SOCIAL-CLASS INEQUALITY IN INFANT MORTALITY IN ENGLAND AND WALES FROM 1921 TO 1980

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Abstract. This paper examines the trend in social inequality in infant mortality in England and Wales between 1921 and 1980, using both class- and occupation-specific data. It employs a summary measure of inequality that uses all of the available data and can be evaluated in terms of its sensitivity to errors using accepted diagnostic techniques. Occupations that played a significant role in determining the time trend in inequality are identified and the effect of mortality among out-of-wedlock births is examined. Implications of these findings for assessing the determinants of social inequality in infant mortality and evaluating the contribution of the National Health Service in its amelioration are discussed.

Résumé. *L'inégalité des classes sociales devant la mortalité infantile en Angleterre et au Pays de Galles de 1921 à 1980.*
Cet article étudie l'évolution de l'inégalité sociale face à la mortalité infantile en Angleterre et au Pays de Galles entre 1921 et 1980, à l'aide de données décomposées selon la classe et selon la profession. L'indice global d'inégalité employé utilise toutes les données disponibles, et sa sensibilité aux erreurs peut être évalué au moyen de techniques de diagnostic reconnues. L'auteur identifie les professions qui ont joué un rôle déterminant dans l'évolution de l'inégalité au cours du temps, et examine l'effet spécifique de la mortalité des enfants illégitimes. Elle envisage ce qu'impliquent ces résultats quant à l'identification des déterminants de l'inégalité sociale face à la mortalité infantile et à l'évaluation de la contribution du National Health Service aux progrès obtenus.

1. Introduction

Occupation-specific mortality rates for England and Wales have been calculated and reported on a regular basis since 1851. Since 1911, these data have been cumulated into five 'social classes' intended to reflect the member's 'general standing in the community'. A strictly occupational definition of these classes was established in 1921, with Class I consisting of the professional and managerial occupations, Class II being intermediate between Class I and the occupations requiring skilled labour that constitute Class III. Occupations considered semi-skilled make up Class IV and Class V is comprised of the occupations of unskilled labourers. The mortality of legitimate infants according to father's occupation-based social class has been routinely reported since 1921, and since 1975 infant death certificates have been linked to their corresponding birth certificates and class-specific rates have been calculated on an annual basis. Given this long tradition of examining mortality in relation to social class, it is somewhat ironic that class-specific mortality rates are the focus of continuing controversy. The existence of class differences in mortality at all ages under 65 is generally acknowledged, but the trend in these differences over time is a matter of heated debate, generating editorials in the major British medical journals under titles such as 'Lies, Damned Lies, and Suppressed Statistics' [British Medical Journal (1986)], and 'The Occupational Mortality Supplement: Why the Fuss?' [The Lancet (1986)]. The official position taken by the Office of the Registrar General in the most recent report has been to recount the inadequacies of the data grouped by social class, and to caution against their use, particularly in longitudinal analyses [OPCS (1986)].

Despite the official warning, the reported class-specific rates for adults have repeatedly been employed to show that inequality in mortality has increased since the early 1950s [Preston et al. (1982), Townsend and Davidson (1982), Pamuk (1985), Marmot and Mc-Dowall (1986), Hart (1986)]. However, the course of class differences in infant mortality has been much less clear, and apparently has recently deviated from that for adults. The general, if somewhat reserved, assessment of the situation with respect to infants has been that: 'In the late 1970s the class differences in infant mortality diminished, but there tend to be fluctuations in such rates from year to year and it will be a few years before this welcome trend can be confirmed' [Townsend and Davidson (1982, p. 19)].

While mortality differences among population sub-groups and their change over time are of concern in any society, the intensity of the debate in England and Wales is almost certainly a function of the existence of a government-supported health-care system established with the avowed goal of reducing inequality in access to care. The trend in mortality inequality is inextricably connected to the political debate over the government's level of funding of the National Health Service, as well as other government programs aimed at reducing material inequalities in British society [Townsend and Davidson (1982), Hart (1986)].

But although the Office of the Registrar General's position regarding the inappropriateness of trend analysis has undoubtably been influenced by the perceived political importance of the subject, it is not based solely on these considerations. Much of the controversy truly stems from inadequacies in the data themselves and in the methods commonly employed in their analysis. A major source of concern about the data for adults are the discrepancies known to exist between the usual occupation reported on the census form and that reported at death. Occupation-specific infant mortality rates are not subject to this type of error since both numerators and denominators are derived from vital records. However, many occupation-specific infant mortality rates are unreliable due to the small number of deaths on which they are based. This problem was exacerbated in 1970–72 when the government deviated from established practice and used a sample of 3.33 per cent of life births to form the denominators.

