MORTALITY IN EIGHTEENTH-CENTURY LONDON: A NEW LOOK AT THE BILLS

Robert Woods

Robert Woods is John Rankin Professor of Geography at the University of Liverpool. He is the author of *The demography of Victorian England and Wales* (2000) and *Children remembered: responses to untimely death in the past* (2006). His current research, involving work on *Fetal health and mortality*, is supported by the Wellcome Trust.

The London Bills of Mortality offer a tantalising challenge to historical demographers. Since they give the number of burials and baptisms, the causes of death, and the ages of those buried for various periods and combinations of parishes in the seventeenth and eighteenth centuries it has been tempting to use the data they provide as a basis for the estimation of mortality rates. This contribution focuses on the period 1728 to 1830 for which the age structure of burials is available. It employs the compendium of Bills material compiled by John Marshall and published in 1832 as *Mortality of the Metropolis*. The paper has little to say that is new about the considerable failings that have been recognised in the Bills as a demographic source, although it does not ignore their potentially distorting effects, rather it illustrates the way in which new estimates may be derived especially for early-age and overall mortality, and it examines the potential use of two distinctive cause of death categories: 'Abortions & Stillbirths' and deaths in 'Childbed'. These data might allow versions of the stillbirth rate (SBR) and the maternal mortality rate (MMR) to be derived for the general London population (that is, background mortality measures) against which rates from other sources, such as the lying-in hospitals, could be compared.

First we must make a few comments on the supposed quality of the London Bills of Mortality as a demographic source and the methods used to derive existing estimates of mortality rates that have been based on the Bills.[1] In his *Observations on the Increase and Decrease of Different Diseases, and Particularly Plague* (London, 1801) William Heberden gave the following judgement.

> People have fallen into two opposite errors concerning the Bills of Mortality. Some have considered their authority as too vague to be made the foundation of any certain conclusions; and others have built upon this foundation, without sufficiently considering its real defects. Both parties are equally in the wrong. (p. v)

His point is still valid. Heberden himself outlined four particular defects in the Bills. First, only those baptised according to the rites of the Church of England

were included; Roman Catholics, Jews, Quakers and other dissenters were excluded. Second, even among members of the Church of England, 'a very large proportion' were buried in the country, or adjacent to London 'but without the Bills'. Third, 'many abortives and still-born, making together about 700 in the year, are noticed in the deaths, but not in the births'. Fourth, mistakes and misrepresentations were numerous; 'yet it deserves to be repeated, that even in their smaller divisions of the subject, the correspondence of one year, and of one week, with another, is such, as must convince every attentive observer, that a considerable degree of credit is due to their report'. When Dr William Ogle, the second Statistical Superintendent at the General Register Office, London, turned to the subject of the 'old' Bills he largely echoed Heberden's points, but went considerably further by proposing estimates of the short-falls, especially between burials and deaths. Ogle believed that for the eighteenth century, burials needed to be inflated by from 1.39 to 1.44 to allow for those burials 'carried away' and the nonconformists; and that, in general, 'a very inadequate idea of the mortality of London in the eighteenth century is furnished by the number of burials as given in the Bills'.[2]

Twentieth-century opinions on the Bills have tended to be rather more optimistic, however, whilst recognising the obvious shortcomings.[3] Several attempts have been made to derive estimates of infant mortality using the age at burial data available in the Bills and to approximate maternal mortality from the number of burials recorded as due to childbed causes. It is generally recognised that the numbers of burials and baptisms recorded in the Bills both need to be inflated and that this should be done on a differential basis, one that allows for the worsening of parish registration, on which the Bills were based, through the eighteenth century and especially into the nineteenth. Alongside the well-known nonconformist and 'carried away' to be buried elsewhere problems, it is also clear that certain parishes normally included in the Bills area were omitted for various periods and that several districts to the north and west were growing rapidly so that 'Bills London' was becoming less representative of the full 'urban London'. Despite these problems (perhaps because of the challenges they provide) historical demographers and quantitative historians have persisted. In *Death and the Metropolis* (1993) John Landers gives a set of inflation factors (Table 5.3, 166). The maximum decadal inflation factors (for the 1810s) are 1.3109 (burials) and 1.2870 (baptisms), but for most of the eighteenth century the inflation factors are far lower (1–4 per cent) and certainly much less than anything proposed by Ogle. Landers' inflation factors are still the best we have. They will be used in the following to derive 'inflated burials' and 'inflated baptisms'.

