

***INFANTS
AT
RISK***



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***An Historical and
International Comparison***



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Cover: The Illustration, taken from a mid-nineteenth century lithograph by Marlet, shows the Sisters of St. Vincent de Paul caring for the foundlings of Paris. Impression in the Wellcome Historical Museum. The picture has been reversed.

INFANTS AT RISK

An Historical and International Comparison

THE pattern of mortality changes as a community advances and matures. In underdeveloped societies, mortality is greatest during the first five years of life. As the society develops, the greatest mortality occurs in the first year of life. In a community which has reached a high level of development, the main impact of mortality moves to old age.

Infant mortality concerns deaths amongst live-born babies in their first year. In 1962, there were 18,000 infant deaths in England and Wales. Numerically, and in terms of expectation of life, infant mortality involves a greater loss of potential than death at any other age.* This study examines the historical picture and the present pattern of infant mortality in this country, and draws on international material to measure and assess the progress achieved and the task remaining.

During the late nineteenth century in England and Wales every sixth baby died before its first birthday. By the 1960s, infant mortality had fallen substantially, but still one infant in 50 died. Birth requires more rapid adaptation to new circumstances than any other event in an individual's life. A baby's survival and healthy growth depend not only on his genetic equipment, but also on other factors. These include whether he is the first or a later addition to the family, his mother's age, his father's occupation and their ability to make use of medical and social services provided for his welfare.

The close relations between infant mortality and social conditions has given the study of infant mortality a special place in

* A previous O.H.E. publication *The Lives of our Children* discussed the pattern of child mortality and its economic impact, with particular reference to the substantial savings of life which resulted from the use of modern vaccines and drugs.

social medicine. The infant mortality rate is generally accepted as an index which measures most sensitively the stages of economic and social growth. Yet, although this is broadly true, there are many aspects of the relationship between infant mortality and improving social and economic conditions which remain enigmatic.

Pattern of Decline

The pattern of infant mortality, since records were first compiled in the 1840s, falls into three distinct phases (*Fig. 1*). From the 1840s until the end of the nineteenth century, the infant mortality rate remained remarkably constant at approximately 150 per thousand births. The 1900s saw the start of a steady and persistent period of decline which lasted until the early 1940s. Infant mortality was reduced by 25 per cent in each decade. During the early years of the Second World War there was an abrupt rise in the infant mortality rate*, but this was followed by a decade which saw a sharp improvement—the rate was halved within ten years. This improvement lost its impetus in the mid-1950s, and the decline in infant mortality appears to have reverted to the trend prevailing throughout the earlier decades of this century.

Infant mortality has been a subject of extensive study and a variety of explanations and theories have been put forward. They include studies on income, nutrition, medical skill and knowledge, the growth of public health and hygiene, differences in family size, housing conditions, class differences and physique. Other studies have considered the mother's education and maternal capabilities, whether she works or not during pregnancy, what use she makes of antenatal care and specialist medical services and whether she has her baby at home or in hospital.¹

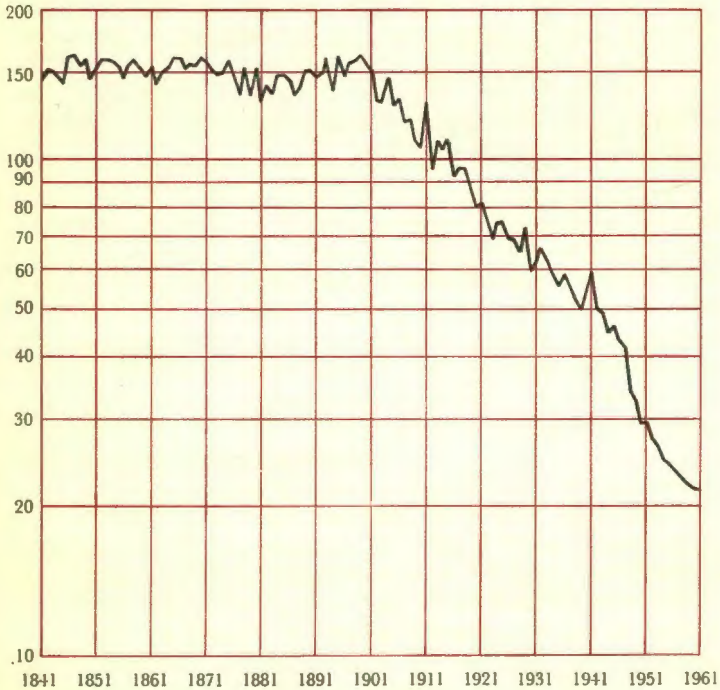
Although each or any of these factors can play a greater or a lesser part in infant mortality, none of them alone can explain the whole pattern of the decline in the infant mortality rate. Despite improvements in social conditions and public health services between 1840 and 1900, the infant mortality rate

* Only a small proportion of the rise in the early years of the war is attributed directly to air raid casualties. The greatest part came from increases in infectious diseases due to the social disruption of war particularly the mingling of urban and rural populations through evacuation.

FIG. 1.

Infant Mortality Rates per thousand live births. England and Wales. 1841-1961.

Source: The Registrar General, *Statistical Review of England and Wales, Part 1 1961* Table 3.



remained unresponsive and fluctuated around 150 deaths per 1,000 live births. Then in the early 1900s, the infant mortality rate began to fall. The steadiness in the rate of decline is remarkable—it was not checked by the depression of the late 1920s and thirties, nor substantially by either of the two World Wars. It is difficult to correlate the steady and uniform improvement in infant mortality with any corresponding steady and uniform progress in social conditions. The rate of improvement accelerated in the late 1940s—a period which saw the introduction of the National Health Service, and the development of the broad spectrum antibiotics. Since the mid-1950s the decline has reverted to its former rate, despite the increased prosperity of an affluent society, full employment and continuing improvements in the social and medical services.

INTERNATIONAL COMPARISONS

THE general pattern is not confined to England and Wales alone, the same trends can be seen in other countries (*Figs. 2, 3, 4 and 5*). In many of these nations, the rate of decline has been generally the same—the exceptions being Portugal and Yugoslavia (*Fig. 5*). However, international comparisons may be misleading. In comparing infant mortality rates there are the special problems of the definition of a live birth and whether or not still births are included in the total infant rates. There are considerable variations in the method of notifying death and the collection and the compilation of statistics. Comparisons over any length of time involve still further complications: the demographic content of populations at risk may change, as for example with the negro population in the United States, or geographic boundaries, as for example in Germany, may be altered. Nevertheless, an indication of experience in other countries is useful.

In *Table A* the Swedish pattern of decline is measured against the experience in other countries. It is seen that Denmark, England and Wales, Scotland, the United States, Luxembourg and Switzerland all fell below the level of 100 deaths per thousand live births within two to nine years of the Swedish rates: yet 45 years later the time lag widened to between nine and 19 years in these countries. The early lead of Norway was not maintained, and declined until in 1939 the Swedish rate was the lower. The rapid decline in infant mortality in the Netherlands has brought the rate equal with Sweden in 1960. The situation in Austria, France, Germany and Italy has slightly improved: the time lag since the 1930s has narrowed, although in 1961 the rates were 11 to 23 years behind the Swedish level.

