

# CHAPTER 2

## BURDEN OF UNINTENTIONAL INJURIES

### 2.1 Introduction

This chapter describes the burden and causes of unintentional injuries in children aged 0–19 years in the WHO European Region (Box 2.1).

### 2.2 Variations in the burden

In 2004, 42 000 Europeans younger than 20 years died from unintentional injuries (1). While injuries are the leading cause of death in those aged 5–19 years, three causes – road traffic, drowning and poisoning – rank among the top 15 causes of death in those aged 0–19 years (Table 2.1). The ranks of different injury types vary with victims' ages. Road traffic injury is the leading cause of death for those aged 5–19, while drowning holds this rank for the group aged 1–4 years (Annex 4, Table 1).

The average age-standardized mortality rate for the group aged 0–19 years in the Region – 18.4 per 100 000 population – masks great variation between countries. When taken together, the rates in LMICs (25.4 per 100 000 population) are more than three times those for HICs (7.9 per 100 000). Comparisons between countries show even greater inequality. Deaths in the countries with the highest rates are almost seven times those in the countries with the lowest rates (Fig. 2.1). Death rates are highest in the Russian Federation, Kazakhstan and the Republic of Moldova and lowest in the Netherlands, Israel and Switzerland. Some countries, such as those in the Caucasus and Balkan region, have less reliable data for the period studied, which are more difficult to interpret (2).

### 2.3 Leading causes of injury

The leading causes of fatal unintentional injuries were road traffic (39%), drowning (14%), poisoning (7%), fires and falls (4% each) (Fig. 2.2). Other causes – including deaths from suffocation, choking, strangulation, hypo- and hyperthermia, animal bites, natural disasters, etc. – account for a high proportion of deaths (32%). As the leading causes change with age, those for children aged under 10 years are drowning and road traffic injuries (both 21%), followed by poisoning (8%), while those for older children are RTIs (51%), drowning (9%) and poisoning (7%) (Annex 4, Fig. 5).

