Population and Disease:
Transforming English Society, 1550-1850

This book is dedicated with love
to my brothers Ted, Graham and John,
sisters Margaret and Sue,
daughter Jos,
son Luke,
and to Tinka whose sense of humour and warm support has been
invaluable in the writing of this book.

Population And Disease: Transforming English Society, 1550-1850

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Caliban Books

Published 2007
Caliban Books
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ISBN 978-1-85066-047-7

Acknowledgements

I would like to express my special thanks to Christine Spence, who co-authored three of the papers that form the basis of essays 4, 8 and 10, as well as commenting in detail on the rest of the book.

The comments on different aspects of the book by the following are also greatly appreciated: Massimo Livi Bacci, Jack Caldwell, John Cleland, Michael Drake, Roderick Floud, Eilidh Garrett, Bernard Harris, Andrew Hinde, John Landers, John Morrill, Cormac O'Grada, Samuel Preston, Ruth Richardson and the anonymous referees of the various publications in which some of these essays first appeared. The generous help of Sue Gibbon and members of staff of the Society of Genealogists' library has also been invaluable.

The financial support of the Wellcome Trust and the Economic & Social Research Council has been essential for the research on which the book is based, and is greatly appreciated.

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[We would like to thank the Ashmolean Library for permission to use Figure 1, and the Wellcome Trust Library for allowing us to reproduce Figures 2 and 3.]

Introduction

The ten essays in this book, six of which have been published previously, have been written during the last decade. Although there is a significant degree of overlap, they have been arranged under four subject headings: methodology, structure of demographic change, causal factors in mortality decline, and the consequences of population change. Within these subject headings, the essays have been presented in the order they were written, and have been edited and re-written to minimize duplication of content. Extra data has been added to individual essays, where appropriate, and a general line of argument has been developed, moving from detailed methodological and empirical analysis to an overall discussion of England's demographic, economic and social history.

The essay format is particularly suitable for the philosophy of the book: scepticism about mathematical models in historical research, and a belief that theoretical thinking is most fruitfully developed through detailed empirical research based on local sources. The most appropriate analogy is the jig-saw puzzle: the construction of a general picture through the careful assembly of individual items, some clearly defined and others either ambiguous or uncertain.

The most important method used in the research is that borrowed from navigation and surveying, the technique of 'triangulation'. I believe this is particularly relevant to the social sciences, where measurement is often difficult and imprecise. The methodology used has involved, not only the measurement of variables from different numerical sources, but also literary evidence from published and unpublished material.

The book reflects a demographic tradition which argues that population change is exogenous to economic development, resulting in a range of economic and social consequences. Habakkuk, Chambers and others, exploring the role of population, were unable to successfully establish that population change was independent of economic development because of the lack of reliable data.[1] One of the aims of the book is to present detailed

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[1] See H.J. Habakkuk, 'The economic history of modern Britain', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography*

evidence confirming the exogenous role of population growth, mainly shaped by changes in mortality.

Adult mortality reduced by about a half during the eighteenth century — most of which occurred in the first half of the century — and infant and child mortality fell sharply at the end of the eighteenth and beginning of the nineteenth century. The reduction in adult mortality appears to have been independent of economic and medical developments, whereas the fall in infant and child mortality was probably due to a range of medical and other improvements.

The essays challenge a number of leading ideas in demography, epidemiology, economic history and historical sociology. The topics discussed include life table models, demographic transition theory, cohort patterns of mortality, and the relationship between height, status stress, poverty and mortality. One major theme is the link between economic and demographic change. Smith, Malthus, Marx, Marshall and others all assumed that economic factors are the main determinants of demographic, sociological and political development. By contrast, the evidence presented in this book suggests that demographic factors were the prime movers of English history, and that demography is a key discipline for the understanding of the transformation of English society in the seventeenth, eighteenth and nineteenth centuries.

(London 1965); J. D. Chambers, *Population, Economy and Society in Pre-Industrial England* (Oxford 1972).

I

Methodology

1. EVALUATING THE SAME-NAME TECHNIQUE AS A WAY OF MEASURING PARISH REGISTER RELIABILITY.[2]

Anglican parish registers have formed the basis of most demographic research for the period before 1837, but have suffered from "that constant and basic problem, the quality of the parish register being studied."[3] In an important study of the subject, J.T. Krause concluded that "parochial registration was relatively accurate in the early eighteenth century, became somewhat less so in the 1780s, virtually collapsed between roughly 1795 and 1820, and then improved somewhat between 1821 and 1837."[4] This conclusion was based on a general study of registration accuracy, with a particular emphasis on the impact of religious dissent on the effectiveness of Anglican registration.[5] Krause made no attempt to directly measure the reliability of parish registers, and concluded that when estimating the reliability of parochial registration "the impressionistic method of the historian, rather than the quantitative method of the statistician must be relied upon."[6]

Krause's work influenced the research of a number of other scholars, including Wrigley and Schofield who assumed that the success of the Anglican Church in countering religious non-conformity was a measure of its effectiveness in ensuring the registration of vital events.[7] It was partly on the basis of this assumption that Wrigley and Schofield concluded that Anglican parish registers were almost perfect at the beginning of registration in the 1540s, but deteriorated significantly at the end of the eighteenth century, mirroring Krause's general conclusions on the subject.[8] In addition to figures on the number of non-conformist

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2 First published in *Local Population Studies*, Number 64 (2000), pp. 8-22.

3 R.E. Jones, 'Further evidence on the decline in infant mortality in pre-industrial England: north Shropshire, 1561-1810', *Population Studies*, Vol. 34 (1980), p. 250.

4 J.T. Krause, 'The changing adequacy of English registration , 1690-1837', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965), p. 393.

5 Krause, 'The changing adequacy', pp. 379-393.

6 *Ibid*, p. 380.

7 E.A. Wrigley and R.S. Schofield, *The Population History of England, 1541-1871: a Reconstruction* (London 1981), p. 137.

8 *Ibid*, p. 561.

baptisms and burials, Wrigley and Schofield used estimates of the effects of delayed baptism and other factors involved in "residual" inflation ratios, but because of uncertain data in these calculations, they accepted the "arbitrary" nature of the "final inflation ratio".[9]

Wrigley and Schofield's assumption that Anglican registration accuracy reflected the amount of religious non-conformity is open to question. There is some evidence to suggest that under-registration was not primarily due to the rise of religious non-conformity but was mainly the result of the negligence of clergymen and parish clerks in registering vital events which took place in their parish, as well as their refusal to register events on account of non-payment of fees.[10]

Although Wrigley and Schofield did not directly measure the adequacy of parish registration, they did attempt to assess it for the period 1801-1841 by estimating the total number of births and deaths in England and Wales.[11] They achieved this by applying a standard life table to data from national censuses, and although there is a degree of uncertainty in their use of a particular life table and the assumption of zero net migration, the procedure did enable them to derive an empirical measure of registration reliability. As they were reliant on national census returns for their estimation of birth and death under-registration, Wrigley and Schofield could not apply the same measures to the period before 1801.

I have carried out nominal-linkage research on a country wide sample of 45 parishes, comparing information about age and birthplace for individuals in the 1851 Census with data from Anglican baptism registers.[12] Table 1.1 compares Wrigley and Schofield's estimates of the proportions of births missing from

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[9] Wrigley and Schofield, *The Population History*, p. 137.

[10] Much negligence resulted from the practice of entering events in rough note books and only copying them up at very irregular intervals, a practice that was present from the very beginning of parish registration. This is evidenced by the significant discrepancies in the number of entries in surviving rough note books and parish registers. For a detailed discussion of this topic see D.J. Steel, *General Sources of Births, Marriages and Deaths before 1837* (National Index of Parish Registers, Volume 1, 1968), pp. 27-31. For further discussion, P.E. Razzell, *Essays in English Population History* (London 1994), pp. 108-111. For evidence on the role of non-payment of fees see pp. 31, 36 of the present volume.

[11] Wrigley and Schofield, *The Population History*, pp. 126-135.

[12] Razzell, *Essays in English Population History*, pp. 82-149.

Anglican registers, with the proportions of births not found in the sample of 45 baptism registers.

Table 1.1: Estimated Proportions Of Unregistered Births, 1761-1834.[13]

Period	*Wrigley and Schofield's Estimates Of Unregistered Births, England And Wales %*	*Comparison Of 1851 Census With Baptism Registers (Razzell) %*
1761-1770	- -	32.4
1771-1780	- -	27.9
1781-1790	- -	32.6
1791-1800	- -	36.0
1801-1810	27.6	32.0
1811-1820	32.3	33.0
1821-1830	29.9	30.0
1831-1834	26.2	27.4

The figures for 1801-1834 are very similar, providing some support for the validity of both forms of data. Table 1.1 also suggests that the sample of 45 parishes is approximately representative of national totals during the first four decades of the nineteenth century.

Although the Cambridge Group's findings and my own on the pattern of parish registration in the period 1801-1841 are approximately similar, there is a major discrepancy in conclusions about birth registration in the period before 1801. Wrigley and Schofield have estimated that 13.5 per cent of all births were omitted from baptism registers in 1761-1770, a proportion that increased to 14.6 per cent in 1771-1780, 17.9 per cent in 1781-1790 and 23.2 per cent in 1791-1800.[14] Considered with their data presented in Table 1.1, this indicates a gradual deterioration of birth registration in this period, followed by a sharp decline after 1811.

13 For the sources on which this table is based, see Wrigley and Schofield, *The Population History*, pp. 543, 544; Razzell, *Essays in English Population History*, p. 95.

14 See Table 3.1, p. 46.

However, my findings show that between a quarter and a third of all births had been omitted from the parish registers, with little or no trend in reliability between 1761 and 1834.

The Same-Name Technique As A Way Of Measuring The Accuracy Of Burial Registration.

Wrigley, Davies, Oeppen and Schofield have discussed ways of assessing parish register accuracy through statistical analysis and general demographic modelling of data.[15] There are, however, a number of difficulties with this mode of analysis. Wrigley and his colleagues acknowledge that this approach to measuring registration reliability is somewhat unsatisfactory: "In most periods the lack of a reliable alternative data source makes it impossible either to test effectively the completeness of Anglican registration by direct comparison with independent evidence, or to establish whether the demography of the Anglican community was similar to that of the population as a whole. For the bulk of the parish register period, therefore, the testing of registration must depend on the internal plausibility and internal consistency of the results obtained."[16]

The census/ parish register method only allows an assessment of birth registration from about 1761 onwards, and has nothing to say about burial under-registration. Fortunately, in addition to this method, there is one source of data which allows the direct study of burial and baptism registration reliability.

It was the custom in England and elsewhere sometimes to give the name of a dead child to a subsequent sibling of the same sex. This custom can form the basis of a method for measuring burial registration reliability. Louis Henry in France and Roger Finlay in England explored the use of information on same-names for this purpose, but concluded that this method was subject to a degree of uncertainty on account of some living siblings sharing the same names.[17] There is, however, evidence that same-names were

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15 E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English Population History from Family Reconstitution, 1580-1837* (Cambridge 1997), pp. 101-106.

16 *Ibid*, pp. 91-92.

17 L. Henry, *Manuel de Demographie Historique* (Paris 1967), pp. 22-23; R. Finlay, *Population and Metropolis* (Cambridge 1981), pp. 45-49.

not given to living siblings in England after the middle of the seventeenth century, and the practice may never have existed even at an earlier period.[18] This issue will form a central part of this essay, but it is first necessary to explain the nature of the method and how it can be used to measure burial registration reliability.

The custom of giving same names can be illustrated by baptisms and burials in the family of Thomas and Ann Duckett in the marsh parish of Canewdon, Essex, which listed in date sequence, were as follows[19]:

1. Thomas son of Thomas and Ann Duckett, baptised 21/6/1724, buried 4/8/1724.
2. Ann daughter of Thomas and Ann Duckett, baptised 13/4/1726.
3. Mary daughter of Thomas and Ann Duckett, baptised 2/8/1727, buried 11/10/1727.
4. Mary daughter of Thomas and Ann Duckett, baptised 14/2/1729, buried 19/2/1729.
5. Mary daughter of Thomas and Ann Duckett, baptised 4/3/1730, buried 20/4/1730.
6. Thomas son of Thomas and Ann Duckett, baptised 31/5/1731, buried 26/6/1731.
7. Mary daughter of Thomas and Ann Duckett, baptised 20/10/1732, buried 29/11/1732.
8. John son of Thomas and Ann Duckett, baptised 24/1/1734, buried 16/3/1734.
9. Thomas son of Thomas and Ann Duckett, baptised 12/3/1735, buried 9/5/1735.

The name Mary was given to four of Thomas and Ann Duckett's children, three of whom had died prior to the baptism of their same-name sisters. Likewise, there were three sons who were given the name of Thomas, two of whom had died before the baptism of their same-name brothers. In this family, burial registration was perfect, with the inclusion of all burials of the first of same-name pairs in the parish register. This practice of same-naming therefore allows an objective measurement of the adequacy of burial registers, by

18 See the *Genealogists' Magazine*, June 1998, p.59; September 1998, pp. 95-97; and December 1998, p. 145.

19 This information is taken from the Canewdon parish register lodged in the Society of Genealogists' library.

expressing the number of first same-name children included in the burial register as a proportion of all first same-name children. With the Duckett family, this ratio is five divided by five = 100%.

Other examples of same-name research indicate however that a parish register frequently omitted a significant proportion of baptisms or burials. For example, Thomas Turner, who lived in East Hoathley, Sussex in the middle of the eighteenth century kept a diary and he listed the births and deaths of his children as follows:[20]

1. Peter: born 19 August, 1754 and died 16 January 1755.
2. Margaret: born 20 March, 1766.
3. Peter: born 1 June, 1768.
4. Philip: born 9 November, 1769.
5. Frederick: born 8th December, 1771, died 7 November 1774.
6. Michael: born 29 April, 1773.
7. Frederick: born 3 May, 1775 and died 13 June 1775.
8. Frederick: born 17 December 1776.

The gap in the birthdates of Turner's first two children is explained by the death of his first wife, and his subsequent remarriage. The pattern of same-naming is illustrated through the repetition of the names of the first Peter and the first two Fredericks, the name of the dead child being given to the next sibling of the same sex. Turner lived all of his married life in the parish of East Hoathley, and the baptism and burials of his children in the parish register were as follows:

Peter baptised 31 August 1754
Margaret baptised 23 April 1766
Peter baptised 28 June 1768
Philip baptised 15 November 1769
Frederick baptised 30 December 1771
Michael baptised 19 May 1773
Frederick baptised 14 May 1775, and buried 13 June 1775.
Frederick baptised 10 January 1777.

Only one of the three Turner children who died was registered in the burial register, and this was because the others had been buried

[20] For details of the sources of information on the Turner family, see Razzell, *Essays in English Population History*, pp. 186, 187.

in the neighbouring parish of Framfield, where their grandparents had lived and been buried. Under family reconstitution rules, the infant and child mortality rate would be 125 per 1000 (1 out of 8 children), whereas the true rate was 375 per 1000 (3 out of 8). Yet the repetition of same-names in the baptism register would alert us to the deficiencies of burial registration, and we can derive correction ratios by expressing total second same-name cases (three) as a ratio of registered same-name burials (one).

The evidence that exists suggests that there were no significant changes in the proportion of families using same-name practices. I have conducted an analysis of the proportion of eligible families who gave same-names to their children for six of the Cambridge Group's reconstitution parishes.

Table 1.2: Proportion Of Eligible Families Using Same Names In Six Reconstitution Parishes, 1541-1837.[21]

Period	*Number Of Eligible Cases*	*Proportion Using Same Names %*
1541-1600	293	50.1
1601-1650	330	57.9
1651-1700	291	72.9
1701-1750	339	67.8
1751-1800	411	65.6
1801-1837	279	59.5

There is some increase in the early period and decline in the later one, but for most of the parish register period between a half and two-thirds of all eligible families appear to have given their children the same name as a deceased child

Evaluation Of The Same-Name Technique.

There are two potential problems with the same-name method: 1. The possibility that some same-name children were alive at the

[21] Eligible families are those with at least two baptised children of the same sex. The table is based on the analysis of original reconstitution schedules for Aldenham, Bridford, Austrey, Dawlish, Hartland and Colyton, kindly provided by the Cambridge Group.

same point of time. 2. That same-name cases are only a sample of all burials, and therefore not necessarily representative of the total population.

There is fragmentary evidence that some same-name children were both alive simultaneously, but this is based on ambiguous information in wills and other sources for the period before the middle of the seventeenth century.[22] For the late seventeenth century it is possible to examine more systematically the question of living same-name siblings through the study of various enumerations, mainly taken under the 1695 Marriage Duty Act. An examination of seventeen census-type listings for the City of London (1695), Goodnestone, Kent (1676), Clayworth, Nottinghamshire (1676 and 1688), Lichfield, Staffordshire (1697), Lyme Regis, Dorsetshire (1696, 1698 and 1703), Swindon, Wiltshire (1697 and 1702), Wanborough, Wiltshire (1697 and 1702), New Romney, Kent (1696 and 1699), Melbourne, Derbyshire (1695), and St. Mary's, Southampton, Hampshire (1695 and 1696) reveals no cases of living full same-name siblings.[23]

The same is true of the 45 parishes covered by the census/ baptism register research summarised earlier. The names of 10,954 people living in these parishes were selected from the household schedules of the 1851 Census, and found to include no living full same-name cases.[24] In most of these censuses there are references to step brothers and sisters sharing the same forename, but these can be recognised by their different surnames or other information in the censuses. Also, in the nineteenth century there are cases of living siblings sharing one common forename (for example, Edward James and Edward George), but no cases have come to light where names are identical. It is therefore important for same-name research that only siblings sharing the same parents and with identical names are selected for study.

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22 See the *Genealogists' Magazine*, June 1998, p.59; September 1998, pp. 95-97; and December 1998, p. 145.

23 For the London listing see D.V. Glass (ed.), *London Inhabitants within the Walls* (London 1965). Copies of the other listings are lodged in the Cambridge Group's library, and photocopies of these were kindly sent to me by their archivist.

24 For details of this sample, see Razzell, *Essays in English Population History*, pp. 93-94.

The problem of the representativeness of the same-name sample is more difficult to assess. The technique requires at least two or more baptisms per family, leading to the exclusion of families with only one child. This is not likely to be a major problem, but the method also cannot be applied to unregistered baptisms or to births not resulting in baptism. This probably leads to an under-statement of the number of unregistered burials, as there was probably some correlation between unregistered births and unregistered deaths in individual families. Although insufficient research has been carried out to allow firm conclusions to be drawn, first same-name children probably represented about ten per cent of all baptisms, and a quarter of all child burials.[25]

It is possible to check the accuracy of the same-name method by cross-matching reconstitution and census data where the latter is available. I have conducted pilot reconstitution research on sixteen parishes in the City of London, linked to the published and indexed London 1695 Marriage Duty Act enumeration list.[26] The cross-matching of enumeration with reconstitution data was facilitated by the genealogical work of Percival Boyd, who compiled 238 volumes of family histories for London inhabitants, covering a total of 59,389 family groups, mainly for the seventeenth and early eighteenth centuries.[27] Boyd used parish registers, guild records, wills and a whole miscellany of sources, to create a "total reconstitution sample", a remarkable demographic and genealogical database.

The starting point of the cross-matching procedure is to assess the accuracy of the 1695 enumeration listing. Jones and Judges in their study of the Marriage Duty listing for the City of London compared the information in the list with that contained in the 1666 hearth tax, the 1673 eighteen months' tax and the 1678

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25 For example, 8 per cent of all baptisms and 26 per cent of child burials included in a reconstitution study of two rural Bedfordshire parishes in the period 1700-1849 were first same-name children, whereas the equivalent proportions in London during the period 1681-1709 were 12 and 23 per cent. For details of the Bedfordshire study see Table 3.10, p. 74; the London research is discussed later in this essay.

26 See Glass, *London Inhabitants*.

27 This material is deposited in the library of the Society of Genealogists. For details of this source, see A. Camp, 'Boyd's London burials and citizens of London', *Family Tree*, Vol. 1 (1985), p. 12.

poll tax, and concluded that "the 1695 assessment was, almost throughout the City, conducted with more diligence and with fuller results than was usual for the period."[28] This conclusion is confirmed by Gregory King's post-enumeration survey carried out in 1696 of two London parishes, St. Benet's and St. Peter, Paul's Wharf. He found that about five per cent of cases were missing in St. Benet's and approximately nine percent in St. Peter, Paul's Wharf.[29] Glass concluded from his work on King's figures that ten per cent for the whole of London was not an unreasonable estimate of the degree of under-enumeration in the Marriage Duty listing.[30] The London returns include the names of most children and their relationship to the head of household, facilitating the linkage between the returns and associated parish registers.

The next stage in the research is to search in the enumeration listing for the children not listed in the burial register but baptised less than ten years before the date of the enumeration. The method assumes that children under ten not found in the enumeration listing or burial register (but with families still living and enumerated in the parish), had died and not been registered in the burial register. This is subject to the qualification of the under-enumeration of living children − perhaps of the order of ten per cent. This cross-matching exercise yields an estimate of the proportion of children not registered in the burial register, and this can be compared to the ratios derived from same-name research. For the London pilot sample data, we can contrast the burial registration experiences of families owning and not owning taxable wealth.[31]

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28 P.E. Jones and A.V. Judges, 'London population in the late seventeenth century', *Economic History Review*, Vol. 6 (1935), p. 48.

29 Glass, *London Inhabitants,* p.xxviii.

30 *Ibid*.

31 Under the 1695 Marriage Duty Act, the main form of wealth liable to extra taxation was the ownership of real estate worth £600 or more, although other categories of wealth-owners were also included.

Table 1.3: Burial Registration Accuracy Amongst Wealth And Non-Wealth Holders In London, Using The Same-Name And Enumeration Listing/ Parish Register Comparison Methods, 1681-1709.[32]

	Children Baptised With Same Names Searched For In The Burial Register		*Unburied Children Searched For In The Enumeration Listing*	
	Families With Taxable Wealth	Families Without Taxable Wealth	Families With Taxable Wealth	Families Without Taxable Wealth
Number Found	46	51	97	108
Number Not Found	18	30	46	66
Proportion Found	72%	63%	68%	62%

The percentage found in both wealth groups was less in the enumeration listing/ parish register comparison than with the same-name method, and this is what we would expect from the existence of some living children not being included in the enumeration list. However, overall the levels of under-registered children are similar under both methods, with 37 to 38 per cent missing amongst non-wealth holders, and 28 to 32 per cent not found amongst the wealthy group.[33] The similarity of the findings of the two methods gives a degree of credence to both.

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32 The data is based on the analysis of volumes 1, 11, 21, 31, 41, 51 and 61 of Boyd's registers lodged in the library of the Society of Genealogists. Sixteen parishes were included in the analysis: St. Christopher-le-Stocks; St Edmund Lombard Street; St. Michael Cornhill; St. Mary Woolnoth; All Hallow Bread Street; St. Mary Aldermanbury; St. Martin Outwick; St. Helen Bishopgate; St. Michael Pat. Royal; St. John Walbrook; St. James Duke Place; St. Antholin; St. Mary Woolchurch; St. Dionis Backchurch; St. Michael le Quern, Allhallows the Less. Information on families with listed taxable wealth and unburied children was obtained by comparing Boyd's data with that in the 1695 Marriage Duty enumeration list. See Glass, *London Inhabitants.*

33 Theoretically these figures can be compared to those derived by Glass and Boulton from their study of parish register and collectors' returns of births and

Of thirty-seven eligible same-name children not found in the burial register, none could be found in the enumeration listing, confirming the validity of the assumption that a missing same-name case is equivalent to an unregistered burial. Also, there were no living same-name cases among the total of 1,253 children included in the sample, giving further support to the conclusion that at the end of the seventeenth century the practice of giving the same names to living children did not exist. Finlay found 258 same-name cases in his study of four London parishes during the period 1580-1650, of which only 149 (58 per cent) could be found in the burial register.[34] He assumed some cases were untraceable in the burial register as a result of being living same-name siblings, but the evidence discussed above suggests the probability that all missing same-name cases were the result of burial under-registration.

A further check on the validity of the same-name ratios is to apply them to the uncorrected infant and child mortality rates found from the cross-matching of Boyd's reconstitution schedules with the information in the 1695 enumeration listing:

Table 1.4: Estimated Infant And Child (1-4) Mortality Rates (Per 1000), London, 1681-1709.

Infants			
Number Of Baptisms	*Infant Burials*	*Same-Name Inflation Ratio*	*Estimated Infant Mortality Rate (Per 1000)*
1253	280	145/97	334
Children Aged 1-4			
Number Of Children (1-4) At Risk	*Child Burials*	*Same-Name Inflation Ratio*	*Estimated Child Mortality Rate (Per 1000)*
733	121	145/97	247

deaths made in London for the 1695 Marriage Duty Act. Unfortunately the collectors' figures were derived from the returns made by Anglican clergymen and were not therefore independent of parish register figures. There is evidence that clergymen were negligent in recording all births and burials, which was one of the reasons why the Marriage Act legislation was repealed in 1706. See Glass, *London Inhabitants* and J. Boulton, 'The Marriage Duty Act in London', K. Schurer and T. Arkell (eds.), *Surveying the People* (Oxford 1992).

34 Finlay, *Population and Metropolis*, p. 85.

John Landers has independently estimated that infant mortality in London at the end of the seventeenth century was at least 360 per 1000,[35] and the overall estimated infant mortality for the total sample in Table 1.4 is 334 per 1000. Given that mortality before baptism is excluded from the latter figure, it is very similar to that estimated by Landers.[36] The provisional conclusion from examining all the data is that the same-name method is reasonably accurate in measuring burial under-registration.

I have analysed the proportion of same-name cases unregistered in the burial register for nine of the Cambridge Group's reconstitution parishes, using reconstitution schedules provided by the Group and relying entirely on their identification of same-names.[37]

Table 1.5: Analysis Of Burial Registration Of Same-Name Siblings In Nine Reconstitution Parishes, 1538-1837.[38]

Period	*Total Same-Name Cases*	*Number Of Burials Not Found*	*Burials Not Found %*
1538-1599	358	122	34.1
1600-1649	465	144	31.0
1650-1699	617	167	27.1
1700-1749	858	191	22.3
1750-1799	594	160	27.0
1800-1837	451	104	23.1

35 Personal communication from John Landers. According to the London Bills of Mortality, child burials under the age of two represented about 60 per cent of baptisms in the period 1728-1739, suggesting that the same-name ratios in Table 1.4 do not over-state the levels of under-registration of burials. See J. Marshall, *Mortality of the Metropolis* (London 1832), p. 63.

36 Boyd's data probably includes more wealth-holders than was typical for London as a whole. Glass estimated that about 27 per cent of the population were wealth-holders paying the higher level of taxation, lower than the proportion of wealth-holders in Table 1.3. See Glass, *London Inhabitants.*, p. xxi.

37 It is not clear whether the Cambridge Group always used the names of both parents to identify same-name siblings, but in general terms this seems to have been the case. This is important in the light of the above discussion about step-siblings and the confusion that sometimes arises on this account.

38 The nine parishes are Colyton, Hartland, Aldenham, Dawlish, Ansty, Bridford, Eccleshall, March and Shepshed. The original data was kindly provided by the Cambridge Group.

Some of the burials not located in the burial register were the result of defective information on the identity of children, who although registered, could not be linked to the reconstitution schedules.[39] Table 1.5, therefore, represents proportions of children not found in the burial reconstitution schedules, rather than general under-registration of buried children. Nevertheless, the table gives some indication of the overall trend of burial registration. It improved slightly throughout the seventeenth and early eighteenth century − the omission rate declining from 34% to 25% − and was followed by a period of more-or-less stability for the rest of the eighteenth and early nineteenth centuries.

Conclusion

The evidence reviewed suggests that the same-name method is a reliable way of measuring burial registration accuracy, and can be applied to parish registers from the sixteenth century onwards. More research will be needed on the earlier period, to assess whether any living siblings shared the same name. However, the evidence from local censuses from the late seventeenth century onwards indicates that same names were only given to children where a sibling of the same sex had died previously. The same-name method is suitable for the evaluation of most burial registers, but requires a study of infant and child mortality in individual families, and therefore cannot be used for an assessment of the adequacy of the registration of adult burials.

In order to check the validity of same-name inflation ratios, research will be required on a number of available sources, using the method of "triangulation". The analysis of late seventeenth century data for the City of London illustrates the method. Same-name research yields correction ratios very similar to those derived from the comparison of enumeration lists with parish registers, and these ratios yield rates of mortality comparable to those derived from the London Bills of Mortality and other sources.

Taken together with earlier findings on the adequacy of baptism registers, the evidence reviewed indicates that both Krause

[39] Some of the registers used by the Cambridge Group, for example, did not always include information on the names of the parents of buried children, making the allocation of children to the correct family problematic.

and Wrigley & Schofield were wrong in thinking that parish registration collapsed between 1795 and 1820. Application of the same-name method to reconstitution data suggests that burial registration of children improved gradually throughout the sixteenth and seventeenth centuries, before stabilising subsequently. Between a fifth and a third of all deaths went unregistered in the eighteenth and early nineteenth centuries, similar to levels of birth under-registration discussed previously, suggesting that there were no major changes in parish register reliability during the long eighteenth century.

Appendix.

In order to help standardise same-name research, I have drawn up some simple rules derived from my own reconstitution work on infant and child mortality. The research requires the reconstitution of families from birth/baptism through to the burial of family members. The family is assumed to come into observation at the birth/baptism of their first listed child, and leave observation at the date of the last recorded event (either birth/ baptism or burial) of a family member.

1. For a child to be included in the list of birth/ baptisms:

a. the birth/baptism entry should include the names of both parents.

b. there should be independent evidence of the family's continued residence in the parish for at least one year after the date of birth/baptism (e.g. the baptism of a younger sibling or the burial of a parent or sibling).

2. Children should be excluded when:

a. children are born/baptised on the same day (unless specified as twins).

b. children are known to be more than one year old at the date of baptism.

3. For a burial of a child to be included in the analysis:

a. the names of the child and at least one parent should be the same as that listed in the baptism register.

or b. the name of the child is the same as that in the baptism register and there is an indication in the burial register that the child is an infant or a child.

4. For a child to be counted as a same-name case:

the second child should have exactly the same Christian names(s) as the first and be born to the same parents.

2. AN EVALUATION OF THE RELIABILITY OF ANGLICAN ADULT BURIAL REGISTRATION.[40]

Introduction

The findings derived from assessments of registration reliability can have a major effect on conclusions about the population history of England and Wales in the parish register period. For example, Wrigley and Schofield concluded that the increase in population in the eighteenth century was mainly due to a rise in fertility, whereas the present author has argued that the prime determinant of population growth in this period was a reduction in mortality. Wrigley and Schofield's conclusion about the central role of fertility in their aggregative work was largely based on the inflation of baptisms at the end of the eighteenth century, derived from an assumption that birth registration deteriorated sharply during this period as a result of increasing religious non-conformity.[41]

I have presented an alternative set of figures on births based on inflation ratios calculated from census/parish register comparisons.[42] Additionally, I have compiled a range of figures on infant and child mortality for different parishes, using inflation ratios derived from same-name research.[43] Little or no work has been carried out on the accuracy of adult burial registration using nominal record linkage, and the purpose of this essay is to present some provisional findings on this topic, based on the linkage of data from enumeration listings, parish registers and probate records.

Comparing Enumeration Listings And Parish Registers.

Enumeration listings have survived for a number of parishes in the pre-1841 period, and they exist in some instances for successive

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[40] First published in *Local Population Studies*, No. 77 (2006).

[41] See p. 47.

[42] See Table 1.1, p. 5.

[43] See Essays 3, 4 and 5.

periods of a decade or less. Where these schedules include data on the marital status of adults, it is possible to compare information on the death of an individual − for example, a husband no longer enumerated in a later listing and his wife becoming a widow − with the returns of burials in the parish register. Enumeration listings were carried out under the 1695 Marriage Duty Act, compiled in order to implement taxation on marriages, births and burials, as well as on bachelors over the age of twenty-five and childless widows. The function of these listings was to help establish the population liable for taxation. The Act ran for an eleven-year period between 1695 and 1706, and required the enumeration listings to be carried out annually.[44] The schedules for two parishes − Lyme Regis, Dorset and Swindon, Wiltshire − have survived with information on marital status for a number of years from 1695 onwards.

For Lyme Regis, 83 married couples were traced in the 1695, 1698 and 1703 listings, in which either the husband or wife disappeared between 1695 and 1703.[45] These 83 couples were in the following categories: (i) 47 husbands whose wives were later enumerated as widows; (ii) 9 wives with husbands later listed as widowers; (iii) 4 husbands whose wives were later enumerated without their husbands; (iv) 23 wives whose husbands were later enumerated without those wives, some of whom were listed with new wives. Identification of individuals was possible because of the near-identical sequence of listing of families in successive enumerations, as well as the presence of children in families.

An attempt was made to locate these 83 individuals in the Lyme Regis burial register, with the following results:

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44 For a discussion of the Marriage Duty Act, see T. Arkell, 'An examination of the poll taxes of the later seventeenth century, the Marriage Duty Act and Gregory King', K. Schurer and T. Arkell (eds.), *Surveying the People* (Oxford 1992); J. Boulton, 'The Marriage Duty Act and parochial registration in London, 1695-1706', Schurer and Arkell, *Surveying the People.*

45 Copies of the Lyme Regis enumeration schedules were kindly supplied by the Cambridge Group's library.

Table 2.1: The Burial Registration Of Husbands And Wives In Families Enumerated In Lyme Regis, 1695 And 1703.[46]

	Total Number Of Cases	*Burials Traced*	*Proportion Of Cases Traced In the Burial Register %*
Husbands No Longer Enumerated, Wives Becoming Widows	47	24	51
Wives No Longer Enumerated, Husbands Becoming Widowers	9	9	100
Husbands No Longer Listed, Wives Enumerated In Their Own Names	4	2	50
Wives No Longer Listed, Husbands Enumerated In Their Own Names	23	19	83
Total	83	54	65

In all, 29 of the 83 unlisted husbands and wives − 35 per cent − could not be traced in the burial register. It is possible that the two disappeared husbands with wives listed in their own names (the third category) had either temporarily left Lyme Regis or abandoned their wives. However, all the families of the unlisted husbands and wives continued to reside in Lyme Regis, usually with their children, and given that most surviving spouses were enumerated in later schedules as widows or widowers, the evidence suggests that the great majority of missing husbands and wives had died between enumeration listings.

One important feature of Table 2.1 is the large number of missing husbands who were not registered in the burial register. It is possible that many of these died at sea − about a fifth of men were listed as mariners in the burial register during 1703-04 and in apprentice indenture documents in 1663-1725. Also it is possible that some of the missing burials were due to the "traffic in corpses", with individuals being buried outside their parish of

46 The burial register used for this research is the manuscript copy deposited in the Dorset Record Office.

residence. However, it is unlikely that this could explain why it was mainly men who were missing from the burial register. Also, the Lyme Regis register often noted such burials − for example, the register recorded that on the 12th January, 1697 "Margaret Miller widow died in this parish but was buried at Musberry in Devon."

In the 1695 and 1698 Lyme Regis enumeration listings, a number of individuals were crossed out of the list with the capital letter D marked against their names, presumably because their families were liable to the tax on burials under the Marriage Duty Act. Of 22 such individuals, 13 were traced in the burial register, all in the year of the census − from the 1st May to the 30th April − the year defined by the Act. The other 9 cases were missing from the burial register, representing an omission rate of 39 per cent − very similar to that found for the missing husbands and wives in Table 2.1. It is unclear whether these 9 cases were all marked for payment of tax on burials, or were simply listed as dead. They could not be located in the 1703 listing and it is likely that they all died between 1695 and 1703, but it is unknown whether they were buried in Lyme Regis or not.

Of the 22 cases marked with the letter D, 11 were husbands, 7 were wives, 3 daughters and 1 a son of the families enumerated. 7 of the 11 husbands were missing from the burial register, 1 of the 7 wives, 1 of the 3 daughters, and none of the sons (the one son was registered). This again mirrors the finding in Table 2.1: husbands were much more poorly registered in the burial register than other members of the family, possibly as a result of being buried at sea or elsewhere outside of Lyme Regis.

Missing cases were not distributed evenly between the 1695 and 1698 enumeration listings: 11 of the 13 cases returned as dead in 1695 were found in the burial register, as against only 2 out of 9 in 1698. This indicates that the legal penalties for the non-registration of burials were taken much more seriously in the first year of the Act, and that the Lyme Regis clergyman and his clerk became much more lax in burial registration in the later period. This is compatible with what is known generally about the gradual deterioration of compliance with the Act during the eleven-year period that it was in force.[47]

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[47] This was reflected in Swindon by the declining number of people enumerated in the listings − 747 in 1697, 649 in 1701 and 522 in 1702 − and most of the

How typical was the poor burial registration found in Lyme Regis? The evidence from Swindon is that in some other parishes it was very much better during this period. Of 25 husbands and wives who disappeared in Swindon during the period 1697-1702, leaving widows and widowers behind, 22 were found in the burial register.

Research on 47 Bedfordshire parishes tracking married couples in the 1841 and 1851 censuses, identified 32 wives and husbands enumerated in 1841 who had become widows and widowers by 1851. 30 of these 32 cases were traced in Anglican burial registers between 1841 and 1851,[48] indicating a high degree of burial registration reliability, even higher than that found in Swindon at the end of the seventeenth century.[49]

Comparison Of Probate Records With Parish Registers.

A further way of checking burial registration reliability is to compare information in probate records with that in burial registers, searching the parish register for the registration of the burial of the person leaving the will. The majority of wills give the parish of residence, although this is not necessarily the parish of burial, which is an issue that must be addressed when comparing probate records with burial registers.

Of 202 people leaving wills in Lyme Regis in the period 1664-1749,[50] 74 could not be traced in the burial register within five years previous to probate − an omission rate of 37 per cent. This is slightly higher than the proportion of missing burials found through the tracking of husbands and wives (35 per cent), but it is sufficiently similar to give some confidence in both methods of evaluating burial registration reliability.

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missing individuals in later enumerations were children, as the number of families remained more or less constant.

48 For further details see Table 8.4, p. 202.

49 There is increasing evidence that parish registration in rural, predominantly Anglican areas, was of a high quality in the post-1837 period, and held up well until at least the second half of the nineteenth century. Personal communication from Andrew Hinde.

50 These probate records are deposited in the Dorset Record Office.

Information on wills is widely available, and it is possible to check registration reliability where both probate records and parish registers survive. Ideally we would want to evaluate both the burial registration of people leaving wills in their parish of residence, as well as in neighbouring parishes where a "traffic in corpses" might have taken place. This is possible for parishes in the county of Bedfordshire, where a digital transcript of Anglican and Non-Conformist burials − covering 355,985 individual entries − has been compiled for the whole county in the period 1538-1851.[51]

A published index of wills proved or administered in the Archdeaconry of Bedfordshire church court is available for the same period, giving information on name, parish of residence, occupation and date of probate.[52] People whose wills were administered by this court are likely to have only owned property in the county of Bedfordshire, as wealthy people owning wealth in more than one county frequently used Prerogative Courts for this purpose. Patricia Bell, the editor of published Bedfordshire wills, concluded that "local probate records relate to the more prosperous husbandman, yeomen, and tradesmen and their widows, and also to parish clergy and some minor gentry."[53] For people using the Bedfordshire court and only owning local property, this is likely to have reduced the incidence of a "traffic in corpses" outside the county.

This is confirmed by the analysis of parish of intended burial listed in Bedfordshire probate records: of the first 100 wills for the period 1510-23 with relevant information, 96 gave the parish of residence as the requested parish of burial.[54]

Thirteen Bedfordshire parishes were selected for intensive study, and were chosen for a project on infant and child mortality because of their high quality of information running from the

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51 A copy of this digital transcript has kindly been made available by the Bedfordshire Family History Society for the current research.

52 J. Stuart and P. Wells (eds.), *The Index of Bedfordshire Probate Records 1484-1858*, Vol. 1 (The Index Library, British Record Society, 1993).

53 P. Bell, *Bedfordshire Wills 1484-1533* (Bedfordshire Historical Record Society), Vol. 76, 1997, p. 1.

54 *Ibid.* These are the Bedfordshire wills nearest to the parish register period which have been transcribed and published.

sixteenth through to the nineteenth century.[55] The parishes are as follows: Barton in the Clay, Bedford St. Mary, Chalgrave, Dunstable, Henlow, Houghton Regis, Husborne Crawley, Maulden, Milton Bryant, Sandy, Shillington, Toddington, and Woburn. The majority of the parishes are located in the south of the county, six of them on the edge of Bedfordshire and six of them partly contiguous to each other. The sample was constructed by selecting names beginning with the letters A to G, chosen from the index of Bedfordshire Probate Records. A name search was then made both in published Anglican burial registers and in the digital burial index.[56] In order to allow for date errors, a case was defined as traced when located in the burial register within five years previous to the date of probate. In order to trace a case in a neighbouring parish register, a search was only made to within one year before probate because of the greater difficulty of establishing correct identity. Phonetical variations were allowed for, and matching criteria were defined as widely as possible − such as a woman listed as a widow even without a forename − in order to minimize the risk of missing a traced case.[57]

55 See P.E. Razzell, 'Life and death in Bedfordshire: early research findings', *Bedfordshire Family History Society Journal,* Vol. 15 (2005).

56 No attempt was made to trace individuals in the digital non-conformist burial index, as the main purpose of the research was to assess the quality of Anglican burial registration.

57 Phonetical variations were examined manually, and any possible name variation was counted as a traced case. It is therefore likely that any false negatives would be more than balanced by false positives.

Table 2.2: People Named In Probate Records And Traced In Thirteen Bedfordshire Burial Registers, 1538-1849.

Period	*Total Number Of Individuals Named In Probate Records*	*Number Of Individuals Named In Probate Records Traced In Burial Registers*	*Proportion Of Individuals Named In Probate Records Traced In Burial Registers %*
1538-99	181	147	81
1600-49	292	249	85
1650-99	348	287	82
1700-49	405	343	85
1750-99	280	228	81
1800-49	241	197	82
Total	1747	1451	83

There was little variation in the proportion of untraced cases over time, and the overall average of missing burials was 17 per cent. 79 per cent of burials were found in the year of probate, 17 per cent in the previous year, 2 per cent two years before, and 2 per cent three to five years previous to the year of probate. Only 4 per cent of burials were located outside the parish of residence as stated in the will index.

It is not possible with present data to trace burials outside of Bedfordshire, but a comparison of the six parishes on the edge of the county with the seven inner parishes suggests that this is not a major problem. The proportion of untraced cases in the former is 16 per cent (148 out of 917), compared to the rate in the seven inner parishes − 18 per cent (148 out of 830).[58] However, the proportion of cases traced in adjacent parishes is slightly less in the outer parishes − 3.5% (27 out of 769) − than it is in the inner parishes − 4.3% (29 out of 682). Most outer parishes were surrounded by three or four other Bedfordshire parishes, and so the minimal differences between inner and outer

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58 The parishes on the edge of the county are Barton in the Clay, Dunstable, Henlow, Houghton Regis, Shillington, and Woburn; the inner parishes are Bedford St. Mary, Chalgrave, Husborne Crawley, Maulden, Milton Bryant, Sandy and Toddington.

parishes in the proportions of burials registered in other parishes is not surprising.

There are variations in the proportions of untraced cases by individual parish, and this appears to have been partly a function of population size.

Table 2.3: People Named In Probate Records And Traced In Thirteen Bedfordshire Burial Registers By Individual Parish, 1538-1849.[59]

Parish	*Proportion Of Individuals Traced In Burial Registers %*	*Proportion Of Individuals Traced In The Same Parish Burial Register %*	*Population Size In 1801*
Milton Bryant	94	92	333
Barton In The Clay	91	87	448
Chalgrave	78	70	534
Husborne Crawley	86	81	543
Henlow	90	88	552
Maulden	82	79	738
Houghton Regis	83	78	784
Shillington	88	87	899
Sandy	88	88	1115
Dunstable	72	71	1296
Toddington	77	72	1443
Woburn	83	77	1563
Bedford St. Mary[60]	74	71	[616]
Total	83	80	

[59] The number of individuals in the probate samples in different parishes is as follows: Milton Bryant: 53; Barton In The Clay: 118; Chalgrave: 82; Husborne Crawley: 108; Henlow: 92; Maulden: 121; Houghton Regis: 167; Shillington: 234; Sandy: 208; Dunstable: 174; Toddington: 191; Woburn: 133; Bedford St. Mary: 66.

[60] Bedford St. Mary was included in the largest population category because it was one parish amongst several in a large town.

There was a general association between the population size of a parish and its proportion of untraced cases, as indicated in Table 2.4.

Table 2.4: The Relationship Between Population Size In Thirteen Parishes And The Proportion Of Individuals Traced In Bedfordshire Burial Registers, 1538-1849.

Parish	*Number Of Individuals Named In Probate Records*	*Proportion Of Individuals Named In Probate Records And Traced In Burial Registers %*	*Proportion Of Individuals Named In Probate Records And Traced In The Same Parish Burial Register %*
Parishes With Populations Under 500	171	92	89
Parishes With Populations Between 500 And 700	281	85	80
Parishes With Populations Between 700 And 1000	522	85	82
Parishes With Populations Over 1000	773	80	77

Some of the sample sizes are not very large and in order to partly remedy this defect, three additional parishes with population sizes of less than 500 people − Little Barford, Bletsoe and Great Barford − were selected for analysis. Of 120 individuals establishing probate in these three parishes during the period 1538-1849, 15 − 13% − could not be traced in burials registers or the digital index. There were 29 untraced cases out of a total of 291 − 10 per cent − in the five parishes with populations of less than 500, exactly a half of the proportion of untraced cases in parishes with a population of over 1000. The reasons for variations in the proportions of traced cases in parishes of different population size will be discussed later.

There appears to have been little or no association between occupation and registration accuracy, as indicated in the following table.

Table 2.5: People Named In Probate Records And Traced In Thirteen Bedfordshire Burial Registers By Occupation, 1538-1849.

