

confidence interval for this outcome was moderately wide, including the null and extending close to the target difference in a direction not favouring lidocaine spray. The trial was not powered for binary outcomes, and the confidence intervals for secondary outcomes of this type, including second degree perineal trauma, were commensurately wide.

In terms of generalisability, only one maternity unit was involved in the trial but a large number of midwives were involved in recruitment (n=101), serving a wide area encompassing a socioeconomically diverse population. In addition, recruitment took place over 16 months. Although only a third of the 2200 women booked to deliver at the unit were approached antenatally about the trial, just 18% of invited women declined participation. All those who were eligible in labour were randomised.

Other strengths of the study include the successful blinding of the women, midwives, and data analysts; a high and similar level of adherence to the protocol for administration of the lidocaine and placebo sprays; and negligible attrition.

The pain scores recorded in this trial were similar to those obtained in previous studies of second stage labour, including high mean levels and considerable variability.^{10 11} In keeping with the findings of previous randomised trials of second stage care,^{12 13} overall levels of genital trauma were higher than generally reported. This may result from trauma being recorded in more detail in the trial questionnaires than would normally be required in clinical notes or on a computer.

In conclusion, the use of a topically applied local anaesthetic during second stage labour was acceptable to women and midwives. The lidocaine spray during delivery did not, however, reduce perineal pain.

We thank the women and midwives who participated in the study; Angela Ralli-Thomas and Mr Colin Ranshaw of St Mary's

Pharmaceuticals, Cardiff; Mike Harmer for facilitating the study; and Jenny Donovan, Deirdre Murphy, and a reviewer for helpful comments.

Contributors: See bmj.com.

Funding: This research was carried out while JS was in receipt of Medical Research Council/Wales Office of Research and Development special training fellowship in health services research, with additional funding for the trial provided by Wellbeing for Women and the Obstetric Anaesthetists Association.

Competing interests: None declared.

Ethical approval: This trial was approved by the Medicines Control Agency, the local research ethics committee and the participating NHS trust research and development directorate.

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(Accepted 27 April 2006)

doi 10.1136/bmj.38878.833241.7C

Deaths from injury in children and employment status in family: analysis of trends in class specific death rates

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Abstract

Objective To examine socioeconomic inequalities in rates of death from injury in children in England and Wales.

Design Analysis of rates of death from injury in children by the eight class version of the National Statistics Socio-Economic Classification (NS-SEC) and by the registrar general's social classification.

Setting England and Wales during periods of four years around the 1981, 1991, and 2001 censuses.

Subjects Children aged 0-15 years.

Main outcome measures Death rates from injury and poisoning.

Results Rates of death from injury in children fell from 11.1 deaths (95% confidence interval 10.8 to 11.5 deaths) per 100 000 children per year around the 1981 census to 4.0 deaths (3.8 to 4.2 deaths) per 100 000 children per year around the 2001 census.

Socioeconomic inequalities remain: the death rate from all external causes for children of parents classified as never having worked or as long term unemployed (NS-SEC 8) was 13.1 (10.3 to 16.5) times that for children in NS-SEC 1 (higher managerial/professional occupations). For deaths as pedestrians the rate in NS-SEC 8 was 20.6 (10.6 to 39.9) times higher than in NS-SEC 1; for deaths as cyclists it was 27.5 (6.4 to 118.2) times higher; for deaths due to fires it was 37.7 (11.6 to 121.9) times higher; and for deaths of undetermined intent it was 32.6 (15.8 to 67.2) times higher.

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BMJ 2006;333:119-21



This is the abridged version of an article that was posted on bmj.com on 7 July 2006: <http://bmj.com/cgi/doi/10.1136/bmj.38875.757488.4F>



A table of the results stratified by age group can be found on bmj.com.

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Conclusions Overall rates of death from injury and poisoning in children have fallen in England and Wales over the past 20 years, except for rates in children in families in which no adult is in paid employment. Serious inequalities in injury death rates remain, particularly for pedestrians, cyclists, house fires, and deaths of undetermined intent.

Introduction

Ten years ago, research identified steep and widening social class gradients in mortality from injury among children aged < 15 years in England and Wales.^{1 2} The death rate from injury and poisoning for children in the lowest social class was five times greater than that for children in the highest social class. Inequalities were found to be greatest for injuries related to fires and those incurred as pedestrians, where the mortality rate ratios between lowest and highest social classes were 15 times and 5 times greater respectively. We examined whether these gradients persist at the start of the 21st century.

Methods

We obtained a data file from the Office for National Statistics containing the anonymised records of all deaths of children (0-15 years) from injury in England and Wales during periods of four years around the 1981, 1991, and 2001 censuses. Each record included the year of death, the underlying cause of death, and the parents' socioeconomic class. Cause of death was coded according to the chapter on external causes of morbidity and mortality in the international classification of diseases (ICD). Socioeconomic class was coded according to the registrar general's social classification for deaths before 2001 and to the eight class version of the National Statistics Socio-Economic Classification (NS-SEC) for deaths from 2001 onwards.³ For our analysis, we based the child's classification on the father's socioeconomic class or the mother's socioeconomic class if the father's was missing.

