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Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991

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Abstract

***Objective*—To examine whether the decline in child injury death rates between 1981 and 1991 varied by social class.**

***Design*—Comparison of class specific child injury death rates for 1979, 1980, 1982, and 1983, with those for the four years 1989-92.**

***Setting*—England and Wales.**

***Subjects*—Children aged 0-15 years.**

***Main outcome measures*—Death rates from injury and poisoning.**

***Results*—Death rates from injury and poisoning have fallen for children in all social classes. The decline for children in social classes IV and V (21% and 2% respectively), however, is smaller than that for children in social classes I and II (32% and 37%). As a result of the differential decline in injury death rates, socioeconomic mortality differentials have increased. In the four years 1979-80 and 1982-83 the injury death rate for children in social class V was 3.5 times that of children in social class I. For the four years 1989-92 the injury death rate for children in social class V was 5.0 times that of children in social class I. Poisson regression modelling showed that the trend in the decline in death rates across the social classes was unlikely to have arisen by chance alone.**

***Conclusions*—Socioeconomic inequalities in child injury death rates have increased. If these gradients persist, the Health of the Nation's target is likely to be met for children in the non-manual social classes but not for those in the manual social classes.**

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Introduction

The Health of the Nation strategy established the reduction of child injury mortality as a government priority.[1] A national target was set: the reduction of the injury death rate for children aged under 15 years by at least 33% by 2005 from a baseline of 6.7 deaths per 100 000 in 1990. Progress towards the target has been encouraging.[2] Child injury death rates have been falling steadily for the past two decades, and if this trend continues, the target will almost certainly be exceeded. Recently, with the publication of *Variations in Health*, the government has also signalled its resolve to tackle the problem of social class variations in health.[3] The social class gradient for deaths due to injuries is steeper than for any other cause of death in childhood.[4] It seems timely therefore to assess whether the rate of decline in child injury mortality varies by social class. We examined social class differences in reductions in child injury mortality by comparing class specific injury death rates in the early 1980s with those in the early 1990s.

Methods

The decennial supplement of occupational mortality published by the Office of Population Censuses and Surveys (now the Office for National Statistics) provides injury mortality data by occupational class for children aged 1-15 years in England and Wales for the four years 1979, 1980, 1982, and 1983.[5] Data for 1981 are unavailable because of an industrial dispute at that time involving members of the registration service. The supplement gives the numbers of deaths from and death rates for all injury and poisoning, as well as for several specific external causes of injury. Direct comparison with more recent data is made difficult by changes in the reporting of class based population data. Specifically, 1991 census data by social class are available only from published sources for the age group 0-15 years. Identical age ranges can be compared, however, by the inclusion of postneonatal deaths for 1981, which are published separately in the decennial supplement. Unfortunately, this is only possible for all deaths from injury and poisoning and not for specific causes of injury.

We obtained a data file containing the anonymised records of all child injury deaths (child defined as 0-15 years) for 1989-92 in England and Wales from the Office of Population Censuses and Surveys. Each record included the external cause of injury code according to the international classification of diseases, ninth revision (ICD-9 E code), year of death, and the parents' occupational class. For these analyses, we based the deceased child's social class on the father's social class unless this was missing, when we based it on the mother's social class. We then calculated child injury death rates by social class for 1989-92 using denominator data from the 1991 census. We calculated death rates for all deaths from injury and poisoning, motor vehicle accidents, pedestrian accidents, and accidents caused by fire and flames. Pedestrian accidents and accidents caused by fire and flames were the leading specific causes of child injury deaths in 1991. Because of the relatively small number of child injury deaths in any individual social class, the preci-

Table 1—*Mortality from injury and poisoning per 100 000 children aged 0-15 years by social class, 1979-83* and 1989-92*

	Rate per 100 000 (No)		% Decline (95% confidence interval)†
	1979-83*	1989-92	
Social class			
I	24.2 (144)	16.5 (94)	32 (12 to 47)
II	25.0 (580)	15.8 (388)	37 (28 to 45)
IIIN	24.2 (248)	19.1 (171)	21 (4 to 35)
IIIM	35.7 (1267)	34.3 (828)	4 (−5 to 12)
IV	47.5 (710)	37.8 (417)	21 (10 to 30)
V	84.7 (423)	82.9 (297)	2 (−13 to 16)
P value for trend			P<0.001
Other	93.4 (1169)	51.2 (966)	45 (40 to 50)
Non-manual *v* manual			
Non-manual	24.7 (972)	16.6 (653)	33 (26 to 39)
Manual	52.5 (3569)	43.5 (2508)	17 (13 to 21)

*Excludes 1981.
†Based on rates before rounding.

sion of class specific injury death rates is likely to be low. To increase precision we compared the decline in injury death rates for non-manual social classes (I, II, IIIN) with the decline in the manual social classes (IIIM, IV, V, "other"). We used Poisson regression modelling to test the linear trend in the decline in injury death rates across the social classes (excluding the "other" category).