Occupation Listed In Probate Records	*Total Number Of Individuals Named In Probate Records*	*Proportion Of Individuals Named In Probate Records And Traced In Burial Registers* %	*Proportion Of Individuals Named In Probate Records And Traced In The Same Parish Burial Register* %
Gentlemen & Professional	67	85	76
Farmers & Yeomen	447	87	83
Artisans & Tradesmen	466	86	82
Labourers & Husbandmen	190	84	83
Widows & Spinsters	249	82	77

It might be expected that the poorer socio-economic groups such as labourers and husbandmen would be subject to less adequate burial registration, but this does not appear to have been the case. The finding of a slightly higher proportion of untraced cases amongst widows and spinsters is different from the findings on Lyme Regis, suggesting that there were special factors at work in the latter place. Table 2.5 also suggests that there was a tendency for gentlemen and professionals to be buried outside their parish of residence, whereas the reverse was true of labourers and husbandmen.

There is evidence for other areas of the country to suggest that adult burial registration was incomplete in the period before the end of the eighteenth century. The following table summarizes research comparing probate records with information in individual parish registers.

Table 2.6: People Named In Probate Records And Traced In The Burial Registers Of Seven Individual Parishes.[61]

Parish And Period	*Total Number Of Individuals Named In Probate Records*	*Proportion Of Individuals Named In Probate Records And Traced In The Same Parish Burial Register %*	*Population Size In 1801*
Lyme Regis, Dorset, 1664-1749	232	65	1451
Hartland, Devon, 1598-1793	81	81	1546
Colyton, Devon, 1553-1773	124	72	1641
Great Dunmow, Essex, 1559-1602	50	80	1828
Long Melford, Suffolk, 1559-1610	97	79	2204
Newbury, Berkshire, 1546-1648	50	76	4275
Thaxted & Saffron Walden, Essex, 1560-1602	62	82	5075
Total	696	72	

[61] A search was made in the burial register for a period within five years before the date of probate. The parishes in Table 2.6 were selected in the course of other research. For example, the two parishes Colyton and Hartland were chosen because they were important in the Cambridge Group’s reconstitution project. With the exception of Lyme Regis, all source material on probate records and burial registers is to be found in the Society of Genealogists’ library.

The percentage of traced cases was lower in parishes in Table 2.6 than the equivalent proportion in Table 2.3 − on overall figure of 72 per cent compared to 80 per cent. This may have been partly due to most parishes in Table 2.6 being small towns − but there is no linear relationship between population size and proportion of burials traced. Most of the sample sizes in Table 2.6 are very small, and cover varying time periods, and only more systematic research will settle the issue of population size and burial registration accuracy.

In one respect the tracing of burials of people making or administering wills is a mild test of burial registration adequacy. People establishing probate were mostly adults − usually males − who owned property and were not from the poorest section of the community.[62] We would expect families of such people to ensure registration of their burials, particularly because of the legal implications of property transfers.

One way of analysing the burial registration of property owners and the poor is to compare the burials of will-leavers with that of paupers. Many parishes paid for the burial of the poor, including the purchase of coffins and carrying the dead to be buried. Lyn Boothman has carried out research on the parish of Long Melford in Suffolk. Of 97 people who left wills in 1559-1610, 20 could not be traced in the burial register (21%), compared to 34 of 52 paupers (65%) buried at about the same time.[63] Boothman has suggested that the very high omission rate amongst Long Melford paupers may have been a result of the non-payment of burial fees by the local poor law authority.[64]

Comparison of poor law and burial records that I have carried out for the two parishes of Whitchurch, Oxfordshire and Folkestone, Kent indicate that burial registration of paupers was of a similar level to that found amongst will-leavers.

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62 See N. Goose and N. Evans, ‘Wills as an historical source’, T. Arkell, N. Evans and N. Goose (eds.), *When Death Do Us Part* (Oxford 2000).

63 Personal communication from Lyn Boothman.

64 L. Boothman, ‘Letter on Long Melford parish registers’, *Local Population Studies,* No. 50 (1993), pp. 80, 81.

Table 2.7: Comparison Of Information On Pauper Burials In Poor Law Records And Parish Registers.[65]

Place	*Period*	*Total Number Of Pauper Burials*	*Number Of Pauper Burials Traced*	*Proportion Of Burials Traced %*
Whitchurch	1651-1750	93	74	80
	1751-1800	68	53	78
Folkestone	1732-1751	57	47	82
	1752-1787	57	51	89

The range of omission rates − from 11 to 22 per cent − is similar to that found among will-leavers in Table 2.3, suggesting that wealth in these two parishes was not an important factor in burial registration reliability.

Discussion

A number of questions is raised by the findings summarised in Tables 2.1 − 2.7. Perhaps the most important is what factors accounted for the under-registration of burials in the parish register period? Wrigley and Schofield have presented figures for different components of death under-registration, which have been summarized by Jeremy Boulton as follows:

65 Razzell, *Essays in Population History*, pp. 211-12.

Table 2.8: Components Of Death Under-Registration In England, 1630-1799.[66]

Date	*Overall Under-Registration*	*Estimated Components Of Under-Registration*		
	%	*Religious Dissent* %	*Delayed Baptism* %	*Residual* %
1630-39	0.0	-	-	-
1640-49	0.2	50	-	50
1650-59	0.8	51	-	49
1660-69	1.2	52	-	48
1670-79	1.8	50	2	48
1680-89	2.5	43	15	42
1690-99	3.2	35	26	40
1700-09	3.7	28	35	37
1710-19	4.2	24	40	36
1750-59	6.7	12	59	29
1790-99	16.5	7	40	53

Burial under-registration due to delayed baptism is not relevant to adult burials, but the other two components in Table 2.8 − religious dissent and residual − are applicable. However, perhaps the most striking feature of the table is the zero amount of overall burial under-registration in the 1630s, and the relatively negligible extent of under-registration in the period up to the middle of the seventeenth century.

Wrigley and Schofield assumed that no inflation of burials was necessary for the effects of religious non-conformity and residual causes on non-registration in the period 1538-1640, but that by 1810-19 it was necessary to increase burials by 48% to account for these forms of under-registration.[67] These assumptions are in strong contrast to the findings derived from the comparison of probate/ burial data summarized in Table 2.2, where there is a significant amount of burial under-registration in the seventeenth

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[66] Boulton, 'The Marriage Duty Act', p. 224.

[67] Wrigley and Schofield, *The Population History*, pp. 545-552.

and first half of the eighteenth century, not dissimilar in amount to that found subsequently.

It is possible to clarify one of the components in Table 2.8 − religious dissent − by analysing the non-conformist registers that have survived for Bedfordshire and been included in the Bedfordshire Family History Society's burial database.

Table 2.9: Non-Conformist Burial Registers, Bedfordshire Family History Society's Database, 1538-1850.[68]

Place	*Denomination*	*Period*	*Number of Burials*
Ampthill	Methodist	1817-41	27
Ampthill	Quaker	1707-1847	112
Bedford	Bunyan Meetinghouse	1846-50	93
Bedford	Congregational	1785-1836	38
Bedford	Howard Church	1790-1837	147
Bedford	Primitive Episcopalean	1834-45	62
Bedford	Protestant Dissenters	1837-50	87
Bedford	Moravian	1746-1850	510
Biggleswade	Baptist	1786-1829	3
Biggleswade	Methodist	1835-50	26
Biggleswade	Protestant Dissenters	1727-1786	2
Blunham	Baptist	1739-1850	99
Cranfield	Baptist	1794-1837	97
Hockliffe	Congregational	1817	1
Houghton Regis	Baptist	1794-1837	18
Leighton Buzzard	Baptist	1771-1850	98
Leighton Buzzard	Quaker	1826-50	44
Little Staughton	Baptist	1786-1806	22
Luton	Baptist	1837-50	397
Luton	Quaker	1776-1850	115
Maulden	Independent	1785-1834	32
Southill	Baptist	1802-20	9
Stevington	Baptist	1830-50	43
Turvey	Congregational	1848-50	6
Woburn	Congregational	1790-1837	75
Woburn Sands	Quaker	1704-1850	66
Total			2501

68 The registers on which the database is based are those copied or transcribed and deposited in the Bedfordshire Record Office.

The above table includes nine registers not covered by the Registrar-General's list of deposited registers published in 1859, and is likely to include all surviving Bedfordshire non-conformist burial registers.[69] The majority of these registers begin in the late eighteenth and early nineteenth century. Only four of the thirteen parishes in the Bedfordshire sample have surviving registers: Bedford, Houghton Regis, Maulden and Woburn. There were several non-conformist denominations in the town of Bedford, and there were a substantial number of burials − 510 − in the Moravian register between 1746 and 1850. Burials included in the registers for the three other parishes were insignificant in number: 18 in the Houghton Regis Baptist register between 1794 and 1837, 32 in the Maulden Independent register in the period 1785-1834, and 66 in the Woburn Quaker register between 1704 and 1850. The number of burials in the Bedford non-conformist registers could be an important factor in Anglican under-registration in that town, but it appears that religious dissent played an insignificant role in the other twelve parishes of the Bedfordshire sample.[70]

The remaining residual component of burial under-registration probably relates to clerical negligence and registration problems such as the non-payment of fees. In the sixteenth and seventeenth centuries, many of the thirteen sample registers had annual gaps in the registration of burials, even after many years of regular registration. However, there was a significant change over time in the occurrence of annual gaps. In the period 1538-1649, 32 per cent of untraced probate cases were the result of yearly gaps in the burial register, whereas after 1700 there were none. This suggests that burial registration improved during the late seventeenth century, but the evidence summarized in Table 2.2 indicates otherwise. Much burial under-registration was probably

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69 See *Bedfordshire Notes and Queries*, Vol. 3, 1890-92 (Bedford 1893), pp. 199-202. The registers in Table 2.9 not covered by the Registrar-General's list are: Ampthill Methodist, Bedford Bunyan Meetinghouse, Bedford Primitive Episcopalian, Bedford Protestant Dissenters, Biggleswade Protestant Dissenters, Hockliffe Congregational, Leighton Buzzard Baptist, Little Staughton Baptist, and Maulden Independent

70 The non-conformist churches in Bedford probably served a wide hinterland covering a number of rural parishes as well as the town itself, but none of the other twelve parishes in the Bedfordshire sample were either adjoining or within a radius of ten miles of the town.

the result of systematic clerical negligence, as indicated by Burn in his study of parish registers, first published in 1829:

"The custody of parish registers having been frequently committed to ignorant parish clerks, who had no idea of their utility beyond their being occasionally the means of putting a shilling into their own pockets for furnishing extracts, and at other times being under the superintendence of an incumbent, either forgetful, careless of negligent, the result has necessarily been, that many Registers are miserably defective, some having the appearance of being kept from month to month, and year to year, yet being deficient of a great many entries."[71]

This clerical negligence appears to have been present from the sixteenth century onwards. For example, "in 1567 the incumbent of Tunstall, Kent, appeared to have tired of registering the Pottman family because of its concentration in the parish and simply stated in the register: 'From henceforwd I omit the Pottmans.'"[72]

As previously mentioned, some of the neglect of burial registration was due to the non-payment of fees. In the Northamptonshire parish of Brington, "the very true reason why this register, is found as imperfect in some years as from 1669 to 1695 is because the parishioners could never be persuaded to take to see it done, not the church-wardens as ye canon did require, and because they refuse to pay such dues to ye curate as they ought be custome to have payed."[73]

In 1702-03 "a committee of Convocation drew up a list of ecclesiastical offences notoriously requiring remedy, in which irregularity in keeping registers is prominent in the list of gravamina."[74] Evidence for clerical negligence became abundant in the early nineteenth century. The *Gentleman's Magazine* remarked in 1811 that "the clergyman (in many country places) has entered the names at his leisure, whenever he had nothing

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[71] J.S. Burn, *The History of Parish Registers in England* (London 1862), p. 18.
[72] *Ibid*, p. 41.
[73] J.C. Cox, *The Parish Registers of England* (London 1910), pp. 20, 21.
[74] W.E. Tate, *The Parish Chest* (Cambridge 1969), p. 49.

better to do, and perhaps has never entered them at all."[75] The *Report of the Select Committee on Parochial Registration in 1833* provided substantial evidence on the reasons for defective parish registration. One of the witnesses, Mr William Durrant Cooper, a solicitor, had extensive experience of tracing individuals in parish registers for property cases, and concluded that parish registration was "exceedingly defective … [with] a very large number of marriages, deaths and baptisms not entered at all … especially deaths."[76] To illustrate this, he gave the following example:

"On the sale of some property [in 1819] from Mr Cott to Lord Gage, it was necessary to procure evidence of the death of three individuals, Mrs Pace, Mr Tuchnott and Mrs Gouldsmith. They were at different places, all in Sussex; Mrs Pace was regularly entered; Mr Tuchnott was buried at Rodmell, about five miles from Lewes, and on searching for the register of burial we found no entry whatever. On making an inquiry in the churchyard of the sexton, he stated he recollected digging the grave, and the ceremony being performed; Mr Gwynne, the rector, whose neglect in that and other parishes is well known, had omitted to enter it … Mrs Gouldsmith, who was buried at Waldron, in the same county, was not entered, but on going to the parish clerk, who was a blacksmith, he stated he recollected the circumstance, and accounted for her burial not being entered in this way: he said it was usual for him, and not the clergyman, to take account of the Burials, and he entered them in a little sixpenny memorandum book … If it so happened that the fee [of one shilling] was paid at the time, as was the case with affluent persons, no entry would appear in his book, he only booked what was due to him, and as the clergyman entered the parish register at the end of the year from his book, and not at the time of the ceremony, all burials that were not entered in his book would not find their way into the register."[77]

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75 Burn, *The History of Parish Registers.*, p. 42.

76 *Report of the Select Committee on Parochial Registration*, (Parliamentary Papers, 1833/ XIV), p. 24.

77 *Ibid,* p. 25.

This evidence suggests that clerical negligence was the main reason for the non-registration of Anglican burials. However, if this were the case, we would expect baptism registration also to be subject to the same process of under-registration. The earlier evidence on baptism and child burial registration indicates little or no linear trend over time, similar to the findings for the same period on adult burial registration depicted in Table 2.2. The proportion of untraced births is higher than the percentage of missing adult burials, and this may be for a variety of reasons − including the different socio-economic characteristics of the samples − but may be partly a function of population size.

Table 2.10: Proportions Of Untraced Births By Population Size Of Parish, 45 Parishes, 1761-1834.[78]

Population Size In 1851	*Total Number of Cases*	*Proportion Of Untraced Births %*
Under 500 (9 Parishes)	579	19
500-999 (7 Parishes)	638	15
1,000-1,499 (9 Parishes)	2,003	28
1,500-1,999 (10 Parishes)	2,383	31
2,000+ (10 Parishes)	5,351	36
Total	5,351	31

The proportions of untraced cases in the smaller parishes is significantly less than those in the larger parishes, a similar finding to that for adult burial registration summarized in Tables 2.3 and 2.4.[79] If many clergymen only compiled their registers sporadically or even at the end of the year as suggested by the anecdotal evidence quoted above, the larger the parish the more likely they were to forget or neglect the registration of marriages, baptisms and burials. This hypothesis will have to be evaluated through further research on much larger samples, and will perhaps

78 Razzell, *Essays in English Population History,* p. 94.

79 The proportions of untraced births in Table 2.10 are larger than the equivalent figures in Table 2.3 and 2.4, but the samples are for different parishes and were selected from the general population for the former, as well as having different socio-economic characteristics.

have to include the study of legal records, diaries, autobiographies and other local historical sources.

Conclusion.

The present essay has illustrated the application of nominal record linkage methodology to the measurement of adult burial registration. The evidence from this research suggests the following conclusions: 1. Burial registration was deficient in all periods between 1538 and 1851. 2. Burial registration of adults was worse in larger than smaller parishes. 3. Socio-economic status appears to have had little or no influence on the quality of burial registration of adults. 4. Religious dissent played an insignificant role in Anglican burial under-registration, which was caused mainly by clerical negligence.

The above conclusions are necessarily provisional, given the small number of parishes covered by the research. However, demographic data by its very nature lends itself to the analysis of registration reliability, particularly where it is possible to 'triangulate' sources such as in the case of Lyme Regis. The availability of a wide range of digital sources − the baptism and marriage registers transcribed by the Church of Jesus Christ of Latter Day Saints (Mormons), the digitisation of burial registers by local family history societies, and the computerisation of the national censuses of England between 1841 and 1901 − will allow research on a large number of parishes.

Methodological work on these digital sources will be a prelude to a new research, not based on 'model-down' reconstruction of national data, but derived from detailed and meticulous local evidence including both quantitative and qualitative source material. These developments will allow comprehensive research on parishes from a wide range of places and counties, and should allow in due course confident general conclusions about the population history of England in the parish register period.

II

The Structure Of Population Change

3. REVIEW OF E.A. WRIGLEY *ET. AL.*'S *ENGLISH POPULATION HISTORY FROM FAMILY RECONSTITUTION 1580-1837.* [80]

Introduction

This volume is published in the Cambridge Studies in Population, Economy and Society in Past Times series, and brings to fruition a project spanning more than thirty years, involving the collaboration of many different individual scholars, both amateur and professional. The Cambridge Group is an Economic and Social Research Council Unit and its work has found such wide acceptance that it has almost achieved official recognition.[81]

The basis of these achievements is the collection of nearly four million individual entries from 404 parish registers, as well as the linkage of detailed material for 26 reconstitution studies. By generating detailed information on nuptiality, fertility, mortality and population structure, the Cambridge Group has made a significant contribution to the development of historical demography, which in turn has had a major influence on a number of other disciplines, including economic, social and medical history.

The Cambridge Group has analysed its data by means of elaborate computer programs. Much of this work appeared in the 1981 volume written by Wrigley and Schofield − *The Population History Of England, 1541-1971* − which mainly concentrated on the results of the aggregative work, using in part the back projection technique.[82] The results are sufficiently familiar not to require detailed discussion here. The main findings

[80] The authors of this book are E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield and it was published in 1997. This essay first appeared in the *Social History of Medicine*, Vol. 11 (1998).

[81] The leading member of the group − Professor Wrigley − has received a knighthood for his contribution to historical demography, and been awarded a gold medal by the International Union for the Scientific Study of Population for his scholarly achievements in the field of population studies.

[82] See E.A. Wrigley and R.S. Schofield, *The Population History Of England, 1541-1871* (London 1981). A second edition with a new introduction was published in paperback in 1989.

were that after a period of stagnation in the second half of the seventeenth and first half of the eighteenth century, population began to grow rapidly after the middle of the eighteenth century. Most of this population growth was interpreted as being due to a rise in fertility, resulting from a fall in the average age at marriage of about three years. Changes in mortality were seen as being more modest, with relatively slight falls in child and adult mortality after the middle of the eighteenth century. Wrigley and colleagues estimate in their latest volume that about two-thirds of eighteenth century population increase was due to rises in fertility, and one third to decreasing mortality.[83]

These findings have been interpreted by the authors as largely confirming the work of Robert Malthus. They have argued that the growth of population was the result of the increase in fertility associated with a fall in the age of marriage, which in turn was probably due to growing real incomes lagged over time. Most of these conclusions are based on the aggregative data collected from the 404 parish registers, although they were supported by the early findings of thirteen reconstitution parish register studies published in 1981. Although these findings and conclusions have found wide acceptance, some of the methods used by the Cambridge Group have come under scrutiny and there has been an extensive discussion of the problems of reconstitution methodology.[84]

Central features of the Cambridge Group's main argument have been challenged within the last few years. For example, Peter Lindert has questioned the way Wrigley and Schofield used Registrar-General's nineteenth century data to estimate birth registration patterns. Lindert concluded that "life tables and nineteenth century censuses suggest that birth

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83 E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English Population History from Family Reconstitution 1580-1837* (Cambridge 1997), p. 126.

84 See T.H. Hollingsworth, *Historical Demography* (London 1976), pp. 181-196. A brief bibliography of work examining the problems of reconstitution methodology is given in Steven Ruggles, 'Migration, marriage, and mortality: correcting sources of bias in English family reconstitutions', *Population Studies*, Vol. 4 (1992), p. 507, fn. 1. The Cambridge Group has fully participated in this debate: see R.S Schofield, 'Representativeness and family reconstitution', *Annales De Demographie Historique*, 1972 (Paris 1972), pp. 121-125, and the discussion which followed, *Ibid*, pp. 127-146.

registration was worse before 1780 than after. Yet Wrigley and Schofield turn the suggestion upside down, arbitrarily revising the censuses instead."[85]

The revisions to which Lindert refers were a part of the Cambridge Groups back projection program, involving a range of assumptions and adjustments which could have a major effect upon key conclusions.[86] The most important adjustments were those made to aggregate numbers of baptisms and burials, and (as with so much of the Cambridge Group's work) these were made on the basis of complex sets of demographic assumptions and calculations rather than on the direct examination of empirical sources.

For example, Wrigley and Schofield in their back projection program inflated baptisms by certain ratios in order to calculate the number of births in England & Wales. These ratios were based on estimates of unregistered births which can be contrasted with empirically derived figures calculated from census/ baptism register research discussed previously.

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85 P.H. Lindert, 'English living standards, population growth, and Wrigley-Schofield', *Explorations in Economic History*, Vol. 20 (1983), p. 136.

86 For example, as a part of the back projection programme, Wrigley and Schofield reduced the size of the age group enumerated in the 1871 Census by 44 per cent; if they had chosen instead to reduce that age group by 40 per cent, their estimate of the English population in 1541 would have been about 9 per cent greater. See R.D. Lee and D. Lam, "Age distribution adjustments for English censuses, 1821 to 1931", *Population Studies*, Vol. 37 (1983), pp. 445-464.

Table 3.1: The Cambridge Group's Estimate Of Unregistered Births In England & Wales, Versus Individuals Listed In The 1851 Census But Not Found In The Baptism Register, 1761-1834.[87]

Period	*Wrigley & Schofield's Estimates Of Unregistered Births In England & Wales, (%)*	*Percentage Not Found In Baptism Registers (Razzell) %*
1761-1770	13.5	32.4
1771-1780	14.6	27.9
1781-1790	17.9	32.6
1791-1800	23.2	36.0
1801-1810	27.6	32.0
1811-1820	32.3	33.0
1821-1830	29.9	30.0
1831-1834	26.2	27.4

The census/ baptism register figures show little or no trend over the period, with approximately a third of all births missing from the baptism registers. Although these figures do not support Lindert's contention that birth registration was worse before 1780 than afterwards, they are significantly at variance from Wrigley and Schofield's estimates of unregistered births. Their figures show a marked deterioration in birth registration at the end of the eighteenth century, whereas the census/baptism register data indicate a more-or-less stable level of registration accuracy.

Without their inflation ratios, Wrigley and Schofield's data indicates a constant level of fertility at the end of the eighteenth and beginning of the nineteenth centuries, as indicated by their crude baptism and burial rates.

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87 See Wrigley and Schofield, *The Population History*, pp. 543, 544; Razzell, *Essays in English Population Studies*, p. 95.

Table 3.2: English Baptism And Burial Rates (Per 1000) Calculated From Cambridge Group Data.[88]

Period	Estimated Population	Baptism Rate	Burial Rate
1701-40	5,350,000 (1721)	29.3	27.7
1741-80	6,147,000 (1761)	29.8	25.5
1781-1820	8,664,000 (1801)	29.4	20.6

The baptism rate was more-or-less constant between 1701 and 1820, whereas there was a significant fall in the burial rate during the same period, particularly at the end of the eighteenth and beginning of the nineteenth centuries. As we have seen previously, Wrigley and Schofield inflated the number of baptisms in 1781-1820, in the belief that the growth of religious non-conformity and other factors led to a decline in the quality of birth registration at the end of the eighteenth century, and it was on the basis of this inflation that they argued that there was an increase in fertility. Earlier evidence cited suggests that this inflation of baptisms is not warranted, and that there were no major changes in parish register reliability during the eighteenth and early nineteenth centuries.

Gregory King's work on the age structure of the English population in 1695 indicates that it was similar to that in 1821 based on national enumeration returns.[89] This data along with the evidence summarized above suggests that there was no significant long-term change in fertility, and that a reduction in mortality was the major factor in bringing about population growth in the eighteenth and early nineteenth century. However given the uncertain quality of the national data, it is necessary to evaluate

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88 For the sources of data on which this table is based, see Wrigley and Schofield, *The Population History*, pp. 541, 543, 549, 551, 577.

89 D.V. Glass, 'Gregory King's estimate of the population of England and Wales, 1695', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965), p. 215.

this conclusion by a detailed examination of reconstitution and other local evidence.

Reconstitution Methodology

The technique of family reconstitution has been practised by historical demographers for over eighty years,[90] and was developed in England by Wrigley with his pioneering work on Colyton.[91] The technique involves the nominal record linkage of data from baptism, marriage and burial registers, tracing individuals wherever possible from birth through to marriage and death. Standard rules are constructed so that record linkage is established in an objective manner, although the application of these rules depends very much on the quality of data available.[92]

Reconstitution methods can only be applied to people who stayed in the parish of their birth, allowing calculation of marriage ages, fertility and mortality rates. This means that migrants are excluded from reconstitution calculations, as they simply leave the field of observation (the parish and its register) to marry, have children and die elsewhere. This is generally recognised as a major problem for reconstitution studies, although the extent of the problem varies from one type of calculation to another.[93] The problem is particularly severe in calculating age at marriage and adult mortality, as these involve tracing people from birth through to marriage and eventual death. In order to calculate

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90 Wrigley *et.al.*, *English Population History*, p. 3.

91 See E.A.Wrigley, 'Some problems of family reconstitution using English parish registers: the example of Colyton', *Proceedings of the Third International Conference of Economic History*, Munich 1965, Section VII, Demography And Economics (Paris 1972), pp. 199-221.

92 One central principal of reconstitution work is that the period at risk in which a demographic event takes place is established independently of the event itself. For example, in order to calculate child mortality rates, it is important that the period in which the child is at risk of dying is established independently (through for example the baptism of another child in the family) of the date of the death of the child itself. Otherwise the calculated mortality rate would be affected by the exclusion of children who lived and did not die in the period in question.

93 For a discussion of some of these problems, see Ruggles, 'Migration, marriage and mortality', pp. 507-522.

adult mortality rates, reconstitution rules assume that adults enter observation at marriage. Age at marriage is measured through tracing an adult's baptism date and subtracting it from his or her marriage date. Adults are then deemed to be in observation until the occurrence of the last known independent event establishing their presence in the parish, such as the burial of a wife or husband.

As early as 1969, T.H. Hollingsworth questioned a number of the assumptions and procedures of reconstitution research. His criticisms may be summarised as follows: (1) Due to migration from parish to parish, the proportion of the total population included in reconstitution samples is very small, in some instances barely reaching 10 per cent. (2) Parish registers are of unknown reliability, but in England are likely to have been very defective during most of the parish register period. (3) There are special problems with the measurement of adult mortality, because of the difficulty of tracking adults to advanced ages. (4) There are difficulties with the calculation of infant mortality because of the delay between birth and baptism, in which period much infant mortality took place.[94]

Hollingsworth argued that many parish registers were very defective even as early as the seventeenth century, and cited the example of the parish of Ottery St. Mary, where the registration of burials at the end of the seventeenth century varied greatly depending on whether or not the vicar took personal responsibility for compiling the parish register.[95] It has been generally accepted that parish registration was very defective in individual parishes, but the problem is the lack of systematic knowledge of registration deficiency in the reconstitution parishes. This is a topic which I will return to later, but before this discussion, it is necessary to consider the nature of the Cambridge Group's reconstitution sample and its representativeness.

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94 Hollingsworth, *Historical Demography*, pp. 181-196.

95 *Ibid*, pp. 191, 192.

The Cambridge Group's Reconstitution Sample

Twenty-six parishes are included in the Cambridge Group's demographic sample, and they were chosen primarily on the basis of two criteria: (i) the availability of volunteers to extract data; and (ii) the selection of parish registers with sufficiently large numbers to enable detailed reconstitution analysis by individual parish.[96] Although at first glance the latter appears to be a reasonable requirement, it has introduced a selection bias. Wrigley and colleagues have described the nature of their sample as follows:

"The twenty-six [parishes] were considerably larger on average than normal. Assuming for simplicity that there were 10,000 parishes in England in 1801, the national average parish size was about 860, or only 40 per cent of 2,187, which was the mean size of the 26 reconstitution parishes. There were some small parishes in the 26, but the difference in size is marked. Although by 1801 the average size of an English parish was about 860 souls, for the bulk of the parish register period a more representative figure would be about 500."[97]

I will argue later that the unrepresentative character of the sample − in which the parishes studied are about two-and-a-half times the size of the national average − is an important weakness as far the results of the research are concerned, particularly with regard to changes in mortality.

Wrigley and colleagues have divided the overall sample into four groups depending on availability of reliable data, and these overlap in time: there is no one period in which all 26 parish registers are included in the reconstitution analysis. Group 1 covers the period 1580-1729 (15 parishes); Group 2: 1600-1729 (20 parishes), Group 3: 1680-1789 (18 parishes) and Group 4: 1680-1837 (8 parishes).[98] The core groups are 2 and 3 which include the majority of parishes for the period 1600 to 1789, but

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96 Wrigley *et.al.*, *English Population History*, pp. 20, 21.

97 *Ibid*, p.20.

98 *Ibid,* p.26.

even here there are only 12 parishes which run throughout the whole period.

The sample of parishes covering the period 1680-1837 presents a major difficulty. As a result of the exclusion of parishes on the grounds of register unreliability, there are only eight registers in this group. This means that there are only eight parishes covering 1790-1837, an important period, for it is data from this group of parishes which is compared with census and civil registration data for 1831 and 1838-44 to assess the overall reliability of reconstitution findings.[99]

Ten parish registers were eliminated from group 3 on grounds of unreliability. The process of exclusion was not based on any independent or objective test, but on the basis of judgement and overall assessment of quality of data. Parish registers were mainly excluded because of the unreliability of their burial registration. Since this is so critical for the study of mortality, it is necessary to quote at length the reasons given for excluding particular parishes. I list the comments in the sequence they are given in *English Population History From Family Reconstitution*:

"*Aldenham*: ... there was ... an exceptionally sharp drop in infant mortality between 1750-99 and 1800-49 (from 141 to only 57 per 1000). The available evidence suggests that a substantial under-registration of deaths must have occurred and 1789 was chosen as the closing date for Aldenham.
Austrey ... The case of Austrey resembles Aldenham though the deterioration of burial registration appears to have occurred earlier. As with Aldenham the number of burials fell sharply, though not so sharply as to justify in itself the conclusion that the register had become unreliable. But since the level of infant mortality also fell to an implausibly low level (from 110 per 1000 in 1700-49 to 47 per 1000 in 1750-99) it seemed prudent to disregard the post-1750 period.
Bridford ... Bridford like Austrey, was a small parish with fewer than 500 inhabitants in 1801. Their registration histories were similar. The completeness of burial registration appears to have deteriorated in Bridford towards the end of the eighteenth century, and there was at the same time an apparent fall in infant mortality,

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99 Wrigley *et.al.*, *English Population History,* pp. 93, 95.

though less marked than in the case of Austrey. The decline was however heavily concentrated in the early months of life. Taken together these signs of deficiency suggest that the reconstitution post-1750 is significantly less complete than earlier.
Colyton ... there appears to have been a weakening in burial coverage towards the end of the eighteenth century. It therefore seemed prudent to use 1789 as the stopping date.
Earsdon ... there was probably a marked deterioration in registration towards the end of the eighteenth century ... between the half-century 1750-99 and the succeeding period 1800-41 ... Infant mortality fell from 126 per 1000 to 66 per 1000, while there was a simultaneous significant decline in age-specific marital fertility rates, a combination of changes that suggests that the reconstitution data should not be accepted after the end of group 3 period [1789].
Hartland ... infant mortality, which was little under 100 per 1000 in 1700-49, fell to 55 per 1000 in 1750-99, and still further to 36 per 1000 in 1800-37. Hartland lay in an area that enjoyed exceptionally low infant mortality, as the returns for the early years of civil registration clearly show ... There is therefore nothing implausible in the early eighteenth century level of infant mortality revealed by reconstitution, but its subsequent apparent fall must reflect deteriorating registration. It would therefore be foolhardy to include the period after about 1770.
Southill ... experienced ... a particularly acute form of abrupt worsening in burial registration after the 1780s, which suggests 1789 as a closing date.
Terling ... the number of burials over the ... decades [1770-9 to 1820-9] changed so implausibly as to cause distrust of any tabulations based on data after 1789 (107, 131, 96, 113, 65, 84)."[100]

The language used in these passages to justify the exclusion of data – "plausibility", "mistrust", "foolhardy", "suggests" − indicates the subjective nature of the process. Although Wrigley and colleagues apply objective tests elsewhere to the overall reliability of reconstitution data, these are not used for decisions about the exclusion of particular time periods from individual

100 Wrigley *et.al.*, *English Population History,* pp. 32-38.

parishes. One of the strengths of reconstitution methodology is that it states its assumptions and procedures in advance, so as to avoid the necessity of subjective judgement. In the present instance, the Cambridge Group have not followed this procedure, leaving themselves open to the criticism of “shaping” their findings to fit preconceived notions.

The Reliability Of The Cambridge Group’s Reconstitution Data.

Wrigley and his colleagues are aware of the critical importance of the reliability of their data, and as we shall see, make a general overall assessment of the quality of their findings. One of the chief methods that they use in assessing data quality, is to compare their findings for the period 1825-37 with civil registration returns for the period 1838-44. The latter data is available for registration districts, allowing only a comparison between parishes and the civil registration districts in which they lie. The chief comparison that the Cambridge Group makes is for infant and child mortality, and the overall average rate for all age groups is about 15 per cent higher in the registration districts than it is in the parishes,[101] a not insignificant difference.

Wrigley and colleagues also compare the figures for the eight parishes with the Registrar-General’s national statistics of infant and child mortality. Infant mortality was about the same in the eight parishes as it was nationally in the late 1830s − about 150 per 1000 − whereas child mortality was about 95 per 1000 in the reconstitution sample, and 130 per 1000 in England and Wales.[102] Wrigley *et.al.* argue that these figures indicate that the reconstitution sample is reasonably representative,[103] but this is questionable given the scale of difference in the child mortality rate. Also, had the data from the excluded parishes been included in the Cambridge Group’s calculations there would be a sharp variation between reconstitution and national infant and child mortality rates. Infant mortality was 104 per 1000 and child mortality 72 per 1000 for the full nineteen parish sample during

101 Wrigley et.al., *English Population History* p. 93.

102 *Ibid*, p. 216.

103 *Ibid,* p. 217.

the 1830s, the former about two-thirds, and the latter nearly half the national rate in the same period, very significant differences.[104] The critical question thus becomes, what was the pattern of reliability of parish register data in the pre-1837 period?

Wrigley and colleagues attempt to answer this question by applying a test involving the comparison of birth intervals of different types of families. The logic of the argument is as follows: (i) Most mothers breast-fed their children in England in the early modern period, and breast-feeding is known generally to delay the further conception of children for periods of up to a year or more. (ii) When a child dies in the first year of life, the mother will become more fertile as a result of ceasing to breast-feed, making it possible to detect the presence of a dead child by the pattern of subsequent birth intervals. (iii) Registration reliability can be measured by comparing the pattern of birth intervals of families with (a) children known to have died in the first year, with (b) those known to have died subsequently, as well as with (c) the group where the date of death is unknown.

The argument is that it is the third group (of unknown dates of death) which would contain unregistered infant burials, and if it did contain such deaths its birth interval pattern would be more like the first group (with infant deaths) than the second (with non-infant deaths). Wrigley and colleagues make a number of complex calculations, and conclude that except for an early period before 1600, when perhaps nearly 30 per cent of all infant deaths were missing in the parish register, burial registration reliability in the reconstitution sample was very high.[105]

There are a number of problems with this method of assessing parish register reliability:

(1) The practice of breast-feeding of sufficient duration to delay birth intervals by one year is assumed rather than measured.

(2) It is also assumed that a mother's fecundity is independent of the health of her children. As one leading authority on the subject has recently written: "the child's death might be related to some characteristics of the mother which are not independent of her own fecundity: for example, severe malnutrition can lead to a lower

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[104] I am grateful to Jim Oeppen for providing the data on which these figures are based.

[105] Wrigley *et.al.*, *English Population History*, pp. 101-106.

fecundability or a longer period of anovulation for the mother."[106] A shorter birth interval is not therefore necessarily measuring the cessation of breast-feeding as a result of an infant death, but it might be measuring the opposite: a healthy and fecund mother with children less prone to infant mortality. And in practice, it might be measuring a combination of both.

(3) Using birth intervals to measure parish register reliability also assumes that the accuracy of death and birth registration are independent of each other. If there is a correlation between the two, as is likely (through the influence for example of financial status on registration practices), then birth intervals might be longer in the "unknown deaths" category not because of the cessation of breastfeeding due to infant death, but as a result of deficient birth registration in the "unknown" category.

All these problems illustrate the difficulty of using abstract and statistical methods for correcting and processing data. The issues dealt with are so complex, and involve so many unknowns and uncertainties, that the resulting data is subject to a large margin of error. One solution to the problem is to measure as directly as possible the reliability of parish registers by cross-matching them with alternative forms of information. Although Wrigley and colleagues engage in a limited exercise of comparing census with baptism register data,[107] they reject the possibility of evaluating parish registers generally through cross-matching alternative forms of data, believing there is insufficient reliable independent information for this purpose.[108]

In fact, as we have seen, there is a range of sources allowing an independent evaluation of parish registers − reconstitution same-name evidence, probate and poor law records − and the conclusions about parish register reliability using this data are very different from those reached by the Cambridge Group.[109]

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106 H. Leridon, 'Fecundability and post-partum sterility: an insuperable interaction?', R. Gray *et al*. (eds.), *Biomedical and Demographic Determinants of Reproduction* (Oxford 1993), p. 246.

107 Wrigley *et.al*., *English Population History*, pp. 109, 110.

108 *Ibid*, pp. 91, 92.

109 See Essays 1 and 2.

Applying The Same-Name Method To Reconstitution Data.

Wrigley and colleagues have raised a number of questions about the validity of the same-name method as follows:[110]

(1) There is some evidence that living children were given the same name, invalidating the assumption that all first same-name children were dead.

(2) Names were often given in colloquial form, making it difficult to recognise identical names, e.g. Meg, Marg, Margaret.

(3) The extent of same-naming may have decreased over time, distorting the pattern of same-names found in the burial register.

Wrigley and colleagues used evidence from my own work to argue the first point, quoting my finding from sixteenth century Essex wills that 0.5 per cent of living siblings shared the same name. What I had not realised when I originally cited this evidence, is that living siblings with the same names might have been from two different marriages, remarriage of widowers and widows being very common in this period. The only reliable evidence on living same-name siblings is from enumeration listings which give information on relationship to the head of household. Extensive evidence from this source summarized previously reveals no cases of living same-name siblings.

The problem of colloquial name variations is not a problem for the same-name method. Only exactly identical names should be selected for analysis, and any name variants should be excluded. In practice very few colloquial same-names occur, and as long as identical same-name cases are sufficient in number to represent an adequate sample, there is not a significant problem.

On the issue of the proportions of families that resorted to same-name practices, the evidence is that there was no linear pattern over time. (See Table 1.2, p. 9). There was some increase in the proportion of eligible children in the early period and decline in the later one, but for most of the parish register period, between a half and two-thirds of all eligible families gave their children same-names. And as we will see, there is no obvious correlation between this pattern of same-naming and changes in burial registration reliability as measured by the same-name method.

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110 Wrigley *et.al.*, *English Population History*, pp. 99-101.

We can conclude from the above review of the evidence, and the previous discussion of the same-name method, that it is a reliable technique for measuring burial registration reliability in reconstitution samples. It also lends itself to the study of baptism register reliability, although the number of cases is very much smaller because the technique depends on same-name infant and child burials, which necessarily represent only a small proportion of the total number of baptisms. The fragments of evidence so far emerging from same-name studies suggest that the pattern of baptism registration is very similar to that for burials, a conclusion supported by the census/ baptism register research reported in Table 1.1.

In addition to registration problems, the study of fertility is complicated by the technical problems of calculating fertility rates from reconstitution data. Because a woman has to be tracked from birth through to marriage and the date of her fiftieth birthday, only a very small proportion of women can be covered by this type of reconstitution analysis. In the case of the Cambridge Group's research, only about 2.5 per cent of females born were included in the full reconstitution fertility sample,[111] a proportion referred to by Wrigley himself as a "small fraction" of the total.[112] As we will see, there are formidable problems about the representativeness of the "reconstitutionable minority" in the study of nuptiality and mortality, but in the case of fertility, the samples are so small, and the difficulties concerning reliability so great, that it is impossible to reach meaningful conclusions using reconstitution techniques. However, as the Cambridge Group has argued that nuptiality was the key determinant of fertility, and it is a subject that lends itself to study through both reconstitution and other research, this is a topic to which we will now turn.

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[111] Wrigley *et.al*., *English Population History*, pp. 113, 146. I am grateful to Jim Oeppen for providing technical advice on this matter.

[112] E.A. Wrigley, 'How reliable is our knowledge of the demographic characteristics of the English population in the early modern period?', *The Historical Journal* ,Vol. 40 (1997), p. 578.

Age At Marriage:The Cambridge Group's Reconstitution Findings

The Cambridge Group's findings on mean age at first marriage of spinsters are summarized in the following table:

<u>Table 3.3: Mean Age Of First Marriage Of Women, Reconstitution Sample, 1610-1837</u>.[113]

Period	*Number of Marriages*	*Mean Age Of Marriage (Years)*
1610-1674	3253	25.9
1675-1724	2849	26.4
1725-1774	3905	25.2
1773-1779	2941	24.5
1780-1837	3620	24.0

This table shows a high average age at marriage in the early period, particularly for the period 1675-1724, gradually falling by 2.4 years until 1780-1837, and resembles the Cambridge Group's earlier findings about age at marriage. These findings underpin their main argument that it was increasing fertility, resulting from a fall in the age at marriage, which was largely responsible for population growth in the eighteenth century.

However, little or no work has been done on the reliability of marriage registration during the parish register period. It has been assumed generally that marriage registration was very much more reliable than birth or death registration, except for the practice of irregular marriage after about 1660. Wrigley *et. al.* conclude that "for several decades after 1660 clandestine marriage was widespread in England", estimating that it formed between 8 and 13 per cent of all marriages.[114] This estimate however is based on indirect evidence and is therefore of unknown reliability. Little is known about the age at which people married clandestinely, but such marriages are likely to have taken place, at least for women, at a younger age than normal on account of their irregularity.

113 I have aggregated some of the periods from the original table so as to make the data more manageable and for purposes of comparison with other evidence. Wrigley *et.al.*, *English Population History*, p. 149.

114 Wrigley *et.al.*, *English Population History* pp. 67-69.

As age of marriage is calculated in reconstitution research by tracing individuals from the baptism to the marriage register, one of the key problems is the extent of migration out of the parish of birth. The proportions of baptised children included as adults in the Cambridge Group's marriage samples varied slightly over time, ranging between 20.3 and 25.9 per cent [115], i.e. only between a fifth and a quarter of the total population. It is possible that some of the untraced marriages were due to clandestine or unregistered marriages, but the probability is that most of them were the result of migration out of the parish of birth.[116] Evidence exists to show that migrants had significantly different sociological characteristics from non-migrants. Migrants tended to be labourers or members of other poor socio-economic groups, whereas non-migrants were more likely to be farmers, shopkeepers and property-owners.[117] What effect this had on the age at marriage and how it changed over time, is as yet unknown.

There is a more serious problem for reconstitution research on age at marriage, which raises a very fundamental question about the methods used in its calculation. The problem can best be clarified with reference to an allied problem, the calculation of adult mortality. As we have previously seen, reconstitution rules require that an independent period of observation is established to measure the period at risk of dying during adulthood, and this is necessary because of the problem of migration. Without migration, it would be possible to calculate mean age at death by tracing all people born in a particular parish to their date of death given in the burial register, but migrants moving out of the parish can distort the age structure of the population at risk of dying. For example, if everyone born in the parish moved out at the age of 40 (say), there would be nobody left in the reconstitution sample to die above that age, significantly distorting the calculated real mean age of death. It is largely for this reason that demographers reject this method of calculating mean age at death in reconstitution research.

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115 I have calculated these proportions from Cambridge Group figures quoted by Ruggles, 'Migration, marriage and mortality', p. 522.

116 See *Ibid* for a general discussion of this issue.

117 Razzell, *Essays in English Population History*, p. 180.

But exactly the same difficulty applies to calculating the average age at marriage: it too is dependent on the age migration patterns of the people born into particular parish, and the greater the amount of migration, the greater the problem. As only between a fifth and a quarter of the people born in the Cambridge Group's reconstitution sample could be traced to a date of marriage, there seems to have been a great deal of outward migration from these parishes. And as with the average age of death, differential age migration can fundamentally distort the calculation of the mean age at marriage. A hypothetical example will illustrate this point most clearly: if in an initial period fifty per cent of all women married under the age of twenty-five, at an average age of 22.5 years, and fifty per cent married above twenty-five, at an average age of 27.5 years, and fifty per cent of both groups emigrated out of the parish, the average age of reconstituted marriage would be 25.0 years. If in a subsequent period the average age at marriage stayed the same in both groups, but none of the women marrying under twenty-five emigrated, and all marrying above the age of twenty five years did so, the reconstituted age at marriage would drop to 22.5 years. The real average age at marriage would stay the same, but migration patterns would create an artificial reduction in reconstitution age at marriage of 2.5 years

Without knowing the age structure of migration, and how it changed over time, it is impossible using reconstitution methodology, to make an objective calculation of the average age at marriage. Ruggles has attempted to create a micro-simulation model of marriage and migration, using known evidence from historical and demographic data, concluding that the Cambridge Group's reconstitution study could understate the average first age of marriage of women by about 2.9 years.[118] This figure depends on a number of different assumptions, some of which have been challenged by Wrigley in a critique of Ruggles's work.[119] But both Ruggles and Wrigley resort to a number of assumptions of unknown reliability, and use samples which form only a fraction

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118 This figure is for a medium migration pattern. See Ruggles, 'Migration, marriage and mortality', Table 4, p. 512.

