



SOCIOECONOMIC DIFFERENCES IN INJURY RISKS

**A REVIEW OF FINDINGS AND A
DISCUSSION OF POTENTIAL
COUNTERMEASURES**

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ABSTRACT

Violence and injuries are not only one of the major causes of premature death but are also considered as one of the causes of mortality with the steepest social gradient. This report presents an overview of the current state of knowledge regarding socioeconomic differences in injury risks, reviewing mortality and morbidity studies conducted both inside and outside the WHO European Region, published during the past 17 years and addressing the leading causes of injury, both intentional or unintentional: interpersonal violence, self-directed violence, traffic, falls, drowning, poisoning and burns. Around 300 scientific articles have been selected and reviewed with the aim of highlighting the main features of the knowledge at hand, including where it comes from, how much attention has been paid to various injury causes, which segments of the population have been considered, and whether European studies, when they exist, obtain results that are similar to those from other parts of the world. Studies of interventions that specifically examine outcome effects across socioeconomic groups or areas were also reviewed.

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TABLE OF CONTENTS

TABLE OF CONTENTS	VII
ABBREVIATIONS	1
EXECUTIVE SUMMARY	2
CHAPTER 1: INTRODUCTION	4
AN OLD PROBLEM IN A NEW CONTEXT	4
WHY CARE ABOUT THE SOCIOECONOMIC PATTERNING OF INJURIES?	4
WHY THIS REVIEW?.....	5
HOW WAS THE REVIEW CONDUCTED AND HOW IS THE REPORT STRUCTURED?	6
REFERENCES	9
CHAPTER 2: ROAD TRAFFIC INJURIES	11
SUMMARY AND EXAMPLES OF FINDINGS	11
SOCIAL DIFFERENCES IN ROAD TRAFFIC INJURIES	12
RISK FACTORS AND INTERVENTIONS	3
REFERENCES	4
CHAPTER 3: FALLS, BURNS, POISONING, DROWNING OR MIXED	15
SUMMARY AND EXAMPLES OF FINDINGS	15
FALLS.....	17
BURNS AND HOUSE FIRES	17
STUDIES IN OTHER OR ON MIXED DIAGNOSES	19
REFERENCES	21
CHAPTER 4 SELF-DIRECTED VIOLENCE	29
SUMMARY AND EXAMPLES OF FINDINGS	29
INDIVIDUAL LEVEL SOCIOECONOMIC DISPARITIES AND SUICIDE MORBIDITY	34
AREA-BASED SOCIOECONOMIC DISPARITIES AND SUICIDE MORTALITY	35
AREA-BASED SOCIOECONOMIC DISPARITIES AND SUICIDE MORBIDITY	38
MULTILEVEL STUDIES	38
MULTI-COUNTRY STUDIES	39
REFERENCES	40
CHAPTER 5: INTERPERSONAL VIOLENCE	55
SUMMARY AND EXAMPLES OF FINDINGS	55
ALL AGES AGGREGATED OR AGES UNSPECIFIED	57
VIOLENCE TOWARDS CHILDREN AND ADOLESCENTS	57
VIOLENCE TOWARDS ADULTS	59
INTIMATE PARTNER VIOLENCE (IPV)	59
REFERENCES	62
CHAPTER 6: ALL CAUSES OR SPECIFIC SITES OR BODY PARTS	73
SUMMARY OF FINDINGS	73
CHILDREN AND ADOLESCENTS	73
ALL AGES AGGREGATED AND ADULTS ONLY	75
REFERENCES	77
CHAPTER 7: THE REVIEW IN BRIEF – WHAT DO WE KNOW NOW?	87
COMPARABILITY OF THE STUDIES – DIFFICULT EXTRAPOLATION OF THE FINDINGS	88
DIRECTION OF THE FINDINGS – SOME PATTERNS BUT ALSO INCONSISTENCY	89
POSSIBLE MECHANISMS – STUDIES ON CAUSALITY UNCOMMON	93
INTERVENTIONS ARE SELDOM EVALUATED WITH REGARDS TO THEIR SOCIOECONOMIC DIFFERENTIAL	94
REFERENCES	95

