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#### ABSTRACT

**Background:** Currently Road Traffic Accidents (RTA) are ranked tenth among the leading causes of death and ninth among all leading causes of disability worldwide. There has been no published study on RTA in Gulu municipality. There is a high frequency of RTA in Gulu municipality with poor road design and inadequate knowledge on road safety precaution among road users.

**Objectives:** To establish the causes of Road Traffic Accidents (RTA), establish the safety measures in place to protect road users to avoid RTA and establish people mostly involved and the mechanism of RTA.

**Design:** A cross-sectional study

**Settings:** Four divisions of Gulu Municipality; Layibi, Laroo, Pece and Bardege.

**Subjects:** Two hundred and forty two participants including pedestrians, drivers of different categories of vehicles, motorcyclists and bicyclists locally known as *boda-boda* and the police were interviewed.

**Results:** Most respondents reported RTA as a problem in Gulu municipality (96%), causing death (48%), financial constraint due to medical treatment (41%) and disability (11%). The following causes of RTA were identified; reckless driving and riding (49%), poor road design (24%), drug abuse (15%) and over loading (12%). According to police records of January to September 2009 RTA involved pedestrians (36.34%), passengers (25.80%), motorcyclists (24.88%), pedal cyclists (11.52%) and drivers (3.68%).

**Conclusion:** RTAs is a substantial burden in Gulu municipality in Northern Uganda with reckless driving or riding, poor road design, overloading, double parking, inadequate road safety signs and knowledge, were major risk factors. Efforts to reduce RTA in Gulu municipality should aim at addressing these problems.

#### INTRODUCTION

Road traffic accident (RTA) is sustained following road crashes by the road users. It is now over 100 years since a motor vehicle accident claimed life of a pedestrian in 1896. Two years later in a similar circumstance, a road traffic accident claimed the life of a driver. Motor vehicle crashes have since then become one of the leading causes of death and disability worldwide (1). RTAs are a major but neglected public

health challenge, ranking tenth among the leading causes of death and ninth among the leading causes of disability worldwide (2,3). It is thought that by 2020, given the current trend and without adequate intervention, RTA will rank the third among the leading causes of morbidity and mortality globally (3). World Bank estimates that RTA cost 1-2% of the Gross National Products (GNP) of developing countries or twice the total amount of development aid received by developing countries (4). Developing countries

have a large share of burden accounting for 85% of the annual gross fatalities and 90% of Daily Adjusted Life Years (DALYs) lost because of RTA (5).

Despite causing death on a similar scale to diseases like malaria and tuberculosis, RTA are not included in the millennium development goals and receive overseas funding which is a tiny fraction compared to that allocated for malaria and tuberculosis (5). Death from RTA is higher in Africa than any other region of the world. This is because of the combination of many factors such as; ignorance of road safety measures, poor vehicle condition, underdeveloped infrastructure, and ineffective law enforcement mechanisms enhanced by corruption (6). A recent road safety project shows that, 10% of the global deaths in 1999 took place in sub-Saharan Africa. However, given the widely recognised problem of under reporting of road traffic deaths in Africa, the true figure is likely to be higher. This is because the police report only the major ones (7). Three months cross sectional retrospective study involving *Boda Boda* (this are motorcyclists or bicyclists who transport passengers at a cost), conducted at Mulago hospital, Uganda showed that injuries due to *Boda Boda* accidents admitted were second to that of motor vehicles. It was reported that a large proportion (67%) of accidents occurred between *Boda Boda* and motor vehicles, 37% involved *Boda Boda* and pedestrians, and only 2% involved *Boda Boda* alone (8). In the same study Nadumba found out that the causes of these RTA included; over speeding, overloading, reckless riding, failure to comply with the traffic laws and regulations, lack of respect for other road users and lack of training before being licensed(8). According to Haworth *et al*, the following factors contributed to motorcycle accidents; being young, inexperienced, sometimes unlicensed riders and riding recklessly during peak hours (9). While others got the accidents on borrowed motorcycles which were in poor mechanical conditions they were not used to. Bad surfaces of the roads also contributed to RTA (10). In general drunken driving has been found to be one of the key determinants in RTA in developing countries as shown in a Kenyan study (10). Inadequate knowledge about road safety signs is also a contributing factor to RTA as demonstrated in a study done in Ghana (11).

