SOCIAL AND ECONOMIC COSTS OF ROAD ACCIDENTS IN EUROPE

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Abstract in original language
Ogromne korzyści wynikające z rozwoju motoryzacji są osiągnięte ogromnym kosztem – ludzkim i ekonomicznym, stanowiącym skutek wypadków drogowych. Bezpieczeństwo drogowe jest traktowane jako zadanie priorytetowe we wszystkich krajach europejskich, ale jego poziom nie jest równomierny. Na mapie Europy wyróżnić można Pas SEC – państw charakteryzujących się wysokim poziomem ryzyka groźnych w skutkach wypadków drogowych. Rzeczywiste koszty wypadków drogowych daleko przewyższają szacunki poszczególnych państw. Przyczynę takiego stanu stanowią niekompletne i niewiarygodne statystyki, trudne do wyceny długotrwałe skutki wypadków oraz wpływ różnic społecznych.

Key words in original language
Wypadek drogowy, bezpieczeństwo drogowe, metody wyceny kosztów, długotrwałe skutki szkód.

Abstract
The current generation has far greater opportunities for motorised travel than their forefathers. But their adventages have been achieved at a large cost – the human and economic costs. Road safety is considered to be a high priority issue in all European countries, but is not equally distributed across Europe. The risk being killed or injured in road accident is much higher in “SEC Belt countries”. The real costs of deaths, injuries and social and economic consequences far exceed the estimates for the following reasons: imcomplete and inaccurate accident statistics, long term impacts of traffic injury and socio-economic dimensions of traffic injury.

Key words
Road accident, road safety, methods of estimating costs, long terms impact of traffic injury.

1. INTRODUCTION

Motorised road transport plays a central role in European societies. Obviously most of the goods needed for everyday life are transported by road and the current generation has far greater opportunities for motorised travel in the course of work and leisure than their forefathers. But their advantages have been achieved at a a large cost – the human and economic costs, in terms of the numbers of road accidents and of people killed and injured as a result of them.

Despite the important decrease in the number of deaths in the European roads during the last decade, there are certainly many more steps to be taken in order to achieve a further decrease in the number of road accident victims in Europe. Road safety is considered to be a high priority issue in all European countries and consequently many efforts have been made to

implement safety measures that will contribute to improving the situation. The objective of the EU is to limit the number of road accident deaths from 54.000 in 2001 to 27.000 in 2010[1].

2. THE SEC BELT COUNTRIES – ROAD ACCIDENT RATE

Road safety is not equally distributed across Europe. The risk of being killed or injured in a road accident is much higher in some European countries than in others. One should mention here the "North – South divide" in European transport safety: while North – Western European countries have developed and implemented plans and policies that have significantly improved road safety, Southern European in turn countries generally suffer from greater road risk. This contrast between safer and less safe Member States has become even more pronounced after the accession to the European Union of new countries in 2004. In addition to the North-South divide in traffic safety, there exists now also the East-West divide[2].

[1] White Paper "European Transport Policy for 2010:time to decide" com (2001)0370

[2] Road accident data in the enlarged European Union, European Transport Safety Council, Brussels 2006, s. 2

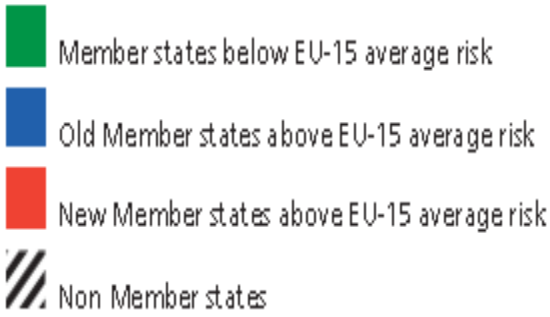


Figure 1. The "SEC Belt" countries

The levels of motorisation and road safety and the gathering of accident data are not uniform throughout Europe. Consequently, three groups of EU countries are taken into account: the "Non SEC Belt countries (North-Western countries hereafter), The Old SEC Belt countries (Southern countries hereafter) and the "New SEC Belt countries" - the most important for us. SEC means Southern, Eastern and Central European countries – countries with a lower level of safety.

