Kumasi Metropolitan Assembly

Retrospective Assessment of Road Traffic Deaths and Serious Injuries Using Hospital Records in Kumasi, 2021-2022

Bloomberg Philanthropies | Initiative for Global Road Safety | Vital Strategies


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Collaborating institution

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Acknowledgements

This report presents findings of a retrospective study on road traffic deaths and serious injuries in a major referral hospital in Kumasi. The study aimed to link hospital fatal cases to police fatal crash records to generate a reliable estimate of road traffic mortality in Kumasi.

The report was produced under the Kumasi Metropolitan Assembly (KMA)-Bloomberg Philanthropies Initiative for Global Road Safety (BIGRS) partnership. Since 2020, KMA has received technical support from BIGRS in implementing evidence-based interventions to reduce deaths and injuries from road crashes.

Retrospective data on road traffic deaths and serious injuries was supported by the Accident and Emergency and Mortuary units of Komfo Anokye Teaching Hospital (KATH). Data abstraction was completed by staff of the two units. Road crash data was supported by the Motor Traffic and Transport Department (MTTD) of the Ghana Police Service.

Kingsley Wirekoh, the BIGRS Surveillance Coordinator in Kumasi, coordinated data collection, analysed the data, and completed the first draft of the report. Dr Raphael Awuah, Regional Technical Advisor for Road Injury Surveillance (Africa) and Dr Sara Whitehead, Global Lead for Road Injury Surveillance – both from Vital Strategies – supervised data collection, analysis, revisions, and publication of the report. Ezequiel Dantas, Deputy Director for Road Injury Surveillance at Vital Strategies, supported review of the report.

Dr Daniel Osei-Kwame, an Emergency Physician Specialist at KATH and Dr Isaac Siaw-Lartey, a pathologist at KATH's mortuary, provided on-site supervision during data collection. The KMA-BIGRS team also contributed to the production of this report.

Executive Summary

Globally, deaths and injuries from road crashes are among the leading causes of death and disability. In Ghana, road traffic injuries are a major cause of death and disability, especially in cities. Implementing effective interventions to reduce road traffic deaths and injuries requires reliable data.

Police crash reports are often the primary source of data to assess the burden and track trends of road traffic deaths and injuries. However, underreporting is a common limitation with police data, and is usually more severe for vulnerable road users – pedestrians, motorcyclists, tricyclists and bicyclists. In addition, given that police are not medically trained, classification of injury types and severity is not feasible for them to complete.

In the absence of a well-functioning civil registration and vital statistics (CRVS) system in Ghana, data from hospitals (including mortuaries) are among few complementary sources to police crash data to generate better estimates of road traffic deaths. In addition, data from health facilities enable a better description of the types and severity of road traffic injuries.

The study accessed retrospective data on road traffic victims from the Accident and Emergency (A & E) and Mortuary units of Komfo Anokye Teaching Hospital (KATH) – the main tertiary referral hospital in Kumasi – with linkage to police fatal crash data to generate a reliable estimate of road traffic deaths in Kumasi and to describe the profile of those killed and injured.

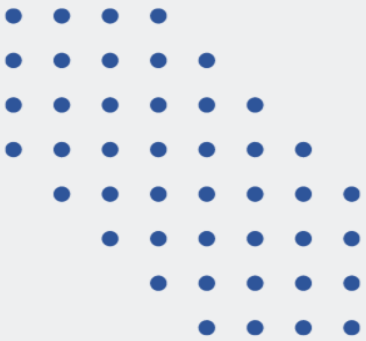
Records of road crash victims who were admitted for at least 24 hours and those who died prior to or while on admission from January 1, 2021 to December 31, 2022 were identified and reviewed. Police crash data for the same period were also accessed directly from police stations in the city. Hospital fatal cases which were documented to

have occurred in Kumasi were linked to police fatal cases to generate a reliable estimate of road traffic deaths in the city.

The findings show that there were 587 deaths in hospital records from 2021 to 2022. 351 of these deaths occurred on admission at the A & E unit while 236 died at the scene of the crash and captured in mortuary records. Of the total number of deaths, 132 (22%) were from crashes which occurred in Kumasi. On the other hand, police recorded 294 deaths in the city in the same period.

Of the 132 deaths which occurred in Kumasi in hospital records, 59 were linked to police fatal crash records – yielding a 45% match rate. Using a conservative capture–recapture approach, the estimated number of road traffic deaths in Kumasi for the two-year period was 663 – suggesting that there were 2.3 times more deaths than police reports.

The finding in this study has provided evidence of underreporting of road traffic deaths in Kumasi using police records alone. This highlights the importance of using complementary data sources to generate a more complete estimate of road traffic mortality and to inform the implementation of context-specific road safety interventions. In addition, better data on the burden of road injuries can inform planning for hospital staffing and health professional training.



Abbreviations

BIGRS	Bloomberg Philanthropies Initiative for Global Road Safety
BRANY	Biomedical Research Alliance of New York
CRVS	Civil Registration and Vital Statistics
ICD	International Classification of Diseases
KATH	Komfo Anokye Teaching Hospital
KMA	Kumasi Metropolitan Assembly
LHIMS	Lightwave Health Information Management System
MTTD	Motor Traffic and Transport Department, Ghana Police Service
NRSA	National Road Safety Authority
RADMS	Road Accident Data Management System
SBER	Social Behavioural and Educational Research
WHO	World Health Organisation

KUMASI

Background

Globally, road traffic deaths and injuries are among the leading causes of mortality and disability. Many of these deaths and injuries are among vulnerable road users – pedestrians, motorcyclists, and bicyclists (World Health Organization [WHO], 2020).

Low- and middle-income countries (LMICs) have the highest proportion of road traffic deaths and injuries accounting for more than 90% (WHO, 2023a) with most of these deaths occurring in cities (International Transport Forum, 2018). The economic burden of road crashes in LMICs is estimated at over USD 65 billion (WHO, 2021).

