

Infant Mortality: A Continuing Social Problem

A volume to mark the centenary
of the 1906 publication of
Infant Mortality: a Social Problem
by George Newman

Edited by

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INFANT MORTALITY: A CONTINUING SOCIAL
PROBLEM



Sir George Newman
(1870-1948)

Author of
Infant Morality: a Social Problem
1906
[Methuen & Co., London]

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INTRODUCTION



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Chapter 1

Infant Mortality: A Social Problem?

Eilidh Garrett, Chris Galley, Nicola Shelton and Robert Woods

Sir George Newman (1870-1948) was a pioneer in public and child health during the first half of the twentieth century. After training as a medical doctor he became lecturer in public health at St Bartholomew's Hospital, London. He subsequently held a succession of public offices, becoming Medical Officer of Health (MOH) for Bedfordshire in 1897 and then for the London Borough of Finsbury in 1900. In 1907 he was appointed Chief Medical Officer to the Board of Education and twelve years later he took up the post of Chief Medical Officer to the newly created Ministry of Health. The latter two positions were key public appointments, which meant Newman was well placed to influence the shaping of British public health policy in the aftermath of the Great War. Throughout his career Newman sought to promote better public health and in 1939 he summarised his views in *The Building of a Nation's Health*. He is best remembered, however, for his 1906 publication *Infant Mortality: a Social Problem*. Based on his experiences as a local MOH, this pioneering work awakened wider general interest in the long-established problem of high infant mortality. Newman used the book to develop a framework whereby the nature and scale of the problem could be fully understood and, more importantly, he proposed a series of policies aimed towards reducing infant mortality rates (IMRs, infant deaths per 1,000 live births) throughout the country. Although its publication was, as far as can be judged, greeted with no great fanfare *Infant Mortality: a Social Problem* has emerged as a landmark volume. Even at the beginning of the twenty-first century Newman's text, research methods, analyses and conclusions still have much to teach both students and researchers, and the present volume has been conceived as a means of commemorating the centenary of its publication and bringing it to the attention of a modern audience.

While working as MOH for Finsbury, George Newman had become aware of a public health enigma – over the course of the previous fifty years IMRs in England and Wales had remained stubbornly high despite the fact that other sections of the population had experienced clear gains in health. As he himself put it:

whilst during the last half-century, a time of marvellous growth of science and of preventive medicine, human life has been saved and prolonged, and death made more remote for the general population, infants still die every year much as they did in former times. Indeed, in many places it appears that they die in greater numbers, and more readily than in the past (Newman, 1906: 2).

National statistics, compiled by the Registrar General during the nineteenth century, bear witness to Newman's concerns, indicating that the average IMR for the 1890s decade was virtually identical to that of the 1850s, whereas mortality rates among

those aged between 5 and 24 had fallen by between 40 and 50 per cent, and among those aged 1 to 4 and those aged 25 to 34 by 30 to 40 per cent.¹ Nor was Newman alone in his observations. The opening years of the twentieth century saw the reasons for the poor survival chances of the nation's youngest citizens become a focus of national debate, particularly after a connection was made with the poor levels of health and physical fitness among the lower social classes revealed by the number of men who had to be rejected by those recruiting troops to fight in the Boer War (Dwork, 1987: 6-21). In 1903 the Interdepartmental Committee on Physical Deterioration was set up to enquire into the reasons for the poor state of the nation's health. Among its many recommendations was a call for more research on the underlying causes of infant mortality (British Parliamentary Papers (BPP), 1904: xxxii).

