IMPROVING SAFETY IN THE ROAD TRANSPORT SECTOR THROUGH ROAD USER BEHAVIOUR CHANGING INTERVENTIONS: A LOOK AT CHALLENGES AND PROSPECTS

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ABSTRACT

The need to improve road safety *remains a* global challenge particularly in developing regions. In fact, despite a relatively low vehicle population, underdeveloped and developing countries account for 90% of road transport related fatalities and injuries globally. To date, solutions implemented have not been effective enough given the high incidences and crashes that still frequently occur and sometimes with devastating effects showing that effective solutions remain elusive.

Various dimensions and approaches can be pursued and/or deployed towards addressing safety on the road network, particularly those focusing on road infrastructure, vehicular and human behaviour safety. However, what matters most is the impact that will be derived thereof towards addressing safety. This paper focuses on one of the dimensions: road user behaviour changing interventions towards improving road safety. The qualitative research method was applied towards the development of this paper. It was established that among many possible interventions that can be deployed to improve road safety in South Africa, road user behaviour changing interventions have a substantial impact on overall safety improvement. The major reason being that these interventions are proactive in nature, hence road users are capacitated to be able to take a proactive approach rather than being reactionary to possible incidences and crashes on the road.

However, the effectiveness of road user behaviour focused interventions has its own challenges that will need to be addressed. This paper identifies the challenges and opportunities that can be explored to improve road safety in South Africa focusing on pedestrians, passengers, drivers, transport companies or operators and regulatory authorities.

Key words: Road safety, road transport sector, road user behaviour changing interventions.

1   INTRODUCTION

Road safety has been and continues to be a topical matter in many global, regional and national strategies and structures where transport matters are deliberated upon. Meanwhile, road carnage statistics continue to rise especially in most low and middle-income countries. According to the International Standards Organisation (ISO) Focus, over 90% of the deaths in road crashes occur in low and middle-income countries which are also hardest hit by the financial pressure resulting from road traffic crashes (ISO Focus, 2009). Road traffic crashes have an enormous impact on the South African society in terms of human loss, pain and suffering, and cost to the economy and the individual (De Beer and Van Niekerk, 2004).

Statistics indicate that at global level, despite the efforts being made to improve safety, road crashes account for over 1.3 million fatalities whilst between 20 and 50 million more people are injured as a result of road traffic crashes every year. It is estimated that the continued rise in road crashes globally has the potential to take up to 75 million lives by 2050 (ISO Focus, 2009).

Previous research indicates that road traffic injuries are the leading cause of death for people between 15 and 29 years of age (World Health Organisation - WHO, 2015). Meanwhile the WHO projects that by 2030, the fifth most common reason for loss of health will be an injury generated within the road transport system. As the WHO puts it, this is "not only catastrophic, but also tragic since most of these deaths can be avoided or, at the very least, dramatically decreased" (ISO Focus, 2009). Equally significant are the costs incurred as a result of road crashes. Kuryvtsev et al (2013) further assert that "the magnitude of the problem varies between countries with the heaviest burden being carried by low and middle income countries". Ainy et al (2014) and WHO (2009) assert that "more than 90% of global traffic fatalities occur in the low and middle-income countries, which possess only 48% of the world's registered vehicles".

According to De Leon (2005), the global road safety challenge transcends the transport sector to the level of a health, social and economic problem as well in that:

- The health sector would have to stretch its bed capacity in order to administer to the victims while still overseeing other important illnesses;

- Families are displaced and their futures shattered because of the sudden demise of their breadwinners, which is a social welfare problem; and

- Crashes lay off workers, which eventually translate to millions of Rand of potential lost productivity thereby affecting domestic production and the economy at large (De Leon, 2005).

It is estimated that at a global level, traffic injuries culminate in loses exceeding USD 518 billion, while at a national level traffic injuries cost governments between 1% and 3% of their Gross Domestic Product (GDP). For example, South Africa is reported by the 2015 WHO Status Report on Road Safety to lose 7.8% of her GDP annually to road crashes. Furthermore, in line with De Leon (2005), ISO Focus (2009) asserts that they "place a huge strain on the healthcare services of many countries". The most disturbing observation is that high-income countries have witnessed decreasing road traffic death rates for several decades now despite a steady increase in vehicle population. This decrease could be attributed to these countries' effective road safety programmes.