In 2021, the Africa region had the highest road traffic death rates — at 19 deaths per 100,000 population — compared to other world regions (WHO, 2023a). In many African countries, road transport is the main and affordable means of mobility; however, there has been limited improvement in road infrastructure to accommodate the increasing number of commuters which has led to daily exposure to an unsafe road environment (WHO, 2015).

In Ghana, there were 2970 reported road traffic deaths in 2021. The death rate per 100,000 population that year was 9.4 (National Road Safety Authority [NRSA], 2022). However, there is evidence that the number of deaths is significantly underreported. In 2021, WHO estimated 8494 road traffic deaths suggesting that there were 2.9 times more deaths than official reported deaths that year (WHO, 2023a).

In Kumasi, the number of reported road traffic deaths increased by 57% from 2017 to 2021. However, the number of reported fatalities dropped by 16% in 2022 — from 160 in 2021 to 134. In addition, the number of reported serious injuries have increased by 101% from 2017 to 2022 (Kumasi Metropolitan Assembly, 2023).

Road traffic deaths and injuries at both the national and city levels pose a significant public health and economic problem, especially as most of those who die are young and in their most productive years (WHO, 2020). Projections show that the number of

road traffic deaths and injuries will increase in the coming years if appropriate actions and interventions are not implemented. Reducing the number of deaths and injuries will require reliable data to better assess the burden.

Road safety data is used for planning, monitoring and evaluation by stakeholders including police, transport department, health sector, insurance companies and policymakers. Reliable data are therefore important to assess the magnitude of road traffic deaths and injuries, and to support regulatory measures and interventions to save lives.

However, the quality and completeness of road injury data in many African countries is generally poor and efforts to use other data sources, apart from police crash data, are needed (Adeloye, 2010). In addition, given that police crash officers are not trained medical personnel, description of injury severity and types cannot be done (WHO, 2010).

Given the limitations with relying on police data alone for reporting on road crash deaths and injuries, it is important to identify other complementary data sources to generate a more accurate estimate of road deaths and injuries (WHO, 2010). In the absence of a well-functioning civil registration and vital statistics (CRVS) system in Ghana, data from hospitals (including mortuaries) are among few complementary sources to police crash data. In addition, data from health facilities enable a better description of the types and severity of road traffic injuries.

A study was therefore conducted to collect retrospective road traffic fatality and serious injury data from the major referral hospital in Kumasi, with linkage to police fatal crash data to generate a reliable estimate of road traffic deaths in the city, and to describe the profile of those killed and injured.

Materials and Methods

Study design

A descriptive cross-sectional design was adopted to collect routine retrospective hospital data. Existing records of road crash victims who were admitted due to their injuries and those who died on admission or at the scene of the crash were identified. Hospital fatal case records were linked to police fatal crash records to generate a reliable estimate of road traffic deaths.

Study site

Records of road crash victims were retrieved from the Accident and Emergency (A & E) and Mortuary units of Komfo Anokye Teaching Hospital (KATH) – a tertiary health institution. A feasibility assessment of health facilities providing trauma care in Kumasi was conducted prior to the commencement of the study; and the findings showed that nearly all seriously injured road crash victims in the city, including those who die prior to admission, are sent to the KATH A & E and Mortuary units.

Study procedures

Records of road crash victims who were admitted (for at least 24 hours) or died before admission from January 1, 2021 to December 31, 2022 were accessed. Hospital staff who had access to the Electronic Medical Records system (known as the Lightwave Health Information Management System) and the Trauma Registry (known as REDcap) were trained to conduct case identification and extraction of data from existing patient records on site. Initial identification of eligible cases was done using A & E logbooks/registers. Using the patient number from the logbook, data was abstracted

from the Electronic Medical Records and Trauma Registry. Post-mortem records were requested where applicable.

Personnel who supported data collection used a standardized data input form with variables including demographics, injury circumstances, diagnoses, and outcome. Personal identifying variables (such as name, age, and sex) and crash location details were collected to facilitate linkage to police fatal crash records for the same period.

Exclusion criteria

Records of road crash victims who were not admitted (that is, minor injuries cases) were excluded. In addition, records of patients attending follow-up care after the first hospital visit were excluded.

Police crash data

Previously collected police crash data for the same period (January 1, 2021, to December 31, 2022) were used to link hospital fatal cases which were documented to have occurred in Kumasi.

Data management and handling

After the completion of data collection, records were entered electronically by trained personnel of the Department of Transport, Kumasi Metropolitan Assembly with signed confidentiality agreements. The electronic records were stored on a password-protected device and accessible only to the study investigators. Personal identifiers were removed after linkage and analyses were completed.

Data analysis

Linkage of hospital and police fatal records was conducted manually. Deaths from crashes which occurred outside Kumasi or those in locations which were not documented in hospital records (labelled as unknown locations in the study) were excluded from the linkage. Linkage variables included name, date of crash/date of presentation to hospital, age, sex, and road user type.

After the linkage of cases was completed, the capture-recapture method was used to estimate the number of road fatalities in Kumasi. Capture-recapture is an approach for providing estimates of an event based on cases that are captured by multiple data sources (Morrison & Stone, 2000). The technique was originally developed for estimating wildlife populations (Chapman, 1951) but has been applied to various epidemiological situations in the past years (LaPorte, 1994), including road traffic morbidity and mortality (Magoola et al., 2018; Abegaz et al, 2014; Samuel et al., 2012).