119 See E.A. Wrigley, 'The effect of migration on the estimation of marriage age in family reconstitution studies', *Population Studies*, Vol. 48 (1994), pp. 81-97.

of the total population − for example married women who are known to have survived to the age of fifty, forming just 6 per cent of the total reconstitution population.[120]

Wrigley has attempted to evaluate the problem of the impact of migration on marriage ages by citing evidence from the 1851 Census, which shows that there was little difference between the marriage ages of migrants and natives enumerated in the census.[121] This evidence indicates that at the end of the parish register period migration does not appear to have unduly distorted the pattern of marriage ages. But there are general grounds for expecting migrants to marry later than natives, and as Ruggles points out, the later people married, "the greater the odds that they would eventually migrate".[122] There is also evidence for the earlier parish register period that this was the case. In her study of London marriage during the early seventeenth century Vivien Elliott found that native-born women married much earlier than migrant women: 494 native women had a mean age of marriage of 20.5 years, whereas 500 migrant women married at an average age of 24.2 years − a difference of 3.7 years.[123]

Elliott used marriage licences as her chief source, as these give information on the marriage ages of both natives and migrants. I have analysed data from marriage licences for the East Kent area, covering 289 parishes. A sample of 200 migrant spinsters was compared to 200 native spinsters for the period 1619-60, and the mean age at marriage of the first group was 24.1 years and the second group was 22.4 years, a difference of 1.7 years. Amongst the native group 43 per cent of women married under the age of 21, compared to 19 per cent amongst the migrants, a significant difference.[124] These variations support

120 Ruggles, 'Migration, marriage and mortality', p. 521.

121 Wrigley, 'The effect of migration', p. 93.

122 Ruggles, 'Migration, marriage and mortality', p. 507.

123 V. B. Elliott, *Mobility and Marriage in Pre-Industrial England* (Cambridge University Ph.D. Thesis, 1978), pp. 291, 325.

124 See J. Meadows Cowper (ed.), *Canterbury Marriage Licences, 1619-1660* (Canterbury 1894). Migrant women were defined as living in a different parish from their parents at the time of marriage, whereas natives were defined as living in the same parish. The first 100 native and migrant cases were selected from the

Ruggles's argument about the distorting effect of migration on the calculation of marriage ages, but the question remains, what was the overall age at marriage of the total population, including both natives and migrants?

A study of marriage licences which includes information on both natives and migrants may help provide an answer. Marriage by licence was more expensive than marriage by banns, but in the seventeenth century it was sufficiently cheap to become very popular in some areas, although its popularity declined as prices increased in the eighteenth century as a result of taxation and other measures.[125] For example, according to a sample of fourteen parish registers in London which listed whether marriages were by banns or licence, two thirds of marriages were by licence in the half-century before 1650, a proportion which had increased to about 90 per cent by the period 1651-1750, before declining to about 30 per cent by the beginning of the nineteenth century.[126]

Marriage by licence was resorted to more frequently in London than elsewhere, but in some other areas it was also very popular. According to local parish registers, about 78 per cent of marriages in Rochester, Kent were by licence in the period 1680-1749, and in East Greenwich, Kent the equivalent figure was 59

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beginning of the volume, and the last 100 native and migrant cases were selected from the end of the volume, both sets of samples yielding similar results.

125 In some areas the price of marrying by licence increased from about ten shillings at the beginning of the seventeenth century to £1.3.6d in 1742, and £3.3s. by 1834. See J. Gibson, *Bishops Transcripts and Marriage Licences* (Birmingham 1991), p.4; B. Frith (ed.), *Gloucestershire Marriage Allegations, 1637-80* (Bristol 1954), p. xvii; D.J. Steel, *General Sources of Births, Marriages and Deaths Before 1837* (National Index Of Parish Registers, Vol. 1, 1976), p. 225.

126 The fourteen parishes are St.Gabriel Fenchurch Street; St.Nicholas Cole Abbey; St.Michael Bassishaw; St.Mary Woolnoth; St.Vedast; St. Peter Cornhill; St. Mary Aldermary; St. Michael Cornhill; St. Antolin Budge Row; Bridewell Hospital Chapel; St. Margaret Pullens; All Hallows Lombard Street; St. Benet Gracechurch & St. Leonard Eastchurch; and St. Clement Eastcheap. The exact figures for all fourteen parishes (number of total marriages in brackets) are: 1600-49: 65.4% (1745); 1650-99: 91.0% (1750); 1700-49: 87.6% (4673); 1750-99: 53.8% (3166); 1800-37: 30.6% (2401).

per cent.[127] Overall, the figure in the county of Kent was about 40 per cent for most of the seventeenth century and the first half of the eighteenth century,[128] a proportion very similar to that found in Gloucestershire in the seventeenth century, where it is estimated that about a third of all marriages were by licence.[129] Although these figures do not represent a majority and tended to exclude the poorest section of the population, they did cover a very wide socio-economic range, from husbandmen, fishermen, artisans, farmers, to professionals and gentry. Marriage licences also have the important advantage of including both migrants and non-migrants, and forming a significantly higher proportion of population in the pre-1750 period than that included in the Cambridge Group's reconstitution sample − covering between 30 and 90 per cent compared to the average reconstitution figure of about 20 per cent.

Most seventeenth century licences include information on marriage age, and these age statements appear to have been reasonably reliable.[130] The following table gives the mean age at first marriage of women calculated from licenses in different counties:

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127 The exact figures are: Rochester 1680-1749: 78.0% (1810 marriages); East Greenwich 1680-1729: 58.8% (1140 marriages).

128 I originally calculated the proportion of people marrying by licence through using parish register and marriage licence returns and I estimated that the proportion of marriages by licence in East Kent during 1677-1725 was 50.7%. See Razzell, *Essays in English Population History,* p. 183. Since I calculated that figure, Jane Jones has published a more reliable estimate, based on the enumeration of entries in parish and marriage licence registers. She estimates that the proportion of marriages by licence in East Kent for the period 1661-1690 was 37 per cent, suggesting that the overall figure for the late seventeenth and early eighteenth century was nearer to 40 than 50 per cent. See J. Jones, 'Counting marriages', *Local Population Studies*, No. 53 (1994), pp. 77, 78.

129 Frith, *Gloucestershire Marriage Allegations*, p. xvi.

130 Razzell, *Essays in English Population History*, p. 83.

Table 3.4: Age At First Marriage Of Women Listed In Marriage Licenses, 1660-1714.[131]

Period	*County*	*Number of Marriages*	*Mean Age At Marriage (Years)*
1662-1714	Yorkshire	7242	23.8
1660-1702	London	500	21.9
1661-1700	Kent	1000	24.1
1670-1709	Nottinghamshire	3284	24.4
1690-1709	Suffolk	356	23.6
1682-1685	Wiltshire	300	25.0

The mean average age at marriage of spinsters marrying in these six counties was 23.8 years, significantly lower than the equivalent figure in the reconstitution sample for 1675-1724, 26.1 years. The marriage licence figures indicate that there was some regional variation, with the lowest marriage age figure (London) being about 3 years lower than for the highest figure (Wiltshire). However, most counties had mean marriage ages in the narrow band of 23.6 - 24.4 years, and so the overall average of 23.8 years is a representative figure, at least for this sample of counties.

The mean age of first marriage of women marrying in 1838-40 in England and Wales according to Registrar-General's figures was about 24.7 years.[132] The marriage licence figures suggest that there was a slight long-term rise in average marriage ages of about 0.9 years, contradicting the finding from the reconstitution study of a fall in age of marriage of 2.4 years. The contradiction between the two sets of findings can only be clarified by further research, perhaps combining work on reconstitution data with marriage licence analysis. We can only conclude that the Cambridge Group's argument that there was a significant fall in the average age at marriage in the eighteenth century is at present unsustainable.

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131 *Ibid*, p. 184.

132 Wrigley *et.al.*, *English Population History*, p. 156.

The Propensity To Marry.

The propensity of people to marry is a key dimension of nuptiality, which can have a significant influence on the level of fertility. Reconstitution methodology has little to say on this important issue. Some data is available from local censuses which allows the study of long-term changes in proportions marrying, the fullest being that for Lichfield, Staffordshire.

Table 3.5: Age And Marital Status In Lichfield, 1695 And 1851.[133]

Age Group	*Period*			
	1695	*1851*	*1695*	*1851*
	Number In Age Group	*Number In Age Group*	*Proportion Ever Marrying %*	*Proportion Ever Marrying %*
15-19	171	199	0.6	1.0
20-24	147	146	15.0	21.2
25-29	144	147	50.0	53.7
30-34	111	115	77.5	60.9
35-39	138	101	84.1	77.2
40-44	62	113	95.2	77.9
45+	274	432	98.2	81.5

The comparison of these two censuses for Lichfield suggests that there was a long-term increase in the proportion of women never marrying. At the end of the seventeenth century 98.2 per cent of all women over the age of 45 were either married or widowed; by 1851 this proportion had fallen to 81.5%. Other late-seventeenth century censuses indicate how popular marriage was at that time: for example, none of the 69 women over the age of 45 living in

133 The figures for 1695 are from a complete enumeration of Lichfield in that year, whereas the 1851 data is derived from a 1 in 2 sample. See Razzell, *Essays in English Population History*, p. 218.

Chilvers Coton in 1684 were spinsters.[134] However, as might be expected, there were local variations, and 15 of the 161 (9.2%) women over the age of 45 living in Stoke-On-Trent in 1701 had never been married.[135]

There is some evidence that the propensity for widows to remarry diminished significantly during the eighteenth century. Samples were taken from the marriage licences for East Kent (covering 289 parishes) to examine whether widowed mothers had remarried between the death of their husbands and the marriage of their daughters.

Table 3.6: Proportion Of Widowed Mothers Remarrying In East Kent.[136]

Period	*Number*	*Proportions Remarrying %*
1619-1646	100	49
1661-1676	72	51
1751-1780	100	10
1751-1810	100	9

There was a major drop in the proportion of widows remarrying between the seventeenth and later eighteenth century. This echoed a similar fall in the number of widows as a percentage of all marriages that took place in East Kent during the same period: from about 30 % in the seventeenth century to just over 10 % in the late eighteenth.[137] Similar reductions have been found elsewhere,[138] and whether these changes were the result of falling mortality or a reduction in the propensity to remarry (or a combination of both), there were clearly some very radical changes in the structure of marriage taking place in the eighteenth century.

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134 Razzell, *Essays in English Population History* p. 219.

135 *Ibid.*

136 *Ibid,* p. 217.

137 *Ibid.*

138 *Ibid*, p. 216.

Given the uncertainties about calculating the average age and propensity to marry, it is not possible to come to any firm conclusions about the role of nuptiality in shaping fertility in early modern England. The Cambridge Group's data is too uneven to be reliable, and is contradicted by independent evidence such as that derived from marriage licences and local censuses. Further evidence − particularly that which combines data from censuses, marriage licences and parish registers − and future research should help clarify some of these issues.[139]

Infant And Child Mortality

One area of the Cambridge Group's work which is subject to less difficulty is the study of infant and child mortality. This is because the number of families migrating in the period immediately after the birth of children was relatively small. Also, it is easier to measure independent events establishing the period at risk for this than any other group in reconstitution studies. However, as we shall see, there are a number of problems in calculating accurate infant and child mortality rates.

Infant mortality represents the proportion of children born and dying in the first year of life, and is calculated by linking births and infant deaths in families known to have resided in the parish for this first year. To measure infant mortality accurately, it is important to establish a correct link between a child in the baptism and burial registers, mainly through information on names of parents and the age of the child at death.

One of the major problems in calculating infant mortality rates is the delay between birth and baptism which occurred in many English parishes. The Anglican Church did not consider an unbaptised child a formal member of the church, and in many instances clergymen refused to register the burial of children dying before baptism. As infant mortality was very high in the first few weeks of life, this could be a source of considerable under-registration of infant deaths. There is evidence that the period between birth and baptism lengthened in the eighteenth century, and Wrigley *et. al*. conclude that the "average

[139] See Table 5.3, p. 130 for additional data on nuptiality patterns.

gap between birth and baptism grew slowly longer ... and by the later eighteenth century was perhaps a month long on average and much longer in many individual cases."[140]

There is no systematic evidence for the birth-baptism interval for the Cambridge Group's reconstitution sample, but other evidence does confirm the conclusion that the interval lengthened generally in the late eighteenth and early nineteenth centuries. Information in some of the registers included in the 45 parish census/ baptism comparison research, indicates that the median delay between birth and baptism rose from about 3.5 weeks in 1761-80 to 6 weeks in 1831-55.[141] Using these latter birth-baptism delay figures and civil registration returns for 1839-44, yields an infant mortality rate before baptism of 54.5 per 1000.[142] This is over a third of all infant mortality in this period, a very significant proportion, although some of this is likely to have been reduced by the practice of giving emergency baptism to vulnerable children.

It is against this background that we can discuss the infant mortality findings in the twenty-six-parish reconstitution sample. The Cambridge Group's figures show that infant mortality rose from 165 per 1000 at the beginning of the seventeenth century to 190 per 1000 in the first half of the eighteenth century, before falling to 140 per 1000 by the early nineteenth century. Virtually all this fall occurred amongst young infants: mortality in children aged 29 days fell from 102 per 1000 in 1725-49 to 49 per 1000 in 1825-37.[143]

Wrigley *et.al* themselves point out one major problem with this data: "The pattern of change during the eighteenth century ... is suspiciously like that which would have arisen from a progressive weakening in the coverage of deaths taking place early in life before baptism had occurred."[144] Wrigley and colleagues dismiss this worry through comparing their data with that from the Registrar-General, showing similar patterns of endogenous and

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140 Wrigley *et.al.*, *English Population History*, p. 229.

141 Razzell, *Essays in English Population History*, pp. 104, 105.

142 *Ibid*, p. 147.

143 Wrigley *et.al.*, *English Population History*, p. 226.

144 *Ibid*, p. 230.

exogenous infant mortality.[145] But only eight parishes are included in this comparison, and there is no direct information on birth-baptism intervals in the reconstitution sample for the eighteenth century period. It is therefore not possible to say whether the Cambridge Group's finding of a sharp fall in neo-natal mortality is reliable. The overall evidence is that the average birth-baptism delay increased from about 8 days in the 1670s to about 54 days in the 1810s.[146]

Wrigley *et.al.*'s data on child mortality suggests a slightly different pattern of mortality: After a modest increase in the seventeenth century there was a decrease from the middle of the eighteenth century onwards. The mortality rate for children between 1-9 years of age rose from 130.8 per 1000 in 1580-1599 to 171.1 per 1000 in 1725-1749, before falling to 133.0 per 1000 by 1825-1837.[147] This type of data is the most reliable of any published by the Cambridge Group, as it is not significantly subject to the difficulty of birth-baptism delay or the problem of migration.

However, all the above conclusions are based on the parishes not excluded on grounds of unreliability, in particular the eight parishes for the period 1790-1837. If we put back the excluded parishes, a modified pattern of infant and child mortality emerges. I have recalculated infant and child mortality rates by including the Cambridge Group's unpublished data which was excluded from the reconstitution sample, and the evidence for nineteen parishes with data for the whole period, 1650-1837, is summarized in Table 3.7. [148]

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145 Wrigley *et.al.*, *English Population History*, pp. 231-233.

146 J. Komlos, 'The birth-baptism interval and the estimate of English population in the eighteenth century', *Research in Economic History*, Vol. 11 (1988), p. 308.

147 Wrigley *et.al.*, *English Population History*, p. 262.

148 This table is based on data kindly provided by Jim Oeppen. The parishes covered by the table are: Terling, Southill, Shepshed, Odiham, Morchard Bishop, Hartland, Great Oakley, Gedling, Earsdon, Dawlish, Colyton, Bridford, Bottesford, Banbury, Austrey, Ash, Aldenham, Alcester, and Ipplepen.

Table 3.7: Infant And Child Mortality Rates (Per 1000) In Nineteen Cambridge Group Reconstitution Parishes, 1650-1837.

Period	*Infant Mortality*	*Child Mortality (Age 1-9 Years)*
1650-1699	137	128
1700-1749	150	133
1750-1799	119	109
1800-1837	94	90

The scale of fall in the late eighteenth and early nineteenth centuries was greater in the full group of nineteen parishes than in the restricted sample. Table 3.7 indicates a fall in infant and child mortality between 1700-1749 and 1800-1837 of 37 per cent and 32 per cent respectively, compared with falls in the Cambridge Group's published figures of 26 per cent and 22 per cent.

The figures for the full nineteen-parish sample also show that the overall level of infant and child mortality was lower than that indicated by the published figures. However, if inflation ratios derived from same-name research on nine reconstitution parishes discussed earlier[149] are applied to the data in Table 3.7, corrected infant and child mortality rates are as follows:

Table 3.8: Estimated Infant And Child Mortality rates (Per 1000) In Nineteen Reconstitution Parishes, 1650-1837.

Period	*Infant Mortality*	*Child Mortality (Age 1-9)*
1650-1699	188	176
1700-1749	193	171
1750-1799	163	149
1800-1837	122	117

The corrections made in Table 3.8 elevate the levels of mortality but the scale of the falls in infant and child mortality is very similar to the uncorrected figures in Table 3.7. It is the inclusion of the parishes excluded by the Cambridge Group which is important for both Tables 3.7 and 3.8, significantly increasing the

149 See Table 1.5, p. 15.

level of fall in mortality in both tables. The corrected infant mortality rates do not allow for any changes in birth-baptism delays, which would probably increase infant mortality to over 200 per 1000 in the period 1650-1749 and about 150 per 1000 by the beginning of the nineteenth century. Also, these figures do not include illegitimate children who probably constituted over 5 per cent of all births during the late eighteenth century and had an infant mortality rate at least twice as high as legitimate children.[150]

However, there are reasons to believe that the fall in infant and child mortality was even greater that that depicted in Table 3.8. Wrigley and colleagues discuss at some length the correlation between population density and levels of overall mortality. They cite Farr's work on the association between population density and levels of mortality for the nineteenth century and argue that a similar correlation probably applied equally to England in the seventeenth and the eighteenth centuries.[151] But in the period up to 1750, infant and child mortality were actually higher in the smaller parishes in the reconstitution sample than in the larger ones. In the group of 19 parishes with continuous data for the period 1650-1837, there are five parishes with populations lower than 1,000 in 1801, with an average population size of 643. These can be compared to fourteen parishes with populations over 1,000 at the same date (average population size 1,767). The infant and child mortality rates of the two groups of parishes are as illustrated in Table 3.9.[152]

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150 Wrigley *et.al.*, *English Population History*, pp. 219-223.

151 *Ibid,* p. 202.

152 These figures are calculated from data provided by Jim Oeppen. I have taken the averages of the mortality rates for the parishes in the two categories. The five small rural parishes are Austrey, Bottesford, Bridford, Great Oakley and Terling. The fourteen larger parishes are those listed in footnote 148, minus these five parishes.

Table 3.9: Infant And Child (Age 1-9 Years) Mortality Rates (Per 1000) In 6 Small Rural Parishes Compared With 20 Large Parishes, Cambridge Group's Reconstitution Sample, 1650-1837.

Period	*Five Small Rural Parishes*		*Fourteen Larger Parishes*	
	Infant Mortality	Child Mortality	Infant Mortality	Child Mortality
1650-1699	153	137	131	124
1700-1749	170	137	143	131
1750-1799	140	94	112	114
1800-1837	85	79	97	96

Infant mortality was higher in the five small rural parishes than in the larger parishes up to the end of the eighteenth century, but this relationship was reversed during the early nineteenth century: the classic pattern of a correlation between population size and high mortality had been established. For child mortality the change took place in the second half of the eighteenth century.

Some of the differences discussed above may be the result of different levels of burial under-registration in different size parishes. Previously we saw how smaller parishes tended to have more reliable registration systems, and so it is possible that some of the higher mortality in the smaller parishes is a function of better registration reliability. There is no direct evidence available on population size and same-name ratios, and so it is not possible, at this stage, to evaluate this hypothesis.

If we inflate infant mortality by the overall burial under-registration ratio revealed in the same-name research discussed earlier, the corrected infant mortality rate for the small rural parishes is about 200 per 1000 for the period 1650-1749. This does not allow for unrecorded deaths before baptism, which would probably inflate the infant mortality rate to significantly above 200 per 1000.

There is other evidence that some eighteenth century rural parishes had very high mortality rates. The Nottinghamshire village of Clayworth, made famous by Peter Laslett and John Harrison in their study "Clayworth and Cogenhoe",[153] had a population of just over 400 people in the 1676-1688 period when two special censuses where carried out by the local incumbent. The infant mortality rate in the twelve years between the censuses was 322 per 1000 (46 infant deaths out of 143 births),[154] and this does not allow for any possible under-registration of burials.

I have carried out a reconstitution study of two small rural Bedfordshire parishes in the eighteenth and nineteenth centuries.[155] Infants were tracked from their date of baptism, and if they survived, through to the end of their fifth year. An independent event – such as the baptism of a sibling or the burial of a parent – was used to establish the presence of the family in the parish for the five-year period. Same-name inflation ratios were calculated by using the procedures described previously. The detailed results of this analysis are as follows:

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153 P. Laslett and J. Harrison, 'Clayworth and Cogenhoe', H.E. Bell and R.L. Ollard (eds.), *Historical Essays 1600-1750 Presented to David Ogg* (London 1963).

154 I have calculated these figures from the parish register deposited in the Nottinghamshire Record Office.

155 I am grateful to Peter Francois and Pat Carroll for undertaking the reconstitution work on these parishes. These two parishes were selected because both parents' names are listed in the baptism registers for the whole period covered, enabling an accurate listing of all children baptized to particular parents. The burial of an infant was established either through the designation of 'son' or 'daughter' of one or both of the parents in question, or through the designation of 'infant', with or without an age being given in the burial register.

Table 3.10: Infant And Child (Age 0-4 Years) Mortality Rates (Per 1000) For The Parishes Of Poddington And Elstow, Bedfordshire, 1700-1899.

Period	*1700-1749*	*1750-1799*	*1800-1849*	*1850-1899*
Number of Baptisms	767	910	1183	701
Number of Infant Burials	135	188	121	51
Uncorrected Mortality Rate	176	207	105	73
Same-Name Ratio	67/55	98/79	54/40	13/11
Corrected Infant Mortality Rate	214	256	138	86
Number Of Children At Risk	550	623	965	498
Number of Child Burials	40	62	58	21
Uncorrected Mortality Rate	73	100	60	42
Same-Name Ratio	67/55	98/79	54/40	13/11
Corrected Child Mortality Rate	94	123	81	50

The estimated mortality rates corrected by the same-name ratios are summarized in Table 3.11:

Table 3.11: Estimated Infant And Child (0-4) Mortality Rates (Per 1000) In Poddington And Elstow, Bedfordshire, 1700-1899.

Period	*Infant Mortality Rate*	*Child Mortality Rate*
1700-1749	214	94
1750-1799	256	123
1800-1849	138	81
1850-1899	86	50

The infant and child mortality rates increased in these two Bedfordshire parishes in the eighteenth century, before falling sharply in the nineteenth century.

Taken in conjunction with the findings on small rural parishes in the Cambridge Group's reconstitution sample, this evidence indicates that infant and child mortality was high in some villages and hamlets. As infant mortality in late nineteenth century rural areas was of the order of 100 per 1000,[156] it would appear that there was a strong reduction in infant mortality between the end of the eighteenth century and the end of the nineteenth − perhaps of the order of 200 per 1000 to 100 per 1000. Most of this decrease probably took place in the first half of the nineteenth century, a neglected period of English demographic history.[157]

Although the smaller parishes in the Cambridge Group's sample appear to have had higher infant and child mortality rates than the larger ones, there is some evidence that larger town parishes had even higher mortality rates during the late seventeenth and early eighteenth centuries. I have carried out reconstitution studies on the market town of Ampthill in Bedfordshire, the parish of St. James's in Norwich, St. Aphage's in Canterbury, St. Peter's and St. Nicholas's in Ipswich, and the parish of St. Swithin's in the City of London.[158]

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156 This conclusion is derived from Registrar-General's figures, as well as research carried out at the Open University on infant mortality, based on copies of civil birth and infant death registers compiled for purposes of compulsory vaccination. See M. Drake and P.E. Razzell, *The Decline of Infant Mortality in England and Wales 1871-1948: a Medical Conundrum* (Interim report submitted to the Wellcome Trust).

157 There is some independent evidence of a significant fall in mortality in the period 1801-40. See Razzell, *Essays in English Population History*, pp. 114-116.

158 All data is based on transcripts of registers lodged in the Society of Genealogists' library. Only registers including information on both parents names in the baptism register were selected, and the nominal record linkage rules are the same as those used in Table 3.10. All subsequent reconstitution tables of infant and child mortality are based on the same procedures. For Ampthill a sample of baptisms and burials was used, selecting all cases beginning with the letters A-G. For all other parishes, 300 baptisms meeting appropriate nominal record linkage criteria were selected. The same-name correction ratios are: Ampthill: 42/37; St. James's Norwich: 40/36; St. Aphage's Canterbury: 32/24; St. Peter's & St. Nicholas's Ipswich: 22/14; St. Swithin's London: 26/21.

Table 3.12: Estimated Infant And Child(1-4) Mortality (Per 1000) In Ampthill, Norwich, Canterbury, Ipswich, And London In The Late Seventeenth And Early Eighteenth Centuries.

Place	*Period*	*Number Of Baptisms*	*Number Of Children At Risk*	*Estimated Infant Mortality Rate*	*Estimated Child Mortality Rate*
Ampthill	1700-1749	505	364	191	128
St. James's, Norwich	1681-1705	300	188	300	272
St. Aphage's, Canterbury	1681-1705	300	174	307	204
St. Peter's and St. Nicholas's, Ipswich	1660-1709	300	151	267	220
St. Swithin's, London	1675-1699	300	159	363	273

The birth-baptism interval was very short in these towns at this period, ranging from a mean of three to thirteen days,[159] minimizing the under-registration of infants dying before baptism.

The infant mortality rates ranged from 191 per 1000 in Ampthill to 363 per 1000 in St. Swithin's London.[160] Although the infant mortality rate in London was very high, it was nearly matched by the rates for Norwich and Canterbury – 300 per 1000

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159 Information is provided in the baptism registers on birth-baptism intervals for some of the periods covered by Table 3.12. A sample of years was selected and the average interval between birth and baptism was as follows (number of cases in brackets): Ampthill, 1700-09: 9 days (40); St. James's, Norwich, 1696-1700: 3 days (250); St. Peter's, Ipswich, 1686-87: 13 days (100 cases); St. Swithin's, London, 1677-99: 8 days (300). These short birth-baptism intervals may have been partly the result of high infant mortality rates, with parents anxious to prevent the death of their children before baptism.

160 For confirmation of this high level of infant mortality in London during this period see J. Landers, *Death and the Metropolis: Studies in the Demographic History of London 1670-1830* (Cambridge 1993); P. E. Razzell and C. Spence, 'The history of infant, child and adult mortality in London, 1550-1850', *The London Journal* (2007, Forthcoming).

and 307 per 1000. In these three towns, between a half and two-thirds of all children died before the age of five, and these are minimum figures because of unregistered mortality before baptism and the exclusion of illegitimate children. Infant mortality in towns of this size had fallen by the mid-nineteenth century to between 155 and 195 per 1000,[161] indicating a long-term shift in mortality, perhaps falling by one half in the 150-year period.

The History Of Adult Mortality

The Cambridge Group's new reconstitution findings have led them to revise their conclusions about changes in adult mortality in the eighteenth century. Whereas they previously found a modest increase in adult expectation of life, they now believe that reductions in adult mortality were significantly greater than they previously thought.[162] Their new findings can be summarised as follows:

"The overall pattern of change ... was of deteriorating mortality during the seventeenth century with a pronounced low point during the 1680s, followed by a marked rise during the first half of the eighteenth century, which had, however, largely levelled off in the second half of the century. From its lowest point in the 1680s to the high point in 1750-9, the rise in e25 [expectation of life at age 25] was almost 9 years, from 27.8 years to 36.6 years, though if the comparison is made between the mid-seventeenth century and the 1750s, the rise is much more modest, since e25 in 1640-59 was 31.4 years, a level only 3 or 4 years short of some decadal figures recorded in the later eighteenth century."[163]

Wrigley and his colleagues cite findings from other work in support of their conclusions about adult mortality. Adult expectation of life amongst tontine nominees, the aristocracy, Scottish advocates, fathers in marriage licences and Members of

161 See N. Williams and C. Galley, 'Urban-rural differentials in infant mortality in Victorian England', *Population Studies*, Vol. 49 (1995), p. 411.

162 Wrigley *et.al.*, *English Population History*, pp. 283-284.

163 *Ibid*, p. 282.

Parliament, increased by a minimum of 9 years in the seventeenth and eighteenth centuries, similar to the Cambridge Group's figure quoted above.[164] But there are also significant points of divergence: most of the data for other groups showed little or no change in adult expectation of life during the seventeenth century, and the long-term increase in e25 was 11 to 12 years, rather than the 3 or 4 years found by Wrigley and his colleagues.[165] The other major difference in findings is that amongst some of the groups there was a continuing increase in life expectancy throughout the second half of the eighteenth century, including the aristocracy and Members of Parliament, and the data for the latter two groups is perhaps the most reliable of any information available.

The Cambridge Group acknowledge that their figures on adult mortality are not their strongest material, accepting in the new volume that "the mortality of adults who married ... cannot normally be established with as much precision as that of infants and children, and the mortality of adults who never married cannot be established at all."[166] The lack of precision results largely from a problem touched on previously: adults can be observed to the occurrence of an independent event, such as the burial of their spouses or their children, but are lost from observation if such independent information is not available. This creates uncertainty about what happens to them during this lost period of observation, and although a great deal of sophisticated statistical work has been undertaken to measure this uncertainty, the matter remains a matter of controversy.[167]

There are other major problems with adult mortality data from reconstitution studies. As the samples are selected from individuals traced from the baptism to the marriage register (to establish the age at which an adult enters observation), only between a fifth and a quarter are included in the Cambridge Group's initial reconstitution sample on adult mortality. This proportion further diminishes as a result of people being lost from observation, and the final group on which calculations of adult

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164 Razzell, *Essays in English Population History*, p. 201.

165 *Ibid*.

166 Wrigley *et.al.*, *English Population History*, p. 11.

167 *Ibid*, pp. 581-600.

mortality are based, includes only between 8.6% and 10.2% of the total sample.[168] Such small minorities are unlikely to be representative, either sociologically or demographically.

An even greater difficulty is the unknown pattern of burial registration reliability in the Cambridge Group's sample. There are so many problems with the reconstitution calculations of adult mortality that it necessary to look elsewhere for meaningful data.

A number of other sources of information about adult mortality exist. The material on the adult life expectancy of groups such as tontine members, the aristocracy, Members of Parliament, and Scottish advocates, has already been referred to and has been published in detail elsewhere.[169] All this material relates to relatively privileged groups but the evidence from marriage licences covers a much wider socio-economic range, including labourers, husbandmen, fishermen, artisans, farmers, merchants, professional and gentry groups. The Cambridge Group found that there was an increase in adult mortality in the seventeenth century, but evidence from the East Kent marriage licences shows that there was a slight improvement in adult life expectancy which accelerated significantly in the eighteenth century amongst all socio-economic groups.[170]

The timing of the eighteenth century improvement in Kent cannot be precisely measured because of gaps in the source material, but marriage licences issued by the Vicar-General have survived almost in their entirety and allow a precise analysis of changing mortality. The Vicar-General had jurisdiction over all parts of England & Wales, but in practice the majority of marriages covered were for London and the Home Counties. We have already seen that there is evidence that two-thirds of Londoners used marriage licences in the seventeenth century, a proportion which rose to about 90 per cent by the period 1650-1749. Information in the Vicar-General's licences is detailed and of high quality, because spinsters marrying under the age of 21

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168 These figures are calculated from data cited in Ruggles, 'Migration, marriage and mortality', p. 522.

169 Razzell, *Essays in English Population History*, pp. 192-201.

170 *Ibid,* pp. 196, 197.

were required to have a sworn affidavit from their parents or guardians confirming consent. The following is an analysis of the proportion of fathers dead and how it changed over time.[171]

Table 3.13: Paternal Mortality Amongst Fathers Of Brides Marrying Under 21, Vicar-General's Marriage Licences, 1600-1849.

Period	*Number of Fathers In Sample*	*Number of Fathers Dead*	*Proportion Of Fathers Dead %*
1600-1641	500	303	43.4
1661-1699	1950	901	46.2
1700-1749	2500	1171	46.8
1750-1799	1937	694	35.8
1840-1849	500	43	28.6

There is no data on the ages of fathers, although this is not likely to have changed greatly during the period covered by Table 3.13,[172] and there is no precise information on the geographical origins of fathers. However, the overall trend over time is clear. After a slight rise at the beginning of the seventeenth century, there was a long period of stability lasting until about the middle of the eighteenth century. The proportion of fathers who had died fell steadily throughout the latter half of the eighteenth century and beginning of the nineteenth century. As most dead fathers had died on average about 10 years previous to the marriage of their daughters, the fall in mortality occurred from about 1740 onwards.

Although the Vicar-General's and East Kent figures are not strictly comparable because of various time gaps in the data,

[171] The material for the period 1600-41 is taken from G. J. Armytage, *Allegations for Marriage Licences Issued by the Bishop of London, 1520-1610* (Harlaian Society, Vol. 25, London 1887). The data for 1661-1849 is derived from copies of the Vicar-General's Marriage Allegations lodged in the Society of Genealogists library. The first 500 cases were selected for each decade covered by the table, except for 1661-1669 and 1780-1789 when only 450 and 437 cases were available.

[172] See Razzell and Spence, 'The history of infant, child and adult mortality in London', for a more detailed discussion of this issue.

the evidence suggests that paternal mortality fell at an earlier date and more rapidly in the latter than the former.

Table 3.14: Paternal Mortality Amongst Fathers Of Brides Marrying Under 21, East Kent And Vicar-General's Marriage Licences, 1600-1849.[173]

East Kent Licences			*Vicar-General's Licences*		
Period	*Total Number Of Cases*	*Proportion Of Fathers Dead %*	*Period*	*Total Number Of Cases*	*Proportion Of Fathers Dead %*
1619-1646	1275	46.7	1600-1641	500	43.4
1661-1700	848	43.2	1661-1699	901	46.2
1751-1779	1799	25.7	1750-1779	1500	37.1
1780-1809	1233	23.1	1780-89 & 1840-49	937	29.9

Most of the 289 areas covered by the East Kent licences were small rural parishes, whereas the Vicar-General's licences mainly covered London and its immediate environs. Table 3.14 indicates that the reduction in adult mortality first took place in rural and not urban areas. This is a conclusion confirmed by Quaker data on adult expectation of life.[174]

173 For the source of the data in this table see Razzell, *Essays in English Population History*, p. 196, and Table 3.13 above.

174 The following figures are based on life expectancy of male and female married Quakers with information on age at death. See R.T. Vann and D.E.C. Eversley, *Friends in Life and Death* (Cambridge 1992), p. 229. Vann and Eversley made no attempt to correct these figures for burial under-registration.

Table 3.15: Life Expectancy (Years) Amongst Adult Quakers, 1650-1849.

Cohort	*Age 25-29*			*Age 30-34*		
	Urban	Southern England	Northern England	Urban	Southern England	Northern England
1650-1699	28	27	29	27	26	26
1700-1749	27	32	35	25	30	32
1750-1799	32	36	31	30	33	30
1800-1849	30	34	*	30	34	32

Quaker life expectancy increased during the first half of the eighteenth century in both southern and northern areas, whereas it only grew in urban areas after the middle of the eighteenth century.

Adult mortality also fell in Nottinghamshire during the eighteenth century, and it occurred mainly in the first half of the century. Table 3.16 summarises estimates of paternal mortality at three periods between 1661 and 1793.[175]

[175] For the source of data see T.M. Blagg and F.A. Wadsworth (eds.), 'Abstracts of Nottinghamshire marriage licences 1577-1700', *British Record Society Index Library*, Vol. 58 (London 1930); T.M. Blagg and F.A. Wadsworth (eds.), 'Abstracts of Nottinghamshire marriage licences 1701-53',*,British Record Society Index Library*, Vol. 60 (London 1935); T.M. Blagg (ed.), 'Abstracts of the bonds and allegations for Nottinghamshire marriage licences', *Thoroton Society Record Series*, Vol. 10 (Nottingham 1946-47); L.M. Shaw (ed.), *Nottinghamshire Marriage Bonds, 1791-1800* (Nottingham 1987). The average age of marriage of all spinsters in the 1660s was about 25 years, whereas spinsters marrying under twenty-one married on average at about 19 years. Dividing the proportion of dead fathers by these mean ages of marriages gives the estimated mortality rates.

Table 3.16: Paternal Mortality Amongst Fathers Of Brides Marrying In Nottinghamshire, 1661-1793.

Period	*Nature Of Sample*	*Number Of Total Cases*	*Number Of Dead Fathers*	*Proportion Of Dead Fathers %*	*Estimated Annual Mortality Rate Per 1000*
1661-63	All Spinster Brides	174	95	55	22
1754-58	Spinsters & Grooms Marrying Under 21	200	53	27	14
1791-93	Spinsters & Grooms Marrying Under 21	200	38	19	10

Mortality fell by more than a half between 1661-63 and 1791-93, echoing similar reductions in adult mortality found in East Kent. Two-thirds of the fall in mortality in Nottinghamshire took place between 1661 and 1754-58, and the remaining third occurred between 1754-58 and 1791-93. In the later eighteenth century, there was a similar reduction in the proportion of dead fathers in Sussex − from 22 per cent in 1754-74 to 16 per cent in 1775-1800.[176]

The decline in adult mortality is confirmed by John Landers' study of mortality in London for the eighteenth century. He estimated from the Bills of Mortality and Registrar-General's data, that mortality in London for the 30-44 age group nearly halved between 1730-49 and 1841.[177] There is further evidence from the apprenticeship records of the Stationers' Company. The proportions of apprentices' fathers listed as dead in the eighteenth century were as follows (sample numbers in brackets): 1721-40: 37.8% (1151); 1741-60: 35.5% (1202); 1761-80: 30.9% (1506);

[176] See D. Macleod, (ed.), 'Sussex marriage licences for the Archdeaconary of Chichester, 1731-74', *Sussex Record Society*, Vol. 32 (1926); D. Macleod, (ed.), 'Sussex marriage licences for the Archdeaconary of Chichester, 1775-1800', *Sussex Record Society*, Vol. 35 (1929). These figures are based on a total of 225 fathers of spinster brides marrying under 21 in 1754-74 and 405 in 1775-1800.

[177] Landers, *Death and the Metropolis,* p. 172.

1781-1800: 24.7% (1897); 1801-20: 23.1% (2957); 1821-30: 21.7% (1490).[178] The majority of these fathers probably lived in London and its environs, similar, perhaps, to the geographical origins of the fathers of young women marrying by Vicar-General's licence.

The proportion of dead fathers listed in these apprenticeship records is lower than that in marriage licence registers, as most apprentices were indentured at about the age of 15, compared to the average age of spinsters marrying under the age of 21, which was approximately 19 years. The decline in mortality indicated by the figures is however very similar to that found for fathers in the Vicar-General's licences: most of the fall occurred between 1750 and 1800, continuing into the early nineteenth century.

The improving adult expectation of life was not confined to the South of England. Civil marriage registers for the north of England in the 1650s gave information on parents, including whether fathers were alive or dead, and the mortality rates of fathers were very similar to those found in Kent, London and the Home Counties in this period.[179] The decline in mortality in the eighteenth century can be tracked for apprentices becoming freemen of the Merchant Adventurers Company in Newcastle-On-Tyne. The mean number of years lived after admission was as follows:

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178 I am grateful to Michael Turner of the Publishing Project at the Bodelian Library for supplying me with this data on stationers' apprentices.

179 Of 380 spinsters married in Lancashire, Yorkshire and other parts of the north of England during 1654-1660, 226 of them had fathers who were dead at the time of marriage, i.e. 59.5 per cent. See the *St. Mary Manchester Marriage Register* in the Society of Genealogists' library.

Table 3.17: Number Of Years Lived After Admission To The Merchant Adventurers' Company, Newcastle-On-Tyne, 1660-1779.[180]

Period Of Admission	*Number In Sample*	*Mean Number of Years Lived*
1660-79	188	21.1
1680-99	166	20.8
1700-19	143	20.8
1720-39	126	25.4
1740-59	104	25.4
1760-79	77	30.3

Most men appeared to have entered the company at about the age of 22, and expectation of life increased by about 9.5 years, mostly from 1720 onwards.

The increase in expectation of life represented by the mortality figures in the marriage licences and apprenticeship records is about 11 years, and according to the marriage licences this was a long-term change. The Vicar-General's marriage licences indicate a slight worsening of mortality in the seventeenth century, partially supporting Wrigley *et.al.*'s argument about this period, although this may be a function of sample size, and is not supported by data from the East Kent licences and that for the various privileged groups.[181]

After the middle of the seventeenth century, the Vicar-General's data indicates a period of stability lasting until about the late 1730s, followed by a sustained increase in life expectancy up to the late eighteenth century and beyond, similar to the findings from the data sources discussed above. All this material indicates that adult mortality nearly halved between the end of the seventeenth and eighteenth centuries, yielding a long-term increase in adult life expectancy of over ten years, a reduction in

180 The quality of the information appears to be high, giving full information on dates of admission and death for between 61% and 80% of cases. See F.W. Dendy (ed.), *Extracts from the Records of the Merchant Adventurers of Newcastle-Upon-Tyne* (Surtees Society, Vol. 101, 1899).

181 Razzell, *Essays in English Population History*, p. 201.

mortality much more substantial than that found by the Cambridge Group.

Conclusion

The Cambridge Group's latest publication − the book under review − contains perhaps their best material to date, focusing on nominal record linkage information which is less subject to ambiguity and uncertainty than the abstract data used in their previous work. Their main achievement has been to create a body of data – both at the aggregative and reconstitution level – which has been collected with meticulous scholarship, providing the raw material for a demographic analysis of England's history for the early modern period.

There is, however, a formidable range of methodological problems with the reconstitution technique, and alternative evidence from other sources raises doubts about virtually all the conclusions reached by Wrigley and colleagues.

In their *Population History of England*, Wrigley and Schofield concluded that "the view that mortality played the dominant role in determining changes in population growth rates … must be set aside so far as English demographic history in early modern times is concerned."[182] Since they wrote that passage in 1981, they have somewhat revised their view, now arguing that a decline in adult mortality played a greater role in population growth than they originally thought. This revised conclusion is partly based on the realization that there were differences in the way infant/child mortality and adult mortality changed over time. The assumption that these different forms of mortality were linked was a result of analysing demographic data in terms of Model Life tables, which assume a constant relationship between mortality levels of different age groups. Wrigley and colleagues originally used these Model Life Tables in their work, but have now rightly cautioned against their use in historical research.[183] However, they themselves have continued to rely on model-building, and it is presumably for this reason that they have not attempted to directly

[182] Wrigley and Schofield, *The Population History*, p. 484, fn 60.
[183] Wrigley *et.al.*, *English Population History*, pp. 535-536.

measure parish register deficiencies by using censuses, wills, poor law records, and other nominal record linkage data.

The evidence considered in this essay suggests little or no change in nuptiality and fertility in the eighteenth century, but a significant decrease in all forms of mortality in the eighteenth century. The data on adult mortality indicates that it fell by nearly a half between the beginning and end of the eighteenth century. This evidence comes from many sources and covers a variety of socio-economic groups: the aristocracy, Members of Parliament, tontine subscribers, fathers listed in marriage licences, fathers of apprentices, Newcastle merchants, and Scottish lawyers.[184] Although much of this material is for privileged groups, the marriage licence and apprenticeship data covers many different occupational groups from a number of areas of the country.

In addition to the fall in adult mortality, there is evidence that there was a major reduction in infant and child mortality amongst elite socio-economic groups and in some areas from the middle of the eighteenth century onwards. The precise scale and timing of this fall has yet to be established, but reconstitution methodology particularly lends itself to this type of work, especially when allied to same-name research. The explanation of the decline of mortality represents a special challenge to medical historians, whose expertise and knowledge should help resolve this problem. The increase in population which resulted from the fall in mortality also played a key role in the industrial revolution, and clarifying the factors associated with this transformation of English society still remains one of the key intellectual issues of economic, medical and social history.

184 Razzell, *Essays in English Population History*, p. 201.

4. POVERTY OR DISEASE ENVIRONMENT − THE HISTORY OF MORTALITY IN BRITAIN, 1500-1950. [185]

Introduction

In 1955, McKeown and Brown published a seminal paper on the mortality decline in England during the eighteenth century.[186] McKeown went on to develop a general thesis emphasizing the role of the standard of living and improving nutrition as an explanation for the reduction of mortality during the period of the "modern rise of population".[187] This emphasis on economic factors reflected a long tradition of thought, initiated by Adam Smith and Robert Malthus, which assumed that poverty played a central historical role in shaping levels of mortality.[188]

McKeown recognised the complexity of the problem, but argued that, in the absence of effective medical treatments before the twentieth century, changes in living conditions must have played the primary role in the reduction of mortality.[189] Although he implicitly made a distinction between improvements in disease environment and economic living standards, the main emphasis in his work was on economic factors and nutritional levels in explaining changes in mortality.[190] However, much recent demographic work has emphasised the importance of "place" as against poverty and "class" in shaping mortality patterns,[191] and

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185 This essay was written jointly with Christine Spence and originally published in M. Breschi and L. Pozzi (eds.), *The Determinants of Infant and Child Mortality in Past European Populations* (Udine, 2004).

186 T. McKeown and R.G. Brown, 'Medical evidence related to English population change in the eighteenth century', *Population Studies*, Vol. 9 (1955).

187 T. McKeown, *The Modern Rise of Population* (London 1976).

188 A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Oxford 1976), Vol. 1, p. 97; T.R. Malthus, *An Essay on the Principal of Population* (Cambridge 1989), Vol. 1, pp. 15, 92, 192, 193.

189 McKeown and Brown 'Medical evidence', p. 139.

190 McKeown, *The Modern Rise.*

191 See R. Woods, *The Demography of Victorian England & Wales* (Cambridge 2000), pp. 190-202. Also see N. Williams, 'Death in its season: class, environment and the mortality of infants in nineteenth century Sheffield', *Social History of* Medicine, Vol. 5 (1992), pp. 71-94; E. Garrett, A. Reid, S. Szreter and

we will argue that "place" in the form of disease environment was critical in shaping mortality in the period before the twentieth century.

McKeown rightly pointed out that there were difficulties in examining long-term changes in mortality, because of the deficiencies in evidence before the advent of civil registration in England & Wales in 1837.[192] However, McKeown's work itself has come under strong criticism, including the observation that there was a significant increase in life expectancy amongst the aristocracy and other elite groups who had always had access to an abundance of food.[193] McKeown recognised that this presented a major problem for his explanation of falling mortality, but argued that decreasing elite mortality was the result of diminishing exposure to infection due to improved health and nutritional standards amongst the general population.[194] In support of his argument, McKeown suggested that improvements in life expectancy occurred first amongst the general population, and only later amongst the wealthy and aristocracy.[195] This is clearly an empirical matter that can only be resolved by good quality evidence, but the data on mortality amongst the aristocracy is of questionable quality due to the absence of reliable source material.