As MOH, Newman had made a number of attempts to reduce the IMR in Finsbury, and in 1906 he published *Infant Mortality: a Social Problem*, the first book-length study to consider this issue. In 356 pages he surveyed national and local patterns of infant mortality; examined the fatal diseases of infancy, with special emphasis being given to epidemic diarrhoea; discussed how social factors, such as the occupation of women, domestic conditions and infant management, affected an infant's chances of survival; and, finally, he showed how preventive measures relating to the mother, her child and the environment could bring about infant mortality decline. Newman did not offer a radically new approach to tackling high infant mortality, instead he provided an extensive survey of what others had written on this subject and using his considerable experience as someone whose daily work entailed a constant fight to improve infant health, he proposed a series of simple practical measures which he believed would address this issue. As the book's title proclaims, Newman believed that high infant mortality was essentially a *social* rather than a *medical* problem and consequently his recommendations for improving infant health were firmly rooted in the social sphere, with the mother being placed as the single most important influence on an infant's survival chances: 'The problem of infant mortality is not one of sanitation alone, or housing, or indeed poverty as such, *but is mainly a question of motherhood*' (Newman, 1906: 257). Such a conclusion remains controversial since, by implication, it held the mothers themselves to blame for high IMRs. Nevertheless, Newman provided his contemporaries with a framework in which to develop policies aimed at reducing infant mortality and many of his ideas about infant health have proved to be enduring.

Over the course of the twentieth century most of Newman's proposals for improving infant health have been implemented to some extent at least, although there is still no consensus as to how the various social and medical advances that occurred in this period affected the long-term decline in infant mortality shown in Figure 1.1. Newman's importance, however, extends far beyond whether or not his proposals brought about improvements in infant survival chances. In particular, his stress on the social causes of infant mortality and his comprehensive discussion of the various direct and indirect factors responsible for causing infant deaths resonates

1 Age specific mortality rates for decades calculated from figures collated by Robert Woods and Nicola Shelton and deposited in the UK Data Archive: ESRC study 3552, *Causes of death in England and Wales, 1851-60 to 1891-1900*.

both with social scientists seeking to understand secular changes in infant mortality and researchers analysing health inequalities in the twenty-first century. The centenary of the publication of *Infant Mortality* therefore allows us the opportunity to celebrate Newman's achievement and his continuing influence on those who are researching the various aspects of infant health. This volume does not seek to provide a comprehensive reassessment of Newman's work in bringing about infant mortality decline, although such a study is long overdue; rather the eleven specially commissioned chapters, together with this introduction and a conclusion, show how his ideas concerning the causes of infant mortality and the means by which infant deaths could be prevented have influenced and remain relevant to those considering infant mortality in a wide variety of contexts. Each contribution demonstrates that while we may now know far more about certain aspects of infant health than we did 100 years ago, the core of Newman's thesis remains unchallenged and *Infant Mortality* is a key text that can still be read with profit.

The wealth of studies carried out on infant mortality testifies to its continuing fascination for the modern researcher. Infants are the most vulnerable members of society, they rely exclusively on others for their survival and hence the rate at which they perish is often taken to be a critical measure of that society's well-being. According to Newman (1906: 1). 'A low rate, other things being equal, indicates a healthy community, a high rate the reverse' and, with the IMR being simple to calculate, it is frequently used as a surrogate for a wide variety of social, environmental and medical indicators. During the nineteenth century, as the science of vital statistics developed, information about births and deaths became readily available and it gradually began to emerge that, with the exception of the very old, infants were subjected to the greatest risk of dying. Moreover, once the considerable spatial variations in infant mortality were revealed, it was obvious that many infant deaths were preventable and an increasing number of concerned individuals began to investigate the reasons why so many infants did not survive their first year. Despite these efforts the IMR remained high and by the early twentieth century, with the birth rate declining and notions of national deterioration to the fore, infant mortality developed into an issue of national importance (see Chapter 2). As Newman was writing *Infant Mortality* the IMR in England and Wales was still over 150, which represented a considerable drain on national resources. In 1905 'there was a loss to the nation of 120,000 dead infants in England and Wales alone, a figure which is exactly one quarter of all the deaths in England and Wales in that year' (Newman, 1906: 2). However, unbeknown to Newman, the IMR had already begun a decline that would continue throughout the twentieth century (Figure 1.1). Newman's book was therefore written at an interesting and significant turning point in demographic history – IMRs were still horrendously high, but they were just beginning to be brought under control. Thus, *Infant Mortality's* significance is threefold: it provides historical demographers with an important and comprehensive analysis of high infant mortality during the late nineteenth and early twentieth centuries; it provides a backcloth, or benchmark against which subsequent events can be seen to unfold; and, additionally, the final chapters can be used as a model to assist the evaluation of other explanations of infant mortality decline.