The specific capture-recapture technique used in this study was based on Chapman's estimator which exhibits less bias than other estimators (Brittain & Bohning, 2009). The Chapman estimator is given by the following equation:

$$\tilde{N} = \frac{(S1+1)*(S2+1)}{(n+1)} - 1$$

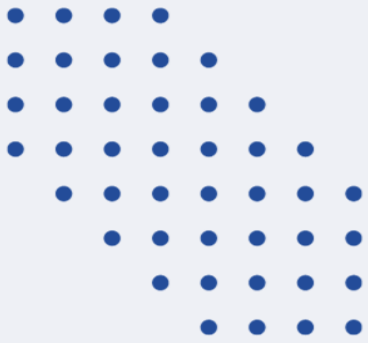
Where $\tilde{N}$ is the estimated number of events (that is, road traffic deaths); $S1$ is the number of events (deaths) recorded in the first data source (police records); $S2$ is the number of events (deaths) recorded in the second data source (hospital records); and n is the number of events reported in both data sources (linked cases). The standard errors (SE) and 95% confidence intervals (95%CI) of the estimates were computed using the following formulas:

$$SE = \sqrt{\frac{(\tilde{N}-S1)(\tilde{N}-S2)}{n}} \quad \text{and} \quad 95\%\ CI = \tilde{N} \pm 1.96SE$$

Stratified analysis of the capture-recapture technique was conducted by sex, age, and road user type. In addition, descriptive analysis using hospital data was conducted to assess the characteristics of those who were killed and seriously injured from road traffic crashes.

Ethics approval

The study was approved by the Institutional Review Board of KATH and the Biomedical Research Alliance of New York, Social Behavioural and Educational Research (BRANY, SBER) Institutional Review Board on behalf of Vital Strategies who provided technical assistance for the study.

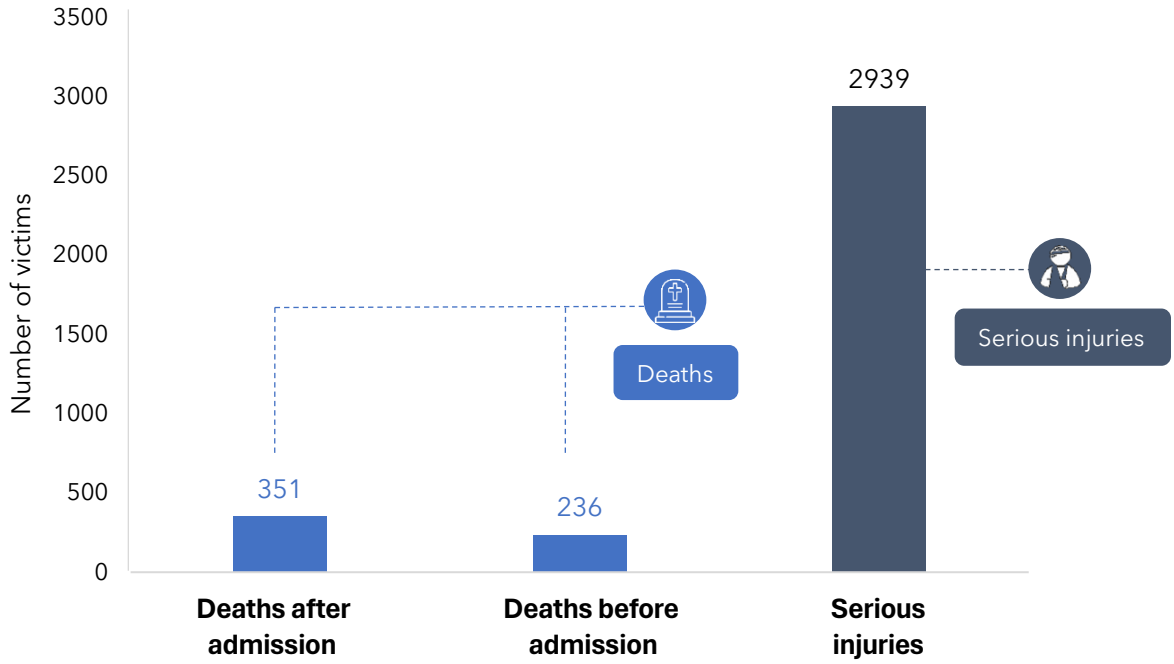


Results

Hospital road traffic deaths and injuries

In total, 3526 road crash casualties were captured in A & E and mortuary records for the two-year study period. Of these, 2939 (83%) were admitted and discharged, 351 (10%) died on admission and an additional 236 (7%) died at the scene of the crash (Figure 1).

Figure 1: Distribution of deaths and serious injuries in hospital records, 2021–2022

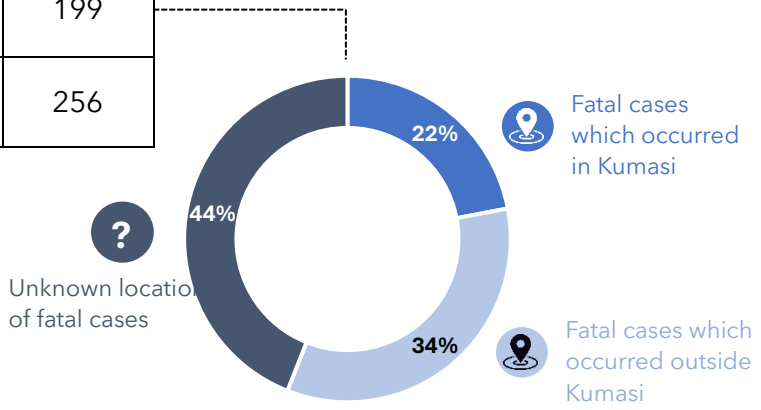


Fatal crash locations

Of the total number of deaths in hospital records (587), 132 (22%) were from crashes which were documented to have occurred in Kumasi, 199 (34%) outside the city's boundary and 256 (44%) in unspecified/unknown locations (Table 1). The location of many cases in mortuary records was not documented.