CHAPTER 8: PAVING THE WAY TO EQUITY IN SAFETY – POSSIBILITIES AND CHALLENGES.... 99

DATA ARE ESSENTIAL AND IMPERATIVE	99
WHAT COUNTERMEASURES CAN BE ENVISAGED TO ADDRESS THE SAFETY DIVIDE?	100
SAFETY-FOR-ALL STRATEGIES	101
LEVELLING-UP AND TARGETED STRATEGIES	103
DECREASING DIFFERENTIAL SUSCEPTIBILITY	103
PREVENTING UNEQUAL CONSEQUENCES OF INJURIES	105
DECREASING DIFFERENTIAL EXPOSURES	106
INFLUENCING SOCIAL STRATIFICATION	107
TARGETED PROGRAMMES - IN SUMMARY	108
CONCLUDING REMARKS	109
REFERENCES	110

Abbreviations

A and E	Accident and Emergency (departments)
FMPV	Female to Male Partner Violence
GNP	Gross National Product
IPV	Intimate Partner Violence
OR	Odds ratio
MFPV	Male to Female Partner Violence
RR	Risk/Rate ratio
RTI	Road Traffic Injury
SES	Socioeconomic Status
TBI	Traumatic Brain Injury
UIM	Unintentional Injury Mortality

Executive Summary

Violence and injuries are not only one of the major causes of premature death but are also considered as one of the causes of mortality with the steepest social gradient. This report presents an overview of the current state of knowledge regarding socioeconomic differences in injury risks, reviewing mortality and morbidity studies conducted both inside and outside the WHO European Region, published during the past 17 years and addressing the leading causes of injury, both intentional or unintentional: interpersonal violence, self-directed violence, traffic, falls, drowning, poisoning and burns. Around 300 scientific articles have been selected and reviewed with the aim of highlighting the main features of the knowledge at hand, including where it comes from, how much attention has been paid to various injury causes, which segments of the population have been considered, and whether European studies, when they exist, obtain results that are similar to those from other parts of the world. Studies of interventions that specifically examine outcome effects across socioeconomic groups or areas were also reviewed.

It is important to remember that comparisons between studies are difficult for structural and operational reasons. As the social stratification differs from one country to another and, with it, the distribution of material and social advantages, the size of the gap between groups is not constant over countries. Also, across studies, the manner in which socioeconomic position and material deprivation are operationalised varies considerably both in the measures used and the scales or number of categories used for similar measures.

The knowledge accumulated so far can be described along the following lines:

- The volume of articles published during the past two decades in medical and public health peer-reviewed journals on the socioeconomic patterning of injuries is impressively high.
- The studies conducted are very often descriptive. Injuries are grouped in various manners and their relative distribution across individual and area socioeconomic descriptors is highlighted.
- All injury causes, all settings, and all age groups are not covered to the same extent.
- Of about 300 studies reviewed, self-inflicted injuries are definitely the causes of mortality and morbidity most studied (41% of the studies reviewed), followed by violence- and traffic-related injuries (16% each). Little attention has been paid to fall, burn, drowning or poisoning injuries.
- Mortality studies dominate the literature reviewed for some injury causes (e.g., self-directed violence, drowning, poisoning) but not all (e.g., road traffic injuries, falls). Morbidity studies are on the increase.
- Within the WHO European Region, the injury causes most studied are self-directed violence and road traffic crashes.
- The studies, though numerous, come from a limited number of countries both outside and inside the WHO European Region. In general, there is a paucity of studies from low- and middle-income countries.
- The evidence at hand is therefore mainly representative of some types of countries (governments and economies) and does not encompass many forms of social stratification.
- Within Europe, the bulk of the evidence stems from high-income countries and, most often, countries from the North. Whether this is a reflection of those countries being more concerned with equity issues in general is uncertain.
- Among mortality studies, the empirical evidence at hand very often shows strong associations with individual- and area-based material deprivation. People from low socioeconomic status and from less affluent areas tend to die by injury to a greater extent than others. This has been observed for most causes of injury (e.g., traffic, self-directed violence, interpersonal violence, poisoning, burns) but also for several settings (e.g., home, work, transport).

