Paediatric Trauma Burden in Tanzania: Analysis of Prospective Registry Data from Thirteen Health Facilities

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Abstract

Background

Trauma is among the leading causes of morbidity and mortality among paediatric and adolescent populations worldwide, with over ninety percent of childhood injuries occurring in low-income and middle-income countries. Lack of region-specific data on paediatric injuries is among the major challenges limiting ability to implement interventions to prevent injuries and improve outcomes. We aimed to characterise the burden of paediatric injuries seen at thirteen diverse health facilities in Tanzania.

Methods

This was a prospective descriptive cohort study of children aged up to 18 years, and presenting to emergency units (EUs) of thirteen multi-level health facilities in Tanzania from 1st October 2019 to 30th September 2020. We describe injury patterns, mechanisms and early interventions performed at the emergency units of these health facilities.

Results

Among 18,553 trauma patients seen in all thirteen-health facilities, 4368 (23.5%) were children, of whom 2894 (66.7%) were male. The overall median age was 8 years (Interquartile range 4-12 years). Fall 1592 (36.5%) and Road Traffic Crash (RTC) 840 (19.2%) were the top mechanisms of injury. Most patients 3748 (85.8%) arrived at EU directly from the injury site, using motorized (two or three) wheeled vehicles 2401 (55%). At EU 651 (14.9%) were triaged as an emergency category. Multiple superficial injuries (14.4%), fracture of forearm (11.7%), and open wounds (11.1%) were the top EU diagnoses, while 223 (5.2%) had intracranial injuries. Children aged 0-4 years had the highest proportion (16.3%) of burn injuries. Being referred, and being triaged as an emergency category was associated with high likelihood of serious injuries with risk ratio 3.3 (95%CI 2.7-4.0) and 2.3 (95% CI 2.0-2.8) respectively. 1095 (25.1%) of patients were admitted to inpatient care and 25 (0.6%) died in the EU.

Conclusions

In these multilevel health facilities in Tanzania, paediatric injuries accounted for nearly one-quarter of all injuries. Over half of injuries occurred at home. Fall from height was the leading mechanism of injury, followed by RTC. Most patients sustained fractures of extremities. Future studies of paediatric injuries should focus on evaluating various preventive strategies that can be instituted at home to reduce the incidence and associated impact of such injuries.

Background

Globally, trauma is the leading cause of death for children over nine years of age with 95% of child injuries occurring in low and middle-income countries. According to the World Health Organisation (WHO), approximately 830,000 children die every year as a result of an unintentional injury (1). In high-income

countries (HIC), child injuries account for 40% of all child deaths, and the American College of Surgeons' Committee on Trauma estimates that children comprise about 25% of all trauma patients (2). While there have been efforts in reducing the burden of childhood mortality due to trauma in most HIC, in low and middle income countries (LMIC) efforts have largely focused on addressing mortality resulting from communicable illnesses, leaving a surge in mortality resulting from injuries among the same age population (3,4).

The United Nations Children's Fund report on childhood injuries showed a decline by 50% in HIC between 1970 and 1995, however in LMIC reports have shown an increasing trend in morbidity and mortality (5,6). This trend has been attributed to socio-economic transition in these countries, with more urban dwellers and increasing motor vehicle accidents, combined with a lack of injury prevention strategies. According to the WHO child injury prevention report, most of the childhood injury burden rests in LMICs, and within these countries, poor children are disproportionately affected (4,7).

In Sub-Saharan Africa (SSA), injuries are a significant cause of mortality, and for every death, there are thousands of non-fatal injuries which are likely under-reported, but result in serious disability that might be preventable with timely treatment (7). While the burden of traumatic injury is very high, many of these injuries can be prevented by simple and cost effective interventions that can be instituted at the community level, targeting children and families (8). The lack of published trauma data (9) and specifically paediatric injury data in the region prevents the understanding of factors that are associated with paediatric injuries, care processes and outcomes; all of which can support the development of interventions to prevent injury occurrence, post injury care, and long-term rehabilitation care (10–12)

In Tanzania, like most LMICs, there is paucity of published data on paediatric injury, which hampers the capacity of health policymakers to understand the burden of pediatric trauma and to prioritize and design effective interventions, such as customizing resources to cater for the needs of management of paediatric injuries. In an effort to understand the burden of paediatric injuries, care process and outcome of paediatric injuries in Tanzania, we undertook a study to describe the causes, patterns, interventions and outcomes of paediatric injuries, among patients presenting at the Emergency Units (EUs) of thirteen multi-level health facilities that include the diverse scale of administrative structure of Tanzania's public health infrastructure.