Table 1: Distribution of hospital fatal records by location of crash, 2021-2022

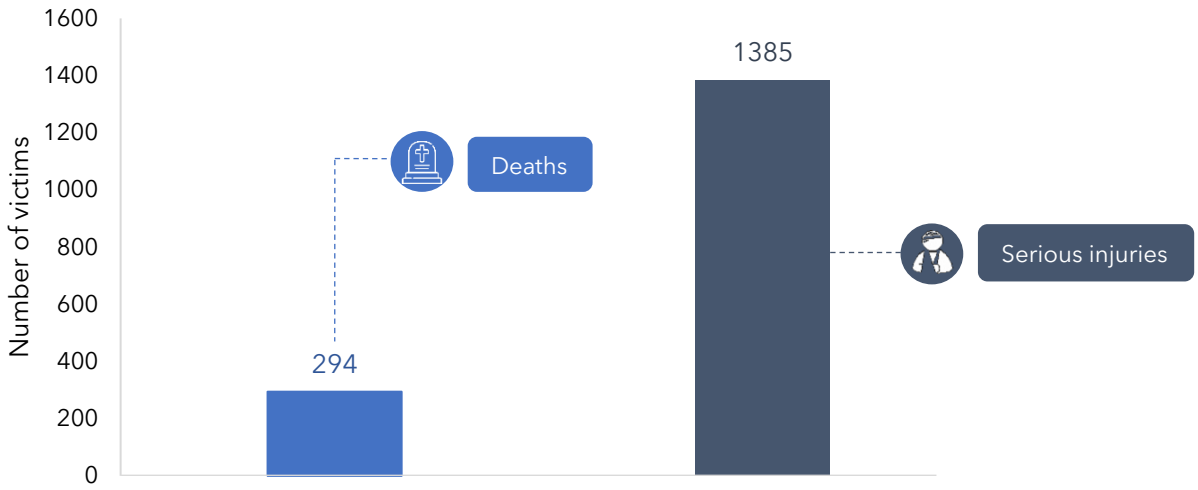
Place of crash	Number
Fatal cases which occurred in Kumasi	132
Fatal cases which occurred outside Kumasi	199
Unknown location of fatal cases	256



Police reported deaths and serious injuries in Kumasi

Police reported 294 road traffic deaths and 1385 serious injuries in Kumasi during the same period (Figure 2).

Figure 2. Police recorded deaths and serious injuries in Kumasi, 2021-2022

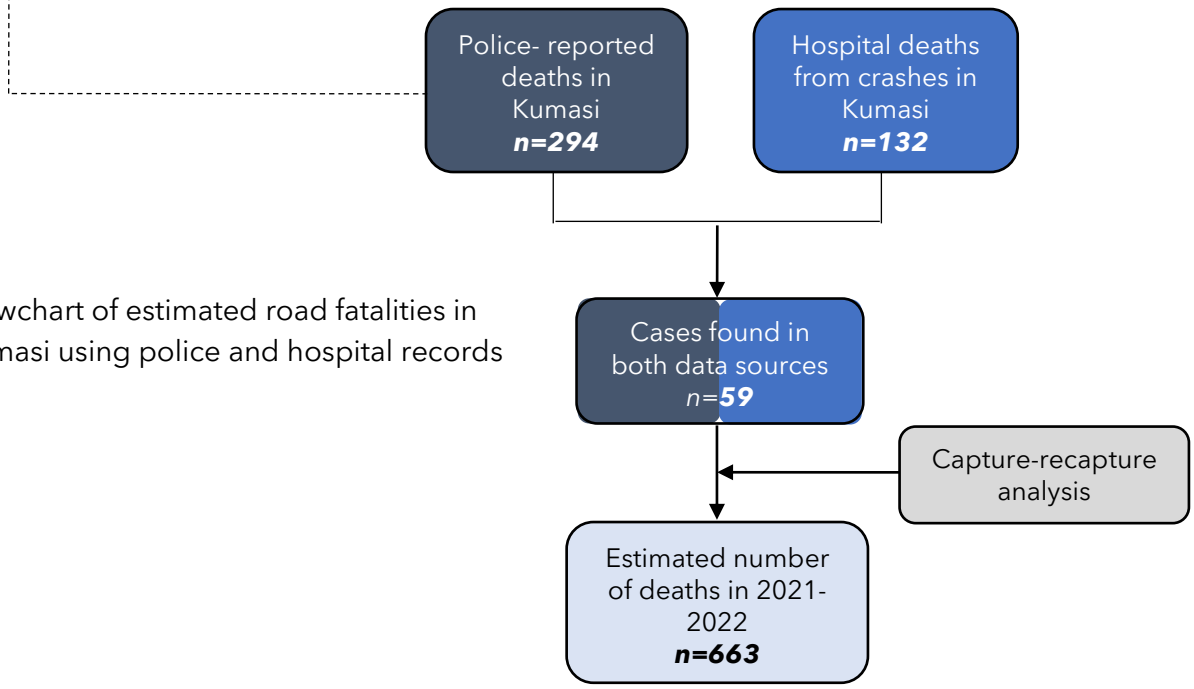


Estimation of road traffic deaths in Kumasi

A capture-recapture approach was used to generate overall and stratified estimates of road fatalities in Kumasi. In the two-year study period, police reported 294 deaths while hospital records captured 132 deaths in the city. A total of 59 hospital fatal cases were linked to police fatal crash cases, yielding a 20% matching rate. Based on a conservative capture-recapture approach, the estimated number of road traffic deaths in Kumasi for 2021 and 2022 was 663 – with an adjusted death rate of 9.3 per 100,000 population (Table 2). The estimated mortality count is 2.3 times higher than police-reported deaths for the same period.

Table 2. Estimate of road traffic deaths in Kumasi, 2021-2022

Capture-recapture estimate				
Police-reported deaths in Kumasi	Hospital-reported deaths in Kumasi	Linked cases	Estimated number of deaths	Police records as a % of estimate
294	132	59	663	44%



Flowchart of estimated road fatalities in Kumasi using police and hospital records

The characteristics of fatal road crash victims in both hospital and police records, including stratified capture-recapture estimates are presented in Table 3. Fatal cases in both police and hospital records showed a similar distribution by sex, age, and road user type.