Lack of information on births and infant deaths amongst the peerage before 1750 forced Hollingsworth to apply correction ratios which inflated infant mortality rates by about three times for this period.[196] There is also some evidence that the proportion of aristocratic children born in the countryside significantly

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K. Schurer, *Changing Family Size in England and Wales: Place, Class and Demography, 1891-1911* (Cambridge 2001).

192 T. McKeown and R.G. Record, 'Reasons for the decline of mortality in England and Wales during the nineteenth century', *Population Studies*, Vol. 16 (1962), pp. 94-95.

193 P. E. Razzell, *Essays in English Population History* (London, 1994), pp. 152-153; S.R. Johansson, *Death and the Doctors: Medicine and Elite Mortality in Britain from 1500 to 1800* (Cambridge Group for the History of Population and Social Structure Working Paper Series, 7 1999), pp. 1-8.

194 McKeown , *The Modern Rise*, pp. 139-141.

195 *Ibid*, p. 141.

196 T.H. Hollingsworth, 'The demography of the English peerage', *Population Studies* (Supplement, 1964).

diminished during the eighteenth century,[197] suggesting that "place" may have played an important role in changing patterns of mortality.

For the post-civil registration period it is possible to work with copies of civil registers compiled after 1853 for use by local vaccination officers and Medical Officers of Health, and frequently deposited on open access in county record offices. For the pre-civil registration era one partial solution is be found in the methodological principle of triangulation, involving measurements from a number of perspectives, and cross-tabulating the results. This, in effect, was the method adopted by Alison Weir, in her genealogical study of the British Royal Family, collating information from many different sources.[198] We have analysed this data, summarised in the following table:

Table 4.1: Mortality Amongst The British Royal Family (Sons And Daughters Of Kings And Queens), 1500-1899.

		Period	
		1500-1699	*1700-1899*
Number Of Stillbirths		31	5
Number Of Live Births		57	43
Proportion Of Live Children Who Had Died By			
	One Day	15.8%	4.7%
	One Month	22.8%	4.7%
	One Year	45.6%	9.4%
	Five Years	63.1%	14.1%
	Fifteen Years	63.1%	14.1%
	Fifty Years	85.9%	35.0%

197 An analysis that we have carried out of volumes 1 and 2 of the G.E.C., *The Complete Peerage*, suggests that the proportion of aristocractic children born in the countryside fell from 52 per cent in the late seventeenth century to 28 per cent in the early nineteenth.

198 A. Weir, *Britain's Royal Families* (London 1994).

In 1500-1699, nine of the fifty-seven live-born royal children (sixteen per cent) died on the first day of life, deaths which are normally excluded from studies of infant mortality before the twentieth century.[199] Stillbirths are also not normally recorded, but are registered sufficiently accurately in the royal family to be able to analyse stillbirth rates and how they changed over time. Infant and child mortality fell dramatically amongst the royal family between 1500-1699 and 1700-1899: whereas 63 per cent of all royal children died under the age of five before 1700, this proportion had fallen to 14 per cent by 1700-1899. The ratio of royal stillbirths to live births fell from 54 per cent in 1500-1699 to 12 per cent in the later period. The royal family was the wealthiest in Britain but their wealth did not protect them against an exceptionally high level of mortality in the period before 1700, or explain their decline in mortality after that date.

The numbers of cases in the samples covered by Table 4.1 are very small and it is possible that the very heavy mortality in the earlier period is affected by special genetic characteristics of the royal family. Multiple sources are not available for the general population and special methods are required to ensure that mortality data have a sufficient degree of reliability to address the issues raised by McKeown and his colleagues. We will not discuss the full range of explanatory variables but will focus on the role of poverty and disease environment in shaping mortality patterns. It will necessarily be speculative, presenting hypotheses and theoretical ideas to promote debate and further fruitful lines of research.

The Impact Of The Disease Environment On Mortality

Since Farr's work on the relationship between population density and mortality in the mid-nineteenth century, the importance of geographical place in determining levels of mortality has been well understood.[200] Farr found that large cities and urban areas had significantly higher mortality rates than rural areas, and

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[199] In most reconstitution studies children dying on the first day are not usually recorded, as most of them had not been baptised, leading to a systematic under-registration of infant mortality.

[200] Woods, *The Demography*, pp. 190-202.

Bowley in the early 1920s found a similar correlation between housing density and mortality levels.[201] It has been assumed that places with greater population sizes and densities would be prone to higher levels of infection, but we will see later that, historically, other geographical factors sometimes negated the association between population size/density and infection.

The concept of disease environment rather than place will be used for analytical purposes, as it focuses on the particular mechanisms for the transmission of disease. It can apply not only to geographical areas, but to domestic environments and even to individuals, in terms of personal hygiene or immunity to external infection acquired, for example, by inoculation and vaccination. One of the problems with analysing the association between disease environment and mortality is that there was frequently a link between the environment and socio-economic status. For example, many more wealthy merchants lived in London than in remote rural areas, and, therefore, when discussing the impact of environment on mortality it is important to, at least initially, control for wealth and socio-economic status.

Infant And Child Mortality: The Influence Of Disease Environment In The Seventeenth And Eighteenth Centuries

There are few historical sources that allow for controlling socio-economic status but one such source of data is that based on Quaker records. Quakers throughout most of their history were a middle class group, and their occupational profile was summarised by Vann and Eversley as follows:

"… a distinctive feature of the Quaker occupational structure is the prominence of wholesale traders, and later of professional men … The most striking difference between Friends and the rest of society, however, is the virtually complete absence, not only of paupers, but also of persons called only labourers."[202]

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201 A.L. Bowley, 'Death rates, density, population, and housing', *Journal of the Royal Statistical Society,* Vol. 86 (1923).

202 R.T. Vann and D.E.C. Eversley, *Friends in Life and Death* (Cambridge 1992), pp. 72-73.

Quakers also shared a distinctive puritan life style, important when considering the role of such factors as alcohol in the determination of mortality. We have re-analysed Vann and Eversley's Quaker reconstitution schedules, using same-name ratios for correcting mortality levels.[203]

Table 4.2: Estimated Quaker Infant Mortality (Per 1000) In England And Ireland, 1650-99.

Place	*Infants At Risk*	*Infant Deaths*	*Same-Name Ratio*	*Estimated IMR*
London	330	113	12/12	342
Bristol & Norwich	691	117	111/86	219
Provincial England	2781	293	304/181	177
Dublin	591	149	45/38	299
Cork, Wexford, Waterford & Limerick	966	131	54/44	166
Rural Ireland	1953	120	75/56	82

Quaker infant mortality was four times higher in London than it was in rural Ireland, and in general terms the more urbanized an area the higher the infant mortality rate. Rural Ireland had a particularly low infant mortality rate, and this was probably largely due to its geographical isolation, as well as its low population density.

There appear to have been similar geographical variations in infant and child mortality amongst the general population in England during the pre-civil registration period. The following table summarizes the results of reconstitution studies which we have carried out on parishes in London, the towns of Truro and

203 See *Ibid*, pp. 186-238 for a description of their data. Their original reconstitution schedules are deposited in Friends House library in London, and we would like to thank the library for allowing us to use this material.

Ampthill, and nine rural parishes with populations of less than 500 in 1801 from different English counties. The figures are for the earliest period available:

Table 4.3: Estimated Infant And Child Mortality (Per 1000) In English Parishes, 1650-99.[204]

	St. Bartholomew's London	*Truro, Cornwall*	*Ampthill Beds.*	*Nine Rural Parishes*
Infants At Risk	593	1618	798	1440
Infant Burials	100	246	102	108
Children (1-4) At Risk	224	976	566	777
Child (1-4) Burials	37	157	47	51
Same-Name Ratio	58/37	162/113	80/55	70/41
Estimated IMR	264	220	186	128
Estimated CMR	260	231	121	112
IMR + CMR	524	451	307	240

The above mortality figures are minimal, in that they do not include deaths before baptism or the deaths of illegitimate children. Table 4.3 indicates a gradient in mortality running from

204 The parishes included in the table are part of an initial sample from a larger study and were mainly selected on the basis of the availability of details of fathers and mothers names in the baptism register; parish registers were chosen from the printed and transcribed volumes in the Society of Genealogists' library. The data for all parishes covers the entire period 1650-99, except for Ampthill which covers 1653-1699. The nine rural parishes are Breamore, Weston Colville, Stow Maries, Cusop, Poddington, Kemerton, Eaton Hastings, Canewdon and Woodchurch. All rates were corrected by same-name ratios directly derived from the reconstitution samples.

the London parish to the nine rural parishes.[205] The differences are similar to those found amongst Quakers, and again suggest that population size and density were major factors in shaping mortality patterns. However there are variations between the different parishes which indicate that other factors were at work.

The population size of Truro in the second half of the seventeenth century was about 2,700, and the equivalent size of Ampthill was approximately 1,300.[206] Both were very small towns compared to London, which had a population of about 585,000 at the end of the seventeenth century.[207] Truro's combined infant and child mortality rate – 451/1000 – was nearly as high as that in St. Bartholomew's, London – 524/1000 – and about fifty per cent higher than Ampthill's – 305/1000 – a similarity and difference which requires special comment.

Truro was located near the Cornish coast and was a centre for the trading of tin to many parts of England and the Continent, and, because of its trading activities and wealth, was described by one contemporary as a "town of merchant princes".[208] Ampthill was an inland market town that served mainly a local area, and was not noted either for its trade or wealth.[209] London, of course, was the main trading centre in England, and famed for it prosperity and wealth. We thus have the paradox that the wealthier the town, the higher mortality.[210]

A clue to the explanation of Truro's high mortality lies in a list of smallpox deaths listed in the parish register for the year

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205 The estimated infant mortality rate for the nine small rural parishes − 128 per 1000 − is relatively low compared to some of the eighteenth century rural rates quoted in the last essay. However, we will see later (Table 4.12 and Table 5.4) that infant mortality increased in the eighteenth century, a pattern similar to that found in Poddington and Elstow in Table 3.10.

206 These population estimates are based on 1801 census figures adjusted by the ratio of baptisms in 1775-1824 to those in 1650-99.

207 E.A. Wrigley and R.S. Schofield, *The Population History of England, 1541-1871* (London 1981), p. 571.

208 V. Acton, *A History of Truro* (Truro 1997), Vol. 1, pp. 93-121.

209 C. Isherwood, *The History of Ampthill* (Ampthill 1921).

210 Mary Dobson has found something similar in the South-Eastern region of England, with mortality generally higher in the wealthier port and marsh districts, and lower in the poorer downland and elevated wealden areas. M. Dobson, *Contours of Death and Disease in Early Modern England* (Cambridge 1997), p. 147.

1767. Of 55 smallpox deaths, 53 were of children, the other two being adults who had come into the town from outside counties – Dorset and Hampshire. 38 of the 53 child deaths were included in the reconstitution study, and the average mean age of death of these 38 children was two years seven months, i.e. most of the smallpox deaths in Truro were of very young children. We do not have a list of smallpox deaths for Ampthill, but one does exist for a similar sized inland market town, Burford in Oxfordshire. There were 181 smallpox deaths in Burford in the epidemic of 1758, of which 78 were of adults, and of the remaining 93 children, it is estimated that 68 were under the age of ten – *i.e.,* only 38 per cent of the total number of smallpox deaths were of young children.[211]

Nearly two-thirds of smallpox deaths in Burford were over the age of ten, a significantly different pattern from that found in Truro. For smallpox to affect mainly young children as it did in Truro, the disease must have been endemic, returning virtually every year to the town. The age structure of smallpox in Burford indicates that the disease only struck infrequently, perhaps every fifteen years or so, explaining the high proportion of adults affected.

There is further evidence that other small inland parishes experienced the same structure of smallpox epidemics as Burford. For example in Godalming, Surrey during the period 1701-23, where epidemics returned about every thirteen years, 76 of the 157 deaths were adults.[212] In Aynho, Northamptonshire during the epidemic of 1723-24, only 28 of 132 cases of smallpox – 21 per cent – and 4 of the 25 smallpox deaths – 16 per cent – were of children under the age of ten.[213] During the general smallpox inoculations that took place in rural parishes after the late 1760s, many of those inoculated were adults.[214]

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211 These figures are calculated from J. Moody, *The Great Burford Smallpox Outbreak of 1758* (Burford 1998).

212 *Surrey Archaelogical Collections,* Vol. 27 (1914), pp. 16-20.

213 P.E. Razzell, *The Conquest of Smallpox* (London 2003), p. 167.

214 *Ibid*, p.120.

The age incidence of smallpox is not only important for its direct impact on mortality, but also as a measure of the epidemiological nature of different disease environments. In towns like London and Truro, a whole range of diseases probably occurred in early childhood from infections being regularly imported via trading activity and contact with the outside world.[215]

However, England was probably protected from much infection through its barrier island status. Inland parishes, away from main routes of communication, appear to have suffered from less infectious disease and therefore had lower mortality levels. This can be illustrated with respect to the rural parishes covered by the present research. The following table lists the infant and child mortality rates of the nine individual rural parishes for the whole period 1650-1849.[216]

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215 Smallpox is known to have been mainly a disease of young children in London, during the eighteenth century. J. Landers, 'Mortality and metropolis: the case of London, 1675-1825' *Population Studies,* Vol. 41 (1987), p. 74.

216 Infant and child mortality rates were compiled by applying the appropriate same-name inflation ratios. For full details see P.E. Razzell and C. Spence, 'Poverty or disease environment? The history of mortality in Britain, 1500-1950', M. Breschi and L. Pozzi (eds.), *The Determinants of Infant and Child Mortality in Past European Populations* (Udine, 2004), p. 50.

Table 4.4: Estimated Infant And Child Mortality (Per 1000) In Nine English Rural Parishes, 1650-1849.

Parish	*Number Of Infants At Risk*	*Number Of Children (1-4) At Risk*	*IMR*	*CMR*	*IMR + CMR*
Breamore, Hampshire	1683	1148	79	50	129
Kemerton, Worcestershire	1035	613	100	47	147
Weston Colville, Cambridgeshire	1150	789	130	71	201
Cusop, Herefordshire	599	372	144	59	203
Eaton Hastings, Oxfordshire	569	411	142	77	219
Woodchurch, Kent	2023	1183	132	104	236
Poddington, Bedfordshire	1523	1301	160	84	244
Candewdon, Essex	539	324	202	123	325
Stow Maries, Essex	573	285	198	170	368

The lowest combined infant and child mortality rate was found in Breamore, Hampshire, a small scattered inland parish in the New Forest away from any major route of communication. A clue to the very low mortality in this parish is found in its burial register: up to the year 1803, there were only twelve smallpox deaths listed, of which ten were adults. This suggests that Breamore managed to avoid much infection during the eighteenth century through its isolated position.

Low mortality in some of the other parishes in Table 4.4 is also probably related to isolated inland location. On the other hand, the two Essex parishes – Canewdon and Stow Maries – had very high infant and child mortality rates. This may have been partly due to their coastal location, but was more likely a result of them being estuarine marsh parishes with endemic malaria.[217] This indicates that high mortality was not always a function of epidemic infection, but could be the result of endemic environmental conditions.

Adult Mortality: The Impact Of Disease Environment In The Early Eighteenth Century

The government levied a tax in 1710 on all apprenticeship indentures, and the registers of taxation paid have survived for the period 1710-1809. Up to the middle of the eighteenth century the registers give information on the apprentice's name, father's name and occupation, place of residence, whether the father was alive or dead at the date of the apprenticeship, and the premium paid by the apprentice's family for the apprenticeship. The national apprenticeship register lacks data on the ages of fathers, and there is always the potential problem of the reliability of this type of data, although early research indicates that information in the national register was of a very high quality in the early period 1710-13.[218]

The evidence from this register suggests that the association between disease environment and infant/child mortality was mirrored in the pattern of adult mortality. Table 4.5 summarises the evidence on geographical region and paternal mortality.

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217 Dobson, *Contours of Death.*

218 The national register of apprenticeships has been transcribed and lodged in the Society of Genealogists' library. A comparison was made between information in this register and that contained in the London guild records published and edited by Cliff Webb. See C. Webb, *London Apprentices* (London 1996-98). Fifty cases were selected alphabetically from volumes 1 − 15 of *London Apprentices* for the period 1710-13 and traced in the national register. Of these fifty cases the information on the death of the father was identical in both sets of records. Examination of later cases suggests that the quality of information on whether the father was alive or dead began to deteriorate after about 1713.

Table 4.5: Mortality Amongst Fathers Listed In The British Apprenticeship Register 1710-1713 By Area Of Residence Of Father.[219]

Geographical Region Of Residence	*Number Of Cases*	*Proportion Of Fathers Dead %*
London & Middlesex	372	37
Surrey, Kent, Hampshire & Sussex	234	35
Cambridgeshire, Suffolk, Norfolk, Lincolnshire, Essex & Huntingdonshire	355	32
Devon, Cornwall, Dorset, Herefordshire, Gloucestershire, Shropshire, Wiltshire, Somerset & Worcestershire	411	30
Bedfordshire, Berkshire, Buckinghamshire, Hertfordshire, Northamptonshire & Oxfordshire	206	28
Cheshire, Durham, Lancashire, Cumberland, Northumberland, Rutland, Westmoreland & Yorkshire	336	27
Scotland	151	22

219 The source of this data is the *National Apprenticeship Register*, Volumes 1-6, in the Society of Genealogists' library.

Although the mortality gradient is not as sharp or linear as that found for infant and child mortality, adult mortality appears to have been highest in the wealthiest area of the country − London − and lowest in the poorest remote region, Scotland.[220] Levels of adult mortality in 1710-13 were probably partly determined by proximity to London the main reservoir of disease infection. Additionally, trading and other activities were associated with the spread of infection, partially explaining the association between the wealth of a region and its mortality.[221] There is also some evidence to suggest that wealth was directly associated with higher levels of mortality as a result of life-style factors − the consumption of rich foods, alcohol and tobacco, accompanied by physical inactivity − a theme which is discussed later in the book.

Infant And Child Mortality: The Role Of Wealth And Poverty In Seventeenth And Early Eighteenth Century.

The following table summarises estimates of infant and child mortality among socio-economic elite and non-elite families in St. Bartholomew's, London and Truro, Cornwall during the early modern period, using family reconstitution techniques. Elite families were essentially wealthy merchants and professionals identified through information in parish register and other sources.[222]

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220 R.S. Schofield, 'The geographical distribution of wealth in England, 1334-1649', *Economic History Review,* Vol. 18 (1965); C. Husbands, 'Hearths, wealth and occupations: an exploration of the hearth tax in the later seventeenth century', K. Schurer and T. Arkell (eds.), *Surveying the People* (Local Population Studies, 1992), p. 76.

221 Within the London region, there was a similar relationship in the nineteenth century between distance from the centre of the city and mortality. Woods, *The Demography*, pp. 376-377. For a discussion of the importance of exposure to infection for determining mortality levels see Landers, *Death and the Metropolis*, 29-32; Johansson, *Death and the Doctors*, pp. 5-6.

222 The elite were designated in the parish register by the title of "Mr", "Gentleman" or "Esquire". For fuller details of how this data was compiled, including how elite families were defined, see Essay 5.

Table 4.6: Estimated Infant And Child Mortality (Per 1000) Amongst Socio-Economic Elite And Non-Elite Families In St. Bartholomew's, London, And Truro, Cornwall, 1619-1750.

Parishes And Period	*Socio-Economic Status*	*Infants At Risk*	*Children (1-4) At Risk*	*IMR*	*CMR*	*IMR + CMR*
Saint Barts., London, 1619-1749	Elite Families	372	199	306	302	608
	Non Elite Families	1122	370	265	274	539
Truro, Cornwall 1629-1750	Elite Families	694	396	239	229	468
	Non Elite Families	2541	1587	181	225	406

Both infant and child mortality were higher among elite than non-elite families in St. Bartholomew's, London, whereas in Truro, although infant mortality was higher amongst the wealthy, there was little difference in child mortality. The St. Bartholomew's figures must be treated with some caution, as there was a great deal of migration in the sample population resulting in a truncated observation of families, particularly amongst the non-elite. There is however data available for city of London parishes using the 1695 Marriage Duty enumeration listing, which although covering a more restricted period, increases the number of families in observation through infancy to childhood. The 1695 listing was carried out for taxation purposes and gives information on families owning real estate of £600 or more, and the following table summarises data on family wealth and mortality for London parishes and Lyme Regis in Dorset for which data on wealth is also available.[223]

[223] For further details of the methodology used in creating the data summarised in this table, see Essay 1. The definition of wealth holding families in Lyme Regis was broader than that in London, and includes tradesmen and artisans leaving wills and paying window tax.

Table 4.7: Estimated Infant And Child Mortality (Per 1000) Amongst Wealth And Non-Wealth Holding Families In City Of London Parishes And Lyme Regis, Dorset.[224]

Parishes And Period	*Socio-Economic Status*	*Number Of Infants At Risk*	*Number Of Children (1-4) At Risk*	*IMR*	*CMR*	*IMR + CMR*
City Of London Parishes, 1680-1710	Wealth Holders	498	359	289	181	470
	Non Wealth Holders	477	310	390	186	576
Lyme Regis, Dorset, 1660-1720	Wealth Holders	246	210	157	231	388
	Non Wealth Holders	299	265	104	220	324

In the London city parishes, infant mortality was lower amongst wealthy than non-wealthy families, whereas there was no significant difference in child mortality between the two groups. In Lyme Regis both infant and child mortality were higher amongst elite families, although the difference in child mortality was relatively insignificant.

The overall conclusion from the data in Tables 4.6 and 4.7 is that infant mortality was greater amongst the wealthy than the non-wealthy in three of the four sample populations, but that it was lower amongst elite families in the London city parishes. Wealth appears to have made little difference in child mortality in any of the parishes in the early modern period.

224 For full details of how the figures in this table are calculated see Essay 1.

A reconstitution study of a number of parish registers with information on occupation during the period 1674-1749 yields the following results.[225]

Table 4.8: Estimated Infant And Child Mortality (Per 1000) By Occupational Status In Ten Parishes, 1650-1749.[226]

Occupation Status	*Infants At Risk*	*Children (1-4) At Risk*	*Estimated IMR*	*Estimated CMR*	*IMR + CMR*
Merchants, Professionals & Gentlemen	341	238	185	112	297
Farmers, Tradesmen & Artisans	1896	1338	187	115	302
Labourers & Paupers	1286	797	151	129	283

Infant mortality was lower amongst labourers and paupers than it was in other socio-economic status groups, although higher child mortality amongst labourers and paupers meant there was little overall difference between the groups.

225 The ten parishes are: Weston Colville, Cambridgeshire; Woodford, Kent; Bedford St. Pauls, Bedfordshire; Highworth, Wiltshire; Ampthill, Bedfordshire; Clayworth, Nottinghamshire; Swindon, Wiltshire; Rochester, Kent; Woodchurch, Kent; Ackworth, Yorkshire. The parishes selected for study are ones which include information on occupation in the register or in a contemporary census lodged in the Society of Genealogists' library.

226 The same-name inflation ratios applied were as follows: Professional & Gentlemen – 31/28; Farmers & Traders: 192/153; Labourers – 128/107. For full details of how the figures in this table were calculated see Razzell and Spence, 'Poverty or disease environment?', p. 53.

Adult Mortality: The Role Of Socio-Economic Status In The Early Eighteenth Century

Information in the national apprenticeship register on father's occupation, premiums paid, and paternal mortality allows an analysis of socio-economic status and adult mortality at the beginning of the eighteenth century. The smallest premiums were paid by families whose fathers were listed as labourers and husbandmen, and the highest premiums by professional, merchant and gentry families.[227]

<u>Table 4.9: Mortality Amongst Fathers Listed In The British Apprenticeship Register 1710-13 By Amount of Premium Paid</u>

Premium Paid	*Number Of Cases*	*Proportion Of Fathers Dead %*
£1-£5	541	22.9
£6-£19	587	30.2
£20+	532	34.0

Table 4.9 indicates a negative association between wealth and adult mortality among apprentices' fathers, although it does not allow for possible age differences of fathers in the three premium groups.[228] The link between wealth and mortality might be partly explained by the wealthy living more frequently in London and other unhealthy towns and cities, but even within those unhealthy areas there was an association between wealth and mortality.

227 For example, the average premium paid by 61 labourers and husbandmen's families in volume 5 of the national apprenticeship register was £7.00, whereas the equivalent figure amongst 72 professional, merchant and gentry families was £105.00.

228 The inverse association between wealth and mortality might be partly explained by wealthier families apprenticing their sons at a later age. A sample of 50 cases from each premium category indicates that the average ages of apprenticeship in the £1-£5 group was 14.4 years; £6-£14 category 14.9 years, and £15+ group 15.9 years. However, even allowing for these age differences, the mortality rate of fathers was still higher in the wealthier premium groups: 1.6 per cent per annum in the £1-£5 category, 2.0 per cent in the £6-£14 one, and 2.1 per cent in the £15+ group.

Table 4.10: Mortality Amongst London Fathers Listed In The British Apprenticeship Register 1710-13 By Amount Of Premium Paid.[229]

Premium Paid	*Number Of Cases*	*Proportion Of Fathers Dead %*
£9 And Under	110	31.8
£10-£19	93	40.9
£20+	99	42.4

Although the number of cases is small, there is still the same linear gradient between wealth and mortality in London as found nationally.

The overall data considered in this essay suggests that in the early modern period before the middle of the eighteenth century, there was no significant association between poverty and mortality, but that on the contrary, mortality – particularly adult mortality – was higher amongst the wealthy than amongst the poor.

Disease Environment And Changes In Infant And Child Mortality Over Time

Quaker data enables an analysis of changes in infant mortality for a particular and distinct social group, allowing for variations in disease environment.

229 For the source of this data see the National Apprenticeship Register, Volumes 1-6 in Society of Genealogists' library.

Table 4.11: Estimated Infant Mortality (Per 1000 Births) Amongst Quakers In Great Britain, 1650-1849.[230]

Period	*London*	*Bristol & Norwich*	*Provincial England*	*Dublin*	*Cork, Wexford, Waterford & Limerick*	*Rural Ireland*
1650-1699	342	219	177	299	166	82
1700-1749	269	216	200	196	160	118
1750-1799	166	158	124	164	151	82
1800-1849	132	107	69	107	65	41

Infant mortality rose in Provincial England and Rural Ireland between 1650-1699 and 1700-1749, before reducing significantly, whereas in other regions if fell throughout the entire period 1650-1849. The first reductions appear to have occurred in London and Dublin, and later in provincial and rural areas. However, an independent study by Landers suggests that infant mortality amongst London Quakers did not fall until after 1750,[231] a contradictory finding. According to Table 4.11, the urban rural

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[230] See R.T. Vann and D.E.C. Eversley, *Friends in Life and Death* (Cambridge 1992), pp. 186-238 for a description of their data. We have re-analysed their reconstitution schedules deposited in Friends House library in London. The number of infants at risk and the same name inflation ratios (in brackets) were for each period as follows: London: 1650-99: 330 (12/12), 1700-49: 519 (52/51), 1750-99: 300 (28/24), 1800-49: 72 (4/3); Bristol & Norwich: 1650-99: 691 (111/86), 1700-49: 990 (133/119), 1750-99: 1062 (120/111), 1800-49: 505 (31/28); Provincial England (England minus London, Norwich and Bristol): 1650-99: 2781 (304/181); 1700-49: 3768 (330/188), 1750-99: 4332 (246/208), 1800-49: 3381 (68/61); Dublin: 1650-99: 591 (45/38), 1700-49: 625 (40/36), 1750-99: 623 (36/29), 1800-49: 270 (15/14); Cork, Wexford, Waterford and Limerick: 1650-99: 966 (54/44), 1700-49: 1402 (62/52), 1750-99: 1300 (73/68), 1800-49: 676 (13/13); Rural Ireland: 1650-99: 1953 (75/56); 1700-49: 2964 (139/111), 1750-99: 2487 (132/119), 1800-49: 513 (10/9).

[231] J. Landers, 'London mortality in the "long eighteenth century": a family reconstitution study', *Medical History,* (Supplement No. 11, 1991), p. 7.

gradient was sustained over the whole period 1650-1849, although there were sharp falls in infant mortality in all areas. An analysis of the reconstitution parishes included in the present research, and nineteen parishes covered by the Cambridge Group, reveals the following pattern of changing infant and child mortality: [232]

Table 4.12: Estimated Infant And Child (1-4) Mortality Rates (Per 1000) In St. Bartholomew's London, Truro, Ampthill, Nineteen Cambridge Group Parishes, And Ten Small Rural Parishes, 1650-1837.

Period	*Infant Mortality Rate*				
	Saint Barts., London	Truro, Cornwall	Ampthill, Bedfordshire	Nineteen Cambridge Group Parishes	Ten Small Rural Parishes
1650-99	264	218	186	188	134
1700-49	342	177	204	193	166
1750-99	206	145	131	163	146
1800-37	-	90	103	122	89
Period	*Child (1-4) Mortality Rate*				
1650-99	260	231	121	105	118
1700-49	274	224	119	103	89
1750-99	114	228	102	95	87
1800-37	-	103	103	74	66

232 Details of the corrected Cambridge Group's nineteen reconstitution parish data are to be found on p. 70. For the other areas, the data is derived from an analysis of parish registers in the Society of Genealogists' library, using the reconstitution rules outlined in Essay 1. The number of baptisms (B) and children at risk (CR), with the same-name correction ratios in brackets, are as follows: St. Bartholomew's: 1650-99: B: 592, CR: 224 (57/37), 1700-49: B: 564, CR 202 (60/32), 1750-99: B:247, CR: 92 (13/8); Truro: 1650-99: B: 1139, CR: 687 (114/80); 1700-49: 1615, CR: 1007 (186/165); 1750-99: B: 1837, CR: 1142 (213/175); 1800-37: B: 1431, CR: 707 (96/74); Ampthill: 1653-99: B: 798, CR: 566 (80/55), 1700-49: B: 1058, CR: 722 (98/83), 1750-99: B: 1118, IR: 864 (73/43), 1800-37: B: 1045, CR: 737 (41/21); Ten Small Rural Parishes: 1650-99: B: 1534, CR: 856 (79/43), 1700-49: B: 2879, CR: 1857 (204/156), 1750-99: B: 3686, CR: 2537 (214/142), 1800-37: B: 2719, IR: 1401 (110/86). The ten small rural parishes are: Ackworth, Yorkshire; Breamore, Hampshire; Canewdon, Essex; Cusop, Herefordshire; Eaton Hastings, Oxfordshire; Kemerton, Worcestershire; Poddington, Bedfordshire; Stow Maries, Essex; Weston Colville, Cambridgeshire; Woodchurch, Kent. No figures are available for St. Bartholomew's for 1800-37 due to the smallness of samples during this period.

The pattern of change in mortality is complex, but generally infant and child mortality appears to have diminished earlier in London, Truro and Ampthill, than it did in the more rural parishes. However, child mortality in Truro fell almost exclusively in the early part of the nineteenth century, as did much of the infant and child mortality in the Cambridge Group's reconstitution sample and the ten small rural parishes. The infant mortality figures must be interpreted with some care, particularly for the late eighteenth and early nineteenth century. As we have seen previously, the interval between birth and baptism generally increased during the eighteenth century, so that, for example, data for St. Bartholomew's shows that the proportion of children baptized within two weeks of birth dropped from 89 per cent in 1650-99 to 22 per cent in 1750-99. Much of this increase in the interval between birth and baptism was probably the consequence of reduced infant and child mortality.[233]

The conclusions about early falling infant and child mortality in London are confirmed by evidence from the London Bills of Mortality, which indicates that mortality of young children reduced significantly from about 1750 onwards.[234] Another contemporary set of bills of mortality – those for Northampton − also indicates that infant and early child mortality fell during the same period, although mortality appears to have diminished at an earlier date and more significantly in London than it did in Northampton.[235] The above evidence suggests that infant and child mortality falls first took place in London, spread to provincial towns, and then to rural areas.

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[233] For evidence of parents baptizing children as a result of sickness and impending mortality see Dobson, *Contours of Death,* p. 297.

[234] The ratio of burials under two as a proportion of baptisms in London were as follows: 1730-39: 59.8%; 1740-49: 60.8%; 1750-59: 50.8%; 1760-69: 33.1%; 1770-79: 33.1%; 1780-89: 38.0%; 1790-99: 26.4%; 1800-09: 21.8%; 1810-19: 20.0%. These figures are derived from J. Marshall, *Mortality in the Metropolis* (London 1832). For a detailed discussion of London's mortality history see P.E. Razzell and C Spence, 'The history of infant, child and adult mortality in London, 1550-1850', *The London Journal* (Forthcoming, 2007).

[235] The ratio of burials under two as a proportion of baptisms in Northampton was: 1740-49: 43.5%; 1750-59: 35.0%; 1760-69: 49.4%; 1770-79: 44.6%; 1780-89: 38.0%; 1790-99: 26.4%; 1800-09: 21.8%; 1810-19: 20.0%. These figures are based on the bills of mortality lodged in the Northampton Public Library.

Socio-Economic Status And Changes In Infant And Child Mortality Over Time

Reconstitution data on changes in the relationship between socio-economic status and mortality is difficult to generate because of the relatively small number of elite socio-economic families found in most communities. However, there are some places that contained sufficient numbers of wealthy families to allow an analysis. For example in Truro, between twelve and thirty-seven per cent of all families were classified in the parish registers and other sources as being members of the local socio-economic elite, made up mainly of merchants and professional families.[236]

<u>Table 4.13: Socio-Economic Status And Estimated Infant/ Child Mortality (Per 1000) In Truro, Cornwall, 1629-1837</u>.

	Elite Families			*Non-Elite Families*		
Period	*IMR*	*CMR*	*IMR + CMR*	*IMR*	*CMR*	*IMR + CMR*
1629-99	271	237	508	201	237	438
1700-49	188	213	401	175	225	400
1750-99	162	135	297	142	244	386
1800-37	66	25	91	93	116	209

Whereas in the seventeenth century infant mortality was significantly higher amongst the socio-economic elite, by the early nineteenth century the reverse was the case.[237] There was a

236 The data in this table is based on an analysis of the Truro parish register lodged in the Society of Genealogists' library. Elite families include merchants, professionals and gentlemen; non-elite are all minus elite families. The number of baptisms (B) and children at risk (CR), with same-name correction ratios in brackets, are: Elite Families: 1629-1699: B: 435, CR: 244 (59/47), 1700-1749: B: 259, CR: 152 (27/25), 1750-1799: B: 280, CR: 164 (28/24), 1800-1837: B: 190, CR: 100 (5/4); Non-Elite Families: 1629-1699: B: 1183, CR: 732 (103/66), 1700-1749: B: 1356, CR: 855 (156/140), 1750-1799: B: 1557, CR: 978 (185/151), 1800-1837: B: 1241, CR: 607 (91/70).

237 The infant mortality figures must be interpreted however with some caution. The proportion of children baptised within two weeks fell from 28 per cent in 1794-99 to 15 per cent in 1800-12.

particularly sharp fall in infant mortality amongst the wealthy at the beginning of the eighteenth century, and significant reductions in child mortality at the end of the eighteenth and beginning of the nineteenth century. A gradual fall in infant mortality occurred amongst other families during the eighteenth century, but the most significant reduction in both infant and child mortality amongst this group occurred at the beginning of the nineteenth century.

No other data of similar quality is available for other places, but a reconstitution analysis of occupational status and mortality in eleven parishes at the beginning of the nineteenth century, corrected by same-name ratios, reveals the following pattern:

Table 4.14: Occupational Status And Estimated Infant/ Child Mortality (Per 1000) In Eleven Parishes, 1812-37.[238]

Occupational Status	*IMR*	*CMR*	*IMR + CMR*
Merchants & Professional	70	19	89
Farmers, Tradesmen & Artisans	91	82	173
Labourers & Paupers	95	72	167

Whereas there was no significant relationship between occupational status and infant/ child mortality during the period 1650-1749 in the group of parishes covered by Table 4.8, infant and child mortality amongst merchants and professionals in the group of parishes in Table 4.14 appears to have been lower than the other socio-economic status groups at the beginning of the nineteenth century.

238 The eleven parishes are: Ampthill, Bedfordshire; Breamore, Hampshire; Cusop, Herefordshire; Canewdon, Essex; Cattistock, Dorsetshire; Elstow, Bedfordshire; Poddington, Bedfordshire; St. Bartholomew's, London; Truro, Cornwall; Weston Colville, Cambridgeshire; Woodchurch, Kent. Data is based on the analysis of parish registers in the Society of Genealogists' library. The number of baptisms (B) and children at risk (CR), with the same-name ratios in brackets are: Merchants & Professional: B: 193, CR: 85 (11/10); Farmers, Tradesmen & Artisans: B: 2339, CR: 1417 (125/104); Labourers & Paupers: B: 3353, CR: 2510 (71/62).

For the later nineteenth century, a study of infant and child mortality in Ipswich in the 1870s using copies of the civil birth and death registers,[239] reveals the following pattern:

Table 4.15: Social Class And Infant And Child (1-4) Mortality Rates (Per 1000) In Ipswich 1872-1880.[240]

Social Class	*IMR*	*CMR*
1	119	65
2	145	95
3	151	129
4	146	126
5	137	122

Infant mortality in Ipswich was slightly lower amongst social class 1 − professionals and merchants − than other social groups, whereas child mortality was significantly lower in social classes 1 and 2 than among other groups. This is similar to the findings summarised in Tables 4.13 and 4.14 above, indicating that in some communities by the nineteenth century there was a strong social gradient in child mortality, but only a minimal one for infant mortality.

Data for a later period indicates that there was a significant sharpening over time of the infant mortality gradient by occupational status group.[241]

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239 Infant and child mortality rates were calculated by using a modified family reconstitution methodology. The classification of social class essentially followed that by Stevenson in his analysis of fertility and child mortality in the 1911 Census. See General Register Office, *Seventy-Fourth Annual Report* (Parliamentary Papers, 1912-13/ XIII.), pp. 73-87.

240 The number of births (B) and children at risk (CR) are: Social Class 1: B: 1293, CR: 875; Social Class 2: B: 2062, CR: 1427; Social Class 3: B: 2755, CR: 1866; Social Class 4: B: 3145, CR: 2245; Social Class 5: B: 2850, CR: 2128. For further details see P.E. Razzell, E. Garrett and R.S. Davies, *The Sociological Study of Fertility and Mortality in Ipswich 1872-1881*. (Report submitted to the Economic and Social Research Council, 2001).

241 This data was generated as a part of the research on the history of infant mortality carried out at the Open University. See M. Drake and P.E. Razzell, *The Decline of Infant Mortality in England and Wales 1871-1948* (Interim Report to the Wellcome Trust, 1999).

Table 4.16: Infant Mortality Rates (Per 1000) By Occupational Group In The District Of Ipswich, Suffolk, 1875-1911.[242]

Period	*Professional*	*Clerks*	*Carpenters*	*Labourers*
1875-1895	112	102	144	175
1896-1905	94	114	148	185
1906-1911	62	49	105	144

Infant mortality diminished most significantly amongst the families of professionals and clerks, so that the gradient in mortality increased significantly between 1875 and 1911. A similar pattern emerged in the registration district of Warwick.

Table 4.17: Social Class And Infant Mortality (Per 1000) In Warwick, 1876-1918.[243]

Period	*Social Class*			
	1 & 2	*3*	*4*	*5*
1876-1879	117	100	104	109
1880-1889	92	102	135	124
1898-1909	83	102	97	117
1910-1918	66	80	97	113

242 This data is based on vaccination birth registers and copies of civil death registers in Ipswich Record Office. Infant mortality rates were calculated by expressing infant deaths as a proportion of births. The numbers of births in each occupational group are: Professional: 1875-95: 349, 1896-1905: 374, 1906-11: 227; Clerks: 1875-95: 394, 1896-1905: 508, 1906-11: 306; Carpenters: 1875-95: 694, 1896-1905: 722, 1906-11: 343; Labourers: 1875-95: 2404, 1896-1905: 3366, 1906-11: 2111.

243 This data is derived from vaccination birth and infant death registers in the Warwick Record Office. Infant mortality rates were compiled by dividing the number of infant deaths by the number of births in each social class category. The social class categories are based on the Stevenson's classification, except that we have included farmers in the composite professional and intermediate group, and agricultural labourers in the unskilled category. The numbers of births in each social class category are: Social Class 1 & 2: 1876-79: 290, 1880-89: 715, 1898-1909: 836, 1910-18: 456; Social Class 3: 1876-79: 657, 1880-89: 1748, 1898-1909: 1576, 1910-18: 1043; Social Class 4: 1876-79: 251, 1880-89: 764, 1898-1909: 965, 1910-18: 601; Social Class 5: 1876-79: 580, 1880-89: 1293, 1898-1909: 985, 1910-18: 604.

There was a minimal social class gradient in Warwick during the first period 1876-79, but by the 1910s there was nearly a two to one difference in infant mortality between the professional & intermediate group and the unskilled social class category. The changing pattern was mainly the result of reductions in mortality among the middle class professional and business group.

The pattern of an increasing social class gradient at the end of the nineteenth century is confirmed by national civil registration figures. The decline in mortality between 1896 and 1911 was particularly great amongst intellectual middle class groups – professional, teachers and clerical workers – while infant mortality only fell slightly amongst working class occupations – textile workers, miners and farm workers. Although infant mortality continued to fall amongst all groups during the first half of the twentieth century, there was still a two to one difference at the extremes of the gradient in 1949-50.[244] However, these national figures do not allow an analysis of the influence of place and disease environment on the relationship between socio-economic status and infant mortality.

Socio-Economic Status And Changes In Adult Mortality Over Time

Marriage licences for East Kent yield data on occupation and paternal mortality for 289 parishes in the period 1619-1809. The following table gives the percentages of dead fathers of under-age daughters by occupational group:

[244] M.R. Haines, 'Socio-economic differentials in infant and child mortality during mortality decline: England and Wales, 1890-1911', *Population Studies*, Vol. 49 (1995), p. 313.

Table 4.18: Paternal Mortality Amongst Fathers Of Spinsters Marrying Under 21, By Occupation Of Husband In East Kent, 1619-1809.[245]

Period	*Occupation Of Groom − Proportion Of Spinsters' Fathers Dead*				
	Gentlemen, Merchants & Professional %	*Yeoman & Farmers %*	*Traders & Artisans %*	*Husbandmen %*	*Mariners & Fishermen %*
1619-1646	39	41	46	50	42
1661-1700	38	42	49	39	45
1751-1809	28	15	26	19	24

Table 4.18 indicates that mortality diminished amongst all social groups in the eighteenth century, but gentlemen, merchants and professionals experienced the smallest reduction in mortality of all groups and had the highest mortality at the end of the period 1751-1809. There is some evidence that this was also the case in Nottinghamshire and Sussex.[246]

245 For the details and source of this data see Razzell, *Essays in English Population History*, p. 197.

246 For the source of data see Macleod, *Sussex Marriage Licences*, Vols. 32 & 35; Blagg, *Abstracts of the Bonds and Allegations for Nottinghamshire Marriage Licences*; Shaw, *Nottinghamshire Marriage Bonds, 1791-1800*; E.W.D. Penfold (ed.), *Calendar of Sussex Marriage Licences … for the Archdeaconary of Lewes, 1772-1837* (Sussex Record Society, Vols. 25 & 26, 1917 and 1919). All marriages with occupational information were extracted from these sources for the period covered.

Table 4.19: Paternal Mortality Amongst Fathers Of Brides And Grooms Marrying Under 21 In Nottinghamshire And Sussex, 1754-1800.

Occupational Group	*Total Number Of Cases*	*Number Of Dead Fathers*	*Proportion Of Dead Fathers %*
Labourers & Servants	225	36	16
Husbandmen	180	34	19
Artisans & Tradesmen	582	123	21
Farmers & Yeomen	457	76	17
Gentlemen &Professionals	92	32	35

The overall pattern of paternal mortality is similar to that found in Kent and elsewhere in the eighteenth and early nineteenth centuries: high adult mortality amongst the very wealthy and lower mortality amongst the general population.[247]

There is however other evidence that elite groups did experience sharp gains in adult life expectancy during the eighteenth century.

Table 4.20: Expectation of Life (Years) for Males Aged 25, 1600-1824.[248]

Period					
	Aristocracy	*Members Of Parliament*	*Tontine Nominees*	*Scottish Advocates*	*Fathers Listed In Marriage Licences*
1600-49	25	–	–	29	27
1650-99	27	26	28	31	29
1700-49	32	31	35	38	–
1750-99	36	37	36	38	38
1800-34	37	38	–	–	–

247 See Essay 4.

248 Razzell, *Essays in English Population History* p. 201.

The quality of evidence for most of these groups is high, but that for Members of Parliament is particularly good, with full information on birth date, entry to Parliament and date of death for over 90 per cent of cohort members. Members of Parliament and the aristocracy came from all areas of the country and probably lived in both town and country, whereas tontine nominees and Scottish advocates lived mostly in large towns and cities during the period covered by Table 4.20.[249]

There was a gain of about 12 years in adult life expectancy amongst both the aristocracy and Members of Parliament, much of it occurring in the first half of the eighteenth century. There is no information of similar quality for the general population, although the data for fathers listed in marriage licences, which covers a wide spectrum of socio-economic groups, indicates that the gains in adult mortality were not confined to the elite.

The evidence on wealth and adult mortality at a later period in the nineteenth century is ambiguous. Chadwick and others produced data to show that the wealthy lived longer than the poor, but this material was generated through a faulty methodology, using age at death as a measure of life expectancy, without allowing for the age structure of the population at risk.[250] The eminent Victorian actuary, Neison, produced a range of evidence to show that adult mortality was higher amongst the wealthy than the poor.[251] Neison's data however was based on individuals who were self-selected, and did not allow for variations in place of residence and the impact of different disease environments.

More reliable figures for a wider range of occupations were published by the Registrar-General at the end of the nineteenth century. There was little or no association between social-economic status and adult mortality in 1860-61 & 1871, but

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249 Evidence on residence of Tontine Nominees is found in F. Leeson*, A Guide to the Records of the British State Tontines and Life Annuities of the 17th and 18th Centuries* (Isle of Wight 1968). For Scottish advocates see R. Houston, 'Mortality in early modern Scotland', *Continuity and Change*, 7 (1992). For the aristocracy see Hollingsworth, 'The demography of the peerage'.