A more serious problem arises from the index traditionally used to summarize the magnitude of class differences in mortality rates. Trends have usually been assessed by comparing ratios formed by dividing the mortality rate in the lowest social class by that in the highest for different time periods. There are a number of problems with this approach, the most obvious being the loss of information about Classes II through IV, which constitute a majority of the population at any period. In addition, the relative sizes of the social classes are not reflected in this ratio; and since the proportion of the population in Class V has decreased considerably since 1921, the possibility exists that the distribution of mortality over the entire population may have improved in spite of the fact that mortality in Class V relative to Class I has worsened [Stern (1983)]. This is particularly problematic with respect to infant mortality where the 'population' under consideration
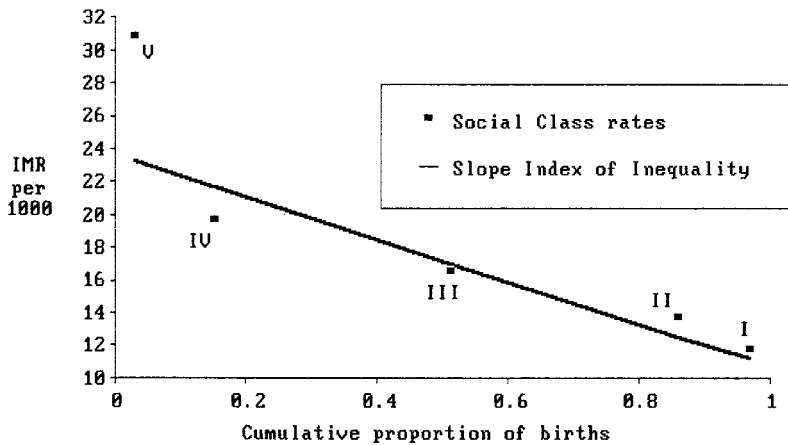
Fig. 1. Inequality in infant mortality, England and Wales, 1970–1972.

is legitimate life births [Machin et al. (1986a)], and thus the distribution of this population over the five classes depends not only on the number of men in different occupations, but also on their relative rates of marriage and on class-specific fertility.

Clearly, the trend in inequality can be assessed most legitimately by using a summary indicator that incorporates the mortality experience of all classes and their relative shares of the population at each point in time. There are a number of indices that fulfil these basic requirements and several have been examined in earlier studies [Preston et al. (1982); Hansluwka (1986)]. The index chosen for this analysis is the slope of a line fitted to the class-specific infant mortality rates ranked according to status (from lowest to highest) and positioned against the midpoint of the cumulative proportion of births attributed to each class. It is a measure of absolute inequality that can be interpreted as the average amount of decline in the infant mortality rate moving from the lowest ranked percentile of the population to the highest. The index for 1970–1972 is presented graphically in fig. 1. The regression line is fitted by weighted least squares, where the weights are the births attributed to each class, because weighting minimizes the effect of deviant rates based on small numbers and makes the index more robust to varying the number of units (classes) on which it is based.

The slope as index of inequality has several advantages over more traditional measures of concentration such as the index of dissimilarity

and the Gini coefficient: it does not require a monotonic decline in the mortality rate with increasing social class in order to be meaningful and it can be evaluated in terms of its sensitivity to errors in the data. In addition, the index can be converted into a relative measure very simply by considering the slope as a percentage of the overall infant mortality rate at each period. [1]

2. Trends in the relative index of inequality

2.1. Inequality by social class

The absolute value of the relative index of inequality (RII) for infant mortality between 1921 and 1970–72 is shown in table 1. Data for the latter half of the 1970s have been combined to eliminate year-to-year fluctuations and a summary index has been calculated for this period as well. The index indicates a high level of inequality: there is a difference of over 60 per cent in the infant mortality rate between the lowest- and the highest-status legitimate births at each period. An increase in relative inequality is indicated between the first years of the Depression and the early 1970s, followed by a substantial drop in inequality in the latter half of the 1970s.

If we examine neonatal and post-neonatal mortality separately, we see that age-specific inequality increased more than inequality in total infant mortality. The trend for infants was mitigated by the greater decline in deaths occurring after the first month of life where class differences are larger. The relative index for neonatal inequality increased by more than 30 percentage points between 1930–32 and 1970–72, while the post-neonatal index rose continuously from 1921 to 1970–72, an increase of almost 38 percentage points over the fifty-year period. It is also clear that the fall in inequality in the latter half of the 1970s was heavily concentrated in the post-neonatal period.

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[1] The relative index can be computed directly by substituting the mortality ratios for each social class for the class-specific infant mortality rates (that is, ratios of the class-specific mortality rates to the overall mortality rate).

Table 1
Relative inequality in infant mortality in England and Wales, 1921–1979 (Relative index of inequality = RII).