Methods

Study Design

This was a prospective descriptive cohort study of children aged up to 18 years, and presented to EUs of thirteen multi-level health facilities in Tanzania from 1st October 2019 to 30th September 2020. In this study we implemented trauma registries (TRs) at thirteen health facilities, which include four regional hospitals (*Tumbi, Morogoro, Dodoma and Mawenzi* regional referral hospitals), three district hospitals

(*Same, Korogwe and Mvomero* Hospitals), five health centres (*Kimara, Chalinze, Mikumi, Mkata and Gairo* health centres), and one dispensary (*Fulwe* dispensary) (**figure 1**).

Study setting

This study utilized prospectively collected trauma registry (TR) data from the EU of 13 multi-level health facilities in the United Republic of Tanzania. Tanzania is a lower-middle-income country, with approximately 60 million people, of which over half are aged between 0-19 years (13,14). The public health system operates on a pyramidal model ranging from dispensaries as the lowest level of care to consultant and national level hospitals as the highest level of care (15). There are significant limitations on specialised paediatric neurosurgical trauma care, with such services being available in consultant and national level hospitals.

All regional and district hospitals have EUs which serve as acute intake areas for patients with acute illness and injuries. While these operate 24 hours, seven days a week, there are variable levels of human resource and infrastructure to support care (16). Health centres and dispensaries have dedicated rooms for care of the injured; health centres operate 24 hours per day, while dispensaries operate only for 12 hours per day. The implementation of TR at these facilities was part of a larger trauma study that was aiming at understanding the health impacts of implementing an Emergency Medical Services (EMS) pilot along the A7 highway that connects northern to southern Tanzania (18). The details and components of pilot implementation of this EMS are discussed elsewhere (17).

Study population

Children aged 0 to 18 years old presenting to any of thirteen health facilities with trauma related complaints, either from the scene of injury or as referral from lower facilities, were eligible for inclusion in the study. We excluded children returning to the EU for follow up care after initial interventions.

Data source

A paper-based standardised trauma documentation form was implemented at the EU of each of thirteen health facilities, and was used for both clinical care as well as informing the TR. This standardized trauma form was initially adopted and modified from the World Health Organisation (WHO) standardized trauma form (18). Prior to implementation, the paper-based trauma documentation form was modified and re-piloted to ensure inclusion of additional variables of interest, especially related to road traffic injuries (RTI). The final version of the form included variables related to demographics, injury location, clinical presentation, injury details, injury severity, level and number of injuries, management, care outcomes, diagnosis, consultation and final disposition of the patients. The standardized trauma form was printed with a carbonless copy to allow the duplication of information for clinical documentation as well as retaining a copy that was used for abstracting data to inform the TR. Data from the standardized trauma form was abstracted to an online data capture software Research Electronic Data Capture (REDCap) (© REDCap version 7.2.2, Vanderbilt, Nashville, TN, USA).

Study procedure

We recruited and trained a research assistant (RA) and trauma data coordinator (TDC) in each health facility to support data collection. The TDCs were health care providers in these facilities and had an overall clinical oversight responsibility to ensure compliance with clinical documentation and data collection procedures. Prior to launching data collection, we trained RAs and TDCs on the overview of primary trauma care and documentation of variables in the standardised trauma form as well as abstracting data to the REDCap tool using digital tablets.

All patients presenting to the EU of these health facilities with injury related complaints were manually recorded into the trauma forms by clinicians and RAs. Details of the care process for the patients was expected to be documented by the clinician, while the RA supported the documentation as well as abstracting the information to the REDCap at the end of the patient care process. The study authors received copies of completed trauma forms from each site, and performed selected check up on some trauma forms and provided feedback to the TDCs and RAs, as well as performing data validation.

Data Analysis

Data was exported from REDCap and imported onto the Statistical Package for the Social Sciences (SPSS version 22.0, IBM, Ltd, Carolina, USA), cleaned, coded and analysed. The descriptive statistics of trauma patients were summarized by frequency distribution tables of patient demographics, and mean and standard deviation, or median and interquartile range (IQR). Variables analysed included mechanism of injury, injury intent, triage level, referral pattern and final EU disposition. In order to understand the risk factors for serious injuries we calculate odds ratios for potentially serious injuries (those that necessitated ward, ICU, operating theatre admission or referral to other facilities).

