



ISSUES IN PUBLIC HEALTH

Road traffic injury: Prioritising interventions

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Background

The Burden of Disease (BoD) Reduction Project¹ of the Western Cape Department of Health reviewed the risk of traffic-related injury and best-practice interventions, for possible application in the province.²

According to global estimates, 1.2 million people are killed and 50 million are injured in road traffic crashes annually, with an anticipated increase of 65% over the next two decades unless there is determined commitment to prevention.³ Eighty-five per cent of road deaths occur in low- to middle-income countries (LMICs) where improved road safety has not been a sustainable concern.³ Road traffic crashes also damage property and infrastructure and adversely affect productivity as a result of transport disruption; the total cost is an estimated R42.5 billion in South Africa in 1998 alone.⁴

Injuries are the second-biggest contributor (one-fifth) to the provincial BoD after the major infectious diseases of HIV and TB (comprising 22%). The road traffic injury burden for the province is 6.9%, which is 40% higher than the national figure of 5%.⁵

Available provincial traffic injury data and the literature on related risks and interventions were reviewed; this included information on injury-related deaths in Cape Town and Stellenbosch from the National Injury Mortality Surveillance System (NIMSS),⁶ data generated by the surveillance working group of the Burden of Disease Reduction Project,⁷ the National Household Travel Survey,⁸ and the Arrive Alive website.⁹ Risks for road traffic injuries (RTIs) and associated

interventions were mapped onto the biological, behavioural, societal and structural levels of the ecological approach employed by the BoD project.¹ As injuries are predictable and preventable, while 'accidents' are random inevitable events, the term RTI (as adopted in the World Report on Road Traffic Injury Prevention³) is used throughout.

RTI risks

The focus of the BoD project is 'upstream' of RTI risks and related interventions (i.e. the more distant and structural determinants further up the causal chain) while downstream risks are closer to the injury outcome (e.g. single carriageways versus quality of emergency care). Upstream can also refer to interventions which are more remote from the risk being addressed (e.g. the legislating of speed governors in engines rather than the policing of speeding motorists). Upstream risks and interventions fall typically within the remit of sectors other than health (e.g. road design versus more rapid emergency response to crashes).

Biological risks for RTI include hearing, vision, attention, age (physical and emotional maturity, inexperience), illness and sex. Seventy-eight per cent of Cape Town traffic deaths were male.¹⁰ Risky driving exposes young people to hazardous situations which they are inexperienced in handling. Thirty-seven per cent of child traffic deaths occur on weekends when limited recreational facilities tend to cause children to contend more with fast-moving traffic and inebriated drivers. Pedestrians in the 5 - 9-year-old age group are particularly vulnerable when going to school¹¹ as they lack the capacity to react appropriately.

Behavioural risks include substance abuse; aggressive driving (e.g. speeding, disobeying rules, taking chances); fatigue; distractions (e.g. cellphone use); and poor safety habits (e.g. non-use of seatbelts, child restraints and helmets). Cape Town mortality data highlight the alcohol-relatedness of deaths among both drivers (>55% of deaths) and pedestrians (>66%).¹¹ Alcohol consumption increases the likelihood of crash occurrence, as well as the likelihood that death or serious injury will result. Crash risk begins to increase significantly at a blood alcohol concentration (BAC) of 0.04 g/dl, and rises exponentially thereafter.¹²⁻¹⁵ The South African BAC limit (0.05 g/dl) is exceeded by males \leq 80 kg after 2 standard drinks (roughly equivalent to a beer, glass of wine or tot of spirits) and after 1 drink by women $<$ 55 kg.¹⁶ The limit for professional drivers is 0.02 g/dl. Aggressive behaviour is also a concern. Between 64% and 84% of KwaZulu-Natal drivers experienced

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aggressive driving (expressions of anger), while 18% were involved in arguments or an assault. Over half who drove when drunk said that they became more aggressive when intoxicated. Fifty-three per cent of drivers regularly exceeded speed limits, and 48% sped through yellow or red traffic lights.¹⁷ The probability of death associated with collisions increases exponentially with speed from about 10% at 30 km/h to more than 90% at 60 km/h.¹⁸

Societal risks include a culture of impunity (lawlessness and ineffective enforcement, particularly for minibus taxi and luxury vehicle drivers); irresponsible advertising that promotes speed; unsafe behaviour and unrealistic lifestyle choices where cars are valued as status symbols above more lasting assets such as houses; social pressure to speed (aggressive tailgating); and unsafe and unregulated vehicle design. While 2% of vehicles are not registered, an additional 3% are not tested for roadworthiness on transfer. Nationally, a total of R85 365 340 in fines was outstanding as at December 2005 while, typically, only 17% of fines issued are recovered (M Vanderschuren, personal communication, 19 November 2007).