Landers also set out a procedure for deriving infant mortality rates from the Bills using estimates of the number of burials aged under one year (proxy for infant deaths, the numerator) derived from the reported number of burials under age two, and 'inflated baptisms' less 'Abortions & Stillbirths' (proxy for live births, the denominator).[4] Landers assumed that of the reported number of burials aged less than two years; a constant proportion (0.75) is likely to

have been aged less than one year (that is, infants aged 0 in completed years). Laxton and Williams used essentially the same procedure, but they allowed for possible variations by deriving estimates of the infant mortality rate using 0.66 and 0.72 as the minimum and maximum proportions of burials under age two that were also under age one. They were also more circumspect about the inflation of baptism numbers, providing a table of possible factors but not selecting ones themselves.[5] The estimates of Landers and Laxton and Williams are summarised in Figure 2 and discussed later.

Let us begin again. Table 1 shows the survival functions ($l(x)$) for a collection of 11 early-age life tables (ages 0 to 10). Most are for urban populations, including three for London, but they are of varying reliability. The last five (numbers 7 to 11) were derived by Dr William Farr, the first Statistical Superintendent at the General Register Office, London, using civil registration data for age at death (numerator) and population census data for the 'at risk' population (denominator). The first five life tables (1 to 5) rely on age at death data from Bills of Mortality, or their local equivalents, and the assumption that the living 'at risk' population can be derived therefrom. Only if the population is stationary can this procedure be justified. Despite this problem, the resulting life tables and the mortality patterns they appear to reflect are consistent with the other examples in Table 1.

This consistency of mortality structure, if not of level, is further illustrated in Figure 1. Here the infant mortality rate (IMR) and the life expectancy at birth in years ($e(0)$) are plotted against the percentage of all deaths that occurred to those aged under 10 years. The 11 example populations from Table 1 are shown. Figure 1 also employs Princeton Model North as a way of summarising the relationships.[6] While Model North does not give a perfect fit, it certainly provides a broad generalisation sufficient to support the argument that, given knowledge of the percentage of deaths under age 10, it should be possible to make a fair estimate of the likely levels of early-age and overall mortality. To illustrate this point further, although not to test it formally, we can use the example of the Chester Bills of Mortality which were compiled by Dr John Haygarth for the three years 1772–1774.[7] In these years Chester had a population of about 15,000 and according to the Bills approximately 46 per cent of all burials were of those aged under 10. This implies that $e(0)$ was about 28 years and IMR around 230 via Model North and Figure 1. These are plausible estimates confirming Chester's 'middling' position in the urban mortality gradient. They also help to cast more doubt on the rather low level of mortality said to have been enjoyed by Carlisle in 1779–1787.[8]

In Table 2 we use Princeton Model North and the percentage of burials under age 10 to derive estimates of $e(0)$ and IMR for London between 1730 and 1830. Alongside these we set the comparable measures provided for England by Wrigley *et al*. in *English population history from family reconstitution, 1580–1837*. Table 2 also shows stillbirth mortality (SBR per 1,000 total births) and deaths in childbed (MMR per 10,000) for London, 1700–1830. The London series for infant, stillbirth and childbed mortality are also illustrated in Figures 2 and 3.

