Childhood deaths from injuries: trends and inequalities in Europe

Jasmine Armour-Marshall, Ingrid Wolfe, Erica Richardson, Marina Karanikolos, Martin McKee

1 Whittington Hospital, Magdala Avenue, London, N19 SNF, UK
2 European Centre on Health of Societies in Transition, London School of Hygiene and Tropical Medicine, London
3 European Observatory on Health Systems and Policies, London School of Hygiene and Tropical Medicine, London

Correspondence: Ingrid Wolfe, London School of Hygiene and Tropical Medicine, Department of Health Services Research and Policy, 15-17 Tavistock Place, London WC1H 9SH, tel: +44 (0) 2079272928, fax: +44 (0) 2079272701; email: Ingrid.wolfe@lshtm.ac.uk

Background: In 1998, a UNICEF report quantified the large East–West gap in Europe in child mortality from external causes (injuries and violence). In the past decade, much has changed in central and eastern Europe, economically, politically and socially. This study updates the earlier analysis, tracking changes in deaths from external causes in the different parts of Europe. Methods: The WHO mortality database was used to examine mortality from external causes for children aged 1–14 years between 1993 and 2008, by country, European subregion and cause. Results: Deaths from external causes have fallen in all of Europe since 1993. However, a clear east–west divide persists, with higher death rates in the former Soviet countries, especially the Commonwealth of Independent States (CIS). Trends in specific causes also vary geographically; the greatest overall declines have been in transport-related deaths, drowning, poisoning and ‘other’ external causes. Transport, drowning and ‘other’ remain the commonest external causes of death in childhood. Conclusion: Child injury mortality rates have fallen across Europe. In the former Soviet countries, this is likely to reflect improvements in living conditions since transition. Yet, large geographical inequalities remain, highlighting the need for enhanced measures to prevent injuries, particularly in the CIS countries and the Baltic states. However, except in a few countries, there is still little research on the nature of the problem or the effectiveness of potential interventions. Child deaths from injuries are avoidable and measures to reduce them would have a significant impact upon the overall burden of child mortality in Europe.

Introduction

A 1998 report compiled for UNICEF highlighted dramatic differences in death rates from injuries in children in different parts of Europe. By 1995, the most recent year included in the report, the death rate from injuries at the ages 1–14 years was over twice as high in central and eastern Europe as in the European Union, whereas in the former Soviet Union the rate was about four times higher. There were many specific reasons, but underlying them all was a failure by policy-makers in the former communist countries to realize that the high toll of premature death was not inevitable and to formulate measures that might reduce it. Since then, the situation in Europe has changed markedly. Most of the countries of central and eastern Europe are now members of the European Union, while life in the former Soviet countries has changed beyond all recognition for many, although not all of their inhabitants. In both of these regions, there have been substantial advances in areas such as product safety, and even those countries not seeking European Union membership have adopted many European laws to ensure free exchange of goods. Greater access to Western literature, and participation in international meetings, has facilitated the exchange of ideas, and introduced new ways of thinking about injuries: in particular, challenging the concept that they are unavoidable that is implicit in the word ‘accident’. Injury prevention has been a focus of development assistance, such as World Bank loans. It is therefore timely to revisit the pattern of childhood mortality from injuries in Europe to take stock of what has been achieved and what still needs to be done. For brevity, throughout this article, the term ‘injury’ is synonymous with those external causes of injury and poisoning in the corresponding chapters of the International Classification of Diseases.

Methods

Data were obtained from the WHO European Mortality Database, last updated in February 2010. Age-standardized mortality rates (using the European Standard Population) from external causes per 100 000 children were calculated for ages 1–14 years. The years studied were from 1993 and 2008. By 1993, the transition-associated fluctuations in mortality in central Europe had settled and the current national frontiers had, by and large, been established. 2008 is the year for which the most recent data are currently available for any country. As the numbers of observed deaths from external causes are small in some countries, 3-year rolling averages have been used where appropriate. As in previous analyses by Sethi et al. and UNICEF, the countries included have been grouped geographically as follows:

- Central Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.
- Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.
- South East Europe: Albania, Bulgaria, Croatia, Montenegro, Romania, Serbia, The Former Yugoslav Republic of Macedonia.
- Southern CIS: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.
- Internationally: Bosnia and Herzegovina, Croatia, Montenegro, Serbia, The Former Yugoslav Republic of Macedonia.