#### BOX 2.1

#### Key facts about unintentional injuries in children

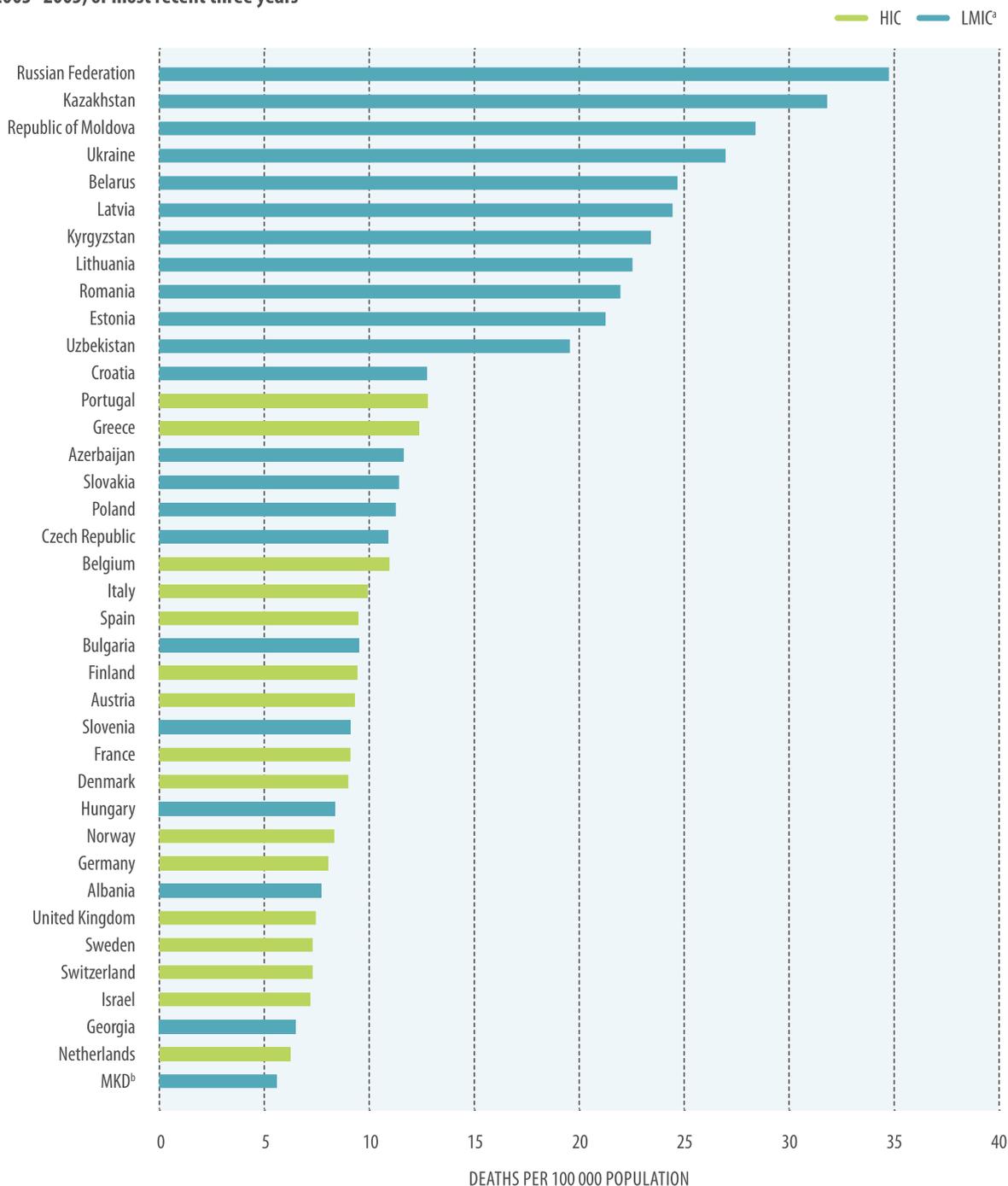
- Injuries are the leading cause of death in children aged 5–19 years in the Region.
- There are 42 000 deaths in children aged 0–19 years annually; 5 out of 6 of these occur in LMICs, where death rates are three times higher than in high-income countries (HICs).
- Boys suffer three out of four injury deaths.
- There are a sevenfold difference between countries with the highest and lowest injury death rates, and up to ninefold differences in the variations within countries.
- Injuries cause a huge drain on health resources, with an estimated annual 5 million hospital admissions and 69 million visits to emergency departments in the Region.
- The low injury rates in HICs suggest lives can also be saved in other settings.

**Table 2.1**  
Ranking of 15 leading causes of death in people aged 0–19 years in the WHO European Region, 2004

Rank	Cause of death
1	Perinatal causes
2	Lower respiratory infections
3	Diarrhoeal diseases
4	Congenital anomalies
5	Road traffic injuries
6	Self-inflicted injuries
7	Meningitis
8	Drowning
9	Leukaemia
10	Violence
11	Upper respiratory infections
12	Poisoning
13	Endocrine disorders
14	HIV/AIDS
15	Epilepsy

Source: The global burden of disease: 2004 update (1).

**Fig. 2.1**  
Average standardized mortality rates for all unintentional injuries in children aged 0–19 years in the WHO European Region 2003–2005, or most recent three years



<sup>a</sup>Income levels are those defined by the World Bank.

<sup>b</sup>The International Organization for Standardization acronym for the former Yugoslav Republic of Macedonia is used in figures throughout this publication.

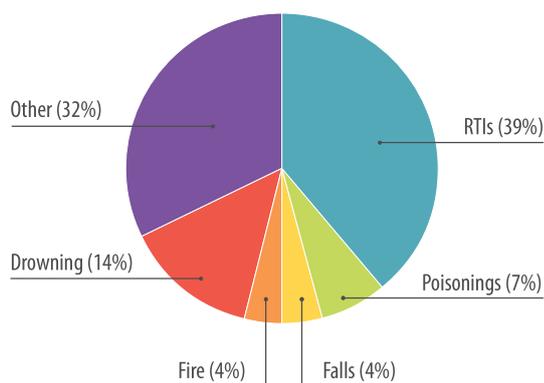
Source: European detailed mortality database (3).