Heavy traffic on the roads has also been found to be a cause of RTA as seen in a study done in Vietnam. In this study an increase in the number of motorcycles of 29% in 2001 was found to be associated with 37% increase in number of RTA (12). Reports from various countries in Africa including Uganda, Kenya, South Africa and Zimbabwe showed that most of the road crashes occurred because of human errors on the roads due to; over speeding, reckless driving, failure to abide by the driving rules (13). Other causes of these accidents included;

distraction of drivers (for example, speaking on cell phones while driving), inadequate maintenance of vehicles and driving while exhausted (13). In Kenya, human errors were found to be responsible for up to 80% of the fatalities (13). In Uganda, community survey conducted by Injury Control Centre Uganda (ICCU) and surveillance report from hospital based trauma registries, identified; RTA, burns and force as being the most cause of accidental injury (8, 14). Injuries are an important public health problem predominantly in young male adult mostly due to RTA (9, 10, 15). Also in Uganda it was shown that pedestrians especially children and adolescents were the most affected (16). In a study by Naddumba in Mulago hospital in 2001, it was found that the age group of injured *Boda Boda* cyclists ranged between 14 and 28 years (mean of 24 years), the pedestrians' ages ranged from 9 to 80 years (mean 29 years) and the *Boda Boda* passengers were from the 18-36years; mean 29 years (8).

In this study our focus was on business men and women and students who mostly get involved in RTA because of the rush through the heavy traffic to get to their business and school respectively. Road traffic accidents is substantial burden in Gulu Municipality with reckless driving or riding, poor road design, drug abuse, overloading, double parking, inadequate road safety signs and knowledge, were major risk factors. This study will provide to the stakeholder the magnitude of RTA in Gulu municipality Uganda and should offer remedy to RTA.

## MATERIALS AND METHODS

This was a cross-sectional study which looked at the relationship between the variables which contribute to RTA. The respondents for the study were pedestrians, drivers, *Boda Boda* riders and the police. They were drawn from divisions of Laro, Pece, Bardege and Layibi in Gulu Municipality in Northern Uganda. The respondents were in the age range of 12 to 60 years. These were people who use the road in the municipality daily. However the boarding students because of their low use of the road and persons who had lived in Gulu municipality for less than three months because of their limited knowledge of RTA, those who did not consent to the study and those with obvious mental illness but live in Gulu municipality streets were left out of the study. The questionnaires, the research tools were pre-tested. The research team held debriefing meetings daily during data collection period and there was double entry of data into computers for analysis. Using the calculation of Taro Yamane's mathematical formula, the sample size of 242 respondents was derived at to detect 80% the number of respondents who use the road daily with acceptable error (0.05) or 95% confidence level.

*Procedure for the study:* The local community leaders and respondents were explained to the objectives of the study and how the results were to be used. Further the respondents were allowed to give an informed consent and were free to drop out of the study at any stage at their will. The study population was divided into pedestrians, drivers and *Boda Boda* riders. The taxi and bus park was chosen by convenience from which twenty drivers were sampled using systematic random sampling method. The entry and exit points to the taxi park were selected by simple random sampling. One vehicle was selected from the first four vehicles by simple random sampling method, from which the first driver was arrived at; subsequently a driver was selected after every two vehicles. The *Boda Boda* stages were clustered according to divisions in the municipality, five stages were selected using simple random sampling using the hat ballot method from each division and two *Boda Boda* riders at each stage were selected by similar simple random sampling method. Pedestrians were represented by students and shopkeepers. One day secondary school from each division was selected by similar simple random sampling method. Four classes were selected from each school by simple random sampling method and ten students were selected from each class by simple random sampling method. Five shopkeepers were selected from each division by convenience method. We interviewed twenty four respondents which included; two drivers, sixteen students, two shopkeepers and four *Boda Boda* riders. For focus group discussion with the *Boda Boda* discussion guide was used to collect the data. However the data from the pedestrians, drivers and *Boda Boda* rider respondents were collected using questionnaires by the researchers assisted by interpreters.