Period	Inequality by social class		Inequality by occupation		Inequality by social class and out-of-wedlock	
	RII	r^2	RII	r^2	RII	r^2
Infant mortality						
1921	61.29	0.94	56.41	0.50	80.36	0.73
1930–32	60.58	0.96	58.98	0.55	74.35	0.83
1939	62.91	0.96				
1949–53	69.54	0.96	67.53	0.65	71.66	0.96
1970–72	76.02	0.72	73.12	0.43	81.37	0.78
1975–79	63.54	0.80			81.22	0.84
Neonatal mortality						
1921	31.04	0.85			51.44	0.51
1930–32	23.41	0.87			44.19	0.43
1939	32.85	0.93				
1949–53	41.76	0.94			50.49	0.87
1970–72	53.99	0.77			62.38	0.83
1975–79	50.21	0.88			67.37	0.86
Post-neonatal mortality						
1921	84.01	0.95			101.88	0.82
1930–32	96.33	0.96			103.54	0.95
1939	100.88	0.96				
1949–53	116.51	0.96			107.89	0.89
1970–72	121.65	0.67			120.31	0.71
1975–79	92.01	0.70			110.11	0.79

Sources: England and Wales, Registrar General, *Report on Occupational Mortality, Registrar General's Decennial Supplement* for the years 1921–23, 1930–32, 1949–53, 1970–72 (London, HMSO). OPCS, *Social and Biological Factors in Infant Mortality* for the years 1975–77, 1978–79, 1980 (London, HMSO). Royal Commission on Population, 1950, *Reports of the Biological and Medical Committee, Vol. IV* (London, HMSO). Data by occupation for 1970–72 was obtained directly from the Office of Population Censuses and Surveys, London.

2.2. Inequality by father's occupation

In order to corroborate the trend in social-class differences in infant mortality, the relative index was also calculated using 130 standard occupation units for every period for which occupation-specific data were available. [2] The units were ranked according to a combined social-class/prestige score [3] and their cumulative share of births. These
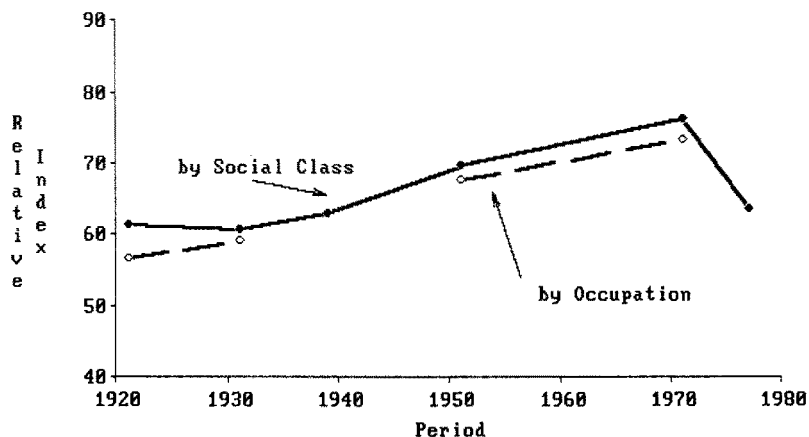
Fig. 2. Relative index of inequality in infant mortality.

indices, also shown in table 1 and displayed in fig. 2, are very similar to those based on the broader social-class groupings. The occupation-based index is lower at each period because in some cases it was necessary to combine occupation sub-groups from different social classes into a single unit. The discrepancy between the two sets of indices was greatest for 1921 with the occupational data showing a continuous rise in relative inequality through 1970–72. But both data sets indicate an increase of between 14 to 16 percentage points in the relative inequality index between 1930–32 and 1970–72.

A significant advantage of employing an index based on least-squares regression is that standard diagnostic procedures can be used to determine the influence of any given observation, in this case the infant mortality rate of an occupation, on the summary index of inequality. An option available in the SAS programming package has been used to produce estimates of the amount of change in the relative index that

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[2] The standard occupation units were created by reclassifying each occupation appearing in the *Occupational Mortality Reports* of 1921–23, 1930–32, 1949–53 according to the *Classification of Occupations, 1970* [OPCS (1970)]. If the component parts of an earlier occupation fell into more than one unit in 1970, the 1970 units were combined to make unambiguous assignment possible. In addition, any unit with less than fifteen infant deaths at any period was combined with another unit.

[3] The social-class/prestige score is partially derived from the work of J.H. Goldthorpe and K. Hope [Goldthorpe and Hope (1974)]. The procedure by which social-class/prestige scores were determined is described in detail elsewhere [Pamuk (1985, p. 21)].

would occur by deleting each occupation-specific rate from the calculation of the slope. [4]

At each period, the overwhelming majority of occupation units had only a very small independent effect on the relative index. For analytical purposes, an occupation was considered influential if its infant mortality rate affected the relative index of inequality by more than one percentage point at any period. In all, thirteen such 'influential' units were identified. These occupations are shown in table 2 along with the degree to which they raised or lowered the relative index at each period.