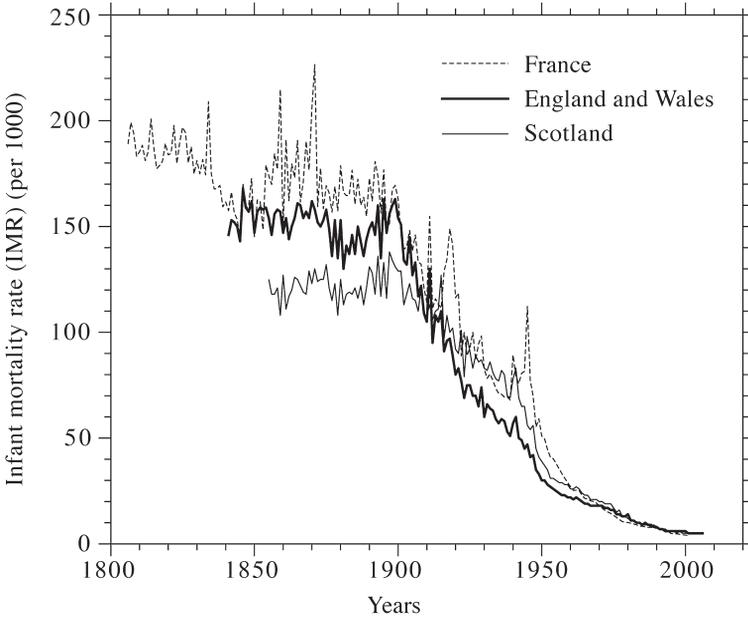


Figure 1.1 Infant mortality rates in France, England and Wales and Scotland, 1800-2006

Figure 1.1 shows nineteenth- and twentieth-century IMRs for England and Wales, together with Scottish and French rates for comparison. In retrospect the twentieth century decline is clear in all three series, but viewed from the perspective of 1906, while the IMR in England and Wales had passed its peak and started to decline, the rise in the 1890s masks this subsequent downturn, making any trend difficult to determine. Throughout the nineteenth century IMRs remained stable over the long term, although there were substantial annual variations, especially in France. Even though all three countries followed a similar path, national differences are apparent. IMRs in Scotland started at a lower level than in England and Wales, increased slightly towards 1900 and then declined more slowly. By contrast, France experienced higher levels for most of the period, far greater annual variations and rates increased significantly as a consequence of both World Wars. After 1950 all three series rapidly converged and it would be hard to escape the conclusion that the secular decline in infant mortality in Britain was part of a wider European phenomenon (Schofield *et al.*, 1991; Corsini and Viazzo, 1997; Bideau *et al.*, 1997).

Figure 1.2 provides both a longer-term perspective and a comparison between infant and childhood mortality rates. It plots decadal rates for England and Wales from the 1580s, thereby removing any annual fluctuations. Until the end of the nineteenth century IMRs remained relatively stable. There was an increase from around 150 to 200 per 1,000 live births between the mid-seventeenth and early-eighteenth centuries followed by a slow, but sustained, decrease until the early-nineteenth century when rates returned to levels in the region of 150. IMRs remained

virtually stationary for much of the nineteenth century and Figure 1.2 further highlights the dramatic turning point in the series that occurred around 1900, just as Newman was beginning to become interested in the problem. For much of the period the infant and childhood mortality series follow the same trends, which may suggest that similar influences were affecting both infants and young children. The series begin to diverge significantly during the nineteenth century, although there is speculation that the early childhood (1-4 years) mortality series may not capture the national trend in the early nineteenth century (Wrigley *et al.*, 1997: 258-260). It is also clear that childhood mortality (0-9 years) began to decrease from the 1870s, which further emphasises the increase in infant mortality at the end of the nineteenth century.