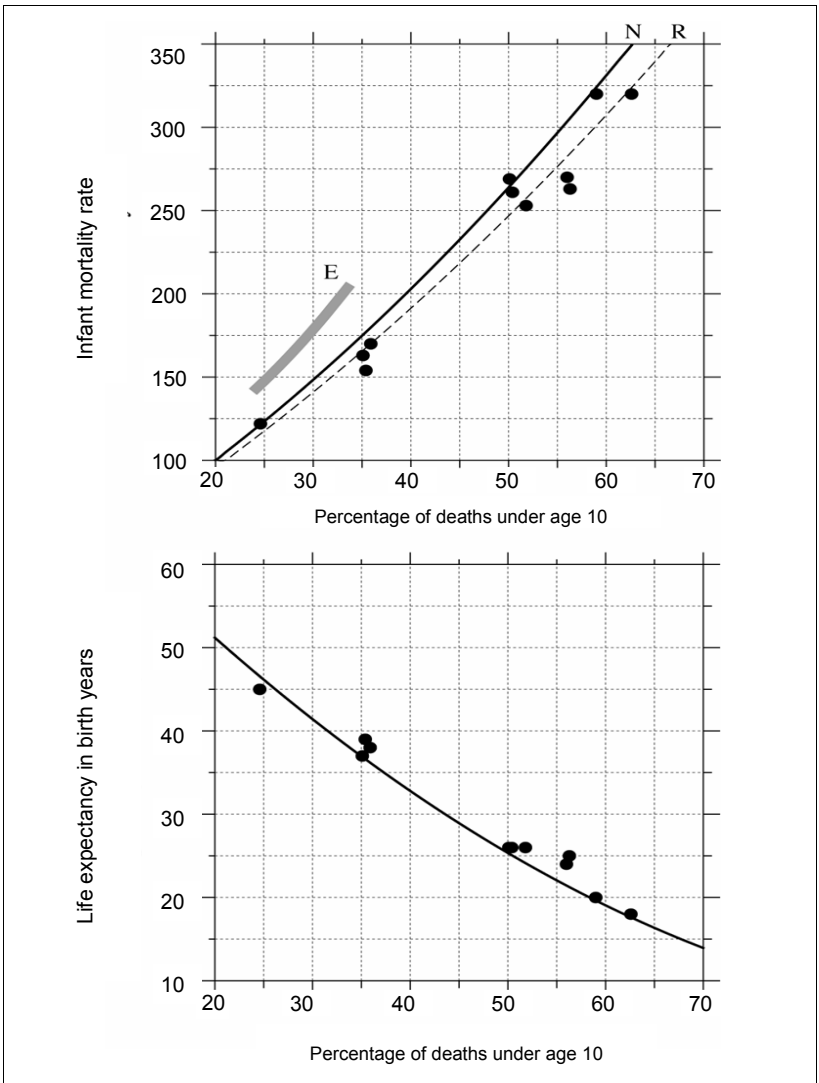
Table 1 Early-age life tables for eleven populations

Age *x*	London 1728–1737	London 1759–1768	Northampton 1741–1770	Norwich 1740–1769	Carlisle 1779–1787	Montpellier 1772–1792	Northampton 1838–1844	Liverpool 1841	Manchester 1841	London 1841	Surrey 1841
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	680	680	739	730	846	737	830	747	731	837	878
2	547	548	628	595	778	637	746	629	616	758	841
3	496	492	585	544	727	572	709	579	570	721	819
4	469	453	562	517	700	524	691	546	537	698	804
5	452	426	544	498	680	487	677	522	514	683	792
10	410	374	496	440	646	437	641	482	499	649	754
e(0)	20	18	26	24	39	25	38	26	26	37	45
e(1)	28	25	34	31	45	33	44	33	34	43	50
IMR	320	320	261	270	154	263	170	253	269	163	122

Notes: The number of survivors to exact age *x* out of 1,000 (life table function *l*(*x*)) is shown, together with life expectancies at birth (*e*(0)) and age 1 (*e*(1)) in years, and the infant mortality rate per 1,000 (IMR).

Sources: (1) from Thomas Simpson, *The Doctrine of annuities and reversions, deduced from general and evident principles: wth useful tables, showing the single and joint lives, &c.* (London, 1742), 4-5, and Thomas Simpson, *Select exercises for young proficients in the mathematicks* (London, 1752), Table 1, p.254; (2), (3) and (4) from Richard Price, *Observations on reversionary payments* (London, 1772), Table XIV, 333, Table IV, 317, and Table V, 318, also Table VIII, 326 for (1); (5) and (6) from Joshua Milne, *A treatise on the valuation of annuities and assurances on lives and survivorships* (London, 1815), Volume II, Table II, 564, and Table VII, 571-73; (7) from William Farr, 'The Northampton Table of Mortality', in *Letter to the Registrar General*, *Eighth Annual Report of the Registrar General* for 1845 (Parliamentary Papers (PP) 1847-48 XXV), 318; (8), (10) and (11) from *Fifth Annual Report of the Registrar General* for 1841 (PP 1843 XXI), xxv-xxvii; (9) from *Seventh Annual Report of the Registrar General* for 1843 and 1844 (PP 1846 XIX), 330.

Figure 1 Relationship between infant mortality (IMR), life expectancy at birth (*e*(0)) and the percentage of deaths aged under 10 years



Note: The 11 populations illustrated are given in Table 1. The curved solid lines (N) show the general relationship from Princeton Model North; in the top graph, the dashed curve (R) illustrates the best-fit statistical relationship (second order polynomial) and the short line (E) shows the relationship for England, 1700-1829 (13 decades).