Results

Patient Characteristics

Among 18,553 trauma patients seen in all thirteen-health facilities during the study period, 4368 (23.5%) were children, of whom 2894 (66.7%) were male, and overall median age was 8 years (Interquartile range 4-12 years). Motorized (two or three) wheeled vehicles 2401 (55%) was the most common mode of EU arrival; 3748 (85.8%) arrived at EU directly from the injury site. Overall 3223 (73.8%) patients were triaged as priority cases. **Table 1**

Mechanism, injury intent and place of injury

Fall from height was the most commonly reported mechanism of injury in the study population, occurring in 1592 (36.4%) of children. Road traffic injuries were the most common mechanism (31.2%) in children aged 15 to 18 years of age, while burn was the second most common mechanism (16.2%) in children aged 0 to 4 years. Overall most injuries occurred at home (56.0%); however in the age group 15 to 18

years, most of injuries (35.7%) occurred on the road. The majority of injuries (82.1%) were unintentional; the age group 15 to 18 had the highest (8.7%) proportion of intentional injuries. **Table 2**

When looking at mechanisms of injury by health facilities, we found that Regional Hospitals had the highest proportion of patients with fall (43.9%) and RTC (22.1%) related injuries, while Health Centres had the highest proportion of stab or cut injuries (17.4%), animal bite (9.4%) and burn related injuries (8.1%). District hospitals had the highest proportion of patients who sustained injuries after being hit by falling objects (4.0%) and those who had sexual assault (3.6%) related complaints. **Table 3**

ICD-10 diagnosis by age group

Multiple superficial injuries (14.4%), fracture of forearm (11.7%) and open wounds (11.1%) were the top three diagnoses, and accounted for over one-third of diagnoses. Intracranial injuries accounted for 5.2% of the overall diagnoses. Children aged 0-4 years had the highest proportion (16.3%) of burn injuries compared to the rest of the study population. Dog bites (5.3%) were more common in the age group 5-9 years, while maltreatment syndrome (4.6%) was more common in the age group 15 to 18 years. **Table 4**

Nature of injuries with risk factors for serious injuries

Overall, male patients (relative risk: 1.5 (95% CI 1.3-1.7) and those with age group 0 to <5 years (relative risk: 1.2 (95%CI 1.1-1.3) had significantly higher likelihood of having serious injuries requiring hospital admission or referral. Patients with poisoning 36 (0.9%) had a relative risk of serious injury of 1.4 (95%CI 1.0-1.9), while those involved in RTC had a risk ratio of 1.5 (95%CI 1.4-1.6). Being referred, and having an initial triage level as an emergency was associated with high likelihood of serious injuries with risk ratio 3.3 (95%CI 2.7-4.0) and 2.3 (95%CI 2.0-2.8) respectively. **Table 5**

Final EU disposition by age group

Most patients 2829 (64.8%) were discharged from the EU, while 28.2% of children aged 0-4 years were admitted to inpatient care, and 10.0% were referred to higher level hospitals. The overall EU mortality was 25 (0.6%), and 1.0% of patients aged 5 to 9 years died while receiving care in the EU. **Table 6**

Discussion

This study used prospectively collected injury surveillance data from a novel trauma registry implemented at thirteen multilevel health facilities over a period of one year to provide a detailed picture of paediatric injuries treated at health facilities in Tanzania. The findings from this study will provide an evidence base for implementation of appropriate injury prevention strategies, as well as guiding resource allocation to inform care processes at these facilities and other similar settings. In Tanzania, most prior studies on paediatric trauma have been limited to single tertiary sites and have spanned less than one year (19,20). The multisite nature of implementation of this trauma registry involving multilevel facilities with diverse resources, level of care and geographical location, provides a broader picture of the description of burden of paediatric injuries and its associated outcomes in Tanzania.

