

FACTORS CONTRIBUTING TO HIGH FREQUENCY OF VULNERABLE ROAD USER INJURY IN DAR ES SALAAM

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ABSTRACT

A Road traffic injury involving vulnerable road users (VRUs) is a serious problem in Dar es Salaam. VRUs fatalities due to road traffic crashes reported in the year 2007 and 2008 were 79 percent of the 799 fatalities for all road user groups. Police records over the years consistently cite inappropriate road user actions as contributing factor to the occurrence of more than three quarters of the reported traffic crashes. The purpose of the study was to uncover the attitudes, road safety knowledge and beliefs of the road users so as to identify what causes their unsafe behaviour in traffic from the users' perspective. In-depth interviews involving a wide spectrum of road users selected using a purposeful sampling strategy were conducted. Analysis of themes followed a qualitative approach where the information collected was subjected to content analysis where key themes and concepts were identified. Emerging themes and patterns were documented. Factors contributing to the high VRU injuries as indentified by the participants included lack of safety knowledge for all users, use of sub-standard helmets, poor condition of the road infrastructure, blatant violation of traffic regulations due to serious weaknesses in the enforcement system, ineffective motorcycle rider training system, the belief among drivers that the road space belongs to them and not for pedestrians and inadequate assistance to pedestrians crossing at main roads. The medical services in government hospitals are not always accessible immediately to the crash victims especially if they are motorcycle riders. The information obtained may be used as a basis for development of road safety campaign materials and for quantitative studies to determine the relative importance of each factor.

1 INTRODUCTION

Fatalities and injuries resulting from road traffic crashes is a major problem worldwide and particularly among developing countries where, according to Peden et al (2004), 90 percent of reported fatalities occur. In low-income and middle-income countries the number of fatalities due to traffic injury is increasing whereas in high income countries overall they are decreasing. The problem is a complex one due to a large number of contributing factors including the infrastructure, traffic mix, economic and social conditions, traffic legislation and its enforcement, and the post-crash management of victims among others. The presence of large number of contributing factors means that solutions that have proven successful in high income countries where the traffic is predominantly passenger cars may not be effective in developing countries where the traffic mix and culture is completely different. In high income countries about 60 percent of traffic fatalities are car occupants whereas in low-income countries pedestrians fatalities are in

the range 41 to 75 percent (Odero *et al* 1997). There is a need therefore for low-income countries to focus on vulnerable road user safety particularly in urban areas where most pedestrian fatalities occur.

In the city of Dar es Salaam, Tanzania, the safety of vulnerable road users (VRUs) is a serious problem. VRUs fatalities due to road traffic crashes reported to the police in the year 2007 and 2008 were 79 percent of the 799 fatalities for all road user groups. During the same period there were 5,825 VRU non-fatal injuries constituting 52 percent of all non-fatal injuries (Masaoe, 2010). Police records over the years consistently cite inappropriate road user actions as contributing factor to the occurrence of about three quarters of the reported traffic crashes. Although pedestrians (66.7 percent of fatalities) were the majority of the victims, contribution from motorcycle riders and passengers, which was 6.7 percent for 2007 and 2008, is set to increase. This is in part due the recent increased use of the mode due to the availability of cheap brands of motorcycles on the market. Pedal cyclists made up 5.5 percent of the fatalities. On the other hand, drivers and passengers (vehicle occupants) made up 21 percent of the fatalities and 48 percent of non-fatal injuries.

Police records over the years consistently cite inappropriate road user actions as contributing factor to the occurrence of more than three quarters of the reported traffic crashes. The aim of this study was to uncover what causes road users' unsafe behaviour and other factors contributing to the occurrence of traffic crashes involving VRUs from the road users' perspective. The study thus explored users' road safety knowledge, training, beliefs, attitudes and their perception of what causes the high frequency of traffic crashes on the city's roads. The information gained gives insight on potential themes for development of road safety campaign materials and for quantitative research. Road safety campaigns are expected to be done more systematically upon the implementation of the National Road Safety Policy (URT, 2009) and this study contributes towards that goal.