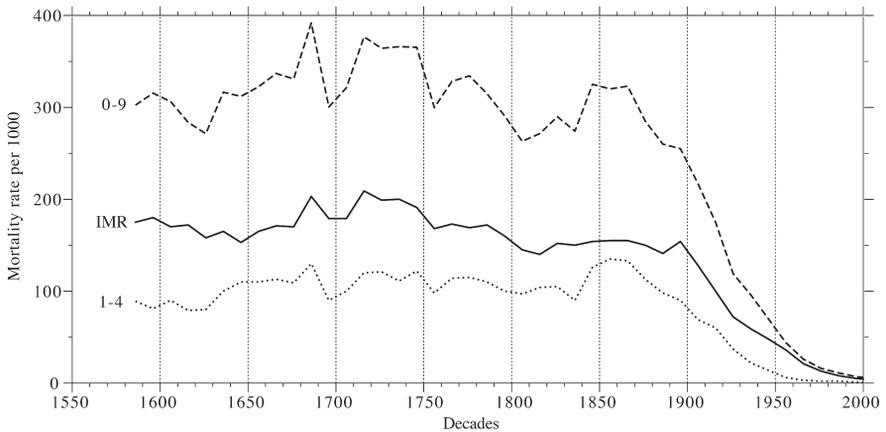


Figure 1.2 Mortality rates amongst infants, those in early childhood, and children under the age of 10: England, 1580-2000

Figure 1.2 was constructed using two sets of series joined together in the 1830s. The post-1837 rates are based on national data collected by the General Register Office (Higgs, 2004), while before 1837 it is necessary to employ some form of ecclesiastical register in order to provide estimates of mortality. The early rates are Wrigley *et al.*'s (1997: 215) attempt to provide national population estimates using family reconstitution, a technique that involves the linking together of vital events, on a representative sample of 26 parish registers (see Chapter 4). The production of this series required heroic efforts – family reconstitution is a time-consuming process that is very wasteful of data since a high degree of completeness and quality in the source material is needed to produce worthwhile results. Even within this set of registers, which were selected because of their apparently excellent quality, not all were deemed sufficiently reliable to yield accurate rates for the entire period. While the amount of effort involved in undertaking family reconstitution ensures that an alternative series will not be forthcoming in the foreseeable future, internal consistency within Wrigley *et al.*'s sample suggests that the broad overall trend

revealed in Figure 1.2 is sufficiently robust to be reflective of overall national patterns.

Due to the nature of pre-civil registration sources in England and Wales much research on this period has focused on establishing levels and trends. Thus, while the national IMR was not high, especially in comparison with regions in Europe, where rates could exceed 250 (Corsini and Viazzo, 1997: 1), there were still considerable local variations. Within Wrigley *et al.*'s (1997: 270-271) parish sample, between 1675 and 1749 rates varied from 92 per 1,000 live births in the Devon parish of Bridford to 311 in March in the Cambridgeshire Fens. It is still not entirely clear what factors were responsible for these wide variations, but the low rates in Bridford are thought to be reflective of a low disease burden in a remote rural settlement, while the high rates in March were due to the unhealthy conditions prevalent throughout fenland areas (West, 1974; see Chapter 5). There were also substantial urban-rural differences in IMRs with large towns, such as York, and even smaller ones, such as Gainsborough, suffering rates in the region of 250 (Galley, 1998: 99). Much still needs to be done to establish the extent of geographical variation in infant mortality across the country and there are whole counties, such as Cornwall, about which little is known (Galley and Shelton, 2001). The possibility of filling gaps in our knowledge is severely restricted by the survival of sources of sufficient quality to allow reliable mortality estimates to be produced. As this is often the result of chance, it means that virtually nothing is known about the emerging industrial towns of the eighteenth century, precisely those places that made Britain unique in this period and where, due to the deteriorating environment, IMRs may not have followed national trends. Here levels of in-migration and church non-attendance were sufficiently high to ensure that the ecclesiastical registration process broke down and estimates of mortality are difficult to make. Moreover, according to Wrigley *et al.* (1997: 73-118) there was a general deterioration in registration during the eighteenth century and this makes the phenomenon of eighteenth-century infant mortality decline, revealed by Figure 1.2, difficult to examine since one of the main indicators of poor registration is a low IMR. Clearly, much remains to be resolved about patterns of infant mortality in the pre-registration period and a careful examination of the wide range of existing sources would undoubtedly prove rewarding.

