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RESEARCH ARTICLE

A Rapid Assessment of Road Crashes in Uganda: Notes from the Field

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Abstract

Background Road crashes continue to persist on Ugandan roads despite the government's commendable efforts over many years. This study sought to explore the persistent causes of road crashes, suggest recommendations and evaluate the costs incurred by the government for treating accident victims.

Methods A rapid cross-sectional study involving both quantitative and qualitative study approaches was performed. Desk reviews and six key informant interviews were conducted with traffic police officers and hospital administrators. Traffic road accident data were abstracted from the Uganda Police Force database for the period of January 2021 to February 2022, to ascertain the magnitude of the problem and its causes.

Results The causes of road accidents are mainly caused by to human error, weather and the poor state of some roads. The government spends reasonable amounts of money in treating accident victims, at USD 245–3590, yet the funds could instead be used to promote socio-economic development in communities.

Conclusion Road crashes continue to occur in Uganda, mainly because of human error. We recommend amelioration of the identified causes of road traffic crashes to save lives and conserve limited public resources.

Keywords Road crashes · Cost of treatment · Road safety · Uganda

Abbreviations

MoWT	MoWT
UGX	Uganda shillings
UNRA	Uganda National Roads Authority
UPF	UPF
WHO	World Health Organization

1 Background

According to the World Health Organization (WHO), each year, 1.35 million people are killed on roadways worldwide. Unfortunately, almost 3700 people are killed globally in crashes involving cars, buses, motorcycles, bicycles, trucks or pedestrians daily. More than half of those killed are pedestrians, motorcyclists or cyclists, who also make up the greatest share of victims of mortality and long-term disability from road traffic crashes and are among the working-age population between 15 and 64 years old. Crash injuries are estimated to be the eighth leading cause of death globally for all age groups and the leading cause of death for children and young people 5–29 years of age. More people now die in crashes than from HIV/AIDS [1]. Fatal and nonfatal crash injuries have been estimated to cost the global economy approximately $1.8 trillion dollars (in 2010 USD) from 2015 to 2030, which is equivalent to a yearly tax of 0.12% of the global gross domestic product [1].

The WHO has reported that road traffic fatalities disproportionately affect low- and middle-income countries, where 90% of global road deaths occur. Therefore, these fatalities are a public health concern that must be addressed. Rising income levels and economic development in many developing countries have contributed to rapid motorization, but road safety management and regulations unfortunately have not kept pace. Action must be taken to address this

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ever-growing public health problem throughout the world, with a special focus on developing countries [2].

The WHO has ranked Uganda among the countries with the highest traffic death rates, estimated at 29 car deaths per 100,000 people. This figure is very concerning because it exceeds the 24.1 per 100,000 people for the African region and 18.0 per 100,000 people global average for deaths, respectively. Road crashes are also increasing at a faster rate [3]. Furthermore, in recent months (March to May 2022), Uganda as a whole has seen a marked increase in road accidents, which have greatly contributed to mortality, injury, morbidity, trauma and disability (Uganda Police Force database, 2022). According to the Uganda Police Force (UPF) Annual Report of 2021, a 42% increase was observed in the number of road traffic crashes, from 12,249 in 2020 to 17,443 in 2021. During that period, 3757 crashes were fatal, and 4616 were minor. A total of 18,305 casualties from crashes occurred in 2021, indicating an 11% decrease. The numbers of people killed decreased by 6%, people seriously injured decreased by 13%, and people sustaining minor injuries decreased by 17% (Uganda Police Force Annual Report, 2021). Road crashes also cost the government approximately 3–5% of the annual gross domestic product [4]. Most road crashes in Uganda have been attributed to human error, such as speeding, driving under the influence of alcohol or other drugs, and distracted driving, among others [5]. Uganda has implemented some control measures to reduce road crashes, such as the enforcement of traffic laws in the Traffic and Road Safety Act, 1998, through police roadside checks and speed management operations [6].