The last column of table 2 shows the effect of these units on the overall increase in the relative index of inequality between 1921 and 1970–72. Using all 130 standard occupation units an increase of almost seventeen percentage points in the relative index was recorded, yet only five occupation units contributed independently to that increase in any significant way.

The relatively low mortality among infants born to fathers in the higher-status occupation of teaching acted to raise the level of inequality at each period, and their advantage increased steadily from the early 1930s. But the other four units are lower-status occupations in which the change over time was in the opposite direction. In 1921, all four had relatively low infant mortality given their status and served to lower the level of inequality. Both machine tool operators and agricultural workers still had relatively low mortality in the early 1950s, but this advantage had virtually disappeared among machine tool operators by 1970–72, and had been very substantially reduced among agricultural workers.

But it is quite clearly two groups of unskilled labourers that contributed most to the rise in inequality, and these are the only units that independently altered the time trend. The deterioration of the relative chances of survival among the infants of men in the category Labourers,

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[4] The statistical program package used for this procedure, SAS Version 5, produces the statistic DFBETAS, which is $b - b(i)$ (where b is the slope computed using all observations and $b(i)$ is the slope obtained by deleting the ith observation), scaled by a measure of the standard error of b which uses $s^2(i)$, the estimated error variance with the ith observation deleted [Belsey, Kuh and Welsch (1980)]. The DFBETAS were converted back to estimates of $b - b(i)$ by multiplying by the standard error of b based on all observations. Discrepancies between this estimate and the actual $b - b(i)$ are normally small, but the procedure does underestimate the effect of large units with highly deviant rates. Thus the greatest discrepancy between the estimate given and the actual $b - b(i)$ was a 0.55 percentage point difference for Labourers, n.e.c. in 1970–72.

Table 2
Effect of specified occupation units on the relative index of inequality.

Occupation unit	Period				Difference
	1921	1930–32	1949–53	1970–72	1970–72 −1921
Labourers, n.e.c.	−3.04	4.75	5.58	6.28	9.32
Building and contracting labourers	−1.30	−4.32	−1.44	6.60	7.90
Agricultural workers	−3.27	−1.69	−3.02	−0.78	2.49
Machine tool operators; foremen and trainees	−0.88	−0.69	−1.25	0.03	0.91
Teachers	0.63	0.41	0.95	1.41	0.78
Relative Index of Inequality based on 130 occupation units	56.41	58.98	67.53	73.12	16.71
Mine workers – underground (coal and other mines)	0.49	1.47	3.36	0.16	−0.33
Proprietors and managers, sales	−0.40	−0.82	−1.56	−0.87	−0.47
Armed forces	0.21	0.60	−2.30	−0.26	−0.47
Machinery operators and attendants	−0.06	−0.12	0.14	−1.50	−1.44
Farmers	1.90	0.26	−0.41	0.29	−1.61
Clerical workers and office managers	3.67	2.85	3.06	1.91	−1.76
Managers, n.e.c.	0.53	0.38	0.09	−1.27	−1.80
Vehicle drivers (motor and other)	−0.34	0.03	−0.15	−4.91	−4.57

Sources: England and Wales, Registrar General, *Report on Occupational Mortality. Registrar General's Decennial Supplement* for the years 1921–23, 1930–32, 1949–53 (London, HMSO). Data for 1970–72 was obtained directly from the Office of Population Censuses and Surveys, London.

n.e.c. (the residual unit of unskilled labourers not elsewhere classified) had the greatest impact. Without this unit the inequality index would have risen by less than 7.5 percentage points between 1921 and the early 1970s. The high infant mortality rate for these workers in 1930–32 alone prevented the level of inequality from falling, as shown in fig. 3. It is not hard to imagine that the infants of casual labourers suffered disproportionately during the depression, but it is sobering to observe that, despite a continual decline in the size of this occupational group, the negative impact of their excessive mortality on the overall inequality index increased at each subsequent period.

But the greatest alteration in the trend in inequality comes from excluding building and contracting labourers (see fig. 3). Their relatively low infant mortality rate acted to lower the index by over a percentage point at each period through the early 1950s. During the early 1930s, infant mortality among these workers was low enough to
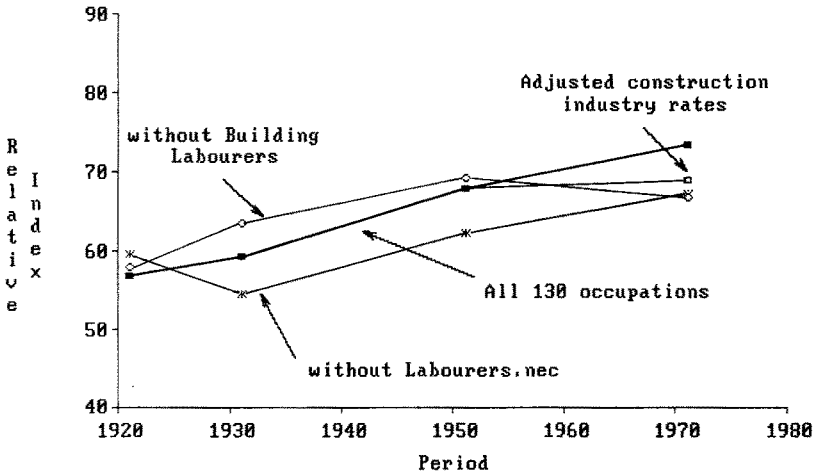
Fig. 3. Relative index of inequality in infant mortality.