- Using a variety of data sources and severity criteria, studies based on morbidity data provide results somewhat less consistent than those of mortality studies. Nonetheless, numerous studies show considerable differences between socioeconomic groups even for less lethal injuries of various kinds.
- The distribution of explanatory risk and protective factors across socioeconomic groups has been studied to a limited extent and only for some causes. The most sophisticated designs are found above all in research on self-directed violence and in some instances in traffic studies.
- The literature consequently remains silent regarding the nature of the mechanisms lying behind socioeconomic differences in injury mortality and morbidity.
- Altogether, mortality and morbidity studies suggest that the socioeconomic patterning of injuries can be multifaceted, influenced by a variety of individual and contextual mechanisms.
- Multilevel studies strongly indicate that mortality and morbidity differentials across people from different socioeconomic backgrounds are a reflection not only of individual mechanisms but also of contextual ones.
- The mechanisms likely to explain those differences may vary by cause of injury, sex and age group of the victim and the setting in which the injury occurred.
- Interventions addressing the differential impact of safety interventions on various socioeconomic groups and areas are few and limited in scope. Most of them deal with injury prevention among small children and focus on home or traffic (as pedestrian, bicyclist or car rider) safety.
- Not surprisingly, as a consequence of the above, most interventions of that kind target the adoption of safe practices and the use of safety equipments, which represent one of several possible approaches for reducing socioeconomic inequalities in injuries, i.e., reducing differential susceptibility.
- Promising interventions for prevention such as those that reduce differential exposure to hazards or those that aim to reduce differential consequences of injuries seem to have received negligible attention.
- In sum, the research at hand provides a poor evidence base as to how to avoid – or narrow down – social differences in injury risks. It is therefore unclear whether prevention works best where it may be needed most.
- European countries are no exception to the above.

It ought to be underlined that restrictions in the review process undertaken by the research team, as well as publication and other selection biases beyond the team's control, may bring an overrepresentation of studies showing socioeconomic differences – or positive effects of interventions.

The maintenance of social inequalities in health and safety is regarded as a major threat to the achievement of population health targets, including raising life expectancy and average health status. In fact, for those targets to be reached and sustained, equity-oriented policies and interventions are required alongside health-for-all ones, both within and outside the health policy domain. Violence and injury are no exceptions

The report provides a general discussion where research needs are highlighted and different strategies are proposed that can contribute to the reduction of the safety divide between people and places. Interventions targeted at low socioeconomic groups or areas – which have not been included in the review process as their evaluation is not concerned with their potential for actually reducing the safety divide – are considered in the discussion as this kind of approach may have a “levelling up” potential. They are introduced in the framework of the various mechanisms of health and safety inequity they may help tackling.

Chapter 1: Introduction

An old problem in a new context

The existence of differences in the health status of people from different socioeconomic groups is not a new phenomenon. Over the years, a great deal of scientific evidence has been produced showing that people from lower socioeconomic positions have mortality rates significantly higher than those from upper positions. The health divide has indeed survived major improvements in medical science, several stages of technological development, considerable demographic changes, and substantial efforts to set up more equitable public-health systems, governments and states.

Nonetheless, the causes contributing to health differentials have changed considerably. Nowadays, although the leading causes of death in numeric terms are cardiovascular diseases and cancer, the ranking of causes changes significantly when age-at-death is considered. Then, external causes such as unintentional injuries, interpersonal violence and self-inflicted injuries become equally – and increasingly – important (WHO 2002b). Evidence for that has been produced both outside (Fukuda et al. 2005) and inside Europe (Martikainen et al. 2003; Shkolnikov et al. 1998).