The retrospective interviews with the police officer in charge of traffic looked at the recorded number of accidents in the last one year by quarter; First quarter, second quarter, third quarter and fourth quarter. In each quarter the different categories of individuals involved in the RTA, different categories of possible cause of the RTA, the locations where the RTA occurs and what influence the cause of the RTA were recorded on interview guide.

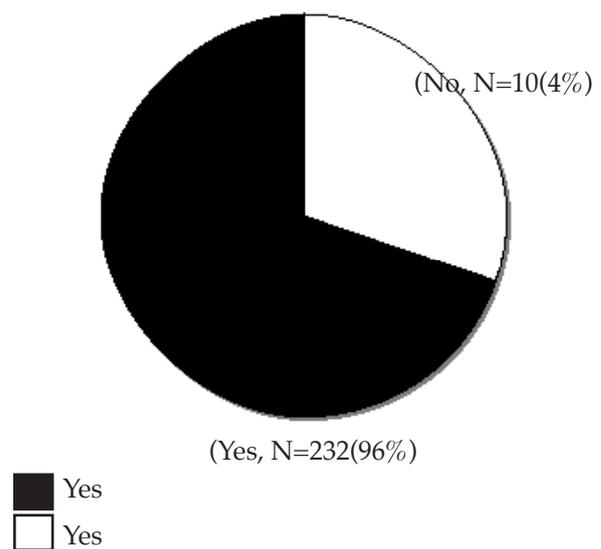
*Data management and analysis:* The collected data were edited to check for completeness, accuracy and consistency. The data were coded, categorised and entered into computers for analysis using Graph Pad Prism 5 computer Statistical software. Proportion and frequency table summarised the distribution of categories variables in the study population. Data is presented using graphs, tables, pie-charts and other statistical forms like use of ratios and percentages to aid comparisons of the scenarios and eventually to ease data interpretation, conclusion, aggregation, recommendations and generalisation

of the relationship between the variables. Data from focus group discussion were analysed manually.

**RESULTS**

A total of 242 respondents from the divisions of Laro, Pece, Bardege and Layibi in Gulu Municipality, Uganda were interviewed within a period of one month for information about RTA. They were stratified according to age, sex, level of education, occupation and marital status. Majority of the respondents were in the age group of 16-25 years 181 (74.8%) and most had attained secondary education 201(83.1%). Biggest number were male 167 (69.0%) and 75 (31.0%) were female. The majority of them were single 180 (74.4%) while only 62 (25.6%) were married. Day students who walk to their schools in the mornings and evenings were 160 (66.1%) of the respondents while *Boda Boda* cyclists were 40 (16.5%). The data clearly showed that the high numbers of young unmarried male operating different type of vehicles and *Boda Boda* in Gulu municipality were the victims of the present RTA. A good number of the respondents admitted knowledge about the problem of road traffic accidents in Gulu municipality (Figure 1).

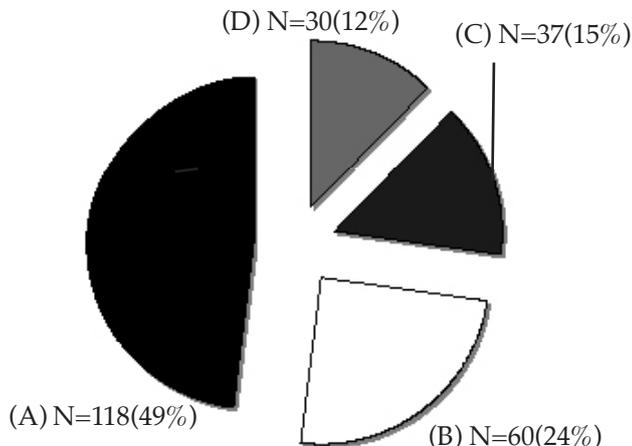
**Figure 1**  
*Knowledge of road traffic accidents amongst respondents in Gulu Municipality*



Pie Chart showing the knowledge of respondents on RTA in Gulu Municipality Yes = respondents who think road traffic accidents are a problem; No = respondents who did not think road traffic accidents are a problem.