offset substantially the effect of the higher rate among general labourers. By 1949–53, however, their mortality advantage had declined substantially from what it had been in 1930–32; and by the early 1970s, the effect of this unit had completely reversed, acting to raise the level of inequality by nearly seven percentage points. In fact, without the infant mortality rate of these workers, relative inequality would have decreased by almost 2.5 percentage points between 1949–53 and 1970–72.

The infant mortality rate recorded for building and contracting labourers for 1970–72 was 61.9, i.e., 3.7 times the average. More revealing is the fact that this represents an increase of 24.4 deaths per thousand live births over the 1949–53 rate for these workers. Because it seems highly unlikely that such a sharp increase in the infant mortality of a single unit would occur over a period when the mortality rate for legitimate infants as a whole declined by 43 per cent, it is quite possible that the mortality rate recorded in 1970–72 was in error.

The source of the error may well have been the misclassification of births actually belonging to this unit into other, higher-status construction-related occupations, thereby reducing the denominator and artificially raising the infant mortality rate. One reason for suspecting this type of misclassification is that an increase or a below-average decline occurred in the infant mortality rates of the three construction-industry occupations, including building and contracting labourers, that experi-

enced declines in their proportionate share of births, as shown in Appendix A. At the same time, the two occupations that experienced increases in their share of total births registered two of the largest percentage declines in the infant mortality rate. Only one construction-related occupation unit (plasterers, cement finishers, and related workers) gave no indication of unusual changes over the period.

In addition, in contrast with previous periods, only a one in thirty sample of live births was used to construct the denominators for the occupation-specific infant mortality rates for 1970–72. Thus, any error resulting from the misclassification of sample births would have been exaggerated. It should be noted, however, that changes in the proportion of married women assigned to these units by the census correspond in direction, if not in magnitude, with the recorded changes in births. As a check on the potential magnitude of the effect of this type of misclassification, the proportion of births in each suspect unit was adjusted to conform to the percentage distribution of married women over these units in 1970–72. The occupation-specific infant mortality rates resulting from these adjustments are shown in Table A.2 of Appendix A. This exercise reduces the mortality rate for building and contracting labourers to 26.4 per 1,000 legitimate live births, still 60 per cent greater than average. But with these adjusted rates, the relative inequality index is reduced to 68.6 per cent, only slightly higher than in 1949–53 (fig. 3).

It is not being argued here that the redistribution of births according to this procedure actually reflects the true number in each of these units. But the assumptions made allow us to examine the effect of the exceptionally high infant mortality rates both for building and contracting labourers and for masons, stonecutters and slateworkers, by determining what the level of inequality would have been had the rates for these two units not been so unusual. By assuming a somewhat arbitrary distribution of births among these occupations, a range for the index of inequality for 1970–72 has been established within which may reside the true measure. To the extent that the actual assignment of births is more accurate than that based on these assumptions, the true index will be higher than the recalculation. Thus, it should be noted that a substantial deterioration in the relative mortality of infants born to building and contracting labourers would be consistent with the change recorded for this unit between 1930–32 and 1949–53.

Certainly it is clear that, whatever the true level of infant mortality among building and contracting labourers, mortality inequality among legitimate infants increased somewhat less in the two decades following the establishment of the National Health Service in 1948, than in the twenty years preceding its founding. The analysis by occupation also indicates that whereas many occupations contributed to the increase over the 1930s and 1940s [5], by the early 1970s the level of inequality was being maintained by two groups of unskilled labourers whose low wages and intermittent employment ranks them among the most disadvantaged of the economically active population.

Since the recorded decline in inequality in the latter half of the 1970s comes from an improvement in the relative mortality of the lowest social class (Class V), it implies a bettering of the relative changes of survival among infants born to building trades and general labourers. This seems likely to have happened even though the rate recorded for building and contracting labourers at the beginning of the 1970s may well have been too high; it suggests, however, that the decline in inequality was not as steep as the published rates indicate.