We calculated death rates from injury for all causes of injury and poisoning combined, using population data from each census. For the most recent period we also calculated death rates for the leading causes of death. To increase the precision of our estimates, we combined the deaths during the years in each of the three periods. We used the Poisson distribution to estimate death rates with 95% confidence intervals.

Results

The average annual death rate from injury around the 2001 census was 4.0 per 100 000 children aged 0-15 years (95% confidence interval 3.8 to 4.2 deaths), compared with 8.1 per 100 000 children (7.8 to 8.4 deaths) around the 1991 census and 11.1 per 100 000 children (10.8 to 11.5 deaths) around the 1981 census.

Table 1 shows the numbers of deaths from injury and poisoning and rates per year per 100 000 children aged 0-15 years by the eight class NS-SEC for the period 2001-3. The death rate for children of parents classified as never having worked or as long term unemployed (NS-SEC class 8) was 13.1 (10.3 to 16.5) times (numbers are rounded) that for children of par-

Table 1 Deaths from injury and poisoning and rates per year per 100 000 children aged 0-15 years by eight class NS-SEC, 2001-3

NS-SEC	Deaths 2001-3*	Rate (95% CI) per year per 100 000 children
1: Higher managerial/professional occupations	85	1.9 (1.6 to 2.4)
2: Lower managerial/professional occupations	111	1.6 (1.3 to 1.9)
3: Intermediate occupations	59	2.9 (2.2 to 3.7)
4: Small employers/own account workers	105	2.9 (2.4 to 3.5)
5: Lower supervisory/technical occupations	91	2.7 (2.2 to 3.3)
6: Semi-routine occupations	148	4.0 (3.4 to 4.7)
7: Routine occupations	180	5.0 (4.3 to 5.8)
8: Never worked/long term unemployed	383	25.4 (22.9 to 28.1)
Total	1162	4.0 (3.8 to 4.2)

NS-SEC=National Statistics Socio-Economic Classification.
 *Excludes one child for whom NS-SEC was missing

ents in higher managerial and professional occupations (NS-SEC class 1). For children of parents in routine occupations (NS-SEC class 7) the death rate was 2.6 (2.0 to 3.4) times higher than in NS-SEC class 1.

The seven leading causes accounted for over 80% of deaths from injury (see bmj.com). Table 2 shows the annual death rates per 100 000 children aged 0-15 years by NS-SEC for the leading causes. Compared with children of parents in class NS-SEC 1, the death rate in children of parents in class NS-SEC 8 was higher for each of these causes: 20.6 (10.6 to 39.9) times higher for deaths as pedestrians, 5.5 (3.1 to 9.6) times higher for deaths as car occupants, 27.5 (6.4 to 118.2) times higher for deaths as cyclists, 16.7 (8.3 to 34.0) times higher for deaths due to other accidental threats to breathing, 37.7 (11.6 to 121.9) times higher for deaths due to exposure to smoke, fire, and flames, and 32.6 (15.8 to 67.2) times higher for deaths of undetermined intent (all ratios based on the estimated death rates before rounding).

Discussion

Death rates from injury and poisoning in children in England and Wales have fallen over the past 20 years. Given the relatively low absolute numbers of deaths, it is surprising that a socioeconomic gradient remains for children with parents in paid employment: the rate of death in children with parents in routine occupations is over twice that in children with parents in higher managerial and professional occupations. More notably, the reductions in deaths from injury have not occurred in children in families with no adult in paid employment.

Methodological issues

The introduction of the National Statistics Socio-Economic Classification (NS-SEC) in 2001 precludes direct comparisons with previous analyses based on the registrar general's social classification.⁴ Comparisons of social gradients over time are therefore not possible, and we cannot assess whether socioeconomic inequalities are narrowing or widening.

Strengths and weaknesses in relation to other studies

Accidental deaths are subject to a coroner's inquest, which can delay registration and sometimes results in subsequent amendment to the underlying cause of

Table 2 Rates of death from injury per year per 100 000 children aged 0-15 years by eight class NS-SEC and external cause, 2001-3. Figures are number of deaths; rate (95% confidence interval)

