Evidence briefing for Transport Health and Environment Pan European Programme (THE PEP) toolbox: Road traffic injuries

Indicator
Road traffic injuries

Overview
Road traffic injuries are a leading cause of death and disability and present a public health and economic threat to Europe (Racioppi, et al., 2004). There is much variation in traffic deaths and injuries in the WHO European Region, both between countries and within countries. A growing evidence base suggests that many road traffic injuries can be prevented and their severity ameliorated through preventive action.

Definitions
The *World report on road traffic injury prevention* defines a road traffic injury as fatal or non-fatal injuries incurred as a result of a road traffic crash. A road traffic crash is defined as a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle (Peden, et al., 2004).

What's the problem? *Key facts*
Road traffic injuries (RTIs) are a leading cause of death and kill 127 000 people per year in the 53 countries of the WHO European Region (Sethi, et al., 2006a). There are at least 2.4 million people recorded to be injured each year, although this figure is an underestimation because of under recording of non-fatal injuries by police. The true figure is more likely to be around 6 million (Gill, et al., 2006, Sethi, et al., 2007a).
Overall mortality rates for RTIs have declined, especially in western Europe. In the countries of the Commonwealth of Independent States (CIS)[a], an increase is observed though. The average mortality rates from RTIs are higher than the EU-27 (UNECE, 2008).

About 55% of deaths occur in younger people aged 15-44 and 75% occur in males as opposed to females. RTIs are *the* leading cause of death in young people under the age of 29 years. Children are particularly vulnerable because they can cope less well with traffic dangers (Sethi 2007, UNECE, 2008).

People over 80 years of age have the highest death rates even though they only make up 3% of all RTI deaths (Fig. 1). Older people have a higher risk of fatality once injured because they are frailer. As pedestrians they are more vulnerable road users because they may be more severely injured. The second highest death rate is in young people aged 15-29 years, who make up 30% of RTI deaths. The highest disease burden is also in the younger age group. Altogether the RTI-related disease burden amounts to about 3.6 million healthy life-years lost (expressed in disability-adjusted life-years or DALYs[b]) and 45% of these are in the age group 15-29 years. 77% of the DALYs lost from RTIs are in males.

[a] Also referred to as EECCA: eastern Europe, Caucasus and central Asia (12 countries)
[b] One DALY is one year of healthy life lost, either due to premature death or life lived with disability.

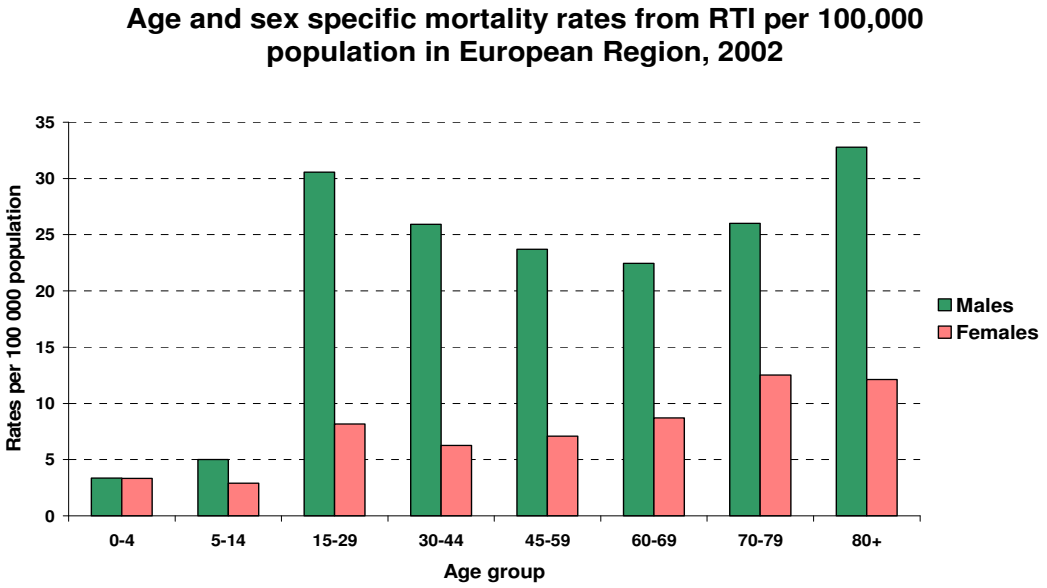

Fig. 1. Age- and sex-specific mortality rates from road traffic injury per 100 000 population in European Region, 2002 (Source: GBD 2002 version 3)

What influences death rates on the roads?