The fall of infant mortality in England and Wales between the two World Wars was identical to that of the United States, while

in Scotland, the decline was slower (*Fig. 2*). The decline during the 1940s was more abrupt in Scotland, and the trend levelled out earlier in the United States than in England and Wales. Deviations from the general trend for certain years can readily be explained—as, for example, with the high number of infant deaths in all countries during the war years in Continental Europe. The years of high infant mortality follow the course of the war—Italy in 1943, Austria in 1945, the Netherlands and Germany in 1946. Yet, soon after 1946 the former rate of decline was resumed (*Fig. 3, 4*). It is remarkable that similar trends can be traced in countries where population size, living and social conditions, levels of nutrition, medical care and patterns of child rearing vary so considerably.

FIG. 2.

Infant Mortality Rates per thousand live births. England and Wales and Scotland. 1901-1961. United States. 1915-1961.

Sources: The Registrar General, *Statistical Review of England and Wales*, Part 1, 1961, Table 3. *Annual Report of the Registrar-General for Scotland*, 1961, Table 7.5. *Historical Statistics of the United States*. Supplement. U.S. Dept. of Commerce, 1960.

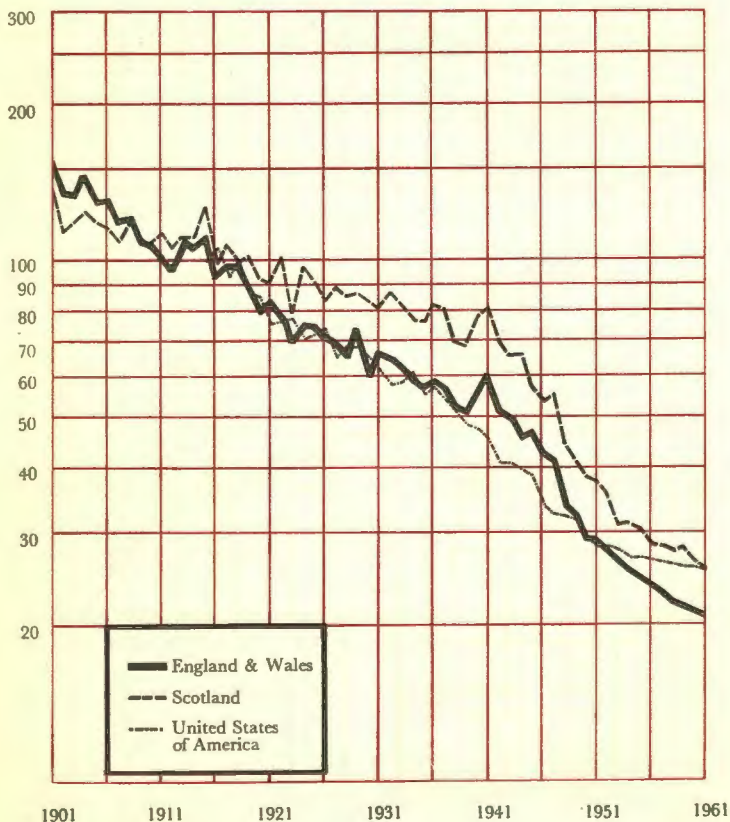
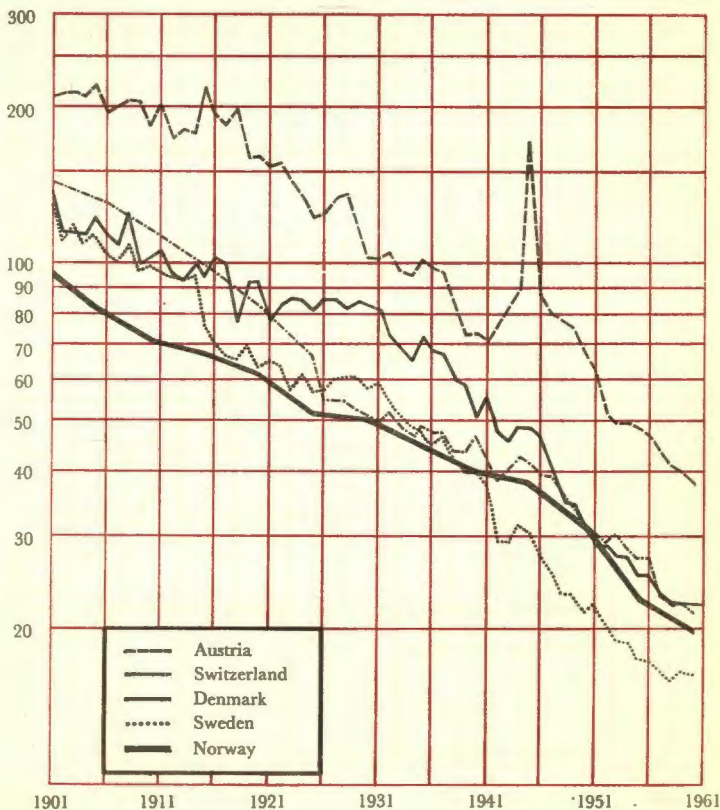


FIG. 3.

Infant Mortality Rates per thousand live births. Austria, Denmark, Switzerland, Norway and Sweden. 1901-1961.

Sources: Bericht über das Gesundheitswesen in Oesterreich. Bundesministerium für Soziale Verwaltung, 1961. Statisches Jahrbuch der Schweiz. Eidgenössisches Gesundheitsamt, 1961. Statistisk Årbog Danmark 1936 and 1962. Dødeligheten og dens årsakeri Norge, 1856-1955. Statistisk Sentralbyrå, 1961. Befolkningsrørelsen, 1900-1961. Central Bureau of Statistics of Sweden.

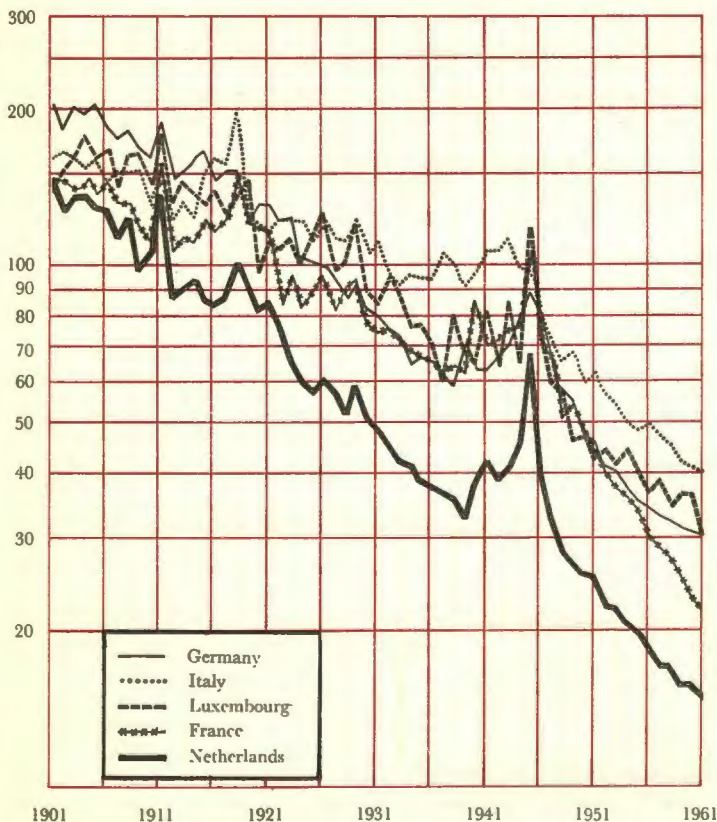


Notes: For Switzerland from 1901-1926 quinary rates only are available. For Norway only quinary rates are available.