Results

The current situation

There is still a clear east–west gradient in child deaths from external causes with the highest rates in the southern CIS countries (figure 1). However, some caution is required here because of concerns about the quality of both mortality and population data. In particular, it is not clear...
Figure 1 Age-standardized death rates from external causes, children aged 1–14 years, by country: latest available year.
why Tajikistan, the poorest of the countries studied, should have a much lower death rate than Kazakhstan or Kyrgyzstan. The true situation in Turkmenistan is impossible to ascertain; the most recent mortality data are from 1998 and more recently successive governments have actively suppressed health data. The most recent Georgian data are from 2001 and again there are major concerns about data quality, especially in relation to deaths of children.

**Trends in external causes of mortality among children aged 1–14**

For brevity, trends are described at a subregional level. Between 1993 and 2008, child external cause mortality rates fell in all regions, but faster in the former Soviet countries so the absolute gap closed considerably (figure 2). However, the continued decline in western Europe means that the relative gap has actually widened, substantially so for the north-western CIS, from 4.0 times greater in 1991–93 to 5.7 times in 2006–08. Progress was somewhat faster in the Baltic states than in the Western CIS from the late 1990s onwards with the former accelerating but the latter slowing.

**Trends in specific mechanisms of death by region**

Deaths from external causes fell in all regions, but by different amounts (figure 3). In the Southern CIS, the largest absolute decline was in deaths from drowning (3.9/100 000), followed by other external causes (3.7/100 000) and then deaths from assault (2.9/100 000) and fire (2.3/100 000). The category ‘other external causes’ included a diverse array of specific causes, varying among countries. For example, in Azerbaijan, it comprised mainly ‘events of undetermined nature’, while in Uzbekistan it was mainly ‘electric current, radiation and extreme ambient air temperature and pressure’, raising the possibility that it included cases of heatstroke. In the north-western CIS, the greatest absolute decline was in deaths from drowning at 2.9/100 000, this time followed by transport-related deaths (2.5/100 000). In the Baltic states, the largest absolute declines have been in transport-related deaths (4.6/100 000), other external causes (3.8/100 000) and then drowning (3.5/100 000). In South East Europe, the greatest declines have been in other external causes (3.2/100 000) followed by transport-related causes (2.8/100 000), while in central Europe, the greatest decline was in transport-related causes (2.7/100 000). In Western Europe, the greatest decline was in transport-related causes (2.0/100 000). In relative terms, the greatest declines include assault (especially in the Southern CIS, Baltic states, Central and Western Europe), fire in the Baltic states and poisoning in Central Europe. Throughout all European regions, drowning, transport and ‘other’ causes remain the largest contributing causes of external deaths in childhood.

**Discussion**

This analysis paints a picture of considerable progress but much is left to do. There are, of course, a number of limitations. First, there are few timely data from several countries as well as concerns about their accuracy. The main concern relates to enumeration of deaths and of the population denominator in some countries; the causes of death being studied here are usually quite obvious, unlike the situation with deaths from chronic diseases in adults. Second, the analysis is limited to mortality. Data on non-fatal injuries require the existence of well-functioning information systems that are far beyond what would be feasible with the resources available in many of the countries concerned and even then there are problems due to the variety of treatment pathways involved.

Death rates in some central European countries, such as the Czech Republic and Slovenia, have now converged with those in their western neighbours, with Poland and Slovakia on course to do so soon. The major problems lie in the two countries that joined the European Union in 2007, Romania and Bulgaria. These are the poorest countries in the European Union, so there are fewer funds available for creating safe environments in which children can play. Both have persisting high levels of corruption, which tends to undermine the enforcement of safety-related legislation, a situation compounded by weaknesses in the Bulgarian justice system. The three Baltic states also have some distance to travel to achieve death rates at the levels seen in the western European Union countries, although they have come down from a much higher baseline at independence and are falling somewhat faster than in the other former Soviet countries.