2 METHODOLOGY

The research used a qualitative approach and brought together the views of a wide range of adult road users. The qualitative approach is increasingly being used to increase understanding of transport problems and good expositions can be found in standard textbooks including Taylor and Bogdan (1998), Bowling (2002) and Ritchie and Lewis (2003). Qualitative approach was adopted as it is effective in the exploration of road users' insights, perceptions and conceptualization of road safety issues. The study took place in Dar es Salaam where the highest number of traffic crashes in Tanzania occurs. Data collection was carried through the months of September to December 2010. Three different points were picked in the city based on their dense interaction of different road users. Given the nature of the study a purposeful sampling strategy was used in identifying study participants. Participants gave verbal informed consent for study participation. The actual number of people to be interviewed was mainly determined by saturation when the researcher perceived that no new information was coming out from the interviews. The number of participants interviewed for each user group is presented in Table 1.

The main data collection tool used was an in-depth interview guide. The guide was developed to ensure that respondent's perceptions, beliefs and attitudes on road safety matters are captured. The in-depth interview was also used to capture experiences of different road users. Written and audio-taped responses were transcribed in Swahili and later translated to English. Analysis of themes followed a qualitative approach where the information collected was subjected to content analysis, where key themes and concepts were identified. Emerging themes and patterns were then documented.

Table 1: Road user groups and enforcement officers participating in the study

	Road user group / enforcement	Number interviewed
1	Pedestrians	48
2	pedal cyclists	32
3	Motorcyclists (riders and passengers)	98
4	Motorized tricycles / bajaji (riders and users)	92
5	Motor vehicle drivers	34
6	Traffic crash victims	17
7	Enforcement officers	24
	Total	345

3 RESULTS

This section presents a summary of factors contributing to the high involvement of vulnerable road users in traffic crashes identified by the participants. First the perceived risks of different categories of road users when using the road are presented followed by the perceived and experienced barriers facing the different categories of road users when using the road. The section concludes with a summary of the identified knowledge gaps among all road users.

3.1 Perceived risks when using the road as a VRU

Findings suggest on a whole that respondents in the study felt that the Dar es Salaam roads are unsafe all users although the risk for car users was considered to be the lowest. Walking and cycling was largely felt to be less safe than driving and this was especially true on the major highways like Morogoro road, Ali Hassan Mwinyi road and Mandela road and in the city center. Cyclists interviewed felt that they were exposed to a range of dangerous behaviours from motor vehicle drivers as they did not seem to notice them out of poor attitude and incompetence. Cyclists also reported experiencing increased level of stress when the volume and speed of traffic increased. Cyclists and pedestrians were concerned about the poor condition of the sidewalks which forces them into the carriageway to share space with fast moving traffic.

Pedestrians adamantly reported that walking is no longer safe especially in areas where there are no sidewalks. A concern was also raised that in places where pedestrian sidewalks were available they are now being used by cars, motorcycles and motorized tricycles wanting to avoid long queues which has become a common phenomena in Dar es Salaam. Petty business is also reported to be carried out on the sidewalks making use by pedestrians a challenge. Pedestrians were also concerned about trying to cross the road at formal crossing or crossing busy roads. One of the issues raised was lack of formalized pedestrian crossing points and where available it was reported that drivers tend to ignore them and when they stop motorcyclists tend to dash through. By drivers choosing to ignore zebra crossings, pedestrians felt that the use of zebra crossings posed more of a risk.

There was a broad agreement that motorcycling was dangerous as a whole and this was discussed in relation to the fact that car drivers do not have the perceptual skills to deal with motorbikes. On the other hand respondents described motorcyclists who provide transport services as high risk takers on the road as they drive too fast, have less experience, are less courteous and impatient. Motorcyclists were also viewed as being aggressive, weaving in and out of cars, running red lights and often using sidewalks to get

where they wanted without considering pedestrian needs. Motorcycle passengers reported that they are fearful of being hit by motor vehicles especially when using main roads due to the recklessness of the riders.

3.2 Road users' belief that traffic crash is an "act of God" or unpreventable

Although the respondents were asked about their perceptions of road crashes using a Swahili word "*ajali*" meaning an 'accident', their explanations did not reflect an understanding of traffic crashes as being a result of bad luck or something that cannot be avoided. When talking about "*ajali*" their explanations were tied to either the human factor or infrastructure condition as being the causes of road traffic crashes as explained by two traffic crash victims in the following quotations "*if the driver was more observant the accident would not have happened. He failed to stop at the traffic lights*"; "*If the driver of the RAV4 had not wanted to overtake in a place where it was impossible, then the accident would not have happened*". From the narrative it is clear that traffic crashes are not perceived as bad luck. People believe that something can be done to reduce the increasing number of traffic crashes. This suggests that the response of a well designed road safety campaign will be received positively as road users believe that something can be done and should be done to prevent traffic crashes.