Table 2 Mortality estimates for eighteenth-century London based on the Bills of Mortality

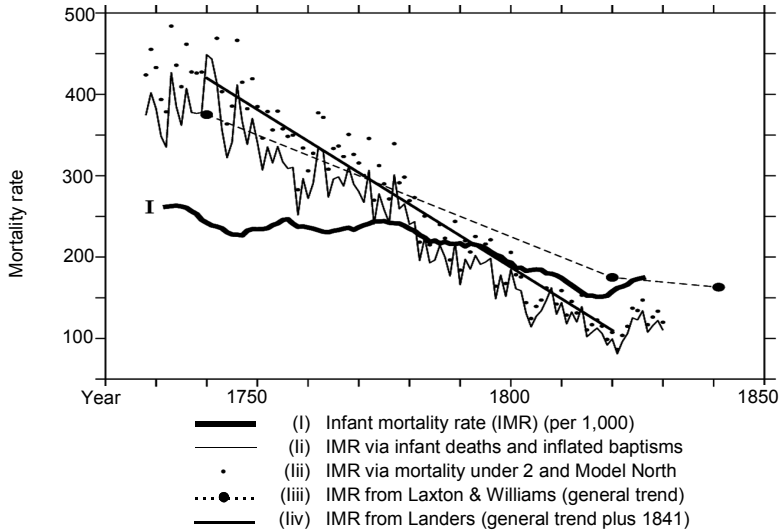
Year	London				England	
	(E) *e*(0)	(I) IMR	(S) Stillbirth	(C) Childbed	*e*(0)	IMR
1700–09			35.3	144	37.3	178
1710–19			33.8	133	35.8	208
1720–29			34.9	131	35.2	198
1730–39	26.0	263	34.3	136	36.6	201
1740–49	30.7	229	34.7	128	37.3	193
1750–59	28.8	242	36.1	117	42.1	166
1760–69	30.3	232	40.0	130	39.0	174
1770–79	28.6	244	32.5	106	39.4	167
1780–89	32.0	220	30.9	88	39.2	173
1790–99	33.3	211	32.6	78	41.7	161
1800–09	37.0	184	21.6	77	44.8	145
1810–19	41.2	155	23.0	72	41.0	141
1820–29	38.9	177	25.6	68	40.9	154

Note: Series (E) gives estimated life expectancy at birth in years (*e*(0)); (I), the infant mortality rate per 1,000 live births (IMR); (S), the stillbirth rate per 1,000 total births; and (C), mortality in childbed (maternal mortality) per 10,000 deliveries.

Sources: The derivation of the London series is explained in the text and illustrated in Figure 3; the England series are from Wrigley *et al.*, *English population history from family reconstitution, 1580-1837* (1997), Table 6.21, 295, and Table 6.3, 224.

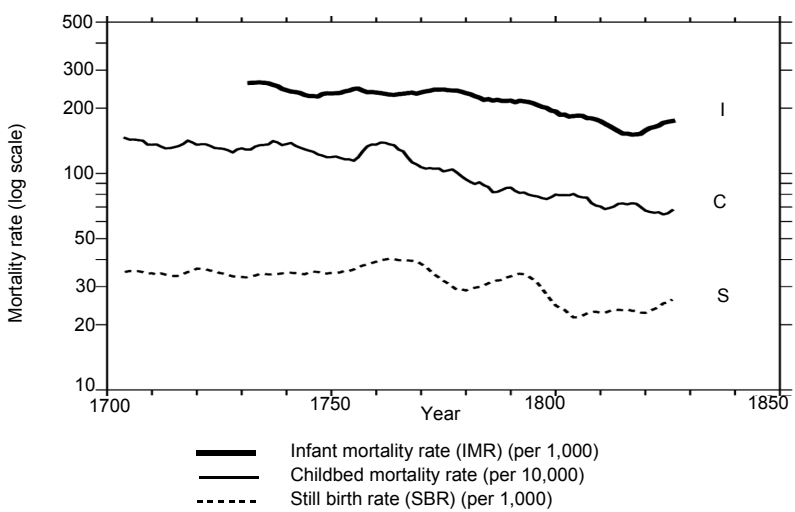
The new infant mortality series (I in Table 2, Figures 2 and 3) is lower than both existing series (Iiii, Landers; Iiv, Laxton and Williams, in Figure 2) for the 1730s to the 1760s, but higher than one (Iiv, Laxton and Williams) for the late eighteenth and early nineteenth centuries. The IMR series labelled Ii and Iii both employ 'burials aged 0–1'; the former derives infant burials (proxy for deaths aged 0) which it relates to 'inflated baptisms' (proxy for live births) while Iii uses Princeton Model North with mortality under age two ('burials aged 0–1' related to 'inflated baptisms'). The three series Ii, Iii and Iiv all have implausibly low infant mortality rates for the early nineteenth century and should probably be discarded, at least for this period. But what of the mid-eighteenth century: could infant mortality have been 400 and life expectancy less than 20 years, as Ii to Iiv suggest? Surely it is more likely that early eighteenth-century London was similar to the other towns shown in Table 1, but that by 1841 it had moved closer to a mean position between, say, Liverpool and Surrey. These mortality differentials are illustrated in Figure 4, which shows how the ratio of mortality in London changed in relation to that in England as a whole in terms of infant and overall mortality. The improvement in mortality was due in large part to London's westward expansion, to its suburbanisation, and, although there certainly was a 'catching-up' in average mortality conditions, it was not quite so dramatic as was once imagined and appears to have been a phenomenon more of the early nineteenth than the eighteenth century.[9]