## 2.4 Variations by age and sex

The death rates from unintentional injuries are highest in children under 1 year old (Fig. 2.3), followed by those aged 15–19 years. At all ages, males have higher rates than females, though this difference is minimal for infants and rises sharply in 15–19-year-olds. The explanation for this difference lies more in environmental factors for infants, and in differences in exposures, socialization and risk factors

for teenagers. This points to the need for even stronger protective environmental measures to address these factors, especially for infants and older boys. Injury rates are higher in males than females, irrespective of the cause, but the difference in risk of death by gender is greatest for RTIs, drowning and falls and smallest for fires and poisoning (Fig 2.4).

**Fig. 2.2**  
Proportion of unintentional injury deaths among people aged 0–19 years in the WHO European Region (total deaths: 42 000)



Source: The global burden of disease: 2004 update (7).

## 2.5 Inequalities in the Region by country income

As highlighted in Fig. 2.1, injury mortality in the countries with the highest rates is more than eight times that in those with the lowest rates. In fact, five out of six deaths from injuries in children and teenagers occur in LMICs. Of the 42 000 deaths in the Region in 2004, 7000 were in HICs and 35 000 in LMICs. Comparison of age-standardized death rates for unintentional injuries for the group aged 0–19 as a whole shows that the likelihood of dying from injuries is 3.2 times higher in LMICs than in HICs. Analyses of this difference by age category show that injury rates are highest in those aged 15–19 years in HICs, and in infants in LMICs. The injury death ratios are therefore highest in the younger ages, with ratios for children under 1 year of age over 10 times higher in LMICs than in HICs (Table 2.2). For those aged 15–19, this ratio is 1.7 times higher in LMICs than in HICs.

As with other health conditions, childhood deaths from injury show a social gradient (4), irrespective of cause and strongly associated with poverty, single parenthood, low maternal education, low maternal age at birth, poor housing, large family size, and parental alcohol use or drug abuse. Unintentional injuries are the leading cause of inequality in childhood death; this was confirmed by an analysis of Scottish data, and is true for both males and females (5). Data show that the greatest inequalities are in children, rather than other age groups, re-emphasizing their vulnerability to socioeconomic factors. There is a ninefold difference in deaths from unintentional injury in children whose parents are unemployed when compared to those with parents in the highest occupations (6).

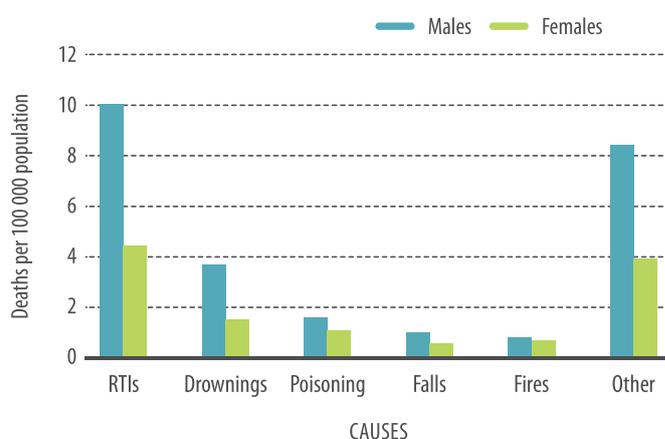
These inequalities are both a threat and an opportunity to adapt and transfer good practice and to report experience from countries with lower mortality rates to those with higher rates. The experience of countries that gave priority

**Fig. 2.3**  
Age- and sex-specific death rates for all unintentional child injuries in the WHO European Region



Source: The global burden of disease: 2004 update (7).

**Fig. 2.4**  
Unintentional injury death rates per 100 000 people aged 0–19 years by cause and sex in the European Region



Source: The global burden of disease: 2004 update (7).