Structural risks include multiple deprivation (e.g. poverty, residence far from employment and services); rapid urbanisation (increased pedestrian and small vehicle numbers); lack of transport infrastructure that separates pedestrians, non-motorised vehicles, motorised vehicles and mass transport; unsafe vehicles (e.g. vehicles that can exceed speed limits, bullbars, lights/indicators out of order); and road design (e.g. poor maintenance, drainage and illumination and absence of absorptive crash barriers, medians and multiple carriageways). Increasing night-time road lighting by 1 candela/m² can reduce crashes by up to 65%.¹⁹ Inadequate public mass transport is a major risk for RTI. Nationally, 74% of households are dependent on public transport and walking.⁸ Local public transport relies on small motorised vehicles, which increase the probability of RTI, along with poor urban planning that provides limited crossing points, poor pedestrian access to amenities and non-separation from vehicular traffic. In Cape Town, which has the most developed commuter rail network, only 7.6% of commuters are served by rail, which is also subject to several safety concerns.²⁰ Summary findings of the National Household Travel Survey are presented in Table I. Bus Rapid Transit, a cost-effective and environmentally friendly mass transit alternative, has been proposed and investigated for specific corridors, but has not received the necessary support.

Recommended interventions to reduce RTIs

The hierarchy of road safety interventions (as with safety in general) prioritises sustainable upstream structural interventions that substantially alter the urban and road environment, such as those that develop infrastructure for non-motorised and non-small-vehicle-based mass transport, rather

Table I. Key findings of the National Household Travel Survey (NHTS) in relation to public transport

For the country as a whole, the key NHTS findings in relation to public transport usage levels include:

- 3.85 million workers use public transport. 3.15 million workers use cars
- 64% of workers who use public transport use a taxi, 22% use a bus, 15% use a train
- Walking times to trains are >15 minutes in the case of 87% of metropolitan or urban households and >30 minutes in the case of 98% of rural households
- Walking times to buses are >15 minutes in the case of 52% of metropolitan or urban households and >30 minutes in the case of 43% of urban households
- Walking times to taxis are >15 minutes in the case of 18% of metropolitan or urban households and >30 minutes in the case of 20% of rural households.

Source: *The First South African National Household Travel Survey*. Pretoria: National Department of Transport, 2003.

than more downstream interventions targeting behaviour change in road users through, say, education campaigns. Apart from reducing RTIs and mitigating negative environmental effects of urbanisation, these strategies may also promote health if they lead to increased walking and cycling and cleaner air – provided the routes are accessible, convenient and safe. Urban transport infrastructure investment needs to be integrated with urban design and planning and community safety initiatives to ensure that networks are well utilised, highly visible and well policed, highlighting the critical need for effective inter-sectoral action integrating technical engineering and health care expertise.

While numerous interventions are possible for reducing the burden of RTI, the effectiveness of interventions in existing SA road safety strategies has not been established. A strong case can be made for implementing the few more downstream strategies aimed at road-users that have been shown to be effective across numerous settings, such as seatbelts, child restraints, helmet-wearing and the enforcement of speeding and driving-under-the-influence (DUI) legislation. Because the majority of fatally injured drivers exceed the legal BAC limit, the enforcement of DUI legislation should be the top priority intervention for local enforcement agencies and lawmakers, and should follow the implementation guidelines devised by international road safety agencies.¹⁶ Wearing safety belts, although compulsory, is neither strictly adhered to nor enforced in South Africa, especially for passengers. Helmet-wearing is well enforced and adhered to by motorcyclists, but not among cyclists, who are forced to use mixed-use public roads for at least part of their journey owing to lack of cycle path networks. Legislation and enforcement here would go hand-in-glove with non-motorised transport development policy.

A summary of risks and associated interventions that are feasible in the Western Cape is presented in Table II.



The need for an inter-sectoral approach

It is clear that implementation of these interventions will require effective inter-sectoral action involving government, the

private sector, NGOs and the research community. Currently, structures that could support the requisite inter-sectoral action are poorly developed, which hinders comprehensive approaches to prevention that could effectively reduce RTIs.

Table II. Feasibility of potential interventions in the Western Cape Province for a range of risk factors*