In partnership with other road safety stakeholders in the country, the UPF has consistently implemented several measures to improve road safety, including deployment of traffic police and highway police along highways (Fika Salama), and public campaigns regarding road safety and security on television and radio, and in communities. Joint coordination teams comprising the police, Ministry of Works and Transport (MoWT), bus owners, bus drivers, passenger protection bodies and the media throughout the country have been working together to address the problems of road crashes and road safety (Uganda Police Force, 2021). Other efforts include continued training of traffic officers; involvement of communities, faith based-organizations, and private and civil society organizations; traffic alert squad operations; and the Road Crash Data System (Uganda Police Force, 2021, 2022).

All these interventions were instituted with the objectives of ensuring safety of all road users; motorists compliance with and adherence to traffic regulations; and capacity building among traffic officers in handling the challenge of increasing crime. Further goals have included improving the traffic monitoring system to provide reliable data for effective road safety planning and implementation by improving road safety coordination and management, vehicle inspections at various stations country-wide for learner drivers and for vehicle class extensions in the country (Uganda Police Force, 2020, 2021, 2022). Despite these commendable efforts by the government to ensure road safety and traffic interventions, the problem of road crashes has persisted. Here, we sought to explore the persistent causes of road crashes and possible solutions in metropolitan area of Kampala, Uganda.

2 Methods

2.1 Study Setting and Study Design

This rapid assessment was performed at the UPF directorate of Traffic and Road Safety at Natete headquarters; the Makerere University School of Public Health Injury Trauma and Triad unit; the Mulago National Referral Hospital; and the Kawolo Hospital on the Kampala-Jinja highway. The two study sites are located in the Kampala and Buikwe districts. The Kampala district is also the central business district of Uganda, and Buikwe is approximately 50 km from the central business district.

This was a cross-sectional descriptive study that used both a descriptive and a correlational design. Quantitative data for the period between May 5 and 8, 2022 was collected from UPF records to allow for numerical measurement. Qualitative data were also collected through key informant interviews to provide explanations of the gravity of the issue under study. The informants were police officers from the directorate of Traffic and Road Safety at Natete headquarters, and experts from Makerere University School of Public Health Injury Triad and two hospitals where most local victims of road crashes are admitted. The study participants were purposively sampled and interviewed to explore and gain deeper insights into the issue investigated, in agreement with Creswell (2017). The participants, on the basis of the nature of their daily work, were considered sufficiently knowledgeable to provide a deeper understanding of road traffic accidents, their causes and the costs of treating accident victims, and to recommend measures that could address the problem in Uganda.

2.2 Data Collection and Analysis

Data were collected through interviews and data abstraction. Quantitative data were abstracted from the Uganda Police database for the last 1-year period from January 2021 to February 2022, by using data abstraction forms with key variables of interest outlined. Interviews based on interview guides were held with four traffic police officers who were purposively sampled to participate in

the study. Six key informant interviews with the hospital directors of both Mulago National Referral Hospital and Kawolo Hospital were conducted by using interview guides to assess the costs incurred by the government in treating accident victims. Data were analyzed in Microsoft Excel, and results are presented in graphs.

3 Results

3.1 Road Crash Categories

The UPF categorizes crashes as fatal, serious and minor accidents. Serious accidents had the highest frequency (315) in the months of February and March 2022 (Fig. 1). However, a general increase in the number of fatal accidents was observed throughout the period.

3.1.1 Causes of Road Crashes or Injuries in Uganda

Figure 2 shows the numbers of drivers and motorcycle riders arrested for the various offenses and issued Express Penalty Scheme (EPS) tickets, as observed on CCTV cameras, for various reasons. The findings indicated that driving vehicles/riding motorcycles in a dangerous mechanical condition and reckless driving were the major sources of accidents. In contrast, the lowest numbers were observed for carrying more than one person on a motorcycle.

3.2 Commercial Motorcycle Riders

Commercial motorcycle (boda boda) riders in Uganda have no formal training and are not fully regulated, and many lack a driving license. They lack adequate understanding of road signage and therefore cannot interpret signs; moreover, many drivers are reckless. The country is served by an unregulated commercial public transportation system, in which most drivers have no or poor driving skills, thus further contributing to road crashes.