The burden of RTIs is unequally distributed across the WHO European Region. People living in low- and middle-income countries in the Region are 50% more likely to die from RTIs as compared to a high-income country (Sethi, et al., 2006b). When standardized death rates are considered, the difference between countries with the highest and lowest rates can vary by a factor of 5 (Fig. 2). In addition, children in lower social classes are 3–4 times more likely to die from traffic injuries than those in higher classes (Roberts, et al., 1996).

Death rates on the roads are influenced by population and vehicle density, transport mode used, legislation, enforcement, road design and infrastructure, vehicle design, road user behaviour, use of safety equipment and access to high-quality emergency trauma services. The *World report on road traffic injury prevention* identified the following as key areas for preventive intervention (Peden, et al., 2004):

- controlling speed
- stopping driving when under the influence of alcohol
- enforcing use of safety equipment such as seat-belts
- child safety seats and motorcycle helmets
- increasing conspicuity and making infrastructural changes to road design to ensure that vulnerable road users are not exposed to unnecessary risk by mixing them with motorized traffic.

Excess speed is the main road safety problem in many countries (UNECE, 2008). In some CIS countries urban speed limits are 60 km/hour whereas good practice advocates 50 km/h in urban areas and 30 in residential areas (Racioppi 2004, UNECE, 2008).

Speeding vehicles are particularly dangerous for pedestrians. There is an eight-fold increase in probability of a pedestrian being killed as the speed of impact with a car increases from 30km/h to 50km/h. Alcohol is an important risk factor in all road users, and young drivers and riders aged 18-25 years are particularly at risk of crashing (Sethi et al., 2007a). As blood alcohol concentrations (BAC) increase, so does the likelihood of crashing, particularly after a BAC of 0.04g/dl. At a BAC of 0.08g/dl the risk is twice that at 0.05g/dl.

Countries undergoing transition with intense economic activity, such Latvia, Lithuania, Kazakhstan and the Russian Federation, have undergone rapid motorization, but without adequate infrastructure development and regulatory controls such as speed, alcohol and driving-licensing systems. This explains the high mortality rates from transport injuries in these countries (see Fig. 2). Those on the cusp of motorization may want to take heed, and apply lessons learnt elsewhere (Sethi, et al., 2007b).