By comparison with what is known about levels and trends, very little can be discovered about why variation and change occurred. Causes of death were not consistently recorded in parish registers and those given for infants tend to be difficult to interpret. Consequently, it is necessary to adopt alternative approaches, such as examining burial seasonality, in order to explain prevailing patterns (Landers, 1993: 203-241). Likewise, calculating IMRs within special groups, such as multiple births or illegitimates, can be revealing and there is also much to be learnt about the relationship between rates of stillbirth, neonatal mortality and post-neonatal mortality, as indeed there is between infant and early childhood mortality rates (Woods, 2005). An examination of the distribution of infant deaths, by breaking up the IMR into its neonatal and post-neonatal or endogenous and exogenous components, can also be productive (Galley and Shelton, 2001; see Chapter 6). There is also the possibility that considering rates for unconventional age groups may aid the understanding of demographic change, since, for example, deaths associated with weaning may have

been transferred from one age group to another if the length of breastfeeding altered (Wrigley *et al.*, 1997: 343-347). Data about many aspects of infant health are sadly lacking, however, and inferences often have to be made from qualitative sources, such as journals, or by recourse to comparative studies. In spite of these seemingly insurmountable obstacles, there is still much that can be usefully discovered about infant mortality in the pre-registration period.

After 1837, and the inception of the civil registration system, a much wider range of data become available to researchers in England and Wales. However, this is normally in the form of pre-digested, published abstracts and reports as access to material from individual civil registration certificates is not usually available in a form conducive to demographic research. The reports do allow geographical variation in infant mortality and associated variables to be studied in some detail at the county, registration district and even sub-registration district level, as Chapter 5 illustrates. The chapters by James, Hall and Drake, and Reid (Chapters 6, 8 and 10) indicate, however, that in a few cases alternative sources, such as the vaccination registers and health visitors' records have been identified, which allow individual infants and their families to be followed. The chapter by Garrett (Chapter 7) demonstrates that research using civil register material is possible in Scotland. MOH reports also provide windows onto local conditions and the resulting levels of infant mortality, as shown in the chapter by Mooney and Tanner (Chapter 9).

Figures 1.1 and 1.2 both demonstrate quite clearly that there has been a very substantial decline in IMR during the twentieth century. It is not a difficult matter to list the causes. Fertility has declined. Ante- and post-natal health schemes have targeted pregnant women, mothers with babies and the infants themselves. The standard of living and the general quality of the health environment have improved affecting the quality of both diet and housing. Successful medical interventions are now possible in the form of, for example, antibiotics, blood transfusion, mass vaccination against the childhood infections, ultrasound scanning, and even foetal surgery. Each of these advances has had a positive impact that in sequence, individually and in combination have helped to push the IMR down. Of course, there are new problems. Several medically advanced Western countries currently have a late-foetal mortality rate that is higher than their IMR and even when IMR appears to be at an irreducibly low level, with the few infant deaths caused by the effects of premature births, by accidents, and sudden infant death syndrome (SIDS), there are still significant differences between the health 'haves' and 'have-nots' in each society (see Chapters 11 and 12).

