

## Section of Pædiatrics

President J L Emery MD

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### Present Patterns of Disease in Childhood

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#### International Comparisons of Perinatal and Infant Mortality Rates

International comparisons of perinatal and infant mortality rates are prone to certain biases which apply, in particular, to recently published statistics. Before making international comparisons, some of these biases will be discussed:

- (1) There are differences in the definition of still-birth and live birth. This produces discrepancies at two levels: (a) The distinction between an abortion and a stillbirth or, using more recent terminology, between early and late fetal death. Viability of the fetus may be defined in terms of gestational length or physical length. Furthermore, there is variation within these measurements, e.g. 20 weeks gestation in the USA and 28 weeks in most other countries; 35 cm physical length in Sweden and 30 cm in Switzerland. (b) The distinction between stillbirth and live birth. Some countries accept any sign of life which includes breathing, voluntary muscle movement, a heart beat or umbilical cord pulsation. Others insist there must be breathing; even this definition is variable, from a single gasp to regular breathing.
- (2) Certain incentives may affect registration. For example, maternity allowance is payable in Finland only to a woman who attends for examination before the end of the fourth month of pregnancy; other countries grant maternity benefit on production of a birth certificate – so acting as a stimulus to registration.
- (3) Statistical tabulations may differ. Perhaps the most serious example is that of the infant who is born alive but dies before the birth is registered. In most countries this would be counted as an

infant death but in France it is tabulated separately as 'Dead before registration', so artificially reducing the neonatal mortality rate.

(4) There may be differences in the administrative structure which influence what is recorded. A single organization may be responsible for registration at local and national levels and for the compilation of the statistics, as in this country. On the other hand, these functions may be the responsibility of different departments: in some of the Scandinavian countries registration is the responsibility of local ecclesiastical authorities but statistical compilation is by a subdivision of one of the Ministries. In such instances, the registration of a birth or death by a nonmedical authority may limit the information that is recorded, e.g. on maternal age and parity or on legitimacy.

Granting these caveats, the statistics published by the World Health Organization generally make adjustments for these biases and it is the most recent statistics published by individual countries themselves that must be interpreted with caution.

In examining some patterns of perinatal and infant mortality particular attention will be paid to four countries, Sweden, Japan, the USA, and England & Wales (for statistical purposes usually counted as one country). These countries show different patterns and most of the other countries in the developed world fit one of these patterns.

Much of the information has been abstracted from Chase's paper which examined perinatal and infant mortality in the United States and six West European countries up to 1965 (Chase 1967). This has been supplemented with more recent statistics from WHO Annuals (World Health Organization 1965–72), and occasionally from the reports published by individual countries. In all the graphs a log scale has been used which allows a comparison of the rate of change in the mortality.

### Perinatal Mortality

The trend in perinatal mortality rates is shown in Fig 1. In the USA the rate of decline slowed in the mid-1950s and did not much change up to 1968. Unfortunately, post-1968 rates are not available from routine statistical sources. For the other three countries the rate of decline has been fairly constant but is less steep for England & Wales.

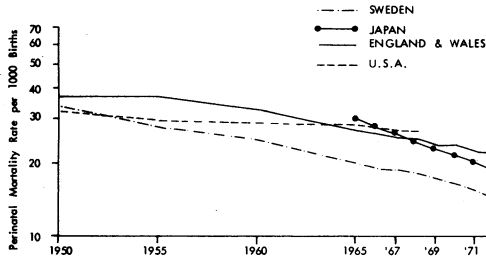


Fig 1 Perinatal mortality rates in selected countries

### Infant Mortality

Statistics of infant mortality rates have been available for at least the past century in most of the developed countries. The trends since 1950 are shown in Fig 2; Sweden leads the international league and her infant mortality rate shows a continuing decline. Furthermore, the rate of decline is constant and there does not appear to be any slackening in the improvement. Japan also shows a continuing decline, but what is striking is the rate at which this is happening; the slope of the graph is steeper than for any other country. Her international position has so improved that she is now challenging the leaders and if the trend continues will overtake Sweden. The factors accounting for this are ill understood; undoubtedly the phenomenal economic boom plays a major role, but what of the priority given to family planning, the liberal abortion policy and the rapid change in place of delivery from home to hospital?

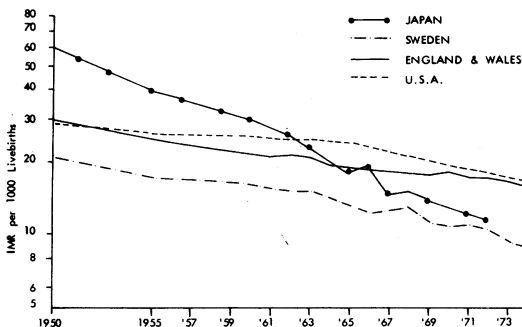


Fig 2 Infant mortality rates in selected countries

There was a marked slackening in the rate of decline in the USA in the 1950s and early 1960s; the line is almost level during this period. This was a source of concern at the time and was one of the factors leading to the initiation of the anti-poverty programme of the Kennedy and Johnson administration. Since 1965 there has been an improvement with a steady fall in the infant mortality rate.