3.3 Poor Attitudes and Human Error

Most of the study participants described that people's attitudes are an issue that leads to human error. Many road users speed, or drink and drive; drivers and riders use mobile phones while driving; theft of signs occurs along roads; overtaking occurs in narrow areas; and some drivers and riders have poor vision, are incompetent, or show no respect for other road users, thus endangering the lives of road users country-wide. The behaviors/attitudes of drivers on the road largely depend on their age, experience, level of education, driver's training and use of drugs/alcohol.

3.4 Distracted Driving/Riding by Using Recent Technological Applications (Jumia, Uber or SafeBoda apps)

The use of technological applications such as the Uber, SafeBoda, Jumia apps has become a problem leading to road traffic incidents in Uganda, because drivers/riders tend to focus on these apps on their mobile phones instead of driving,

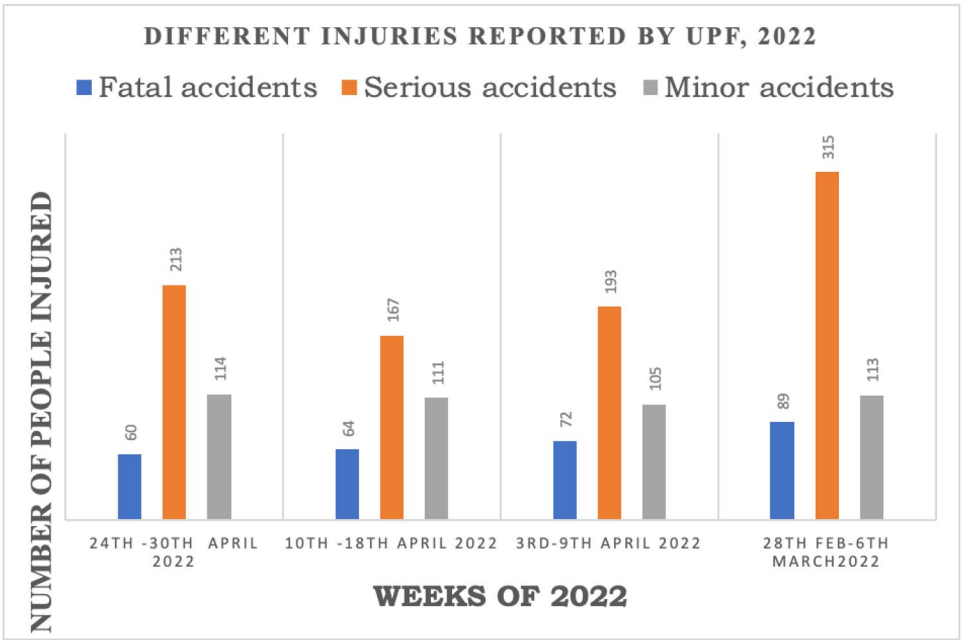

Fig. 1 The nature of injuries, as reported by police, revealing high costs of treatment incurred by the government