**Table 2.2**  
Age-specific death rates and death rate ratios for people aged under 20 years in LMICs and HICs

Rates and rate ratio	Age groups (years)					
	<1	1–4	5–9	10–14	15–19	<20
Death rates in:						
HIC	6.49	4.80	2.99	3.86	18.78	7.93
LMIC	66.43	31.82	15.76	13.95	32.71	25.38
Rate ratio	10.23	6.62	5.27	3.61	1.74	3.20

Source: The global burden of disease: 2004 update (7).

to injury prevention decades ago, and invested in research, development and practice, represents a most useful resource for the whole Region, and its sharing should be supported as part of international cooperation.

## 2.6 Beyond fatal injuries

Deaths are only the tip of the clinical iceberg; many non-fatal injuries occur for each death, often with far reaching consequences. Assessing the non-fatal burden remains somewhat challenging, however, given the variety of data systems in the Region. Studies in the Netherlands, Sweden and the United Kingdom were used to create Fig. 2.5. The study in the Netherlands showed that, for every death from home and leisure injuries, there were 160 hospital admissions and 2000 emergency room attendances (7). The United Kingdom study showed a similar ratio: 1 death to 151 admissions and 1947 attendances (8), while for Sweden, the ratio was 1 death to 75 admissions and 959 attendances (9). This gives an average ratio of 1 death to 129 hospital admissions and 1635 emergency room attendances.

The slope of the pyramid (Fig. 2.5) changes with the proportion of those who die or are seriously injured. This is related to the age of the injured person and the mechanism and severity of the injury. A study from the United States of America estimated that, for every injury death among those under 19 years, there are 45 hospitalizations and 1300 visits to an emergency room (10). Were the ratio for the group aged under 20 in these countries to prevail for the European Region as a whole, in addition to 42 000 deaths, there would be 5.4 million hospital admissions and 68.7 million attendances at emergency departments.

Further, many more millions would seek help from general practitioners or treat themselves. These numbers estimate the prevalence of serious injuries, implying a huge drain on scant health resources, funds not spent treating other conditions and lost productivity. In addition, injuries can have long-term physical and psychological consequences for children, with serious effects on health

**Fig. 2.5**  
The clinical pyramid for injuries in children

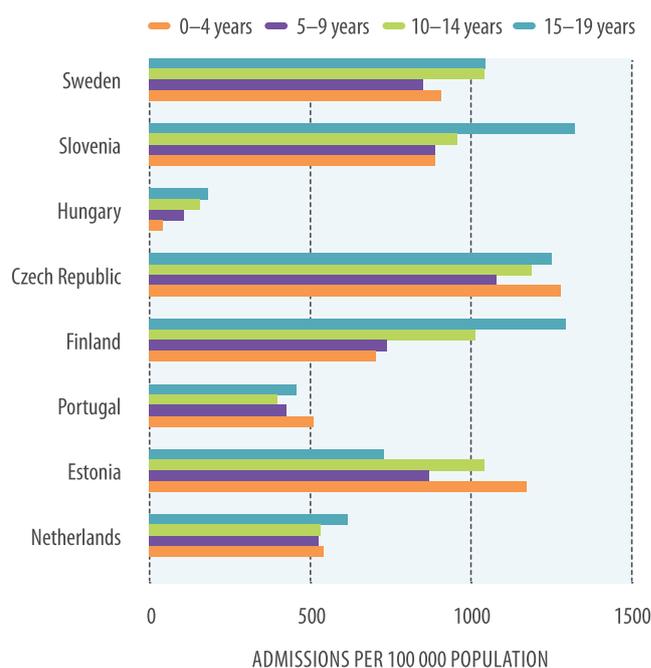


and well-being in later life for them and their families, whose income prospects can be greatly diminished by the presence of a disabled child requiring long-term assistance. Very little is known about these other important health and economic effects.