The levelling of the curve in England & Wales occurred later than in the USA, i.e. in the early 1960s. However, what is disquieting is the persisting plateau; improvement is slow and we seem likely to be overtaken by several countries. In contrast, most other West European countries show a continuing decline. For example, Finland has a steep rate of fall rather like Japan; the Netherlands, France and Denmark resemble the pattern for Sweden: the important point is that there does not appear to be any falling off in their rate of improvement.

If the proportionate improvement in infant mortality rate over the 10 year period 1963–72 is considered, Japan and several European countries show improvements of over 30% while for England & Wales it is less than 20%.

It is pertinent now to analyse separately the two components of the infant mortality rate, i.e. the neonatal and the postneonatal mortality rates.

### Neonatal Mortality

The trend in the neonatal mortality rate (Fig 3) is similar to that of the infant mortality rate except that there is no levelling of the line for England & Wales.

The great effect of low birthweight on the neonatal mortality should be noted. In 1973, in England & Wales, infants of birthweight 2500 g or less, though only 6.4% of all live births, accounted for 57.3% of all neonatal deaths.

There are quite marked international differences in the proportion of live births that are of low birthweight (Table 1). The higher proportion of low birthweight infants in England & Wales compared with, for example, Sweden, inevitably

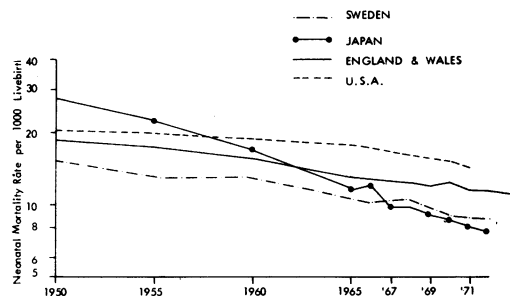


Fig 3 Neonatal mortality rates in selected countries

Table 1

Proportion of live births of birthweight less than 2500 g

	Low birthweight as percentage of live births	Source
Japan (1972)	5.3	Ministry of Health and Welfare, Tokyo (1972)
Sweden (1971)	4.1	National Central Bureau of Statistics, Stockholm (1973)
USA (1967):		US Department of Health, Education and Welfare (1972)
White	7.1	
Others	13.6	
England and Wales (1973)	6.5	Registrar General (1975)
Finland (1970)	4.6	Official Statistics of Finland, Helsinki (1974)

has a disadvantageous effect on the neonatal mortality rate. In fact, the 0-7 day mortality rate in 1971 among low birthweight infants in Sweden was 128/1000 and in England & Wales 100/1000, a fact that speaks highly of our medical care for the neonate.

#### Postneonatal Mortality

England & Wales has failed to show any significant improvement in the postneonatal mortality rate over the past 15 years (Fig 4). There is a continuing decline in the other countries but the line for England & Wales is almost level. Thus the major component of our poor performance in the trend of infant mortality is the lack of improvement in the postneonatal mortality rate.

The factors affecting the postneonatal mortality rate are predominately social - a disproportionate number of the postneonatal deaths occur among the lower social classes, in large families, especially if the mother is young (Morris 1976). This fact is highlighted again by the Confidential Enquiry into postneonatal deaths 1964-1966 (Department of Health and Social Security 1970), 312 of the 679 deaths occurring at home. Avoidable factors

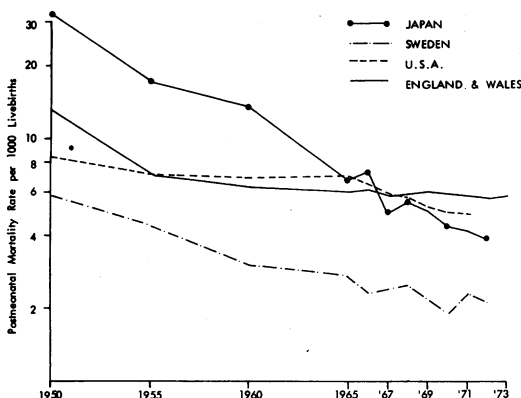


Fig 4 Postneonatal mortality rates in selected countries

Table 2

Proportionate changes in the sample of legitimate live births in England &amp; Wales 1970-72 analysed by parity and by grouped Social Class of father (Registrar General 1974)

	Legitimate live births				
	Total	No. of previous liveborn children			
	0	1	2	3 or more	
<i>Social Class I &amp; II</i>					
1970	4 940	1946	1761	843	389
1972	5 056	2139	1830	737	347
Percentage change	+2	+10	+4	-13	-11
<i>Social Class III</i>					
1970	12 561	4751	4193	2019	1595
1972	11 449	4559	4068	1602	1215
Percentage change	-9	-4	-3	-21	-24
<i>Social Class IV &amp; V</i>					
1970	5 588	1951	1690	955	991
1972	4 715	1679	1522	730	782
Percentage change	-16	-14	-10	-24	-21
<i>All Classes</i>					
1970	23 987	9082	7916	3945	3038
1972	22 101	8790	7712	3191	2398
Percentage change	-8	-3	-3	-19	-21

contributing to the deaths were present in 187 instances; 36% of these were 'social' and 35% 'parental'. Only 25% were related directly to medical services, i.e. general practitioner, hospital or local authority.