In these health facilities, paediatric injuries accounted for nearly one-quarter of all trauma cases, highlighting the public health importance of this problem. The peak incidence for injuries in this study is 5 to 9 years of age which is in agreement with prior studies done in similar settings (19,21). Inability of children to recognize and avoid potential injury risks on their own is one of the unique risks that young children face (22). While the observed high incidence of injury in this age group underscores this fact, it further provides an opportunity for targeted interventions in specific injury settings to reduce the risk and severity of injury (7). Similar to previous studies, male children were more affected than females, with a male to female ratio of 2:1. We did not evaluate further the reasons behind this difference, however prior studies have attributed this male preponderance to the overactive nature of male children as compared to female ones (23).

In Tanzania, there is a lack of formal pre-hospital service, which limits the ability of the health system to provide holistic emergency medical services (EMS) to acutely ill and injured patients (24). In this study, over three-quarter of patients presented to the EU directly from the injury sites, and the majority used motorized (two or three) wheeler as mode of transport to the EU. The absence of formalized pre-hospital care is not only limiting effective EMS provision, but predisposes injured patients to delay of care access, as well as potential for secondary injuries due to improper handling of victims of injuries (25).

In the EU, the majority of patients were triaged to either priority or emergency levels of care, requiring immediate life saving interventions to save their lives or prevent lifelong disabilities. In patients presenting with acute illness or injuries, the initial triage level has been associated with both level of resource utilization as well as the clinical outcomes of patients (26). These findings indicate the need to further evaluate the outcome, resources availability and referral patterns of paediatric patients based on the initial level of triage which can be used in guiding the development of protocols for care and referral.

Most injuries were unintentional, occurred at home and resulted from a fall as the main mechanism of injury, which is in concordance with prior studies (27). Playing has been described as the most common activity at the time of domestic injuries in paediatric patients (28). Given that most injuries in this study occurred at home, a setting that is usually perceived to be safe to parents, interventions to reduce the incidence of home related injuries will require identification of potential hazards in the context of the stages of children's growth. Interestingly, when we analysed the age specific mechanisms of injury, we found that as the age increases (from 0-4 years to 15 - <18 years) the settings change from home to the road, as well as increase in the proportion of intentional injuries. We believe this is due to the fact that with increasing age, there is a likelihood of children getting around on daily activities and outdoor sports independently and hence predisposing themselves to risk of RTC and other outdoor injuries, as well as intentional injuries (29,30).

Overall, fracture of extremities accounted for over two-thirds of the final EU diagnoses, a finding that is in concordance with most of the previously published studies of paediatric injuries (30). Fracture of the forearm, fracture of shoulder, and fracture of the upper arm accounted for the majority of these fractures. The peak incidence of both these injuries was at the age group of 5 to 10 years, which corresponds to our

observed high incidence of fall as a mechanism of injury recorded in this age group. In previously published studies, intracranial injuries have been associated with poor clinical progression and outcomes (30). In our study population, intracranial injuries accounted for five percent of the final EU diagnosis with an equal distribution across all age groups. Evaluation of the long-term sequelae of these injuries will enable understanding of resources and capacity at each of these facilities, as well as the associated outcomes. Similar to previously published studies (31), burn injuries were found to be fairly common in this study population, and were mostly concentrated in the age group 0-4 years, which had 4-11 times higher incidence compared to other age groups.

One-third of patients were either admitted or referred to higher-level health facilities, with children in the age group 0 to 4 years having the highest proportion of those admitted or referred, compared to other age groups. We evaluated the risk factors for serious injuries, defined by the need for hospitalization, emergency operation or transfer to higher level facilities. Patients who arrived to the EU as referral cases from lower facilities had a significantly higher likelihood of serious injuries compared to those who arrived directly from the crash site. This is likely due to the fact that these patients who are referred to the EU have sustained serious injuries that could not be managed by the lower level facilities due to resources or expertise limitations, and hence necessitated the transfer to higher facilities. Similarly when a patient is triaged to an emergency category they had a two-fold likelihood of serious injuries compared to other triage categories. Poisoning as a mechanism of injury was found to be associated with a 1.4 fold likelihood of serious injuries. There is a lack of dedicated poison treatment centres in Tanzania (32), which limits the ability of most facilities to appropriately manage patients with suspected poisoning. Characterising the nature and severity of poisoning will be key to understanding the resources and expertise needed to inform development of this centre in Tanzania and other LICs.