250 E. Chadwick, *Report on the Sanitary Condition of the Labouring Population of Great Britain, 1842* (Edinburgh 1965)

251 F.G.P. Neison, *Contributions to Vital Statistics* (London 1864), p. 151.

a linear gradient had begun to emerge by the first decade of the twentieth century. The white-collar group had the lowest adult expectation of life in the first period, 1860-61 and 1871. There were only modest gains in adult life expectancy amongst the skilled manual and semi-skilled groups before 1900-02, but significant increases amongst the middle class groups during this period, particularly the white-collar category. There were subsequent gains amongst all groups, but the evidence suggests that the middle classes were the first to benefit from mortality improvements.[252]

Although there are no standardised figures available for the period before 1921, there appears to have been an increase in the social class gradient in adult mortality during the early twentieth century. By 1921 the ratio of standardised adult mortality between Class I and Class V was 82 to 125. During the 1920s, 1930s and 1940s the class gradient appears to have stabilised, with adult mortality in Class V being about 40 to 50 per cent higher than in Class I.[253] However, none of the national figures allow an analysis of socio-economic status and adult mortality by place and disease environment.

Conclusion

Adult mortality in Britain was probably generally higher amongst the wealthy during the seventeenth and first half of the eighteenth century, as was infant mortality in some communities. However, the data reviewed suggests the relationship between poverty, disease environment and mortality was highly complex. The wealthy are known to have fled London and other towns during the plague, to have escaped childhood diseases such as smallpox by moving away from areas known to be affected by the disease,

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[252] Woods, *The Demography*. We have not discussed the unskilled category as it excludes labourers who were the largest occupational group in the country. Labourers had one of the lowest adult mortality rates in 1860-61 and 1871, but data is not available for the whole of the second half of the nineteenth century. See General Register Office, *Supplement to the Thirty-Fifth Annual Report* (Parliamentary Papers 1875/XVIII), pp. clxxii-clxxv.

[253] R.G. Wilkinson, 'Class mortality differentials, income distribution and trends in poverty 1921-1981', *Journal of Social Policy,* Vol. 18 (1989), p. 308.

and to have avoided marsh areas known to suffer from endemic malaria.[254] However, the wealthy were often forced to reside in unhealthy disease environments for economic reasons, such as the merchants operating in London and Truro, and the royal family living in palaces located in London and other unhealthy areas. In fact the trading and other activities of the wealthy which involved travel and contact with a range of different disease environments partly explains the high mortality of the wealthy in the early modern period, although life-style factors were also probably very important.

The data reviewed in this essay provides little support for McKeown's argument that mortality declined first amongst the general population and then later amongst the rich. The reduction of infant and child mortality first took place amongst the aristocracy, gentry, merchant and professional families. This reduced mortality was likely to have been the result of a range of environmental and other improvements initiated by the wealthy from the beginning of the eighteenth century onwards. The role of wealthy families in reducing adult mortality is more ambiguous.

If the arguments of this essay are correct, they support the theory of the 'epidemiologic transition' in which infectious diseases that killed both poor and rich alike were replaced by degenerative illnesses afflicting the poor more than the rich.[255] This transition was associated with the appearance of a social class/mortality gradient in infant and child mortality in the eighteenth century, before which time there seems to have been a minimal correlation between poverty and mortality.

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254 For evidence of avoidance of the plague by the rich, see S. Porter, *The Great Plague* (Stroud 1999), p. 77. The wealthy not only went to great lengths to avoid smallpox directly, but also frequently only hired servants who had previously had smallpox or had been inoculated or vaccinated. (See Razzell, *Conquest of Smallpox*). Jane Austen wrote in *Sense and Sensibility* of the avoidance of infection at the end of the eighteenth century: "the word infection … gave instant alarm to Mrs Palmer on her baby's account … and confirming Charlotte's fears and caution, urged the necessity of her immediate removal with her infant." J. Austen, *The Complete Novels* (Oxford 1994), p. 186. For the avoidance of unhealthy marsh areas, see Dobson *Contours of Death*, pp. 296-300. For a general discussion of avoidance of disease see J.C. Riley, *The Eighteenth Century Campaign to Avoid Disease* (Basingstoke 1987).

255 A.R. Omran, 'The epidemiological transition theory. A preliminary update', *Journal of Tropical Pediatrics*, Vol. 29 (1983).

In England the reduction of infant and child mortality appears to have taken place in the eighteenth and nineteenth centuries mainly as a result of improvements in sanitary conditions and public hygiene, changes in domestic architecture such as the building of houses in brick and the elimination of earth floors in houses. Other individual measures – such as inoculation and vaccination against smallpox, improved personal hygiene and better breastfeeding practices – also played a role.[256]

Most of the above improvements were the result of a cultural shift in attitude towards better hygiene, cleanliness and more effective medical treatment. Many environmental improvements were the results of local improvement acts, whereas others – such as the drainage of land – were introduced for mainly economic reasons. Contemporaries became increasingly aware of the importance of these measures for the health of both themselves and their children, although some of the improvements resulted from cultural changes in architectural fashion and personal taste.

The various environmental improvements responsible for the reduction of mortality appear to have occurred in a very structured fashion. Jones and Falkus have summarized the improvements that took place in the eighteenth century as follows:

"Brick building and fire resistant styles of architecture, street improvements, fashions for social amenities, and the new institutional form of improvement Act all tended to start out in London … [these influences led to] the transformation of the provincial towns [which] was so extensive that with only slight exaggeration, it might be termed their exit from medievalism. Since provincial towns were numerous, though small by European standards, and because they were so widely scattered about the countryside, they transmitted near-metropolitan models of a way

256 For an extensive discussion of the explanation of the decline in mortality see Razzell *Essays in English Population History*. For discussion of the role of improved personal and environmental hygiene in reducing mortality see R. Haines and R. Shlomowitz, 'Explaining the modern mortality decline: what can we learn from sea voyages?', *Social History of Medicine,* Vol. 11 (1998); S. Guha, 'Nutrition, sanitation, hygiene, and the likelihood of death: the British army in India c. 1870-1920', *Population Studies,* Vol. 47 (1993).

of life and standards of consumption to almost the whole rural population."[257]

This structure of environmental improvements is similar to the history of infant and child mortality: the first changes occurred in London and other large cities, followed by market towns, and then in small provincial rural parishes. These various improvements and the reduction in mortality also appear to have been structured by socio-economic status: first amongst royalty and the urban elite, then by provincial members of the professional middle classes, and finally amongst the general rural population. Certainly it was royalty and the aristocracy living in London who first built brick houses, eliminated earth floors and other unhygienic domestic arrangements, adopted inoculation against smallpox, and introduced a range of other sanitary and medical improvements.[258] Domestic servants also played a role in the cultural transmission of improvements throughout the eighteenth century.[259] Undoubtedly geographical factors were very important, particularly with respect to distance from and contact with London.

Poverty became more important in shaping mortality in the nineteenth century through its association with disease environment. With the development of large cities and industrial areas, social classes became increasingly geographically segregated, leading to an association of poverty with 'the slum'. We hypothesize that before the twentieth century the high mortality found in slum areas was not primarily the result of nutritional poverty, but was mainly due to unhealthy disease environments.

If as we have argued, mortality was not fuelled mainly by poverty but by disease environment, this will affect theoretical assumptions about the relationship between economic and demographic development. The evidence suggests that the reduction of mortality was not brought about mainly by economic

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257 E.L. Jones and M.E. Falkus, 'Urban improvement and the English economy in the seventeenth and eighteenth centuries', P. Borsay (ed.), *The Eighteenth Century Town: 1688-1820* (London 1990), pp. 145-146.

258 Razzell, *Essays in English Population History.*

259 J. Hecht, *The Domestic Servant Class in Eighteenth Century England* (London 1956).

factors, but was due chiefly to shifts in attitude and knowledge about health and the environment. The resulting changes in mortality and population had a significant impact on economic and social development, a theme which will be explored in detail later in the book.

5. POPULATION, POVERTY AND WEALTH: THE HISTORY OF MORTALITY AND NUPTIALITY IN ENGLAND, 1550-1850.

Introduction.

The relationship between economic development and population growth has long been a matter of controversy.[260] The debate has not only interested demographers but has attracted the attention of economic historians and other social scientists concerned with explaining economic and social change. Much of this debate has been influenced by the assumptions of classical economics, summarised by Adam Smith in his conclusion that "the demand for men, like that for any other commodity, necessarily regulates the production of men; quickens it when it goes on too slowly, and stops it when it advances too fast."[261] His analysis influenced the work of Malthus, Marx, Marshall and others, who all assumed the primacy of economics over demography. Malthus was the most influential of these thinkers, arguing that the main impact of economic factors on population change occurred through the mechanism of nuptiality, with shifts in the standard of living influencing age at first marriage and the propensity to marry.

Much of the argument has focused on England, the country in which the first classical industrial revolution took place. Up until the 1950s, it was the general consensus that population increase in England had occurred mainly as a result of a decline in mortality. Most writers on the subject argued that this reduction in mortality was primarily the result of medical and other non-economic factors, such as smallpox vaccination and an improvement in public and private hygiene.[262] In the 1970s and

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260 D. Hodgson, 'Orthodoxy and revisionism in American demography'. *Population and Development Review* 14 (1988); J. Simon, *Theory of Population and Economic Growth* (Oxford 1986).

261 A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations,* Volume 1 (Oxford 1976), p. 98. Smith emphasized the impact of poverty on mortality. *Ibid*, p. 97.

262 G.T. Griffith, *Population Problems of the Age of Malthus* (Cambridge 1926); M.D. George, *London Life in the Eighteenth Century* (London 1925); J.D. Chambers, 'Three essays on the population and economy of the Midlands', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965).

1980s the consensus shifted towards a belief that economic factors were primary in shaping population development, mainly through their impact on nuptiality and fertility. The work of E.A. Wrigley and the Cambridge Group was central to this paradigm shift.[263]

According to the findings of the Group's research, population increased rapidly during the sixteenth and early seventeenth century, followed by a period of stagnation in the second half of the seventeenth and first half of the eighteenth century, with rapid growth after the middle of the eighteenth century – a pattern similar to that found by Rickman and others working previously in the field.[264] As we have seen, most of the population changes were interpreted by Wrigley and colleagues as resulting from shifts in nuptiality and fertility due to long-term economic changes, but the evidence reviewed previously in essays 1-4 suggests that exogenous shifts in mortality were the key factors in shaping patterns of population change in the period 1550-1850.

In order to clarify these issues further, additional evidence on changes in nuptiality and mortality will be considered in this essay. No attempt will be made to construct a general demographic model. There is good reason to believe mathematical models when applied uncritically are very misleading. For example, the existing evidence suggests that infant and child mortality rose sharply for most of the eighteenth century in England, at a time when adult mortality was falling significantly. Life table models assume that infant/ child and adult mortality move in the same direction, but in the case of eighteenth century England they appear to have changed in opposite ways. Given these problems, the present essay will focus on new empirical findings and explore their possible theoretical implications.

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263 E.A. Wrigley and R.S. Schofield, *The Population History of England, 1541-1871* (London 1981).

264 Wrigley and Schofield, *The Population History*; J. Brownlee, 'The history of birth and death rates in England and Wales taken as a whole from 1570 to the present to the present time', *Public Health,* Vol. 34 (1915-16).

The History Of Nuptiality In The Seventeenth, Eighteenth And Nineteenth Centuries.

Some of the most persuasive evidence in favour of the centrality of nuptiality is data on mean age of first marriage. However, as we have seen previously, the accuracy of the findings has been criticized because of the distorting effects of migration.[265] Additionally, there is evidence that those who married in their parish of birth were sociologically and demographically unrepresentative. The marriage licences of West Sussex − covering approximately 150 parishes − contain information on parish of birth of those marrying in the late eighteenth century.

Table 5.1: Proportion Of Brides And Grooms Born In The Parish Of Marriage In West Sussex, By Groom's Occupation, 1775-1800.[266]

Groom's Occupation	*Bachelor Grooms Marrying In Parish Of Birth %*	*Spinster Brides Marrying In Parish Of Birth %*
Gentlemen & Professional	5	29
Yeomen & Farmers	34	34
Artisans & Tradesmen	17	27
Husbandmen	7	13
Labourers & Servants	2	10

Except for gentlemen and professional grooms, occupational groups associated with the ownership of property were much more likely to marry in their parish of birth than those without property. These differences were marked amongst grooms, but even among brides there was a three to one difference in the proportions

265 Ruggles, 'Migration, marriage and mortality'. See also Essay 3.

266 See D. Macleod, (ed.), 'Sussex marriage licences for the Archdeaconary of Chichester, 1775-1800', *Sussex Record Society*, Vol. 35 (1929). The number of bachelor grooms (BG) and spinster brides (SB) in each occupational group are as follows: Gentlemen & Professional: BG: 124, SB: 120; Yeomen & Farmers: BG: 396, SB: 424; Artisans & Tradesmen: BG: 863, SB: 874; Husbandmen: BG: 471, SB: 450; Labourers & Servants: BG: 227, SB: 222.

marrying in the parish of birth. These findings are mirrored in studies of overall geographical mobility. Souden concluded from his research that "the marked lifetime immobility of farmers … contrasted with labourers … would show the degree to which landholding, or its prospect, would condition movement."[267]

There is evidence that there were variations in mean age at marriage by socio-economic group in the eighteenth century. The following table is based on data from Nottinghamshire marriage licences.[268]

Table 5.2: Mean Age Of Marriage (Years) Of Spinsters, By Occupation Of Groom, Nottinghamshire, 1670-1769.[269]

Period	Labourers	Husband -men	Artisans & Tradesmen	Yeomen & Farmers	Professional & Gentlemen
1670-1689	26.1	24.7	25.1	24.2	23.8
1690-1709	25.8	24.4	24.5	24.1	23.9
1710-1729	25.9	25.0	24.7	24.5	24.0
1730-1749	25.6	24.4	24.1	24.4	24.0
1750-1769	25.0	24.4	24.2	23.6	24.7

There were slight falls in mean age at marriage in most groups during the period, but there was also a change in the pattern of marriage amongst the poorest and wealthiest occupational

267 D. Souden, *Pre-Industrial English Migration Fields* (University of Cambridge Ph.D. Thesis 1981), pp. 250, 254, 310.

268 For the source of data see T.M. Blagg and F.A. Wadsworth (eds.), *Abstracts of Nottinghamshire Marriage Licences 1577-1700* (British Record Society Index Library, Vol. 58., London 1930); T.M. Blagg and F.A. Wadsworth (eds.), *Abstracts of Nottinghamshire Marriage Licences 1701-53* (British Record Society Index Library, Vol. 60, London 1935); T.M. Blagg (ed.), *Abstracts of the Bonds and Allegations for Nottinghamshire Marriage Licences* (Nottingham: Thoroton Society Record Series, Vol. 10., Nottingham 1946-47).

269 The number of marriages on which these figures are calculated are: Labourers: 1670-89: 208, 1690-1709: 149, 1710-29: 98, 1730-49: 114, 1750-69: 124; Husbandmen: 1670-89: 405, 1690-1709: 342, 1710-29: 796, 1730-49: 526, 1750-69: 103; Artisans & Tradesmen: 1670-89: 728, 1690-1709: 728, 1710-29: 954, 1730-49: 1129, 1750-69: 1092; Yeomen & Farmers: 1670-89: 199, 1690-1709: 185, 1710-29: 132, 1730-49: 422, 1750-69: 733; Professional & Gentlemen: 1670-89: 180, 1690-1709: 206, 1710-29: 255, 1730-49: 189, 1750-69: 186.

categories. In the earliest period 1670-89 the mean age of first marriage amongst labourers' wives was 26.1 years, as against 23.8 years for professionals & gentlemen. This difference had disappeared by 1750-69, with a mean age of 25.0 years for the former and 24.7 years for the latter.[270]

Marriage licence and reconstitution data does not include information on the proportion of women ever married. To create this type of data, and it is necessary to turn to censuses and other sources to analyse this aspect of nuptiality.

A number of local enumeration listings have survived with information on age and marital status, as well as church records with similar information for court witnesses.[271] Although the data from the local enumerations is more reliable than that from church court depositions − including information on the complete population rather than samples of court witnesses − the depositions are not restricted to one individual place but cover a large number of different parishes within a regional district. The following table summarizes the enumeration and church court data, comparing the proportions ever married with that for England & Wales in 1851.[272]

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270 For further evidence on socio-economic status and age at marriage see Table 9.5, p. 242 and Table 9.7, p. 244. It is possible that the increase in age at marriage amongst professional and gentlemen families was partly the result of declining mortality during this period.

271 The witnesses to church courts came from a wide range of backgrounds and although not a random sample of the general population, they provide a valuable source of information on marriage patterns.

272 The figures for Chilvers Coton, Lichfield and Stoke-on-Trent are taken from P.E. Razzell, *Essays in English Population History* (London 1994), p. 218; the data for 1851 is from B.R. Mitchell and P. Deane, *Abstracts of British Historical Statistics* (Cambridge 1976), p.16. The figures on East Kent depositions are based on an analysis of church court deponents with surnames A-K in the Canterbury Cathedral Archive; the London Diocese figures are derived from information in C. Webb, (ed.), *London Bawdy Courts*, *1703-13* (London 1999), and those for the Winchester Diocese are based on *Winchester Diocese Consistory Cause Papers*, *1700-35* (Manuscript, Society of Genealogists' library). The enumeration figures for Wetherby, Wembworthy, Cardington, Astley, Corfe Castle, and Ardleigh are derived from census schedules lodged in the library of the Cambridge Group. The source of data and the total number of women in each age group is as follows: East Kent, Church Court Depositions: 15-19: 15, 20-24: 60, 25-34: 109, 35-44: 77, 45+: 132. Chilvers Coton, Local Enumeration: 15-19: 52, 20-24: 35, 25-34: 59, 35-44: 48, 45+: 69. Lichfield,

Table 5.3: Proportions Of Women Ever Married In Individual Parishes, 1585-1851.

		Age Group – Proportion Of Females Ever Married				
Place	*Period*	*15-19*	*20-24*	*25-34*	*35-44*	*45+*
		%	%	%	%	%
East Kent	1585-1628	7	42	83	95	100
Chilvers Coton, Warwickshire	1684	9	23	64	90	100
Lichfield, Staffordshire	1695	1	15	72	87	98
Stoke On Trent, Staffordshire	1701	0	17	69	86	91
London	1700-1713	0	37	72	88	98
Hampshire	1700-1730	0	38	77	100	98
Wetherby, Yorkshire	1776	3	41	69	93	86
Wembworthy, Devon	1779	0	13	63	85	100
Cardington, Bedfordshire	1782	3	43	85	93	100
Astley, Warwickshire	1782	0	33	79	100	100
Corfe Castle, Dorsetshire	1790	0	27	62	81	81
Ardleigh, Essex	1796	0	32	75	91	99
England & Wales	1851	0	20	64	84	91

Table 5.3 indicates that there were no linear changes in nuptiality between 1585 and 1851, and there was considerable variation

Local Enumeration: 15-19: 171, 20-24: 147, 25-34: 262, 35-44: 200, 45+: 274. Stoke On Trent, Local Enumeration: 15-19: 69, 20-24: 64, 25-34: 124, 35-44: 100; 45+: 161. London, Church Court Depositions: 15-19: 24; 20-24: 40; 25-34: 89; 35-44: 69; 45+: 66. Hampshire, Church Court Depositions: 15-19: 11; 20-24: 26; 25-34: 26; 35-44: 57; 45+: 51. Wetherby, Local Enumeration: 15-19: 32; 20-24: 27; 25-34: 29; 35-44: 27; 45+: 63. Wembworthy, Local Enumeration: 15-19: 9; 20-24: 8; 25-34: 16; 35-44: 13; 45+: 13. Cardington, Local Enumeration: 15-19: 36; 20-24: 28; 25-34: 43; 35-44: 43: 45+: 72. Astley, Local Enumeration: 15-19: 20; 20-24: 6; 25-34: 14; 35-44: 11; 45+: 17. Corfe Castle, Local Enumeration: 15-19: 54; 20-24: 44; 25-34: 92; 35-44: 62; 45+: 94. Ardleigh, Local Enumeration: 15-19: 64; 20-24: 60; 25-34: 96; 35-44: 44; 45+: 80.

across time and place.[273] Some of this variation is probably a function of sample size and data source, and there is a suggestion in the enumeration data that marriage age may have risen slightly in the eighteenth century, before falling in the nineteenth. This however appears to have been accompanied by a reduction in the proportion of women ever married, a trend consistent with the church court data.

A reduction in the age of marriage and an increase in the proportion of women never marrying may well be linked. During the late seventeenth century about 26 per cent of spinsters in East Kent married widowers, and on average they married 3.8 years later than spinsters marrying bachelors.[274] By the beginning of the nineteenth century, the proportion of spinsters marrying widowers had fallen to 11 per cent,[275] probably reflecting the diminished number of widowers available for marriage due to a reduction in adult mortality. We can hypothesize that many spinsters who had married widowers in the early eighteenth century were unable to find marriage partners in the later part of the century, leading in some areas to a fall in the mean age of marriage but a rise in the number of women never married.

The balance of evidence does not suggest that nuptiality and fertility were the central factors in population change in England during the seventeenth, eighteenth and

273 There is some evidence that the propensity to marry among women at the end of the seventeenth century was higher amongst wealthy families than the general population. The combined proportion of women married or widowed in Lichfield and Stoke-on-Trent is as follows amongst elite families (with domestic servants), and non-elite families (without domestic servants). (Number of marriages are in brackets). Elite Families: 15-19: 0% (25), 20-24: 15% (27), 25-34: 69% (62), 35-44: 95% (38), 45+: 99% (74); Non-Elite Families: 15-19: 1% (186), 20-24: 10% (213), 35-34: 58% (288), 35-44: 87% (247), 45+: 93% (348). This data is based on an analysis of transcript of the Lichfield 1695 Marriage Duty listing kindly provided by the Birmingham & Midland Society for Genealogy & Heraldy. For the Stoke-on-Trent 1701 listing see D.A. Gatley (ed.), *The Stoke-upon-Trent Parish Listing, 1701* (Staffordshire Record Society, *Collections for a History of Staffordshire*, Fourth Series, Vol. 16 , 1994).

274 These figures are based on the first 1000 East Kent marriage licences for the period 1661-1676. J.M. Cowper (ed.), *Canterbury Marriage Licences, 1661-76* (Canterbury 1896).

275 This figure is derived from the first 1000 East Kent marriage licences for 1810-37. A.J. Willis (ed.), *Canterbury Marriage Licences, 1810-37* (Chichester 1971).

nineteenth centuries. The next section will examine further evidence for the relationship between socio-economic status and the fall in mortality during the same period.

Socio-Economic Status And Changing Infant And Child Mortality In The Seventeenth, Eighteenth And Nineteenth Centuries.

In order to evaluate McKeown's argument that mortality fell first in the general population and only subsequently amongst the wealthy, it is necessary to control for geographical area. A special analysis of infant and child mortality in the county of Bedfordshire has been carried out, covering all parish registers up to the year 1851.[276] These registers record the families of clergymen, gentlemen, esquires, and members of the aristocracy. The registration of elite families was sufficiently well-defined in parish registers to attract a special tax under the 1695 Marriage Duty Act, and all births of children of gentlemen fathers were taxed a minimum of twenty-two shillings, as against the standard charge of two shillings.[277]

Baptisms to clergymen, gentlemen, esquires and members of the aristocracy were selected from the parish registers, and the next family in the register was chosen as a control.[278] A total of 115 parishes from all parts of Bedfordshire were included in the research, some of these were towns but the majority were small country parishes with a population of less than 500 in

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[276] Most of these parish registers were published by the Bedfordshire Record Office and all the registers for the county are lodged in the Society of Genealogists' library.

[277] D.V. Glass (ed.), *London Inhabitants Within the Walls* (London 1965), p. xi.

[278] Only families with information on father's name were selected for study. Of the 731 elite families, 230 were clergymen (31%), 328 gentlemen (45%), 140 esquires (19%) and 33 aristocrats (5%). There was information on the occupation of 280 (38%) of the 731 control families, of which 149 were labourers (53%). More elite families were located in the parish registers during the seventeenth than the eighteenth and nineteenth centuries, and this may have been because information on elite status was more systematically recorded in the earlier period, although there is some evidence that an increasing number of elite families baptised their children in London during the later period.

1801.[279] Same-name inflation ratios were used to correct for burial under-registration; the results of this research are summarized as follows.

Table 5.4: Estimated Infant And Child Mortality (1-4) Rates (Per 1000) Amongst Elite And Control Families In 115 Bedfordshire Parishes, 1600-1849.[280]

Period	*Elite Families*			*Control Families*		
	IMR	CMR	IMR + CMR	IMR	CMR	IMR + CMR
1600-49	98	90	188	144	66	210
1650-99	147	99	246	166	164	330
1700-49	239	53	292	195	139	334
1750-99	136	49	185	245	127	372
1800-49	86	50	136	99	101	200

Combined infant and child mortality increased sharply in Bedfordshire between 1600-49 and 1700-1749, by more than a half amongst both elite and control group families. Mortality was slightly less amongst the elite group in the periods up to the middle of the eighteenth century, but after 1750 mortality grew amongst the control group at a time when it fell amongst the elite population, leading to a significant mortality gradient.[281] Infant and child mortality did not begin to diminish in the control group until the early nineteenth century when it decreased sharply,

279 All 129 printed transcripts of Bedfordshire parish registers were included in the research, of which 115 had information on elite and control families.

280 The numbers of baptisms (B) and children at risk (CR), with same-name inflation ratios in brackets are: Elite Families: 1600-49: B: 873, CR: 634 (57/45); 1650-99: B: 854, CR: 625 (57/44); 1700-49: B: 486, CR: 336 (32/27); 1750-99: B: 458, CR: 311 (12/11); 1800-49: B: 464, CR: 302 ((10/8). Control Families: 1600-49: B: 799, CR: 604 (51/28); 1650-99: B: 663, CR: 502 (61/40); 1700-49: B: 558, CR: 423 (78/61); 1750-99: B: 471, CR: 342 (36/24); 1800-49: B: 591, CR: 467 (13/8).

281 135 of 168 (80%) elite same-name cases were traced in the burial register, as against 161 of 239 (67%) in the control group, indicating that burial registration was more accurate in the former than in the latter.

somewhat similar to the pattern found in Table 4.12 for the Cambridge Group and nine rural parishes.[282]

Another source of data enabling an analysis of socio-economic status and child mortality is that provided by Boyd. The following table summarizes infant and child mortality rates in London corrected by same-name inflation ratios. The analysis contrasts data for the total sample with that for members of the twelve leading mercantile trading companies,[283] although after 1750 there is insufficient information on wealthy families for a breakdown of this data.[284]

Table 5.5: Estimated Infant And Child (1-4) Mortality (Per 1000) In The City Of London, 1539-1849.

	Total Sample			*Elite Merchants*		
Period	*IMR*	*CMR*	*IMR + CMR*	*IMR*	*CMR*	*IMR +CMR*
1539-1599	155	168	323	121	134	255
1600-1649	238	224	462	222	191	413
1650-1699	256	282	538	261	291	552
1700-1749	409	176	585	422	240	662
1750-1799	263	270	533	–	–	–
1800-1849	141	118	259	–	–	–

282 The pattern of infant and child mortality amongst the control group is similar to that found in Poddington and Elstow in the eighteenth and nineteenth centuries. See Table 3.11, p. 74.

283 B. Weinreb and C. Hibbert, *The London Encyclopedia* (London 1983), pp. 167-177.

284 For the source of this data see footnote 32. For the period 1750-1849 the data was supplemented by volumes 2-8, which included additional information for the parishes of St. Nicholas and St. Lawrence Old Jewry. There are insufficient numbers to use different same-name ratios for the two groups in Table 5.8. The numbers of baptisms (B) and children at risk (CR) are: Total Sample: 1539-99: B: 839, CR: 616; 1600-49: B: 1073, CR: 770; 1650-99: B: 1020, CR: 686; 1700-49: B: 704, CR: 387; 1750-99: B: 720, CR: 435; 1800-49: B: 199, CR: 102. Elite Merchants: 1539-99: B: 485, CR: 404; 1600-49: B: 610, CR: 485; 1650-99: B: 465, CR: 340; 1700-49: B: 194, CR: 131. The same-name inflation ratios are: 1539-99: 48/31, 1600-49: 83/52, 1650-99: 99/67, 1700-49: 68/39, 1750-99: 60/36, 1800-49: 8/4.

Mortality was lower amongst the elite group than in the total sample population during 1539-1649, but this differential was reversed in the period 1650-1749, when mortality was higher amongst elite families.[285] However, the most striking feature of Table 5.8 is the marked increase in infant and child mortality between 1539-1599 and 1700-49 in both groups,[286] similar to the pattern in Bedfordshire. In London, the combined mortality rate more than doubled in elite families, and nearly doubled amongst the total sample population during this period.[287]

The combined infant and child mortality rate in London was 615 per 1000 in 1750-74, 458 per 1000 in 1775-99 and 259/1000 in 1800-49. This scale of fall is similar to that found by Landers amongst London Quakers during the same period,[288] suggesting that there was a general reduction in infant and child mortality in all socio-economic groups at the end of the eighteenth century.

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[285] There is some evidence that wealthy families placed their young infants out to nurse in more healthy parishes during the late sixteenth and early seventeenth century, and this may have been the main reason for their lower mortality during this period. R. Finlay, *Population and Metropolis: the Demography of London, 1580-1650* (Cambridge 1981), p. 94.

[286] It should be noted that this increase in mortality occurred in London despite the disappearance of the plague in the 1660s. According to Forbes' study of the parish register of Aldgate – which lists age and cause of death in the period 1583-99 − plague was mainly a disease of adolescents and young adults. T.R. Forbes, *Chronicle from Aldgate* (New Haven 1971). This conclusion is confirmed by the analysis of the parish register of Allhallows London Wall , which also lists age and cause of death for the period 1574-98. Of 121 plague deaths in Allhallows, only 14 − 12 per cent − were under the age of five, and the mean age of death was 19 years. See R. Hovenden, *The Register of Christenings, Marriages and Burials of the Parish of Allhallow London Wall, 1559-1675* (London 1878). The Hollingsworths however argued from a study of age at death in the parish of St. Botolph without Bishopsgate for the year 1603 that children were particularly vulnerable to plague. M.F. Hollingsworth and T.H. Hollingsworth, 'Plague mortality rates by age and sex in the parish of St. Botolph's without Bishopsgate, London, 1603', *Population Studies*, Vol. 25 (1971).

[287] The increase in infant and child mortality is similar to that found by Landers amongst London Quakers in the period between 1650 and 1749. J. Landers, 'Mortality and metropolis: the case of London, 1675-1825' *Population Studies* Vol. 41 (1987), p. 64.

[288] Landers, 'Mortality and the metropolis', p. 64.

Evidence from the Registrar-General's early reports indicates little or no association between wealth and mortality in London during the mid-nineteenth century. The following table summarizes data on average rateable value of housing and mortality in London's thirty registration districts.[289]

Table 5.6: Infant, Child And Adult Mortality In London By Rateable Value of District, 1838-44.

Registration Districts	*Mean Annual Value Of Rated Property On Each House*	*Infant Mortality Rate Per 1000*	*Child (1-4) Mortality Per 1000*	*Adult (25-44) Male Mortality Per 1000*
10 Districts With Lowest Rateable Value	£15	153	52	13
10 Districts With Medium Rateable Value	£26	168	59	15
10 Districts With Highest Rateable Value	£58	167	58	13

289 See General Register Office, *Fifth Annual Report*, p. 446; General Register Office, *Eighth Annual Report*, pp.192, 193; General Register Office, *Ninth Annual Report (Folio Edition)*, pp. 236-238. Infant mortality rates were calculated by expressing deaths in the first year as a proportion of births; child and adult mortality rates were derived by dividing deaths in the appropriate age categories by the population size multiplied by 1000. The districts in the three rateable value groups − in order of value − were as follows: 1. Lowest mean rateable value: Bethnal Green, Camberwell, Shoreditch, Bermondsey, Newington, Stepney, St George Southwark, Greenwich, Rotherhithe, Lambeth. 2. Medium rateable value: Hackney, Whitechapel, St George-in-the-East, Islington, East & West London, Clerkenwell, St Saviour & St Olave, St Luke, Kensington & Chelsea, Holborn. 3. Highest mean rateable value: Poplar, Westminster, Pancras, St Giles, Strand, Marylebone, St James Westminster, City of London, St George Hanover Square.

Districts with the smallest mean rateable values − mainly in the East End of London − had the lowest infant and child mortality rates, as well as one of the lowest adult mortality rates. However, the differences in mortality levels were relatively small, suggesting that there was no significant link between wealth/poverty and mortality in London during this period.[290] Evidence to be reviewed suggests that the wealth of a district was not always reflected in the quality of its public sanitation. For example, in Cheapside, which was one of wealthiest areas of the City of London, there were no drains even as late as 1844, and night soil was still being discharged directly onto the streets.[291]

The Liverpool parish register contains detailed information on father's occupation during the period 1675-1749, allowing the following analysis of infant and child mortality:

290 There is some independent evidence to support this conclusion. Infant mortality amongst Quakers in London in 1825-49 was 150 per 1000, identical to the rate amongst the total population living in equivalent registration districts in 1838-44. Quakers by this period were mainly wealthy merchants and professionals, and the registration districts included in the sample were as follows: Islington, Clerkenwell, Holborn, St. Lukes, City of London, Bermondsey, Rotherhithe, St. Saviours & St. Olaves, St Georges Southwark, Lambeth, Newington, and Camberwell. See Landers, J., 'London mortality in the "long eighteenth century": a family reconstitution study', *Medical History*, Supplement No. 11 (1991), pp. 6-7; General Register Office, *Eighth Annual Report*, pp. 192-93.

291 See p. 171.

Table 5.7: Estimated Infant and Child (1-4) Mortality (Per 1000) Of Merchants & Professionals And The Total Population Of Liverpool, 1675-1749.[292]

Period	*Merchants & Professionals*			*Total Population*		
	IMR	*CMR*	*IMR + CMR*	*IMR*	*CMR*	*IMR + CMR*
1675-1712	201	205	406	202	201	403
1713-1749	172	237	409	192	293	485

There was little or no difference in infant and child mortality amongst merchants & professionals and the general population in 1674-1712. In the following period, 1713-49, mortality increased significantly amongst the general population at a time when it was static amongst the elite group. Most of this increase in mortality in the general population was amongst the 1-4 age group, opening a social class gradient in this age category.

We may summarize the evidence reviewed on the history of socio-economic status and infant and child mortality as follows:

1. Infant and child mortality increased sharply amongst both rich and poor in London from the early seventeenth century, and in Bedfordshire and probably elsewhere, from the middle of the seventeenth century onwards.
2. Levels of infant and child mortality were similar amongst the wealthy and poor in both town and countryside until the end of the seventeenth century.

292 The data is based on all entries in the *Liverpool Parish Register* for the period 1675-1749. The register is lodged in the Society of Genealogists' library. The number of baptisms (B) and children at risk (CR), with same-name inflation ratios in brackets are: Merchants & Professionals: 1675-1712: B: 512, CR: 337 (44/30); 1713-49: B: 456, CR: 219 (35/25); Total Population: 1675-1712: B: 2949, CR: 1915 (227/134); 1713-49: B: 4539, CR: 1954 (354/175).

3. Early mortality began to fall amongst elite families from the middle of the eighteenth century onwards, although in some towns this appears to have occurred at the beginning of the century.
4. Infant and child mortality only reduced amongst the general population during the late eighteenth and early nineteenth century.

Discussion

Two of the most important findings in the above evidence on mortality were the relative lack of an association between socio-economic status and infant and child mortality before the eighteenth century, and a very significant increase in infant and child mortality in London, Bedfordshire and elsewhere during the seventeenth century.

This increase in mortality was probably the result of a growth in disease virulence. Similar increases in infant and child mortality have been found for a number of other urban and rural parishes in England during this period.[293] Dobson has presented evidence for population decline in late seventeenth and early eighteenth century south-east England, suggesting that it was the

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293 There is information on twelve Cambridge Group parishes for the period after 1550, showing a modest growth in infant mortality but a significant increase in child mortality − of about 55 per cent − between 1550-99 and 1700-49. Wrigley and Schofield, *The Population History*, p. 249. More recent figures covering a larger group of parishes for the period 1580-1849 indicate higher levels of infant and child mortality, but with similar proportionate increases between the late sixteenth and middle of the eighteenth century. Wrigley *et.al.*, *English Population History*, pp. 226, 251. Equivalent increases in mortality occurred in York and London during the same period. C. Galley, *The Demography of Early Modern Towns: York in the Sixteenth and Seventeenth Centuries* (Liverpool, 1998), pp. 92-93. However none of this data has been corrected for burial under-registration. The evidence on adult mortality suggests no significant change in mortality in the seventeenth century. See Essay 3 of the present volume.

result of the '*unification microbienne du monde*',[294] with the introduction of a range of new diseases, including malaria.[295]

There is a consensus that incomes improved significantly during the period 1600-1749, with real wages growing by approximately 50 per cent.[296] The increase in infant and child mortality during this period of growing real incomes suggests that the nutritional standard of living did not play a significant part in shaping mortality patterns.[297]

Diseases like smallpox are known to have increased significantly in virulence from the sixteenth century to the late nineteenth century.[298] Other infections – in particular diseases classified by contemporaries as "fever" – also increased significantly during the seventeenth century.[299] Typhus was probably introduced into England from the Continent during the middle of the sixteenth century.[300] It affected rich and poor alike and became widespread in both town and countryside during the seventeenth century.[301] However, typhus was much more fatal to

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294 E. Le Roy Ladurie, 'Un concept de l'unification microbienne du monde xive-xviie siecles', *Le Territoire de L'historien* (Paris 1978).

295 M. Dobson, 'The last hiccup of the old demographic regime: population stagnation and decline in late seventeenth and early eighteenth-century south-east England', *Continuity and Change*, Vol. 4 (1989).

296 Wrigley and Schofield, *The Population History*, pp. 408, 642-643.

297 For a general discussion of economic development and mortality in the early modern period, see J. Hatcher, 'Understanding the population history of England 1450-1750', *Past and Present,* Vol. 180 (2003).

298 Razzell, *The Conquest of Smallpox*, pp. 166-180.

299 Fever and ague account for about 6 per cent of all deaths in Aldgate during 1583-99, most deaths occurring amongst adolescents and adults. See Forbes, *Chronicle from Aldgate.* See also *Allhallows in the Wall Burial Register* for a similar level of fever deaths. According to the London Bills of Mortality, about 15 per cent of all deaths were due to fever in the first half of the eighteenth century, again most of them taking place amongst adults. Vann & Eversley, *Friends in Life and Death*, pp., 212-215, 234. Fever appears prominently in some Bedfordshire burial registers after the end of the seventeenth century. See the *Riseley Parish Register*, p. Bi, and *The Milton Ernest Parish Register*, p. xi, in the Society of Genealogists' library.

300 H. Zinsser, *Rats, Lice and History* (New York, 1963), p. 279.

301 C. Creighton, *A History of Epidemics in Britian,* Vol. 2 (Cambridge 1965), pp. 30-33. The environmental conditions favourable to the spread of typhus appear to have been present in England well before the sixteenth century. Body lice continued to be prevalent in both town and countryside well into the

adults than children,[302] and it was probably more the virulent strains of smallpox, and other childhood diseases, imported into England with the growth of world trade that led to the increase in infant and child mortality in the seventeenth century.[303]

There were a number of changes in domestic hygiene that were possibly linked to the reduction of mortality in the early eighteenth century: the building of houses in brick, the elimination of earth floors, and the more effective washing of furniture and clothes.[304] However, most of these changes were probably first adopted by elite families, and the lack of an overall association between socio-economic status and falling adult mortality raises questions about the exact role of these improvements in the reduction of mortality.

There was a fall in the number of 'fever' deaths amongst adults in London during the eighteenth century,[305] and much of this reduction in mortality was probably linked to the gradual elimination of typhus infection.[306] Woollen underwear was replaced by linen and cotton garments during this period, and more effective washing − involving the boiling of clothing − was

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eighteenth and nineteenth centuries. The prevalence of body lice is illustrated by entries in the Riseley parish register: four deaths are listed in the period 1690-1742 as a result of 'eaten up of lice'. See *The Riseley Parish Register,* p.Bi.

302 A.J. Saah, 'Rickettsia prowazekii (epidemic louse-borne typhus', G.L. Mandell, J.E. Bennett and R. Dolin (eds.), *Principles and Practice of Infectious Diseases*, Vol. 2 (Philidelphia 2000), p. 2051; Creighton, *A History*, Vol. 2, p. 47. Typhus probably replaced plague as the main cause of death of adults in London and elsewhere, perhaps explaining why there was not a more general decrease in adult mortality after the 1660s.

303 Dobson, 'The last hiccup', p. 421; M. Livi Bacci, *The Population of Europe* (Oxford 2000), p. 63. For the role of world trade in spreading smallpox and yellow fever see M.B.A. Oldstone, *Viruses, Plagues and History* (Oxford 1998), pp. 4, 30, 45, 46.

304 De Saussure wrote in the late 1720s: "The amount of water English people employ is inconceivable, especially for the cleansing of their houses … Not a week passes by but well-kept houses are washed twice in the seven days, and that from top to bottom; and every morning most kitchens, staircase, and the entrance are scrubbed. All furniture, and especially all kitchen utensils, are kept with the greatest cleanliness." C. De Saussure, *A Foreign View of England in 1725-29* (London 1995).

305 Vann and Eversley, *Friends in Life and Death*, p. 234.

306 Creighton, *A History*, Vol. 2, p. 14.

probably responsible for the progressive elimination of both body lice and typhus.[307]

However, the decline of infant and child mortality in London appears to have been linked to general environmental changes associated with improvement acts introduced from the 1740s onwards.[308] There were few socio-economic variations in London's mortality in the whole period 1550-1849, suggesting that overall disease environment was more significant in this highly urbanized area than individual differences.

Other measures important for the reduction of infant and child mortality − such as better breastfeeding practices, inoculation/ vaccination against smallpox, and improved personal hygiene − were introduced at a later date.[309] During the period of rapidly decreasing infant and child mortality in the countryside − 1801-41 − per capita consumption of soap nearly doubled: from 5.3 pounds in 1801 to 9.9 pounds in 1841.[310] There is evidence that personal hygiene played a significant role in improving health and reducing mortality during the nineteenth century.[311]

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307 Gilbert White noted in 1778: "The use of linen changes, shirts or shifts, in the room of sordid and filthy woollen clothing, long worn next to the skin, is a matter of neatness comparatively modern; but must prove a great means of preventing cutaneous ails." Forty-four years later, Francis Place concluded that "the success of the cotton manufactures' had enabled the working classes to 'discard the woollen clothes which were universally worn by them, which lasted for years, and were seldom, if ever washed." See Razzell, *Essays in English Population History*, p. 223.

308 R. Porter, 'Cleaning up the Great Wen: public health in eighteenth century London', W.F. Bynum and R. Porter (eds.), *Living and Dying in London* (*Medical History,* Supplement No. 11, London 1991).

309 Razzell, *Essays in English Population History*, pp. 224-229; Razzell, *The Conquest of Smallpox*.

310 B.R. Mitchell and P. Deane, *Abstracts of British Historical Statistics* (Cambridge 1976), pp. 8, 265.

311 R. Haines and R. Shlomowitz, 'Explaining the modern mortality decline: what can we learn from sea voyages?, *Social History of Medicine,* Vol. 11 (1998); S. Guha, 'Nutrition, sanitation, hygiene, and the likelihood of death: the British army in India c. 1870-1920', *Population* Studies, Vol. 47 (1993). For a detailed discussion of the impact of improved sanitation and hygiene on childhood mortality from diarrhoea see S.E. Burger and A.A. Esrey., 'Water and sanitation: health and nutrition benefits to children', P. Pinstrup-Anderson, D. Pelletier and H. Alderman (eds.), *Child Growth and Nutrition in Developing Countries* (Ithaca 1995).

Although most of these measures were not the result of economic developments, clearly economic change did have an indirect influence on mortality. For example, agricultural improvements led to the drainage of marshland which probably contributed to the elimination of malaria, and the production of cheap cotton cloth enabled working class families to improve their standard of personal hygiene. There was also an economic element in some of the other factors responsible for mortality decline: for example the rebuilding of houses and house floors in brick and stone. However, elite social groups had always had the economic resources necessary for these improvements, and the majority of changes probably resulted from new attitudes towards disease, personal hygiene and the environment.[312] These changes in attitude and belief appear to have first influenced the educated and wealthy, and gradually spread to the general population later in the eighteenth and nineteenth centuries.

Conclusion

The evidence reviewed suggests that the structure of population change in the long period between the sixteenth and nineteenth centuries is similar to the pattern of changing mortality during the same period. Population grew rapidly during the sixteenth century when early mortality was low, it stagnated after the middle of the seventeenth century as infant and child mortality increased, and resumed rapid growth during the eighteenth century as overall mortality diminished.[313]

Population increase came to a halt in a number of European countries at the beginning of the seventeenth century and only resumed during the eighteenth.[314] For example,

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312 This shift in attitudes was partly associated with the eighteenth century enlightenment movement. The Royal Society's statistical investigation in the 1720s into the effectiveness of inoculation − comparing natural smallpox mortality with that amongst the inoculated − is perhaps the first historical example of a scientific assessment of a medical treatment. Razzell *Conquest of Smallpox*, pp. 172-74.

313 For different estimates on long-term changes in population levels see Wrigley and Schofield, *The Population History*, pp. 575, 577.

314 Livi Bacci, *The Population*, p. 8.

population had increased rapidly in Holland in the sixteenth and early seventeenth centuries in spite of half its population living in urban areas, but this growth came to an end in the middle of the seventeenth century and only resumed at the end of the eighteenth century.[315] This stationary population was probably the result of increasing disease virulence, particularly affecting the trading towns of Holland.[316] The Dutch economy stagnated during the eighteenth century[317] and on the argument of the present essay this lack of economic growth was largely a function of its static population.

Fertility appears to have played little or no role in population change in England during the eighteenth century, and most of the demographic developments were probably the result of changes in disease environment. Demographic transition theory tends to assume that both fertility and mortality were high before the period of transition, whereas the English evidence indicates a cyclical pattern in long-term mortality levels. Theories of demographic transition have also tended to emphasize the central role of economic forces in population change, but in England during the seventeenth, eighteenth and early nineteenth centuries, the evidence reviewed indicates that reductions in mortality and increases in population were not primarily shaped by levels of economic development.