There are strong indications that with continued economic growth and the concomitant increase in the motor vehicle population, the problem will worsen in most low and middle-income countries (Bhalla et al. 2009). This is despite the fact that the economic consequences of road traffic crashes are very important in terms of both lost productivity and all healthcare resources needed (García-Altès & Pérez, 2007).

In light of the impact and consequences of road accidents highlighted above, it is imperative that regional structures, national and local governments implement appropriate interventions to address the status-quo. This paper pays particular attention to road user behaviour changing interventions towards improving road safety.

2   BACKGROUND

Whilst road safety has improved significantly in most developed countries and regions like Canada, Sweden, United States of America, the European Union and Australia this is unfortunately not the case in most underdeveloped and developing regions. Importantly, developed countries did not achieve this feat overnight. At some point (during the motorisation era in the 1960s up to the 1980s), they also went through the same cycle. This reduction was achieved through a deliberate and concerted effort of implementing evidence-based road safety strategies which culminated in gradual improvement in the overall road traffic safety.

In developed regions, road traffic safety, which Linu et al (2007) defines as "methods and measures for reducing the risk of a person using the road network being killed or seriously injured" was therefore ultimately improved through direct interventions which included human behaviour change solutions. Such interventions were not limited to public awareness of road rules and law enforcement as is often the case in underdeveloped and developing regions (Linu et al. 2007). The reason for not focusing on these two road safety intervention dimensions only is that "of the people who violated the road rules, about 83.2% were already aware of the rules" (Linu et al. 2007). It is against this background that this study explores ways to encourage the enforcement of road user behaviour changing strategies to improve road traffic safety.

The fact that it is estimated that road user behaviour is believed to be a factor in 95% of all road crashes (www.arrivealive.co.za), emphasises that more effort needs to be directed towards this element if indeed road safety is to be improved globally. However, like in many fields or cases, efforts to curb road crashes are hampered by the unavailability of reliable data that can be manipulated towards designing targeted interventions (WHO, 2015).

2.1   Defining the Road User

Linu et al (2007) identify definable groups of road users which are pedestrians, cyclists, motorists and passengers of both private vehicles and public transport. For the purpose of this paper, the definition of road users is broadened to include fleet owners and transport entities i.e. particularly those with vehicles that are used for commercial purposes, consignors and consignees together with their agents and non-motorised transport (such as animal-drawn vehicles) which is still used as a regular means of transport in some underdeveloped and developing countries.

The interventions presented in this paper are based on this broad understanding of the road users. Firstly, it is envisaged that this would give a collective picture of the regular road users and those that make decisions for those who ultimately use the road network, such as employers. Secondly, it is envisaged that the development and/ or selection of road user behaviour change interventions would need to respond to all the defined road users if indeed desired results are to be achievable.

2.2   Human Behaviour and Road Safety Regulations Violations

At the heart of road safety challenges are a number of traffic law violations which can be directly attributable to inappropriate human behaviour in traffic. Therefore, the recommendations outlined in this paper seek to address these challenges which in one way or another are attributable to the road users as defined in the broad definition above.

3   THE STUDY DESIGN

A wider definition of road users was adopted to include institutions and transport operating firms as well as consignors and consignees amongst others with a view to broaden the reference group when talking about road users and behaviour change interventions.

An extensive literature review was conducted to understand the historical trends around road safety, road crashes and interventions and/or programmes that have been implemented or are under implementation at global level and in various parts of the developed and developing worlds.

The literature review relied on texts and research papers compiled based on a mixture of qualitative, quantitative, mixed methodology and primary research. The focus of the literature review included regular road users, especially those that are at most risk including young drivers, those who drive daily to and from work, long distance drivers, motorcyclists and pedestrians in urban environments.

The development of recommendations for interventions was based on the review of road safety research literature and reports prepared by road safety practitioners. Thus, the paper was also informed by outcomes from various road safety workshops, conferences and international benchmarking exercises attended by the researchers both nationally and internationally. Of relevance to this paper are following documents:

- Status Report on the implementation of the Roadmap for Accelerating the Implementation of the African Road Safety Action Plan 2015-2020 presented at the 2nd High-Level Conference in Brasilia (Brazil) (2015);

- Report on the Road Safety Management Leadership Programme conducted by Monash University Accident Research Centre, the Centre for Automotive Safety Research of the University of Adelaide and Melbourne Business School (RTIA, 2014); and

- International Bench-Marking Report: Points Demerit Systems & Driver Rehabilitation Programmes (RTIA, 2014).

