

Road traffic injuries in Tanzanian children and adolescents: A cross-sectional household survey

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ABSTRACT

Objective: To measure annual rates of road traffic injuries (RTI) and to describe the characteristics of road traffic crashes experienced by children and adolescents in Tanga, Tanzania.

Methods: We conducted a cross-sectional household survey using geospatial population-weighted sampling in the city of Tanga in northern Tanzania. Data were collected in February and March of 2022. We report 12-month rates of road traffic crashes and RTI (reported by adult caregivers) among children and adolescents <18 years of age.

Results: A total of 2,794 adult respondents reported data on 6563 children and adolescents, among whom, 180 were reported to have experienced road traffic crashes in the past 12 months (crash incidence: 27.4 per 1,000 children, 95%CI 23.5–31.4) and 158 sustained injuries (RTI incidence: 24.1 per 1000 children, 95%CI 20.4–27.8). Almost a quarter of RTI (23%) were reported to be major (resulting in ≥30 days of missed activities). RTI was higher among adolescents (13–17 years) than children <5 years (21.5 vs. 14.1 per 1,000, $p=0.039$). Few children always or sometimes wore helmets when riding on motorcycles/motorbikes (12.8%) or wore safety restraints/seat belts in cars or other vehicles (11.9%).

Conclusion: The high rate of road traffic crashes and RTI observed among children and adolescents in a medium-sized city in Tanzania underscores the urgent need to improve road safety and increase use of safety equipment in low resource settings.

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Introduction

Globally, road traffic injuries (RTI) are the leading cause of death among adolescents 10–19 years of age, the third leading cause of Disability-Adjusted Life Years (DALY) lost in this age group, and the third leading cause of death for children 5–9 years

[1]. In addition to death and disability, RTI can have lasting effects on children as a result of post-traumatic stress disorder, disrupted schooling and strains on household resources [2–6].

An estimated 93% of deaths resulting from RTI occur in low and middle-income countries and road traffic mortality rates are three times higher in low- compared to high-income countries [7]. Geographic discrepancies in RTI result from multiple factors, including poor road infrastructure, limited enforcement of traffic laws (including speed limits), and low use of seatbelts and helmets [8–11]. Rates of RTI and their contribution to all-cause mortality are expected to increase substantially in resource limited settings (RLS) due to urbanization, population growth, and wider access to motorized vehicles [7,12].

Abbreviations: confidence intervals, (CI); geospatial information system, (GIS); interquartile range, (IQR); Multiple Indicator Cluster Surveys, (MICS); primary sampling units, (PSU); road traffic injuries, (RTI); sub-Saharan Africa, (SSA); Resource limited setting, (RLS); World Health Organization, (WHO).

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Reducing RTI among children and adolescents has been a global priority for more than a decade. In 2010, the World Health Organization (WHO) announced a 'Decade of Action for Road Safety' to draw attention to the risks children face on roads and to generate action to improve safety [13]. Ten years later, it announced the 'Second Decade of Action', setting ambitious goals, including a 50% reduction in road deaths and serious injuries by 2030 [14]. To achieve these targets, countries need data to inform road safety interventions [15]. Unfortunately, studies measuring RTI in low-income countries are limited, including information about how and where most accidents occur [8,16–18].

In the United Republic of Tanzania, there are more than 330,000 serious road traffic injuries per year and the road traffic mortality rate is 31 per 100,000, which is higher than the average for sub-Saharan Africa (SSA) (27 per 100,000) [19]. One of only a few studies measuring RTI in children in Tanzania was conducted in 2012 in the capital city of Dar es Salaam and found a rate of RTI of 22.1 per 1,000 among children 5–14 years and 37.6 per 1,000 in adolescents and adults (15–44 years) [18]. With a young population (44% of Tanzanians are under 15 years) and a growing economy, morbidity and mortality from RTI are expected to increase in the coming years in Tanzania, making this a major public health concern [20–22].

We conducted a population-based household survey in 2022 to measure annual rates of road traffic crashes, RTI, accident characteristics, and injury severity among children and adolescents <18 years in Tanga, a medium sized city in northern Tanzania.

Methods

We conducted a cross-sectional population-based household survey to measure occurrence of road traffic injuries in a 12-month period (April 2021–March 2022) among children and adolescents in Tanga, Tanzania. Data were collected in February and March 2022. The protocol was approved by the National Institute for Medical Research in Tanzania and the Institutional Review Board at the CUNY Graduate School of Public Health and Health Policy.