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315 A.M. Van Der Woude, 'Population developments in the northern Netherlands (1500-1800) and the validity of the "urban graveyard" effect', *Annales De Demographie* (1982).

316 Livi Bacci, *The Population*, p. 63.

317 J. De Vries and A.M. Woude, *The First Modern Economy: Success, Failure and Perseverance of the Dutch Economy, 1500-1815* (Cambridge 1997).

III

Causal Factors In Mortality Decline

6. THE ROLE OF PERSONAL, DOMESTIC AND PUBLIC HYGIENE IN SHAPING ENGLISH MORTALITY PATTERNS, 1500-1899.

Introduction

Essays 3-5 suggest that there was little or no correlation between wealth and levels of infant and child mortality before the eighteenth century, and that the first reductions in these forms of mortality took place amongst royalty, the aristocracy and other members of the wealthy elite. The falls in infant and child mortality amongst the general population took place during the late eighteenth century and early nineteenth century. These reductions in mortality appear to have occurred first in cities and towns starting in the middle of the eighteenth century, and later in rural areas at the end of the eighteenth and beginning of the nineteenth century.[318]

The reasons for the exceptionally high mortality amongst royal children before 1700 must be largely speculative given the absence of serious scholarship on the medical history of the royal family, and the hygiene and sanitary conditions in palaces and royal residences during the early modern period. It is possible that the high levels of infant and child mortality in the pre-1700 period may have been a result of genetic factors. Also, there is evidence that venereal disease may have been a factor in the high infant and child mortality amongst the royalty.[319] However, the children of monarchs known to have had many illegitimate children − and therefore more likely to have suffered from venereal disease − only had a slightly higher rate of mortality than those born to monarchs without illegitimate children.[320] Also, the number of children born to each Queen was smaller in the earlier period than

318 See Essays 2-5.

319 For example, Pepys claimed that the Duke of York had given his wife venereal disease with the result that 'all her children are thus sickly and infirm.' R. Latham and W. Matthews (eds.), The *Diary of Samuel Pepys*, Vol. 9, (London 1995), p. 154.

320 The proportion dying under five was 54.6% (12 out of 22) among children born to monarchs without illegitimate children, and 68.6% (24 out of 35) to those with illegitimate children. These figures are derived from Weir, *Britain's Royal Families*.

the later one,[321] and as high fertility is known to be generally associated with high infant mortality,[322] this suggests that the large number of children dying in the pre-1700 period was not the result of purely biological factors.

Recently Johansson has argued that doctors played a central role in the reduction of mortality in elite families during the early modern period.[323] She has listed the following medical innovations and practices which might have affected the health of the wealthy and reduced their mortality: i. cinchona bark for the treatment of malaria; ii. the employment of lithotomy and new surgical techniques for cutting the stone; iii. digitalis extracted from foxglove for the treatment of gout and dropsy; iv. inoculation against smallpox; v. the use of colostrum and other improvements in infant feeding; vi. advice on hygiene and cleanliness to improve personal health; vii. medical influence on improvements of public health.[324] Most of these medical improvements have been extensively discussed in the literature,[325] but the role of doctors was probably more ambiguous than claimed by Johansson. For example, physicians greatly complicated the practice of smallpox inoculation, by introducing a period of preparation for purging and bleeding patients, a period in which patients were vulnerable to natural infection.

The role of personal, domestic and public hygiene in the mortality decline has however been relatively neglected in the literature and I will focus on this topic in the following discussion.

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321 The average number of live born children in 1500-1699 was 4.9 children, as against 7.3 children in 1700-1899.

322 See E. Garrett and A. Reid, 'Thinking of England and Taking Care: Family Building Strategies and Infant Mortality in England & Wales, 1891-1911,' *International Journal of Population Geography*, Vol. 1 (1995), for a discussion of the evidence for the association between high fertility and infant mortality.

323 Johansson, *Death and the Doctors.*

324 *Ibid*, pp. 36-46.

325 See M.D. George*, London Life in the Eighteenth Century* (London 1925)*;* G.T. Griffith*, Population Problems in the Age of Malthus* (Cambridge 1926); M.C. Buer*, Health*, *Wealth and Population* (London 1926); Razzell, *Essays in English Population History*. For the role of doctors in lowering infant and maternal mortality see A. Armstrong, *The Population of Victorian and Edwardian Norfolk* (Norwich 2000*)*, p. 63.

Sanitary Conditions And The Disease Environments Of Royal Palaces

The paradox of high mortality amongst the royal family is made even greater by what is known about the sanitary arrangements made by royalty from the early sixteenth century onwards. Henry VIII introduced extensive water supplies into most of the major royal palaces, including elaborate conduit and lead-pipe systems.[326] Bathrooms were built with running hot water in some of the palaces as a part of these improvements,[327] and Queen Elizabeth is known to have owned "a portable bath that she took with her from palace to palace."[328] Arrangements were made to discharge waste and sewerage from royal palaces into nearby rivers:

"The importance of keeping moats clean meant that all sewers and drains from the moated platform of a house had to run either over or under the moat and away from the house. The drains at Hampton Court for instance started in sumps in the floor of the kitchens, ran down the centre of the kitchen court picking up waste from the subsidiary buildings, and then out of the moat. After running across the forecourt they collected more waste from outbuildings before emptying in the river."[329]

The practice of hygiene however did not reflect these known sanitary arrangements. In King Henry's case

"it is known on medical advice the King took medicinal herbal baths each winter, and also avoided baths when the sweating sickness was about. This avoidance possibly reflected a school of thought that rated bathing as a dangerous activity which 'allowed the venomous airs to enter and destroyeth the lively spirits in man and enfeebleth the body.'"[330]

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326 S. Thurley, *The Royal Palaces of Tudor England* (Yale 1993), pp. 163-167.

327 *Ibid*, pp. 167-171.

328 A. Weir, *Elizabeth the Queen* (London 1998), p. 235.

329 Thurley, *The Royal Palaces*, pp. 172, 173.

330 *Ibid*, p. 171.

Henry VIII's practice of bathing was similar to that of his daughter Elizabeth, who used her portable bath "twice a year for medicinal purposes."[331] The problem was much more radical than could be addressed by individual royal action: as one social historian has written "the palace buildings themselves were always danger spots … [resulting from] primitive sanitation, inadequate scavenging and almost total ignorance of other elementary facts about public health bred disease."[332] There were large congregations of people attending court, and "in the heyday of Whitehall Palace it was not unusual for the Steward to provide 1,500 people with dinner on a single day."[333] The crowds included "hordes of beggars, prostitutes and pickpockets that lived on their wits right on the king's doorstep."[334]

In the earlier period, many of the royal residences had earth floors which were associated with highly unsanitary conditions: "The floors of the royal apartments [of Westminster Palace] in 1500 were still being strewn with rushes and sweet herbs that were changed daily, like sawdust in a butcher's shop … Dogs and beggars roamed the courtyards living on the scraps that fell from the royal table … It was not surprising that crowned heads and courtiers carried posies as they walked about the palace precincts to counteract the offensive smells and help ward off infection."[335]

Erasmus gave his well-known description of English buildings in 1517, which may have included some of the royal palaces that he visited: "the floors are generally spread with clay and rushes from some marsh, which are renewed from time to time but so as to leave a basic layer, sometimes for twenty years, under which fester spittle, vomit, dogs' urine and men's too, dregs of beer and cast-off bits of fish, and other unspeakable kinds of filth."[336] Two foreign visitors, Paul Hentzner and Thomas Platter,

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331 Weir, *Elizabeth the Queen*, p. 235. See also L.G. Matthews, *The Royal Apothecaries* (London 1967), p.73.

332 N. Williams, *The Royal Residences of Great Britain: a Social History* (London 1960), p. 2.

333 *Ibid*, p. 7.

334 *Ibid*, p. 6

335 *Ibid*, p. 18.

336 Quoted in Razzell, *Essays in English Population History*, p. 24.

noted in 1598 and 1599 that the floors of the palaces at Greenwich, Nonsuch and Hampton Court were still strewn with rushes and hay.[337]

A recent biography of Queen Elizabeth noted how at court in the Great Hall, the "ladies of the Privy Chamber were so encumbered by their farthingales that there was no room for them all on the benches and they were obliged to eat 'on the ground on the rushes', the floors being strewn with herbs and grasses in order to scent the air and cover up the dirt."[338] The dangers to health of such flooring was pointed out by Andrew Boorde, and referring to sleeping sickness, he described how he had known "when the straw and rushes hath been cast out of a house infected, the hogs the which did lie in it, died of the pestilence …"[339] This is plausible, given that sweating sickness was probably a form of influenza, known to infect both pigs and humans.

The Eltham Ordinances issued by Wolsey in 1524 also revealed the poor sanitary conditions of the kitchens in royal palaces. Under the heading of "Scolyons, And Keeping Cleane Of The Courts", the ordinances stated that

"for the better avoyding of corruption and all uncleanesse out of the King's house, which doth ingender danger of infection … it is ordeyned, by the King's Highnesse, that the three master cookes of the kitchen shall have everie of them by way of reward twenty marks, to the intent they shall provide and suffiently furnish the said kitchens of such scoloyns as shall goe naked or in garments of such vilenesse as they now doe, and have been accutomed to doe, nor lie in the nights and dayes in the kitchens or ground by the fire-side; but that they of the said money may be found with honest and whole course garments, without such uncleannesse as may be the annoyance of those by whom they shall passe …"[340]

The hygienic state of the food prepared in such conditions must have had a major impact on the health of members of the royal

337 Razzell, *Essays in English Population History*, pp. 224, 225.

338 Weir, *Elizabeth the Queen*, p. 252.

339 H.E. Poole, *The Wisdom of Andrew Boorde* (Leicester 1936), p. 52.

340 *A Collection of Ordinances and Regulations for the Government of the Royal Household* (Society of Antiquaries, London 1790), p. 148.

family forced to consume it. The Eltham Ordinances also revealed the squalid state of the court itself, including the area immediately outside the King and Queen's chambers:

" … the yeoman wayters, upon their wayting day, avoyde and purge the haute-pace at the King's chamber-doore, of all manner servants, raskalls, boyes and others, soe as the same place be not pestered with any great number of persons, but as the King may have a large passage to the Queen's chamber; and that they see the same haute-pace to be clean kept, soe that noe ale, water, broken meate, or other thing conveyed out of the King's chamber, be cast or remaine there, to the annoyance and filthynesse of the same."[341]

The attempted reforms of the court failed, and in 1547 the Privy Council had to issue a proclamation that "no person of what degree soever shall make water or cast any annoyance within the precinct of the court."[342] At "Greenwich it was found necessary to paint red crosses on the walls of the inner courtyard so that 'none should pysse ayenst them'," particularly outside the king and queen's chambers.[343]

In some palaces the sewerage and other waste products were discharged into surrounding moats, "and a feeling letter among the State papers vividly recalls the unpleasantness involved in cleaning out a 'marvellous fowll and fylthy' moat at one of the royal palaces."[344] Like the City of London, royal palaces were usually bounded by polluted and stagnant water, and were inhabited by dense populations during the period of court residence, ideal conditions for the breeding of mosquitoes, disease and infection. The practice of emptying waste into moats was sufficiently common for Andrew Boorde to caution against letting "the filth of the kitchen descend into the moat."[345]

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341 *A Collection of Ordinances and Regulations for the Government of the Royal Household* (Society of Antiquaries, London 1790), p.153.

342 P.L. Hughes and J. Larkin, *Tudor Royal Proclamations, Volume 1, 1485-1553* (London 1964), p. 405.

343 H.M. Colvin (ed.), *The History of the Kings Works*, Vol. 4 (London 1982), p. 27.

344 *Ibid*, p. 28.

345 Poole, *The Wisdom of Andrew Boorde*, p. 25.

The internal sanitary arrangements of some of the palaces and houses of the rich were revealed by Sir John Harrington in 1596:

"… there be few great & well contrived houses, but have vaults and secret passages under ground, to convey away both the ordure & other noisome things, as also the raine water … with the fishwater coming from the kitchen, bloud and garbage of fowle, washing of dishes, and the excrements of the other houses joyned together, and all these in moyst weather stirred a little with some small stream of rain water … these thus meeting together, makes such a quintessence of a stinke, that if Paracelsus were alive, his art could not devise a stronger."[346]

However, it was not just the sanitary and hygienic conditions inside the palaces which were responsible for the very high mortality amongst the royal family. It was the large congregation of people who attended and visited the court, at all times of the year. This was recognised by the Court itself, one royal proclamation referring to the "perill oftentimes ensueth by the meanes of great assemblies of people in the time of infectious diseases."[347] Many of these came from London and other cities and towns known to be reservoirs of disease and infection, and frequent royal proclamations were issued throughout the whole of the Tudor and Stuart period attempting to prevent people attending court during periods of plague or other epidemic diseases.[348] However, it was impossible to prevent large numbers of people attending court for economic and other reasons. During Charles II's reign, a proclamation was published commanding

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346 J. Harrington, *A New Discourse of a Stale Subject, Called the Metamorphosis of Ajax* (ed. E.S. Donne, London 1962), pp. 160, 161.

347 J.F. Larkin and P.L. Hughes (eds.), *Stuart Royal Proclamations, 1: Royal Proclamations of King James I, 1603-25* (Oxford 1973*)*, p. 151.

348 See Hughes and Larkin, *Tudor Royal Proclamations*, Vol. 1, pp. 234, 235, 259, 260, 319, 320, 408; Vol. 2, pp. 318, 319, 320, 321, 322, 345, 346; Larkin and Hughes, *Stuart Royal Proclamations*, pp. 151, 152, 175, 176; J.F. Larkin (ed.), *Stuart Royal Proclamations,* Vol. 2 *: Royal Proclamations of King Charles I, 1626-46* (Oxford 1983*)*, pp. 64, 65.

"Our officers, and namely Our Knight Marshall not to suffer about or nere Our standing houses, and houses, tents, boothes, or places, to be employed for tipling-houses, selling or takeing tobacco, hott waters, or any kind of disorder, which besides the annoyance, live upon Our House and corrupt the meaner sort. The said Marshall shall cause his men to waite daily to punish and remove vagrant persons, rogues, and all sorts of beggars, idle and loose people…"[349]

Royal Palaces were also places of legal privilege, whereby bankrupts were exempt from legal process so that they became "nothing but Dens of Thieves and Bankrupts … a sacred Asylum to receive them."[350] They were also centres of healing, so that large numbers of the sick and diseased flocked to them to seek a cure. The Court struggled to regulate such practices, but without success. The royal physician "ought to espie, if any of this courte be infected with leperiz or pestylence, and to warne the soveraynes of hym, till he be purged clene, to keepe hym oute of courte. There ought no perilous syke-man to lodge in this courte …"[351]

Part of the problem was that the sovereigns themselves accepted their duty to cure diseases like scrofula (the King's Evil), believed to be curable by the sovereign's touch. The practice had been revived by Queen Elizabeth, and "at Whitehall and on progress, Elizabeth would regularly 'press the sores and ulcers' of the afflicted 'boldly and without disgust'"[352] King Charles I was particularly concerned to regulate the practice and issued a series of proclamations between 1629 and 1632 attempting to control the times people could approach him at the Court for the purposes of cure.[353] His son, Charles II seems to have been more relaxed about touching for the King's Evil, and touched nearly 1,700 people in the first two months after his restoration,[354] attempting to heal not

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349 *A Collection of Ordinances and Regulations*, p. 352.

350 M. Misson, *Memoirs and Observations in His Travels over England* (London 1719) p. 224.

351 *A Collection of Ordinances and Regulations* p. 43.

352 Weir, *Elizabeth the Queen*, pp. 58, 226.

353 Larkin, *Stuart Royal Proclamations*, pp. 238, 239, 330, 331, 332, 349.

354 L. Picard, *Restoration London* (London 1997), p. 79.

only people suffering from scrofula, but also people displaying "other miscellaneous symptoms".[355] The last monarch to touch for the King's Evil was Queen Anne, who last performed the ritual on the 27th April 1714, three months before she died.[356]

Royalty was however concerned about protecting its young infants against the dangers of infection. For example, King Henry VIII issued in 1537 the following proclamation with reference to the baptism of his son Edward:

"His highness, being credibly informed that there is and hath been great infection of the plague within the city of London and the suburbs of the same, doubting that a great multitude of his loving subjects being joyous (as they have cause) of the birth of the said noble prince would make their access to his grace's court, whereby peril might ensue; doth therefore straightly charge … all … his subjects … shall [not] repair of resort unto his said grace's court …"[357]

King Charles issued a proclamation in 1630 in which he announced the removal of the christening of Prince Charles into the country, on account of "the present danger of the pestilence so fearfully dispersed in severall parts of this our City of London."[358] It is perhaps for this reason, that the royal children were often sent to live in country houses outside London at Hanworth, Ditton, Beaulieu, Hertford, Woodstock, Ampthill, Enfield, Guildford, Working, Otford, Westenhanger, Hunsdon, Tyttenhanger, Hatfield and Ashridge.[359] We know little about the conditions in these houses, except that most of them appear to have had no running water and suffered from the most primitive sanitary conditions.[360] In any event, most of the royal children had apartments in the

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[355] Picard, *Restoration London*, p. 80.

[356] M. Bloch, *The Royal Touch* (London 1972), p. 220. The Whigs played a central part in these cultural changes, as well as with medical innovations such as inoculation against smallpox. See A. Wilson, 'The politics of medical improvement in early Hanoverian London', A. Cunningham and R. French (eds.), *The Medical Enlightenment of the Eighteenth Century* (Cambridge 1991).

[357] Hughes and Larkin, *Tudor Royal Proclamations*, pp. 259, 260.

[358] Larkin, *Stuart Royal Proclamations*, p. 273.

[359] Thurley, *The Royal Palaces of Tudor England*, pp. 78, 79, 80.

[360] *Ibid*, p. 163.

major palaces in London,[361] and spent at least some time living with their parents, which would have made them very vulnerable to the diseases of the Court described above.

The dangers of royal children receiving infection from crowds of courtiers and others began virtually from the day of their birth. King Henry VII issued a series of ordinances that give us a glimpse of the way royal children were treated:

"To ordayne for christening of a Prince … the font to bee sett on a great height, that the people may see the christening, and presse not too nighe … there must bee borne before the child two hundred torches; twenty-four borne by esquires about the child, and the other borne before by yeomen … Earles, Barons, Banneretts … to beare … the child to the Queen's chamber doore … then the child to bee had into the nursery, where it shall bee nourished with a Ladie governour to the nursery nurse, with four chamberers, called rockers; and the chamberlaine … to see the nurses meate and drinke bee ever asayed while she giveth the child sucke; and a phisition to stand over every meale, and see what meate or drinke shee give the child."[362]

The latter part of this quote indicates the nature of the feeding of infant royal children, a mix of breastfeeding and the use of solids, including 'meate or drinke', virtually from the first day after birth. Given the very poor state of hygiene in kitchens and elsewhere in the royal palaces, the feeding of young infants with solids and artificially prepared drink must have been highly dangerous. Valerie Fildes has presented evidence to show that the benefit of colostrum available from the mother in the first three or four days was generally with-held from children on the grounds that it was thought harmful, and that it was only during the eighteenth century that the medical benefits of colostrum were realised.[363]

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361 Thurley, *The Royal Palaces of Tudor England* pp. 78, 79, 80.

362 *A Collection of Ordinances and Regulations*, pp. 126, 127.

363 V. Fildes, *Breasts, Bottles and Babies* (London 1986), pp. 81, 83, 91.

A Case Study Of Sanitary Conditions: The Diaries Of Samuel Pepys.

The diaries of Samuel Pepys provide very detailed information on personal and domestic hygiene, allowing us to explore in greater detail their possible impact on mortality levels. In order to understand the environment in which Pepys lived, it is necessary to summarise the sanitary condition of the City of London and Westminster during the seventeenth century. Before the great fire of 1666 most houses were timber-framed, and the streets were composed of irregular-shaped cobbles including a central kennel for surface drainage. Although piped water had been laid on in some houses in the City of London and elsewhere, there was virtually no internal plumbing and many houses were reliant on wells and pumps for their water supply. Some houses had cesspits built outside the house in gardens and yards, but most houses appeared to have had open vaults in basements in which all waste matter − kitchen waste, excreta, urine, rain water − was deposited.

The waste vaults were usually connected to the “houses of office” (latrines) and kitchen sinks by internal waste ducts and pipes, often made of timber, and sometimes built at an angle to accommodate latrines on the upper floors. Most households at this time used chamber pots emptied into the vaults via the “houses of office” on different floors, although very often the main latrine appears to have been located next to the kitchen,[364] presumably to allow more convenient disposal of all waste material. In the absence of water closets, most excreta and urine was deposited in the vaults through gravity, and the conditions of some of the wooden ducts particularly in hot weather must have been highly unhygienic. These internal areas of the house − with their deposits of kitchen waste and human manure − must have been ideal breeding grounds for rats, fleas, lice and other parasitic organisms, which as we will see later, afflicted Pepys, his domestic household and his social circle.

These vaults were usually emptied by night-soil men who would enter the house after nine o’clock in the evening, using the night-time to empty the contents of the vault. Sometimes the waste matter was pumped into the open street, as happened in the

[364] See J. Schofield, *The London Surveys of Ralph Tresswell* (London 1987), pp. 22-24.

following example. In the 1670s, Lord Guildford bought a house in Chancery Lane in London:

“There he found a ‘small well in the cellar, into which all the drainage of the house was received’, from closet and sink alike. When this was full a pump went to work to clear it into the open kennel (gutter) of the street. As may be imagined ‘during the pumping the stench was intolerable’, offending not only his lordship, but all the houses in the street . . . Nor was his the only house to create such a nuisance, for ‘other houses there, which had any cellars, were obnoxious to the same inconveniences.’ Guildford proposed that the inhabitants should join in making a drain along the street deep enough to discharge into the new sewer under Fleet Street, but they refused, ‘alledging danger to their houses and other frivolous matters.’” [365]

This practice of depositing manure and other waste products into the street had a long history in London, partly due to many smaller houses not having privies built into them. The statutes regulating the streets of London and still in operation in 1720, included the following:

“No Man shall cast any Urine-Boles, or Ordure-Boles into the Streets by Day or Night, afore the Hour of nine in the Night; And also he shall not cast it out, but bring it down, and lay it in the Canel, under pain of three Shillings and four pence. And if he do cast it upon any Persons Head, the Person to have a lawful Recompence, if he have hurt thereby.”[366]

The reader will note that it was only if the passer-by was damaged by the deposit of the urine and ordure boles on his head that he had any legal redress.

The above brief discussion of sanitary conditions in London during the seventeenth century is sufficient to provide the background for discussion of the detailed evidence provided by Pepys’s diary. Pepys lived in Seething Lane in the City of London,

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365 T.F. Reddaway, *The Rebuilding of London* (London 1940), p. 287.

366 J. Stow, *A Survey of the Cities of London and Westminster*, (ed., J. Strype, London 1720), Book 2, p. 307.

near to the Tower of London and next to other officials at the Navy Office. His main water supply was from a pump located in a yard shared with his neighbours,[367] and his waste was discharged into a vault located in his cellar, which he also shared with his neighbours. In the first year of the diary, the following event occurred:

"This morning one came to me to advise with me where to make me a window into my cellar in lieu of one that Sir W. Batten has stopped up; and going down into my cellar to look, I put my foot into a great heap of turds, by which I find that Mr Turner's house of office is full and comes into my cellar, which doth trouble me; but I will have it helped."[368]

Pepys agreed that Turner's night-soil should be emptied out of Pepys's cellar, although this was done through Turner's own house and with the agreement that his "vault of turds" should either be enlarged or built as a separate structure.[369] Pepys also had a problem with his other neighbours − Sir William Batten and his wife − about the "emptying of our houses of office", but after some discussion it was mutually agreed that it should be done through Pepys's "office".[370] The reasons for these disputes probably lay in the unpleasantness of the process of emptying these vaults. Pepys described how his own cellar was emptied:

"So from thence home, where my house of office was emptying, and I find they will do it with much more cleaness then I expected. I went up and down among them a good while; but … I went to bed and left them [my servants] to look after the people. So to bed … Up about 6 a-clock and find the people have just done; and Hannah not gone to bed yet, but was making clean of the yard and the kitchen … going to Sir W. Batten (having no stomach to dine at home, it being yet hardly clean of last night's turds) …"[371]

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367 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 5, p. 249.
368 *Ibid*, Vol. 1, p. 269.
369 *Ibid,* Vol. 4, p. 220.
370 *Ibid*, p. 233.
371 *Ibid*, pp. 252, 253.

The willingness to tolerate such conditions appears to have been general. On one occasion Pepys found that "my wife and maid Ashwell had between them spilt the pot of piss and turd upon the floor and stool and God knows what, and were mightily merry washing of it clean. I took no notice but merrily."[372] On another occasion, Pepys encountered by accident Lady Sandwich in his house, and "I perceive by my dear Lady's blushing that in my dining-room she was doing something upon the pott; which I also was ashamed of and so fell to some discourse…"[373] But there were times when Pepys was irritated by the conditions in which he lived, although he made no attempt to change them:

"… at night home and up to the leads [on the roof]; but were, contrary to expectation, driven down again with a stink, by Sir W. Pen's emptying of a shitten pot in their house of office close by; which doth trouble me, for fear it do hereafter annoy me. So down to sing a little, and then to bed."[374]

Pepys was often bothered by sanitary problems from adjoining houses, including flooding and damp; "In the morning, seeing a great deal of fowle water come into my parler under the partician between me and Mr Davis, I did step thither to him and tell him of it, and did seem very ready to have it stopped."[375] Pepys's basement was certainly subject to damp,[376] but much of it probably due to the internal conditions in his own house. On one occasion he kept a pet eagle in his latrine, but was glad to get rid of it, "she fouling our house of office mightily."[377] He himself was not averse to using other areas of the house for similar purposes: he once "lacked a pot but there was none, and bitter cold, so was forced to rise and piss in the chimney."[378] This is reminiscent of Boorde's earlier warning against the practice: "…beware of pissing in draughts, and permit no common pissing place to be about the

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372 Latham and Matthews, *The Diary of Samuel Pepys,* Vol. 4, p. 155.
373 *Ibid*, Vol. 5, p. 129.
374 *Ibid*, Vol. 7, p. 113.
375 *Ibid*, Vol. 1, pp. 304, 305.
376 *Ibid*, Vol. 7, p. 336.
377 *Ibid*, Vol. 5, p. 352.
378 *Ibid*, p. 357.

house or mansion … And beware of emptying of piss pots, and pissing in chimneys."[379]

Subsequently when Pepys was staying in lodgings in Greenwich to avoid the plague, he resorted to the chimney in the following way:

"And so I to bed, and in the night was mightily troubled with a looseness … and feeling for the chamber pott, and there was none … I was forced in this strange house to rise and shit in the Chimney twice; and so to bed and was very well again …"[380]

This is very similar to what happened in Charles II's court when they spent the summer of 1665 in Oxford to escape the plague; they were castigated by the diarist Anthony Wood, for "though they were neat and gay in their apparell, yet they were very nasty and beastly, leaving at their departure all their excrements in every corner, in chimneys, studies, colehouses and cellars."[381] It is not surprising given these standards of personal hygiene, that the earth in many house floors, particularly that in cellars, was used as a source of saltpetre (potassium nitrate), which resulted from the deposit of excreta and urine either from animals or human beings.[382] The deposit of excreta and urine on floors appeared to have been general in London, for in 1627, the government issued a proclamation stipulating that the earth remaining from demolished houses in London should be made available to the saltpetre men:

"That whensoever any old house or building in London, or within three miles thereof, shall be pulled downe, and the earth and Rubbish is be caried away or remooved, That before any part thereof be stirred or removed, there be notice thereof given at the Kings storehouse for the making of Saltpeter in Southwarke, and that the Deputy or workmen of Saltpeter, doe, and may first take so

379 Poole, *The Wisdom of Andrew Boorde*, p. 22.

380 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 6, p. 244.

381 Quoted in Razzell, *Essays in English Population History*, p. 205

382 For a general discussion of the use of earth floors as a source of saltpetre see *Ibid*, pp. 203-205.

much of the said Earth or Rubbish, as in their judgement and experience is fittest for Saltpeter for the Kings Service."[383]

In order to maximise the availability of saltpetre (used in the manufacture of gunpowder), the government attempted to prevent the paving "with stone, or bricke, or Floore with board … any Cellar or Vault … or do lay the same with lime, sand, gravell, or other thing, whereby the growth and encrease of the Mine of Saltpeter may be hindered or impaired."[384] It is unclear whether Pepys's cellars were paved or not, or indeed whether his kitchen which adjoined his back yard had an earth floor − most kitchens in the country had earth floors at this time − but certainly the conditions in his basement would have been highly conducive to the growth of saltpetre. The poor sanitary arrangements in Pepys's house were also reflected in the low level of personal hygiene. There is no evidence that Pepys ever took a bath, although he did occasionally wash his hands and face in cold and warm water.[385] He considered that his wife going to a public bath-house was sufficiently unusual to warrant special comment:

"… my wife being busy in going with her woman to a hot house to bath herself, after her long being within doors in the dirt, so that she now pretends to a resolution of being hereafter very clean − how long it will hold, I can guess …"[386]

Pepys was forced to sleep by himself on the next night, "my wife after her bathing alone in another bed."[387] Two nights later he was made to clean himself "with warm water; my wife will have me, because she doth herself."[388] The problem was that there was no running water in the house, and hot water was only available in very limited supply, so that when Pepys washed his "legs and feet

383 Larkin, *Stuart Royal Proclamations*, p. 159.

384 *Ibid*, p. 455.

385 See the discussion of washing and bathing in the companion volume to Pepys's diary, Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 10.

386 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 6, p. 40.

387 *Ibid*, p. 41.

388 *Ibid*, p. 44.

with warm water" he was forced to do it in the kitchen.[389] On most occasions when Pepys mentioned cleaning himself he referred to rubbing himself clean with a dry cloth.[390] He had a constant problem keeping his hair clean, and on one occasion "had Sarah to comb my head clean, which I find so foul with poudering and other troubles, that I am resolved to try how I can keep my head dry without pouder."[391] Pepys attempted to deal with this problem by having his hair cut very short and wearing a wig, but he found to his dismay that all the wigs he bought were infested with nits.[392] He himself was infested with head and body lice on more than one occasion, and summarised his problem as follows:

"So to my wife's chamber, and there supped and got her to cut my hair and look my shirt, for I have itched mightily these six or seven days; and when all came to all, she finds that I am louzy, having found in my head and body above 20 lice, little and great; which I wonder at, being more than I have had I believe almost these 20 years. I did think I might have got them from the little boy, but they presently look him, and found none − so how they came, I know not; but presently did shift myself, and so shall be rid of them, and cut my hayre close to my head."[393]

Although concerned on this occasion about lice in his hair and on his body, Pepys was much more relaxed when he stayed at an inn in Salisbury: "Up finding our beds good but we lousy. Which made us very merry …"[394] He had a very similar reaction when he discovered fleas in his bed when he stayed at Portsmouth; on this occasion he shared a bed with his colleague and friend, Dr Timothy Clarke, physician to the King's household:

"The Doctor and I lay together at Wiards the Chyrugeons in Portsmouth … We lay very well and merrily. In the morning

389 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 7, p. 206.

390 *Ibid*, Vol. 3, p. 188.

391 *Ibid*, p. 96.

392 See for example *Ibid*, Vol. 5, p. 212.

393 *Ibid,* Vol. 9, p. 424.

394 *Ibid*, p. 231.

concluding him to be the eldest blood and house of the Clerkes, because all the Fleas came to him and not to me."[395]

This anecdote illustrates one of the central features of personal hygiene in the seventeenth century: there was a strong intimacy and physicality to social life which would have facilitated the spread of much infection and disease. Dr Clarke as a royal physician was responsible for bleeding and giving physic to members of the royal family and attended the Queen during childbirth,[396] and here we see a direct link between the poor personal hygiene of Pepys and his circle and the health of the royal family. Dr Clarke's medical instruments, in particular his lancet used in treatment for bleeding and other operations on members of the royal family, were almost certainly not properly sterilised and therefore a major source of infection.

Clarke's obstetric practices were probably not dissimilar to those of contemporary midwives:

"If the membrane bag of fluid in which the baby had developed had not been broken by the time the midwife arrived, she would put her hand up the mother's vagina and break the membrane with a specially sharpened fingernail, or a sharp-ended thimble … In 1687 a midwife estimated that two-thirds of miscarriages, stillbirths and maternal deaths in childbed were due to colleagues."[397]

Fleas were clearly present in Pepys's own household, although his attitude towards them appeared to be very matter-of-fact: "… I thought myself to be mightily bit with fleas, and in the morning she [my wife] chid her maids for not looking the fleas a-days. But when I rise, I find that it is only the change of the weather from hot to cold …"[398] It is in these casual references that attitudes towards personal and domestic hygiene are so revealing: for example, when Pepys returned home to dine with his friends Batty and Mr How,

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395 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 3, p. 70.
396 See for example *Ibid*, Vol. 5, p. 197; *Ibid*, Vol. 7, p. 49.
397 Picard, *Restoration London*, p. 94.
398 *Ibid*, p. 260.

he and his wife "fell out a little about the foulness of the linen of the table …"[399]

On a more intimate level, Pepys makes references to his sexual life revealing much about his own personal hygiene: "… I went up to her [Sarah] and played and talked with her and, God forgive me, did feel her; which I am much ashamed of, but I did no more, though I had so much a mind to it that I spent in my breeches. After I talked an hour or two with her, I went and gave Mr Hunt a short visit, he being at home alone."[400]

Pepys makes no mention of washing or changing of clothes after his many sexual encounters, and it is this physicality and lack of concern with smell which probably accounts for Pepys's reaction to the following incident: "I went to Mr Crews and thence to the Theatre, where I saw again *The Lost Lady* … And here, I sitting behind in a dark place, a lady spat backward upon me by a mistake, not seeing me. But after seeing her to be a very pretty lady, I was not troubled with it at all."[401] Perhaps this tolerance to spitting has a special Pepysian flavour, but a more general tolerance might help explain the entry in the diary: "At night to supper and to bed − this night having first put up a spitting-sheet, which I find very convenient."[402] Perhaps Pepys was only following here current practice, for as Andrew Boorde had advised: "When you be out of your bed, stretch forth your legs and arms, and your body, cough and spit, and then go to your stool to make your egestion … And wash your hands and wrists, your face and eyes, and your teeth, with cold water."[403]

Hygiene within the house was reflected in the sanitary conditions of the surrounding streets; we have already seen how the waste and soil from the house was deposited onto the street, and animal manure was a constant hazard, not only from horses, but from pigs, goats, chickens, ducks and cattle.[404] Pepys

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399 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 9, p. 402.

400 *Ibid*, Vol. 3, p. 191.

401 *Ibid*, Vol. 2, pp. 24, 25.

402 *Ibid,* Vol. 3, p. 262.

403 Poole, *The Wisdom of Andrew Boorde*, p.33. The common practice of spitting may have been a factor in the spread of tuberculosis.

404 See Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 3, p. 243. One of the regulations still in force in 1720 required that 'No Man shall have any Kine, Goats, Hogs, Pigs, Hens, Cocks, Capons or Ducks in the open Street, under

constantly complained about the dirt and filth of the roads of London, frequently making it impossible for him to walk from one area of the town to another.[405]

Poor hygiene and inadequate conditions of storage also affected the quality of food and drink. Given the contamination of the soil with excreta and other waste products, and the reliance on wells and pumps, most supplies of water were probably polluted. The ladies accompanying the Portugese Queen complained "much for lack of good water to drink",[406] and although the main staple drink at this time was beer and wine, water was drunk by Pepys and his contemporaries.[407] Milk was also drunk, but sometimes with uncomfortable consequences:

"In our way [from Hackney] drinking a great deale of Milke … I was in mighty pain all night long, of the Winde griping of my belly and making of me shit often, and vomit too … this I impute to the milk that I drank, after so much beer. But the cold, to my washing my feet the night before."[408]

This quote not only reveals an ignorance of the dangers of contaminated drink, but a wariness of washing and bathing which was probably quite general at this time.[409] The diary also has a number of references to polluted food, which Pepys again appears to have been relatively tolerant of, as indicated in the following quote: "…took Commissioner Pett home with me for dinner, where my stomach was turned when my sturgeon came to table, upon which I saw very many little worms creeping, which I suppose was through the staleness of the pickle."[410] He was more ashamed of

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pain of Forfeiture of the same.' Stow, *A Survey of the Cities of London and Westminster*, Book 2, p. 306.

405 See for example Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 2, pp. 81; 188, 189; *Ibid,* Vol. 4, pp. 3, 12; *Ibid,* Vol. 8, pp. 344, 356, 444; *Ibid*, Vol. 9, pp. 9, 478.

406 *Ibid*, Vol. 3, p. 92.

407 For example, on one occasion, Pepys 'drank on wine, but sent for some water, the beer not being good.' *Ibid*, Vol. 4, p. 265.

408 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 7, p. 207.

409 *Ibid*, p. 172 for another reference to Pepys blaming the washing of his feet for an attack of colic.

410 *Ibid*, Vol. 3, p. 120.

the meat that his father and mother regularly served the children of Lord Sandwich when they were staying with them: "though they buy good meate, yet can never have it before it stinks − which I am ashamed of."[411]

Venison pasties appeared to have been particularly vulnerable to contamination: "a very good pasty of venison, better then we expected, the last stinking basely."[412] Some of the contamination of meat Pepys attributed to the weather: "… home to dinner, where a stinking leg of mutton − the weather being very wet and hot to keep meat in."[413] With the absence of proper storage facilities, and the very poor hygienic conditions inside the house, it is not surprising that food often became contaminated.

Pepys frequently describes the illnesses and poor health that he and his family, friends and colleagues frequently suffered from, although these are mainly descriptions of symptoms rather than accounts of the diseases involved. It is possible to recognise in the diary all the classical diseases known to exist at this time: plague, smallpox, typhus, tuberculosis, malaria, dysentry, gastro-enteritis, typhoid fever, measles, scurvy, scarlet fever, venereal disease, and a host of other more minor complaints. There are also a large number of deaths referred to in the diary, particularly of infants within the first few weeks of life.[414] It is impossible to calculate an objective measure of mortality from the diary because the references are too piecemeal, but Pepys did list the births and deaths of his own family of origin. There were eleven children born to his father and mother, seven of whom died during childhood; of the four who survived childhood, two of Pepys's brothers died unmarried in their thirties, and his remaining sister married but died at the age of forty-two.[415]

Pepys himself suffered from a stone in the kidney, and what he called colic; this was a chronic disorder and occurred constantly throughout the period of the diary. From the symptoms described − chronic pain, diarrhoea, flatulence and wind − this was

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411 Latham and Matthews, *The Diary of Samuel Pepys,* Vol. 5, p. 193.

412 *Ibid*, Vol. 8, p. 375.

413 *Ibid*, Vol. 9, p. 252.

414 For example, Pepys's friends Mrs Knepp and Mrs Pierce both lost infants within the first few weeks of life; see *Ibid,* Vol. 7, pp. 220, 236.

415 *Ibid*, Vol. 5, p. 361.

probably a form of gastro-enteritis, a complaint which also afflicted Pepys's wife, Elizabeth. Pepys also described other illnesses, including fever; on one occasion he described his illness as follows: "having been this day or two mightily troubled with an itching all over my body, which I took to be a louse or two that might bite me − I find this afternoon all my body is inflamed and my face in a sad redness and swelling and pimpled …"[416] This could have been an attack of typhus, but there is no way of knowing from this distance in time what particular illnesses affected Pepys and his circle of family and friends.

As we have seen, in the sixteenth and early seventeenth century infant and child mortality were relatively low in London, in spite of the very poor levels of personal, domestic and public hygiene. Death results from a number of factors, including the virulence of pathogens as well as the hygienic state of the environment.[417] Diseases such as smallpox only became really fatal after the middle of the seventeenth century, and Pepys lived through a period of transition which resulted in the high infant and child mortality of the late seventeenth and early eighteenth century.

Pepys himself survived the hazards of this environment, dying at the age of seventy,[418] but most other members of his family died young, including his wife who died at the age of twenty-nine,[419] leaving Pepys who never remarried, to be survived only by two nephews, his sister's sons.

Changes In Sanitary Conditions And The Disease Environment During The Eighteenth Century

Personal and public hygiene changed radically during the eighteenth century, and probably had a marked impact on the very high levels of mortality amongst elite and other groups outlined in

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416 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 4, p. 38.

417 This is illustrated by the current role of the MRSA staphylococcus in hospital deaths, the result of the interaction of a virulent bacteria with the poor hygienic condition of hospital environments.

418 Latham and Matthews, *The Diary of Samuel Pepys*, Vol. 1, p. xl.

419 She died from a fever during a journey to Holland. *Ibid*, p. xxxv.

the earlier sections of the book.[420] London was one of the first areas to experience the decline in infant and child mortality in England, and improvements there also had a major influence on developments elsewhere in Great Britain. As Cruikshank and Burton wrote of the Georgian city: "… virtually all significant developments were pioneered in London. Be it means of financing building speculation and building controls, architectural design, theories and aesthetics, or street paving and lighting, London was always the first testing ground."[421]

One of the major developments in London was the greater introduction of piped water − nine new water companies were founded in London between 1669 and 1806.[422] Strype summarised in 1720 the state of water supply in London as follows:

"… there is not a street in London, but … [that] Waters run through it in Pipes, conveyed under Ground: And from those Pipes there is scarce a House, whose Rent is 15 or 20 pounds per Annum But hath the Convenience of Water brought into it, by small Leaden Pipes laid into the great ones. And for the smaller Tenements, such as in Courts and Alleys, there is generally a Cock or Pump common to the Inhabitants …"[423]

Lucas gave a more detailed statement of improving water supplies in London at the later date of 1756:

"There is not a considerable street in London which is not furnished with such plenty of water, by way of aqueducts or pipes, from various sources, besides what its wells by pumps supply, that not only the ordinary offices on the ground floor, or under it, in every house, but even the upper story of most houses are, or may be, supplied with water by pipes from the common aqueducts in the street. Such is the plenty of this useful element, that in many of the great streets there … are common cocks for watering the streets

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420 For a discussion of changes in hygiene see Razzell, *Essays in English Population History*, pp. 163-172, 203-205, 223-229.

421 D. Cruickshank and N. Burton, *Life in the Georgian City* (London 1990), p. xiii.

422 R. Porter, 'Cleaning up the Great Wen: public health in eighteenth century London', *Medical History*, Supplement 11 (1991), p. 6.

423 Stow, *A Survey of the Cities of London and Westminster*, Book 1, p. 28.

in summer; from the overflowing of which, most places are supplied with water enough to suppress dust and cool the pavement in the summer, and to wash away their filth in a running stream through their cannals in the winter."[424]

We do not know in detail how these improved water supplies changed the conditions of domestic and personal hygiene, but the outcome was that by the middle of the nineteenth century most houses in London had running supplies of water. Henry Mayhew published in 1861 the results of a survey of water supply and drainage in three different types of parish, the aristocratic parish of St. James Westminster, the middle class parish of St. Anne's Soho, and the poorer parish of St. George the Martyr, Southwark. The great majority of all three parishes had running water to their houses, varying from 81 per cent in St. George's, to 96 per cent in St. Ann's and St. James's.[425] These running supplies of water allowed the introduction of water-closets, and the proportion of houses with this facility varied from 10 per cent in St. George's, 46 per cent in St. Anne's and 66% in St. James's.[426]

But more important than the introduction of water closets was the building of drains in and around the houses, which allowed the removal of kitchen waste and human manure into cesspools outside the house. Such drains were built in 88 per cent of the houses in St.George's, 97 per cent in St. Anne's, and 96 per cent in St. James's.[427] Medical and social historians have emphasized the importance of the water-closet but the introduction of house drainage probably had a more significant impact on health and mortality than any other sanitary improvement. House drains were of course only really possible with the introduction of running water, which allowed the drains to be flushed and waste to be removed from inside the house. The kind of conditions found in Pepys' house − floors and latrine ducts contaminated with excreta and urine − were almost certainly eliminated progressively throughout the eighteenth century by the building of house drains,

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424 C. Lucas, *An Essay On Water* (London 1756), p. 128.

425 H. Mayhew, *London Labour and the London Poor*, Vol. 2 (London 1862), p. 434.

426 *Ibid*.

427 *Ibid.*

which allowed the removal of cesspits from within the house, to areas in the garden and elsewhere outside the house.

This does not mean to say that sanitary conditions were ideal in mid-nineteenth century London. The surveys reported by Mayhew indicate many sanitary problems − dampness in lower floors, contaminated wells, stagnant water − particularly in the poorest parish, St. George's. There were also areas of London which had no drainage or sewerage at all: in the city parish of Cheapside, sewerage was still being pumped into the streets as late as 1844,[428] but these practices were very exceptional in Victorian London, whereas they had been very common in Pepys's time.