"Non SEC Belt countries"	"Old SEC Belt countries"	"New SEC Belt countries"
"North-Western countries"	"Southern countries"	"New countries"
Austria	Belgium	Cyprus
Denmark	France	Czech Republic
Finland	Greece	Estonia
Germany	Italy	Hungary
Ireland	Portugal	Latvia
Luxembourg	Spain	Lithuania
Netherlands		Malta
Sweden		Poland
United Kingdom		Slovakia
		Slovenia

According to Figure 2, the two Member States showing the highest rates of "road accident deaths per million inhabitants" are Latvia and Lithuania, which both belong to the "New countries" cluster. Malta seems to have lower rates than the rest of the European countries. Furthermore, the Netherlands, Sweden and the United Kingdom are found to be characterised by a rather low rate, while the rates for Greece and Portugal on the one hand and for Poland, Slovenia and Czech Republic on the other hand, are among the highest. It seems that the countries in the "North-Western" group have the lowest rates, while the highest rates occur in the "New" cluster. The only exception is Malta, where the limited length of the road network could contribute to the low death rates by restricting the average mileage per motor vehicle.

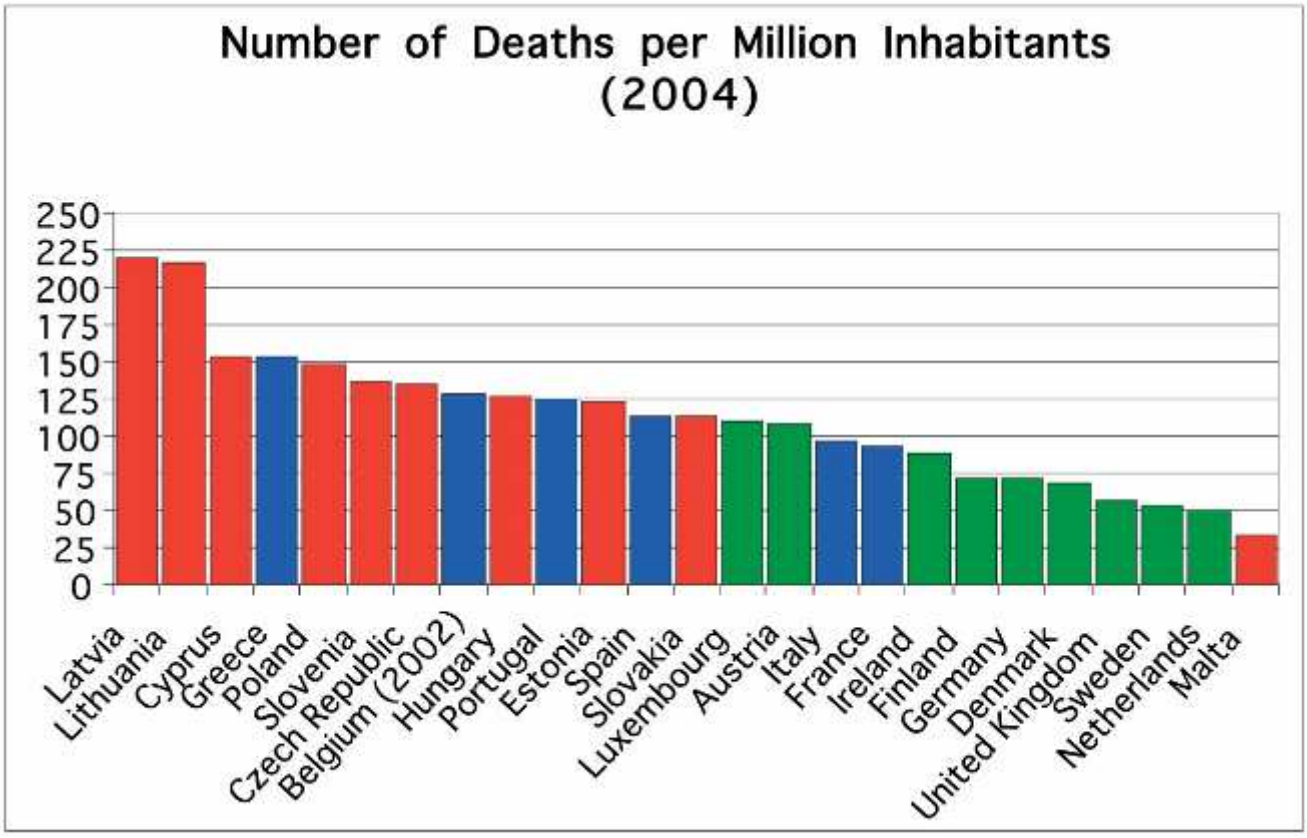


Figure 2. Road Accident Deaths per million Inhabitants for 2004, Road accident data in the enlarged European Union, European Transport Safety Council, Brussels 2006, s. 8