A required sample size of 6,557 children and adolescents <18 years of age was calculated using the UNICEF Multiple Indicator Cluster Surveys (MICS) methodology [23]. To collect data on the target sample of children and adolescents, we aimed to collect data from 2,850 adult participant (parents or primary caregivers of a child <18 years) based on an average of 2.3 children per household [24]. Sample size calculations were based on an estimated RTI rate of 15 per 1,000, alpha of 0.05 and design effect of 1.2 (to adjust the variance to account for the sampling approach which is described below) [16].

The city of Tanga is divided into 24 administrative units, known as wards, which include urban and peri-urban areas. The study was conducted in 14 of the 24 wards in and around the city center which include 68% of the population of Tanga city (according to the 2012 census) [25]. The study used a hybrid geospatial and population-weighted sampling approach to generate a probabilistic sample of children and adolescents based on data collected at 285 primary sampling units (PSU). PSU were apportioned to the 14 wards based on population size and randomly distributed in likely residential areas (proximal to roads and addressable paths) within the wards using geospatial information system (GIS) software (ArcGIS Pro [26]). At each PSU, data were collected from one adult caregiver at 10 different homes. Each PSU had a designated sampling area around it using Delaunay triangulations where data collectors could attempt recruitment. Data collectors had tablets equipped with an interactive web map (ArcGIS online) that identified their location relative to assigned PSU and designated data collection area.

Eligible participants were adults ≥ 18 years who self-identified as a parent or primary caregiver of at least one child or adolescent (<18 years) residing in the home. Adults were ineligible if they were not a parent/caregiver of a child or adolescent or if they did not reside in the home. A consent form was read to all participants and verbal consent was taken. In each household, only one parent or primary caregiver was interviewed but participants were asked to report data for all children in the home for whom they were a parent or primary caretaker. Trained data collectors administered surveys in Swahili or English on electronic tablets in outdoor spaces to minimize risk of SAR-CoV-2 exposure. Participants did not receive any compensation.

The survey collected demographic data on participant's age, sex and level of education, as well as information about the household. Participants reported the age, sex and their relationship to each of the children residing in the home for whom they were parents or primary caretakers. For all children and adolescents, participants reported any experience of road traffic crashes and injuries over the previous 12 months. The study used WHO definitions of road traffic crashes ("collision[s] or incident[s] that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle") and RTI ("any fatal or non-fatal injuries incurred as a result of a road traffic crash") [27]. These definitions were explained to participants during survey administration. Additional questions were asked if a road traffic crash was reported, including information about when and how the crash occurred, severity of injuries and whether medical care was received. Minor injuries were defined as those resulting in less than 30 days of missed activities of daily living including going to school or playing with friends, while major injuries were those resulting in >30 days of missed activities. Participants were also asked to report the age of any child or adolescent who died as a result of a road traffic crash in the previous 12 months.

Statistical analysis

Descriptive statistics are presented on the participants (adult respondents) and children/adolescents included in the survey. Rates of road traffic crashes and RTI were estimated by dividing the number of children/adolescents reported to have experienced these outcomes in the previous 12 months by the total number of children/adolescents in the survey and are reported with 95% confidence intervals (CI) (estimated using the Clopper-Pearson (Exact) method). In further analyses, we estimated RTI rates including only children/adolescents reported to have missed at least one day of normal activity as a result of their injuries (to provide a more conservative measure of RTI). We also estimated RTI rates including deaths from road traffic crashes. Descriptive data are presented on how accidents occurred and types and severity of injuries. Road traffic crash and injury data were compared across three age groups, 0–5 years, 6–12 years and 13–17 years, using Pearson Chi-squared tests. Survey weights were not applied in generation of estimates given the sampling approach. Statistical analyses were performed in SAS 9.4.

Results

Participant characteristics

A total of 4,293 homes in the selected wards in Tanga City were visited by data collectors. Eligible adults were identified at 2,963 homes, of whom 2,815 (95.0%) agreed to participate. The median age of adult participants was between 30 and 39 years (Table 1). Most participants (84.7%) were female and had completed at least primary education (94.2%) which is consistent

Table 1

Characteristics of adult respondents and children/adolescents in a household survey conducted in Tanga, Tanzania (February–March 2022).