4   DISCUSSION

The need for behaviour change interventions to improve road safety cannot be overemphasised given the fact that over 95% of all road crashes are attributable to human behaviour (www.arrivealive.co.za). As indicated earlier, research indicates that of the people who violated the road rules, about 83.2% are aware of the rules (Linu et al., 2007). It therefore does not come as a surprise that despite investments in law enforcement, driver licensing and public road safety education and awareness campaigns, the impact remains negligible. This points to the fact that no matter how much is invested in other interventions other than behaviour changing ones, the impact would be limited.

It is important to point out that gone are the days when road safety issues were resolved by a single country and its citizens. The advent of globalisation, regionalisation, regional trade and integration brought about increased movements of people, private and public passenger vehicles and freight vehicles between countries and regions. Apart from increasing the traffic volumes on the road networks, this has come with its own road safety challenges, adding to what already exists in the domestic environment.

The United Nations Decade of Action for Road Safety 2011 - 2020 dictates the implementation of interventions starting at global level right up to local communities. Thus, among stakeholders there has never been a greater need to cooperate and work together than now particularly in regard to strategies and countermeasures that are required in order to improve road safety and at the heart of this is behaviour change interventions.

Additionally, disparities in vehicle safety and fitness standards, driver training standards and competence, and regulatory requirements among many others bring added dynamics to the puzzle. It is therefore imperative that whatever intervention is designed to address road safety issues, the approach is to involve not only the domestic stakeholders but also those from neighbouring countries and regions.

It is important to indicate that there is sustained growth in traffic volumes on the roads in many developing and middle-income countries. The International Federation of Red Cross and Red Crescent Societies (IFRCRCS) (2007) asserts that roads are now frequented by a great diversity of users, particularly young drivers who constitute the group at the highest risk of being involved in a road crash since they are newly licensed and thus inexperienced. Meanwhile vehicle fleets including trucks, minibuses and taxis are growing in number.

4.1   Elements of Human Behaviour

There are many elements that constitute problematic human behaviour in traffic and they include driving under the influence of alcohol and narcotic drugs, using phones whilst driving, attempting to reach objects in the car whilst driving, over-speeding, jumping or skipping red lights, lane invasion, not wearing seat-belts, not using children restraints, driving beyond recommended driving times, driving whilst fatigued, using undesignated roads, vehicle overloading and leaving vehicles unroadworthy.

Amongst these elements, the four most common road safety behaviours that result in most fatal crashes are failure to wear seat-belts, failure to wear crash helmets, driving at excessive or unsuitable speeds and driving under the influence of alcohol **(**IFRCRCS, 2007). IFRCRCS (2007) further asserts that each of these primary risk factors played a role in 30 to 50 per cent of fatal or disabling crashes worldwide, irrespective of the country.

Indications are that countries which have introduced targeted action plans to combat at least one of the above risk factors have succeeded in reducing road crash fatalities by 20 to 40 per cent within a few years, even when the trend was previously rising steeply.

A detailed breakdown of human factors is depicted in the Road Traffic Management Corporation (RTMC) Annual Report (2014)'s segmentation of human contributory factors as they relate to the 2014 fatal crashes in figure 1 below.
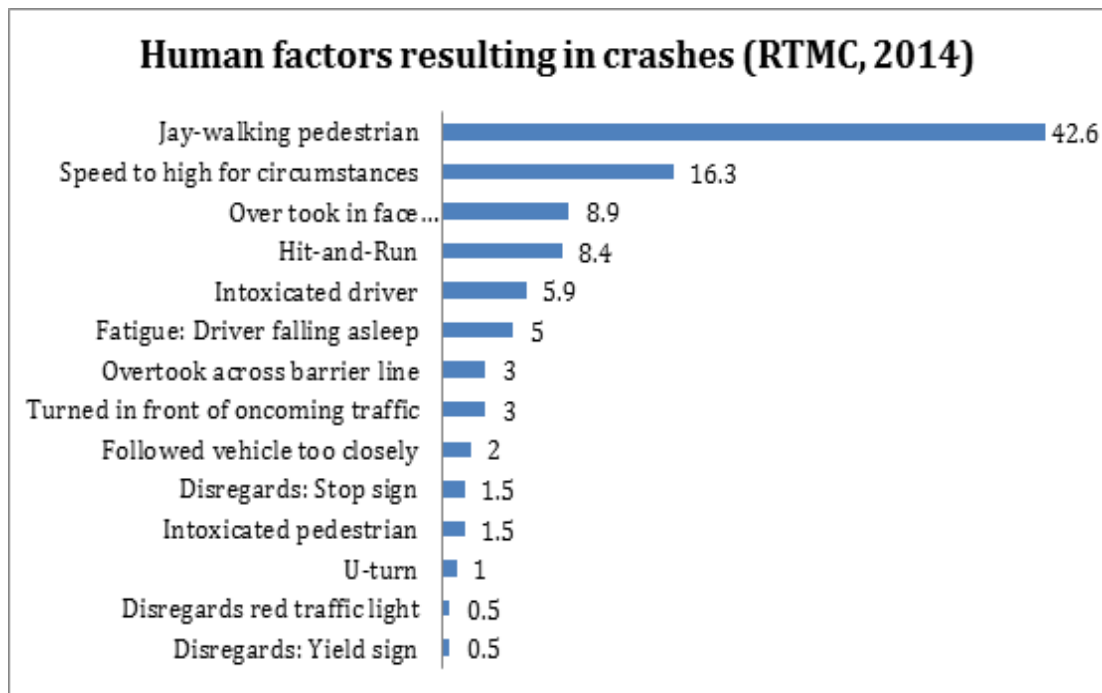