Table 3. Stratified capture-recapture estimates of road traffic deaths in Kumasi, 2021-2022

Characteristic	Police-reported deaths in Kumasi n (%)	Hospital-reported deaths in Kumasi n (%)	Linked cases n (%)	Estimated deaths (95% Confidence Interval)
Sex				
Male	226 (79)	107 (81)	51 (87)	470 (389 – 552)
Female	61 (21)	25 (19)	8 (13)	178 (85 – 271)
Age group				
0-19	60 (20)	20 (15)	10 (17)	115 (70 – 161)
20-39	101 (34)	54 (41)	26 (44)	207 (158 – 256)
40-59	69 (24)	31 (24)	11 (19)	186 (106 – 265)
60+	42 (14)	25 (19)	11 (19)	92 (58 – 126)
Missing	22 (8)	2 (1)	1 (1)	34 (0 – 71)
Road user type				
Pedestrian	177 (60)	166 (25)	38 (64)	241 (206 – 276)
Motorcyclist/tricyclist	55 (19)	356 (54)	9 (15)	217 (106 – 329)
Vehicle occupant	59 (20)	6 (1)	11 (19)	69 (55 – 83)
Other/Unknown	3 (1)	134 (20)	1 (2)	59 (0 – 139)

Hospital-reported injury types

Injury types were classified by using Chapter 19 codes of the International Classification of Diseases 10 (ICD 10) manual. These codes classify injuries by body region. Table 1 shows the percent distribution of all injury types (irrespective of location of the crash) in hospital records.

Of the total number of hospital fatal cases (587), about four out of five (76%) were head injuries. Similarly, head injuries constituted the highest proportion (38%) of non-fatal injuries (Table 4). In addition, injuries to the leg accounted for 22% of non-fatal injuries and 3% of fatal injuries in the two-year period. These findings can inform emergency response and post-crash care delivery in Kumasi.

Table 4: Distribution of injury types in hospital records, 2021-2022

ICD Code	Description	All injuries	Non-fatal injuries	Fatal injuries
S00 – S09	Head	44%	38%	76%
S10 – S19	Neck	3%	3%	3%
S20 – S29	Thorax	3%	4%	2%
S30 – S39	Abdomen, lower back and pelvis	4%	5%	2%
S40 – S49	Shoulder and upper arm	6%	7%	1%
S50 – S59	Forearm	3%	3%	0%
S60 – S69	Wrist and hand	1%	1%	0%
S70 – S79	Hip and thigh	10%	11%	1%
S80 – S89	Lower leg	19%	22%	3%
S90 – S99	Ankle and foot	4%	5%	0%
T00 – T07	Multiple body regions	2%	1%	11%
T08 – T14	Injuries to unspecified part of trunk, limb of body region	1%	1%	2%
Total		**100%**	**100%**	**100%**

Fatal head injuries were common among all road users. Particularly, a significant proportion of pedestrians (76%) and two- and three-wheelers (87%) had fatal head injuries. In addition, half (50%) of bicyclist had fatal injuries to multiple parts of the body (Table 5). The distribution of non-fatal injuries by road user type can be found in the appendix.

Table 5: Distribution of hospital-reported fatal injuries by road user type, 2021-2022

ICD Code	Description	Pedestrians	2- and 3-wheelers	Cyclists	Vehicle occupants	Unknown
S00 – S09	Head	76%	87%	50%	67%	74%
S10 – S19	Neck	2%	3%	0%	6%	3%
S20 – S29	Thorax	2%	1%	0%	5%	1%
S30 – S39	Abdomen, lower back and pelvis	2%	0%	0%	5%	2%
S40 – S49	Shoulder and upper arm	1%	2%	0%	2%	1%
S50 – S59	Forearm	0%	0%	0%	0%	0%
S60 – S69	Wrist and hand	0%	0%	0%	0%	0%
S70 – S79	Hip and thigh	0%	3%	0%	0%	0%
S80 – S89	Lower leg	4%	2%	0%	0%	2%
S90 – S99	Ankle and foot	0%	0%	0%	0%	0%
T00 – T07	Multiple body regions	7%	2%	50%	16%	18%
T08 – T14	Injuries to unspecified body region	5%	1%	0%	0%	1%
Total		**100%**	**100%**	**100%**	**100%**	**100%**

Hospital-reported deaths and injuries by sex and age

Males made up the highest proportion of all fatal (81%) and non-fatal injuries (80%) in hospital records (Figure 3). Also, those aged 20 to 39 years accounted for 42% of deaths and 51% of injuries (Figure 4). A similar sex and age distribution has been observed for deaths and serious injuries in police crash records since 2017.