3. COSTS TO SOCIETY OF TRAFFIC INJURY - VALUATION OF ROAD ACCIDENT DEATH

In 2004 the estimated annual costs, both direct and indirect, of traffic injury in the EU- 15 countries exceeded 180 billion euros. At European Union level, the most frequently used "magic number" to put a value on the prevention of casualties is the "1 Million euro rule"[3]. The 1 Million euro value is frequently used as a test of the effectiveness of traffic safety measures and implies that a measure can be considered for implementation when for every million euros spent on a road safety measure, at least one death is prevented. This amount takes into account the economic damage of a death, and also a certain proportion of the damage resulting from (serious) injuries and from accidents with only property damage. Because, on average, for every prevented death there will also be a number of accidents with injuries and an even greater number of accidents with only property damage[4] . This estimation has not been updated since 1997.

[3] This was introduced by the European Commission in its 17 Road Safety Programme 1997-2001 to help select traffic safety measures - Promoting road safety in the EU: The Programme for 1997-2001, Commission of the European Communities 1997

[4] Wesemann, P. Economic evaluation of road safety measures. Contribution to the 117th Round Table, 26 and 27 October 2000, Paris. SWOV Publication D-2000-16E. SWOV Institute for Road Safety Research, The Netherlands.

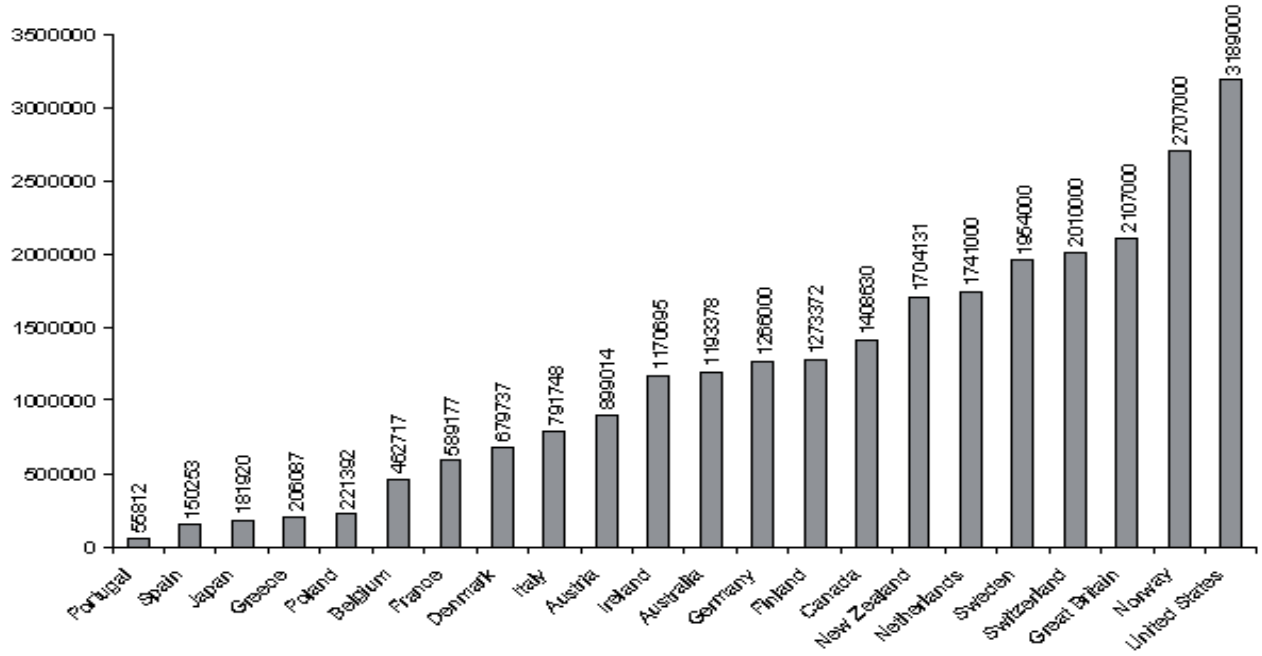


Figure 3 Official monetary valuation of a road accident death in selected countries (Euro in 2002-prices), Social and economic consequences of road traffic injury in Europe, European Transport Safety Council, Brussels 2007, p. 17

The Figure 3 shows the official monetary valuation of a road accident death in a number of countries[5]. The valuations vary substantially. It would be interesting to notice that some of the countries that have a good safety record, such as Norway, Great Britain, Sweden and the Netherlands, assign a high monetary value to the prevention of a traffic death, whereas countries with a rather bad road safety record, like Portugal, Spain and Greece, assign a low monetary value to the prevention of death. These values are determined by two main factors.