2.3. The role of out-of-wedlock births

As optimistic as the trend seems to be, we must recognize that not all the infants born in England and Wales are covered in an analysis based on social class or occupation of the father: infants born outside of marriage are excluded. Through the early 1950s, slightly less than five per cent of all births were out-of-wedlock, but by the early 1970s that proportion had grown to almost eight per cent, and towards the end of the decade the figure had climbed to ten per cent. It is arguable that these infants are in a position of greater disadvantage than children born legitimately to employed fathers, regardless of the nature of the employment. At a minimum, a sizeable proportion of infants born out-of-wedlock must rely on the mother alone for support, both financially and in the less tangible aspects of care. If we accept this

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[5] Although the categories Building and contracting labourers, Underground mine workers, Teachers, and Labourers, n.e.c. made noticeable contributions, the actual increase was much larger.
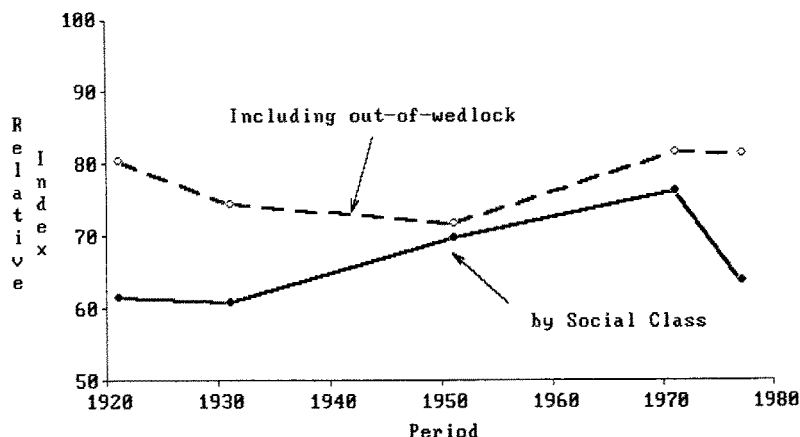
Fig. 4. Relative index of inequality in infant mortality.

argument, births occurring outside marriage can be included in our analysis by ranking them below Social Class V. [6]

The relative inequality indices that result from the inclusion of out-of-wedlock infants are shown in the third column of table 1 and are compared graphically to the indices based on social class alone in figs. 4–6. Not surprisingly, the above-average mortality of out-of-wedlock infants raises the level of relative inequality at every period, but particularly in the two periods before the war and again in the last half of the 1970s. The observed decline in social-class inequality for this last period virtually disappears when births outside marriage are included. In fact, the trend shows a substantial decline between 1921 and 1949–53 followed by a nearly equivalent rise in the subsequent thirty years, a very different trend from that for legitimate births alone.

Some clarification of this discrepancy occurs if we examine neonatal and post-neonatal mortality separately. The two trend lines for neonatal mortality are generally quite similar (fig. 5). The overall increase in

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[6] Unfortunately, births occurring outside marriage but registered jointly by both parents are not routinely categorized according to the social class of the father. However, there is some indication that jointly registered births have class-specific mortality rates similar to those of legitimate infants [Macfarlane (1987)]. To the extent that this is true, the infant mortality rate for 'illegitimate' births is generally lower than it would be had the category been limited to only those births for whom information on the father does not appear. Thus, the estimates of inequality presented here are probably conservative, given the disguised heterogeneity in out-of-wedlock births.
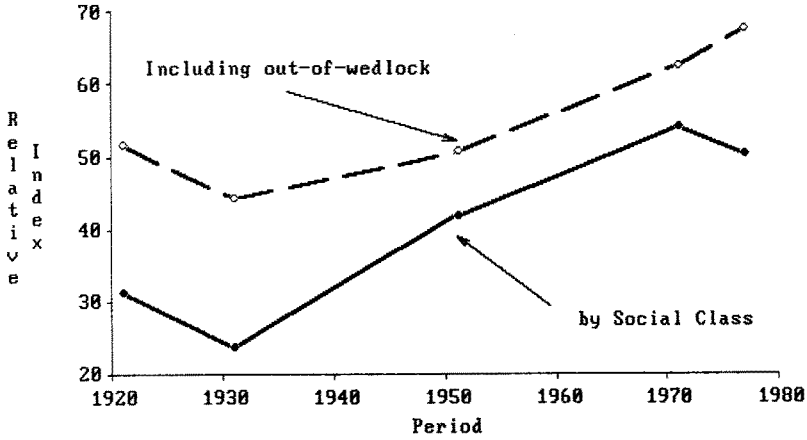
Fig. 5. Relative index of inequality in neonatal mortality.

class inequality in neonatal mortality among legitimate infants between 1930–32 and 1975–79 was almost 27 percentage points; the increase was 23 percentage points with out-of-wedlock infants included. In addition, if we accept that the index for 1970–72 is probably too high, then the trends become even more consistent.