	N	%
Respondents	2,794	100
Age		
18–29	707	25.3
30–39	839	30.0
40–49	662	23.7
50+	586	21.0
Sex		
Female	2367	84.7
Male	427	15.3
Highest level of schooling completed		
Incomplete or no primary	163	5.8
Primary	1643	58.8
Secondary	827	29.6
Tertiary/University	161	5.8
Type of home		
House	2718	97.3
Flat/apartment	41	1.5
Outbuilding	35	1.2
Household vehicle ownership (any)		
Bicycle	722	25.8
Motorcycle/motorbike	709	25.4
Car or truck	270	9.6
Other [^]	22	0.8
None	1362	48.8
Number children and adolescents <18 living in household		
1–2	1729	61.9
3–5	1004	35.9
6–10	61	2.2
Number of adults ≥18 years living in household		
1–2	1297	46.4
3–5	1275	45.6
6–10	222	8.0
Median household size (median, IQR) (adults and children)	5.5 (IQR 4.0–7.0)	
	N	%
Children and adolescents	6,563	100
Age (median, IQR)	8 (4–12)	
0–5 years	2276	34.7
6–12 years	2709	41.3
13–17 years	1578	24.0
Sex		
Female	3222	49.1
Male	3341	50.9
Relationship of respondent to child		
Mother	4077	62.1
Father	703	10.7
Grandmother	1015	15.5
Grandfather	161	2.4
Sister/brother	224	3.4
Other relative	314	4.8
Adoptive parent	5	0.1
Other	64	1.0
Attends school		
Yes	4929	75.1
No	1634	24.9
Mode of transport to school*		
Walking	3483	70.7
Bicycle	257	5.2
Motorcycle/motorbike	657	13.3
public bus/dalla dalla	613	12.4
school bus	189	3.8
Private car	116	2.4
Other	90	1.8
Uses helmet when rides on motorcycle/motorbike**		
Always/sometimes	609	12.8
Never	4102	86.0
Do not know	55	1.2
Uses seatbelt/safety restraint when riding in car or other vehicle**		
Always/sometimes	675	11.9
Never	4871	86.3
Do not know	99	1.8

[^]Includes tricycle (bajaj) and bus (dalla dalla); *Among those attending school; **Among those who ride motorcycles/motorbikes;***Among those who ever ride in cars or other vehicles

Table 2

Rates of road traffic crashes and injuries among children and adolescents in Tanga, Tanzania (February–March 2022).

	Number children/adolescents	Number in road traffic crash* in previous 12 months	Road traffic crash rate per 1,000 (95%CI)	Number road traffic injuries^ previous 12 months	Road traffic injury rate per 1,000 (95%CI)**	Number road traffic injuries with disability^^ previous 12 months	Road traffic incidence with disability^^ rate per 1,000 (95%CI)
All	6563	180	27.4 (23.5–31.4)	158	24.1 (20.4–27.8)	115	17.5 (14.3–20.7)
Age in years							
0–5	2276	48	21.1 (15.2–27.0)	43	18.9 (13.3–24.5)	32	14.1 (9.2–18.9)
6–12	2709	79	29.2 (22.8–35.5)	65	24.0 (18.2–29.8)	49	18.1 (13.1–23.1)
13–17	1578	53	33.6 (24.7–42.5)	50	31.7 (23.0–40.3)	34	21.5 (14.4–28.7)
p-value for ages			0.050		0.039		0.210

*World Health Organization (WHO) definition of road traffic crash: "collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle"; ^WHO definition of road traffic injury, "any fatal or non-fatal injuries incurred as a result of a road traffic crash" (21). ^^RTI with disability restricted to children who reported to have missed >1 day of normal activity; **Estimate of RTI including three deaths: 24.7 per 1,000 (95%CI 20.9–28.4).

with population data from the 2012 census [22]. Data were collected on 6,563 children and adolescents with a median age of 8 years (interquartile range (IQR) 4–12). Mothers provided data on most children/adolescents in the survey (62.1%), while 15.5% had data reported by grandmothers and 10.7% by fathers. Most children/adolescents (75.1%) were reported to be attending school, among whom, 70.7% reportedly walked, 13.3% rode on motorcycles/motorbikes, 12.4% took public transport and 5.2% rode bicycles to get to school. Very few children always or sometimes wore helmets when riding on motorcycles/motorbikes (12.8%) or wore safety restraints/seat belts in cars or other vehicles (11.9%) (Table 1).