FIG. 4.

Infant Mortality Rates per thousand live births. Italy, Luxembourg, Germany, France and the Netherlands. 1901-1961.

Sources: Statistisches Bundesamt der Bundesrepublik Deutschland. Repubblica Italiana Istituto Centrale di Statistica. *Annuario di Statistiche Demografiche*, Vol. X, 1960. Institut National de la Statistique et des Etudes Economiques de la France. Nederland Central Bureau voor de Statistiek. Service Central de la Statistique du Luxembourg.

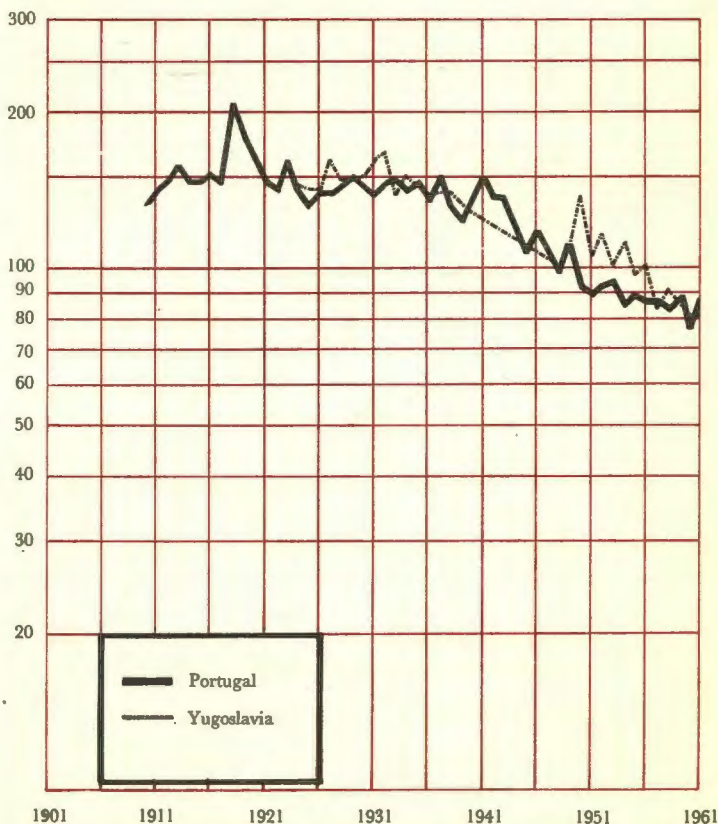


Note: From 1900-1944 the statistics apply to the Deutsches Reich and from 1946-1961 to the Bundesgebiet excluding Berlin.

FIG. 5.

Infant Mortality Rates per thousand live births. Portugal. 1910-1961. Yugoslavia 1924-1961.

Sources: Anuario Demografico Portugesa Instituto Nacional de Estatistica. Statistički godišnjak F.N.R.J., 1962.



Notes: The Portuguese Statistics include the rates for the Azores and Madeira. There is no data for 1940-1948 available for Yugoslavia.

TABLE A.**An International Comparison of Infant Mortality Rates**

* Only five yearly averages are available for Norway. In this table the midpoint of the quinary average is given.

† Indicates rates ahead of the Swedish rate.

Country	Year in which I.M.R. passed:				Year in which Sweden passed the 1961 I.M.R. rate of each country	Time lag in years of each country behind the Swedish rate—1961
	100 deaths per 1,000 live births	75	50	25		
England & Wales	1911	1923	1943	1952	1952	9
Scotland	1916	1938	1948	—	1944	17
Austria	1932	1938	1951	—	1940	21
Denmark	1909	1932	1940	1955	1950	11
France	1922	1931	1950	1959	1950	11
Germany	1926	1933	1950	—	1944	17
Italy	1932	1948	1954	—	1938	23
Luxembourg	1909	1922	1949	—	1942	19
Netherlands	1920	1926	1931†	1951	Equal	Equal
Norway*	1883†	1908†	1928†	1948	1952	9
Portugal	1947	—	—	—	1914	47
Sweden	1907	1915	1933	1947	1961	0
Switzerland	1915	1922	1931†	1956	1951	10
U.S.A.	1917	1921	1939	—	1947	14
Yugoslavia	1953	—	—	—	1915	46

Note: The figures derived from Figs. 2-5 give the years when each country reaches the level of 100, 75, 50 and 25 deaths per thousand live births. In the final column the position of each country in 1961 is compared to the Swedish infant mortality rate. For example, England and Wales reached the rate of 100 deaths per thousand live births in 1911, four years after Sweden, by 1923 the rate of 75, eight years behind, in 1943 50, ten years behind and a rate of 25 in 1952 with the time lag behind Sweden halved to five years. Sweden reached the 1961 level of England and Wales in 1952 so the time lag has now widened to nine years. The rate of decline in the early 1950s has not been maintained and the rate of improvement in England and Wales has slowed down.

A BACTERIOLOGICAL APPROACH

THE historical pattern of infant mortality has been dominated by the reduction in bacterial infections. It is therefore logical to approach the subject from a bacteriological point of view. Although elementary aseptic and antiseptic techniques were first advocated in the mid-1800s they were greeted with scepticism. It is, therefore, not surprising that infant deaths, which were mainly due to infections, showed no reduction. By the turn of the century, however, principles of hygiene were becoming accepted, and the use of soap and antiseptics rapidly increased.^{2, 3} In particular, the midwifery service received statutory recognition in 1902, and a growing number of competent midwives were available to attend domiciliary confinements. Their skills made possible the practical application of theories for the control of infection during childbirth and after. It was at this time that infant mortality started to decline. In the succeeding years public health and welfare services developed and gradually grew into the present maternity and infant welfare services.

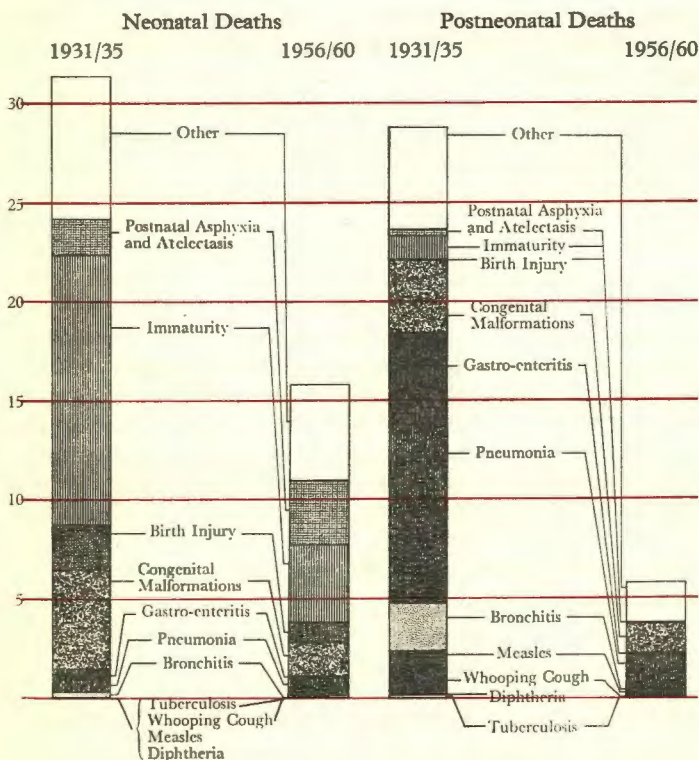
The control of bacterial infection originally depended on anti-sepsis and asepsis to prevent infection. Later, particularly after the pharmaceutical revolution of the mid-1930s, ways were developed to attack microbes after they had invaded the body. The body's natural defences can be strengthened by inducing artificial immunity with vaccines. Alternatively, the invading microbes may be controlled or destroyed by bacteriostatic or bactericidal drugs.