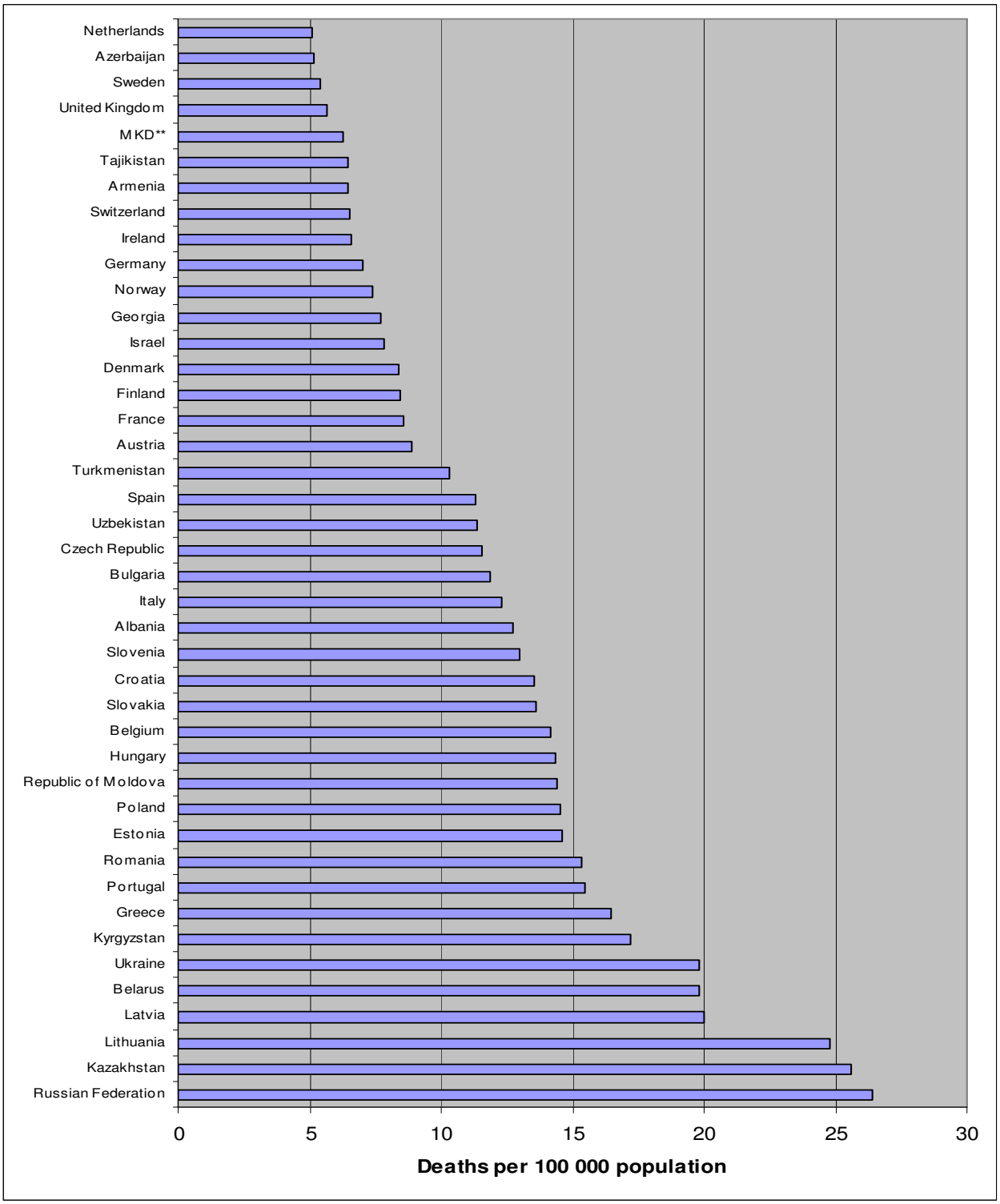

Fig. 2. Age-standardized death rates from transport injury per 100 000 population in European Region by country, 2003*(*Source: Health for All Mortality dataset (WHO, 2007a))

*Transport crash deaths rather than RTIs have been used for greater completeness. 95% of transport injury deaths are due to RTIs

** The International Organization for Standardization acronym for the former Yugoslav Republic of Macedonia

Road users

There are different types of road users and they are affected differently by traffic exposure. Amongst those most vulnerable to RTIs are pedestrians, cyclists and motorized two-wheelers. Unfortunately relatively little research on prevention has been conducted for these groups. Two thirds of crashes occur in towns, where there is a greater mix between these vulnerable road users and motor vehicles. Fatalities for cyclists and pedestrians are 7-9 times higher than for those involved in car crashes (Racioppi, et al., 2004, Sethi, et al., 2007a). The mortality and proportion of deaths on the roads among pedestrians varies from country to country. This reflects differences in exposure as well as safety. It is lowest in the Nordic countries, such as Iceland and Sweden and highest in the CIS and Baltic countries, such as the Russian Federation and Latvia. It is important to pay extra attention to pedestrian safety because (a) pedestrians are more vulnerable to sustaining a severe injury when struck (b) more children and older people are affected and more vulnerable and (c) most safety interventions historically were geared to protecting vehicle occupants rather than pedestrians.

Walking and cycling are healthier transport modes, but these will only be chosen as an option if safety is assured.

What are potential policy solutions?

Across the European Union (EU), there has been progress on prevention of road traffic injuries. Better enforcement of speed limits, as well as alcohol limits, is among the most effective elements used to reduce road traffic fatalities (Peden 2004, Racioppi 2004, Sethi 2007, UNECE, 2008).

Effective preventive strategies include the following.[c]

- National road safety plans with targets for reducing road traffic injuries and deaths are an essential way forward to ensure the safety of citizens in Europe.
- Employ multisectoral safety programmes to decrease deaths and injuries.
- A well-resourced lead national or regional road safety agency is key to developing and implementing road safety plans.
- Legislation and proper enforcement are critical elements of national road safety plans. This requires the commitment of human, financial and political capital.
- Controlling speed, stopping drink–driving, using safety equipment and reducing exposure can save lives.
- Traffic restrictions reduce congestion and improve road safety, whereas building more roads encourages car use.
- Effective road planning measures include minimizing exposure to high-risk road traffic scenarios, designing roads for safety, setting safety rules and securing compliance.
- Providing visible, crashworthy, smart vehicles is a contribution the motor industry could make.
- Delivering effective and timely post-crash care is critical to saving lives and preventing disability.
- Sustainable transport policies with less reliance on cars can also improve safety for cyclists and pedestrians. These would give precedence to cycling and walking for short journeys and better public transport for longer journeys.
- Such transport policies will bring other health and environmental benefits such as making conditions more favourable for physical activity to counteract the obesity epidemic and decrease environmental pollution and global warming (Box 1).