The first is the method used for estimating them. The typology of methods for estimating costs shown in Figure 4 below[6]. Values based on the willingness-to-pay approach tend to be about twice as high as values not based on the willingness-to-pay approach. The costs of restitution are the direct costs generated by road accidents (for example, medical costs, property damage or administrative costs). Generally speaking, the human capital approach is used to estimate the value of lost productive capacity due to a traffic death, whereas the willingness-to-pay approach is used to estimate the value of lost quality of life. Two varieties

[5] Sælensminde, K. Verdsetting av trafikksikkerhet i ulike lands nytte-kostnadsanalyser. Arbeidsdokument SM/1352/2001, Transportøkonomisk institutt, Oslo 2001 and Blaeij, A. de., Koetse, M., Tseng, Y-Y., Rietveld, P., Verhoef, E., Valuation of safety, time, air pollution, climate change and noise; methods and estimates for various countries. Report prepared for ROSEBUD. Department of Spatial Economics, Vrije Universiteit, Amsterdam 2004

[6] This typology was developed in COST 313: Alfaro, Chapuis and Fabre, Socio-economic cost of road accidents, final report of action COST 313, Brussels, Commission of the European Community 1993

of the willingness-to-pay approach are normally used: the individual willingness-to-pay approach and the social willingness-to-pay approach[7].

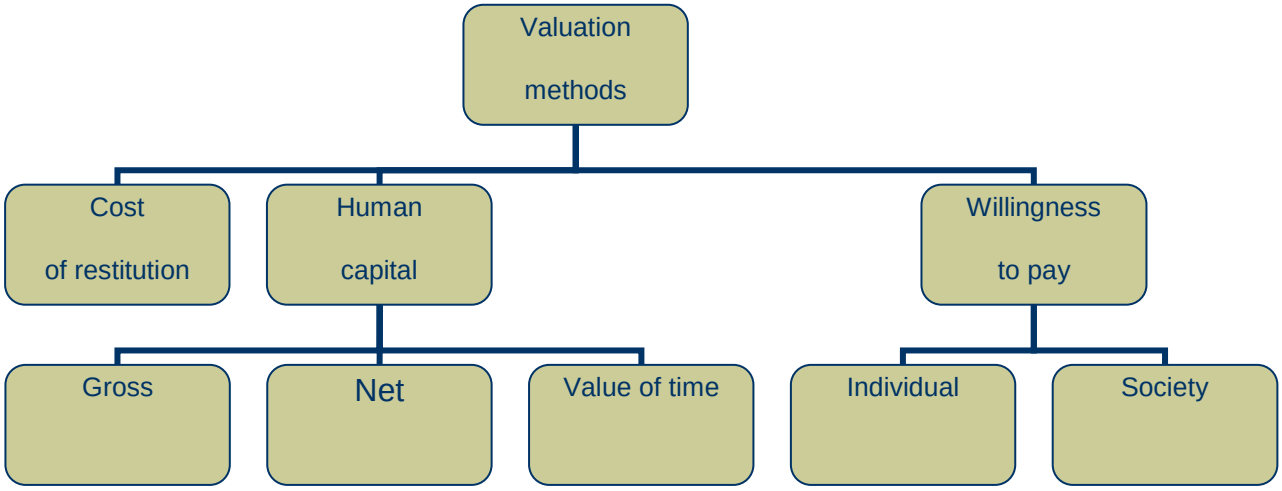
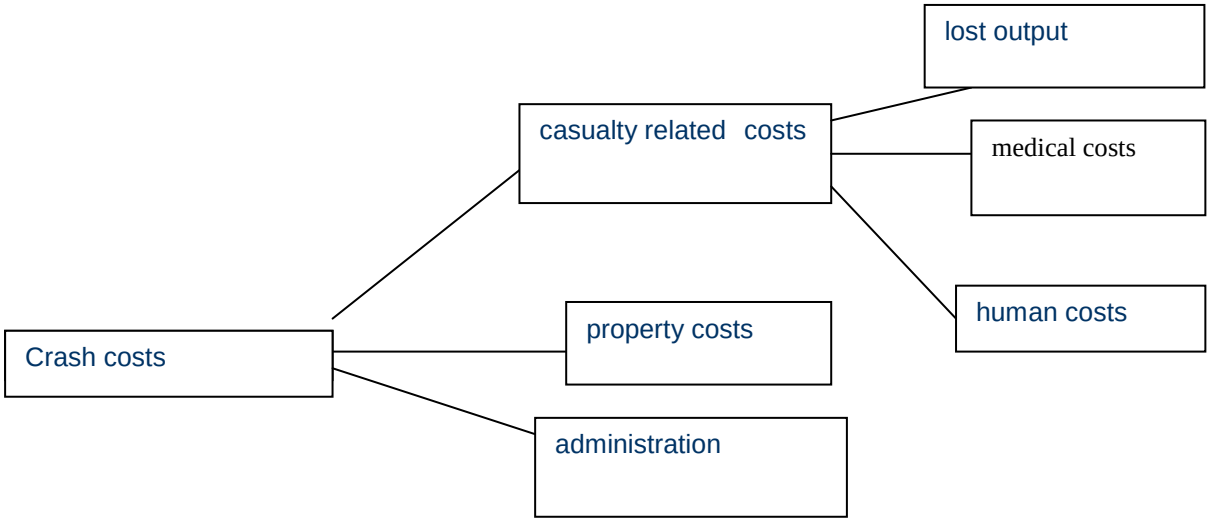