In 1906 Newman divided his study into eleven chapters which focused on, among other topics: the factors affecting IMRs; infant and childhood diseases; ante-natal influences; female employment; domestic and social conditions; and preventive measures involving the mother, the child and the environment. While this structure could not be mirrored exactly in the current volume, contributors do address the same topics. Beyond this introduction, the volume is made up of three parts. The first, comprising Chapters 2 and 3, considers Newman, his work and his influence on those who came after him in the study of infant mortality. The second consists of seven chapters, which report recent research addressing factors considered by Newman to have had an impact on infant mortality. The final part consists of three chapters,

the first two reporting on infant mortality experience in the twentieth century, to act as a reminder of the phenomenal gains in survival chances which have been won for infants during the hundred years since *Infant Mortality: a Social Problem* was published. The final chapter reviews some of the principal changes that occurred in social attitudes, legislation, public health and medical practice as the IMR fell. It also suggests that a complete explanation of how and why infant mortality remained high until the end of the nineteenth century remains elusive, along with the factor, or combination of factors, which finally set it on its downward path. The simple pattern of change shown in Figures 1.1 and 1.2 has often misled researchers into believing that a significant change or changes must have occurred at or around 1900 when rates began to decline. However, as Newman showed, the influences on infant mortality were complex and interconnected and their unravelling has remained tantalisingly difficult to achieve. Moreover, with virtually every aspect of living conditions showing significant improvements during the course of the twentieth century, it has remained difficult to determine the precise weight that must be given to each factor in the decline; the apparent simplicity of the overall trend sometimes masks rather than illuminates the pattern of change. However, all contributors have found it instructive to consult Newman to see how he viewed the problems they have been considering.

Galley, in Chapter 2, discusses the development of infant mortality as a problem of national importance at the end of the nineteenth century. He then outlines the history of Newman's work and his contribution to the debate on the social dimensions of infant mortality, explaining how and why Newman came to write *Infant Mortality*. A life-long Quaker, Newman had strong ideological views on society and welfare, and he developed his interest in public health through medical training. His work as MOH for several localities, as well as other voluntary positions he held, exposed him to society's worst problems and conditions and led to his strong belief in social change as the operative condition for health improvement. He had begun to write on infant mortality and feeding in Finsbury by 1904. The publication of the Physical Deterioration Report in that year focused the nation's interest on infant mortality, and the publication of *Infant Mortality* in 1906 was thus very timely, although it took time for many of Newman's recommendations to be implemented.

In Chapter 3, Woods considers the role of *Infant Mortality* as an agenda for research, both at the time of its writing and as a benchmark for work in the twentieth century and beyond. He argues that Newman's study was especially influential in establishing infant and child health as a social problem, as well as a medical one. In seeking to explain persistently high levels of infant mortality, Newman focused on conditions within the towns and cities and on the timing of death within the first year of life; both issues which continue to be pursued by contemporary analysts. Newman then moved on to deal with epidemiological matters, especially the incidence of diarrhoea. Woods discusses how Newman's approach focused attention on the role of the mother and the home environment, which proved controversial. Newman, and his contemporaries, gave special prominence to the dangers of poor infant feeding thus rendering mothers centrally responsible for infant care. Newman's reorientation of concern away from disease, and onto the care of individual infants marked a

departure in medical science and allowed mothers to be made the focus of blame for high rates of infant mortality. However, in channelling policy towards the welfare of mothers he paved the way for many of the maternal and infant health and welfare policies developed during the twentieth century and contributing to the, by historic standards, impressively low rates of infant mortality found in Britain today.