Limitations

This study included patients from a purposefully selected sample of health facilities that were located close to strategically busy highways in Tanzania, and hence may limit its generalisability to the rest of health facilities in the country. However, we believe the multilevel nature of these health facilities, ranging from lower (dispensary) to the tertiary (regional hospital) level has provided an opportunity to better understand the burden of paediatric injuries at these different levels. Furthermore, the COVID-19 pandemic impacted our overall data collection process, as we had to withdraw research assistants and have them work from home to minimize risk of disease transmission, hence affecting the quality of data collection. However, using a standardized clinical documentation form by clinician ensured that care to the patient and data collection was maintained during the study period.

Conclusion

In these multilevel health facilities in Tanzania, paediatric injuries accounted for nearly one-quarter of all injuries. Over half of injuries occurred at home, fall from height was the leading mechanism of injury, followed by RTC. Most patients sustained fractures of extremities. Patients who arrived to the EU as

referral cases, those triaged as emergency category had more than two-fold likelihood of serious injuries requiring hospitalization, emergency operation or transfer to higher levels of care. Future studies of paediatric injuries should focus on evaluating various preventive strategies that can be instituted at home to reduce the incidence and associated impact of such injuries.

Declarations

Ethics approval and consent to participate

The study protocol was reviewed and approved by the National Health Research Ethics Review Committee (NatREC) and Institutional Review Board of the Muhimbili University of Health and Allied Sciences (MUHAS). As no patient or provider identifying details were kept, and no patient contact was made, the IRB approved a waiver of patient consent.

Permission to publish

The permission to publish was obtained from the National Health Research Ethics Review Committee (NatREC).

Availability of data and materials

The datasets used and/or analysed during the current study are available on request from Principal Administrators

Competing interests

The authors declare no conflicts of interest.

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Author contributions

HRS and JAM contributed to the conception and design of the study, acquired, analysed and interpreted the data, and drafted the manuscript. SM contributed to the conception and design of the data collection, data acquisition, data monitoring, data cleaning, interpretation and fundraising. KC contributed to the conception and design of the data collection and fundraising and assisted with data interpretation. SK contributed to the conception and design of the data collection, data monitoring, and fundraising. All authors read, revised, and approved of the final manuscript.

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Tables

Table 1. Patient Characteristics

	N=4368
Sex*	
Male	2894 (66.3%)
Female	1447 (33.1%)
Age[ň]	
Median (IQR) years	8 years (IQR: 4-12 years)
Age groups	n (%)
< 5 years	1165 (26.7)
5-9 years	1433 (32.9)
10-14 year	1040 (23.9)
15-<18 years	676 (15.5)
Triage level[ǂ]	
Emergency	651 (14.9)
Priority	3223 (73.8)
Queue	430 (9.8)
Referral status	
Direct from injury site	3748 (85.8)
Referred	519 (11.9)
Unknown	101 (2.3)
Mode of arrival	
Motorcycle	1852 (42.4)
Tricycle	549 (12.6)
Ambulance	94 (2.2)
Bicycle	20 (0.5)
Walk-in	681 (15.6)
Car	524 (12.0)
Bus	10 (0.2)
Mini-bus	502 (11.5)
Other	62 (1.5)

Unknown	74 (1.7)

**27 (0.6%) had undocumented gender status*

ň *54 (1.2%) had missing age*

ǂ *64 (1.5%) had missing triage category*

Table 2. Mechanism, intent and injury settings

	Age distribution (in years)				
Variables*	Overall (N= 4368)	0-4 (n=1165)	5-9 (n=1433)	10-14 (n=1040)	15-<18 (n=676)
Mechanism**	n (%)	%	%	%	%
Fall from height	1592 (36.4)	41.4	42.9	32.6	20.3
RTC	840 (19.2)	12.4	17.5	22.1	31.2
Stab or cut	476 (10.9)	5.5	11.7	14.1	13.3
Animal bite	343 (7.9)	4.9	9.5	9.9	6.8
Burn	291 (6.7)	16.2	4.0	1.4	2.5
Blunt trauma	200 (4.6)	3.1	3.7	5.8	7.1
Hit by falling object	120 (2.7)	3.0	2.7	2.7	2.8
Sexual assault	80 (1.8)	0.4	1.4	2.4	4.4
Poisoning	38 (0.9)	1.7	0.1	0.5	1.5
Others[#]	230 (5.3)	6.8	7.5	4.3	7.0
Injury intent					
Intentional	147 (3.4)	0.8	1.8	4.8	8.7
Unintentional	3586 (82.1)	85.2	83.3	82.2	74.0
Unknown	635 (14.5)	14.1	14.9	13.0	17.3
Place of injury					
Home	2445 (56.0)	77.2	58.7	44.0	30.3
On the Road	975 (22.3)	12.8	21.2	26.5	35.7
School	355 (8.1)	1.6	8.9	12.6	11.4
Work	159 (3.6)	3.9	2.9	3.9	4.3
Playground	107 (2.5)	0.1	1.6	4.0	6.1
Public Space	252 (5.8)	3.5	5.1	6.9	9.9
Others	11 (0.3)	0.2	0.1	0.4	0.6
Unknown	64 (1.5)	0.9	1.4	1.6	1.8