Immunization against diphtheria provides an illustration of the most complete control of one cause of infant mortality (*Fig. 6*). There have been no infant deaths from diphtheria in England and Wales since 1947. Deaths from whooping cough have been falling rapidly since the start of the century, but antibiotics, and

FIG. 6.

Infant Mortality Rates per thousand live births. England and Wales. Quinary Comparison 1931/35 and 1956/60 of Neonatal and Postneonatal deaths by selected main causes.

Source: The Registrar General, *Decennial Supplement for England and Wales, Part 1* (various years).



later on, effective vaccines have dramatically cut mortality since the early 1950s.

Deaths from gastrointestinal infections showed no improvement between the early 1930s and the mid-1940s. The decline during the following decade was swift. Between the end of the war and 1956 deaths from this cause fell by nine-tenths. Respiratory diseases still account for the largest number of infant deaths, particularly pneumonia and bronchitis, but the mortality rate has been reduced by more than two-thirds since the 1950s. For these diseases much of the improvement took place during the period which coincided with the introduction of penicillin and the broad spectrum antibiotics.

How does the pattern of infant mortality over the past 125 years relate to this framework of progress in the understanding and control of disease? During the latter half of the nineteenth century the infant mortality rate did not respond to medical progress. The decline started at the turn of the century. The emergence of midwifery as a profession with professional standards coincides with this change in trend. It may well be that this brought about the practical application of accumulated knowledge. Medical science had developed an understanding and ability to cope with disease, while the professional organisation of midwifery provided the means of applying this knowledge. From 1900 onwards there were progressive advances in both sectors—in medical science and in its application. There were cumulative advances in the ability to control disease through vaccines and chemotherapy, which were matched by corresponding advances in the organisation of medical care and public health, which were finally consolidated in the tripartite system of the National Health Service.

THE CONTEMPORARY SCENE

THE infant mortality rate is lower than ever before, but after the rapid decline since the war, the improvement has lost its impetus. Although the infant mortality rate for England and Wales compares favourably with some countries, it is nevertheless still higher than in other countries, notably in Scandinavia, The Netherlands, New Zealand and Australia.⁴ It is especially in still birth, deaths during birth and deaths in the first week after birth that England and Wales and Scotland lag behind many Continental countries and the United States.⁵

It is customary to divide infant deaths into neonatal deaths occurring in the first four weeks after birth, and postneonatal deaths in the first year of life after the first four weeks. Perinatal mortality is another concept often used, usually including still births and the loss of infant life during birth and the first seven days.

In 1953 two thirds of all infant deaths occurred during the neonatal period as compared with one third in 1906 when separate statistics for the two periods were first compiled. There has been a 90 per cent reduction in postneonatal deaths and a 60 per cent improvement in neonatal mortality in the 50 year period.⁶

The greater reduction in post-neonatal mortality is largely due to the achievements in the control of infectious diseases. These have not been matched by as rapid improvements in the control of other causes of death, such as immaturity, asphyxia, birth injury and congenital malformations, which each have their greatest effect in the neonatal period. (*Figs. 6, 7*).

Major factors dominating the pattern of infant mortality are the biological effects such as the mother's age and parity* and the

* Parity is defined as the number of previous children, living, dead and still born of all marriages.

FIG. 7.

Infant Mortality Rates per thousand live births. England and Wales. Quinary Comparison 1931/35 and 1956/60 of Neonatal and Postneonatal deaths by selected main causes.

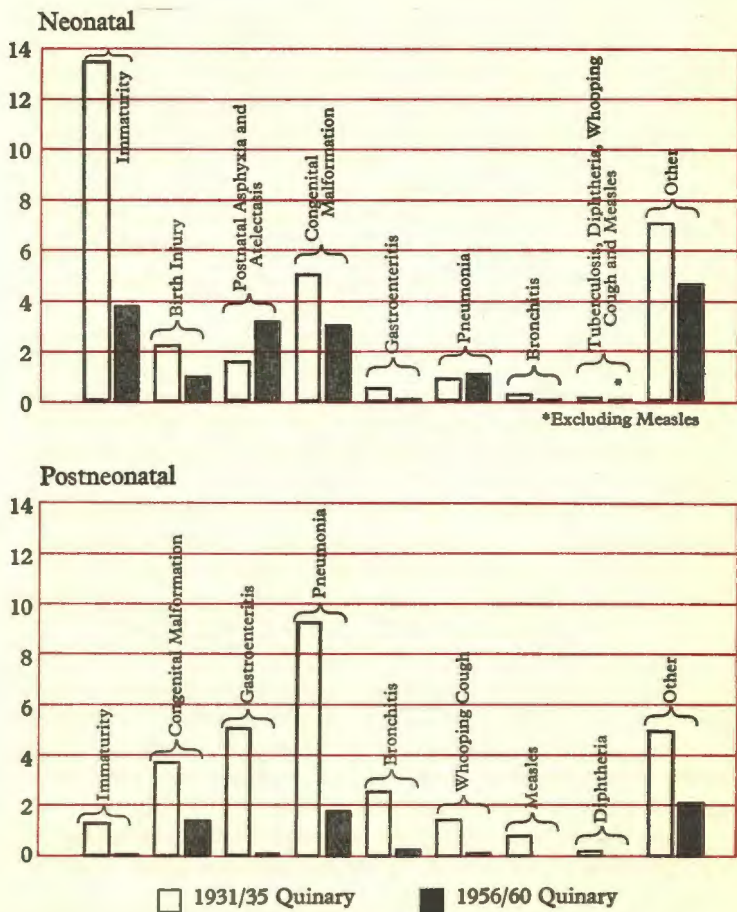
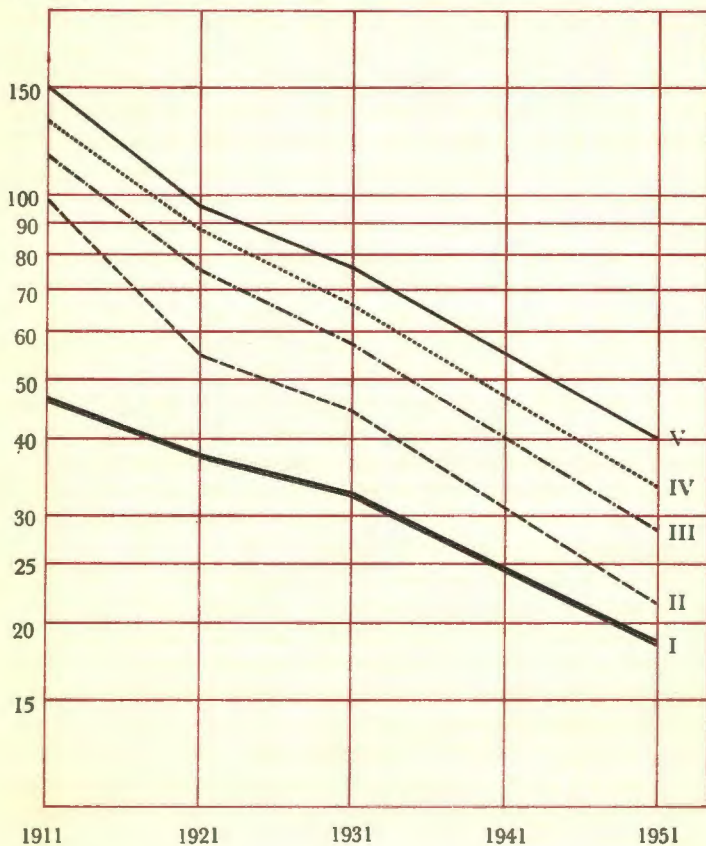