If the causes of postneonatal deaths are examined, it is among the respiratory and gastro-intestinal diseases that England & Wales has a poor record in comparison with, for example, Sweden. How much are these differences due to our housing inadequacies and the lack of sanitary facilities that accompany them?

#### Conclusion

If there is to be any significant effect on the decline in the infant mortality rate, the emphasis will have to be on social policy rather than medical care. Table 2 shows the changing pattern of family size by social class between 1970 and 1972; the greatest reduction has occurred amongst large families and in the lower social classes. Trends such as these have important implications; the ray of hope is that the postneonatal mortality rate fell to 5.3 per 1000 in 1974, the largest fall in a single year since 1964 (Office of Population Censuses and Surveys 1975).

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### Postneonatal Mortality in Sheffield

The halcyon period of the immediate post-war years, when neonatal and postneonatal mortality rates fell steadily in all social groups (Morris & Heady 1955), is over. As Pharoah (1976) has pointed out, the postneonatal death rate in this country is now lagging behind not only the Scandinavian countries but many other countries such as France and Japan. Infant mortality rates would seem, particularly from the recent studies of Wynn & Wynn (1974*a, b*), to be linked to a variety of different child health care systems. There appear to be many and various factors affecting mortality.

An enquiry carried out by the Ministry of Health in 1964 indicated that there was a definite group of possibly preventable deaths. Our own studies reinforce this.

The paediatric pathologist is usually concerned with naming diseases found at death and determining pathological causes of death but it is possible to take this a little further and to pose the question: 'How often and under what circumstances do possibly preventable deaths occur?'

This requires not only approaching each death from the point of view of diagnosis, but also in assessing the disease state from the viewpoint of the inevitability or otherwise of death. Such decisions must be rather arbitrary and debatable.

We divided deaths into four major groups, A, B, C and D, as follows:

**Group A:** Deaths in children with severe diseases of long standing in whom death is almost certainly not preventable though it may be delayable. Such deaths occurred in children with gross congenital deformities of the central nervous system and the heart. In this group also were children with progressive degenerative diseases.

**Group B:** Deaths from diseases for which treatments are available. There is an 'accepted

mortality rate' in such diseases as meningitis and pneumonia. However, in these, mortality is probably modified depending on the time of treatment.

**Group C:** Deaths in children in whom the disease found at necropsy would not ordinarily be considered adequate to account for death but would produce symptoms. These deaths include children with virus infections but in whom the cause of death was not obvious and children with tracheitis and gastroenteritis...

**Group D:** Deaths with no evidence of ordinary disease. These deaths occur in two forms: (1) Those where there is evidence that the children have been unwell - they had fatty change in the liver and evidence of an alteration of growth rate in the costochondral junction (D1). (2) Those where the child appears to have died in a healthy state (D2).

There was also a small group of malignant tumours (T).

A breakdown of all postperinatal child deaths in Sheffield over a two-year period, analysed as just described, is shown in Fig 1.

The first, most striking, fact is that more deaths occurred out of hospital than in hospital. The in-hospital deaths were chiefly of the Group A type. There were a small number of tumours and the rest were of Group B type. In Sheffield, very ill children are all sent to hospital by their home doctors.

The other deaths occurred either at home as 'cot deaths' or on the way to hospital. There were a few inevitable deaths - chiefly undiagnosed congenital deformities of the heart - but the bulk of the deaths were of the B and C groups. Deaths in apparently normal children were extremely uncommon. There were no 'battered baby' deaths

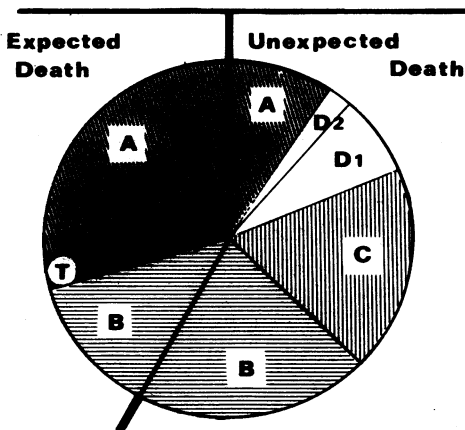


Fig 1 Distribution of postperinatal deaths in Sheffield 1972-3 (see text). (Reproduced from Emery 1976 by kind permission)