Results

In 1979-83 (excluding 1981 (see methods)) the injury death rate for children in social class V was 3.5 times that of children in social class I (table 1). For 1989-92 the injury death rate for children in social class V was 5.0 times that of children in social class I. Table 1 shows the decline in injury mortality by social class. Injury mortality fell for children in every social class, although the decline for children in social classes I and II (32% and 37% respectively) was greater than for children in social classes IV and V (21% and 2% respectively). The largest proportional decline in injury mortality occurred for children in the "other" category. When social class categories were combined into non-manual (I, II, IIIN) and manual (IIIM, IV, V, and "other") the proportional decline in injury mortality was greater for children in the non-manual group than for children in the manual group (33% *v* 17%). To examine the effect of comparing slightly dissimilar age groups for the analyses of cause specific injury deaths, we repeated the analyses in table 1 using the age groups 1-15 years for the earlier period and 0-15 years for the later period. There was no substantial effect on the differential decline by social class.

Motor vehicle accidents that involved children as vehicle occupants, pedestrians, or cyclists constituted 51% of all child deaths from injury and poisoning in 1979-83 and 44% of all such deaths in 1989-92 (child pedestrian accidents alone constituted 33% and 25% respectively of all such deaths). The proportion of all accidents that were caused by fire and flames increased from 8% to 10%.

Table 2 shows child injury death rates by social class and external cause. For motor vehicle accidents death rates in social classes I and II declined by 30% and 39% respectively, compared with 18% and 1% in social classes IV and V. In both periods there were steep social class gradients in child pedestrian injury mortality. For deaths due to fire and flame, rates in social classes I and II declined by 28% and 5% respectively, but in social classes IV and V rates increased by 18% and 39% respectively. For both motor vehicle accidents and pedestrian accidents the decline in injury death rates in the manual social classes was smaller than in the non-manual social classes. Poisson regression modelling showed that the trend in the decline in death rates across the social classes was unlikely to have arisen by chance alone (see tables 1 and 2).

Discussion

At the time of the 1981 census the death rate for children in social class V was three and a half times that for children in social class I. Since 1981, owing to the differential decline in injury death rates, this gradient has grown steeper. The death rate for children in social class V is now five times that in social class I. The differential decline in child injury mortality is consistent with the pattern of steepening mortality gradients that have been observed in adults.[6 7] Importantly, a social class differential is evident for both the relative and absolute decline in injury mortality.

METHODOLOGICAL ISSUES

Could increasing mortality differentials be due to changes in classification procedures? The allocation of social class based on occupation is subject to continuous refinement as new occupations evolve and as technological change makes previous occupational classifications irrelevant. The Office of Population Censuses and Surveys used the CO80 classification system in 1981 but the standard occupational classification in 1991. Continuity was examined by comparing social class based on CO80 with social class as reallocated on the basis of the standard occupational classification for a sample of the 1981 census.[8] Apart from a small increase (less than 2%) in the proportion of cases

Table 2—*Injury death rates per 100 000 children by social class and external cause, 1979-83* (ages 1-15 years) and 1989-92 (ages 0-15)*

	Motor vehicle accidents†			Pedestrian accidents			Accidents caused by fire and flame		
	Rate per 100 000 (No)		% Decline (95% confidence interval)‡	Rate per 100 000 (No)		% Decline (95% confidence interval)‡	Rate per 100 000 (No)		% Decline (95% confidence interval)‡
	1979-83	1989-92		1979-83	1989-92		1979-83	1989-92	
Social class									
I	11.3 (65)	7.9 (45)	30 (−2 to 52)	6.1 (35)	4.4 (25)	28 (−20 to 57)	1.2 (7)	0.9 (5)	28 (−127 to 77)
II	12.5 (280)	7.7 (189)	39 (26 to 49)	6.9 (155)	3.5 (85)	50 (35 to 62)	1.0 (22)	0.9 (23)	5 (−71 to 47)
IIIN	11.7 (115)	8.8 (79)	25 (0 to 43)	6.1 (60)	4.6 (41)	25 (−11 to 50)	0.9 (9)	1.1 (10)	−22 (−200 to 51)
IIIM	17.2 (594)	16.6 (401)	4 (−9 to 15)	11.5 (398)	9.8 (236)	15 (1 to 28)	2.8 (97)	2.4 (59)	13 (−20 to 37)
IV	20.4 (297)	16.8 (186)	18 (1 to 31)	14.6 (212)	9.6 (106)	34 (17 to 48)	4.1 (60)	4.9 (54)	−18 (−71 to 18)
V	33.3 (162)	32.9 (118)	1 (−25 to 22)	26.3 (128)	22.3 (80)	15 (−12 to 36)	9.5 (46)	13.1 (47)	−39 (−108 to −5)
P value for trend		P = 0.001			P = 0.055			P = 0.134	
Other	49.2 (485)	19.8 (373)	60 (54 to 65)	31.7 (312)	12.0 (227)	62 (55 to 68)	8.8 (87)	6.4 (115)	31 (9 to 48)
Non-manual *v* manual									
Non-manual	12.1 (460)	8.0 (313)	34 (24 to 43)	6.6 (250)	3.8 (151)	42 (28 to 52)	1.00 (38)	0.96 (38)	3 (−52 to 38)
Manual	24.1 (1538)	18.7 (1078)	23 (16 to 28)	16.5 (1050)	11.3 (649)	32 (25 to 38)	4.55 (290)	4.77 (275)	−5 (−24 to 11)

*Excludes 1981.
†Includes pedestrian accidents.
‡Based on rates before rounding.