FIG. 8.

Infant Mortality Rates per thousand legitimate live births by Social Class. England and Wales. 1911-1951.

Source: The Registrar General, *Decennial Supplement for England and Wales, Part 1* (various years). No census taken in 1941.



effects of the environment which are "measured" by the Registrar General in the statistics by the social class of the father.* Two studies, one undertaken by the Social Medicine Research Unit of the Medical Research Council based on 1949 infant mortality experience, and the other by the National Birthday Trust Fund on 1958 experience have examined the influence of the environment on infant mortality. In *Table B* the effects of maternal age and parity and social class as found by the Social Medicine Research Unit are shown for still births, neonatal and postneonatal deaths. It demonstrates the mortality for each period: the rates are expressed as a percentage of the average neonatal mortality rate. For example, a mother of over thirty having her first baby of social class IV or V has a very high risk of the baby being still born, while the baby of a young mother with three or more older children in the middle or bottom social groups also has a very high risk in the postneonatal period. The table shows that the risk of still birth increases rapidly with the mother's age in all social groups, that the risk of still birth and neonatal deaths tends to be lower for the second and third births than for the first or later births and that the risk of death in the postneonatal stage increases rapidly with the size of the family. Throughout, the risk of mortality at any stage increases step by step with social class. Some factors underlying this social and biological pattern are described in the Appendix. Over and above this pattern, there are distinct regional differences in infant mortality—generally increasing towards the North of Britain—which can only partly be explained by economic differences.^{7, 8, 9.}

Since the effective control of the infectious diseases the focus of attention is on the high proportion of infant deaths occurring in the neonatal and perinatal periods. Care and attention must be directed to the vulnerable infants: for example, there is evidence that premature babies are not taken to welfare centres with any more regularity than other children, nor do their mothers seek extra medical advice.¹⁰ The shift away from postneonatal mortality has led to a greater emphasis on prenatal medical care with a resulting decline in "miscarriages". However, the process

* Social Class I: Professional occupations; Social Class II: e.g. Farmers, teachers, shopkeepers, managerial occupations; Social Class III: Skilled occupations, e.g. fitters, clerks; Social Class IV: Semi-skilled occupations, e.g. farm workers, machine minders; Social Class V: Labouring occupations, e.g. railway porters, kitchen hands.

Comparative Risks of Still Birth, Neonatal and Postneonatal Deaths according to the Social Class of the Father and the Mother's Age and Parity

(Single, legitimate births in England and Wales—Average neonatal death rate=100)

Sources: The table is based on Heady, J. A., Stevens, C. F., Daly, C., and Morris, J. N., *Lancet*, 500, Table I, 1955.

Mother's parity	Social class	Still births			Neonatal deaths			Postneonatal deaths		
		Mother's age			Mother's age			Mother's age		
		—25	25–29	30 and over	—25	25–29	30 and over	—25	25–29	30 and over
1	I and II	84	108	196	68	80	116	25	23	24
	III	96	132	223	87	93	133	54	31	33
	IV and V	104	152	260	103	99	158	70	57	57
2, 3	I and II	60	56	101	77	58	66	47	32	31
	III	71	75	117	87	71	83	92	61	45
	IV and V	70	92	143	104	80	96	131	84	62
4 and over	I and II	(131)	85	162	(179)	71	102	(134)	78	59
	III	99	104	188	162	90	100	221	114	86
	IV and V	81	106	208	134	94	125	200	149	103

Rates in parentheses are concerned with fewer than ten deaths or still births.

Births for which social class or the mother's age, or parity, were not stated are excluded from the table.

Rates for still births are related to live and still births, while rates for later periods are related to live births only.

Mortality rates are expressed as a percentage of the average neonatal infant mortality rate for the year 1949.

of gestation and the effects of virus infections such as rubella and the causes of asphyxia and congenital malformation are still far from understood. The objective must be to find ways of avoiding malformations, rather than concentrating only on preventing consequent deaths.

Persistence of Social Class Difference

The social pattern of infant mortality has persisted despite the substantial changes in social conditions of the past 50 years. What is more remarkable is that the relative difference between social classes has remained virtually constant since at least the Edwardian era. In 1911 when mortality was first related to social class, the infant mortality of social class V was two and a half times greater than in social class I. In 1951, the relative position of these classes was identical (*Fig. 8*). There has been little change in the relative order of social class not only in the postneonatal stage but also in the neonatal stage and in the case of still births. (*Figs. 9, 10, 11*).

There are unfortunately no comparable figures later than 1951 for England and Wales showing infant mortality broken down by occupation and social class, as these figures are collected decennially through the census.* What evidence is available, however, suggests that the introduction of the National Health Service has effected no reduction in the class difference. Figures for perinatal deaths in the National Birthday Trust Survey showed that the influence of social class was still present in 1958. In Scotland, for which infant mortality rates by social class have been published for each year from 1939 to 1961, the class difference has remained constant. The gap between social class I and V is similar to that in England and Wales: in 1961 the rate in Scotland for social class V was still more than twice the rate for social class I (*Fig. 12*). The tendency since such statistics were first recorded fifty years ago both in England and Wales and Scotland has been for the rate of social class V to lag 30 years behind the rate of social class I. The decline in infant mortality has not come about through proportionately greater improve-

* Statistics for England and Wales broken down by occupation based on the 1961 Census will not be available before 1965.

FIG. 9.

Postneonatal Mortality Rates per thousand legitimate live births by Social Class. England and Wales. 1911-1951.

Source: The Registrar General, Decennial Supplement for England and Wales, Part 1 (various years). No census taken in 1941.