Box 1. Example from Sweden: Vision Zero

A good example of a successful approach to road traffic safety is the Swedish Vision Zero project (Swedish Road Administration, 2006). It includes a wide range of measures such as the installation of roundabouts to calm traffic, median barriers on highways, 30 km/h speed limits in built-up areas, clearing the roadside areas of potential dangerous objects such as trees, mandatory daytime running lights, mandatory cycle helmets for children under the age of 15 and in-depth studies of all fatal collisions. As a result, the Swedish traffic-related mortality rate of children and young people has more than halved during the last 15 years. This indicates that it is feasible to reduce mortality despite a high level of motorization.

[c] Sources: *World report on road traffic injury prevention* (Peden, et al., 2004), *Preventing road traffic injury: a public health perspective for Europe* (Racioppi, et al., 2004) and *Youth and road safety in Europe* (Sethi, et al., 2007a).

Costs and benefits

The health service and societal costs of road traffic injuries are very high and estimates suggest that costs to society are in the order of 2% of the gross domestic product (Racioppi, et al., 2004). There are reports that suggest that an estimated
55 000 lives would be saved in one year (or 63% of RTI deaths) if the European Region had the same death rates as the country with the lowest rate in the Region (in this case the United Kingdom) (Sethi et al., 2006a) Whereas reliable estimates of the expenditure required to achieve this goal cannot be made, there is ample evidence of cost-effective interventions. The financial savings to society from selected road safety interventions are presented in Table 1. Although the precise magnitude of the cost-benefit ratio may be country specific, the measures mentioned in Table 1 have proven to provide value for money (ETSC, 2003). For example, the table shows that for each €1 spent on random breath testing for alcohol control leads to a saving of €36. Affordability of safety equipment is an important issue, as this will not only be influenced by disposable income for different social groups but also by the price of safety equipment relative to income, especially for middle-income countries (Hendrie et al., 2004).

Table 1: Financial savings to society from selected road safety interventions

Measure on which €1 could be spent	**Savings (€)**
Road design	
Simple road markings	1.5
Upgrading marked pedestrian crossings	14.0
Pedestrian bridges or underpasses	2.5
Guard rails along the roadside	10.4
Removal of roadside obstacles	19.3
Median guard rail	10.3
Signing of hazardous curves	3.5
Area-wide speed and traffic management	9.7
Conspicuousness	
Daytime running lights (normal bulbs)	4.4
Roadside lighting	10.7
Alcohol control	
Random breath testing	36.0
Car restraints	
Audible seat-belt reminders	6.0
Child restraints	32.0
Helmets	
Cycle helmets	29.0
Motorcycle helmets	16.0

Sources: ETSC (2003), Institute for Road Safety Research SWOV (2001) and United States National Centre for Injury Prevention and Control (2000).

What are the potential tools for action?

- Promote discussion between different sectors, including the transport, urban planning, justice and health sectors, putting safety at the forefront.
- Develop national road safety plans with targets for mortality reduction.
- Integrate road traffic injury prevention into policies for sustainable transport
- Implement the WHO Regional Committee for Europe resolution on the prevention of injuries, which calls upon Member States to reduce the toll from injuries with a requirement to report on progress in 2008 (WHO 2005).
- Strive to achieve the European Community Road Safety Action Plan targets of a reduction in road traffic injury deaths of 50% by 2010 (European Parliament 2007).
- Increase the use of cost–effectiveness analysis of sustainable transport and safety interventions that emphasize benefits across a range of sectors.
- Maximize the adaptation and transfer of best practice across the Region.
- Improve the use of health sector data for surveillance and evaluation.

Uncertainties

Some challenges lie ahead:

- Political, financial and human resource investment will be needed.
- Attitudes to the preventability of RTIs and societal responsibility for road safety may be difficult to change.
- Equitable action across all sections of society and a diverse range of road users is important for social justice, but requires political commitment.
- Working with car manufacturers and the energy, alcohol and entertainment industries is necessary to develop a comprehensive picture of safety and transport policy, but challenging to achieve.
- Mortality rates (particularly injury rates) for some countries may be biased due to underreporting, especially in the central Asian republics, the Caucasus countries and some Balkan countries. In certain cases under-registration of deaths may be as high as 20%, and this must be borne in mind when making comparisons between countries.