** 54 (1.2%) had missing age*

***158 (3.6%) had unknown or missing documentation of mechanism of injury*

[#]Others includes gunshot wound, foreign body inhalation, suffocation, drowning

Table 3. Mechanism of injury by health facility

	All	Regional Hospitals	District Hospitals	Health centres*
	N=4368	N=2171	N=502	N=1695
Mechanism of Injury**	n (%)	%	%	%
Fall	1592 (36.4)	43.9	33.5	27.8
Road Traffic Crash	840 (19.2)	22.1	20.3	15.3
Stab or cut	476 (10.9)	6.4	8.4	17.4
Animal Bite	343 (7.9)	6.8	7.4	9.4
Burn	291 (6.7)	5.9	5.0	8.1
Blunt force trauma	200 (4.6)	3.6	2.6	6.4
Hit by Falling Object	120 (2.7)	2.4	4.0	2.8
Sexual Assault	80 (1.8)	1.8	3.6	1.4
Poisoning	38 (0.9)	0.8	1.0	0.9
Drowning	23 (0.5)	0.3	2.0	0.4
Suffocation	11 (0.3)	0.4	0.2	0.1

Gunshot	2 (0.05)	0.0	0.2	0.0
Other	194 (4.4)	4.6	5.2	4.1

**Includes one dispensary*

***158 (3.6%) had unknown or missing documentation of mechanism of injury*

Table 4. ICD-10 diagnosis by age group

	Age distribution (in years)				
	Overall* (N= 4314)	0-4 (n=1165)	5-9 (n=1433)	10-14 (n=1040)	15-<18 (n=676)
ICD-10 diagnosis**	n (%)	%	%	%	%
Multiple superficial injuries, unspecified	622 (14.4)	13.1	12.1	16.2	18.5
Fracture of forearm	505 (11.7)	7.9	14.0	13.7	9.9
Open wound of unspecified body region	481 (11.1)	6.4	12.2	13.3	12.3
Fracture of shoulder and upper arm	385 (8.9)	9.4	12.8	6.3	3.7
Burns and corrosions	296 (6.9)	16.3	3.9	1.5	3.0
Open wounds involving multiple body regions	232 (5.4)	4.4	5.0	5.9	7.0
Bitten or struck by dog	228 (5.3)	3.4	7.4	5.3	3.8
Fracture of lower leg, including ankle	226 (5.2)	3.9	5.7	5.7	5.9
Intracranial injury	223 (5.2)	5.7	4.8	4.3	5.9
Fracture of femur	207 (4.8)	5.8	4.8	4.0	3.3
Maltreatment syndrome	79 (1.8)	0.5	1.2	2.4	4.6
Effects of foreign body entering through natural orifice	70 (1.6)	4.0	1.1	0.7	0.0
Bitten or struck by other mammals	69 (1.6)	0.3	0.9	3.6	2.2
Sprain and strain of other and unspecified parts of foot	68 (1.6)	2.5	1.3	1.3	1.0
Fracture at wrist and hand level	67 (1.6)	1.1	1.2	2.0	2.4
Fracture unspecified	56 (1.3)	1.4	1.0	1.9	0.7
Dislocation, sprain and strain of joints and ligaments of elbow	38 (0.9)	1.1	1.3	0.6	0.1
Contact with hornets, wasps and bees	34 (0.8)	1.1	0.7	0.9	0.3

Dislocation unspecified	34 (0.8)	1.1	0.8	0.7	0.1
Poisoning by, adverse effects of and under dosing of drugs	33 (0.8)	1.4	0.1	0.3	1.8