3.3 Rescue and access to medical services

Involvement in a road traffic crash was considered as a major setback in one's life, especially if one was injured. Road injury victims talked about their experiences of rescue services and access to medical services as being somewhat unsatisfactory with the exception of few cases, where the services were rated excellent. Although getting or being taken to a health facility was reported to take place immediately after the crash the quality of care/ services received varied among different categories of crash victims depending on the ability of the victim or other family members to pay for the medical services. Motorcycle victims rated their experience with the government health services as a crash victim more negatively than the other road user groups. They experienced poor quality of services and in some instances being neglected altogether as stated by one of the motorcycle traffic crash victim, "*the government hospitals are no good, the moment you get there and they know you are a motorcyclists they ignore you completely. I stayed for two hours without being attended. Later when my relatives came they decided to take me to a private health facility*".

3.4 Perceived barriers to VRU safety

Respondents described a number of different factors that they felt contributed to the high risk of using the road as a VRU. These tended to focus on three elements of the traffic system: the road user behaviour, enforcement of traffic law and infrastructure condition. The roadworthiness of vehicles did not seem to bother the respondents perhaps because of the low operating speeds in the city.

Inadequate driver training and road safety knowledge leading to poor driving skills especially among motorcyclists was frequently mentioned as a key contributing factor to the high risk among vulnerable road users. Respondents also mentioned that the lack of formalized rider training schools for motorcyclists and cyclists places them as a major threat to road traffic safety. Concerns raised by respondents are a reflection of findings from the interviews with motorcycle drivers interviewed. Of the motorcycle drivers interviewed only 37 percent of them reported to having a driving licence and only 25 percent attended a formal driving school. Inadequate training especially regarding road

safety was also linked to the low use of helmets among motorcyclists. It was explained by several of the traffic police who were interviewed that motorcyclist tend to put on a helmet if he or she sees a police officer, otherwise helmets would remain tied to the back of motorcycles, despite the fact that the helmets are for their own protection. However, one can also argue that issues of quality of the helmets are an important factor in determining whether or not people use them. Riders observed that it was difficult to acquire standard motorcycle helmets and they were forced to purchase the sub-standard ones that are readily available and cheaper but known to provide very limited protection in a crash.

Respondents also mentioned the factors contributing to dangerous road use in terms of walking and cycling. Discussion of skill problems among pedestrians, cyclists and motorcyclists centered on inappropriate crossing of roads and violation of traffic regulations - the most frequently mentioned being driving through red traffic lights. Regarding cyclists, unsafe use of the road was a problem - one traffic police remarked *"at times cyclists tend to carry bulky loads that block their ability to use sight mirrors, this is very dangerous for their safety because they are unable to see vehicles coming behind them"*.

The weaknesses in the country's system of apprehension and punishment of traffic offenders to a large extent was identified as the major cause of lawlessness and blatant disregard for regulations and general disrespect for traffic laws on most of the roads and consequent increase in road injury occurrence. Respondents narrated that lack of enforcement of traffic rules and regulations by members of the police force was one of the motivating factors for risky behaviour and widespread violation of traffic rules observed among the different categories of road users. Examples cited included non use of helmets, failure to stop at zebra crossings and traffic lights, over speeding and reckless driving, drunk driving and driving without a valid driving licence. One of our motorcyclist interviewed had this to say with regards to the non-use of helmets *"I often don't use a helmet because I know I can get away with the police catching me"*. On the other hand, one traffic police noted that it was difficult to apprehend motorcyclists who violate traffic regulations as it is easy for them to maneuver their way in-between traffic so being able to chase them would mean having a motorbike which is not the case for the police always. Also the police felt that the punishments for those found with traffic offences like driving without a valid driving licence was not deterrent since offenders easily pay the current fine.

Another important issue raised in the interviews was the infrastructure condition including poor road markings, lack of segregated pathways for motorcyclists, cyclists and pedestrians and the over-riding of traffic signals by traffic police during peak traffic flows. Pedestrians observed that when the police take over managing traffic at signals they completely ignore pedestrians. This was admitted by one of the traffic police in an interview *"I should be honest that when we are directing traffic we do not take into account pedestrians, they just figure out when and how to cross on their own and yes this is very dangerous and risky for them"*.