The distributions of different categories of RTA as recorded from the respondents and from the police are shown in Figure 2.

**Figure 2**  
*Causes of road traffic accidents in Gulu Municipality*

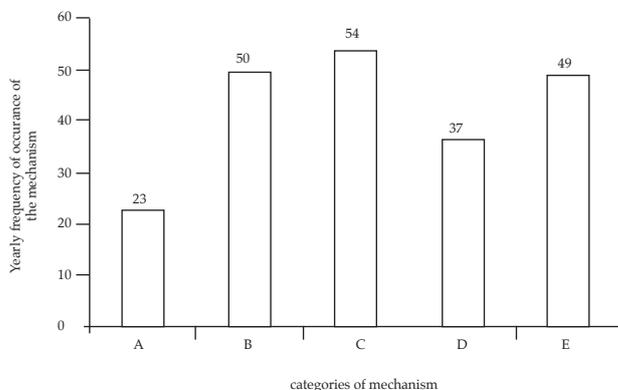


Pie Chart showing major causes of RTA as revealed by respondents and police traffic; A= reckless driving and riding (49%), B = poor roads (24%), C = drug abuse (15%) and D = over loading (12%). In addition significant causes of RTA were also cited during focus group discussions and interview with police officer

in charge of traffic. These were double parking, over loading, inadequate road safety signs and knowledge on road use by road users

However the mechanisms which are involved in RTA in Gulu Municipality are shown in Figure 3.

**Figure 3**  
*Mechanism of road traffic accidents in Gulu municipality*

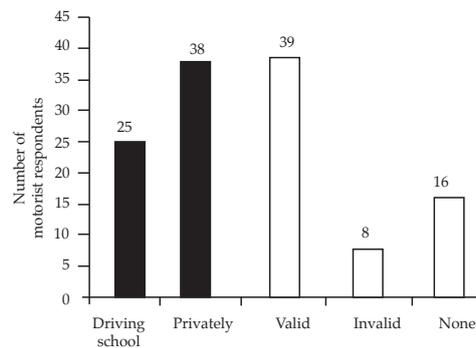


Bar graph showing the mechanism of RTA in Gulu municipality; A= motor vehicle to motor vehicle, B = motor vehicle to motorcycle, C= motorcycle to motorcycle, D= motor vehicle to pedestrians and E = motorcycle to pedestrians.

Sub samples of sixty three of the motorists were randomised from the sample studied and asked how they learned to drive and whether they have valid driving permit. A few of the respondents learned to

drive from registered driving schools while majority learned to drive from friends. It was then found out that those who learned to drive from registered driving schools have driving licences which were either valid or expired but not renewed. Meanwhile a few of those who learned how to drive from friends had driving licence but many of them did not have driving licences (Figure 4).

**Figure 4**  
How motorists learn to drive or ride and state of their motoring permits



Bar chart showing how the respondents learned how to drive/ride and the state of the driving permits. Interview with the Police traffic officers indicated that RTA is major health hazards in Gulu Municipality. The data showed that most of the RTA were serious while a good numbers were fatal (Table1).

**Table 1**

Police report cases of road traffic accidents in Gulu Municipality between January and September 2009. All motorists reported to have had no visual problem. Although none of them had their sight tested. As regard state of fatigue during their operations, largest number of motorists (73.01%) admitted that, they got tired during the course of their work. While 14.29% admitted driving/riding under the influence of alcohol and 68.25% reported that they had witnessed their colleagues drive/ride under the influence of alcohol

		Month of the year									
Case	Severity	Jan	Feb	March	April	May	June	July	Aug	Sept	Total
Serious	Road user										
	Driver	01	01	02	01	00	01	00	01	01	08
	Motorcyclist	05	02	07	05	02	11	05	06	11	54
	Pedal cyclist	02	03	05	02	00	04	04	02	03	25
	Pedestrians	05	06	04	07	05	05	05	06	13	73
Passenger		11	04	10	06	07	12	08	11	04	56
	Sub-total	24	16	29	21	14	33	22	26	32	217
Fatal		09	05	04	04	03	06	03	03	02	39
Total		33	21	33	25	17	39	25	29	34	256