*****_Overall 54 patients were missing age_.

******_These are top 20 EU diagnoses, only primary diagnosis was included, and 153 patients were missing final EU diagnosis_

Table 5. Description of nature of injury with risk factors for serious injuries

Variable	Overall	Serious injuries*	Relative Risk	p-value
	N=4368	**N=1472**	**RR [95% CI]**	
Mechanism of injury*	**n (%)**	**n (%)**		
Fall	1592 (36.4)	678 (46.1)	1.5 (95%CI 1.4-1.6)	P < 0.0001
RTC	840 (19.2)	386 (26.2)	1.5 (95%CI 1.4-1.6)	P < 0.0001
Stab or cut	476 (10.9)	31 (2.1)	0.2 (95%CI 0.1-0.2)	P< 0.0001
Animal bite	343 (7.9)	36 (2.4)	0.3 (95%CI 0.2-0.4)	P < 0.0001
Burn	291 (6.7)	150 (10.2)	1.6 (95%CI 1.4-1.8)	P < 0.0001
Blunt force trauma	200 (4.6)	32 (2.2)	0.5 (95%CI 0.3-0.6)	P < 0.0001
Hit by falling object	120 (2.7)	26 (1.8)	0.6 (95%CI 0.5-0.9)	P < 0.0001
Sexual assault	80 (1.8)	23 (1.6)	0.9 (95%CI 0.6-1.2)	P=0.3747
Poisoning	38 (0.9)	18 (1.2)	1.4 (95%CI 1.0-1.9)	P=0.0433
Others	230 (4.4)	64 (4.3)	0.8 (95%CI 0.7-1.0)	P=0.0694
Age[ň]	**N=4368**	**N=1449**	**RR [95% CI]**	
< 5 years	1165 (26.7)	446 (30.8)	1.2 (95%CI 1.1-1.3)	P=0.0001
5-9 years	1433 (33.2)	470 (32.4)	0.9 (95%CI 0.9-1.1)	P=0.7136
10-14 year	1040 (24.1)	330 (22.8)	0.9 (95%CI 0.9-1.0)	P=0.2614
15-18 years	676 (15.7)	203 (14.0)	0.9 (95%CI 0.8-1.0)	P=0.0642
Referral[#]	**N=4267**	**N=1450**	**RR [95% CI]**	
Direct from injury site	3748 (87.8)	1142 (78.8)	0.3 (95%CI 0.2-0.3)	P<0.0001
Referred	519 (12.2)	308 (21.1)	3.3 (95%CI 2.7-4.0)	P < 0.0001
Triage level	**N=4304**	**N=1458**	**RR [95% CI]**	
Emergency	651 (15.1)	334 (22.9)	2.3 (95%CI 2.0-2.8)	P < 0.0001
Priority	430 (10.0)	91 (6.2)	0.4 (95%CI 0.4-0.6)	P < 0.0001
Queue	3223 (74.9)	1033 (70.9)	0.7 (95%CI 0.6-0.8)	P < 0.0001

Injury intent	**N=3733**	**N=1202**	**RR [95% CI]**	
Intentional injuries	147 (3.9)	31 (2.6)	0.6 (95%CI 0.4-0.8)	P < 0.0001
Unintentional injuries	3586 (96.1)	1171 (97.4)	1.8 (95%CI 1.2-2.7)	P = 0.0037
Gender**	**N=4341**	**N=1464**	**RR [95% CI]**	
Male	2894 (66.7)	1008 (68.9)	1.1 (95%CI 1.0-1.2)	P = 0.0308
Female	1447 (33.3)	456 (31.1)	0.9 (95%CI 0.8-0.99)	P = 0.0308

**Included injuries requiring hospital admission, operation theatre procedure, or referral to higher level of care*

[ň] *54 (1.2%) had missing age*

***27 (0.6%) had undocumented gender status*

[Ħ] *101 had unknown referral status*

Table 6. Final EU disposition by age group

	Age distribution (in years)				
	Total N=4368 [ň]	0-4 n=1165	5 to 9 n=1433	10 to 14 n=1040	15 to 18 n=676
Disposition*	n (%)	%	%	%	%
Discharged home	2829 (64.8)	60.3	65.5	66.8	68.5
Admitted to ward	1095 (25.1)	28.2	23.4	23.8	24.6
Transferred to another facility	363 (8.3)	10.0	8.9	7.5	5.2
Died at ED	25 (0.6)	0.4	1.0	0.3	0.4
Admitted to OT	14 (0.3)	0.1	0.5	0.4	0.3
Unknown	42 (1.0)	1.0	0.8	1.2	1.0