Another barrier to VRU safety is the lack of understanding and mutual respect between different road users which has resulted in car drivers not understanding when pedestrians or cyclist have the need to use the road. In discussions with car drivers, roads were seen as a space for cars and other road users were seen as encroaching on the space meant for cars. The issue of "competition for space" emerged between car drivers and motorcyclists and car drivers and pedestrians. It was suggested in the interviews that there was a lack of mutual awareness and consideration between the competing groups. On one hand respondents reported that car drivers often neglected to look out and yield to

motorbike riders as reported in the following quotation by a motorcyclists *“car drivers will never give us the right of way; they do not acknowledge or respect a motorcyclist’s presence and rights on the road”*. Whereas on the other hand respondents reported that motorcyclists often drove too fast for the prevailing traffic conditions. Again the idea of a contested and competitive space emerged between car drivers and pedestrians: car drivers tended to view pedestrians as intruding on to “their space”.

Pedestrians were also cited as being involved in risky behaviour that compromised their own safety and the safety of other road users. Risky pedestrian behaviours mentioned included dashing or running across the road or waiting in the middle of a carriageway when crossing a road. Not waiting for the green pedestrian crossing light was also cited as a typical behaviour among pedestrians. Other factors identified as relating directly to road crossing behaviour mentioned were the heavy volume of traffic and lack of adequate lighting especially during the night. The most common example of risky areas identified was junctions. This was especially risky at areas with high volume of vehicles and pedestrians competing for the use of the road. Busy roads were also cited as key areas of road safety concern especially for pedestrians and cyclists given the lack of cycling lane and pedestrians paths in many of the roads. From the perspective of cyclists and motorbike and drivers themselves visibility of vulnerable road users was a major concern. Examples given were of pedestrians stepping out into stationary motor traffic when cyclists were still moving and car drivers turning without indicating or without checking their mirror.

3.5 Summary: Road safety knowledge gaps and attitude

The importance of the use of helmets for the safety of the motorbike users and not for the sake of fulfilling traffic regulations is an important knowledge gap emerging out of the data collected. For many of the motorcyclists the use of helmets was more about avoiding being caught by traffic police and not about their own safety given the obvious risk of head injury should a collision occur. Among pedestrians there seems to be a knowledge gap on how and when to cross the road at junctions and away from junction along main roads. The necessity of sharing of the road space between motor vehicle drivers and motorcyclists and consideration of other road users’ rights particularly those of vulnerable users is an attitudinal issue that needs addressing.

Another important knowledge gap picked up in the course of the study was on the importance of attending a formal motorbike rider training as a prerequisite for being able to use the roads safely and not merely the possession of a driving license for motor vehicles other than a motorcycle. According to one of the traffic police vehicle inspectors who are responsible for testing drivers it’s only 10% of motorcyclists who would come in for a test. It was the assumption among many of the motorcyclists interviewed that anybody with a driving licence, meaning as long as one is able to drive a car then the person can automatically ride a motorcycle safely. However, discussions with the traffic police clearly pointed out that only drivers with class A driving licence are legally allowed to ride motorcycles, given the fact that their training is more focused on the use of motorcycles.

4 DISCUSSION

The aim of the present study was to uncover beliefs, attitudes and perceptions of road safety issues among different categories of road users. Respondents who participated in this study are aware that road traffic crashes are an important problem that warrants immediate attention. Among the different categories of respondents there was an agreement that motorcyclists are currently being over-represented in the traffic crashes

statistics and the need for special measures targeting motorcycle riders and other road users. Although it was stated that there have been some improvements made with regards to the road infrastructure it was felt that this in itself cannot translate into significant reduction of road crashes given the fact that the human behaviour has a major influence in road crashes. One of the repeatedly mentioned human errors is the difficulties reported by motor vehicle drivers in detecting both motorcyclist and cyclists until it is too late to avoid collision. The late detection of motorcyclists and cyclists suggests that their visibility on the road maybe placing them at risk, especially when considering the inadequate road lighting on many of the roads in the city. Most participants could identify problems in the road traffic system which they believe are contributing to the occurrence of traffic crashes and they did not assign the events to some causal factors outside the system. This implies that fatalism is not an issue as discussed in Dixey (1999). However, the motorbike riders were viewing the motor-vehicle drivers as a problem and vice versa while motor vehicle drivers were seeing pedestrians as intruders and the traffic police were neglecting the pedestrians. The implication here is that effective road safety campaign must target the changing of this mindset among road users so that each one perceives himself or herself as the one in control. Each road user must see himself or herself as responsible to take measure(s) to reduce the chance of being involved in a traffic crash.