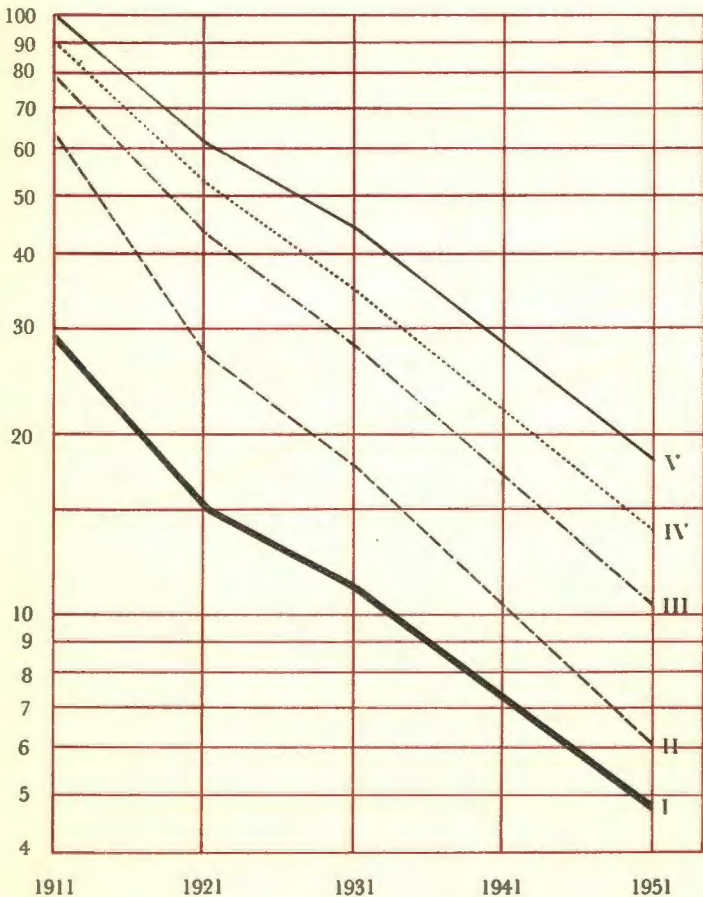


FIG. 10.

Neonatal Mortality Rates per thousand legitimate live births by Social Class. England and Wales. 1911-1951.

Source: The Registrar General, Decennial Supplement for England and Wales, Part 1 (various years). No census taken in 1941.

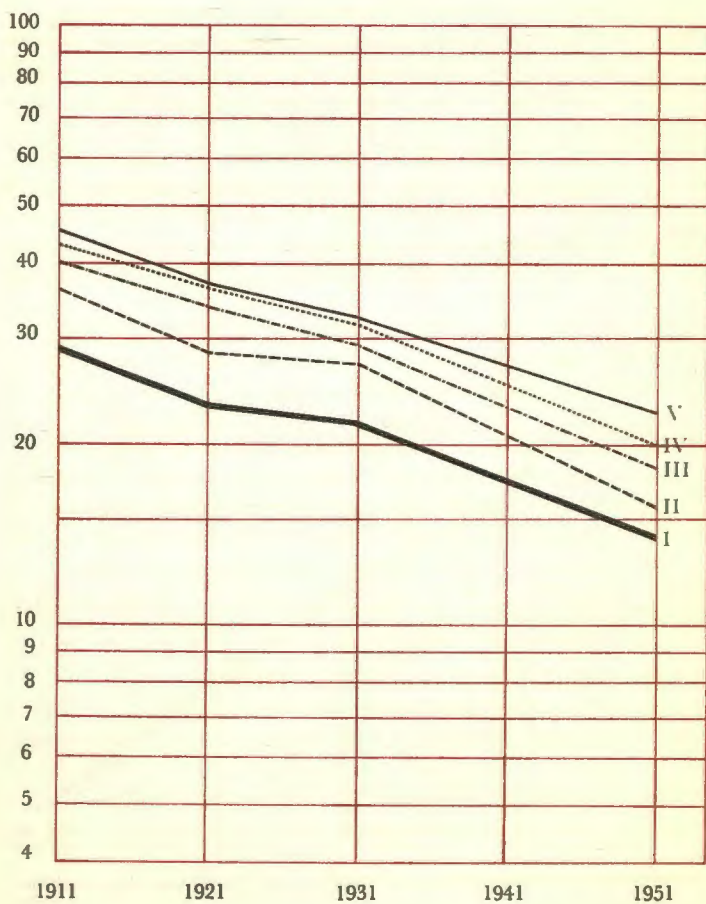


FIG. 11.

Still Birth Rates per thousand legitimate live births by Social Class. England and Wales. 1911-1951.

Source: The Registrar General, Statistical Review of England and Wales, Part I (various years).

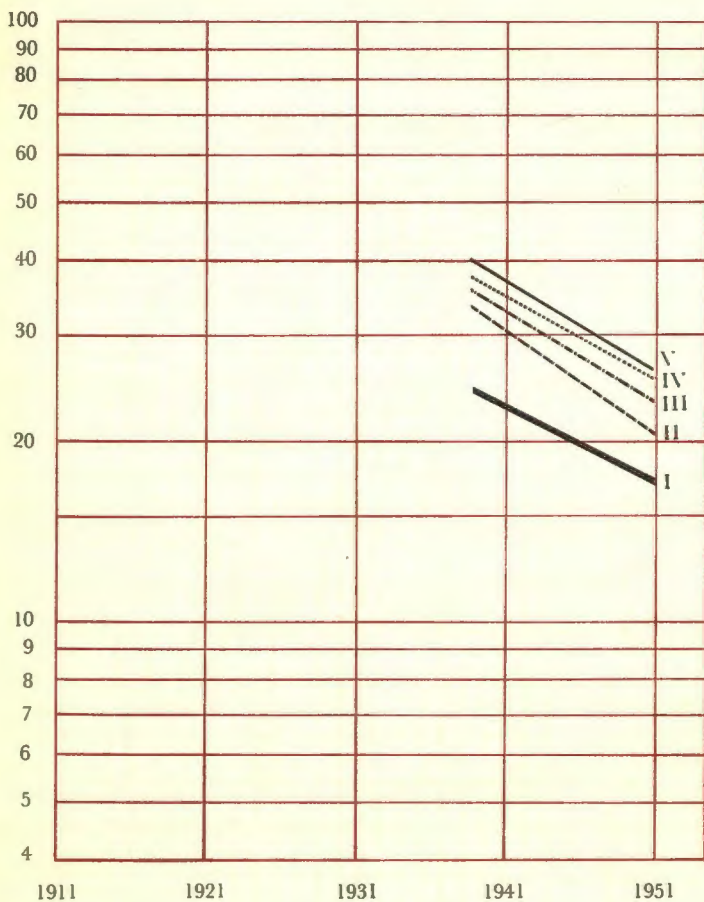
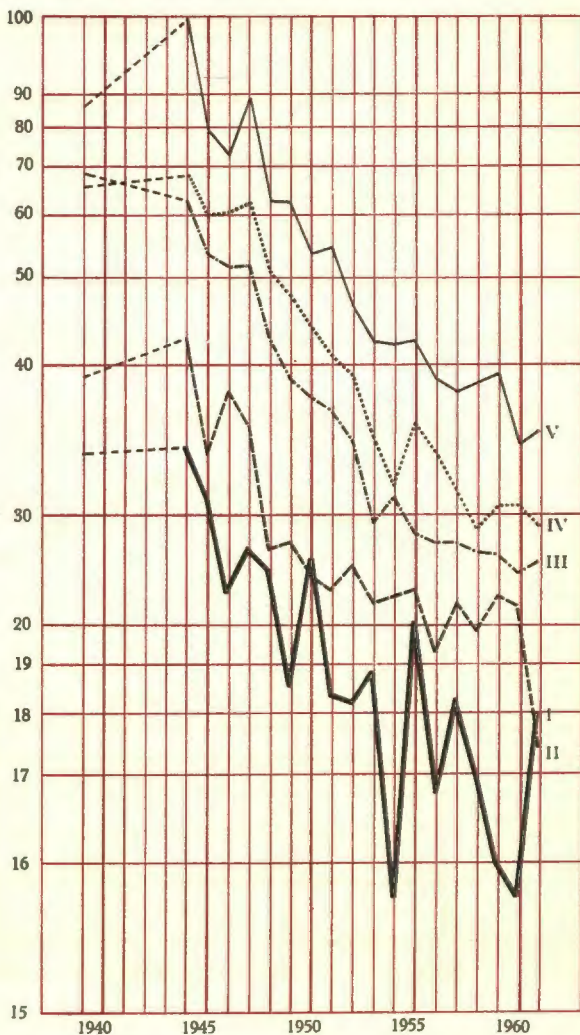