Road traffic crash and injury rates

Overall, 180 children were reported to have been involved in a road traffic crash in the past 12 months, yielding a rate of 27.4 per 1,000 children (95%CI 23.5–31.4) (Table 2). Adolescents 13–17 years had the highest rate of road traffic crashes, 33.6 per 1,000 (95%CI 24.7–42.5), and children ≤ 5 years had the lowest, 21.1 per 1,000 (95%CI 15.2–27.0) (rates by age groups comparison, $p = 0.050$). The overall RTI rate was 24.1 per 1,000 (95%CI 20.4–27.8), and was highest among 13–17 year olds (31.7, 95%CI 23.0–40.2) and lowest in children ≤ 5 years (18.9, 95%CI 13.3–24.5; p -value=0.039). The RTI rate restricted to children/adolescents who experienced at least one day of missed normal activity was 17.5 per 1,000 (95%CI 14.3–20.7) (Table 2). Three children (aged 8, 15 and 17 years) were reported to have died as a result of road traffic crashes in the previous 12 months. The RTI rate including deaths was 24.7 per 1,000 (95%CI 20.9–28.4).

Crash characteristics

Most road traffic crashes occurred in the afternoon (35%) or at sunset (37%) (Table 3). Among children and adolescents who were reported to be attending school, 34% of crashes occurred when they were traveling to or from school. Accidents traveling to/from school were more common among children 6–12 years (48%) compared to those ≤ 5 (13%) and 13–17 years (39%) ($p=0.004$) (Table 3). The types of roads where children and adolescents experienced road traffic crashes differed. Most crashes experienced by children ≤ 5 years occurred on non-paved roads (65%) whereas for adolescents, most crashes occurred on paved roads and highways (40%, $p=0.004$) (Fig. 1).

Overall, 44% of crashes were experienced by children and adolescents who were riding in or on vehicles, while 56% occurred

when they were not in vehicles. Among children/adolescents who experienced crashes in or on a vehicle, half (54%) occurred when they were on a motorcycle/motorbike, 38% on a bicycle, and 2% occurred when they were in a private car (Table 3). Among adolescents, 42% of accidents occurred when they were operating a vehicle. Most crashes experienced by children and adolescents when they were not in a vehicle involved them being struck as a pedestrian (86%) and 76% of these children were struck by motorcycles/motorbikes (Table 3). Almost no children or adolescents (1%) were wearing safety restraints, helmets or reflective gear at the time of their accident.

Almost half (47%) of parents reported some changes in their child's behavior after experiencing a road traffic crash (Table 3). Among children with behavior changes, half (49%) were afraid to cross the street, which was more common in children ≤ 5 years (61%) compared to adolescents (22%) ($p=0.029$). Overall, most parents (76%) reported taking their child/adolescent for medical care after a crash; medical care was more commonly sought for children ≤ 5 years (90%) and 6–12 years (73%) compared to adolescents (66%) ($p=0.019$). Few parents (18%) filed police reports after a crash.

RTI characteristics

Among all children who were injured as a result of a road traffic crash (158 out of 180), most were reported to have minor injuries (77%), while 23% had major injuries (Table 3). The most commonly reported injury was bruising (77%), followed by broken bones or fractures (16%). The most commonly reported injured body parts were legs (56%), arms (39%), heads (22%) and faces (20%). Among those injured, 34% were unable to perform normal activities, including attending school for a few days, while 19% and 20%, respectively, were unable to do so for 1–3 weeks or over a month (Table 3). Most parents of injured children/adolescents reported their child received all needed medical care (92%), however 42% of parents reported lost income due to the child's injury.

Discussion

We found high rates of road traffic crashes and injuries in both children and adolescents in our population-based household survey conducted in Tanga, Tanzania. RTI was more common among adolescents compared to younger children and the circumstances of accidents also varied by age. There was very little reported use of safety equipment, including seat belts and helmets,

Table 3

Characteristics of road traffic crashes and injuries experienced by children and adolescents <18 years in Tanga, Tanzania 2021-2022 (N=180) (household survey February-March 2022).