Relevant web links

www.walkingbus.com
Child-friendly mobility plan

http://www.euro.who.int/violenceinjury
WHO Regional Office for Europe web site. This section is on injury prevention

http://www.who.int/violence_injury_prevention/road_traffic/en/
WHO headquarters web site. This section is on road traffic injury prevention

http://ec.europa.eu/transport/roadsafety/road_safety_observatory/care_en.htm
EU's European Road Accident database (CARE) web site.

http://www.euro.who.int/hfadb
WHO Regional Office for Europe web site. This section is on the health for all data base

http://www.enhis.org/
Web site of European environment health information system

References

European Parliament (2007). *Road safety: European Parliament says more action needed*. Brussels, European Parliament (http://www.europarl.europa.eu/news/expert/infopress_page/062-1938-015-01-03-910-20070112IPR01913-15-01-2007-2007-false/default_en.htm, accessed 14 March 2007).

ETSC (2003). *Cost effective EU transport safety measures*. Brussels, European Transport Safety Council.

Gill M, Goldacre MJ, Yeates DGR (2006). Changes in safety on England's roads: analysis of hospital statistics. *British Medical Journal*, 333:73–75.

Hendrie D et al. (2004). Child and family safety device affordability by country income level: an 18 country comparison. *Injury Prevention*, 10:338–343.

Peden M et al (2004). *World report on road traffic injury prevention.* Geneva, World Health Organization (http://www.who.int/world-health-day/2004/infomaterials/world_report/en, accessed 14 March 2007).

Racioppi F et al (2004) *Preventing road traffic injury: a public health perspective for Europe*. Copenhagen, WHO Regional Office for Europe, (http://www.euro.who.int/document/E82659.pdf, accessed March 2007).

Roberts I, Power C (1996). Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991. *British Medical Journal*, 313:784–786.

Sethi D et al (2006a). *Injuries and violence in Europe: why they matter and what can be done.* Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/InformationSources/Publications/Catalogue/20060601_1, accessed 14 March 2007).

Sethi D et al. (2006b) Reducing inequalities from injuries in Europe. *Lancet* 3687: 2243-50.

Sethi D et al. (2007a). *Youth and road safety in Europe.* Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/InformationSources/Publications/Catalogue/20041119_2, accessed 14 March 2007).

Sethi D et al. (2007b). Preventing the leading cause of death in young people in Europe. *J Epidemiol Community Health* 2007;61:842–843.

Swedish Road Administration (2006). *Safe Traffic – Vision Zero on the move.* 2nd ed, Borlänge, Swedish Road Administration, (http://publikationswebbutik.vv.se/upload/1723/88325_safe_traffic_vision_zero_on_the_move.pdf, accessed December 2008).

SWOV Institute for Road Safety Research (2001). *Cost-benefit analysis of measures for vulnerable road users. PROMISING.* Amsterdam, SWOV Institute for Road Safety Research (http://www.swov.nl/rapport/promising/wp5final.pdf, accessed 14 March 2007).

United States National Centre for Injury Prevention and Control (2000). *Working to prevent and control injury in the United States – fact book for the year 2000*. Atlanta, National Centre for Injury Prevention and Control.

UNECE. (2008). Transport, health and environment: trends and developments in the UNECE- WHO European region (1997–2007). New York and Geneva, United Nations Economic Commission for Europe.

WHO (2002). Revised Global Burden of Disease 2002 estimates [web site]. Geneva, World Health Organization (http://www.who.int/healthinfo/bodgbd2002revised/en/index.html, accessed 14 March 2007).

WHO Regional Office for Europe (2005). *WHO Regional Committee for Europe resolution RC55/R9 on Preventing injuries in Europe*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/Governance/resolutions/2005/20050922_1, accessed 14 March 2007).

WHO Regional Office for Europe (2007). European health for all database [online database]. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/hfadb, accessed 14 March 2007).

Author
Dr Dinesh Sethi, Technical Officer Noncommunicable Diseases and Environment
WHO Regional Office for Europe

This document was prepared within the framework of the Pan-European Programme on Transport, Health and the Environment (THE PEP) for the Healthy Transport toolbox.

Publication date
September, 2009