Figure 2 Infant mortality estimates for eighteenth-century London based on the Bills of Mortality



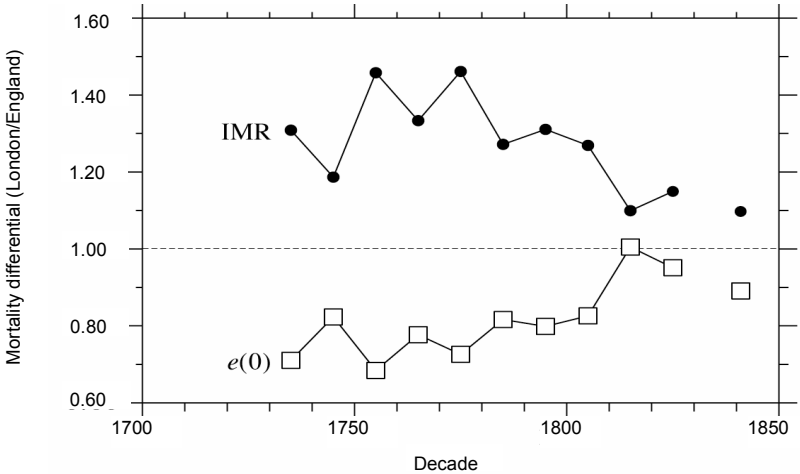
Note: A 9-point moving mean has been applied to the I series. See text and Table 2 for explanation.

Figure 3 Mortality estimates for eighteenth-century London based on the Bills of Mortality



Note: A 9-point moving mean has been applied to the I, C and S series. See text and Table 2 for explanation.

Figure 4 Mortality differentials, London compared with England



Note: The ratios of London to England for Infant mortality (IMR) and life expectancy at birth (*e*(0)) are shown. The year 1841 is also illustrated, but note that '1841 London' is larger than 'Bills London'.

Source: See Table 2.

The other two series in Table 2 and Figure 3 also require attention. The stillbirth rate (S) has been derived by relating 'Abortions & Stillbirths' to the sum of 'inflated baptisms' and 'Abortions & Stillbirths'. The resulting decadal rates range from 40.0 to 21.6 per 1,000 with a tendency to be lower in the early nineteenth century than in the eighteenth. The rate for deaths in childbed comes from 'Childbed' in the Bills of Mortality related to the sum of 'inflated baptisms' and 'Abortions & Stillbirths' and, as is conventional with the maternal mortality rate, it is expressed in parts per 10,000. Childbed mortality and maternal mortality in general show downward trends from the middle of the eighteenth century in both London and England as a whole, as Table 3 makes clear.[10]

One of the most interesting aspects of this estimation exercise is that it provides the opportunity to establish the general, background level of mortality for London so that it may be compared with the experience of various sub-populations, which are often better recorded. The London Quakers have received such attention, as have the inmates of its foundling hospital and the patients at its lying-in hospitals.[11] The records of the British Lying-in Hospital (Brownlow Street, London) appear to be especially valuable in this regard. Table 4 is based on the compilation of hospital statistics assembled by William Heberden and published in 1801. It shows that during a period of 50 years, 25,782 women were delivered in the hospital of whom 391 died, and that of the 25,034 live births some 794 babies died before leaving hospital. It also suggests that the stillbirth rate (stillbirths per 1,000 total births)

Table 3 Estimates of childbed mortality for London and maternal mortality for England, 1700-1824

Year	London Childbed mortality (1)	England Maternal mortality (2)
1700–24	137	134
1725–49	132	123
1750–74	120	95
1775–99	88	90
1800–24	73	63

Note: Both rates are expressed in parts per 10,000.