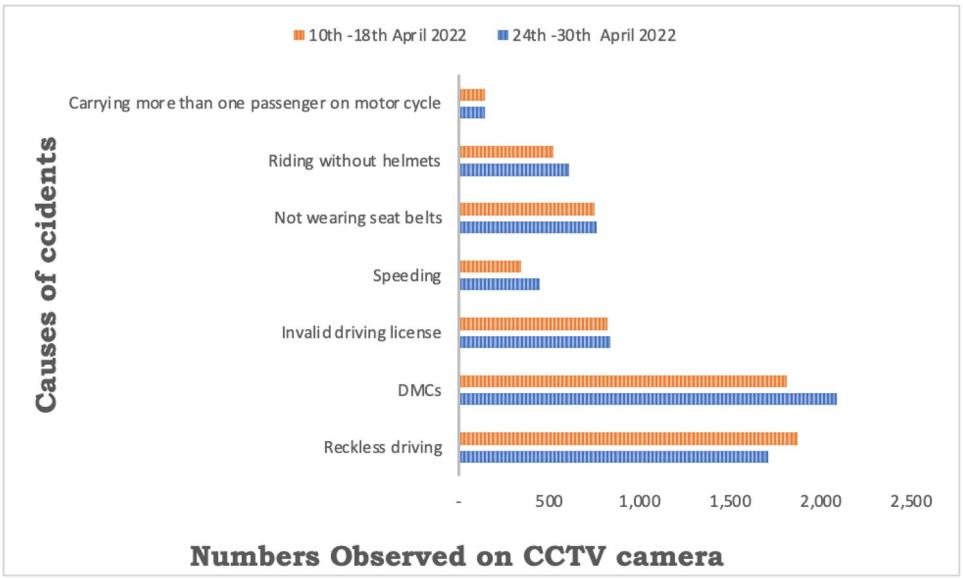

Fig. 2 Traffic offenders arrested and issued EPS tickets country-wide for various traffic offenses at various checkpoints

and thus have limited mental capacity available for driving tasks. Distracted driving leads to avoidable deaths on the roads and must be controlled and stopped. In the Traffic and Road Safety Regulations (2020), the use of mobile telephones while driving is prohibited; however, gaps exist in the enforcement of this regulation.

3.5 Limited Use of Seat Belts

The use of car seat belts is not optional and is incorporated in the Traffic and Road Safety Act. The use of seat belts is the best defense against aggressive and distracted drivers, who may also be impaired. Therefore, seat belts help save lives and prevent avoidable injuries/deaths from road accidents. Most of the study participants described that many drivers and passengers do not use seat belts, because people have not normalized and appreciated the use of seat belts. Therefore, in vehicle accidents, preventable injuries/deaths occur because the vehicle occupants have no stability owing to seat belts not being used. Some reasons for failure to use seat belts are a lack of understanding of their importance and the general perception by drivers that seat belts limit their freedom of movement behind the wheel.

3.6 Vehicles in Poor Mechanical Condition

Vehicles in this case are cars, trucks, motorcycles and bicycles that road users choose to deploy on the road system. Drivers/riders must ensure that vehicles are mechanically sound, with functional brakes and lighting, and good tires.

All key informant participants from the UPF described that many vehicles on the roads are not routinely inspected and are in dangerous mechanical condition, partly because of the negligence of drivers/owners and partly because police vehicle inspection centers are not in operation. Vehicle owners/drivers do not follow the recommended maintenance schedules and intervals. Some vehicles used on the road are too old and are unsuitable for road use. These vehicles are dangerous, pose a risk to lives, and contribute to avoidable accidents and loss of lives.

3.7 Weather

Many study participants, particularly members of the Uganda Police, described that weather is associated with occurrence of road crashes on roads in some parts of the country. More accidents occur in rainy seasons because of the slippery nature of the roads, such as on the Mbarara-Masaka Highway, and because of poor visibility due to foggy weather, such as on the Gulu Highway and other parts of the country.

3.8 The State of Some Roads and Terrain

The study indicated that the roads may include potholes; poor drainage due to inadequate maintenance, thus making the roads impassable; and smoothly textured surfaces that greatly contribute to road crashes.

In addition, most roads are narrow single carriage, two-way roads without a median and with few opportunities for overtaking; hence, many head-on collisions result. Most roads lack zebra crossings, walkways or cycling lanes; have poor/no road markings and poor visibility at junctions; and have inadequate signage. The speed limit and sharp bend signs are limited on the road networks and are often stolen for use as scrap metal. Furthermore, some roads are characterized by very steep gradients and consequently are highly accident prone; for example the Katabalanga road stretch in

Fort portal is very steep, and when a vehicle is driven on it at high speed, road accidents are inevitable.

3.9 Community and School Children Lack Understanding of Road Signage

Many participants noted that around Kampala and many parts of the country, parents entrust boda boda riders with school children very early in the morning, and the children tend to sleep along the way, and sometimes fall off and are injured or even killed by other drivers or riders. These children do not understand the road signage and may be hit while crossing roads.