[ň] *54 (1.2%) had missing age*

Figures

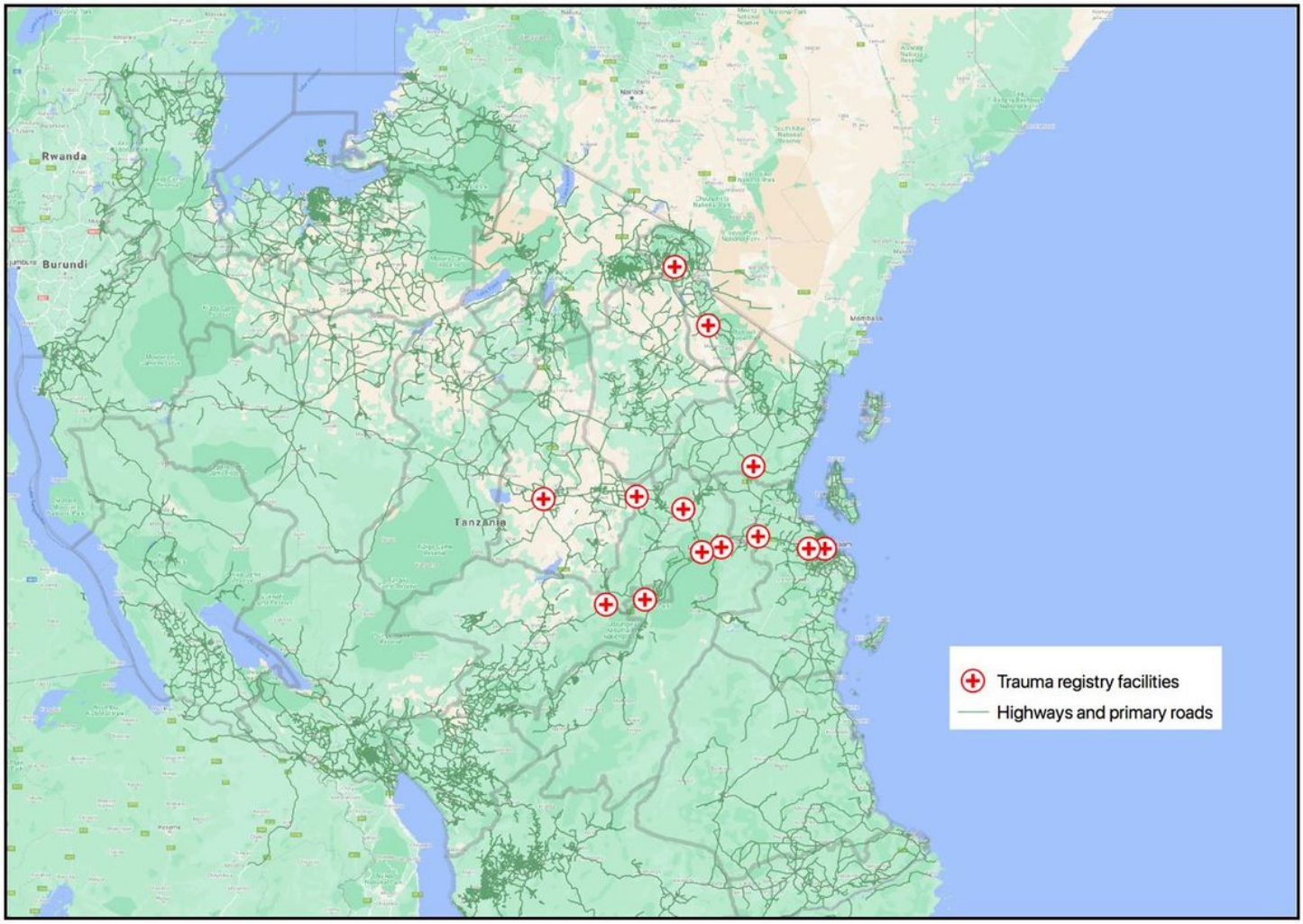

Figure 1

Map of Tanzania showing the location of each health facility

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryTable1and2.docx