Risk factor	Summary of issues	Possible traffic interventions	Feasibility
Structural factors			
Urban planning in respect of demographic and socio-economic factors including land use	High proportion of pedestrian injuries, with children vulnerable High need for mobility because workers live far from workplace	<ol style="list-style-type: none"> 1. <u>Improve pedestrian infrastructure.</u> 2. <u>Shorter pedestrian routes.</u> 3. <u>More available mass public transport.</u> 	<ol style="list-style-type: none"> 1. Difficult 2. Moderate 3. Difficult
Transport planning and design	Non-separation of high-speed vehicles from non-motorised transport and pedestrians Safer mass transport alternatives Poor road and vehicle crash protection design Poor design for night travel or which facilitates speeding	<ol style="list-style-type: none"> 1. <u>Improved transport and pedestrian infrastructure integrating modes.</u> 2. <u>Segregated pedestrian and motorised transport system.</u> 3. <u>Increase availability of mass public transport.</u> 4. Public information, education and awareness of traffic safety and alternative transport options. 5. Improved road design (collapsible road furniture, safety barriers, collision cushions at bridges, traffic calming and management measures, <u>speed management systems at 'black spots'</u>). 6. Implement improved vehicle design standards for safety (speed governors, tracking systems to detect fatigue, airbags, breath alcohol and seatbelt-compliant immobilisers, <u>daytime running lights for all vehicles</u> and modified vehicle fronts to protect vulnerable road users). 	<ol style="list-style-type: none"> 1. Difficult 2. Moderate 3. Difficult 4. Easy 5. Moderate 6. Easy
Policy implementation	Defects in road design, layout and maintenance that can lead to unsafe road user behaviour Vehicle factors such as braking, handling, maintenance	<ol style="list-style-type: none"> 1. Independent expert safety audit. 2. Regular road maintenance programmes to clear debris, trees. 3. Regular vehicle testing for roadworthiness. Increased testing for public service vehicles. 	<ol style="list-style-type: none"> 1. Easy 2. Easy 3. Easy
Societal factors			
Ineffective enforcement and culture of lawlessness	General rules of the road, moving violations – speed, recklessness, aggressive driving, DUI Rules may be broken with impunity due to lack of enforcement	<ol style="list-style-type: none"> 1. <u>Policy providing regular, random enforcement with consequences (camera placement including dummy cameras and highly visible, adjudication, demerit system and confiscation of vehicles).</u> 2. <u>Enabling legislative environment to ensure consequences.</u> 3. <u>Occupational health regulation for professional drivers in respect of fatigue, and driver medicals at certain ages and conditions.</u> 	<ol style="list-style-type: none"> 1. Moderate 2. Moderate 3. Easy
Role of the media	Advertising and media currently glamourise fast driving and inappropriate lifestyle choices	<ol style="list-style-type: none"> 1. Advertising policies for motor industry restraining harmful advertising (speed, environmental damage, macho image) similar to tobacco, alcohol restrictions. 2. Educational programmes to create awareness. 	<ol style="list-style-type: none"> 1. Easy 2. Easy



Table II (continued). Feasibility of potential interventions in the Western Cape Province for a range of risk factors*

Risk factor	Summary of issues	Possible traffic interventions	Feasibility
Behavioural factors			
Risk taking	Aggressive driving, speed, alcohol, recreational drugs, cellphones; non-use of seat belts, child restraints and helmets	<ol style="list-style-type: none"> <u>1. Law enforcement programmes randomly implemented with consequences.</u> <u>2. Graduated driving licence system (progressive rights as a driver).</u> 3. Demerit system. 4. Relevant vehicle safety designs for alcohol and speeding. 5. Public information, education and awareness programmes. 	<ol style="list-style-type: none"> 1. Easy 2. Moderate 3. Moderate 4. Moderate 5. Easy
Biological factors			
Age	Young drivers are at greatest risk because of inexperience Older drivers have increased risk due to neuropsychological decline	<ol style="list-style-type: none"> <u>1. Graduated driver's licensing system.</u> <u>2. Improved licensing system geared to health and behavioural problems, based on examinations or tests.</u> 3. Public information and awareness campaign. 4. Bi-annual re-tests for drivers over 70. 	<ol style="list-style-type: none"> 1. Moderate 2. Moderate 3. Easy 4. Moderate
Medical conditions (e.g. fatigue, epilepsy) and treatment	Similar effects to alcohol	<ol style="list-style-type: none"> 1. Public information, education and awareness programmes. 2. Improved licensing. 	<ol style="list-style-type: none"> 1. Easy 2. Moderate

*Priority was accorded to structural, followed by societal, behavioural and biological factors. Intervention feasibility for implementation in the Western Cape Province is assessed, and those proven to be effective are underlined.

For example, every effort is required to reduce vehicle speeds, which constitute a major determinant of crash incidence and severity, particularly in areas where fast-moving vehicles, pedestrians and cyclists share the road. Speed limits on urban arterial roads with encroaching informal settlements and areas with substantial pedestrian activity (schools and shops) should be regularly surveyed with a view to road engineering, enforcement or vehicle design solutions. In addition to more effective enforcement, successful interventions will require substantive changes to the socio-cultural landscape (driving behaviours), and restrictions on motor vehicle design and advertising (facilitating and glamourising fast, aggressive driving).

All interventions should be supported by an information system capable of monitoring and evaluating effectiveness and efficiency (costs and benefits). Evaluation should be conducted by an integrated multi-disciplinary team that is independent of implementing agencies, to ensure objectivity and best practice for safety promotion and injury prevention.

Equity aspects in planning and resource allocation are paramount in seeking protection for all road users, as those who do not possess motor vehicles currently bear a disproportionate share of road injury and risk.

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