Figure 4 Methods for estimating costs of traffic injury - Social and economic consequences of road traffic inury in Europe, European Transport Safety Council, Brussels 2007, p 16

The second factor determines the monetary valuation of a road accident death as real income in a country. Generally speaking, lower values are found in countries that have a relatively low gross domestic product per capita, higher values are found in the richer countries.

4. COMPONENTS OF CRASH COSTS



[7]More information about methods for estimating costs is given by Trawén, A., Maraste, P. and Persson, U. Methods for estimating road accident costs – A comparison of costs for a fatal casualty in different countries. Paper to Traffic Safety on Three Continents, International Conference in Moscow, 2001, p. 19-21 September, 2001, Wesemann, Economic evaluation of road safety measures. Contribution to the 117th Round Table, 26 and 27 October 2000, Paris. SWOV Publication D-2000-16E. SWOV Institute for Road Safety Research, The Netherlands 2000, Blaeij, A. de., Koetse, M., Tseng, Y-Y., Rietveld, P., Verhoef, E. Valuation of safety, time, air pollution, climate change and noise; methods and estimates for various countries. Report prepared for ROSEBUD. Department of Spatial Economics, Vrije Universiteit, Amsterdam 2004.

In the Human Capital method the cost can be divided in 5 categories – shown in Figure 5.

Figure 5: Babtie Ross Silcock, Guidelines for Estimating the Cost of Road Crashes in Developing Countries, Final Report, Department for International Development, London, May 2003, p. 8

By far the largest portion of property damage stems from damage to vehicles. Other property damage is small. Because of the typically large proportion of damage only crashes, the cumulative cost of vehicle damage can contribute to the greatest proportion of total costs of crashes in a country. The total cost of property damage is likely to have been underestimated.The total number of crashes is rarely adjusted for the often substantial under-reporting within official statistics. Previously, it has usually been the case that insurance company data has been used, but this is not representative of all crashes and will reflect the more costly crashes only. Although insurance company data is likely to remain as the main source of vehicle damage cost data, it might be possible to supplement this with the data from other sources such as motor repair businesses, fleet owners or individual vehicle owner surveys, but experience has shown that this is often difficult. Data is also required on the average numbers of vehicles involved in each rash, and the average number of vehicles damaged in each crash.These numbers will be different. For example, in some fatal crashes a vehicle may be completely destroyed, in others the vehicle may suffer negligible damage, even though a pedestrian is killed.

Police and administration costs are usually low when compared to other cost components. The only source of data is from the police service, courts and insurance companies themselves. These costs are typically low compared to other cost components, such as vehicle damage.