	Total		0-5 years		6-12 years		13-17 years		p-value
	N	% [§]	N	%	N	%	N	%	
	180	100%	48	27%	79	44%	53	29%	
Time of day when crash occurred									
Morning	47	26%	11	23%	23	30%	13	25%	0.064
Afternoon	62	35%	16	33%	28	35%	18	34%	
At sunset	67	37%	17	36%	28	35%	22	41%	
At night (after dark)	4	2%	4	8%	0	0.0	0	0%	
Child traveling to or from school at time of crash (among children attending school)									
Yes	59	34%	4	13%	38	48%	17	39%	0.004
No	94	66%	26	87%	41	52%	27	61%	
Child riding in/on vehicle at time of the crash									
Yes	80	44%	18	37%	31	39%	31	59%	0.049
No	100	56%	30	63%	48	61%	22	41%	
Type of vehicle child riding in at time of crash (among those riding in vehicles)									
Motorcycle/motorbike	43	54%	11	61%	15	48%	17	55%	0.859
Bicycle	30	38%	7	39%	12	39%	11	36%	
Private car	2	2%	0	0%	1	4%	1	3%	
Other [†]	5	6%	0	0%	3	9%	2	6%	
Child operating vehicle (among those riding in vehicles)									
Yes	19	24%	0	0%	6	19%	13	42%	0.003
No	61	76%	18	100%	25	81%	18	58%	
Other types of vehicles involved in the crash (among those riding in vehicles)									
Motorcycle/motorbike	46	58%	11	61%	19	61%	16	52%	0.698
Bicycle	18	23%	7	39%	7	23%	4	13%	
Private car	11	14%	1	6%	3	10%	7	23%	0.173
Other [†]	14	18%	1	6%	5	16%	8	26%	0.192
Type of crash experienced by children not in vehicles									
Child stuck by vehicle as a pedestrian	86	86%	23	77%	42	88%	21	95%	0.410
Child struck by vehicle while playing in playground/yard	12	12%	6	20%	5	10%	1	5%	
Other	2	2%	1	3%	1	2%	0	0%	
Type of vehicle that struck child (among those not in vehicles)									
Motorcycle/motorbike	76	76%	23	77%	37	77%	16	73%	0.754
Bicycle	16	16%	4	13%	9	19%	3	14%	
Private car	4	4%	1	3%	1	2%	2	9%	
Other [†]	4	4%	2	7%	1	2%	1	4%	
Child wearing safety restraint, helmet or reflective gear at time of crash									
Yes	2	1%	0	0%	1	1%	1	2%	0.513
No	177	98%	48	100%	78	99%	51	96%	
Do not know	1	1%	0	0%	0	0%	1	2%	
Child's behavior changed after crash									
Yes	85	47%	28	58%	39	49%	18	34%	0.037
No	93	52%	20	42%	40	51%	33	62%	
Do not know	2	1%	0	0%	0	0%	2	4%	
Types of behavior change (among children with behavior changes)									
Fear of riding in a vehicle	48	57%	16	57%	21	54%	11	61%	0.873
Fear of crossing the street	42	49%	17	61%	21	54%	4	22%	
Fear of being alone	8	9%	3	11%	3	8%	2	11%	0.882
Child taken for medical care									
Yes	136	76%	43	90%	58	73%	35	66%	0.019
No	44	24%	5	10%	21	27%	18	34%	
Where medical care received									
Hospital	102	76%	29	67%	47	81%	26	74%	0.609
Clinic/health center	24	17%	9	21%	9	16%	6	17%	
Other [†]	10	7%	5	12%	2	3%	3	9%	
Police report filed about the crash									
Yes	32	18%	4	8%	15	19%	13	24%	0.147
No	144	80%	44	92%	62	79%	38	72%	
Do not know	4	2%	0	0%	2	2%	2	4%	
Child sustained injuries in crash									
Yes	158	88%	43	90%	65	82%	50	94%	0.105
No	22	12%	5	10%	14	18%	3	6%	
Severity of injuries (all analyses below include only children with injuries)									
Minor injury*	122	77%	32	74%	47	72%	43	86%	0.194
Major injury	36	23%	11	26%	18	28%	7	14%	
Injury type									
Cut	12	8%	2	5%	6	9%	4	8%	0.673
Bruise/Pain	121	77%	35	81%	45	69%	41	82%	
Broken bone/ fracture	25	16%	8	19%	11	17%	6	12%	0.651
Burn	2	1%	1	2%	0	0%	1	2%	0.488
Concussion/head injury	12	8%	2	5%	6	9%	4	8%	0.674
Amputation	3	2%	0	0%	1	2%	2	4%	0.357
Other	11	7%	3	7%	7	11%	1	2%	0.282