3.10 Suggested Recommendations

Several recommendations for improvement of road safety were suggested by the key informants, as summarized in four different broad categories: enforcement, education, engineering and emergencies.

3.10.1 Enforcement

a. The Traffic and Road Safety Act (amendment, 1998; act, 2020) is in place, but regulations are currently lacking. The MoWT should expedite this process.
b. The MoWT should create a department to regulate boda boda operation across the country. All boda boda riders should possess driving licenses, and enforcement should be provided by UPF.
c. The Government of Uganda (GoU) should renovate the inspection centers for vehicles across the country to enable annual mechanical inspection of vehicles by the UPF.
d. Mandatory use of seat belts while traveling in vehicles should always be enforced by traffic police.
e. The UPF should very strictly enforce the law restricting use of mobile telephones while driving, to deter many drivers and riders from being distracted by their mobile phones while operating these machines on the road, and save lives.
f. The GoU should invest in building a digital national road crash database based on the minimum standards stipulated by the WHO. This database could be managed by UPF and associated with existing CCTV systems to enable its improvement and subsequent rollout. This centralized data system will harmonize data on road accidents from the UPF, Ministry of Health and MoWT.
g. More enforcement equipment for UPF should be procured, such as speed guns, breath analyzers, and express penalty machines, which should be deployed along major roads in the country.
h. The MoWT should liaise with UPF to validate driving licenses. Many drivers use fake licenses.
i. The GoU should consider certain vehicle ages to be unworthy of operation and deregister them. Additionally, the MoWT should seek evidence of regular vehicle maintenance before issuing licenses for vehicles.

3.10.2 Education

a. The driving curriculum should be standardized across all driving schools in the country to aid in regulating the many driving schools opening across the country.
b. The curriculum of police training should be revised to include first aid and emergency care for road traffic injury victims. UPF officers are always the first responders to any accident scene and therefore could offer basic support to victims.
c. The Ministry of Education and Sports should include highway code and road use in the education curriculum at all levels. Education should be provided at every stage of learning, from kindergarten to tertiary levels, to create a culture and mindset of road safety.
d. The Ministry of Education and Sports should create guidelines for children crossing roads, and buses dropping off and picking children up from school. The transportation of children from homes to schools should be regularized.
e. Special training/sensitization programs should be provided in all media. All media should allocate time for educating the public on road safety and usage. Print media should create road usage and safety material in all languages to educate the public on safe driving habits. All radio and television stations should broadcast messages on road usage and safety in prime time hours.
f. The MoWT should develop more reading materials for the public on road safety, which should be included in print media as leaflet inserts.
g. UPF should organize regular medical examination of drivers and riders, including visual ability to drive.

3.10.3 Emergency

The GoU, through the Ministry of Health, should establish a functional emergency system with an active 24-h call center tasked to dispatch at least two response vehicles to every crash scene. The responders should include (1) the police (to protect the crash scene) and (2) a paramedic team (to provide required emergency care). This emergency system should include district local governments, because accidents occur in those areas.

(a) The GoU should provide sustainable funding for the road traffic crash response through tapping into existing

funding structures, such as the Road Fund and Stamp Duty, to increase funding for the response to road traffic crashes in the country.

(b) The UPF should target hotspot areas for 24/7-h surveillance on major roads.

3.10.4 Engineering

a. We suggest that roads be constructed in the proper size with all required designs. The roads should have standard infrastructure, including parking lots, bus stops, guard rails and pedestrian walkways.
b. The MoWT and Uganda National Roads Authority (UNRA) should undertake continual improvement of all major highways and install visible signage in the proper places to warn motorists and other road users. Eye-catching colors should be used. To prevent theft of the metallic signs for scrap metal, plastic materials could be used. Zebra crossings with reflective paint should be installed in every urban center and in school locations.
c. UNRA should engage with UPF in the construction and approval of these roads across the country.
d. The MoWT should apply existing crash data for the inclusion of road safety measures in planning, design and construction/rehabilitation of roads.
e. The MoWT and UNRA should ensure timely identification of road defects (potholes, broken signage, worn road markings, etc.) across the country's road network, and repair them.