Lost output refers to the lost productive capacity from those affected by road crashes and is typically the largest part of casualty related costs. It can range from the value resulting from as little as one day of lost time for a slight casualty, up to decades of foregone work for those killed or permanently disabled. Lost output is believed to have been underestimated in most past studies, as it was limited to the crash victim(s) only and to the number of work days lost - either to recovery or to average retirement age in the case of death. Some of those injured will not return to their jobs, and will spend additional time looking for new employment. Thus there is not only lost working time to take into account, but also reduced income after resuming employment. Lost output estimates should also take account of income lost by caregivers. When someone in a poor family is injured the whole family gets involved; those on daily wages may lose their job, children may not go to school and older members may spend less time caring for infants. A further concern is that costings focus on the short term, with little information on the long-term disabled.

Medical costs of those injured in crashes range from at-scene to recovery, or death, and include first aid and rescue services (ambulance), hospital costs (food and bed, operations, x-rays, medicines, doctors services) and rehabilitation costs (treatment and prosthetics). Medical costs only usually constitute a small proportion of the total costs of crashes. However, the burden of road casualties on medical sector resources is likely to be significant. The medical costs will often be the first and most tangible economic burden experienced by the family. Insufficient consideration has also been given to the effect on hospitals of road casualties. For example, if a crash victim is using a hospital bed, this means it may not be available to others requiring medical treatment. The medical resources available to treat other patients as a result of a reduction of road casualties requiring treatment could be significant.

Traditionally medical costs have been assessed from the perspective of individual hospitals, with data provided on cost per bed estimated from overall public sector budget allocations. However, medical costs may consist of both private and public sector expenditure, and can be long term costs, depending upon the severity of injury. To estimate the medical costs resulting from casualties of crashes, data is required on a range of items for example the cost of at scene care, transport, in-hospital stay, out patient treatment, drugs and prosthetics. Data may be available from national hospital expenditure estimates, insurance payments, hospital studies and casualty surveys.

The human costs, usually defined as 'pain grief and suffering', is added to the overall estimate of crash costs. As well as the cost elements described previously, which directly or indirectly affect the economy of the country, there are also other effects of crashes such as suffering and bereavement and other adverse effects on the quality of life. The amount to be added could be considered as part of a social objective of poverty alleviation, as crashes are known to have a greater adverse effect upon the poor. The amount to add to reflect pain grief and suffering within the Human Capital method is essentially a political decision, to be made for each crash costing undertaken. Because of the disproportionate effect of crashes upon the poor, an amount added to reflect pain grief and suffering could be considered as part of an overall objective of poverty alleviation.

The greater the amount added, the higher the value society would place upon the prevention of crashes. However, the amount to be added can be informed by consideration of the amounts added. An appreciation of the wider effects of crashes on poorer households, as well as the effects that it has not been possible to quantify accurately and include within other cost elements, could also be used as justification for adding a greater amount to reflect pain grief and suffering[8].

5. THE BARRIERS OF ESTIMATING REAL COSTS – RECOMMENDATIONS FOR POLICY ANF LAW MAKING

5.1 INCOMLETE AND INACCURATE OFFICIAL ROAD ACCIDENTS STATISTICS

The level of reporting for injuries treated in hospital is, on the average, less than 50%. It can be seen that the percentage of injury accidents reported in official road accident statistics varies substantially between countries. In most countries, the level of reporting has been determined by comparing the number of injured road users treated in hospitals (including outpatients not staying in hospital overnight) to the number of injured road users recorded by the police. For some of the new member states of the European Union (Poland, Slovakia, the Baltic states), the level of accident reporting in official statistics is not known.

Injuries are not always correctly classified by severity in police accident reports. Definitions of reportable injuries are often not very clear and not standardised. A simple injury scale should be developed for use by the police and the other emergency services. Final classification of injuries according to severity should be performed by medical professionals.Countries should make injury data more comparable between countries. The national linked dataset of road traffic crash data should be produced from hospital admissions

[8] See Babtie Ross Silcock, Guidelines for Estimating the Cost of Road Crashes in Developing Countries, Final Report, Department for International Development, London, May 2003, p.13-32

and police road traffic accidents data for use by policymakers, researchers, planners and practitioners. They should encourage electronic linkages between sources of injury data, like STRADA in Sweden[9]. Moreover countries should regularly monitor the level and accuracy of reporting in official road accident statistics and make the results of studies available to other countries. It is needed to provide a set economic valuations of the benefits to society of preventing road accident deaths and injuries for use in cost-benefit analyses of road safety programmes[10].