Human factors resulting in crashes (RTMC, 2014)

Factor	Value
Jay-walking pedestrian	42.6
Speed to high for circumstances	16.3
Over took in face...	8.9
Hit-and-Run	8.4
Intoxicated driver	5.9
Fatigue: Driver falling asleep	5
Overtook across barrier line	3
Turned in front of oncoming traffic	3
Followed vehicle too closely	2
Disregards: Stop sign	1.5
Intoxicated pedestrian	1.5
U-turn	1
Disregards red traffic light	0.5
Disregards: Yield sign	0.5

Figure 1: RTMC human contributory factors segmentation

As it is evident from the graph above, jay-walking, speeding and overtaking in the face of oncoming traffic, driving under the influence and fatigue resulting in driver falling asleep each contribute 42.6%, 16.3%, 8.9%, 5.9% and 5%; respectively. These are the top five leading contributory human factors contributing to road traffic crashes in South Africa and thus warrant intervention.

In line with the RTMC list in the graph above, the other elements that pose substantial risk factors are: driver fatigue (which mostly affects long-distance and cross-border road transport drivers in particular), the use of mobile telephones, overtaking across barrier lines, turning in front of oncoming traffic, overtaking in the face of oncoming traffic, failure to observe safety distances and a lack of visual aids for drivers; amongst others (WHO, 2015).

At organisational level the human factors contributing to road crashes include poor load management and restraining, poor vehicle maintenance, poor driver assignment and poor trip scheduling. None of these risk factors should be overlooked. There are also the basic rules of the road which users should comply with, such as the rules for giving way, overtaking, traffic lights and no-entry signs (IFRCRCS, 2009).

4.2   Behaviour Change Interventions

A number of behaviour change interventions can be deployed to address road carnage in South Africa and these include:

a) <u>Balance between road safety education and law enforcement:</u> Governments have put a lot of effort and resources in road safety education and public awareness campaigns. However, this intervention alone has proven to have minimal impact, if any. It is against this background that such pockets of excellence as Victoria in Australia, Sweden and The Netherlands couple education and public awareness campaigns with firm law enforcement which goes beyond monitoring violations by stopping drivers and checking road worthiness, use of safety belts by all vehicle occupants as well as load management in the case of freight vehicles (Victoria Road Safety Strategy). Dedicated road safety ambassadors (considering the inadequacy of law enforcement officers) could be trained to man areas dominated by pedestrian jay-walking to ensure that pedestrians only cross roads where and when it is safe to do so.

b) <u>Introduction of graduated learner driver licensing:</u> Countries that have proven to be world leaders in road safety have graduated learner licensing underpinning their driver education system. The introduction of graduated learner driver licensing inculcates the culture of road safety in the citizenry from childhood (Road Traffic Infringement Agency (RTIA), 2014).

The success of this kind of a system is dependent on a strong collaboration between the education and transport departments. For instance, in Nevada (USA), learners are allowed into this programme from the age of 15 (RTIA, 2014). The schools through their districts are required to inform the licensing department in case a learner participating in the programme drops out of school. As soon as the licensing department is informed, the concerned learner's participation in the programme is discontinued.