Severe injuries in children require hospitalization, which can provide valuable information for prevention. Unfortunately, although most countries have data on hospitalization for injuries, only a few have complete data by mechanism of injury (11). Data from countries for which mechanism information was available in 90% or more of the discharges for that year (Fig. 2.6) show injury admission can vary twofold: for example, the Netherlands versus the Czech Republic. While this may reflect differences in the incidence of severe injuries to some extent, interpreting hospitalization data is complex because of differences in access to hospitals, patterns of health care practice and health care financing. Nevertheless, these data emphasize the frequency of severe injuries in children and confirm the huge drain on health resources. Admission rates appear to increase with age for some countries, and to be highest in children aged under 5 years in a few others.

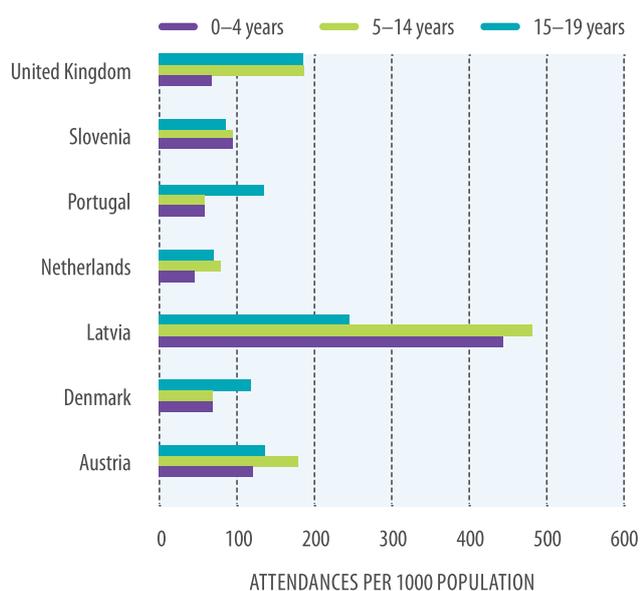
In some countries, data are available on injury-related visits to emergency departments. A study of visits resulting from home and leisure-related injuries in 8 European countries gave attendance rates ranging from 50 and 180 per 1000 population (Fig. 2.7). For most countries, these appear to be lowest in children aged 0–4 years and increase with age; the converse is true in others (12).

**Fig. 2.6**  
Hospitalization rates for children with unintentional injuries by age category for selected European countries, 2004



Source: APOLLO Hospital Discharge Database (17).

**Fig. 2.7**  
Emergency department attendance rate for home and leisure injuries per 1000 population per year by age for selected European countries, 2000–2004



Source: adapted from Polinder et al. (12).

## 2.7 The burden of injuries

As mentioned, injuries can result in lifelong pain and disability. The burden can be quantified with disability-adjusted life-years (DALYs), where 1 DALY is 1 year of life lost to premature death or lived with disability (1). Falls and RTIs rank eighth and ninth among the leading causes of DALYs lost in children aged under 15 years in the WHO European Region (Table 2.3). The actual ranking and the specific types of injuries involved vary somewhat by gender and country income level, with drowning being among the top 15 causes in males in LMICs, and RTIs as the leading injury mechanism in females (Annex 4, Table 3). The often long-term psychological effects of injury on children are difficult to quantify. For RTIs, post-traumatic stress disorder and anxiety can have long-lasting effects (13).