5.2 LONG TERM IMPACTS OF TRAFFIC INJURY

Long term impacts of traffic injury are poorly documented in all european countries. Little is known about these impacts. Mortality rates are fairly well known in the different member states. Statistics on survivors are much less reliable, especially for slight injuries. These patients are usually only to a small extent included in the trauma registries or police records, even though the long-term consequences of injury might be severe. The EU and member states should consider adopting targets for reducing not just deaths, but also serious injuries. There are, however, reasons to believe that a number of people living with lasting impairments as a result of traffic injury is likely to be increasing.

To describe the long-term outcome following injuries a large number of scales have been developed. An ideal instrument to evaluate the outcome should include both objective and subjective assessments and still be simple, quick, reliable, reproducible and cost-effective. calculations as well as other methods of describing the burden of injury on society all have their flaws. Thus it seems reasonable to use several measures in combination to provide relevant information on the different perspectives following injury. Countries are recommended to adopt a consensus based prospective injury impairment scale (based on the Abbreviated Injury Scale AIS[11]).

In most countries, official road accident statistics make a distinction between three levels of injury severity: fatal, serious and slight. In most countries, fatal injuries include all those who die within 30 days of the accident as a result of injuries sustained in the accident. The Eurpean Union should encourage member states to adopt a common definition of slight and serious injuries and of lasting impairments. Implementing common definitions of these concepts would make road accident statistics more comparable across countries than they are today[12].

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[9] Swedish Data Trafic Aquisision

[10] See Social and economic consequences of road traffic inury in Europe, European Transport Safety Council, Brussels 2007, p.9-12

[11] The Abbreviated Injury Scale (AIS) describes injuries on a 6-point numerical scale in terms of threat to life and tissue damage. Thus, an AIS 1 (minor) injury does not pose a threat to survival, whereas survival is highly uncertain in the case of an AIS 5 (critical) injury. Another injury scale, the Injury Severity Score (ISS) provides a numerical scale (from 1 to 75) that uses three injuries with the highest severity in three different body regions to measure the overall severity where a score of 75 is, for all intents and purposes, non survivable - see Baker, S. P., O'Neill, B., Haddon, W., Long, W. B. The Injury Severity Score: A method for describing patients with multiple injuries and evaluating emergency care. Journal of Trauma 14, 1971,p.187-196 .A New ISS has been proposed which uses three of the most severe injuries anywhere in the body to calculate an ISS score: NISS – see Osler, T., Baker, S. P., Long, W. (1997) A modification of the injury severity score that both improves accuracy and simplifies scoring. The Journal of Trauma: Injury, Infection, and Critical Care, 43, p. 922-926.

[12] See Social and economic consequences of road traffic inury in Europe, European Transport Safety Council, Brussels 2007, p. 18-26

5.3 SOCIO-ECONOMIC DIMENSIONS OF TRAFFIC INJURY

Social disparities in road accident risk in road accident are also not very well known. However, most studies show that individuals who have a low social status are more frequently involved in road accidents than individuals who have a high social status. This tendency applies to all groups of road users. Social disparities in risk are not immutable, but may be reduced by means of appropriate treatment. Thus, if men with a low level of education wore seat belts as often as those with a high level of education, their death rate would be reduced – perhaps not to the same level as for highly educated drivers, but at least the difference would be reduced[13]. Countries are encouraged to develop policies designed to reduce social disparities in road accident risk, to the extent that these are regarded as unjust[14].

The study suggests that social disparities in child pedestrian risk can be reduced by means of traffic calming, and the more strongly traffic calming is concentrated in the deprived areas, the greater the reduction of the social disparities in risk[15]. A systematic use of traffic calming in residential areas for the purpose of reducing social disparities in road accident risk is encouraged. Moreover european countries should develop policies aimed at modifying unsafe road user behaviour associated with low social status.

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[13] According to the evidence provided by the study of Braver, E. R. , Rice, Hispanic origin, and socioeconomic status in relation to motor vehicle occupant death rates and risk factors among adults. Accident Analysis and Prevention, 35, 2003, p. 295-309.

[14] See Social and economic consequences of road traffic inury in Europe, European Transport Safety Council, Brussels 2007, p. 33-35

[15] Jones, S. R., Lyons, R. A., John, A., Palmer, S. R. Traffic calming policy can reduce inequalities in child pedestrian injuries: database study. Injury Prevention, 11, 2005, p. 152-156.

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