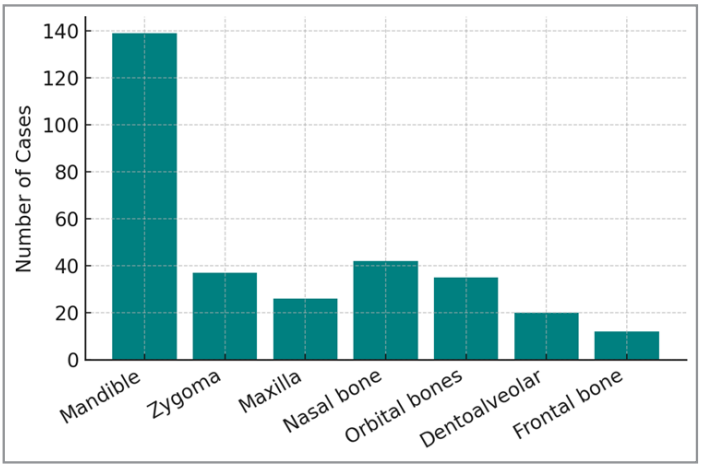

Figure 1: Bar chart showing the anatomical distribution of fractures among patients with orofacial injuries (n = 248)

Diagnostic Modalities

Diagnostic modality selection was significantly associated with injury site ($p < 0.05$). Orthopantomograms (OPGs) were requested in 40.7% of cases, primarily for mandibular fractures. Plain radiographs were requested in 23.4% of cases, while computed tomography (CT) was requested in 27.8%, mostly for midfacial injuries. In 8.1% of cases, diagnosis relied solely on clinical examination, typically for superficial soft tissue injuries. The breakdown of imaging requests is presented in Table 4.

Table 4: Association between diagnostic modality and injury site (n = 248)

Diagnostic Modality	Mandible Fractures (n)	Midfacial Fractures (n)	Total (n)	χ^2	p-value
OPG	90	11	101	73.36	< 0.001
Plain radiograph	28	30	58	1.47	0.226
CT scan	15	54	69	43.77	< 0.001
Clinical only	6	14	20	4.90	0.027
Overall	139	109	248	84.72	< 0.001

Treatment Modalities

Definitive surgical management, including open reduction and internal fixation (ORIF) or intermaxillary fixation (IMF), was required in 39.5% of patients. These procedures were not available at Chalinze District Hospital and were referred to higher-level tertiary centers. Provisional fixation for mandibular instability (16.9%) was also not performed locally and required referral. At the facility, initial management primarily involved wound debridement and suturing (33.1%), conservative management (7.3%), and general stabilization prior to referral (3.2%). The distribution of treatment modalities is summarized in Table 5.

Table 5: Treatment modalities and complications among patients with orofacial injuries (n = 248)

Treatment Modality	n	Percentage (%)
Definitive surgical management (ORIF and IMF) – referred	98	39.5
Wound debridement and suturing (performed locally)	82	33.1
Provisional fixation for mandibular instability – referred	42	16.9
Conservative management (performed locally)	18	7.3
Stabilization prior to referral	8	3.2

Discussion

Maxillofacial trauma remains a significant public health concern, particularly in low- and middle-income countries where access to advanced diagnostic and surgical facilities is limited [11]. This retrospective study at Chalinze District Hospital — a key healthcare facility along the Dar es Salaam–Morogoro highway — highlights the socio-demographic distribution, aetiology, injury patterns, diagnostic modalities, and treatment approaches for orofacial injuries in a high-traffic corridor of Tanzania.

Consistent with findings from other regional and global studies, males were more frequently affected than females, with a male-to-female ratio of 2.1:1 [12]. This predominance is likely related to men's greater participation in high-risk activities, including motorcycle riding, commercial driving, and physically demanding occupations [13]. The most affected age group (21–40 years) reflects the population segment with the highest mobility, employment in manual labor, and exposure to road traffic hazards. Similar trends have been reported in maxillofacial trauma studies from Nigeria, India, and Kenya [14, 15], underscoring the role of socio-economic and occupational factors in injury risk.

Road traffic accidents (RTAs) emerged as the leading cause of injury (76.2%), with motorcycles involved in nearly half of these cases. This aligns with previous Tanzanian studies, where motorcycles are both a primary mode of transport and a major cause of trauma [16]. The high proportion of pedestrian victims (40.9%) may be attributed to the hospital's strategic location along a busy highway, where poor pedestrian infrastructure, speeding, and limited enforcement of road safety laws increase vulnerability [17]. Similar findings have been documented in other East African settings, where inadequate helmet and seatbelt use further contributes to injury severity [18].