There were also improvements in the streets of London during the eighteenth century, resulting from the passing of a series of private improvement acts between 1740 and the end of the century. The results of these initiatives were described by Thomas Short in 1767: "Many of its [London's] streets have been widened, made straight, raised, paved with easy Descents to carry off the Water; besides Wells in most public Yards; and Pipes for conveying Plenty of fresh Water to keep them clean and sweet."[429]

The businessman, William Hutton had come to London as a young man in the middle of the century, and when he returned in 1785, he was greatly surprised to discover the transformation which had taken place in the city: "The stranger will be astonished at the improvements which have been introduced during the last 35 years and how money could be procured to complete them. He will find every street and passage in the whole city, and its environs, has been paved in one regular and convenient stile ..."[430]

Jones and Falkus have described how the environmental improvements first introduced into London spread into provincial towns during the eighteenth century, and subsequently into rural areas.[431] This dissemination of metropolitan standards of hygiene

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428 J. Ficlater, 'History and statistics of the sewerage of the Metropolis', *Journal of the Statistical Society*, Vol. 7 (1844), pp. 156, 157. Cheapside was one of the wealthiest areas of London, and the poor public sanitation of some wealthy London districts might explain the lack of a correlation between the wealth of a district and its mortality rate. (See Table 5.6, p. 136)

429 Porter, 'Cleaning Up the Great Wen,' p. 6.

430 *Ibid.*

431 See pp. 122, 123 of the present volume.

and public health into the countryside was described by Heberden in 1813:

"any body, who will be at pains to compare the condition of London, and of all great towns in England during the seventeenth century, with their actual state, and note the corresponding changes which have taken place in diseases, can hardly fail to consider cleanliness and ventilation as the principal agents in producing this reform … The same spirit of improvement, which has constructed our sewers, and widened our streets, and removed the nuisances with which they abounded, and dispersed the inhabitants over a larger surface, and taught them to love airy apartments and frequent changes of linen; has spread itself likewise into the country, where it has drained the marshes, cultivated the wastes, enclosed the commons, enlarged the farmhouses, and embellished the cottages."[432]

Although Malthus stressed economic factors in his theoretical analysis of mortality, in practice he agreed with Heberden's emphasis on public and private hygiene as the main explanatory factor in declining mortality:

"Dr Heberden draws a striking picture of the favourable change observed in the people of England since [the late seventeenth century] … and justly attributes it to the improvements which have gradually taken place, not only in London, but in all great towns; and in the manner of living throughout the kingdom, particularly with respect to cleanliness and ventilation."[433]

Malthus was also aware of the importance of "place" rather than "class"' in determining levels of mortality: "A married pair with the best constitution, who lead the most regular and quiet life, seldom find that their children enjoy the same health in town as in the country."[434] These improvements in personal and domestic

432 W. Heberden, 'Some observations on the scurvy', *Medical Transactions of the Royal College of Physicians*, Vol. 4 (1813), p. 70.

433 *Ibid*, Vol. 1 (1810), p. 118.

434 *Ibid*, p.257.

hygiene took place amongst all classes of the community, as described by Frances Place in 1822:

"the change … has taken place, not only in London, but all over the country, in the habits of the working classes, who are infinitely more moral, more sober, more cleanly in their persons and their dwellings, than they were formerly' particularly the women; partly from the success of the cotton manufactures, which has enabled them to discard the woollen clothes which were universally worn by them, which lasted years, and were seldom, if ever washed; partly from increased knowledge of domestic concerns, and the nursing and general management of children. Notwithstanding the vice, the misery and disease which still abounds in London, its general prevalence has been greatly diminished."[435]

The aristocracy and gentry probably played a key role in initiating the historical improvements in hygiene: they were responsible for the building of Queen Anne and Georgian squares in London, and disseminated this style of architecture into provincial towns and villages, along with the new standards of personal, domestic and public hygiene. Domestic servants of the aristocracy and the wealthy probably also helped disseminate the new standards of hygiene, as they visited relatives in the country or set up their own households after marriage.[436] Doctors played a critical part in this process, best evidenced by their role in improving hygiene in the army and navy during this period. Haines and Shlomowitz have recently presented evidence on falling mortality in British slave ships: crude death rates per month fell from 99 per 1000 in 1676-1700 to 37 per 1000 by 1776-1800,[437] a mortality reduction which they largely attribute to the introduction by ships' doctors and surgeons of strict rules of hygiene and sanitation.[438]

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435 F. Place, *Illustrations and Proofs of the Principles of Population* (London 1930), p. 253.

436 J.J. Hecht, *The Domestic Servant Class in Eighteenth Century England* (London 1956), pp. 200-230.

437 R. Haines and R. Shlomowitz, 'Explaining the mortality decline in the eighteenth century: what we can learn from sea voyages', *Social History of Medicine*, Vol. 11 (1998), Tables 1 and 4.

438 *Ibid*. A similar reduction in mortality as a result of hygienic measures imposed by military authorities is analysed in S. Guha, 'Nutrition, Sanitation,

These improvements in hygiene were a part of a general process taking place in England at this time.[439] M.C.Buer summarized her reading of the literature as follows:

"The importance of fresh air and cleanliness began to be preached by the best doctors in the seventeenth century and with increasing vigour in the eighteenth century. Dirt and 'all nastiness' was condemned as unhealthy … and the origin of disease began to be ascribed to dirt, damp situations, bad water and bad food instead of the will of the Almighty. It would be possible to quote pages of extracts from eighteenth century doctors preaching the efficacy of soap and water and fresh air."[440]

Mary Dobson has recently examined the sources referred to by Buer, detailing the range and complexity of medical and environmental improvements in early modern England.[441]

Conclusion

We are now in a position to summarise the conclusions reached from the review of the evidence discussed in this essay. Recent research indicates that there was little or no correlation between wealth and mortality in the period before the eighteenth century, and that the fall in infant and child mortality happened first among the aristocracy and other wealthy groups.

The following are possible factors in the decline of mortality:

1. The introduction of piped water into town houses which led to both improvements in personal hygiene and better sanitary arrangements resulting from the building of house drains and external cesspools.

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hygiene, and the likelihood of death: the British army in India c. 1870-1920', *Population Studies*, Vol. 47 (1993).

439 See V. Smith, *Cleanliness in the Development of Idea and Practice in Britain, 1770-1850* (Ph.D. thesis, London School of Economics, June 1985).

440 Buer, *Health, Wealth and Population*, p. 138.

441 M. Dobson, *Contours of Death and Disease in Early Modern England* (Cambridge 1997).

2. The paving and cleaning of streets made under various local improvement acts introduced in nearly all towns during the eighteenth century.
3. The improvement of domestic hygiene associated with the rebuilding of houses in brick and tile − in particular the replacement of earth floors with brick, tile and timber flooring in rural areas during the eighteenth century.
4. The practice of inoculation and vaccination against smallpox introduced during the eighteenth and nineteenth centuries, and other medical innovations such as the use of Peruvian Bark against malaria.
5. The introduction of better feeding practices of infants − particularly the use of colostrum in the first few days of life − and the gradual replacement of solid foods in the early months of life by breast-milk.
6. The progressive elimination of malaria with the drainage of marshlands associated with the development of agriculture.
7. The improvement in personal hygiene associated with the introduction of cotton clothing, the water closet and the bath at the beginning of the nineteenth century.

Some of these changes were linked to economic factors − such as the drainage of marshes, and the provision of public sewers and drains in urban areas − but these were not the primary reasons for the improvements in personal domestic and public hygiene, or the adoption of prophylactic measures against smallpox. Only a minority of the population lived in marshland and urban areas in the eighteenth and early nineteenth century, and most of the improvements in health and life expectancy took place in non-malarial rural areas.

Doctors and surgeons played a key role in these improvements, through their writings and influence on public authorities, which was mediated through elite private patients living in London and other large towns. Royalty and the aristocracy also played an important part in introducing improvements in hygiene and medicine at the beginning of the eighteenth century. For example, Lady Mary Wortley Montagu was responsible for introducing the practice of inoculation into England, and had her son inoculated against smallpox in 1721. The two young royal princesses − Amelia and Caroline − were inoculated in the following year, and the practice became fashionable generally amongst the aristocracy and gentry, partly as a result of the successful inoculations of the royal children, but also due to publications on the benefits of inoculation fostered by the Royal Society.[442]

These changes were an autonomous development associated with a growing realisation that health and mortality could be radically improved by the adoption of such measures, and were essentially a part of the 'medical enlightenment of the eighteenth century.'[443]

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442 P.E. Razzell, *The Conquest of Smallpox* (Firle 1977), pp. 4-6, 40.

443 See A. Cunningham and R. French, *The Medical Enlightenment of the Eighteenth Century* (Cambridge 1991).

7. INTRODUCTION TO NEW EDITION OF *THE CONQUEST OF SMALLPOX.*

Recent Research On The History Of Smallpox.

The Conquest of Smallpox was originally written as a part of the debate on the origins and causes of population increase in eighteenth and early nineteenth century Britain. It attempted to address some of the issues raised by McKeown on the relative roles of economic and medical factors in the decline in mortality during this period.[444]

The extent, age incidence and variation in case-fatality rates are all factors in shaping the demographic consequences of smallpox. It has sometimes been assumed that smallpox was mainly a disease of childhood in Britain,[445] but in some areas it affected more adults than children. In the first edition of *The Conquest of Smallpox* this was not a topic covered in any detail. Data for the age incidence of smallpox in towns indicated that it was a disease of childhood,[446] but no attempt was made to systematically assess the age structure of the disease in the countryside. There was a brief discussion indicating that smallpox did affect many adults in some areas, such as Godalming, in Surrey, but the only detailed data cited was that for Aynho, Northamptonshire, which showed that 43 per cent of cases and 68 per cent of smallpox deaths were of adults.[447]

The age incidence of smallpox is important for three reasons: 1. It is an indication of whether the disease was endemic in a particular area. 2. Case fatality varied very significantly by age. 3. Age incidence had a marked effect on the up-take of inoculation and vaccination.

During the eighteenth century smallpox is known to have been a disease of childhood in Sweden and many other

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444 T. McKeown, *The Rise Of Modern Population* (London 1976).

445 See for example, S.R. Duncan, S. Scott and C.J. Duncan, 'The dynamics of smallpox epidemics in Britain, 1550-1800', *Demography,* Vol. 30 (1993), p. 407.

446 See Razzell, *The Conquest of Smallpox,* p. 150 for some evidence on this subject.

447 *Ibid*, pp. 153, 166.

European countries.[448] In Britain it was also a disease of childhood in some areas, particularly in cities and large towns. Monro indicated "the inhabitants of Scotland generally have the smallpox in their infancy or childhood; very few adults being seen here in this disease."[449] Haygarth also implied that smallpox was mainly a disease of childhood in Cheshire and Lancashire, quoting evidence that ninety-five per cent of the militia of these counties had contracted smallpox before their entry into the militia.[450]

Evidence from parish registers suggests that there were regional differences in the age incidence of smallpox. The data for 39 parishes reveals the following pattern:[451]

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448 Razzell, *The Conquest of Smallpox*, p. 151; P. Skold, *The Two Faces Of Smallpox* (Umea 1996), p.105; K.J. Pitkanen, J.H. Mielke and L.B. Jorde, 'Smallpox and its eradication in Finland: implications for disease control', *Population Studies,* Vol. 43 (1989), p.99.

449 See Razzell, *The Conquest of Smallpox*, p. 127.

450 *Ibid,* p. 163.

451 The data for Manchester, Carlisle, Chester, and Kilmarnock is derived from Charles Creighton, *A History of Epidemics in Britain,* Vol. 2 (Cambridge 1894), pp. 527, 536, 538, 554. The figures for Thorton Lansdale and Newton Reigny are from S. Scott and C.J. Duncan, *Human Demography and Disease* (Cambridge 1998), pp. 285, 293. The figures for Whitehaven for 1751-81 are from J. E. Ward, 'Death in eighteenth century Whitehaven: the mortality records from Holy Trinity Church', *Transactions of the Cumberland & Westmorland Antiquarian & Archaelogical Society,* Vol. 98 (1998), pp. 256, 257. The information on smallpox in Birstall, Yorkshire was kindly provided by Michael Drake. All other data is based on the analysis of parish registers in the Society of Genealogists' library. Parishes were selected mainly on the basis of references to smallpox in secondary literature. Where there was specific information on age at death, children were defined as being under twenty-one; otherwise they were categorised as children where they were referred to as "son/ daughter/ child of". The age incidence of cases of smallpox would be different from the figures in this table because of variations in case-fatality by age.

Table 7.1: Smallpox Deaths Amongst Children And Adults In English Parishes.

Place	*Date*	*Number Of Child Smallpox Deaths*	*Number Of Adult Smallpox Deaths*	*Proportion Of Child Smallpox Deaths %*
Northern Parishes				
Penrith, Cumberland	1656-61	60	1	98
Adel, Yorkshire	1685-1702	16	0	100
Skipton-In-Craven, Yorkshire	1716-36	110	4	96
Newton Reigny, Cumberland	1727	9	0	100
Kilmarnock, Scotland	1728-63	622	0	100
Ackworth, Yorkshire	1745-1812	84	1	99
Thorton-in-Lansdale, Yorkshire	1750-56	24	5	83
Whitehaven, Cumberland	1751-81, 1785-86	664	4	99
Manchester, Lancashire	1769-74	588	1	99
Chester, Cheshire	1772-77	369	0	100
Hickleton, Yorkshire	1776-88	2	0	100
Braithwell, Yorkshire	1777-1812	17	0	100
Carlton-Juxta-Snaith, Yorkshire	1777-1812	6	0	100
Addingham, Yorkshire	1777-1812	41	0	100
Burhwalis, Yorkshire	1778-1803	6	0	100
Hindley, Lancashire	1779-1814	160	0	100
Carlisle, Cumberland	1779-1787	241	0	100
Heslington, Yorkshire	1782-1804	5	0	100
Askham Bryan, Yorkshire	1783-1812	6	0	100
Skipton-In-Craven, Yorkshire	1783-1812	196	2	99
Birstall, Yorkshire	1784	41	41	100
South-Western Parishes				
Truro, Cornwall	1767	53	2	96
Whittington, Shropshire	1774-76	14	0	100
Southern Parishes				
Basingstoke, Hampshire	1675-1803	147	188	44
Riseley, Bedfordshire	1690-1742	15	12	56
Godalming, Surrey	1701-23	78	79	50
Calne, Wiltshire	1704-58	211	137	61
Tenterden, Kent	1712-41	10	36	22
Banbury, Oxfordshire	1718-19	61	41	60

Place	*Date*	*Number Of Child Smallpox Deaths*	*Number Of Adult Smallpox Deaths*	*Proportion Of Child Smallpox Deaths %*
Breamore, Hampshire	1720-1803	2	10	17
Aynho, Northamptonshire	1723-24	8	18	31
Great Shefford, Berkshire	1751-67	2	1	66
Rayleigh, Essex	1753	7	18	28
St. Mary's, Southampton, Hampshire	1753-61	22	26	46
St. Mary's, Bury St.Edmunds, Suffolk	1756-57	93	66	58
Burford, Oxfordshire	1758	93	78	54
Cuxham, Oxfordshire	1772	2	6	25
Horton Kerbie, Kent	1772-1801	0	8	0
St. Lawrence, Thanet, Kent	1774-89	57	1	98
Sutton Courtenay, Berkshire	1782-1811	3	6	33

This table must be interpreted with caution. The categorisation of regions is somewhat arbitrary and some of the data refers to the late eighteenth century when inoculation was being practised, and this may have reduced the age at which people caught smallpox. Some parishes were towns with fairly substantial populations − such as Manchester, Carlisle and Chester – and this would have provided the conditions for endemic childhood disease.[452] However, overall the table suggests that there was a north/south divide, with smallpox being a childhood disease in most northern parishes, and affecting both adults and children in southern ones. The two south-western parishes − Truro and Whittington − appear to have fallen into the northern rather than southern pattern.

There is more precise information on age of death in some parishes. In the southern area, only 15 per cent of all smallpox deaths in Tenterden during 1712-42 were under the age

452 London which is not covered by the table had the vast majority of its smallpox cases amongst young children. See J. Landers, 'Mortality and metropolis: the case of London, 1675-1825' *Population Studies,* Vol. 41 (1987), p. 74.

of ten,[453] compared to 23 per cent in Aynho, Northamptonshire in 1723/24.[454] Likewise, a reconstitution study of Burford in Oxfordshire indicates that 38 per cent of smallpox deaths in 1758 were in this under-ten age category.[455] By comparison, the great majority of smallpox deaths were children under ten in the northern parishes − 88 per cent in Adel, 86 per cent in Ackworth, 94 per cent in Braithwell, 83 per cent in Burhwalis, 83 per cent in Carlton-Juxta-Snaith, 98 per cent in Addingham, 95 per cent in Skipton-in-Craven, 100 per cent in Heslington, Manchester, Chester and Carlisle. These high northern figures are similar to the proportion of smallpox deaths under the age of ten in Sweden during 1756-60 − 94 per cent.[456]

All this data suggests that southern England was quite distinctive in its age structure of smallpox. It may have been partly due to the fact that many of these southern parishes were inland, and that England's island position gave it some protection against the importation of infection. However, in the seaport town of Southampton the majority of smallpox deaths appeared to have occurred amongst adults,[457] and many northern inland districts suffered from smallpox as an endemic disease.

Evidence on inoculation also suggests that smallpox was mainly a disease of children in the north of England. For example, 83 per cent of the people inoculated in the Halifax area by Nettleton in 1723 were children under the age of seven.[458] By contrast, the general inoculations that took place in the south of

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453 This figure is derived from the analysis of *Dr Cliff's Diary* (Kent Archives Office Maidstone, P364/28/4), which lists the causes and ages of death in Tenterden between 1712 and 1742.

454 For the raw figures for Aynho, see Creighton, *A History of Epidemics,* Vol. 2, p. 520.

455 These figures were derived from J. Moody, *The Great Smallpox Outbreak of 1758* (Burford 1998).

456 The figures for Sweden are from Skold, *The Two Faces of Smallpox* p. 166.

457 It is possible that many of the adult smallpox deaths in Southampton were due to people migrating from the surrounding countryside, and this issue can only be settled by a reconstitution study of one of the parishes in the town.

458 See Razzell, *The Conquest of Smallpox*, p. 175. For other evidence of inoculation of children in the north see *Ibid*, pp. 98-102.

England involved all age groups, as in Brighton "from one day to Near Fourscore Years".[459]

Not only the age incidence, but also the small number of smallpox deaths in some southern parishes suggests that it was possible to avoid the disease for very long periods of time.[460] In a period of more than eight decades in the eighteenth century, there were just twelve smallpox deaths in Breamore, Hampshire and ten of these were adults. In Horton Kerbie, Kent, there were just eight deaths from smallpox in 1772-1801, and this low mortality was probably not the result of inoculation, for the descriptions of people dying from the disease were as follows: "a young woman", "married", "aged 61", "aged 54", "wife", "aged 61", "wife", and "aged 55".

In *The Conquest of Smallpox* I have described how people went to extreme lengths to avoid smallpox in the south of England.[461] A further example is provided by an advertisement placed in the *Chelmsford Chronicle* in 1766:

"A lad between thirteen and fourteen years of age, to be a postillion or an assistant under an older servant. He has not had the smallpox, so would rather chuse a place detached from any town."[462]

Likewise, when Joseph King of Colne Engaine, Essex was called for jury service in 1779, he wrote:

"I am warn'd to appear this day at the Sessions to be one of the Petty Jury, and I should have readily attended but am inform'd that the Small Pox is very much about Chelmsford and its neighbourhood and neither my Selfe Wife nor any of my children have had it, it strikes such a Dread and Horror upon me that I dare

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459 Razzell, *Conquest of Smallpox,* p. 122. See *Ibid,* pp. 111-122 pages for a discussion of general inoculations and the age groups involved.

460 Haygarth pointed to the small number of smallpox deaths in some southern rural parishes: in three Kent parishes there were only 10 smallpox deaths in the twenty-year period 1762-82. See *Ibid,* p. 195.

461 *Ibid*, p. 151 and the various references to the avoidance of market towns when smallpox was present.

462 J.R. Smith, *The Speckled Monster* (Chelmsford 1987), p. 21.

not venture to attend so I humbly beg of your Worship for this time to excuse me . . ."[463]

This fear of smallpox can be contrasted with the attitude of the general population in the north of England. Writing of Chester, Haygarth noted that "the lower class of people have no fear of the casual [natural] smallpox. Many more examples occurred of their wishes and endeavour to catch the infection, than to avoid it."[464] Monro observed of Scotland in 1765 that "in the villages the peasants are generally assistant to their neighbours of whose family any is sick … and [do not] fly from the place where it [smallpox] is."[465]

It is possible therefore that the variations in the age structure of smallpox were due to regional differences in attitude towards the disease. However, the more plausible hypothesis is the reverse: that a fatalistic attitude arose where smallpox was endemic and affected mainly children, whereas in southern rural areas where the disease took an epidemic form and affected children and adults alike, individuals were much more fearful of it.

The question arises as to why smallpox was endemic in northern England, the Scottish mainland and Sweden, characterised generally by dispersed populations of a rural character. In the case of the north of England it was probably partly the result of industrialisation, particularly where industrial villages existed in large numbers and where there were extensive pack-horse routes and regular communication between villages

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463 Smith, *The Speckled Monster*, p. 24. There is however some evidence that not all diseases were avoided in the way that smallpox was. The mean age of the ten people dying from smallpox in Sutton Courtenay, Berkshire in 1782-1811 was 38 years, compared to the average age of the six measles deaths − 6 years. (See the Sutton Courtenay parish register in the Society of Genealogists' library). Likewise, the mean age of the forty-five smallpox deaths in Tenterden, Kent during 1712-41 was 30 years, compared with the average age of 10 years for the fourteen people dying from measles and whooping cough. (*Dr Cliff's Diary*). This suggests that families in these two southern parishes were concerned to avoid smallpox but not the more benign diseases of measles and whooping cough. It is probable that more serious infections were avoided, particularly by the wealthy who had the means to remove their families when threatened. See Austen *The Complete Novels*, p.186.

464 See Razzell, *The Conquest of Smallpox*, p. 72.

465 *Ibid,* p. 127.

and towns. However, this would be less true of Scotland and Sweden, and perhaps the nearest to an explanation of the endemic nature of smallpox in these countries, has been put forward by Deborah Brunton. Noting that the disease was not endemic in the Scottish islands, Brunton observed:

"The epidemiological pattern of smallpox on the islands was not dissimilar to that found on the English mainland, where discrete, densely populated village communities were periodically visited by the disease. In mainland Scotland, however, smallpox showed a quite difference incidence. Much of the Scottish rural population was scattered thinly over the countryside in small settlements, called 'farm touns' consisting of a few families. As a result, infectious diseases travelled through areas very slowly and were present for long periods. In some parishes, smallpox deaths were recorded in five, or even eight, of ten years, though more typically it was present for around one-third of the time."[466]

This suggests that smallpox was difficult to avoid in these areas, which presumably explains why it was a disease of childhood. In the south of England, the smallpox epidemics tended to strike at distinct periodical intervals and were therefore highly visible, enabling avoidance of the disease.

Although it may have been possible for many people to escape smallpox altogether in some southern villages, there could be a penalty to be paid by avoiding the disease in childhood. This is illustrated in a smallpox census carried out on August 1772 in the Oxfordshire village of Cuxham. Twenty-nine children were attacked by the disease, of which only two died − 7 per cent − compared to six of twenty adults − 30 per cent.[467]

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466 D. Brunton, 'Smallpox inoculation and demographic trends in eighteenth-century Scotland', *Medical History*, Vol. 36 (1992), p. 409.

467 Details of this census are to be found in the Cuxham Marriage Register. What is surprising given the higher fatality amongst adults, is that only 2 adults as against 27 children were inoculated during this epidemic.

There is not a great deal of evidence on the case-fatality rates of smallpox by age during the eighteenth century, but one of the most detailed surveys was that carried out in Aynho during 1723-24:

Table 7.2: Age Incidence Of Smallpox Cases And Deaths In Aynho, Northamptonshire, 1723-24.[468]

Age	*Smallpox Cases*	*Smallpox Deaths*	*Case-Fatality %*
0-4	13	3	23
5-9	15	1	7
10-14	33	3	9
15-20	14	1	7
20-24	16	3	19
25-29	9	3	33
30-39	12	3	25
40+	22	9	41

The evidence suggests that there was a U-Curve distribution of case-fatality, documented in a limited way in *The Conquest of Smallpox*.[469] Although based on small numbers, the evidence for Aynho suggests there was a marked difference in the fatality of smallpox depending on age − with a 7 per cent fatality for the 5-9 age group, and 41 per cent for those over the age of 40.

There is similar evidence for this U-Curve distribution from modern times. The following table summarises the data for the unvaccinated population of Madras in 1961-69:

468 Creighton, *A History of Epidemics*, Vol. 2, p. 520.

469 See Razzell, *The Conquest of Smallpox,* pp. 166-68.

Table 7.3: Age Specific Case Fatality Rates Of Smallpox In Unvaccinated Persons In Madras, 1961-69.[470]

Age Group (Years)	*Number Of Cases*	*Case Fatality %*
0-4	2091	41.7
5-9	708	22.2
10-14	154	11.7
15-19	143	22.4
20-29	260	39.2
30-39	91	44.0
40-44	32	37.0
45+	55	61.5

Neither Tables 7.2 or 7.3 brings out variations in case-fatality amongst young children under the age of ten. Data from the Whitehaven Dispensary for the period 1783-1804 reveals the following pattern:

Table 7.4: Age Specific Case Fatality Rates Of Smallpox In The Whitehaven Dispensary, 1783-1804.[471]

Age Group (Years)	*Number Of Smallpox Cases*	*Number Of Smallpox Deaths*	*Case Fatality Rate %*
0-2	378	139	37
2-5	665	105	16
5-10	308	32	10
10+	36	3	8

Mortality was highest in the 0-2 age group, and nearly four times as high as that in the 5-10 age category. There were no children attacked in Aynho under the age of two, which might explain why the fatality rate in the 0-4 age group in the 1723/24 epidemic was relatively low.

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470 F. Fenner, *Smallpox and Its Eradication* (World Health Organisation, Geneva 1988), p. 54. For other data on the age case-fatality rates see *Ibid,* pp. 51, 53, 54.

471 See *Annual Reports of the Whitehaven Dispensary, 1783-1804*. (Cumbria Record Office, Whitehaven, Ref: YTHOS 2/60).

The figures in Tables 7.2, 7.3 and 7.4 reveal the complexity of smallpox mortality, and given the variations in age incidence and age-specific fatality rates, it is difficult to draw definitive conclusions about smallpox mortality in eighteenth century Britain. Some remote rural areas in the south may have largely avoided the disease altogether, whereas others less isolated suffered very heavy mortality; for example Burford in Oxfordshire lost about a sixth of its population to smallpox in 1758, which included both adults and children.[472] The disease appears to have affected mainly children in the north of England and Scotland, and in large towns and cities in the south of England. However, fatality would have depended very much on the exact age structure of the disease in these areas.

Age incidence not only affected mortality levels but also the practice of inoculation and vaccination. Brunton has pointed out that general inoculations were largely confined to the south of England, with little evidence that they took place in the north and in Scotland, other than in remote areas like the Shetland Islands.[473] This is probably because endemic smallpox generated a fatalistic resignation, whereas the epidemic form of the disease affected large numbers of adults, creating panic and a resort to mass inoculation and vaccination.

The minimal mortality associated with vaccination undoubtedly helped popularise this new form of inoculation. Many parents feared to impose an immediate hazard on their children where there was a possibility that they might avoid smallpox altogether. The risks of vaccination were sufficiently low to overcome this difficulty. Resistance to vaccination in countries and areas where smallpox was a disease of childhood soon disappeared. This was partly because inoculation had made gradual headway in these places before the introduction of vaccination. By the beginning of the nineteenth century smallpox had also become a very virulent disease, killing large numbers of

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472 Moody, *The Great Smallpox.*

473 D. Brunton, *Pox Britannica: Smallpox Inoculation In Great Britain, 1721-1830* (Ph.D. Thesis, University of Pennsylvania 1990).

children in areas where it was endemic, and vaccination became rapidly popular.[474]

The Impact Of Inoculation And Vaccination On Mortality And Fertility.

General inoculations covering all vulnerable members of the population were widely practised in the south of England, a conclusion confirmed by research published since the original edition of *The Conquest of Smallpox.*[475] These mass inoculations covered both children and adults, and were practised from the mid-1760s onwards. The impact of these general inoculations depended on the age incidence of smallpox and the virulence of individual outbreaks of smallpox, as well as any secondary diseases that resulted from smallpox, such as tuberculosis and infantile "convulsions". It is impossible to put a precise figure on this saving of life, but it must have been significant during the end of the eighteenth and beginning of the nineteenth centuries.

Outside the south, the decrease in mortality resulting from the practice of inoculation must have been much more modest. This was documented to some extent in the first edition of *The Conquest of Smallpox*, presenting evidence that inoculation was only gradually adopted in the north of England and in Scotland, and towards the end of the eighteenth century. For example, the proportion of smallpox to all deaths in Hindley, Lancashire was as follows:

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474 See A. Mercer, *Disease, Mortality and Population in Transition* (Leicester, 1990); D.R. Hopkins, *Princes and Peasants: Smallpox in History* (Chicago 1983).

475 Smith, *The Speckled Monster*; Mercer, *Disease Mortality*; Brunton, *Pox Britannica.*

Table 7.5: Smallpox Mortality In Hindley, Lancashire, 1779-1814.[476]

Period	*Number Of Smallpox Deaths*	*Total Number Of Deaths*	*Smallpox As A Proportion Of All Deaths %*
1779-89	50	277	18.1
1790-99	59	402	14.7
1800-09	45	532	8.5
1810-14	6	251	2.4

Virtually all smallpox deaths in Hindley were of children, with short-interval epidemics occurring every two years. Table 7.5 suggests that inoculation made only modest inroads into smallpox mortality before 1799, but significant falls took place after 1800, probably the result of the practice of vaccination and inoculation.

It is possible to trace the long-term impact of inoculation and vaccination on smallpox mortality in one northern urban parish, the town of Whitehaven. Between 1751 and 1781 there were a total of 3,138 deaths, of which 597 − nineteen per cent − were due to smallpox, most of whom were of children.[477] In 1776 local surgeons began to offer free inoculation to the poor,[478] and in 1781 the Whitehaven Dispensary began to inoculate local people *gratis*. In the following eighteen years 1,309 children were inoculated, of whom only one died.[479] The case-fatality rate of smallpox in Whitehaven was 19 per cent at this time,[480] and therefore these 1,309 inoculations saved about 250 children, an average of about 14 children per year. Given that on average approximately 20 children died annually from smallpox between 1751 and 1781, this represents a very significant saving of life.

However, according to the dispensary's reports, some of the poor continued to resist inoculation until the very end of the

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476 These figures are based on an analysis of the Hindley parish register in the Society of Genealogists' library.

477 See *Annual Reports Of The Whitehaven Dispensary*.

478 Ward, 'Death in eighteenth century Whitehaven', p. 257.

479 *Annual Reports of the Whitehaven Dispensary*.

480 *Ibid.*

eighteenth century, and it was not until the year 1804 when vaccination became universally accepted, that smallpox began to disappear as a cause of death in the annual reports.[481]

Smallpox mortality declined in Hindley and Whitehaven in a more-or-less linear fashion during the late eighteenth and early nineteenth century, but in other parishes the pattern was more complex and non-linear. For example, the parish register of Ackworth, Yorkshire gives age and cause of death for the period 1745-1812, revealing the following evidence on smallpox mortality:

Table 7.6: Smallpox Mortality In Ackworth, Yorkshire, 1745-1812.[482]

Period	*Number of Smallpox Deaths*	*Number Of All Deaths*	*Smallpox Deaths As A Proportion Of The Total %*
1745-49	3	75	4.0
1750-59	3	125	2.4
1760-69	46	301	15.3
1770-79	14	168	8.3
1780-89	15	163	9.2
1790-99	9	148	6.2
1800-09	6	175	3.4
1810-12	0	47	0.0

Smallpox mortality was very low before 1760, and only increased to more than 15 per cent in the 1760s. Thereafter mortality declined steadily, until it more-or-less disappeared in the early nineteenth century. The low mortality in the late 1740s and 1750s illustrates the variability of smallpox mortality, something that contemporaries were aware of: "it is sometimes so very Mortal, and at other Times so very mild and Favourable" and "they are

481 *Annual Reports of the Whitehaven Dispensary*

482 The table is based on an analysis of the parish register in the Society of Genealogists' library.

fatal in one Place, favourable in another and not known in a third."[483] However, Table 7.6 also indicates an increase in the virulence in smallpox in the 1760s, perhaps a part of a general growth of case-fatality in the eighteenth century.

The possible influence of smallpox on fertility is discussed briefly in *The Conquest of Smallpox*. Since its first publication, Willibrord Rutten has examined the topic through an analysis of Dutch municipal records. He concluded:

"Survivors of smallpox infection apparently had similar marriage, sterility, and fecundity rates to the general population. It is argued that smallpox was of no significance as an aetiological factor in male infertility."[484]

This conclusion is somewhat at variance with the findings of Skold's work on Swedish data. He concluded that both age at marriage and their fertility were influenced by smallpox, largely through women becoming less attractive as marriage partners due to smallpox pitting.[485] There is a lack of detailed data for Britain, but the limited evidence that is available does not indicate a relationship between smallpox and age at marriage.[486]

There has been virtually no work done on the secondary mortality resulting from smallpox. Voth and Leunig have claimed that smallpox reduced height − and therefore presumably health − amongst recruits to the Marine Society who had survived attacks of smallpox.[487] But their methodology and quality of data have been strongly criticised, and the issue of how

483 See Razzell, *Conquest of Smallpox*, p. 174.

484 W. Rutten, 'Smallpox, subfecundity, and sterility: a case study from a nineteenth-century Dutch municipality', *Social History of Medicine*, Vol. 6 (1993), p. 85.

485 Skold, *The Two Faces of Smallpox*, pp. 204, 211, 212, 220.

486 For example, age at marriage in London appears to have risen slightly at the end of the eighteenth century, when smallpox mortality was beginning to fall.

487 H.J. Voth and T. Leunig, "Did smallpox reduce height?: stature and the standard of living in London, 1770-1873", *Economic History Review*, Vol. 49, (1996), pp. 541-560.

smallpox may have affected height has yet to be finally clarified.[488]

Although inoculation and vaccination played a subsidiary part in reducing overall mortality, these prophylactic measures played a major preventative role in protecting the population against the effects of a highly virulent disease. Overall case-fatality amongst young children was of the order of 45 per cent by the 1870s. Smallpox had grown in virulence throughout the eighteenth and nineteenth centuries, and was probably increasing in prevalence with the growth of turnpike roads, canals and railways.[489] By the time civil registration was introduced in 1837, smallpox was largely a disease of young children affecting virtually the whole population.

We can conclude this section by illustrating the fatality of smallpox through quoting one of the Registrar-General's reports for the early 1870s. He illustrated the consequences of neglecting vaccination by comparing mortality in London with that in The Hague:

"It is well known that among the lower classes in Holland a very strong prejudice exists against vaccination. It may be useful to enquire what might be the result in London if the prejudice against vaccination, which is so strongly held by a few in this country, should ever become so widely spread as in Holland. If the same death rate had prevailed in London during the [first] quarter [of 1871] as existed in The Hague during January and February, the

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488 M. Heintel and J. Baten, 'Smallpox and nutritional status in England, 1770-1873: on the difficulties of estimating historical heights', *Economic History Review,* Volume 51 (1998); P.E. Razzell, 'Did smallpox reduce height?', *Economic History Review*, Volume 51 (1998); T. Leunig and H.J. Voth, 'Smallpox did reduce height: a reply to our critics', *Economic History Review*, Volume 51, (1998); P.E. Razzell, 'Did smallpox reduce height?: a final comment', *Economic History Review*, Vol. 54, (2001); T. Leunig and H.J. Voth, 'Smallpox really did reduce height: a reply to Razzell', *Economic History Review,*Vol. 54 (2001); D. Oxley, '"The seat of death and terror": urbanization, stunting, and smallpox', *Economic History Review*, Vol. 56 (2003); T. Leunig and H.J. Voth, 'Comment on "Seat of death and terror"', *Economic History Review,* Vol. 59 (2006); D. Oxley, '"Pitted but not pitied" or, does smallpox make you small', *Economic History Review*, Vol. 59 (2006).

489 The Registrar-General pointed out the importance of foreign and domestic forms of communication in spreading smallpox; see for example, General Register Office, *Thirty-Fourth Annual Report,* p. xxxi.

deaths from this disease within the Metropolitan Division would have been 38,828 during the three months, instead of the 2,400 which actually occurred."[490]

Conclusion

Inoculation and vaccination had a significant impact on smallpox mortality, but the magnitude of that impact cannot be fully assessed without further research. The age incidence and case-fatality of the disease varied so significantly from place to place that only detailed work on parish registers and other local sources will further clarify the overall magnitude of reductions in smallpox mortality.[491]

However, we can provisionally evaluate the demographic importance of smallpox by comparing the summary evidence on overall mortality and that on inoculation/ vaccination and smallpox mortality. There were major falls in infant, child and adult mortality in London from the middle of the eighteenth century onwards, but the chronology and age structure of these reductions in mortality do not suggest that inoculation played a primary role in this process. Inoculation was not widely practised in London until the end of the eighteenth century, and smallpox mortality did not begin to fall until the 1770s.[492] Also, given that smallpox was mainly a disease of young children in London, inoculation probably made little contribution to the fall in adult mortality that took place from about the 1740s onwards.

Much of the fall in infant/ child mortality occurred in rural parishes at the end of the eighteenth and beginning of the nineteenth centuries, and this was the period when inoculation and vaccination were very widely practised. From the age incidence of smallpox, we would expect these prophylactic measures to make the greatest contribution towards reducing child mortality in

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490 General Register Office, *Thirty-Fourth Annual Report,* p. xxxi.

491 However, the problems of registration discussed in Chapter 7 of *The Conquest of Smallpox* must be taken into consideration. A further example of registration problems is illustrated by an entry in the Dedham parish register for 1724: " a great Number of Persons who died in this year when ye Small Pox was very fatal, are omitted." See Smith, *Speckled Monster,* p. 192.

492 See Razzell, *The Conquest of Smallpox*, p. 198.

northern parishes. Inoculation also contributed to the reduction of both infant and child mortality in the south of England, although given the age incidence of smallpox − affecting both children and adults in the south − its impact is likely to have been limited.

Adult mortality appears to have diminished in most areas of England in the first half of the eighteenth century, and inoculation and vaccination were only widely adopted at the end of the eighteenth and beginning of the nineteenth centuries. It is therefore unlikely that these prophylactic measures were central to the reduction of adult mortality, which appears to have occurred largely for reasons exogenous to medical and economic developments.[493]

The history of inoculation illustrates the increasing importance of empirical medicine in eighteenth century England. This development was not linked to the classical learning of the ancient universities, but was associated with the dissenting academies and the non-conformist doctors who played such an important role in the development of inoculation practice.[494] Much of this emphasis was also linked to market forces, illustrated in the letters of the Glynde bailiff Thomas Davies, discussing the cost and effectiveness of inoculation practices provided by different inoculators.[495]

In summary, we may conclude that inoculation and vaccination did not play the major role in diminishing overall mortality in Britain during the eighteenth and early nineteenth

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493 Although inoculation does not appear to have played a major role in the reduction of adult mortality, it prevented the increase in mortality resulting from growing smallpox virulence.

494 See F. M. Lobo, 'John Haygarth, smallpox and religious dissent in eighteenth-century England', A. Cunningham and R. French (eds.), *The Medical Enlightenment of the Eighteenth Century* (Cambridge 1990).

495 See Razzell, *The Conquest of* Smallpox, pp. 82, 84. The importance of market forces in the practice of inoculation is illustrated somewhat humorously by a letter written to the *Chelmsford and Colchester Chronicle* on the 4th March 1768: "All the villages in our neighbourhood [in Northamptonshire] are at present under Inoculation. We have a great variety of practitioners, from the pompous Tye-Wigg down to the greasy night Cap; even boys of seven or eight years perform the operation for a halfpenny a-piece, and succeed surprisingly . . . Giles Wilcox, the sowgelder, who lives near the pinfold, is by far the most in vogue. He takes pupils at 2s 6d a head and teaches 'em the true orthodox method. What the method is I cannot learn, but 'tis said to be preferable to the Suttonian or any other wholesale itinerant operator we have seen yet."

century. However, these prophylactic measures did make a highly significant contribution and were a part of a general process of medical innovation and improvement that were responsible for the reduction in infant and child mortality during the late eighteenth and early nineteenth century.[496]

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496 The wealthy and educated classes played a pioneering role in the adoption and practice of both inoculation and vaccination; for example, Benjamin Pugh wrote in 1779: "the royal family, nobility, and people of fortune, have their children inoculated at the proper ages; the people in middle life inoculate pretty generally; and the poor (seeing so many instances of the happy success of it) are every where desirous of being inoculated as soon as the natural smallpox begins to range near them." *Gentleman's Magazine*, 20 March 1779, p. 52. See also pages 72 and 125 of *The Conquest of Smallpox*.

[PICTURE OF PRINCE REGENT – FIGURE 1]

8. THE HAZARDS OF WEALTH: ADULT MORTALITY IN PRE-TWENTIETH CENTURY ENGLAND. [497]

Introduction

The association between social class and adult mortality has become one of the key areas of research in twentieth century epidemiology and demography. Recently, Wilkinson and Marmot have argued that there is a general link between social inequality and adult mortality, partly mediated through the impairment of immunity resulting from 'status stress'. In support of this thesis, they have quoted references to links between poverty and high mortality in eighteenth and nineteenth century England.[498] Davey Smith and colleagues have stressed the role of life-style and life-course events, and have also cited historical evidence for a close association between poverty and ill-health.[499]

There is abundant historical and contemporary evidence to indicate that inadequate nutrition, poor housing and over-crowded environments result in increases in mortality.[500] However, much of the historical data for the association between poverty and adult mortality is based on flawed methodology and unreliable evidence.[501] Evidence reviewed earlier indicates that

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497 Written jointly with Christine Spence and first published in the *Social History of Medicine*, Vol. 19 (2006).

498 R.G. Wilkinson, *Unhealthy Societies: the Afflictions of Inequality* (London 1996); R.G. Wilkinson, 'Health inequalities: relative or absolute material standards?' *British Medical Journal,* Vol. 314 (1997); M. Marmot, *Status Syndrome*: *How Your Social Standing Directly Affects Your Health* (London 2004).

499 G. Davey Smith, D. Dorling and M. Shaw (eds.), *Poverty, Inequality and Health in Britain, 1800-2000: A Reader* (Bristol 2001).

500 *Ibid;* B. Harris, 'Public health, nutrition, and the decline of mortality: the McKeown thesis revisited', *Social History of Medicine,* Vol. 17 (2004); H.R. Rashad, R. Gray and T. Boerma, *Evaluation of the Impact of Health Interventions* (International Union for the Scientific Study of Population, Belgium 1995); P.G. Lunn, 'Nutrition, immunity and infection', R. Schofield, D. Reher and A. Bideau (eds.), *The Decline of Mortality in Europe* (Oxford 1991).

501 For an example of the faulty use of age at death as a basis for calculating adult expectation of life see E. Chadwick, *Report on the Sanitary Condition of the Labouring Population of Great Britain* (Edinburgh 1965), pp. 219-27; for a critique of this method see the General Register Office, *Fifth Annual Report*, pp. xxviii-xxxi.

before the twentieth century male adult mortality in England may have been as high among the wealthy as it was in the general population, and, in some periods and places, may have been higher than it was among the poor. Given the known link between poverty and mortality, this contradiction represents an historical puzzle which warrants further investigation. This essay will explore the possible reasons for this conundrum, discussing a range of evidence from contemporary sources, and linking this with current understanding of health and mortality amongst the adult population.

The data we present is limited in scope, both in the size of samples and the geographical areas covered, and suffers from a lack of randomness due to the self-selected nature of much of the source material. However, the evidence from a number of independent sources suggests certain provisional conclusions, and provides the basis for more systematic and comprehensive research in the future.

Socio-Economic Status And Adult Mortality Before The Twentieth Century.

One of the most reliable studies of socio-economic status and mortality before the twentieth century is that by Hollingsworth on the aristocracy. It is possible to compare his findings with those for England and Wales, in the middle of the nineteenth century, following the introduction of civil registration.

Table 8.1: Expectation Of Life (Years) At Aged 20 Amongst The Aristocracy And The Population Of England & Wales.[502]

Cohort Born	*Males*	*Females*
Aristocracy , 1825-49	42.0	48.3
England and Wales, 1840-41	39.2	41.7
Aristocracy , 1850-74	42.9	52.1
England and Wales, 1860-61	42.7	45.7

502 T.H. Hollingsworth, 'The demography of the English Peerage' to *Population Studies,* Supplement, Vol. 18 (1965), pp. 54, 58.

Among men, the aristocracy had a slight advantage in life expectancy at age 20 in the first cohort, but this had disappeared by the later period, whereas female aristocrats had higher adult life expectancy in both periods. These findings make no allowance for place and the role of disease environment in shaping mortality levels.[503] This can be illustrated through research on the peerage published by the Victorian actuaries Bailey and Day in 1863. They compared the life expectancy of the peerage with Farr's findings on the general population of England and the population living in healthy districts.

Table 8.2: Mean Adult Male Duration Of Life Amongst The Peerage And In England, Mid-Nineteenth Century.[504]

Age	*Peerage Families*	*English Table Dr. Farr*	*Healthy Districts Dr. Farr*
20	41.46	39.99	43.40
30	35.51	33.21	36.45
40	28.33	26.46	29.29
50	21.40	19.87	22.03
60	14.56	13.60	15.06
70	8.77	8.55	9.37

Life expectancy was slightly higher at all ages among the peerage than in the general English population, although it was less than for those living in healthy districts. The aristocracy spent long periods living in London and in other towns and rural areas, all with different mortality risks. It is therefore important to present data, wherever possible, within geographical regions and districts, and to attempt to control for the role of place in shaping mortality levels.

As seen previously, the East Kent marriage licences yield data on occupation and paternal mortality for 289 parishes in the

503 For a discussion of the role og geographical place in shaping mortality see Essay 4 of the present volume and E. Garrett, A. Reid, S. Szreter, and K. Schurer, *Changing Family Size in England and Wales: Place, Class and Demography, 1891-1911* (Cambridge 2001).

504 A. Bailey Hutcheson and A. Day, 'On the rate of mortality prevailing amongst families of the peerage during the nineteenth century', *Journal of the Statistical Society*, Vol. 24 (1863), p. 69.

period 1619-1809, which indicates that adult mortality was slightly lower among gentlemen, merchants and professionals than in other occupational groups in the seventeenth century, but higher in the second half of the eighteenth century.[505] The latter finding is confirmed by the analysis of marriage licences in Nottinghamshire and Sussex.[506] Data derived from apprenticeship indentures indicates a positive correlation between wealth and adult mortality in the early seventeenth century among apprentices' fathers both in London and nationally.[507]

The higher mortality amongst the wealthy may have been partly a function of greater ages of fathers, but the limited amount of evidence does not support this conclusion. In the absence of birth control, the average age of fathers was probably largely determined by age of marriage. There is information on socio-economic status and median age of male marriage in Nottinghamshire for the period 1701-1753.[508]

Table 8.3: Median Age Of Marriage (Years) Of Grooms Listed In Nottinghamshire Marriage Licences, 1701-1753.