**DISCUSSION**

The respondents interviewed to assert the status of Road traffic accidents (RTA) in Gulu Municipality within a period of one month were drawn from division of Laro, Pece, Bardege and Layibi. Both sexes with various ages, levels of education, occupations and marital status were recruited in the study. According to this study the distributions of the RTA were high among young unmarried males with very basic educations. The high number of young unmarried male operating different type of vehicles and *Boda Boda* has been shown here to contribute majorly towards the present RTA in Gulu Municipality as was found by Cumming, McKnight, *et al.* (16). Habitually, worldwide, young unmarried male enjoy driving motorcars or riding motorcycles at high speed and this when the mechanical status of the machines are faulty or the condition of the roads are bad very often have ended in RTA. This finding

agrees with earlier studies by Odera in Kenya and Naddumba in Mulago hospital (7, 8) respectively. A large proportion of respondents reported that RTA were a problem in Gulu municipality because they; claimed many lives, caused financial constraints and disability (Figure 2). This was in keeping with studies done in other places like Peden & Hyder, (4) and WHO, 2006 (5). The following causes of RTA were identified; reckless driving/riding, poor roads, drug abuse and over loading. The following were also cited in the focus group discussions and interview with police officer in charge of traffic; double parking, over loading, inadequate road safety signs and knowledge on road use by road users. These findings were similar to those found in other studies (10, 13, 15). Most respondents had witnessed or been involved in RTA of which the highest numbers of cases were from Layibi division with other divisions having almost equal distribution of cases. In all a good number of respondents reported to have witnessed

RTA more than twice in a period of two years and that most RTA had occurred during day time. There was almost uniform distribution in the mechanisms of RTA with collisions involving motor cycle to motor cycle leading. Our findings were different from those of Naddumba, Odero and Kitara (8, 10, 17) in which RTA mainly involved motor cyclists. Walking was the most common mode of transport used by respondents followed by bicycle, motor cycle and motor vehicle. This was in keeping with the findings of other studies (13, 18). There were 60.3% of the motorists (drivers and motor cycle riders) who did not attain formal training on driving/riding, these is in line with the Odero study in which most of the motorists lacked formal training before being licensed (10). Meanwhile a good number of driver/riders reported to have had valid driving permits, few had invalid driving permits (Figure 4). Most of the motorists reported to have had no visual problem, yet none of them had their sight tested. Asked whether the RTA was caused by fatigue and or influence of alcohol. A larger number of motorists admitted that, they get tired during the course of the work, and a few also admitted to occasionally driven/ridden under the influence of alcohol and a good numbers of them reported that they had witnessed their colleagues drive/ride under the influence of alcohol (Figure 2). This is in line with the Kenyan study by Odero in which drunken driving was found to be one of the key determinant in RTA in developing countries (10). A similar study done in Ghana showed that the number of drunken drivers and pedestrians involved in RTA was high suggesting that alcohol played a role in RTA (11). Regarding the condition of their vehicles a good number were in road worthy condition, however, some motor vehicles appeared to be in poor condition while the motor cycle appeared to be in good condition. Concerning speed limit because of the nature of their business as transporters of passengers or goods, the motorist said that they enjoyed driving at the speed above 50km/hour. Only drivers/riders who operates their own vehicles admitted to drive/ride between 30-50km/hour, these agree with Naddumba in which over speeding has been cited as one of the causes and the peak of the accident was June, followed by September; the lowest was in May and February, this is similar to study (8).

In conclusion, RTA is a substantial Public Health burden in Gulu municipality with reckless driving/riding, poor road design, drug abuse, overloading, double parking, inadequate road safety signs and knowledge as major risk factors. Collective effort to reduce RTA should aim at measures such as improving road design, educating the community on safe road use, formal training of drivers/riders, putting up more road safety signs and reinforcing the traffic rules.

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