3.11 Governmental Cost of Treatment of Accident Victims

The study revealed that most accident victims are rushed to nearby health facilities across the country, but notably many victims are rushed by the UPF to general hospitals such as Kawolo; Kiryandongo; Nkozi; and St. Francis Hospital Nagalama, and are later referred to Mulago National Referral Hospital for further management.

The cost implications of treating accident victims at each of the hospitals visited is discussed below.

1. At Mulago National Referral Hospital, an average of 45–70 victims are received at the emergency department (ED) on a normal day, and approximately 80–130 victims of demonstrations, riots and strikes in the Kampala Metropolitan Area are received, as well victims of multiple accidents.

   The victims spend an average of 14 days in Mulago Hospital under intensive care and later return for follow-up in approximately 60 days. Treating each victim costs an average of Uganda shillings (UGX) 13,660,000 for services not limited to resuscitation (at ED), CT (head) scans, theatre operations, intensive care unit admission, admission to wards for approximately 10 days, rehabilitation, reviews, X-rays and wheelchairs. Some 90% of these costs are incurred by the GoU for each victim.
2. Kawolo General Hospital receives an average of three to five accident victims on a normal day and approximately 34–50 victims in the event of accidents on Jinja road. The hospital takes responsibility for transporting victims to the Mulago National Referral Hospital when further management is necessary. The hospital spends an average of UGX 930,000 on treatment for each accident victim, which covers services including, but not limited to, resuscitation fluids such as normal saline, 5% dextrose, X-rays, CT scans and fuel for the ambulance to Kampala. These victims spend approximately 14 days in the hospital. The GoU pays approximately 94% of all costs per individual. Kawolo hospital is at a lower level than Mulago National Referral Hospital—which offers more specialized services—thus explaining the variations in the treatment costs estimated.

4 Discussion

This study explored the causes of accidents, suggested solutions and assessed the governmental costs of treating accident victims in Mulago National Referral Hospital and Kawolo Hospital in Uganda. Most accidents in the country were due to the use of vehicles in dangerous mechanical condition on roads and reckless driving. Various solutions to curb accidents were suggested and categorized into education, enforcement, engineering and emergencies.

We characterized road crashes in the country into serious, fatal or minor accidents. Most accidents in Uganda were serious. Serious accidents are those leading to major injuries to the victims. However, a general increase was observed in the number of fatal accidents, possibly because of several factors including reckless driving; the influence of alcohol; and an absence of, or failure to observe, road signs by motorists and pedestrians. The findings could further be attributed to boda bodas in Uganda lacking formal training: the drivers are self-taught and are unregulated, do not regularly use helmets while on the road, and carry more than one passenger. Distracted driving associated with the use of handheld devices and apps while driving and riding was a major cause of accidents in Uganda. The findings of this study are consistent with others in the region [7–9].

The recommendations suggested by the study participants have been implemented in the country by the different actors for many years. However, they must be reinforced and

revisited according to the recommendations of the WHO Road Safety Guidelines of 2018 (WHO, 2018). Recommendations regarding health education through road safety campaigns in communities, schools and the media have been reported to be effective in Kenya, Namibia, Zambia, Ghana and the Cote d'Ivoire. Re-enforcement of traffic laws, speed limits, and training in road signage interpretation and speed limits have been shown to decrease road crashes in countries such as Nigeria and Rwanda. Strengthening policy and programs on safety and technologies, and using databases such as geographic information systems have been shown to be successful in improving road traffic operations and data management [6].