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Table 3 (continued)

	Total		0-5 years		6-12 years		13-17 years		p-value
	N	% [§]	N	%	N	%	N	%	
	180	100%	48	27%	79	44%	53	29%	
Days child not able to perform regular activities									
None	43	27%	11	26%	16	25%	16	32%	0.955
A few days	54	34%	15	35%	22	34%	17	34%	
one to three weeks	29	19%	7	16%	14	21%	8	16%	
one month or more	32	20%	10	23%	13	20%	9	18%	
Child received all medical care needed									
Yes	145	92%	41	96%	62	95%	42	84%	0.121
No	11	7%	1	2%	3	5%	7	14%	
Do not know	2	1%	1	2%	0	0%	1	2%	
Family able to afford all medical care needed									
Yes	143	91%	40	93%	62	95%	41	82%	0.042
No	15	9%	3	7%	3	5%	9	18%	
Family lost income due to the child's injury									
Yes	67	42%	19	44%	28	43%	20	40%	0.566
No	90	57%	23	54%	37	57%	30	60%	
Do not know	1	1%	1	2%	0	0%	0	0%	

[§] Due to small sample sizes per group (N<100), proportions are presented as integers

[†] includes Bus/dalla-dalla, three-wheelers, non-motorized vehicles and trucks

[^] includes dispensary, pharmacy, herbalist; *Minor injuries were defined as those resulting in less than 30 days of missed activities of daily living including going to school or playing with friends, major injuries were those resulting in ≥30 days of missed activities

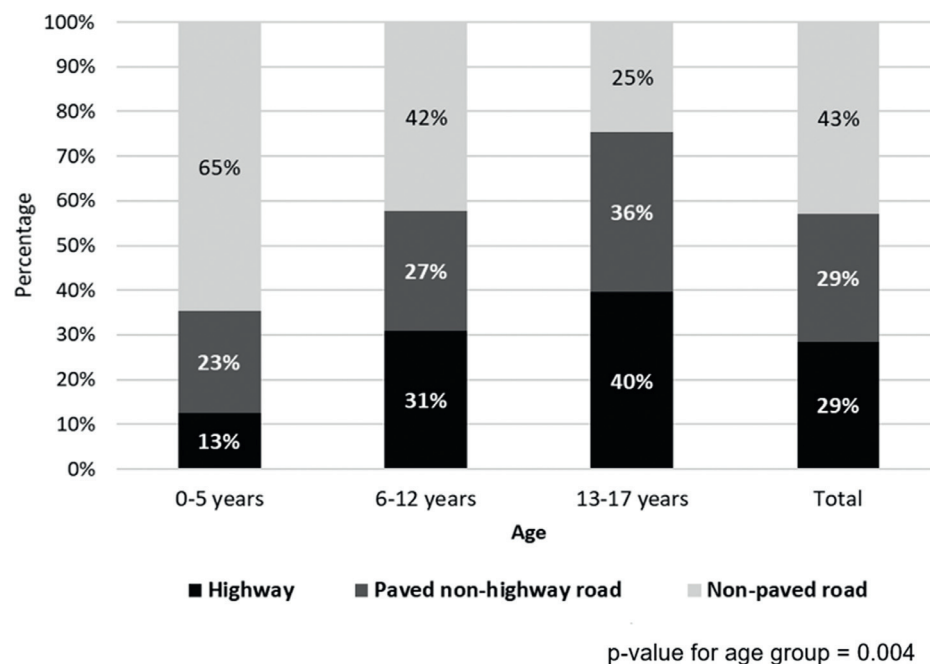


Fig. 1. Type of roads where traffic crashes occurred among children and adolescents <18 years in Tanga, Tanzania (N=180) (household survey February-March 2022).

which may contribute to greater severity of injuries, and motorcycles/motorbikes were a major source of injury for children and adolescents, both as passengers and pedestrians.