FIG. 12.

**Infant Mortality Rates per thousand live births by Social Class.
Scotland, 1939-1961.**

Source: Annual Report of the Registrar-General for Scotland (various years).



Note: There are no statistics available by social class for 1940-1944.

ments in social classes of the community where infant mortality was greatest. It is a trend in which all classes of the community have benefited uniformly.

A variety of explanations can be put forward for the persistence of uniform differences between classes. It can be argued that even if there has been a general levelling up in social class difference in matters such as income and expenditure, conditions of employment, welfare services, education and so on, this has not affected the factors which matter in infant mortality. This is particularly true if class differences are evaluated in terms of the family's social capital* rather than current assets. Improvements in housing and education take longer.

In addition, as a corollary to this, there are persistent differences in attitudes among the social classes and in the use of the welfare and medical services available. Greater opportunities and new medical advances are first exploited by the higher social classes. It takes time for them to infiltrate down the social scale. This has been found true whether the services are free or not. Lack of understanding and inability to take advantage of available services may handicap mothers in the lower social grades. It has been found that the families of "white-collared" workers, social classes II and III, have the best record of attendance at child welfare clinics; their rate is twice that of social class V.¹⁰

These arguments, however, would not necessarily explain why the class differential had remained so remarkably constant, because differences between the social classes themselves have certainly changed in the past 50 years. Also, if improvements affecting infant mortality were more generally adopted by social classes I and II, the gap might even have been expected to widen. Two explanations would, however, account for the difference having remained uniform. The first involves the concept of a common risk, and once again assumes that the improvement should be considered in bacteriological terms. As control of infection has been the primary cause of reduced infant mortality, it is entirely logical to expect that each section of the community would benefit proportionately. Although the social class with the highest absolute mortality from an infectious disease will enjoy the greatest

* See footnote on page 32.

absolute advantage if the infection is controlled, the proportionate benefit should be the same for every class. If this explanation is correct, there is a real possibility of closing the class differential now that infections play so little part in infant mortality.

The alternative explanation, however, accepts as inevitable that improvements will be adopted sooner by the higher social classes. As each successive advance is slowly filtering down the social scale, new advances are taking place amongst classes I and II, so that they maintain a proportionately lower infant mortality rate. They were the first to receive systematic ante-natal care. They could afford to buy sterile baby foods sooner. Even although modern antibiotics were available for all, the fact that the upper class family had a private telephone may have been crucial in ensuring that the treatment was prescribed promptly enough to save their infant's life. The present time lag of about 30 years between the mortality rates of the highest and lowest social classes is compatible with the fact that many relevant advances—such as the ownership of a telephone—are adopted several decades later by the lower social classes. On this theory, it must be anticipated that the class differential in infant mortality will persist in the future. As the social classes IV and V reach the standards already attained by social classes I and II, the latter will have made further progress, both materially and educationally.

It therefore remains to be seen whether it does, in fact, prove possible to reduce, or even eliminate, the social class differential in infant mortality.

THE SOCIAL AND ECONOMIC IMPLICATIONS OF INFANT MORTALITY

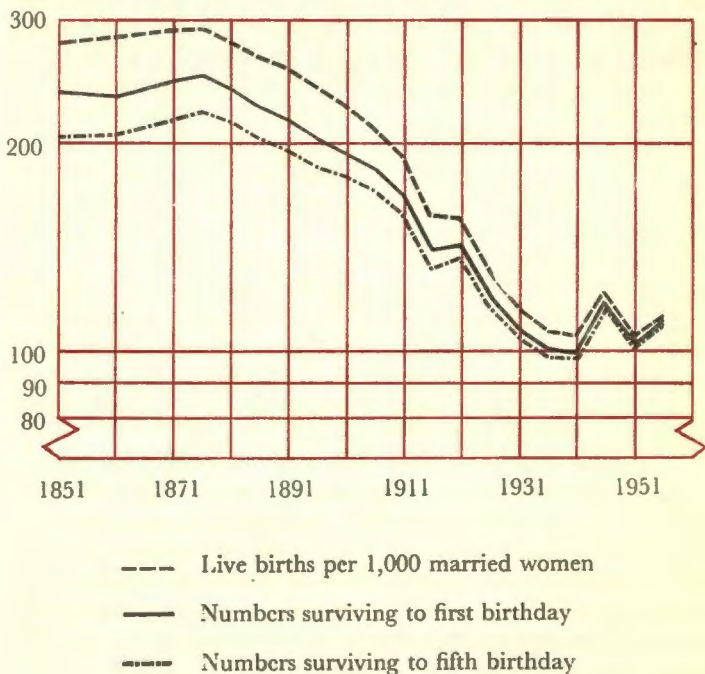
IN societies where mortality is high in the early years of life, the birth rate must also be high if the population size is to be maintained. The central issue concerning the impact of a change in mortality during the early years of life is the effect it may have on birth rates. A general change in mortality in infancy or in early childhood may alter the pattern of family formation. How far can the changes in the birth rate in England and Wales over the past century, be explained by the greater chances of survival from birth? The question is of more than historical interest. Death rates in underdeveloped communities have rapidly fallen in recent years—and much of this fall is due to improved mortality rates early in life. The development of medical science and international health organisations makes it possible to endow a primitive society with a mid-twentieth century death rate within the course of a few years. If the need to replace losses through mortality in early years diminishes, will the high birth rate also fall away?

The experience in England and Wales over the past century suggests that this does not necessarily follow. The decline in mortality in the early years of life can explain at most only one half of the fall in the birth rate. In the 1860s, the number of births per thousand married women averaged nearly 300 a year. Mortality in the first five years of life was such, however, that only 200 of those born alive reached what is now school-age (*Fig. 13*). The numbers of births started to fall away from the mid-1870s. During this period, the death rate among children between one and five years improved, and although by the early 1890s the annual number of births per thousand married women had fallen to 250, the number of those who reached the age of five was virtually the same as 40 years earlier. After this, however—the period of declining infant mortality—any correlation between the birth rate and mortality early in life breaks down. The birth rate fell far below

FIG. 13.

Live Births per thousand Married Woman aged 15-44 years. England and Wales. Quinary Periods 1851/56—1956/60. And Mortality in Infancy and Early Childhood.