Sources: (1) from Table 2; (2) from Wrigley *et al.*, *English population history from family reconstitution, 1580–1837* (1997), Table 6.29, col. (3), 313.

was about 40. Although the British Lying-in Hospital can have delivered little more than 3 per cent of all those born in London during the second half of the eighteenth century, its stillbirth statistics, at least, are remarkably consistent with what one might expect of a European population before 1940. Dr Robert Bland's work on the midwifery records of the Westminster General Dispensary for 1774–1781 indicates a stillbirth rate of 43.8.[12] William Farr believed that the stillbirth rate was around 40 in the 1870s and this was also the average rate for England and Wales in the 1930s; although for London during this first decade of registration it was 30–32.[13] The estimates of late-fetal mortality given for London in Table 2, for the lying-in hospital in Table 4 and from other sources, both speculative and statistically based, seem to tell the same plausible story. The stillbirth rate in eighteenth-century London fell in the range 30–50 with 40 offering a credible approximation. By this argument, the stillbirth rates for the early nineteenth century derived from the Bills (Table 2) are too low.

It would be most helpful if a similar comparative exercise could be undertaken focusing on childbed or maternal mortality estimates in Tables 2, 3 and 4. Certainly, there is a good match between the estimates of maternal mortality for England, derived by Roger Schofield, and those for London, based on 'Childbed' deaths in the Bills (Table 3). The mortality experience of women giving birth in the lying-in hospital was substantially worse, however. Although the three rates are not strictly comparable, it seems likely that there was at least a 50 per cent extra risk of dying at the hospital. Since lying-in hospitals tended to attract some of the more complicated obstetric cases, although not necessarily emergencies because only recommended married women were admitted, this higher mortality rate should not be surprising.[14]

There are still many aspects of eighteenth-century London's mortality regime that remain impenetrable. The Bills are a truly demanding source that cannot be used without making several critical assumptions concerning their quality and how it changed over time. Much also depends on the demographic models chosen to reflect general relationships; other models would give

Table 4 Mortality at the British Lying-in Hospital, London, 1750–99

Year	Women delivered	Total births	Stillbirths	Live births	Children dying	Women dying
1750–59	3,761	3,806	113 (29.7)	3,693	224 (60.7)	84 (223)
1760–69	4,862	4,919	132 (26.8)	4,787	238 (49.7)	95 (195)
1770–79	5,639	5,697	232 (40.7)	5,465	129 (23.6)	102 (181)
1780–89	5,549	5,620	293 (52.1)	5,327	129 (24.2)	89 (160)
1790–99	5,971	6,047	285 (47.1)	5,762	74 (12.8)	21 (35)
1750–99	25,782	26,089	1,055 (40.4)	25,034	794 (31.7)	391 (152)

Note: The rates are given in brackets. The mortality rate for women (women dying/women delivered) is expressed in parts per 10,000, the other rates for stillbirths (stillbirths/total births) and children (children dying/live births) are in parts per 1,000.

Source: Derived from William Heberden, Jr., *Observations on the increase and decrease of different diseases, and particularly of the plague* (London, 1801), table on pp.39-41.

different results. The special sub-populations for which there are particularly good records (or just some data) also demand assumptions to be made if their experiences are to be compared with (even used to reflect) the general situation. And what of London itself? Did its inhabitants in 1750 face the same mortality risks as those living in a small town, but because London was considerably larger (population of 575,000 in 1700, 675,000 in 1750 and around 900,000 in 1800, perhaps) its impact on national demography was so much greater?[15] Finally, and rather unexpectedly, the Bills appear to offer a way of looking at late-fetal and maternal mortality, one that chimes rather well with the other fragmentary evidence that is available.