One can therefore wonder whether downward trends in rates of fatal injuries noticed in rich nations, including a number of European ones (Morrison et al. 2000a; 2000b; UNICEF 2001), benefit to the same extent members of all socio-economic groups in those nations. If safety appears to have improved in general but the safety divide remains or if it worsens (Edwards et al. 2006), what does that tell us about the policies and strategies in place, or about their transferability to other countries?

It should also be emphasized that injuries not only contribute significantly to the health divide but they have also become a leading cause of death and disability around the world (Hofman et al. 2005). In the WHO European Region only, injuries account for 9% of deaths and 14% of ill-health. The burden is substantially higher in countries from Eastern Europe (Sethi et al. 2006). International prognoses suggest that the ranking of injuries as a cause of death and disability is on the rise, particularly in the younger segments of the population and in low- and middle-income countries (WHO 2002a; 2002b; WHO 2007).

The increase is not only relative, that is, compared with other health problems, but also absolute: worldwide, an increasing number of people die of injuries or are disabled daily. Explanations for this can be found, among others, in the rapid macro-economic phenomenon of internationalization, urbanization, and motorization (Whitehead and Dahlgren 2006a; 2006b; Sethi et al. 2006) and their related consequences on people and communities, life styles and practices.

Why care about the socioeconomic patterning of injuries?

Paying attention to variability in population health and safety is important for several reasons. One is that social stratification and income distribution have an impact on population health and safety. It has even been proposed that the size of the gap between the mortality and morbidity rates of the most and the least advantaged groups can be regarded as indicative of the potential for improvement in a nation's (or living area's) health and safety (Blane 1995).

Perhaps most importantly, injury differentials should not inevitably reflect differences in wealth: they are neither unavoidable nor irreversible (Laflamme 1998). For example, built-in safety measures of various types (e.g., better housing, safer products) and the conception of safe environments (traffic separation, traffic calming, and safer home or work environments) can do a lot to enhance safety for all – including the least well off.

Further, as abatement strategies (the protection of each citizen through a collective measure that affects a whole community or country) may not always be possible, making a choice between alternative countermeasures aimed at reducing the safety divide may require a deeper understanding of the mechanisms via which socioeconomic differentials in violence and injury risks are produced. For example, when environmental changes are too costly, empirical evidence may be needed to determine which of several possible measures is most likely to impact on injury risks (or their consequences), in a particular deprived living area or hazardous work environment.

A further aspect already raised above is the distribution of the benefits of prevention. Although there is growing evidence that “prevention works”, we do not really know whether it works where it is needed most (Towner et al. 2005). As in other prevention domains, it is highly probable that programmes implemented under less than ideal conditions produce fairly negative results, particularly when they rest on local participation (Strawn 1994; Beeker et al. 1998; Gottfredson et al. 1998; Stone et al. 2007). To date, strategies for prevention specifically aimed at reducing socioeconomic disparities are few and often limited in scope. This, in turn, provides us with only limited evidence-based alternatives.

Last but not least, some interventions may even miss their target and have negative effects on socioeconomic disparities. This is the case for instance with information campaigns aimed at influencing individual health and safety behaviours, as those who are most likely to “get the message” and put it into practice may belong to the already less at-risk groups.

Why this review?

A great deal of research has been produced on socioeconomic disparities and injury, most of which is cause-specific (e.g., road traffic injuries of various kinds, domestic violence, self-directed violence). Reviews have been conducted, often on specific causes or particular age groups (see box below), but the information remains scattered. An overarching picture of the problem has not yet been achieved. Plans to reduce socioeconomic disparities could greatly benefit from a clear situation analysis of the problem, from which the implications for policy, practice and research can be discussed.

This report is an attempt in that direction. It presents an inclusive overview of the current state of knowledge regarding socioeconomic differences in injury risks by considering studies published in the medical and public health literature during the past 17 years that address the leading causes of both fatal and non-fatal injury: interpersonal violence, self-directed violence, traffic, falls, drowning, poisoning and burns. A distinction is introduced between studies according to whether they were conducted inside or outside the WHO European Region (including both EU and non-EU countries). Even multi-country studies are considered.