As a result, the benefit of the programme is twofold: It prepares learners to be skilled drivers from a very early age as it in the meantime serves as an incentive to keep children longer at school thus contributing towards improving a country's literacy levels and rate.

c) <u>Collaboration between law enforcement and the insurance industry:</u> In countries that implement point demerit systems, detailed profiles of individual drivers are kept electronically in terms of their driving behaviour. The profile is used to generate a driver report detailing demerit points the driver accumulates and infringements for which the driver is fined (RTIA, 2014).

The insurance industry uses these reports to determine a driver's risk profile and subsequently the premium as well. This is a private-public partnership that benefits both the insurance industry and law enforcement as well in that drivers drive more responsibly to avoid building a negative driver profile for them thus improving road safety on the one hand. On the other hand, the fact that responsible driver behaviour results in fewer crashes means less claims against insurance policies thus minimising risk exposure for the insurance industry.

d) <u>Rehabilitation programmes for habitual offenders and medical reviews:</u> Some countries that implement point demerit systems also implement rehabilitation programmes to assist drivers whose licences get suspended to be reinstated. The drivers are, however, required to complete an accredited rehabilitation programme to assist them to address the behaviour that led to their licence suspension (RTIA, 2014).

In some cases, driver risky behaviour could be a function of ill-health or old age. As a result, Florida (USA) has a medical review programme that assesses a driver whose offences are suspected to be as a result of medical condition (RTIA, 2014). The driver's licence is suspended until the medical condition has been addressed to a point where he or she can drive without posing a risk to other road users. Victoria (Australia) and Florida also have a programme targeting old drivers from the age of 70 years. These drivers are required to provide medical certificates confirming that they are still medically fit to drive on an annual basis if not bi-annually (RTIA, 2014).

e) <u>National rollout of the Administrative Adjudication of Road Traffic Offences Act (AARTO):</u> It is clear that the implementation of the previous two interventions is entirely dependent on the implementation of the South African point demerit system called AARTO. It is therefore critical that this system be implemented as a matter of urgency to support the other human behaviour change interventions by profiling drivers and temporarily or permanently taking high risk drivers out of the roads through driving licence suspension or cancellation where necessary.

f) <u>Introduction of Accreditation Schemes:</u> The deployment of accreditation systems or schemes in the road transport industry is not novel. Accreditation schemes have been in existence for many years. In countries such as Australia for instance, the National Heavy Vehicle Accreditation Scheme (which is a government scheme) mainly focusing on heavy vehicle (vehicles above 4.5 tonnes) safety, operator performance monitoring, strategies and interventions is aimed at promoting road safety and fatigue management. There are also various self-regulation systems that are implemented and managed by the road transport industry for instance, the Trucksafe system (www.rtms.co.za).

The schemes promote proactive compliance to regulatory requirements by the road transport sector. The United States of America implemented various safety frameworks and processes aimed at enhancing regulatory compliance and road safety for commercial vehicles and this include the Free and Secure Trade (FAST) programme that is dedicated to road freight transport operators. In this programme, operators with a history of compliance are given incentives while those with a history of non-compliance are treated differently (www.cbp.gov/travel/trusted-traveler-programs/).

The whole principle of accreditation schemes or systems, whether implemented as regulatory tools or voluntary is the need for 'mind-set shift' in regard to the way entities conduct business. For entities or organisations to receive incentives from the schemes, they need to demonstrate that their behaviour, conduct and systems enable them to comply with minimum regulatory requirements and set standards for the industry. Accreditation schemes are therefore one intervention which can be implemented by regulatory authorities towards improving road safety (www.rtms.co.za).

g) <u>Value Chain Responsibility Assignment:</u> Road carnage can be substantially reduced if everyone in the road transport value chain can be held accountable for their actions or inactions. In this regard legislation can be implemented to ensure that implementation is feasible. The regulations should address all stakeholders from public transport operators to private motorists, cognisors, consignees, freight shipping and forwarding agencies and drivers amongst others.

It is envisaged that the approach will ensure proactive compliance by all stakeholders in the value chain in as far as meeting regulatory requirements is concerned. Value chain responsibility assignment will ensure that each of the stakeholders play their part effectively in respect to taking steps that lead to prevention of road carnage. This should be coined around the same principles of the Chain of Responsibility applied in Australia in the regulation of heavy vehicles and/or the Consignor Consignee Legislation here in South Africa.

This approach would also ensure that those who do not perform their actions are punishable by law. It is envisaged that this approach would lead to reduced cases of road traffic regulations violation, a scenario that would significantly reduce crashes on the roads.