Smith and Oeppen, in Chapter 4, take a deliberately long-term perspective. They illustrate and discuss at length the various background studies that have made the construction of a time-series for infant mortality, such as the one in Figure 1.2, possible. They outline the problems of using ecclesiastical parish registers, of employing family reconstitution techniques, and of charting variations over time and between different localities. For example, they emphasise the need to distinguish between endogenous and exogenous mortality within total infant mortality because the two components moved in different patterns, especially during the eighteenth century. They show that urban-rural mortality differentials were especially important and that they have a long history – well before the industrial revolution of the nineteenth century. They also suggest that foetal mortality may have varied in past centuries and that late-foetal mortality (stillbirths) affected both fertility and infant deaths. Their discussion of maternal mortality highlights the need to appreciate the extent to which the life chances of women were affected by the risks of pregnancy, and how the social elite was not always able to secure a health advantage in the past.

In Chapter 5, Sneddon brings to light some of the deficiencies to be found in the analyses of late-nineteenth century observers of infant health. In 1906 Newman had shown that population density was not the only cause of high infant mortality since London did not have the highest IMR nationally, but these deviations were not explored. Possibly, if high non-urban IMRs had been highlighted Newman's thesis concerning the baleful influence of towns on infant survival would have been compromised, so they were ignored. However, it is more likely that, as MOHs were primarily attracted to large population centres (Shelton, 2000), their reports failed to provide sufficient focus on infant mortality in rural areas to bring this to national attention. The mapping of infant mortality at registration district level by Woods and Shelton (1997: 47-64) makes it very clear that there were areas in England and Wales that had much higher levels of infant mortality than their population density would predict. Sneddon uses data from the essentially rural and agricultural areas of the Fens in the mid-nineteenth century to show that a 'fenland penalty' existed with rural levels of infant mortality that were more comparable with towns such as Leeds, Liverpool or Manchester.

Chapter 6, by James, uses some especially revealing sources to unravel the effects of parental employment and residential location on infant mortality during the mid-nineteenth century. She demonstrates that while there was, in general, an urban penalty and a rural advantage in terms of early-age mortality, employment in certain occupations could have a deleterious effect on the health of one's children even in the countryside. Her use of nominal record linkage with vaccination registers and census enumerators' books provides an especially detailed picture of health and mortality in Northamptonshire, one that the author of *Infant Mortality* would particularly have relished.

Newman argued that the distribution of infant mortality in England and Scotland suggested 'that there may be, broadly, a line of cleavage between urban and rural conditions', the 'study of which may throw some light on to the causes of infant mortality'. In Chapter 7, Garrett examines the civil registers of births, marriages and deaths for the seven registration districts covering the Isle of Skye, Inverness-shire, and the registration district of Kilmarnock, during the later nineteenth century. She attempts a more detailed comparison of infant mortality in urban and rural surroundings than even Newman could construct from late nineteenth-century reports. However, this attempt is partially thwarted when it is realized that a large proportion of deaths, and particularly infant deaths, did not have their cause medically certified. Garrett suggests that even the official sources do not reveal a full picture of the risks run by infants in different settings, and argues that a great deal of work remains to be done at the local level before the nature of differences and the dimensions of inequalities can be fully understood.

In Chapter 8, Hall and Drake focus on the causes and effects of infant diarrhoea, a disease to which Newman devoted much space in his own account. They demonstrate that diarrhoea had an especially important place among the causes of infant death; that its impact was markedly seasonal; that there was also an environmental dimension; but that social class appears to have played an additional, significant role. Their research also stresses the need to consider micro-variations, to deal with the experiences of individual families in detail and to move away from the aggregate approach encouraged by the Registrar General's vital statistics. They show exactly what needed to be done in the field of public health for infant mortality to secure a downward path in the twentieth century. Infant diarrhoea had to be conquered.