Population-based interventions that aim to reduce socioeconomic differences in injury risks were also sought. As the focus of the review was on the safety divide, it was decided that interventions targeted exclusively at deprived groups would be included only in instances where the programme effects and outcomes were assessed in comparison with better-off socioeconomic groups. Targeted interventions without that kind of assessment would be considered in the discussion chapter of the report.

The aim of this report is to highlight the main features of the knowledge at hand, to clarify where it comes from, which segments of the population it is based on and whether European studies, when they exist, reach results that are similar to those from other parts of the world. Thereafter, research needs as well as key mechanisms that can be tackled in order to combat the socioeconomic patterning of injuries are highlighted in a general discussion.

The report is tailored to public health researchers and practitioners, safety planners, and policy makers and should serve as a source of information, reflection and inspiration for research and practice.

Earlier reviews

Peer-reviewed articles

- Birken CS, Macarthur C. Socioeconomic status and injury risk in children. *Paediatr Child Health* 2004;9:323-25.
- Boxer PA, Burnett C, Swanson N. Suicide and occupation: a review of the literature. *J Occup Environm Med* 1995;37:442-52.
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- Reading R, Haynes R, Shenassa ED. Neighborhood influences on child injury risk. *Child Youth Environment* 2005;15:165-85.
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Reports

- Engström K. *Social Inequality in Violence-related Injuries: Knowledge Accumulated, Research Needs, and Alternatives for Prevention*. Sweden's National Institute of Public Health: Stockholm, 1999.
- Laflamme L. *Social Inequality in Injury Risks: Knowledge Accumulated and Plans for the Future*. Sweden's National Institute of Public Health: Stockholm, 1998.
- Towner, E, Dowswell T, Emington G, Burkes M, Towner J. *Injuries in Children aged 0-14 years and Inequalities*. United Kingdom: Health Development Agency, 2005.

Meta-analyses

- Guterman NB. Enrollment strategies in early home visitation to prevent physical child abuse and neglect and the "universal versus targeted" debate: a meta-analysis of population-based and screen-based programs. *Child Abuse & Neglect* 1999;23:863-90.
- Kendrick D, Coupland C, Mulvaney C, Simpson J, Smith S, Sutton A, Watson M, Woods A. Home safety education and provision of safety equipment for injury prevention. *Cochrane Database Systematic Review* 2007 Jan 24; (1):CD005014.

How was the review conducted and how is the report structured?

Original research articles that examined socioeconomic disparities in injury risk or measured the effects of interventions across socioeconomic groups were obtained through a literature search in the databases of SafetyLit, the Cochrane Library and the National Library of Medicine's Medline. For the former database, all studies included under "social disparities" were examined for relevance. All Cochrane reviews related to injury were considered. For the latter database, English, French, Swedish and Danish language studies published between January 1990 and June 2006 were identified using the keywords "injury or injuries or violence or accident or accidents or suicide or parasuicide or deliberate self harm" in

conjunction with “educational status or education or social class or socioeconomic status or occupation or income or social position or socioeconomic position or socioeconomic context or social context or deprivation or socio-economic factors or socio-economic characteristics or residence characteristics or neighbourhood”. Additional studies were also identified from the reference lists in selected articles and in those of the reviews listed above.

Although the limited number of databases examined may mean that the search was not exhaustive the approach used with those databases was as inclusive as possible. Any study including denominators and testing for significance or providing confidence intervals was dealt with regardless of the strength of its design and the effort made to control for confounding factors. The inclusion criteria of the papers are presented in the box below.