Figure 3. Hospital-reported deaths and injuries by sex, 2021–2022

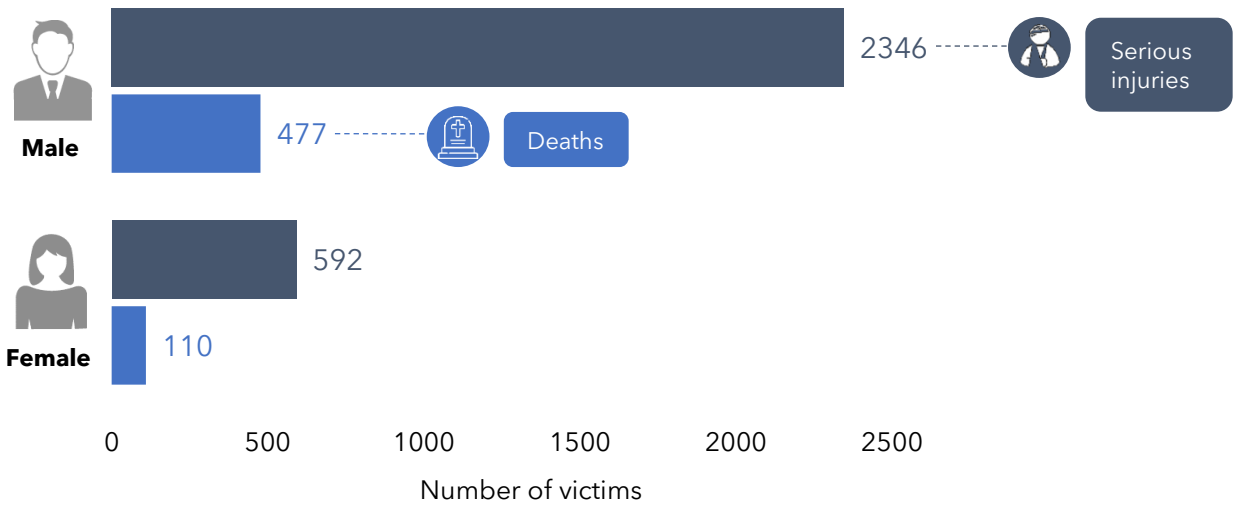
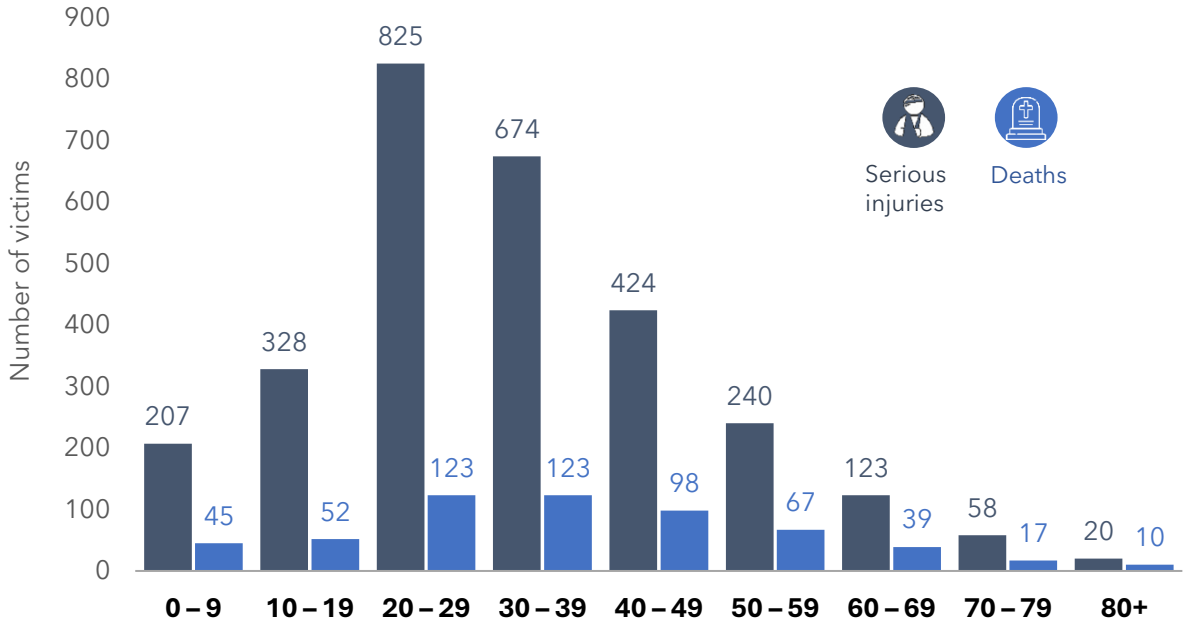


Figure 4. Hospital-reported deaths and injuries by age, 2021–2022



Hospital-reported deaths and injuries by road user type

Deaths and injuries by road user type from hospital records showed a similar pattern to police records. More than half of deaths (56%) and injuries (51%) were among vulnerable road users – pedestrians and motorcyclists/ tricyclists (Figures 5 and 6).

Figure 5. Hospital deaths by road user type, 2021-2022

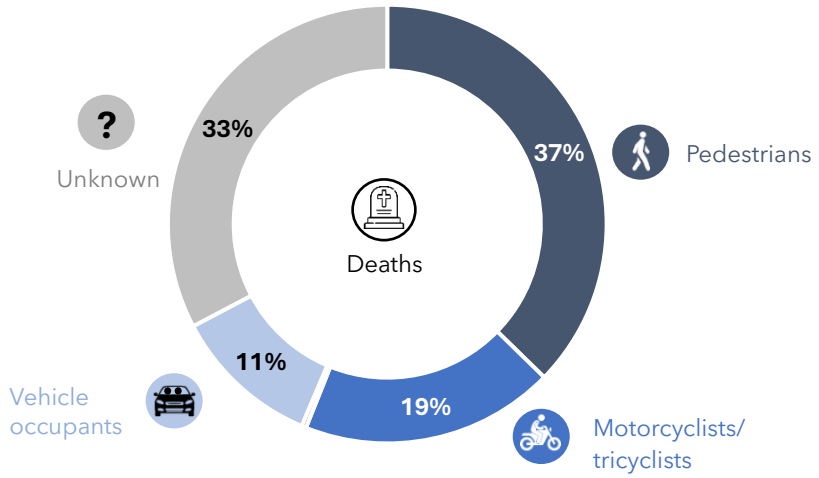
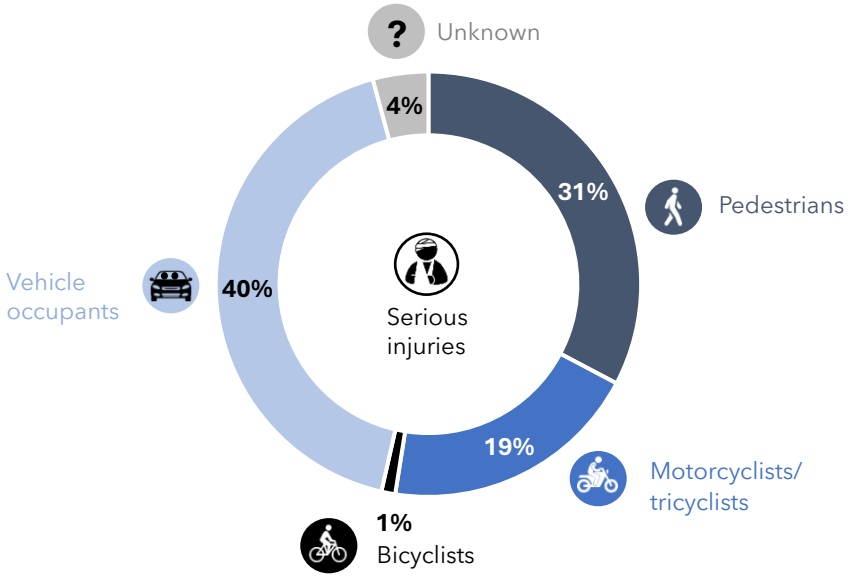