## 2.8 Costs of injuries in children

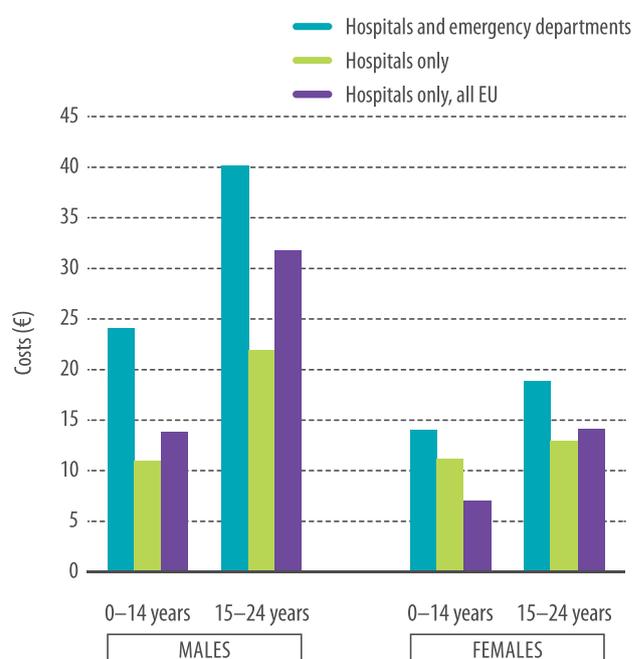
Injury cost estimates are relatively scarce in the literature, particularly when one examines specific age groups and/or injury mechanisms. Thus, cost estimates are very limited. The most recent European estimates of the average direct medical costs, based on emergency department attendance and hospital admission, are €19 per capita for injuries in children aged 0–14 and €28 per capita for people aged 15–24 years. The costs for injured males are twice those for females, as seen in Fig. 2.8; this reflects both a higher incidence rate and a higher hospitalization rate with more severe injuries. About 60% of these costs are estimated to comprise the direct medical costs of hospitalization, with the rest related

**Table 2.3**  
The 15 leading causes of DALYs among children aged 0–14 years, 2004

Rank	Cause (% of total)
1	Perinatal causes (21.6)
2	Congenital anomalies (9.8)
3	Lower respiratory infections (7.5)
4	Diarrhoeal diseases (7.1)
5	Iodine deficiency (4.0)
6	Unipolar depressive disorders (3.1)
7	Asthma (2.7)
8	Falls (2.2)
9	RTIs (1.9)
10	Refractive errors (1.7)
11	Migraine (1.7)
12	Endocrine disorders (1.5)
13	Schizophrenia (1.4)
14	Meningitis (1.4)
15	Iron-deficiency anaemia (1.3)

Source: The global burden of disease: update 2004 (7).

**Fig. 2.8**  
Mean costs per capita in 2005, for total admitted and/or non-admitted injury patients by age category, using aggregated data from Austria, Denmark, Latvia, the Netherlands, Portugal, Slovenia and the United Kingdom (Wales) and an estimate for the EU



Source: adapted from Polinder et al. (12).

to emergency department visits (12). Not only costs but also their distribution between hospital admission or attendance vary by gender and age (Fig. 2.8).

The total societal costs of injuries far exceed the direct health service costs. Injuries have considerable indirect costs, which include those due to lost opportunities, pain and suffering, and wages lost in having to care for injured or disabled children. Few data are available on this.

## 2.9 Conclusions

Unintentional injuries are the leading cause of death in children aged 5–19 years; for each death, there are many more hospital admissions and emergency care visits. LMICs suffer the largest losses: 5 out of 6 of these deaths. The leading causes of death are road traffic, drowning, poisoning, falls and fires. Lessons from HICs suggest that numerous evidence-based interventions exist. This evidence base is an opportunity for action and is discussed in more detail in later chapters. The inequalities highlighted here imply that children in the Region have unequal access to safe environments, and that this inequality is a source of social injustice that needs to be addressed (Box 2.2).