Inclusion criteria for studies in the review

- Publication: in a peer-reviewed journal between January 1990 and June 2006
- Language: English, French, Danish and Swedish studies
- Design and methods: For risk distribution studies, wide ranging but use of tests for statistical significance or included confidence intervals. For intervention studies, randomised controlled trials or controlled before and after studies
- Focus: For risk distribution studies, examination of the relationship between socioeconomic status (SES) and injury at an individual- or area-level as the primary research question. Studies merely controlling for SES were excluded. For intervention studies, those measuring the effects of interventions across socioeconomic groups
- Severity level: fatal and non-fatal injuries
- Cause: all injury types resulting from interpersonal violence, self-directed violence, traffic collisions, falls, drowning, poisoning and burns
- Analytical level: both area-based and individual-based studies
- Measures for individual-based studies: education, income and wealth, social class/occupational status, composite measures of these factors and proxy measures such as neighbourhood deprivation
- Measures for area-based studies: compositional aspects such as educational level, occupational status, income, wealth, poverty, and deprivation of an area

In the time since the literature search was completed, two important meta-analyses regarding interventions to reduce injuries in the home environment came to the authors’ attention – one on home safety education for childhood unintentional injuries of various kinds (Kendrick et al. 2007) and the other on early home visitation programmes to reduce child physical abuse and maltreatment (Guterman 1999). Given that they assess differences in outcomes depending on whether interventions are population-based or targeted – although the specific studies that they cover did not – they have been included in the review.

The selected articles were then classified according to each main injury cause. A number of studies covered several injury causes combined or focused on specific injury sites or body parts. Given the inclusive approach taken in the review process, an additional chapter was included: all/mixed causes and specific sites or body parts. This section highlights those various mortality and morbidity studies that have looked at socioeconomic disparities from another angle than “cause-specific”.

As becomes evident, some causes of injuries received considerable attention during the past decades, above all self-directed violence but also interpersonal violence and traffic. Other causes are covered to a very limited extent, e.g., falls, drowning, poisoning and burns. In light of this, the report has the following sections:

Unintentional injury causes

- Traffic
- Falls, burns, poisoning, drowning and mixed causes

Intentional injury causes

- Self-directed violence
- Interpersonal violence

Other

- All causes or injuries of specific sites or body parts

While the use of the above broad categories are in keeping with WHO practice, in individual chapters these have often been replaced with terms more commonly used in research, and therefore also the terms used in the literature search. This particularly pertains to self-directed violence which is more commonly referred to as suicide, with fatal outcome (suicide mortality); or as attempted suicide, deliberate self-harm, or parasuicide with non-fatal outcome (suicide morbidity). Although an important issue, it is beyond the scope of this report to debate the definitions of these terms.

In the report, each section is introduced with a summary of the main findings and examples from different countries showing the size of the associations between socioeconomic status and injury. This is followed by a brief overview of the studies and their findings, and study-by-study tables. The studies are grouped according to where they have been conducted (within or outside Europe) and whether they are based on individual data, area data (so called ecological studies), or both (so called multilevel studies).

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Chapter 2: road traffic injuries

Summary and examples of findings

The vast majority of the articles within this area focused on children and young people. Most of the studies were conducted in European countries, especially in the Northern part of Europe. Studies from outside Europe came from the USA, Canada, New Zealand and Australia. Altogether, the findings show that low socioeconomic position at the area or individual level seems to increase the risk of being injured in traffic. This applies, to a varying extent, to different ages and for different kinds of traffic categories. The results indicate that there are socioeconomic differences not only for mortality, but also for road traffic injury morbidity, as measured by both minor injuries and injuries requiring hospital in-patient care. The evidence concerning socioeconomic differences in relation to gender is conflicting.

Mortality studies*	16	
Country		
Europe	11	England, Spain, Sweden, The Netherlands
Outside Europe	4	Australia, Canada, New Zealand, USA
Multi-country	1	
Age		
All ages	2	
Childhood/youth	9	
Adulthood	5	
Category of road users		
All users aggregated	8	
Users separated (more than one)	5	
Users separated (only one)	3	
Morbidity studies*	35	
Country		
Europe	25	Greece, Ireland, Spain, Sweden, United Kingdom
Outside Europe	9	Canada, USA
Multi-country	1	
Age		
All ages	3	
Childhood/youth	27	
Adulthood	5	
Category of road users		
All users aggregated	9	
Users separated (more than one)	17	
Users separated (only one)	9	
Interventions	4	Canada, New Zealand, United Kingdom
Related risk factors	8	Belgium, Mexico, Sweden, United Kingdom, USA

* Some studies dealt with both injury mortality and morbidity and they are reported twice.