There are few studies reporting population estimates of RTI for children and adolescents from Tanzania or other countries in SSA. The RTI rates we observed are similar to those found in a 2013 study conducted in the capital of Tanzania, Dar es Salaam, which reported a rate of 15 per 1,000 among children <5 years and 29 per 1,000 in children and young adolescents (5-14 years) [18]. Dar es Salaam is the largest city in Tanzania and had over four million residents at the time of the most recent census in 2012. We expected to find lower incidence of RTI in Tanga which has a population of roughly 300,000. It is possible that RTI has increased in Dar es Salaam over the years since the 2013 study was con-

ducted but our finding may also indicate that less densely populated urban areas are also high risk environments for RTI. A recent study from Mozambique found that living in urban areas was associated with lower rates of RTI compared to rural and peri-urban areas [28], and a study from Ghana found that the circumstance of accidents vary across urban, peri-urban and rural areas [29]. These findings underscore the need for further examination of the relationship between urbanicity and RTI, particularly as access to motorized vehicles expands [30,31].

Adolescents 13-17 years in our survey were disproportionately affected by RTI, with rates close to 32 per 1,000. These findings are consistent with data indicating that RTI are the leading cause of death among adolescents aged 15-17 years worldwide [32]. Higher incidence of RTI among adolescents may be a result of greater mo-

bility as well as riskier behaviors, including speeding and driving under the influence of alcohol [33]. In addition to differences in RTI incidence, we also observed that how and where road traffic crashes occur varies by age. Young and school-aged children were more likely to experience road traffic crashes on non-paved roads and as pedestrians, whereas adolescents were more likely to be injured on paved roads, including highways, and while operating vehicles. Travel to and from school was particularly dangerous for 6-12 year olds with almost half of children with RTI in this age group injured while traveling to school. Both of these findings are consistent with previous studies which have shown that children are more likely to be injured on small, unpaved side streets and face high risk of injury during school-related travel [18,34–36]. These data should be used to inform efforts to improve road safety, including increasing sidewalks, safety infrastructure, and enforcement of speed limits around schools.

More than half of road traffic crashes occurred when children and adolescents rode on motorcycles/motorbikes and three-quarters of children injured as pedestrians were hit by motorcycles/motorbikes. While these types of vehicles are playing an important role in expanding mobility and economic opportunities, they also pose a risk to users and pedestrians [8,37,38]. Motorcycles/motorbikes are less safe, particularly for children, and motorcycle riders may be less likely to obey traffic rules putting other motorists and pedestrians at risk [39,40]. With the increasing number of registered motorcycles and motorbikes in Tanzania and across SSA [41], steps should be taken to reduce the dangers for riders and pedestrians, including lowering speed limits and increasing enforcement, requiring training for motorcycle/motorbike users and implementing helmet laws for drivers and passengers [29,42].

Finally, we found an alarmingly low use of seat belts/safety restraints and helmets. Among all 6,553 children/adolescents in the survey, 86% reportedly never use seatbelts or helmets, and only 1% of children/adolescents who experienced road traffic crashes as passengers in vehicles were using seat belts or helmets at the time of the accident. The lack of safe transport policies, including laws requiring the use of seatbelts and helmets, in Tanzania and in many other countries in SSA contributes to high burden from RTI in this region [43,44]. Studies demonstrate that children have 71% lower risk of injury or death in car crashes when restraints are used [45] and data also show that helmet laws prevent injuries [46]. Efforts to prevent road traffic injury in children should include implementation of safety restraint and other laws to prevent and reduce severity of injuries [42].

A strength of our study is the population representative sample and focus on a medium-sized city which provides unique data from a setting similar to where many children and adolescents in SSA live. It is important to measure RTI in these middle size urban areas which continue to grow across SSA [47]. It is also critical to understand the characteristics of RTI experienced by children and adolescents in these settings, including how and when they are most likely to occur to inform the development of interventions to improve road safety. A limitation is reliance on 2012 census data which were used to apportion the study sampling units (a census is planned for later in 2022). Our sampling approach was based on the assumption that the distribution of the population has remained relatively stable since 2012 which would make our design robust to anticipated population increases. If there have been major changes in the distribution of the population across the city during the last 10 years, we may have under sampled some areas.

We found high rates of RTI in a population-based survey conducted in Tanzania. Our findings underscore the significant threat posed by road traffic crashes to the health and wellbeing of children and adolescents, and the urgent need to address road safety in RLS.

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Foundation Botnar had no role in the design or conduct of the study.

Declaration of Competing Interest

The authors have no conflicts of interest to disclose.

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