NS-SEC	Pedestrians	Car occupant	Pedal cyclists	Events of undetermined intent	Other accidental threats to breathing*	Exposure to smoke, fire and flames†
1: Higher managerial/professional occupations	10; 0.2 (0.1 to 0.4)	19; 0.4 (0.3 to 0.7)	2; 0.05 (0.01 to 0.2)	8; 0.2 (0.1 to 0.4)	9; 0.2 (0.1 to 0.4)	3; 0.1 (0.01 to 0.2)
2: Lower managerial/professional occupations	15; 0.2 (0.1 to 0.4)	13; 0.2 (0.1 to 0.3)	6; 0.1 (0.03 to 0.2)	16; 0.2 (0.1 to 0.4)	21; 0.3 (0.2 to 0.5)	2; 0.03 (0.004 to 0.1)
3: Intermediate occupations	10; 0.5 (0.2 to 0.9)	8; 0.4 (0.2 to 0.8)	1; 0.05 (0.001 to 0.3)	11; 0.5 (0.3 to 1.0)	7; 0.3 (0.1 to 0.7)	2; 0.1 (0.01 to 0.4)
4: Small employers/own account workers	19; 0.5 (0.3 to 0.8)	12; 0.3 (0.2 to 0.6)	6; 0.2 (0.1 to 0.4)	19; 0.5 (0.3 to 0.8)	13; 0.4 (0.2 to 0.6)	6; 0.2 (0.1 to 0.4)
5: Lower supervisory/technical occupations	16; 0.5 (0.3 to 0.8)	16; 0.5 (0.3 to 0.8)	2; 0.1 (0.01 to 0.2)	14; 0.4 (0.2 to 0.7)	15; 0.4 (0.3 to 0.7)	3; 0.1 (0.02 to 0.3)
6: Semi-routine occupations	23; 0.6 (0.4 to 0.9)	19; 0.5 (0.3 to 0.8)	11; 0.3 (0.1 to 0.5)	18; 0.5 (0.3 to 0.8)	26; 0.7 (0.5 to 1.0)	16; 0.4 (0.2 to 0.7)
7: Routine occupations	41; 1.1 (0.8 to 1.6)	19; 0.5 (0.3 to 0.8)	9; 0.3 (0.1 to 0.5)	26; 0.7 (0.5 to 1.1)	30; 0.8 (0.6 to 1.2)	20; 0.6 (0.3 to 0.9)
8: Never worked/long term unemployed	71; 4.7 (3.7 to 5.9)	36; 2.4 (1.7 to 3.3)	19; 1.3 (0.8 to 2.0)	90; 6.0 (4.8 to 7.3)	52; 3.4 (2.6 to 4.5)	39; 2.6 (1.8 to 3.5)
Total	205; 0.7 (0.6 to 0.8)	142; 0.5 (0.4 to 0.6)	56; 0.2 (0.1 to 0.3)	202; 0.7 (0.6 to 0.8)	173; 0.6 (0.5 to 0.7)	91; 0.3 (0.3 to 0.4)

*Excludes accidental drowning and submersion.

†Excludes one child for whom NS-SEC was missing.

death.⁵ The data we used were provided by the Office for National Statistics in 2005 and were therefore the most accurate and complete mortality data available at that time. To estimate child injury death rates for different socioeconomic groups we used mortality data classified according to social class at death and census data estimates of the child population at risk. The extent to which social class is assessed consistently within mortality and census data is therefore critical to the validity of our results as any such numerator-denominator bias could distort the social class gradients. Results from longitudinal studies that have linked census data with mortality data have found that numerator-denominator bias has little effect on social class mortality differentials.⁶ These analyses, however, were carried out by using the registrar general's social classification of deaths and similar studies using the National Statistics Socio-Economic Classification have yet to be completed. For this reason we cannot exclude the possibility of some numerator-denominator bias.

Possible mechanisms and implications for policymakers

We have identified a particularly high injury death rate for children whose parents are classified as never having worked or as long term unemployed. Our results show that children in these families face greater risks of dying in road traffic accidents and in fires and

from undetermined causes than children in all other social groups. The reason for the overall fall in mortality from injury in children is probably due to the declining exposure of children to risk of injury, particularly as pedestrians.⁷ Explanations for the inequalities that persist between children from workless families and those in work are necessarily speculative but probably lie in different exposures to risk as there is no reliable evidence that differences in attitudes and knowledge can account for them.^{8,9} The higher risk of being killed as a pedestrian, compared with as a car occupant, certainly suggests greater exposure to risk of road injury. Their higher risks of dying in house fires may reflect the quality and type of housing, with the greatest risks for those in temporary and poor housing.

We thank the Office for National Statistics, in particular Mr Folkert van Galen, for providing the mortality and census data. We also thank Colin Cryer, whose comments helped to improve this paper.

Contributors: See bmj.com.

Funding: This work was undertaken by the London School of Hygiene and Tropical Medicine, who received funding from the Department of Health. The views expressed in the publication are those of the authors and not necessarily those of the Department of Health.

Conflict of interest statement: None declared.

Ethical approval: Not required.

What is already known on this topic

Steep and widening social class gradients in mortality from injury in children in England and Wales were identified 10 years ago

Inequalities were greatest for deaths of children in house fires and as pedestrians

What this study adds

Child injury deaths have fallen in most socioeconomic groups

Children in families with no adult in paid employment are a notable exception

Inequalities are still greatest for deaths of children in house fires and as pedestrians

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(Accepted 24 March 2006)

doi 10.1136/bmj.38875.757488.4F