Key messages

- The government's Health of the Nation strategy established the reduction of child injury death rates as a priority
- Mortality from childhood injury is falling, but there are steep social class gradients in death rates
- A comparison of class specific child injury death rates in 1981 and 1991 shows that the decline in injury death rates in social classes IV and V (21% and 2% respectively) was much smaller than for those in classes I and II (32% and 37%)
- Because of the differential decline in child injury death rates, socioeconomic mortality differentials increased during this period
- Unless government rhetoric on social class gradients in health is matched with appropriate action, the Health of the Nation's target for accidents will be met for children in the non-manual social classes but not for those in the manual classes

assigned to social class V and a small decrease (less than 2%) in cases assigned to social class IV, the difference for each group was no greater than 0.3%. Thus changes in classification procedures would not account for the steepening social class gradients.

For both total injury mortality and the specific external causes apart from fire and flame the largest decline in child injury mortality was in the "other" category. Arguably the most plausible explanation for this decline is a change in the characteristics of people in the category. The "other" category comprises three subgroups: household heads in the armed forces (6%), those whose occupation was inadequately described (4%), and the unoccupied group (90%). In 1981, parents classified as unoccupied were mainly economically inactive single mothers. Judge and Benzeval estimated that 89% of the unoccupied group in 1981 comprised economically inactive single parents.[9] About three quarters of these parents would have been dependent on income support.[10] The high injury rates for children of parents classified as unoccupied in 1981 would almost certainly be related to the homogeneously disadvantaged nature of this group. Since 1981, however, the proportion of all children who are in the unoccupied group has increased considerably, from 6% of all children in 1981 to 17% of all children in 1991. It is inevitable that an increase in this proportion would be accompanied by an increase in heterogeneity. This can be verified by estimating the numbers of economically inactive lone mothers in 1991, using the method that Judge and Benzeval used for 1981. The number of single parent families in Great Britain in 1991 was estimated to be 1.3 million.[11] By using this figure and an estimate of the proportion of lone parents who were economically active it can be calculated that 66% of the unoccupied group in 1991 comprised economically inactive lone mothers.[12] If this estimate is valid it would suggest a major change in the characteristics of the unoccupied group in the decade between the censuses. Although this change would account for the dramatic decline in child injury deaths in the unoccupied group, it is worth emphasising that even when the "other" category is included with the manual social classes the decline in injury mortality in the non-manual social classes remains substantially greater.

PUBLIC HEALTH ISSUES

The most likely explanation for the steepening social class gradient in child injury death rates is a deepening of the differential exposure to health damaging or health promoting physical and social environments resulting from greater inequalities in income.[13] Motor vehicle accidents account for almost half of all child injury deaths. In the event of a car crash the risk of death to occupants of small cars is considerably higher than to occupants of larger, heavier cars.[14] Newer cars have air bags (which inflate on impact, for protection), while older cars do not. Although loan schemes for child car seats exist, the cost of purchasing such a seat or a child restraint can amount to a substantial proportion of the annual disposable income of poor families.[15] As long as the safety of vehicles is rationed on the basis of the willingness and ability to pay, increasing inequality in income is likely to be accompanied by increasing differentials in injury mortality.

The decennial supplement of occupational mortality noted that death rates from fire and flames exhibited one of the steepest socioeconomic gradients.[5] Nevertheless, between 1981 and 1991 the death rate decreased for children in social classes I and II but increased for children in social classes IV and V, resulting in a further widening of the mortality differentials. Most of the deaths in this category are from residential fires. The risk of residential fire is strongly related to the type and quality of housing. Fire risk is greatest for those living in the poorest council housing and in temporary accommodation.[16] The increasing socioeconomic inequality might therefore be explained by temporal trends in the housing situation of families with children. The number of families declared homeless doubled between 1980 and 1991, with the number of households in temporary accommodation increasing nearly fivefold.[17]

Injury death rates are falling, but owing to the even larger decline in mortality from other causes injuries are responsible for a growing proportion of all child deaths in England and Wales. Because injuries are the major contributor to differentials in socioeconomic mortality this will result in a steepening in socioeconomic gradients in childhood mortality.[18] The observed widening of socioeconomic differentials in injury mortality will further exacerbate this trend. The government's decision to tackle the problem of social class gradients in health is encouraging.[3] These analyses indicate the need to address the problem at its source.

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