The outcome of implementing these interventions targeting human behaviour at individual and organisational levels will culminate in a road transport industry that is characterised by low levels of road carnage and significant improvement in road safety.

5   MAJOR STUDY FINDINGS AND RESULTS

Based on research that was conducted and the discussions in this paper, the following findings were made:

- Over 90% of the deaths in road crashes occur in low and middle-income countries which are also hardest hit by financial pressure resulting from road traffic accidents, with South Africa reported by the 2015 WHO Status Report on Road Safety to lose 7.8% of her GDP annually to road crashes;

- At global level, over 95% of all road crashes that occur are attributable to human behaviour. Thus, road user behaviour change interventions if properly implemented, may have a substantial impact on overall road traffic safety improvement;

- Despite the efforts being made to improve safety, road crashes account for over 1.3 million fatalities whilst between 20 and 50 million more people are injured as a result of road traffic crashes every year;

- It is estimated that the continued rise in road crashes globally have the potential to take up to 75 million lives by 2050;

- In South Africa human factors namely: jay-walking, speeding and overtaking in the face of oncoming traffic, driving under the influence and fatigue resulting in driver falling asleep contribute 42.6%, 16.3%, 8.9%, 5.9% and 5% respectively to road carnage. These are also the top five leading contributory human factors towards road carnage in South Africa;

- The other elements that have globally been identified to pose substantial risk factors are: driver fatigue (which mostly affects long-distance and cross-border road transport drivers in particular), the use of mobile telephones, driving under the influence of other drugs, overtaking across barrier lines, turning in front of oncoming traffic, overtaking in the face of oncoming traffic, failure to observe safety distances and a lack of visual aids for drivers; amongst others; and

- At organisational level, behaviour elements that contribute to road carnage are poor load management and restraining, poor vehicle maintenance, poor driver assignment and poor trip scheduling.

6   CONCLUSIONS

It can be concluded that:
- At global level, up to 95% of road crashes are attributable to human behaviour;

- In South Africa, up to 80% of road crashes are attributable to human behaviour;

- Globally, approximately 83% of those that violate road and traffic rules are aware of the rules;

- Addressing human factors through implementation of human behaviour change interventions will lead to significant improvement in road safety; and

- Improving road safety will lead to reduction in the socio-economic impact of road carnage in South Africa.

The following behaviour change interventions can be implemented towards improving road safety in South Africa:

- Balance between road safety education and law enforcement in the road transport sector;

- Introduction of graduated learner licensing taking lessons from countries like the USA and Australia;

- A collaborative approach between law enforcement and the insurance industry towards monitoring driving behaviour;

- Rehabilitation programmes for habitual offenders and medical reviews with a view to assist drivers to improve behaviour. Lessons can be drawn from the USA, Canada and Australia;

- National rollout of the Administrative Adjudication of Road Traffic Offences Act (AARTO);

- Introduction and institutionalisation of Accreditation Schemes such as the South African Road Transport Management System (RTMS). Lessons can be learned from Australia and the USA. This will also require the implementation of a regulatory

framework that enables recognition and extension of incentives to transport operators;

- Value Chain Responsibility Sharing with a view to hold respective stakeholders in the road transport industry accountable for their actions/ or inactions;

- Implementation of alcohol safety schools;

- Introduction of compulsory Junior Traffic Training Centres for primary school children;

- Implementation of compulsory correctional supervision for habitual traffic offenders;

- Conducting research on intervention strategies to counteract drink and drunk pedestrians;

- Conducting research on intervention programmes to counteract impaired drivers; and

- Developing a cadre of road safety personnel dedicated to man areas dominated by jaywalking ensuring that pedestrians only cross the roads when and where it is safe to do so.

It is envisaged that through implementation of the above interventions, road safety will improve significantly in most low and middle income countries including South Africa.

7   RECOMMENDATIONS

In order to ensure successful implementation of the above interventions, it is recommended that:

- Political will in regard to championing implementation of the interventions be supported through appropriate budget allocations and road safety ambassadorship;

- Stakeholders in government and private sector work closely in support of implementation of the interventions;

- Lessons be drawn from countries that have successfully reduced road carnage through collaborative arrangements and peer support;

- Appropriate road safety programmes be identified for deployment across all spheres of government; and

- Investment in technology be accelerated to improve the quality and completeness of road crash data to ensure that road safety strategic planning is evidence-based and focuses on addressing risky human behaviour that will have the most impact in reducing road crashes.

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