Acknowledgements

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NOTES

1. J. Landers, *Death and the metropolis: studies in the demographic history of London, 1670–1830* (Cambridge, 1993), is the most important study; E.A. Wrigley and R.S. Schofield, *The population history of England, 1541–1871: a reconstruction* (London, 1981), especially 77–83, on the Bills and parish registers; M.D. George, *London life in the eighteenth century* (London, 1925; Harmondsworth, 1966), still provides the best introduction to London living conditions; and D. V. Glass (ed.), *The development of population statistics* (London, 1973), outlines the statistical issues.
2. W. Ogle, 'An inquiry into the trustworthiness of the old Bills of Mortality', *Journal of the Royal Statistical Society*, **55** (1892), 437–60, quotation at .450. But R. Dudfield, 'A survey of the mortality due to childbearing in London from the seventeenth century', *Proceedings of the Royal Society of Medicine, Section of Epidemiology and State Medicine*, **17** (1924), 59–72, concluded that 'the numbers recorded in the Bills of Mortality furnish a fair approximation of the fatality "in childbed"' (60).
3. Landers, *Death and the metropolis*, especially 162–95; P. Laxton and N. Williams, 'Urbanisation

and infant mortality in England: a long-term perspective and review', in M.C. Nelson and J. Rogers (eds), *Urbanisation and the epidemiological transition, essays in social and demographic history, No. 9*, Department of History, University of Uppsala (Uppsala, 1989), 109–35, especially 124–27; and E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English population history from family reconstitution, 1580-1837* (Cambridge, 1997), especially 256–7 and 308.

4. Landers, *Death and the metropolis*, 169.
5. Laxton and Williams, 'Urbanisation and infant mortality', 124–7 and Appendix D, 135.
6. A.J. Coale and P. Demeny, *Regional model life tables and stable populations* (Princeton, 1966). Selecting among the four 'families' of Princeton models (West, North, South, East) is not a straightforward matter. It is also true that the models are not ideal when mortality is at a very high level ($e(0)$ is less than 35 years), but they do still provide a valuable and consistent guide to general expectations. In this case Model North has been selected because, when compared with the other three, it appears to replicate the mortality structure in those early modern populations with a high degree of urbanisation. Figure 1 illustrates the range of variation in IMR and percentage of deaths under age 10 in England using observations for each of the 13 decades 1700–1709 to 1820–1829 (E in top graph). See Wrigley *et al., English population history*, 261–3. Other examples could be placed on (checked against) Figure 1. R. Finlay, *Population and metropolis: the demography of London, 1580-1650* (Cambridge, 1981), Table 5.1, 85, has early-age life tables for four London parishes in the late sixteenth and early seventeenth centuries (mean IMR, 191; percentage of deaths under age 10, 39.9). C. Galley, *The demography of early modern towns: York in the sixteenth and seventeenth centuries* (Liverpool, 1998), Table 4.4, 92, gives comparable figures of 257 and 44.9 for the parish of St Martin Coney Street, 1561–1700.
7. John Haygarth has recently been the subject of a biographical study: Sir Christopher Booth, *John Haygarth, FRS (1740–1827): a physician of the Enlightenment, Memoirs of the American Philosophical Society*, **254** (Philadelphia, 2005). His three papers on the Chester Bills appeared in *Philosophical Transactions of the Royal Society*, **64** (1774), 67–78; **65** (1775), 85–90; and **68** (1778), 131–54.
8. The Carlisle table was constructed by Joshua Milne, actuary to the Sun Life Assurance Society, and published in *A treatise on the valuation of annuities and assurances on lives and survivorships; on the construction of tables of mortality; and on the probabilities and expectations of life* (London, 1815), Volume II, Chapter XI, 404–61. See also W. Sutton, 'On the method used by Milne in the construction of the Carlisle Table of Mortality', *Journal of the Institute of Actuaries*, **24** (1883), 110–29. Milne hoped that his life table would reflect the general mortality experience of England and Wales and that it would be of help to the life assurance industry. In this he was probably justified, but Carlisle's life expectancy appears too high for the urban living conditions of the eighteenth century. See W.A. Armstrong, 'The trend of mortality in Carlisle between the 1780s and the 1840s: a demographic contribution to the standard of living debate', *Economic History Review*, **34** (1981), 94–114, and R. Woods, *The demography of Victorian England and Wales* (Cambridge, 2000), 360–80.
9. The history of London's relentless spread has been told many times. See the contributions to P. Clark (ed.), *The Cambridge urban history of Britain, Volume II: 1540–1840* (Cambridge, 2000), and H. Clout (ed.), *London history atlas* (London, 1991), 70–83.
10. The term late-fetal mortality is now preferred to stillbirths. Both should apply to those fetuses that have survived to a particular gestational age (28 weeks in the past, but now 24 or even 20 weeks since the mother's last menstrual period (LMP)) but are born without any vital signs. (e.g. respiration, pulse, crying etc). There are equivalent definitional problems in the measurement of maternal mortality, which should relate to the deaths of women during or immediately after giving birth and as a direct consequence of parturition. Here deaths of women in childbed (the Bills of Mortality burial category 'Childbed') are used as a rough guide, an alternative to the more sophisticated approach that is possible in family reconstitution studies based on parish registers.
11. Landers, *Death and the metropolis*, Table 4.3, 136, and Table 4.10, 158, gives early-age mortality estimates for the London Quakers. IMR and percentage of deaths under age 10 for three birth cohorts are: 1650–1699, 260 and 47.8; 1700–1749, 342 and 58.2; 1750-1799, 276 and 49.0. The IMR of 342 for the first half of the eighteenth century is especially high and has encouraged similar speculations on infant mortality among London's population in general. However, R.T. Vann