On the other hand, the relative inequality in post-neonatal mortality among legitimate infants rose by over 32 percentage points between 1921 and 1949–53; but the inclusion of out-of-wedlock infants limits
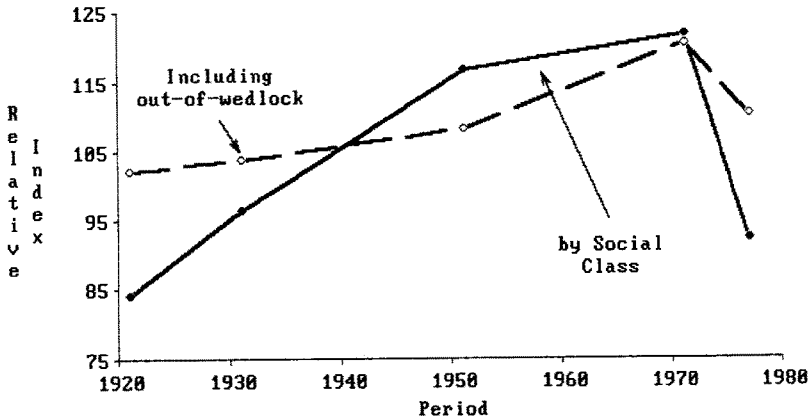

Fig. 6. Relative index of inequality in post-neonatal mortality.

the increase to only six percentage points. Over this period, the post-neonatal mortality rate of children born outside marriage was falling much more rapidly than that of legitimate infants as a whole and for the children of manual labourers in particular. But between 1949–53 and 1970–72 post-neonatal mortality among legitimate infants showed little increase in inequality (fig. 6), and again there is the distinct possibility that it actually levelled off or even declined somewhat at this point. In any case, the index for legitimate infants had clearly fallen by the latter years of the decade. When out-of-wedlock infants are included, however, the change is much less dramatic. Again, it is possible that the high value of the index in the early 1970s obscures what may have been a small but steady increase in relative inequality in post-neonatal mortality over the entire period, an increase of less than ten percentage points.

3. Discussion

It is unfortunate that the perceived 'success' of the 1970s in reducing class differences in mortality may have more to do with the increase in out-of-wedlock childbearing than with a more equal distribution of survival chances. In any case, it seems clear that whatever contribution the National Health Service may have made toward ameliorating class inequality in infant mortality has been confined to the post-neonatal period. Even if there were no real decline in inequality at this age in the last half of the 1970s, the summary index for all births was only 2.2 percentage points higher than in 1949–53, while the 1949–53 index represented an increase of six percentage points over its level in 1921. More importantly, the greater overall reduction in post-neonatal mortality, where class differences are larger, kept the inequality index for infant mortality as a whole from rising as much as it did within each age-specific group. To the extent that the National Health Service has applied its greatest efforts to those causes of infant death disproportionately affecting the most disadvantaged groups, it has served to reduce the overall level of inequality even if better-off children may have benefitted from these measures to a slightly greater degree.

Although the level of inequality in post-neonatal mortality remains high, the extraordinary rise in neonatal mortality differences poses a more difficult problem in many respects. Many of the frequently

proffered explanations for the persistence of the large class gap in infant survival relate to the material deprivation experienced by families in the lower classes. Low wages and high levels of unemployment are seen to translate into overcrowded housing with poor sanitation – conditions that directly produce higher mortality rates from respiratory and other infectious diseases [Brennan and Lancashire (1978)]. In addition, strains on both financial and personal resources are seen to contribute to higher mortality from accidents and other causes by reducing the abilities of parents to provide skilled and effective care for their babies [Smith (1985)].

These explanations fit with the larger class differences observed for post-neonatal than for neonatal mortality, and with the increased concentration of excess mortality over time in the most disadvantaged segments of the larger population. The latter fact is itself consistent with the increase in the proportion of the population living in poverty that occurred during the 1960s and 1970s while GNP and living standards for the country as a whole were rising [Townsend and Davidson (1982)].

The connection between poverty and post-neonatal mortality has traditionally been regarded as so fixed that improvements in health care delivery alone could have little effect on reducing the magnitude of class differences. At the same time, the connection between a higher level of neonatal mortality and poverty has been regarded as more complex, but generally more amenable to health service intervention, if for no other reason than because the great majority of these deaths occur before the infants leave the hospital after birth. But the reality is that inequality in neonatal mortality has risen steadily since the early 1930s, concurrent with an increase in hospital confinements. By the last half of the 1970s when '...virtually all women who choose to do so [could] be delivered in a hospital...' [Gill (1980, p. 121)] and over 90 per cent of all deliveries were, when the average length of post-delivery hospital stay was six days, and when every pregnant woman could avail herself of prenatal care services as soon as she became pregnant [British Information Services (1974)], inequality in neonatal mortality had climbed to its highest level ever.

There are of course known associations between poverty and neonatal mortality, although the mechanisms through which they operate appear more complicated than those influencing mortality in the post-neonatal period. Cigarette smoking is a known risk factor for low birthweight

and varies inversely with social class [Chamberlain et al. (1975)]. The diets of poorer pregnant women are likely to be less adequate than those of higher-status mothers-to-be and to have been of poorer nutritional quality since their own infancy [Illsley and Kincaid (1963)].