### BOX 2.2

#### Key messages for policy-makers

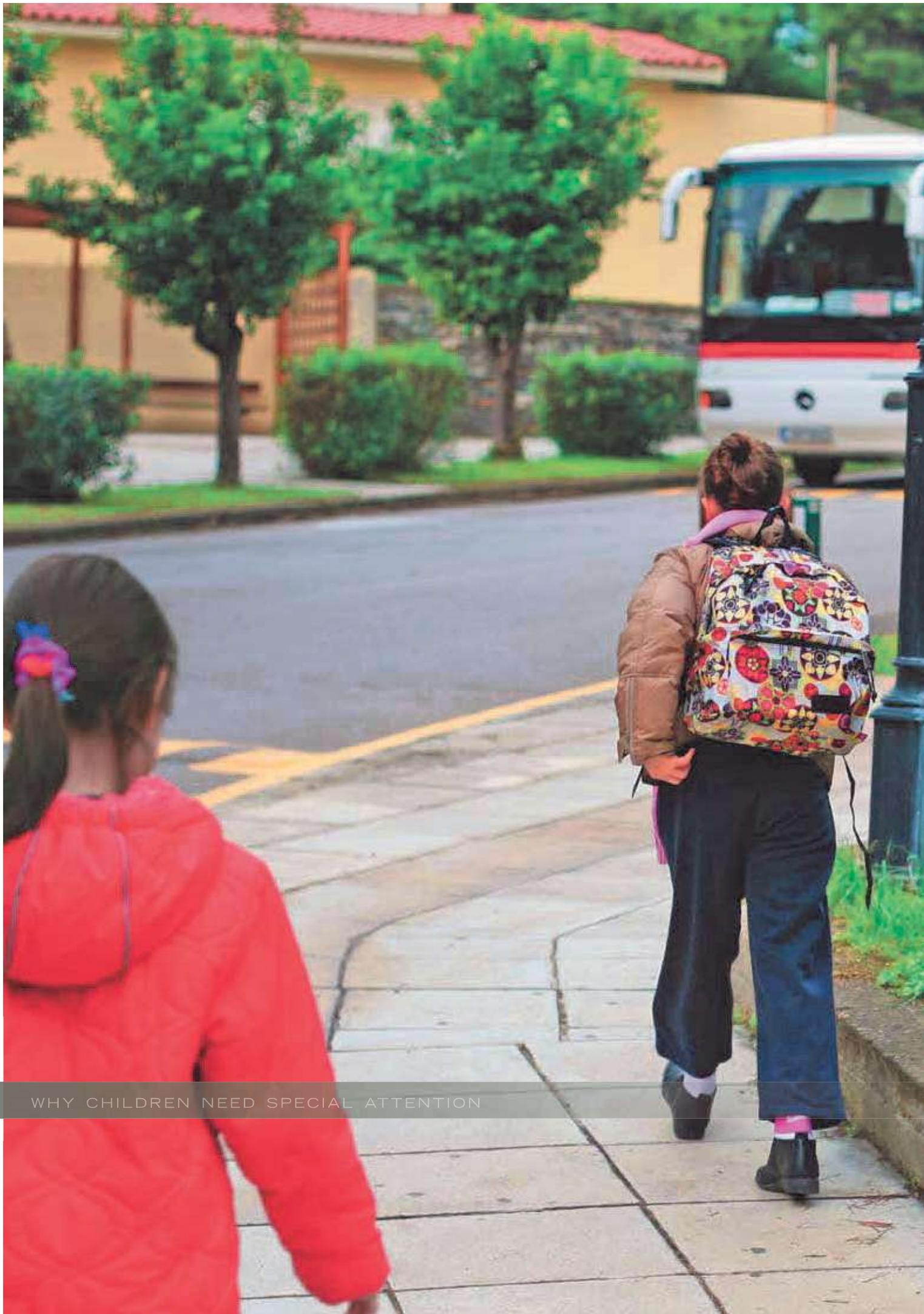
- Injuries are a leading cause of childhood death and disability, and a huge drain on health and societal resources.
- The Region shows large inequalities between and within countries, implying that children have unequal access to safe environments.
- Better data are needed to understand the consequences and costs of injury.
- Stronger policy support and long-term commitment are urgently needed to address the societal and environmental determinants of injuries and to reduce inequalities.

## 2.10 References

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A young girl with dark hair, wearing a white dress with a ruffled collar, is looking down. A hand is resting on her shoulder. The image is faded and serves as a background for the text.

By giving child injury prevention greater priority, Member States will join a global effort to reduce a leading cause of child mortality, and creating a safer and more just society for children in the European Region.



WHY CHILDREN NEED SPECIAL ATTENTION