Interpretation of the data is difficult because of the limited epidemiological research on childhood injuries in this region. Much of the existing research is, like this article, descriptive, analysing trends in mortality in a
single or few countries. Examples include research in Lithuania and Belarus. These produce results consistent with those reported here. One multi-national study has combined mortality and hospitalization data from countries that include Latvia and Slovenia to calculate burden of disease attributable to injuries in childhood and adolescence. A few have used other sources of data, such as the Polish study of farm injuries, taking advantage of provincial data from a Farmers’ Insurance Fund, which captured injuries leading to a claim for compensation. This described a summer peak in such injuries, which were concentrated among 13- to 15-year-old boys and largely involved falling, with approximately equal numbers occurring when working alone or assisting adults. A Romanian study described the reasons for attendance by children suffering from injuries and poisoning at emergency departments in Cluj. An Estonian study used data from forensic autopsies and provided detailed information on mechanisms of death. For example, it found that most poisonings were by carbon monoxide. Among the transport-related deaths, about a third were passengers in cars and a third pedestrians, with the remainder involving railways, snowmobiles and an airplane. Most of the homicides involved trauma to the head.

A few studies have been able to identify potential determinants of deaths from injury. An example is a Lithuanian study that found suicides were more common among those with low education and living in rural areas. This study also documented that suicide by hanging was increasingly common among adolescent girls. Similarly, an Estonian study linking data from the birth and death registers, identified an increased risk of death from injury in children whose mothers were young, had low educational attainment, and were without a partner. Importantly, the existing research is concentrated in a small number of countries, in particular Lithuania and Estonia. Although, we searched for papers in Russian and Lithuanian as well as in English language, we found virtually no published epidemiological research on childhood injuries from much of the CIS.

This is perhaps unsurprising given the findings of a 2006 survey of the institutional response to violence and unintentional injuries in the WHO European region, which found that few of the countries in the east of the region had developed an adequate structural response or devoted sufficient resources to injury prevention and control. Informants from Armenia, Georgia, Lithuania and the Russian Federation explicitly reported that unintentional injury prevention was not a governmental priority and no programmes to prevent accidental drowning, falls or poisoning, child abuse or youth violence could be identified in the CIS, although of course it is possible that there are local initiatives, for example within Healthy Cities projects, that have not been reported.

Despite the welcome declines, injuries are still responsible for a significant proportion of the total burden of childhood deaths, accounting for over 30% of child deaths in many countries; the commonest cause being transport-related and drowning. At least 15 000 child deaths each year could be avoided if all countries in the European region were to reduce mortality from injuries to a rate of 3.5/100 000. What has been achieved in many of the high burden
countries is likely to be largely a consequence of a general improvement in living standards, including greater product safety, improved transport infrastructure and enhanced social environments. However, it cannot be assumed that this will be enough, given the continuing variation in western European countries, with Portugal sharing many of the epidemiological features of the newer European Union Member States.

Public health professionals might be expected to take a lead in making the scale of the problem visible, as has happened in Lithuania and Estonia. However, while many countries have attempted to reform the outdated sanitary-epidemiological services inherited from the communist period, few have had much success. Where they have, as in Hungary, their focus has been on the high burden of chronic disease. Ministries of health are ideally positioned to co-ordinate a multi-sectoral response to injuries; however, they may be hampered by a lack of authority, insufficient funding and a weak regulatory environment to enforce interventions. The WHO has, however, provided them with a number of measures designed to raise awareness of childhood injuries, and offers logistical support to improve injury surveillance systems.

Injuries remain the leading cause of childhood deaths in Europe. Over the last 50 years, there have been remarkable successes in reducing the toll of childhood death from infectious diseases throughout Europe. The Western European countries have shown what can be done to reduce deaths from injury. They have taken a range of measures including stronger safety legislation (which they have enforced), better surveillance systems and support for intersectoral partnerships to strengthen prevention, as set out in the WHO’s recent comprehensive review of the implementation of injury prevention measures in the European Region. A concerted effort in Eastern Europe to prevent childhood deaths from injury is long overdue.

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References


Key points

- Mortality rates from external causes among children in Europe aged 1–14 years have fallen across all regions between 1993 and 2008.
- Transport, drowning and ‘other’ causes have declined substantially but remain the commonest categories of external causes of death in childhood throughout European regions.
- Regional inequalities in child external cause mortality still persist with the highest mortality rates in the Baltic states and CIS.
- Measures to address these inequalities will require improvements in the quality and availability of epidemiological data coupled with sustained injury prevention and control.
- Childhood deaths from injury are preventable through public policy; a concerted effort by Eastern European countries is required to reduce the large numbers of childhood deaths from external causes.