Complicating these known risks is the fact that one of the largest differences by social class is found in the utilization of the National Health Service for preventive services such as prenatal care. It is in the area of preventive care and health education that the more subtle effects of social class appear to take their toll. Well documented inadequacies exist in the services provided in depressed inner-city areas that almost certainly affect utilization; short and/or inappropriate hours of clinic operation, long waits, inaccessible locations, no facilities for children, and '... inadequacies as regards the actual content of the check-up (lack of individual attention and advice tailored to the individual's needs, lack of privacy, etc.)' [Townsend and Davidson (1982, p. 151)]. It has also been suggested that middle-class patients are able to benefit more from the medical attention they receive because they are able to communicate more effectively with doctors who are themselves disproportionately drawn from the higher social classes [Cartwright and O'Brien (1976)].

These factors may not weigh as heavily in the decision to utilize health services when illness is already apparent. It may be that some of the perplexing difference between the trends in neonatal and post-neonatal inequality are revealed in the following statement:

> ... while it is axiomatic for many individuals, (especially those in the healing professions) that good health should be a prime goal in life, to those people in lower economic strata, ill health is just one more crisis to cope with. Such people are happy to avail themselves of curative services, but they have little inclination or energy to engage in preventive health action. Their lives are so uncertain that there seems little point in planning [Gill (1980, p. 134)].

4. Conclusions

Between 1921 and 1980 the level of infant mortality in England and Wales fell from 83 to less than 12 deaths per thousand live births. As a

result, social inequality in infant mortality measured in absolute terms has also fallen dramatically. Relative inequality, on the other hand, has proven to be far more intractable. There can be little doubt that social inequality in neonatal mortality has increased steadily since the 1930s, while the perceived decline in post-neonatal inequality in the late 1970s [Machin et al. (1986b)] appears to be largely artifactual. There is little evidence to suggest that the establishment of the National Health Service in 1948 affected these trends in any significant way. Thus, reducing relative inequality in infant mortality appears to require changes beyond providing health care at no cost at the point of delivery. Changes are required in the broader social environment that will reduce the concentration of risk factors among the materially disadvantaged. The ability of the NHS to participate in this process at all will depend on increasing resources and targeting areas of greatest need, both geographically and in terms of emphasizing and improving preventive and educational services.

Appendix A. Adjustments to the distribution of births assigned to construction-industry occupations in 1970–72

Table A.1
Estimated numbers of births and infant mortality rates in construction-industry occupations, 1949–53 and 1970–72.

Occupation unit	IMR			% of births				% of married women		
	1949–53	1970–72	Percentage change	1949–53	1970–72	Percentage change	1951	1971	Percentage change
Bricklayers, tile setters	27.80	17.68	−36.40%	1.30%	0.99%	−23.77%	1.01%	0.99%	−1.98%
Masons, stonecutters, and slateworkers	30.20	31.94	5.76%	0.14%	0.07%	−50.71%	0.15%	0.11%	−26.67%
Plasterers, cement finishers, and related workers	29.50	16.67	−43.49%	0.36%	0.39%	8.33%	0.28%	0.30%	7.14%
Construction workers, n.e.c.	32.33	14.51	−55.12%	1.49%	3.83%	157.25%	1.72%	2.40%	39.53%
Machinery operators	37.21	16.64	−55.28%	1.11%	1.94%	74.59%	1.21%	1.87%	54.55%
Building and contracting labourers	37.35	61.87	65.65%	2.50%	0.59%	−76.40%	2.38%	1.23%	−48.32%
All construction-industry occupations	29.45	16.73	−43.19%	6.90%	7.81%		6.75%	6.90%	

Table A.2
Infant mortality rates based on births adjusted to conform to the distribution of wives in 1971.

Occupation unit	IMR			% of births		
	1949–53	Adjusted 1970–72	Adjusted percentage change	1949–53	Adjusted 1970–72	Adjusted percentage change
Bricklayers, tile setters	27.80	15.74	−43.39%	1.30%	1.11%	−14.37%
Masons, stonecutters, and slateworkers	30.20	17.85	−40.89%	0.14%	0.12%	−11.65%
Plasterers, cement finishers, and related workers	29.50	[a]	[a]	0.36%	[a]	[a]
Construction workers, n.e.c.	32.33	20.61	−36.24%	1.49%	2.70%	81.12%
Machinery operators	37.21	15.34	−58.78%	1.11%	2.10%	89.43%
Building and contracting labourers	37.35	26.41	−29.29%	2.50%	1.38%	−44.68%

Based on adjusted births and infant mortality rates:

Relative index of inequality = 68.60
            R squared = 0.60

[a] Not included in adjustments

Appendix A. Adjustments to the distribution of births assigned to construction-industry occupations in 1970–72

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