The following table presents examples of studies where positive associations between socioeconomic status and different types of road traffic injury were found. The studies are presented by country of origin.

Severity	Country	Findings
Mortality		
Studies within Europe		
	Spain ¹	A multi-level analysis from Barcelona revealed a higher risk of traffic injury death for the population with no schooling, after adjustment of contextual variables for both males and females (RR=4.26 and 4.24 respectively).
	England and Wales ²	Child injury deaths have fallen in most socioeconomic groups from 1981 to 2001 except for children in families with no adult in paid employment. Steep social gradients are still evident particularly for pedestrian injuries (RR=4.7).
Studies outside Europe		
	Canada ³	An area-based study in Montreal and all of urban Canada observed that children living in the poorest neighbourhoods had a four times higher risk for RTIs compared to children in the least poor neighbourhoods.
	USA ⁴	A study based on the nationwide personal transportation survey and the Fatality Analysis Reporting System (FARS) found higher RRs for those who had not completed high school for both men and women (3.52 and 2.79 respectively).
Morbidity		
Studies within Europe		
	Greece ⁵	Children residing in less wealthy towns had almost double the risk of having pedestrian injuries compared with children living in wealthier towns.
	Sweden ⁶	National studies based on individual data indicate that low socioeconomic position is related to a higher risk of RTIs. The injury risk of pedestrians and bicyclists are 20-30% higher among the children of manual workers than those of intermediate and high level salaried employees. Socioeconomic differences increase for injuries involving motorised vehicles (RR between 1.70-1.80).
	United Kingdom ^{7,8}	A number of studies from the UK have observed a strong relationship between deprived areas and a high rate of pedestrian injuries. A cross sectional survey in Trent showed that children in the most deprived areas had a nearly 4 times higher risk for pedestrian injuries compared to children in the most affluent areas.
Studies outside Europe		
	New Zealand ⁹	The risk of pedestrian injuries among children in the lowest socioeconomic groups was over twice that of the children in the higher socioeconomic groups.

1 Borrell et al. 2002
2 Edwards et al. 2006
3 Dougherty et al. 1990

4 Braver et al. 2003
5 Moustaki et al. 2001
6 Hasselberg et al. 2001

7 Coupland et al. 2003
8 Hippisley-Cox et al. 2002
9 Roberts et al. 1995

Social differences in road traffic injuries

The studies included herein are organized in three main sections representing studies conducted within Europe and outside Europe, and a section on risk factors and interventions.

European studies. From the total number of 44 reviewed articles, 33 were from European countries, mainly from the northern part of Europe. A large number of the studies focused on children and young people. Both area-based and individual level studies have been conducted. The effect of area deprivation on RTIs has been studied for different kinds of road users. All studies but one showed a relationship between low socioeconomic position and an increased risk of road traffic injuries. The area-based studies have primarily focused on pedestrian and bicycle injuries. A study focusing on pedestrian casualties in England found an association between increased deprivation and higher numbers of pedestrian casualties for all ages, but a stronger association for children (Graham et al. 2005). The strong relationship between the degree of deprivation and pedestrian injuries for children is also shown in other studies from Britain (Adams et al. 2005; Coupland et al. 2003; Edwards et al. 2006; Lyons et al. 2003; Kendrick 1993). Children in deprived areas in England have up to a four times higher risk for pedestrian injuries compared to children in more affluent areas. A recent English study shows that even though child injury deaths have decreased in most socioeconomic groups over the last twenty years, the clear inequalities in injury deaths