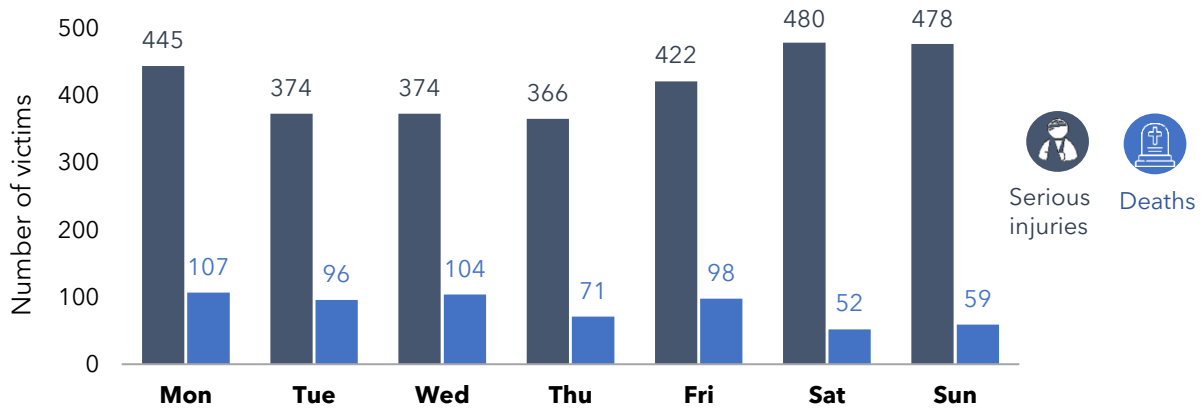
Figure 6: Hospital injuries by road user type, 2021-2022



Hospital-reported deaths and injuries by day of week

No pattern was observed for deaths and injuries by day of week in hospital records (Figure 7). However, many of the recorded deaths in the two-year period were from crashes which occurred on Mondays and Wednesdays. Additionally, serious injury cases frequently occurred from crashes which occurred on Saturdays and Sundays.

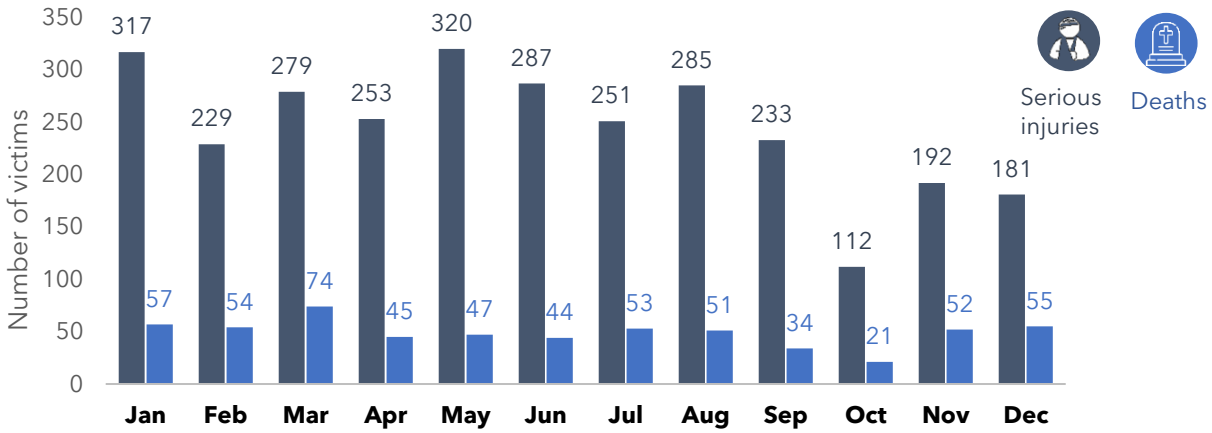
Figure 7. Hospital-reported deaths and injuries by day of week, 2021–2022



Hospital-reported deaths and injuries by month

The distribution of deaths and injuries by month showed no seasonal pattern (Figure 8). The highest number of reported deaths occurred from crashes in March.

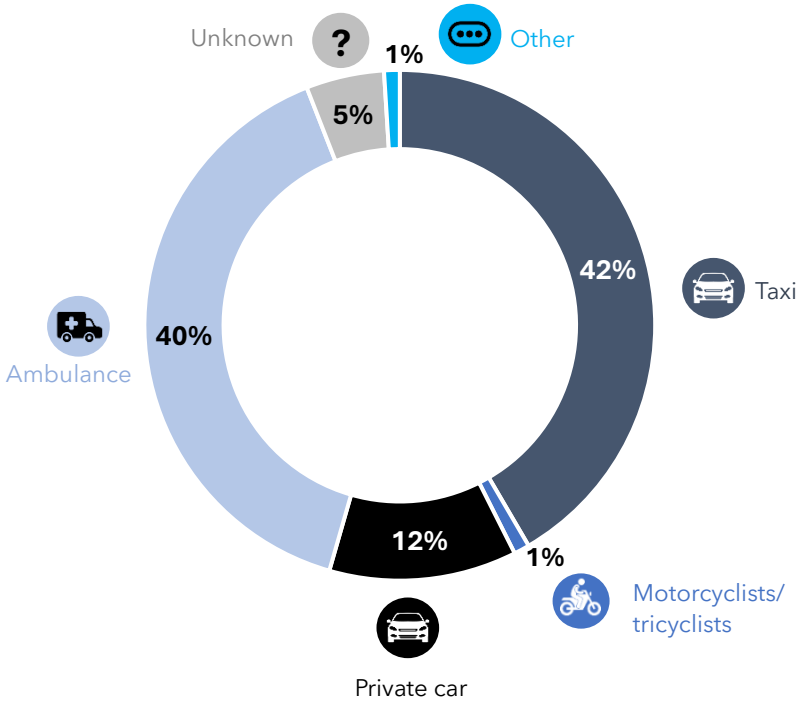
Figure 8. Hospital-reported deaths and injuries by month, 2021–2022



Arrival mode

Seriously injured road crash victims at the A & E unit were frequently brought in by taxi (42%) and ambulance (40%) (Figure 9). It is important to note that it was not possible to determine whether the ambulances were emergency response vehicles or hospital owned in A & E records. These ambulances are therefore likely to be transfers from other hospitals rather than ones from the crash site especially as KATH is a public tertiary facility.