Sources: Registrar General, *Statistical Review of England and Wales, Part II, 1961*. Table C. Chester Beatty Research Institute. *Serial Abridged Life Tables, England and Wales, 1841-1960, Part I*.



what was necessary to balance up the increased chances of survival from birth. From the mid-1950s, the birth rate has risen. Clearly other factors than infant mortality are of greater significance.

Within the individual family the improvement in infant mortality takes on deeper significance. The death of an infant has now become an exceptional event. Family formation is less subject to the wastage and emotional disturbance consequent on high infant mortality—the experience of parents today differs substantially from that of their grandparents.

The reduction of infant deaths has changed the pattern and thrown into relief the present residue of mortality. Great advances have resulted from the understanding and control of infectious diseases, culminating in the virtual elimination of many with the use of modern vaccines and drugs. Infections are now comparatively rare causes of infant mortality. Although there has also been much improvement through better care during and after pregnancy there is still scope for further progress. Britain lags behind other countries in the speed at which infant mortality has been reduced in recent years.⁴

Congenital causes of death now assume the greatest importance. There should be more research into the process of gestation and the reasons for underlying weaknesses in some infants. The proportion of “avoidable” deaths in the neonatal stages is high, especially lower down the social scale. It would appear that much could be done to avoid mortality among those vulnerable infants. The recognition and the singling out of the babies at high risk for special care, such as early and regular prenatal care and hospital confinement would considerably improve the perinatal and neonatal rates. Further improvement is required before the pattern of mortality in our community takes the shape of that of an advanced society where death is, for the most part, confined to old age. If the infant mortality rate in Britain could be reduced to that of Sweden, about 4,000 babies’ lives would be saved each year.

The health services cannot by themselves achieve all the reduction in infant mortality which would be possible. What is also needed is that more use should be made of the available maternity services by expectant mothers. If the proper demands were made on the services, especially early in pregnancy, it is likely that the inadequacies would be revealed and highlighted, and that some expansion would be inevitable.

APPENDIX

Some Factors Underlying the Social and Biological Pattern

Social Class

The social pattern of infant mortality underlines the impact which the environment has on a new born child. The biological factors are dominant in the neonatal stage and the social factors become stronger as age increases. However, step by step, lower down the social scale, the infant mortality rate is higher, not only in the postneonatal stage but also to a lesser extent with neonatal deaths and a similar pattern is found in still births.

The factors which can contribute to this difference between social classes are numerous. There is no doubt about the complexity of the problem and to single out one factor above all others is to ignore their interdependence. Social behaviour is conditioned by many influences; an individual's attitude and opinions are affected by the whole range of his experience. The young baby feels the impact of all the forces of his surroundings: there are the biological influences such as the baby's own physical make-up, and his mother's age and the size of the family, as well as the environmental influences which include his father's occupation and income, the part of the country and the type of home in which they live, his mother's and his father's education, the quality of care they give or can afford to give the baby and whether the baby is legitimate or not. A useful distinction can be made between factors affected by current money income, such as food, clothing and fuel, and other matters affected by expenditure on "social capital" such as housing or education, which depend not only on current income but on such matters as the ability to raise credit*. All these "assets" influence the attitudes and the way of life of the individual.

The Family's Social Capital

A family with a small baby placed in poor housing conditions clearly has a difficult time. It is probable that low standards of child care are not so much due to economic factors, but to the strain of living in over-crowded or inadequate dwellings.¹⁰ It is hardly surprising that infant mortality in bad housing conditions has been found to be twice as high as the average rate for all infants. There is evidence to suggest that the standard of housing and the quality of maternal care each exert a greater effect on mortality rates than does the frequency with which the infants develop illnesses.¹¹ The standard of nutrition must be considered: a national food survey found that in the consumption of most nutrients other than the carbohydrates there were downward gradients from social class I to V.¹²

* The term social capital can mean either the social capital of a community as a whole such as its road system, its housing stock, its public administration or education service, or the social assets enjoyed by individual families. Here, only the latter meaning is used.

The type of education received by an individual plays an important part in shaping parental behaviour and attitudes. It is not surprising, therefore, that infant mortality rates reflect differences in education. The rate rises steadily from parents with University education to those with the minimum elementary level; even in a group of the same occupation, there is evidence that the children of those with a higher level of education are more likely to survive the first year of life.¹¹

Maternal Care

The quality of maternal care during the first year of life bears a direct relationship to the growth and development of a child. The mortality rate among all infants enjoying a high standard of maternal care is less than half the national average. Mothers in social classes I and II have greater skills in maternal care and the rates of "avoidable deaths" in social classes I and II are lower than in social classes IV and V.¹¹ Health visitors' reports show that the proportion of "efficient" mothers declines steeply with falling social class and increasing family size.¹³ The position of an illegitimate baby is much more precarious than that of other children. The death rate amongst babies of single women living alone, is two and a half times the general infant mortality rate, while the "avoidable" death rate is more than three times greater than the average rate for all classes.

Mother's Age and Parity

A mother's age and parity greatly influence the baby's chance of survival. These factors are at their most important in still births and neonatal deaths, for after the first month the death rate falls regularly with the mother's age and parity, except in large families. Young mothers are the least likely to have still born children but a mother's first child is more likely to be still born than subsequent children.

High postneonatal death rates are associated with large families.* With a large family there is an increased opportunity of infection, especially when an elder brother or sister first goes to school. The risks are often aggravated by overcrowding. The economic consequences of a large family affect most levels of income, but are particularly marked as social class declines. Added to this is the difficulty a young mother faces in providing adequate care for a large number of small children.

Weight at Birth

The definition of prematurity used by the Registrar General is a live born infant with a birth-weight of 5½ lbs. or less.† However, even in this apparently strictly biological sphere there are complicating factors. The definition takes no account of whether the full period of gestation is completed. In a study in Birmingham, it was found that the average weight of babies living in the poorer districts was less than those living in the more prosperous districts.¹⁴ It is therefore not surprising that in Aberdeen in 1949-1951 premature births were twice as common in social classes IV and V than in social classes I and II.¹⁵ A complicating factor

* In a study the rate of postneonatal deaths for an only child was found to be 6.3 per thousand live births, while for a child in a family of two or more it was 13.2.¹¹

† This is the definition in the international classification of diseases Sec. XV. If weight is not specified, a live born infant with a period of gestation of less than 37 weeks, is specified as "premature".

in premature deaths is that the baby is more prone to fatal respiratory and infectious diseases than a full term baby and so the secondary cause of death may well be stated on the certificate. Figures derived from death certificates may, therefore, understate the number of deaths arising from immaturity.

Geographical Area

Neonatal and postneonatal death rates broken down geographically and by social class show the familiar class gradient within each region. When the different regions are compared the rates for the South compare very favourably with those for the North and Wales.¹⁶ The unfavourable regions climatically coincide with the depressed areas.¹⁷ When the regional rates of the same social class are compared the greatest differences are to be found among the three lower social classes, the wage earners. The comparative stability of social class I demonstrates the importance of socio-economic factors. However, when perinatal rates are compared, social classes I and II in the North are at the same level as class III in the South and the infants of skilled workers in the North rank in mortality levels with those of semi-skilled workers of the South.¹⁸

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