From an anatomical perspective, mandibular fractures were the most common hard tissue injury (56.0%), particularly involving the condylar region, followed by midfacial fractures such as zygomatic and nasal bone injuries. The mandible's prominence and exposure make it particularly susceptible to direct impact forces, a trend widely reported in African and Asian trauma literature [19, 20]. Soft tissue injuries, especially lacerations (57.3%), were also prevalent, reflecting the combined occurrence of blunt and penetrating trauma in road accidents [21]. These findings are consistent with reports from both rural and urban hospitals in sub-Saharan Africa, where delays in presentation and limited protective gear use exacerbate injury patterns [22].

Diagnostic evaluation showed a significant association between imaging modality and injury site. Orthopantomograms (OPGs) were most frequently requested for mandibular fractures, while computed tomography (CT) scans were preferred for midfacial trauma. However, the absence of advanced imaging facilities at Chalinze necessitated referral of such cases to higher-level centers. This limitation reflects a broader challenge in Tanzanian district hospitals, where resource constraints hinder timely diagnosis and contribute to treatment delays.

Treatment patterns were heavily influenced by the hospital's capacity. Definitive surgical management including open reduction and internal fixation (ORIF) or intermaxillary fixation (IMF) was required but could not be performed locally, necessitating referral. Similarly, provisional fixation for mandibular instability was also not available. Local management primarily consisted of wound debridement and suturing conservative approaches and general stabilization prior to transfer. These figures highlight the urgent need to strengthen surgical capacity at district-level facilities or establish streamlined referral pathways to reduce morbidity associated with delayed care.

Clinical Implications

The findings from this study have several implications for clinical practice and health policy. First, targeted preventive strategies such as motorcycle helmet campaigns, pedestrian safety programs, and strict enforcement of traffic laws could significantly reduce the burden of maxillofacial injuries. Second, investment in essential imaging equipment and surgical capabilities at district hospitals would allow for earlier intervention and improved outcomes. Third, developing standardized trauma management protocols and training programs for healthcare workers could enhance the quality of care for orofacial trauma patients in resource-limited settings.

Future Research Directions

Further multi-center studies are warranted to evaluate long-term outcomes, assess the cost-effectiveness of capacity-building interventions, and explore the role of community education in injury prevention. Additionally, prospective data collection could provide deeper insight into the time-to-treatment intervals and their impact on recovery, particularly in rural and peri-urban populations.

Methodology

This retrospective study was conducted at Chalinze District Hospital, Tanzania, and involved the review of patient records for individuals diagnosed with maxillofacial injuries between January 2020 and December 2025. Extracted data included demographic characteristics, clinical presentations, radiological requests and findings, as well as treatment modalities. Descriptive statistics were used to summarize the data, and Chi-square tests were applied to assess associations and trends in maxillofacial injuries. A p-value of ≤ 0.05 was considered statistically significant.

Results

The most affected age group was 23–45 years, with a male predominance (68%). Pedestrians formed the largest victim category, followed by motorcyclists and passengers. Road traffic accidents (RTAs), particularly those involving motorcycles, were the leading cause of orofacial trauma. Mandibular fractures were the most frequent injury type, followed by maxillary fractures and soft tissue lacerations. Orthopantomograms (OPGs) were the most commonly needed diagnostic tool for mandibular fractures, while CT scans were primarily requested for midfacial injuries ($p < 0.05$). Open reduction and internal fixation (ORIF) were the predominant treatment need, followed by intermaxillary fixation and wound debridement. Orofacial injuries were more prevalent among pedestrians (n = 98, 39%) than among motorcyclists and passengers (n = 52, 21%). RTAs accounted for 60% of cases, followed by workplace accidents (20%), falls (15%), assaults (6%), and other causes (4%). Overall, 81% of patients sustained mandibular or midfacial fractures, with mandibular fractures (56%) being the most common, followed by zygomatic complex fractures (15%) and midfacial fractures (10%). Additional fracture sites included nasal (17%), orbital (14%), dentoalveolar (8%), and frontal bone (5%). Among mandibular fractures, condylar fractures were most common (5%), followed by fractures of the angle (3%), symphysis (3%), body (2%), and parasymphysis (2%). Lacerations were the most frequent soft tissue injury, followed by contusions and incised wounds. The choice of imaging was significantly associated with the fracture site, with OPGs preferred for mandibular fractures and CT scans for midfacial injuries ($p < 0.01$).

Conclusion

This study underscores the need for targeted preventive strategies against oral maxillofacial injuries, which are predominantly caused by road traffic accidents in the Chalinze District. It also highlights the importance of strengthening district hospital trauma management capacity to improve patient outcomes.

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