Mooney and Tanner, in Chapter 9, consider the Notting Dale Special Area in Kensington, London. They describe how a network of five streets was identified as a blemish on the reputation of the larger district in which it was situated. Interventions directed at the Special Area were conceived as spatially focused remedies for socio-pathological evils. Overcrowding, especially in common lodging houses, was reduced; street paving and road asphaltting were improved and access to clean water and provision of lavatories were both increased. Few policies were directly aimed at infants, although the Special Area experienced extremely high IMRs, as high as one in two births in 1899. Commentators emphasized the relationship between poor health and low morality, remarking that people were having too many children and noting that a better class of mother was required. The implication being that parental neglect was to blame for the extremely high IMRs, although some observers acknowledged that mothers were not deliberately neglectful, but rather that their ignorance led to neglect. In their chapter Mooney and Tanner illustrate one of the few schemes that were aimed at infants: the provision of crèches, as suggested by Newman. Some critics argued that such facilities encouraged mothers to work, whereas others acknowledged that female employment in the Special Area's laundries and in cleaning was crucial both to the women themselves and to their employers; the upper classes of Kensington.

In Chapter 10, the last in Part II, Reid discusses the implementation of one of Newman's recommendations: the instruction of mothers by domiciliary health visitors. The increased regulation of the registration of births, as recommended by

Newman, was instrumental in the health visitors knowing where and when to visit. Reid argues, from her work on Derbyshire in the early twentieth century, that it is difficult to establish the impact the schemes had in reducing infant mortality since health care provision varied greatly and those living in the worst conditions were generally visited more often. Despite this, certain groups in Derbyshire were found to have lower than expected post-neonatal mortality; including those infants who were both artificially fed and received an early visit.

In Chapter 11, which opens Part III, Dorling discusses how patterns of infant mortality changed in the twentieth century, highlighting the fact that the largest decline was not seen until 1951. He argues that development, a reduction in poverty and access to affordable health care for all brought about declines in the IMR for all social groups. Key factors in this decline were the introduction of infant welfare schemes and, in the post-1945 period, the National Health Service. Despite very low levels of infant death in contemporary England and Wales, inequalities still remain and these Dorling attributes to poverty.

Kelly, in the penultimate chapter, explores results from the 1946, 1958 and 1970 British Birth Cohort studies and the 1990s Avon Longitudinal Study of Pregnancy and Childbirth. These have shown how social and health inequality throughout the lifecourse may be influenced by environment early in life. Using a sample of over 18,000 babies born during a 12-month period spanning the years 2000-01 and recruited into a Millennium Cohort Study, Kelly shows how the demographic make-up of the United Kingdom population has changed dramatically since the 1970 cohort were born. Infant mortality is no longer a significant problem in the new millennium, she argues, although social inequalities in infant health remain and new inequalities, such as that based on ethnicity, can now be identified.

In our final chapter, Shelton asks how the issue of inequality, which Newman raised, may be pursued in the twenty-first century. In the hundred years since 1906 IMRs in the United Kingdom in all social groups have fallen dramatically and levels are now among some of the lowest in the world. Does inequality still remain? One of the challenges in answering this question is how inequality across time, space and between social groups should be measured. The challenge in measuring inequality across time is two-fold. For example, it is difficult to argue that a society in which one section of the population has an IMR of 200 while another section suffers only 100 infant deaths per 1,000 births experiences half the inequality compared with a society where the maximum IMR is, say, 4 and the minimum 1. Regardless of the level of inequality, the differences between mortality rates in the best and worst areas, or – and these may not always be interchangeable – the richest and poorest groups, highlight the fact that potentially avoidable infant deaths still occur as a result of social inequity a hundred years after Newman identified infant mortality as a social problem. In the remainder of her chapter Shelton discusses Newman's legacy in terms of how contemporary policy relates to his agenda for prevention. She considers how contemporary debate on the social aspects of infant mortality and wider infant health inequalities differ in their focus and policy implications. How, Shelton asks, is blaming mothers for the poor survival of their offspring supposed to help? Does apportioning them the blame form a first step towards their education?