Treatment of accident victims in public health facilities results in very high governmental costs worldwide, according to studies from other countries [9]. In Uganda, this cost was estimated to be between USD 245–3590. Thus, funds that could have been used for other developmental ventures in communities are instead spent on treating patients in hospitals, including the costs of transporting patients to hospitals and medical bills (Mbowa et al. 2022). The government therefore must reaffirm its commitment to securing road safety and traffic laws by supporting enforcement and implementation, to protect the lives of the people, prevent high treatment costs, and enhance the socioeconomic transformation and development of the country.

Our study has several strengths. First, we were able to gather evidence of discussion by the country's high-level decision-making body (the Cabinet) regarding road crashes at a time when the country was experiencing numerous crashes. We were able to interview people who are directly involved in the management of, research on and response to road crashes in Uganda. Thus, our findings are authentic and applicable to real-life settings in Uganda, and implementing our recommendations should substantially contribute to reducing the problem of road crashes. We reviewed the literature from January 2021 to April 2022, thus providing data across a wide spectrum of studied trends over time. The data abstraction tool that we used in line with UPF and MoWT gives validity to the variables reported herein. We attempted to estimate the cost of caring for victims of road crashes—an often overlooked variable that is valuable to policy makers. However, this study has several limitations arising from its being a quick fact-finding exercise to provide information on road crashes in Uganda. We reviewed secondary data from UPF records, thus raising concerns regarding data completeness and accuracy. Second, we visited only two hospitals; therefore, we might have missed insightful information on this subject matter that could potentially have been gained from other areas. Third, we did not interview some key stakeholders on this subject, such as the Leadership of motorists and cyclists, boda bodas or passenger vehicles. Therefore, we might have missed several reasons for the findings.

Further studies could focus on (1) modeling and predicting the burden of road crashes in Uganda by 2030 and different intervention scenarios; (2) thoroughly determining the direct and indirect costs incurred by the GoU or patients in the treatment of fatal, serious and minor crashes in Uganda; and (3) understanding the factors driving the absence of road signs on Uganda's road network.

5 Conclusion

The results of the study showed that driving/riding vehicles in dangerous or poor mechanical condition and reckless driving were the major sources of accidents. Therefore, human error in the form of speeding and poor decision-making by drivers is highly responsible for road crashes in Uganda. Other reasons included poor conditions of some roads, the presence of unskilled boda boda riders, low use of seat belts and illiteracy regarding road signs. Our recommendations call for reassurance and enforcement of traffic laws, punishing traffic offenders and more support from the government, in the form of equipment, funding and a functional database center for coordination of all traffic data in the country. The government incurs substantial costs in treating accident victims. Therefore, a need exists for the government to be more involved in the enactment of traffic laws by various parties to help reallocate these monies to areas that prevent road crashes and protect the lives of road users. We recommend that all parties, such as the MoWT, UNRA, the Ministry of Health, the media, educational institutions and UPF should be very concerned and should act on the suggestions made by the participants in this study, to address the problem of road crashes as a collective responsibility. These efforts would help prevent unnecessary deaths and injuries on roads.

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Author Contributions AWW, MMM: conceptualized and designed the study. AWW, CA: collected and analyzed data, and developed the first draft of the manuscript. FM, BN, MN: reviewed and technically improved the manuscript. MMM: mobilized resources for executing this study. All authors read and approved the final version of the manuscript.

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Availability of Data and Materials All data supporting findings are contained in the paper. There are no restrictions on data sources; however, details of the full data may be accessed through Mr. Abel Wilson Walekhwa, wabelwilson@gmail.com.

Declarations

Conflict of Interest The authors declare that thery have no competing interests.

Ethical Approval and Consent to Participate Permission to conduct this study was obtained from Commissioner Road Safety directorate, UPF and was granted on May 5, 2022. An introduction letter was also obtained from the Minister for Science, Technology and Innovation secretariat explaining the benefits and purpose of the study, this letter was presented to the Mulago National Referral Hospital and Kawolo Hospital, and permission was granted to collect information. Informed consent was sought from all participants (hospital leadership, police officers in the directorate of traffic and road safety and some experts from the TRAID Unit, School of Public Health, Makerere University) for participation in this study.

Consent for Publication Not applicable.

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