Figure 9. Mode of arrival at the A & E unit, 2021-2022



Discussion

The findings of the capture–recapture estimation suggest an underreporting of road traffic deaths in Kumasi with fatalities estimated to be 2.3 times higher than official police reports for 2021 and 2022. The finding is comparable to a previous study in Accra that suggested road traffic deaths were 2.2 times higher than official police reports (Accra Metropolitan Assembly, 2023).

To put this finding in context, it is important to consider other estimates of underreporting of road traffic deaths in Ghana. The WHO estimates that 2.9 times more deaths occurred than are reported nationally in 2021 (WHO, 2023b). The Global Burden of Disease study also estimated that deaths in Ghana are three times more than are reported nationally (Global Road Safety Facility et al., 2014). The differences in the estimates may likely be due to the fact that these national estimates used statistical models while this study used a direct measurement approach by accessing a complementary data source (hospital data) to estimate road traffic deaths. In addition, the discrepancy between the modelled national and city estimates may be due to more complete police reporting in cities compared to peri-urban or rural areas, or imprecise inputs for the models.

Irrespective of this, the finding in this study shows evidence of underreporting of road traffic deaths in Kumasi when relying on police records alone. The reasons for this include the lack of consistent follow-up by police to update their records for victims who may have died after a period of hospital admission, the fact that the parties involved sometimes agree to not report the crash to the police or where a follow-up request was made to withdraw the case, inability of police to attend to all crashes due to resource constraints, and poor quality documentation of crashes mainly from the use of a standardized tool.

The findings reinforce the importance of linking data sources to generate a more accurate estimate of the burden of road traffic deaths to inform the planning and

implementation of health, transport, and enforcement interventions to reduce road traffic fatalities and injuries.

The distribution of deaths by sex and age in hospital records were identical to that observed in police records for the same period with males and those aged 20 to 39 years accounting for the highest proportion of deaths and serious injuries. This has economic and social implications as many of these victims are economically active, leading to a drop in household income and an increase in expenditure from the direct costs of post-crash care treatment for those who are seriously injured.

In addition, vulnerable road users (pedestrians, motorcyclists, tricyclists and bicyclists) constituted the highest proportion of deaths in both hospital and police records. However, in hospital records, the road user type of one-third of deaths was not documented (and labelled as unknown). The findings highlight the importance of prioritizing the safety of vulnerable road users in Kumasi. Measures such as speed reduction at the approach to pedestrian-vehicle conflict points, clearing pedestrian walkways from obstructions, enhanced enforcement of helmet use, and improving street lightning especially when visibility is inadequate can help to protect vulnerable road users.

The study found that most fatal cases in hospital records were head injuries – particularly among pedestrians and motorcyclists/tricyclists. These findings could inform behaviour change communication and enforcement planning from the prevention perspective, as well as emergency response and health resource allocation for post-crash care.

Limitations

The estimation of road traffic deaths was for the city of Kumasi, so there should be consideration for the context when extrapolating the estimates to other urban settings in Ghana. In addition, there were data quality and completeness concerns in hospital records, including inconsistent documentation of crash location.

This missing information may have reduced the quality of record linkage and thus resulted in an inflated estimate using the capture-recapture method.

Recommendations and conclusions

Evidence from this study showing underreporting of road traffic deaths when relying on police records underscores the importance of using complementary data sources to generate realistic estimates of deaths. This would help to better assess the burden of deaths from road crashes and inform planning, resource allocation, and intervention implementation to save lives. Specifically, police and hospital data integration should be introduced and sustained to enhance the reliability of reporting on road traffic deaths and injuries.

Improving the civil registration and vital statistics (CRVS) system could also ensure that the medicolegal death investigation system (which is the system responsible for conducting death investigations and certifying the cause and manner of unexplained or unnatural deaths such as deaths from road crashes) is well-functioning and could potentially complement police crash data.

In addition, the introduction of a national road accident database management system (RADMS) at the national level is expected to create a digital platform for the collection, and management of police crash data. This would likely improve access to crash data for analysis, reporting and possibly linkage purposes.

The following recommendations aim to improve data collection systems and data linkage processes and ensure that quality data informs road safety interventions.

- Improving the data collection systems place in major referral hospitals in Kumasi to ensure the highest quality of data. This can be done by introducing standardized tools or improving existing ones. Key variables such as the victim's road user type, road name and crash location should be consistently documented in hospital records to facilitate linkage with police crash data.
- If possible, the documentation of road crash victims in police and hospital records should include a unique identifier such as the national identification number of the victim/patient, if available, to improve data linkage processes.

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Appendix

Distribution of hospital-reported non-fatal injuries by road user type, 2021-2022

ICD Code	Description	Pedestrians	2-and-3 wheelers	Cyclists	Vehicle occupants	Unknown
S00 – S09	Head	38%	47%	58%	32%	38%
S10 – S19	Neck	2%	2%	3%	3%	4%
S20 – S29	Thorax	3%	3%	3%	4%	7%
S30 – S39	Abdomen, lower back and pelvis	4%	4%	8%	6%	6%
S40 – S49	Shoulder and upper arm	5%	6%	6%	9%	9%
S50 – S59	Forearm	2%	3%	0%	5%	3%
S60 – S69	Wrist and hand	1%	1%	8%	2%	1%
S70 – S79	Hip and thigh	9%	9%	0%	15%	12%
S80 – S89	Lower leg	30%	19%	11%	19%	14%
S90 – S99	Ankle and foot	5%	5%	0%	4%	6%
T00 – T07	Multiple body regions	0%	1%	0%	1%	0%
T08 – T14	Injuries to unspecified body region	0%	1%	3%	1%	0%
Total		100%	100%	100%	100%	100%

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