Thinking of interventions to improve the safety of road users, two issues should be given priority. Firstly it would be important to normalize safe driving behaviour especially among motorcyclists and increasing awareness of motorcyclists for car drivers. In this regard any future campaign could also be aimed at increasing appreciation among the car drivers that the road space is for all users. Secondly, it should be made compulsory that motorcycle riders ensure their visibility by either driving with their lights on and wearing reflectors or other luminous clothing that would increase their visibility. Given the lack of traffic skills reported mostly among motorcyclists and their increasing use in the country it is necessary that a system is put in place to ensure that all motorcycle drivers undertake compulsory training to facilitate their understanding of existing traffic rules and safe use of roads.

From the road safety engineering perspective priority should be given to separation of non-motorized traffic from the motorized traffic where speed exceeds 30 km/hr in line with safe system approach as expounded in Oxley (2005) among many proponents of the approach. This will address the observation by many road users interviewed that the paths and sidewalks for pedestrians and cyclists are inadequate and in poor condition. Other potential measures to address the above issues and the inadequacies in the enforcement system and medical services are summarized in Table 2. Some of the suggestions in the table were adopted from (Constant and Laggard, 2010) and published international experience.

Table 2 Factors affecting high frequency of traffic crashes involving VRU and potential interventions

	Identified crash contributing factor	Potential Intervention	Main Actor(s)
1	Road infrastructure: Poor condition of roads and traffic control system, poor condition of bicycle and pedestrian paths (NMT), inadequate sidewalks and cycle routes.	<ul style="list-style-type: none"> • Provide more/improve facilities for NMT • Comprehensive application of traffic control devices 	Central and local governments
2	Pedestrians: <ul style="list-style-type: none"> • Inadequate and ineffective pedestrian crossings • Knowledge of where and how to cross roads • Assistance to cross the road – using zebra crossing is rather risky 	<ul style="list-style-type: none"> • Provide signals at pedestrian crossings • Road safety campaigns • Deployment of traffic police/wardens to assist pedestrians at critical locations 	<ul style="list-style-type: none"> • Government • Non-governmental organizations
3	Motorbike and pedal cycle riders: <ul style="list-style-type: none"> • Inadequate formal rider training, • Violation of riding regulations including wearing helmets, red light running, disregarding rights of others • Presence of ineffective helmets in the market • Inadequate knowledge of benefits of wearing helmets 	<ul style="list-style-type: none"> • Formalize their training, • Establish rider training schools and • Enforcement. • Education 	Government Entrepreneurs
4	Traffic police: Weaknesses in the law enforcement system	Ensure that the enforcement system is effective	Government Pressure groups / the press
5	Motor-vehicle drivers: Inadequate consideration for other road users, belief that the road is only for motor vehicles	<ul style="list-style-type: none"> • Emphasize road safety issues in driver education and campaigns 	<ul style="list-style-type: none"> • Government • Managers of driving schools
6	All road users: <ul style="list-style-type: none"> • Lack of road safety knowledge and skills • Sharing the road space 	Road safety campaign <ul style="list-style-type: none"> • The road is for all users • Consideration for all road users 	Government The press Non-Governmental organizations
7	Medical services: Delays in accessing medical treatment especially for low-income traffic crash victims at government hospitals	<ul style="list-style-type: none"> • Implementation of the health policy. • Insurance for motorcyclist 	<ul style="list-style-type: none"> • Government • Insurance companies • Professional associations (Med)

5 SUMMARY, CONCLUSION AND RECOMMENDATION

The study involved 345 road users from the whole city and uncovered a number of factors perceived to be contributing to the frequent occurrence of road traffic injuries among VRU. The main factors included weaknesses in the law enforcement system, poor condition of the road infrastructure and the traffic control system, ineffective motorcycle rider training system, the belief that if one knows how to drive a car (s)he can also ride a bike, inadequate provisions for cyclists and pedestrians, drivers' attitude that that the road space belongs to them and pedestrians are intruders, motorbike riders not being visible to motor-vehicle drivers and inadequate road safety knowledge among all road users. The

difficulty to access to medical services without delay at government hospitals especially for those unable to pay worsens the consequences on the victims of road traffic injury.

While some potential interventions are indicated on the basis of the factors identified and international experience, the results provided a sound basis for quantitative studies to determine the relative importance of each factor and themes for developing road safety campaign materials targeting reduction of VRU in road traffic crashes. Both are strongly recommended.

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