and D. Eversley, *Friends in life and death: the British and Irish Quakers in the demographic transition, 1650–1900* (Cambridge, 1992), Table 5.1a, 194–5, Table 5.10, 228, gives lower mortality estimates for Quaker populations in London, and Bristol and Norwich. For London, they propose: 1700–1749, IMR 263, percentage of deaths under 10 46.3; 1750–1799, 141 and 30.7; and for Bristol and Norwich combined: 1700–1749, 194 and 43.5, 1750–1799, 146 and 30.6. Their estimates of $e(0)$ are 30–33 for 1700–1749 and 42–44 for 1750–1799. On the foundling hospital, see A. Levene, 'The estimation of mortality at the London Foundling Hospital, 1741–1799', *Population Studies*, 59 (2005), 87–97.

12. 12R. Bland, 'Some calculations of the number of accidents or deaths which happen in consequence of parturition &c.', *Philosophical Transactions of the Royal Society*, **71** (1781), 355–71. The Westminster General Dispensary provided an out-patient midwifery service for poor, married women. Between 1774 and 1781, 1,897 women were delivered of 1,923 children, with 84 dead-born. Bland (363) explained: 'By dead-born children I mean those that die after they have been perceived to move, that is, generally after four months. Abortions, or deaths before that period, may reasonably be estimated at double this number; so that, perhaps, 1 child in 8 dies in the womb, or in the act of coming into the world.'
13. 3W. Farr, *Vital statistics*, edited by N. A. Humphreys (London, 1885), 107, from *Thirty-eighth annual report of the Registrar General* for 1875 (British Parliamentary Papers, 1877, **XXV**, xxv-xxvi). The derivation of stillbirth estimates is discussed in R. Woods, 'The measurement of historical trends in fetal mortality in England and Wales', *Population Studies*, **59** (2005), 147–62, especially Figure 4, 156, but see also G. Mooney, 'Still-births and the measurement of urban infant mortality rates *c*.1890–1930', *Local Population Studies*, **53** (1994), 42–52.
14. It is difficult to reconcile this conclusion with that of L.F. Cody, 'Living and dying in Georgian London's lying-in hospitals', *Bulletin of the History of Medicine*, **78** (2005), 309–48, who suggests that the 'eighteenth-century lying-in hospital was statistically as safe or safer than a home delivery in some years' (342). It may have been for the child, but not for the mother. I. Loudon, *Death in childbirth: an international study of maternal mortality, 1800–1950* (Oxford, 1992), especially 196-203, and *The tragedy of childbed fever* (Oxford, 2000), especially 58–74, argues that before the 1880s the lying-in hospitals were disastrous for maternal health.
15. On London's impact, see E.A. Wrigley, *People, cities and wealth* (Oxford, 1987), 133–56. Wrigley and Schofield, *Population history of England* (415) represent London by a life expectancy at birth of 20 years, which may be too low. R. Woods, 'Urban-rural mortality differentials: an unresolved debate', *Population and Development Review*, **29** (2003), 29–46, considers the form and impact of urban-rural mortality gradients, whether discrete or continuous, steep or shallow, and their influence on national demographies.