Period	Gentle-men	Yeoman Farmers	Artisans & Tradesmen	Husbandmen	Labourers
1701-20	26	26	25	27	26
1721-40	28	27	25	26	27
1741-53	25	25	24	26	25

505 Table 4.18, p. 116.

506 See Table 5.5., p. 134.

507 Table 4.9, p. 106, Table 4.10, p. 107.

508 J.D. Chambers, 'The course of population change', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965), p. 332. The number of marriages in the following table for the different periods are as follows: 1701-20: Gentlemen: 168, Yeomen Farmers: 141, Artisans & Tradesmen: 57, Husbandmen: 487, Labourers: 138; 1721-40: Gentlemen: 118, Yeomen Farmers: 186, Artisans & Tradesmen: 133, Husbandmen: 695, Labourers: 89; 1741-53: Gentlemen: 55, Yeomen Farmers: 412, Artisans & Tradesmen: 119, Husbandmen: 254, Labourers: 85. By the late nineteenth century, men from wealthier socioeconomic groups married significantly later than those from the poorer social classes. See R. Woods, *The Demography of England and Wales* (Cambridge 2000), p. 86.

Table 8.3 suggests that median age of male marriage did not vary greatly between different socio-economic groups in the first half of the eighteenth century.

The evidence from marriage licences and apprenticeship indentures on paternal mortality is subject to a measure of uncertainty because of the lack of exact information on the ages of fathers and the self-selected nature of the samples. More reliable data becomes available with the introduction of national censuses and civil registration in the nineteenth century. As discussed earlier, Farr cited well-based evidence on the average rateable values and associated mortality levels of the different registration districts of London in 1838-1844, which showed no significant association between the wealth of a district and its adult mortality level.[509]

It is possible to construct reliable statistics of adult mortality for the period after 1841 in individual rural and urban parishes by using censuses and information in burial registers. This involves tracking married couples in the 1841 and 1851 censuses, and linking this data with that in the parish burial registers for the intervening years. This methodology has the advantage of triangulation, allowing the comparison of information about widows and widowers in the 1851 census with that in the burial registers. The selection of married couples allows the measurement of independent demographic events for establishing the period at risk − the listing of a spouse in a burial register, the baptism of a child, or the enumeration of the husband or wife in a later census.

To evaluate the impact of socioeconomic status on adult mortality, a sample was constructed for 47 Bedfordshire parishes, selecting the first married couple with elite status in the 1841 census. All professional, merchant and independent families with at least one domestic servant were selected for the elite category − there was an average of 3.2 servants per family − and they were matched with the next labourer's family of a similar age

[509] See Table 5.6, p. 136.

in the census schedule.[510] The parishes were chosen in sequence from the Registrar-General's list of 1841 censuses.[511]

Table 8.4: Mortality Amongst Husbands And Wives Enumerated In Bedfordshire Censuses, 1841-1851.

	Number Of Grooms And Brides	*Number Of Traced Cases*	*Percentage Of Traced Cases Dead*	*Number Of Years At Risk*	*Average Age Of Traced Cases (Years)*
Professionals, Merchants and Gentlemen	250	165	16%	1531	39.8
Labourers	250	182	15%	1738	40.7

A total of 250 married couples were included in the sample − 125 from elite families and 125 from labourers' families. Of the 250 husbands and wives in the elite category, 165 were traced (66 per cent) either in the 1851 census or the burial register; the equivalent figure for the labourers' sample was 182 out of 250 (73 per cent). Most of the untraced cases were probably due to migration, as they involved the disappearance of both husband and wife. It is unlikely that burials of both husband and wife were unregistered, given the high quality of the burial registers in these rural parishes at this time. Of 32 widow and widowers identified in the 1851 census, 30 of their spouses were traced in Anglican burial registers between 1841 and 1851, indicating a high degree of burial registration reliability.

510 The age of labourers selected was within plus or minus five years of that of elite husbands.

511 The parishes are as follows: Ampthill, Arsley, Aspley Guise, Bedford St. Cuthbert's, Bedford St. John's, Bedford St. Mary's, Bedford St. Paul's, Biggleswade, Blunham, Clifton, Clophill, Colmsworth, Cranfield, Dunstable, Eaton Socon, Flitton, Harrold, Haynes, Henlow, Higham Gobion, Holwell, Houghton Conquest, Houghton Regis, Hunwick, Kempston, Keysoe, Langford, Leighton Buzzard, Lower Gravenhurst, Luton, Melchbourne, Northill, Pertenhall, Poddington, Potton, Renhold, Shefford, Shelton, Southill, Stotfold, Streathley, Tilbrook, Tingrith, Toddington, Turvey, Woburn, and Wrestingworth.

Twenty six of 165 elite husbands and wives (16 per cent) died in the decade between 1841 and 1851, whereas the number amongst the 182 labourers' husbands and wives was 27 (15 per cent). This slightly higher mortality among elite families was despite a lower average age of husbands in 1841, and a shorter period at risk. Among wives, mortality was also higher in elite than in labourers' families: 13 out of 79 traced cases died (17 per cent) as against 10 out of 83 (12 per cent). However, the sample sizes are small, and Table 8.4 suggests no significant difference in overall adult mortality between elite and labourers' families in Bedfordshire at this time.

Reliable figures for a wider range of occupations were published by the Registrar-General at the end of the nineteenth century. There was little or no correlation between social group and adult mortality in 1860-61 and 1871, although the white-collar group had the lowest adult expectation of life in this period.[512]

Research carried out by the lead author and associates on copies of civil death registers linked to censuses in Ipswich for the period 1871-1910 includes an analysis of social class and adult mortality for the whole Ipswich population.[513] The latter was measured by tracking families between censuses in the two decades 1871-81 and 1891-1901, and analysing the mortality of husbands and wives where at least one of them survived to be enumerated at the end of the decade.[514]

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512 Woods, *The Demography*, p. 234.

513 This research was a part of a project carried out jointly with Christine Spence, Ros Davies and Eilidh Garrett. See P.E. Razzell, *The Sociological Study of Fertility and Mortality in Ipswich, 1872-1910* (Report submitted to the Economic & Social Research Council 2006).

514 The survival of one of the partners provided an independent event for the period of observation − ten years − between the dates of the censuses. A fuller analysis of this data will be made at a later date. The categorisation of social class was a modified form of that developed by Stevenson in the 1911 Census, but full details will be provided in a later publication. The numbers of cases on which the mortality figures were calculated by period, social class and age group are as follows: 1871-81: Social Class 1: 16-30: 234, 31-45: 601, 46-60: 462, 61+: 141; Social Class 2: 16-30: 232, 31-45: 526, 46-60: 373, 61+: 76; Social Class 3: 16-30: 685, 31-45: 1287, 46-60: 798, 61+: 145; Social Class 4: 16-30: 608, 31-45: 918, 46-60: 569, 61+: 134; Social Class 5: 16-30: 316, 31-45: 586, 46-60: 395, 61+: 88. 1891-1901: Social Class 1: 16-30: 282, 31-45: 610, 46-60: 478, 61+: 176; Social Class 2: 16-30: 373, 31-45: 736, 46-60: 395, 61+: 132; Social Class 3: 16-30: 896, 31-45: 1536, 46-60: 962, 61+: 265; Social Class 4: 16-30: 675, 31-

Table 8.5: Social Class And Adult Mortality (Per 1000) Among Husbands And Wives, Ipswich, 1871-1881 And 1891-1901.

Social Class	*Period 1871-1881*				*Period 1891-1901*			
	Age Group				Age Group			
	16-30	31-45	46-60	61+	16-30	31-45	45-60	61+
1	56	87	162	326	32	49	111	273
2	52	95	172	329	43	67	134	280
3	42	66	134	338	39	65	120	196
4	54	73	132	299	31	63	119	317
5	73	84	137	273	47	69	118	282

For most age groups, adult mortality was slightly higher amongst the wealthier social classes than the poorer ones in the period 1871-81, but this pattern began to reverse at the end of the nineteenth century.[515]

The national statistics for England and Wales indicate that since the beginning of the twentieth century, a social class gradient in adult mortality has been progressively established, and the socioeconomic adult mortality differential has widened significantly during the last few decades.[516]

The Role Of Nutrition And Physical Activity.

Given that elite families were much wealthier than other members of the population, and that they had access to far better provision of food, good housing and medical care, why were their adult mortality rates the same or even higher than the rest of the

45: 1197, 46-60: 682, 61+: 164; Social Class 5: 16-30: 513, 31-45: 912, 46-60: 525, 61+: 181.

515 It will be possible to study the national relationship between social class and adult mortality by carrying out a random study of individual families in England and Wales. Such research is being carried out by Kevin Schurer and associates who are studying a 2 per cent random sample of the population of England and Wales, and tracking individual families between the decadal censuses in the period 1851-1901, and linking this data with civil registration information on deaths.

516 Wilkinson, 'Class mortality differentials', p. 308; *Independent Inquiry into Inequalities in* Health, p. 348.

population? The issue becomes even more puzzling in the light of the relatively low adult mortality among labourers and other poor groups. There is much evidence of the inadequate diet of labourers' families in the late eighteenth and early nineteenth centuries, culminating in the 'hungry forties'.[517] Chadwick and others described the very poor quality of much of their housing, and the poverty of labourers − particularly in rural areas − has been very widely documented.[518] Recently, Bernard Harris has argued that nutrition did play a significant historical role in shaping mortality,[519] and there is good evidence that extreme poverty did significantly increase mortality in certain historical periods.[520] These findings increase the puzzle of a lack of a socio-economic gradient in adult mortality before the twentieth century.

However, there is a contemporary literature on wealth and health, which stresses the hazards of wealth rather than of poverty. Thomas Tryon in 1683 wrote:

"Great drinking of *Wine* and *strong Drinks* after full Meals of *Flesh* and *Fish* … do often wound the Health … which many of the richest sort of People in this Nation might know by woful Experience, especially in London, who do yearly spend many Hundreds, (I think I may say Thousands) of Pounds on their *Ungodly Paunches* … for their *Bellies* are swellen up to their *Chins* … their *Brains* are sunk in their *Bellies; Injection* and *Ejection* is the business of their Life, and all their precious hours

517 J. Burnett, *Plenty and Want: a Social History of Diet in England from 1815 to the Present Day* (London 1968).

518 *Ibid;* R. Heath, *The English Peasant* (London 1893); P.E. Razzell and R. Wainwright, *The Victorian Working Class: Selections from the Letters to the Morning Chronicle* (London 1973), pp. 4 -11.

519 B. Harris, 'Public health, nutrition and the decline of mortality: the McKeown thesis revisited', *Social History of Medicine,* Vol. 17 (2004). The problem with generalisations about the role of nutrition is that some infectious diseases are known to have varied markedly in their historical virulence, and this may have changed the influence of nutrition on resulting mortality. For example, smallpox had a case-fatality of about 5 per cent in sixteenth century London, whereas by the late nineteenth century this had risen to 45 per cent, and nutrition may have played a different role in the former compared to the latter. For the complex interaction of nutrition and infection in shaping mortality see P.G. Lunn, 'Nutrition, immunity and infection', R. Schofield, D. Reher and A. Bideau (eds.), *The Decline of Mortality in Europe* (Oxford 1991).

520 Davey Smith *et.al.*, *Poverty, Inequality and Health*.

are spent between the *Platter* and the *Glass*, and the *Close-stool* and *Piss-pot*."[521]

Tryon stressed that it was not just eating and drinking that was responsible for obesity, but also physical inactivity, which varied not just between individuals but among different socio-economic groups:

"Suppose a man were to seek *Fat Men* and *Women,* would he go into *Country-Villages* and *poor small Towns* among *Plough-men* and *Shepherds*? … No, no, such a Man's Errand would lie in *great Cities* and *Market-Towns,* where there is store of *strong Liquors* and *Idleness*. … [among] People that live sedentary Lives, and are easie Imployment, more especially of mature Age, as *Gentlemen* and *Citizens*, etc, who use themselves to lie long in Bed in the Morning, and to great Dinners and rich Cordial Drinks …"[522]

Tryon was mainly concerned with the effect of life-style on the health of the wealthy, and had little to say about the ordinary population. The puritan clergyman Richard Baxter did give a detailed account of the lives of the rural poor at the end of the seventeenth century:

"For by the advantage of their labour and health, their browne bread and milk and butter and cheese and cabbages and turnips and parsnips and carrots and onions and potatoes and whey and buttermilk and pease pies and apple pies and puddings and pancakes and gruel and flummery and furmety, yea dry bread, and small drinke, do afford their appetites a pleasanter relish and their bodyes more strength and longer life than all the varieties and fullness of flesh and wines and strong drinkes do, to the idle gluttonous and voluptuous rich men …The worst of the poore mans case as to health, is that they are put to goe through raine and wett, through thick and thin, through heat and cold and oft want that which nature needeth."[523]

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521 T. Tryon, *The Way to Health, Long Life and Happiness* (London 1683), pp. 313-314.

522 *Ibid*, pp. 320, 341

523 F.J. Powicke, (ed.), *Richard Baxter's the Poor Husbandman's Advocate to Rich Racking Landlords* (London 1926), pp. 22-26.

Baxter understood that the poor were able to enjoy relatively good health as long as they had an adequate diet of fresh vegetables, fruit, dairy and grain products, and engaged in vigorous activity during their working life. He may have exaggerated the quality of the diet of the poor, although he acknowledged that they suffered from the ill-effects of wet and cold.

An understanding of the link between diet, drink, exercise and health had become very general by the early eighteenth century. George Cheyne established his medical reputation through the publication in 1724 of his *Essay on Health and Long Life*, which ran to nine editions, and was translated into a number of different European languages. Cheyne summarized the main argument of this work by quoting Sir Charles Scarborough's advice to the Duchess of Portsmouth: "you must eat less, or use more exercise, or take physic, or be sick."[524]

Cheyne himself had suffered from obesity which he described in his autobiography:

"Upon my coming to London, I all of a sudden changed my whole Manner of Living; I found the Bottle Companions, the younger Gentry, and Free-Livers' to be the most easy of Access … I soon became caressed by them and grew daily in bulk and friendship with these gay gentlemen … and thus constantly dining and supping … my health was in a few years brought into great distress, by so sudden and violent a change. I grew excessively fat, short-breathed, lethargic and listless … My appetite being insatiable I sucked up and retained the juices and chyle of my food like a sponge and thereby suddenly grew plump, fat, and hale to a wonder, but … every dinner necessarily became a surfeit and a debauch, and in ten or twelve years I swelled so such an enormous size that upon my last weighing I exceeded 32 stone."[525]

Although Cheyne acknowledged that his obesity was to some extent a family characteristic, he understood that it was also a function of his life-style. The pattern of consumption of food and

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[524] G. Cheyne, *Practical Rules for the Restoration and Preservation of Health and the Best Means for Invigorating and Prolonging Life* (London 1823), p. 64.

[525] R. Porter (ed.), *George Cheyne: the English Malady, 1733* (London 1991), pp. 325-6, 342.

drink by the fashionable was partly the result of economic prosperity and the importation of luxuries:

"Since our wealth has increased and our navigation has been extended we have ransacked all the parts of the globe to bring together its whole stock of materials for riot, luxury, and to provoke excess. The tables of the rich and great (and indeed those who can afford it) are furnish'd with provisions of delicacy, number, and plenty, sufficient to provoke, and even gorge, the most large and voluptuous appetite. …"[526]

Cheyne summarized his general conclusions as follows:

"If any man has eat or drank so much, as render him unfit for the duties and studies of his profession … he has overdone … It is amazing to think how men of voluptuousness, laziness, and poor constitutions, should imagine themselves able to carry off loads of high-seasoned foods, and inflammatory liquors, without injury or pain; when men of mechanic employments, and robust constitutions, are scarcely able to live healthy and in vigour to any great age, on a simple, low, and almost vegetable diet."[527]

Three years after Cheyne published this work, Short wrote his *Dictionary Concerning the Causes and Effects of Corpulency*, in which he concluded that "lean People generally enjoy a far greater Measure of Health" than those who were over-weight.[528] This theme of the damaging effects of excess and obesity, became commonplace in eighteenth and nineteenth century medical writings.

One of the most popular eighteenth century books on medicine was Buchan's *Domestic Medicine* which was first published in 1769, and was frequently reprinted in new editions through to the middle of the nineteenth century. Buchan summarized his view on activity, exercise and health as follows:

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526 Porter, *George* Cheyne, pp. 49-50.

527 Cheyne, *Practical* Rules, p. 65.

528 T. Short, *A Dictionary Concerning the Causes and Effects of Corpulency* (London 1727), p. 39.

"Those whom labour obliges to labour for daily bread, are not only the most healthy, but generally the most happy … Tis now below any one to walk who can afford to be carried. How ridiculous would it seem to a person unacquainted with modern luxury … to see a fat carcase, over-run with diseases occasioned by inactivity, dragged through the streets by half a dozen horses."[529]

The ill-health of the wealthy was sometimes linked to the incidence of gout, although contemporaries had a broader conception of the disease than would be the case today.[530] The awareness of the ill-effects of over-eating does not appear to have greatly influenced the behaviour of the wealthy in the eighteenth century. Parson Woodforde detailed in his diary his dietary excesses almost on a daily basis. For example, on the February 14th 1791, he wrote, "we had for Dinner Cod and Oyster Sauce, a fillet of Veal rosted, boiled Tongue, stewed Beef, Peas Soup and Mutton Stakes. 2nd Course, a rost Chicken, Cheesecakes, Jelly-Custards &."[531]

Evidence of this sort is, of course, only anecdotal, and may not be typical of the gentry's and aristocracy's consumption of food at this time. However, there are general accounts that suggest that their food consumption may have been excessive. When F. La Rochefoucald visited England in 1784 he described the dining customs of country houses as follows:

"Dinner is one of the most wearisome of English experiences, lasting, as it does, for four or five hours. The first two are spent in eating and you are compelled to exercise your stomach to the full order to please your host. He asks you the whole time whether you like the food and presses you to eat more, with the result that, out of pure politeness, I do nothing but eat from the time that I sit down until the time when I get up from the table … All the dishes

529 W. Buchan, *Domestic Medicine; or the Family Physician* (Edinburgh 1769), pp. 100-1.

530 See for example W. Black, *An Arithmetical and Medical Analysis of the Diseases and Mortality of the Human Species* (London 1973), p. 87.

531 J. Beresford (ed.), *James Woodforde: The Diary of a Country Parson* (Norwich 1999), pp. 262-3.

consist of various meats either boiled or roasted and of joints weighing about twenty or thirty pounds."[532]

Fogel has estimated that the wealthiest tenth of the population consumed more than 4000 calories per adult per day at the end of the eighteenth century,[533] similar to Seebohm Rowntree's finding of 4,039 calories amongst the servant-keeping class in York at the end of the nineteenth century.[534] Commenting on the findings of a survey of the budgets of six of these families, Rowntree concluded that "considering these six diets as a whole, it is clear that the amount of food consumed is in excess of requirements … it is doubtful whether the work done by the six families here considered is more than 'light industrial work', the food requirements … [for which are] 3000 calories of fuel energy."[535]

Rowntree's sample was very small and there is little direct evidence on the effect of diet on obesity levels among the rich at this time. Information was collected on the weight of the wealthy and fashionable when they were weighed at Berry's wine merchants in St. James's Street, London, and weight registers have survived from 1756 to the present day. This, of course, is a self-selected sample, and the consumption of wine is likely to have increased the incidence of obesity amongst this wealthy group. Nevertheless, the information in the registers provides some useful background data, and was used by Francis Galton in his biometric research. He analysed the weights of 139 members of the aristocracy born between 1740 and 1829, and aged 27 to 70. [536] Many aristocrats had their weights taken several times a year, and Galton compiled charts of weight by age for each individual.

He divided his sample into three birth cohorts − 1740-69, 1770-99 and 1800-29 − and found that weight fluctuated much

532 F. La Rochefoucald, *A Frenchman in England in 1784* (London 1995), pp. 29-31.

533 R. Fogel, 'Second thoughts on the European escape from hunger: famines, price elasticities, entitlements, chronic malnutrition and mortality rates', S.R. Osmani (ed.), *Nutrition and Poverty* (Oxford 1992), p. 269.

534 B.S. Rowntree, *Poverty: A Study of Town Life* (London 1901), p. 253.

535 *Ibid,* p. 254.

536 F. Galton, 'The weights of British noblemen during the last three generations', *Nature*, Vol. 17 (1884).

more significantly in the first cohort, concluding that "there can be no doubt that the dissolute life led by the upper classes about the beginning of [the nineteenth century] … has left its mark on their age-weight traces."[537] Although sample sizes were small, Galton calculated mean weights for the different cohorts, and the overall average declined from 179 pounds to those born in 1740-69 to 171 pounds in 1800-29.[538] The mean average of all the weights taken for the whole sample of 139 individuals is 174 pounds − 12 stone 6 pounds.

There is no information on the heights of the peerage, but there is some data on German aristocratic students aged 21 for the period 1772-96. Sixty young aristocrats had a mean average height of 168.8 cm, 6 to 7 cm less than today's equivalent.[539] Galton quoted figures of weight by age for professional men in the early 1880s, ranging from 161 pounds for 27-years olds to 174 pounds for 60-year olds. No heights were recorded, but there is such data on Sandhurst recruits − perhaps representative of the professional group − which indicates an average height of 68 inches for men over the age of twenty-one born during the middle of the nineteenth century.[540] This can be compared to data on the weight and height of contemporary working class populations. For example, Liverpool convicts weighed an average of 143 pounds with a mean height of 66 inches during the mid-nineteenth century,[541] indicating that working class men were significantly leaner than their wealthy aristocratic and professional contemporaries.[542]

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537 Galton, 'The weights of British noblemen', p. 267.

538 *Ibid.*

539 J.M. Tanner, *A History of the Study of Human Growth* (Cambridge 1981), pp. 111-2.

540 R. Floud, K. Wachter and A. Gregory, Height, *Health and History: Nutritional Status in the United Kingdom, 1750-1980* (Cambridge 1991), p.178.

541 J.T. Danson, 'Statistical observations relative to the growth of the human body (males) in height and weight, from eighteen to thirty years of age, as illustrated by the records of the borough gaol of Liverpool', *Journal of the Statistical Society of London*, Vol. 23 (1862), pp. 20-6.

542 Most evidence points to a U-shaped relationship between Body Mass Index and adult mortality. This suggests that both the malnourished and the over-nourished were at higher risk of mortality. See R. Fogel, *The Escape from Hunger and Premature Death, 1700-2100: Europe, America and the Third World* (Cambridge 2004), p. 24.

The association between wealth, dietary excesses, lack of exercise and ill-health continued to be documented into the nineteenth century.[543] The influence of these factors on longevity was summarized by Sinclair in 1833:

"It has been justly observed, that it is not the rich and great, nor those that depend on medicine, who attain old age, but such as use much exercise, breathe pure air, and where food is plain and moderate … Hence it would appear, that the situation of the middle, and even the lower classes of society, is particularly favourable to longevity."[544]

Sinclair somewhat romanticized the condition of the poor, and perhaps a more realistic account is the following description of the life of agricultural labourers at the end of the nineteenth century:

"… wages are for labourers 8s. or 9.s. a week … In wet weather or in sickness his wages entirely cease so that he seldom makes a full week. The cottages, as a rule, are not fit to house pigs in. The labourer breakfasts on tea-kettle broth, hot water poured on bread and flavoured with onions; dines on bread and hard cheese at 2d. a pound, with cider very washy and sour, and sups on potatoes or cabbage greased with a tiny bit of fat bacon. He seldom more than sees or smells butcher's meat. He is long lived, but in the prime of life "crippled up", i.e. disabled by rheumatism, the result of wet clothes with no fire to dry them by for the next morning, poor living and sour cider."[545]

Other descriptions of labourers' life-style suggest a more generous diet, although most accounts indicate that food was often in short supply.[546] Heath noted at the end of the nineteenth century the difference in stature between the farmer and agricultural labourer: "Compare the shapely forms of the young farmers with those of the stunted young labourer, and … compare the stalwart, jovial

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543 See for example W. Wadd, *Comments on Corpulency* (London 1829), p. 164; W. Banting, *Letter on Corpulence, Addressed to the Public* (London 1864).

544 J. Sinclair, *The Code of Health and Longevity* (London 1833), p. 404.

545 Quoted in Burnett, *Plenty and Want*, p. 166.

546 *Ibid.*

forms of the elderly farmers with the rheumatic, misshapen forms of the old labourers, and the evil result, not only of over-early work, but of a lifetime of poor and insufficient food and bad lodging, will be manifest."[547]

It may be that poor diet and poverty had a stronger impact on morbidity than mortality among labourers, although as we will now see, other factors may have influenced mortality levels.

The Role Of Alcohol And Tobacco Consumption.

Thomas Tryon summarized the changes that had taken place in the smoking of tobacco during the seventeenth century:

"It is not above sixty or seventy years ago since that only *Gentlemen*, and but a few of those took *Tobacco,* and then so moderately, that one Pipe would serve four or five, for they handed it from one to another … but now every Plow-man has his Pipe to himself."[548]

However, he acknowledged that among ordinary working families "the Expenses which this smoking generally draws with it, have half starved their poor Families",[549] and that wealth played a role in the consumption of tobacco and other luxuries:

"Are not those that live in the most Remote parts of *England,* and far from *Cities* and *Sea-Ports*, where *Money* is scarce, and such things dear, that the common People cannot buy them, most healthful and freest from Diseases? But now these *Out-landish Ingredients* begin to be so much admired, that the *good Dame, viz the Farmers Wife* will sell her *Eggs, Butter, Cheese* and *Wheat* to buy *Sugar, Spice* and *Tobacco* …"[550]

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547 R. Heath, *The English Peasant* (London 1893), p. 129.

548 Tryon, *The Way to Health*, p.168.

549 *Ibid,* p. 171.

550 *Ibid*, p. 223.

Hogarth more than sixty years later made a similar distinction between the destructive gin-drinking of Londoners and the more healthy habits of the rural poor:

"go into some Country Village, where that Fiery Dragon Gin has not yet spread her Poison, and you will find their Children, though in Rags, yet of a goodly and healthful Look. Their Diet indeed is coarse, but yet it's wholesome; their Drink, though better than small Beer, answers the Ends of Nutrition better than the finest Spirituous Liquors in the World."[551]

He also drew a distinction between the habits of the wealthy and the poor in the countryside:

"The Squire, who does not keep his Cellar full of the best Liquor, is but little regarded by the Farmers and Neighbours; and if the Farmer has not a Tub of the best ready breach'd, or Brandy and other Ingredients for Punch when the 'Squire is pleas'd to honour him with his own and his Friends Company, he must never expect to be invited to the noble Sport of Hunting … And all of them are unanimously of Opinion in one Thing, that is, that they never think they make a Friend welcome unless they make him drunk."[552]

La Rochefoucald in his account of life in English country houses, commented on the amount of alcohol consumed during dinner:

"After the sweets … the table is covered with all sorts of wine, for even gentlemen of modest means always keep a large stock of good wine. On the middle of the table there is a small quantity of fruit, a few biscuits (to stimulate thirst) and some butter, for many English people take it at dessert … One proceeds to drink − sometimes in an alarming measure. Everyone has to drink in his turn, for the bottles make a continuous circuit of the table and the host takes note that everyone is drinking in his turn."[553]

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551 W. Hogarth, *A Dissertation on Mr Hogarth's Six Prints Lately Published, Viz Gin Lane, Beer Street, and the Four Stages of Cruelty* (London 1751), p. 32.
552 *Ibid,* p. 6.
553 La Rochefoucald, *A Frenchman*, pp. 29-31.

The dangers of alcohol were well-known to eighteenth century writers and artists. One of the most vivid of Rowlandson's satires was *Death in the Bowl*, showing the skeletal figure of Death drinking with a group of obese-looking gentlemen crouched over a bowl of alcohol (Figure 2). Another of his satires showed Death wheeling an obese man away in a wheel-barrow from a tavern, outside of which three portly figures are depicted drinking and smoking tobacco, with Death telling the dead man's wife, "Drunk and alive, the man was thine, But dead & drunk, why − he is mine." (Figure 3).

There is very little systematic evidence on the consumption of alcohol by different socioeconomic groups, but the cost of alcohol probably constrained the amount consumed by the poor. The budgets published by Eden, Davies and others during the eighteenth and nineteenth centuries, showed that the labouring poor bought little alcohol.[554]

However the budgets did not reveal the full story, partly because they took no account of home brewing, but also because they did not adequately measure expenditure on alcohol at taverns and public houses. Eden attempted to summarize the overall position in 1797 as follows:

"Purchased liquor is an article of expenditure particularly prevalent in the South … [although] if taxed, at any time, with drinking too much, he [the labourer] thinks it sufficient … to allege, that, excepting on a Saturday evening, or occasions of festivity, he rarely allows himself more than a pint, or at most, a pot of beer a day … This is not the case in the North; where, besides the pure limpid stream, the general drink of the labouring classes is either whey or milk, or rather milk and water; or, at best, very meagre small beer."[555]

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554 F.M. Eden, *The State of the Poor, or, an History of the Labouring Classes in England from the Conquest to the Present Period*, Vol. 1 (London 1797); D. Davies, *The Case of Labourers in Husbandry* (Dublin 1796); W. Neild, 'Comparative statement of the income and expenditure of certain families of the working classes in Manchester and Dukinfield in the years 1836 and 1841', *Journal of the Statistical Society of London*, Vol. 4 (1841); Rowntree, *Poverty*.

555 Eden, *The State of the Poor* p. 542.

A hundred years later Richard Heath came to similar conclusions. He noted the prevalence of taverns and beer-shops in rural areas, but writing about the Weald of Sussex concluded:

"… it would be a good thing if … the little beer shops would be shut up, and a vast amount of misery prevented. Not that the peasant of the Weald is a drunkard. He is far too poor for that. It is only on club days, and occasionally on Saturday night, that he gives way. Habitual drinking in the country is the vice of a class in a superior social position."[556]

Rowntree at the end of the nineteenth century also found a relatively small consumption of alcohol amongst the respectable poor: "the families studied [earning under 26 shillings a week] represent the steady, respectable section of the labouring classes, who spend practically nothing upon drink."[557] However, Rowntree echoed Heath when he concluded:

"There is more drinking in Class B [the second poorest group] than in Class A [the poorest group], but this does not imply a lower moral standard. People in Class A are for the most part so absolutely destitute that they could not get much drink even if they wished. And in Class B, as we have seen … the money for drink can only be found, in the great majority of cases, by foregoing some other expenditure which is necessary for maintaining the family in a state of physical efficiency."[558]

556 Heath, *The English Peasant*, p. 187.
557 Rowntree, *Poverty*, p. 237.
558 *Ibid*, p. 58.

[FIGURES 2 AND 3]

More prosperous working-class groups did, however, consume alcohol, and Rowntree estimated that the average expenditure on drink was six shillings a week, absorbing "more than one-sixth of the average total family income of the working classes of York."[559] There is plenty of evidence that alcohol was consumed in large quantities in the second half of the nineteenth century. Samuel Smiles estimated in 1875 that the working classes spent £60,000,000 on drink and tobacco.[560] As John Burnett has pointed out, "when allowance is made for the growing number of teetotallers, it means that many families must have spent a third, and some half or more, of all their income on drink."[561] A degree of prosperity was required for the consumption of drink, and growing real incomes of working class families after the middle of the nineteenth century made this possible.

This was also true of tobacco consumption which fell in the first half of the nineteenth century[562] when real income was probably stagnating or declining, but increased significantly after the middle of the century when incomes were rising.

Table 8.6: Index Of Real Income And The Per Capita Consumption Of Tobacco In The United Kingdom, 1850-1936.[563]

Period	*Index Of Real Income (1850=100)*	*Per Capita Consumption Of Tobacco (Pounds)*
1850-1859	99	1.11
1860-1869	109	1.27
1870-1879	130	1.41
1880-1889	143	1.45
1890-1899	170	1.69

559 Rowntree, *Poverty* p.143.

560 S. Smiles, *Thrift* (London 1905), p. 114.

561 Burnett, *Plenty and Want*, p. 199.

562 Per capita consumption of tobacco was as follows: 1791-1815: 1.11 pounds; 1816-40: 0.84 pounds; 1841-65: 1.06 pounds. B.R. Mitchell and P. Deane, *Abstracts of British Historical Statistics* (Cambridge 1976), pp. 355-58.

563 For the source of data see Mitchell and Deane, *Abstracts*, pp. 343-45, 355-58. We have merged the indices in Mitchell and Deane's Tables 1b and 1c to create a continuous index, by using the overlapping year 1902 for an inflation ratio to adjust the later series.

There was a more-or-less linear relationship between the growth of real income and the per capita consumption of tobacco in the second half of the nineteenth century.

Budgets compiled by Eden, Davies, Rowntree and others showed virtually no consumption of tobacco in respectable working class families, similar to the pattern of alcohol consumption.[564] Tobacco cost about threepence an ounce, and where family incomes were less than ten shillings a week, it would have been impossible for the working poor to sustain a significant consumption of tobacco over extended periods.[565]

The literary evidence indicates that wealthy men smoked tobacco fairly regularly. Smoking rooms were introduced into some country houses as early as the 1720s, and by the middle of the nineteenth century "smoking rooms had become an integral part of most gentlemen's country houses, and guests who did not appear in them for a convivial smoke or game after the ladies had retired were liable to be dragged out of bed to conform to a recognized social convention."[566] The habits of the royal family are illuminating in this respect:

"[Queen Victoria] disliked the habit intensely … Even Prince Albert had not presumed to smoke in her presence; and at Osborne House … a special smoking room was built … The queen could always detect the smell of tobacco on documents which were sent up to her; and her Assistant Private Secrertary, Frederick Ponsoby … and his colleagues took to carrying peppermints in their pockets in case a summons to the queen came at a moment when their breath was sure to offend her."[567]

The economic capacity to consume tobacco − along with an excessive consumption of food and alcohol − undoubtedly damaged the health of the wealthy. These patterns of consumption along with a lack of physical activity may have been largely

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564 Eden, *The State of the Poor;* Davies, *The Case of Labourers*; Neild, 'Comparative statement'; Rowntree, *Poverty*.

565 C. Hibbert, *The English: a Social History, 1066-1945* (London 1987), p. 559. See also the budgets quoted in Eden, *The State of the Poor;* Davies, *The Case of Labourers*; Neild, 'Comparative statement'; Rowntree, *Poverty*.

566 Hibbert, *The English*, p. 554.

567 *Ibid*, p. 553.

responsible for the high adult mortality of the rich, a theme which can be further explored through the writings of the eminent Victorian actuary, Francis Neison.

The Work Of Francis Neison.

Neison was an actuary who worked for one of the leading insurance companies, and had a life-long interest in the causes of ill-health and mortality. He was sceptical about the emphasis on sanitation and poverty by his contemporaries Farr and Chadwick, and produced a range of evidence to show the importance of personal behaviour, in particular the role of physical activity and the consumption of alcohol.[568] His starting point was evidence on socio-economic status and adult mortality:

"In the year 1843, a report was made, by a committee of actuaries, on the mortality among persons assured by seventeen of the principal assurance companies of this country, and these persons may be fairly considered to belong to the middle and upper classes of society; and at various periods since the year 1824, inquiries have been made into the mortality rate among the members of friendly societies, including the more industrious and prudential of the working and the labouring portion of the people. One important result derived from these investigations is, that … [the] information clearly proves the mortality of the middle and upper classes to be above, and that of the industrious working classes to be below, the ratio for the country generally."[569]

In attempting to explain this unexpected finding Neison pointed out the importance of the characteristics of members of friendly societies:

"Their incomes are very limited, affording but the scantiest and simplest means of support. Their habitations are of an inferior order, being of the cheapest kind, and consequently in the worst streets … For an individual to remain a Member of a Friendly

568 F.G.P. Neison, *Contributions to Vital Statistics* (London 1864).
569 *Ibid*, p. 151.

Society, it is required that he should make his weekly or monthly contribution to its funds; and although a few pence is all that is needed, it presumes on a certain amount of frugality and industrial habit, sufficient to separate him from the reckless and improvident, who are more openly exposed to the vicissitudes − poverty, distress, destitution and disease ..."[570]

Neison recognised that poverty did play a role in creating ill-health, but argued that this was largely a function of variations in individual behaviour. He also contrasted the frugality and temperate habits of friendly society members with that of the wealthy:

"… by tracing the various classes of society in which there exists sufficient means of subsistence, beginning with the most humble, and passing on to the middle and upper classes, that a gradual deterioration in the duration of life takes place … this condition would seem to flow directly from the luxurious and pampered style of living among the wealthier classes, whose artificial habits interfere with the nature and degree of those physical exercises which, in a simpler class of society, are accompanied with a long life."[571]

He provided statistical evidence in support of the thesis that physical activity and alcohol were the key factors in shaping adult mortality patterns. He analysed friendly society records and showed that clerks whose occupation required minimal physical exertion, had a significantly lower expectation of life at all ages than plumbers, painters, bakers and miners. Clerks at age 20 had an expectation of life of 31.8 years, plumbers and painters 36.9 years, bakers 40.0 years, and miners 40.7 years.[572]

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570 Neison, *Contributions* p. 38.

571 *Ibid,* p. 43.

572 *Ibid,* pp. 54, 55.

Neison classified occupations by amount of physical activity, and whether they were employed outdoors or indoors, and summarized his findings as follows:

Table 8.7: Expectation Of Life (Years) Amongst Friendly Society Members.[573]

Age	*Indoor Occupations With Little Exercise*	*Indoor Occupations With Great Exercise*	*Outdoor Occupations With Little Exercise*	*Outdoor Occupations With Great Exercise*
20	41.9	42.0	37.8	43.4
30	35.1	34.5	30.1	36.6
40	27.9	27.8	23.0	29.1
50	20.5	21.2	17.3	22.0
60	14.0	15.1	11.0	15.6
70	8.6	10.4	4.6	9.3

The unhealthiest occupations were those carried out outdoors with little exercise, followed by indoor occupations with little or great exercise. The healthiest occupations were those involving great exercise but carried out outdoors. Table 8.7 suggests that working outside did carry some health penalties − presumably through the effects of cold and damp − but that outdoor occupations with much physical activity conferred significant health benefits.

Neison carried out a special survey of mortality among those with "intemperate habits" through sending out questionnaires to insurance companies, asking for information on insured members from medical personnel. He found a very strong mortality gradient, with those having "intemperate habits" − presumably mainly those addicted to alcohol − having much higher levels of mortality.

573 Neison, *Contributions* p. 456.

Table 8.8: Mortality Among Persons Of Intemperate Habits Compared To That Of The General Population In England & Wales.[574]

Age	*Number Of Those With Intemperate Habits Exposed To Risk*	*Died*	*Mortality Per Cent*	*General Population In England & Wales, Mortality Per Cent*	*Proportion Of Intemperance Mortality To That Of England & Wales*
16-20	74.5	1	1.342	.730	1.8
21-30	949.0	47	4.953	.974	5.1
31-40	1861.0	86	4.620	1.110	4.2
41-50	1635.5	98	5.992	1.452	4.1
51-60	966.0	62	6.418	2.254	2.9
61-70	500.5	40	7.992	4.259	1.9
71-80	110.0	20	18.182	9.097	2.0
81-90	15.0	2	20.000	19.904	1.0

There are problems with the interpretation of Table 8.9 − the nature of the sample, its socio-economic and geographical composition − but its findings are plausible: those who drank large quantities of alcohol − and probably smoked tobacco − suffered levels of mortality in some age groups four or five times higher than the general population.

Neison assumed that he had largely refuted the arguments of Farr, Chadwick and other sanitarians, but there is no inconsistency between the importance of disease environment on the one hand, and the role of lifestyle on the other. There is evidence for the importance of both, and the relative role of these variables will depend upon particular historical and social circumstances.[575]

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574 Neison, *Contributions* p. 204.

575 J.C. Riley, *Rising Life Expectancy: a Global History* (Cambridge 2001).

Wealth And Mortality Among Women.

The small amount of available evidence on female adult mortality is ambiguous before the twentieth century. Tryon claimed at the end of the seventeenth century that women's health suffered because of their life-style:

"… there being hardly any Women in the known-World that are such great Drinkers and lovers of strong liquors as the *English* ... the too frequent drinking of *Wine* and *strong Drinks,* which … makes her lose her way … [and the] Inconveniences the Mother suffers, the Child partakes thereof, both in the time of Pregnancy (or breeding) and whilst it sucks."[576]

He claimed that wealthy women were less healthy than the poor, resulting from their physical inactivity:

"Women ought *not to lie too long in* Bed, as most of them that are of any Quality or Ability do … if they do but use any kind of Exercises, and hereby their Travail in Child-bearing is tenfold more burthensom than otherwise it would be, witness many ordinary Country People, who have nothing the trouble such times as our *fine lazy sluggabed Dames.*"[577]

There is no systematic evidence on life-style of women in wealthy families. Certainly many of the fashionable women depicted in contemporary pictorial satires were shown as obese and over-weight.[578] Both Pepys and Parson Woodforde describe in their diaries female guests consuming very generous quantities of food and drink,[579] and Woodforde makes reference to female alcoholics of his acquaintance.[580] Dobson quotes Dr George Buxton's diary

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576 Tryon, *The Way to Health*, pp. 278, 283-84.

577 *Ibid,* pp. 288-9.

578 A.P. Oppe, *Thomas Rowlandson: His Drawings and Water-Colours* (London 1923); V. Murray, *High Society: a Social History of the Regency Period, 1788-1830* (London 1998).

579 R.C. Latham and W. Matthews (eds.), *The Diary of Samuel Pepys*, 11 Volumes (London 1995); Beresford, *James Woodforde*.

580 Beresford, *James Woodforde*, pp. 20, 99.

for the year 1770, in which "he claimed to have seen many women die miserably" of alcoholism.[581]

Gronow writing in the Regency period, described how women along with men consumed large quantities of food and alcohol during dinner parties:

"… a perpetual thirst seemed to come over people, both men and women, as soon as they had tasted their soup; as from that moment everybody was taking wine with everybody else, till the close of the dinner; and such wine that produces that class of Cordiality which frequently wanders into stupefaction. How all this eating and drinking ended was obvious, from the prevalence of gout, and the necessity of every one making the pill-box their constant bedroom companion."[582]

Irvine Loudon has presented evidence to show that maternal mortality was as high or even higher among middle class as it was among working class mothers during the nineteenth and early twentieth centuries, and this was probably partly due to the delivery of babies by medical practitioners with inadequate obstetric practices.[583] Judith Lewis has argued that there were similar problems with the treatment of pregnant aristocratic women, although her research indicates that only about five per cent of women in peerage families died in childbirth in the period before the mid-nineteenth century, similar to estimated levels in the general population.[584] However, there was a marked drop in maternal mortality among aristocratic women in the nineteenth century, much more rapid and significant than that which occurred amongst the general population, which may have been linked to the development of the anti-sepsis movement in the mid-nineteenth century.[585]

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581 M. Dobson, *Contours of Death and Disease in Early Modern England* (Cambridge 1997), p. 246.

582 Murray, *High Society.*

583 I. Loudon, *Death in Childbirth: an International Study of Maternal Care and Maternal Mortality, 1800-1950* (Oxford 1992), pp. 243-6.

584 J. Lewis, ' "Tis a misfortune to be a great ladie": Maternal Mortality in the British Aristocracy, 1559-1959', *Journal of British Studies*, Vol. 37 (1998).

585 *Ibid*, p. 33; Loudon, *Death in Childbirth.*

Conclusion

The overall evidence considered provides only minimal support to Wilkinson and Marmot's thesis that social inequality *per se* leads to higher mortality in adults. The absence of a social class gradient in adult mortality before the twentieth century indicates that other factors were more significant. The data considered suggests that there were important health hazards associated with the ownership of wealth − including an excessive consumption of food, alcohol and tobacco, and lack of physical activity − which were linked to high adult mortality amongst the wealthy before the twentieth century.

IV

The Consequences Of Demographic Change

9. DEMOGRAPHY, ECONOMICS AND THE CHANGING SOCIAL STRUCTURE OF ENGLAND DURING THE INDUSTRIAL REVOLUTION.

Introduction

Medieval historians have written extensively of the consequences of the autonomous role of population resulting from the impact of the plague: the transformation of the economy, and changes in feudal tenure and other aspects of the social structure.[586] Economic historians during the 1950s and 1960s also traced the impact of population on the economic and social structure of eighteenth century England: rising prices, declining real incomes amongst the mass of the population, rising agricultural profits, a polarisation of wealth between the rich and the poor and other economic and social changes.[587]

More recently, population economists have begun to analyse the positive impact of population growth on economic development, and have challenged the classical Malthusian assumption that population increase has an overall negative effect on economic growth.[588] Julian Simon and Ester Boserup in particular have analysed in detail the various long-term benefits of population growth: an improvement in transport infra-structure, the development of cities and improved health services, the increase in technical innovation arising from a greater density of population, and the more intensive cultivation of land due to increasing demand for food.[589]

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586 See J. Hatcher, 'England in the aftermath of the black death', *Past and Present*, Vol. 144 (1994) for a review of the evidence.

587 H.J. Habakkuk, 'The economic history of modern Britian', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965), p.148; J.D. Chambers, 'The course of population change', D.V. Glass and D.E.C. Eversley (eds.), *Population in History: Essays in Historical Demography* (London 1965); J.D. Chambers, *Population, Economy and Society in Pre-Industrial England* (Oxford 1972).

588 See J. Simon, 'Introduction', J. Simon (ed.), *The Economics of Population: Key Modern Writings,* Vol. 1 (Cheltenham 1997).

589 Simon, 'Introduction'; J. Simon, *Theory of Population and Economic Growth* (Oxford 1986); E. Boserup, *The Conditions of Agricultural Growth: the Economics of Agrarian Change under Population Pressure* (Chicago 1965); E.

Simon and Boserup have also agreed with medievalists about the centrality of mortality decline in population growth. However, medieval historians have tended to focus more on the consequences of increases or decreases in labour supply for general economic development, whereas Simon, Boserup and other population economists have emphasized the long-term technical innovations resulting from population growth. This is perhaps partly due to the different periods of history considered by the two different groups, but there is a general agreement that demographic factors had an independent and powerful impact on economic development through the exogenous influence of mortality.

In the late 1950s, Habakkuk put forward a general thesis on the relationship between demographic and economic history in Britain before the nineteenth century. He presented a "heroically simplified version of English history", which ran as follows:

"... long-term movements in prices, in income distribution, in investment, in real wages, and in migration are dominated by changes in the growth of population. Rising population: rising prices, rising agricultural profits, low real incomes for the mass of the population, unfavourable terms of trade for industry − with variations depending on changes in social institutions, this might stand for a description of the thirteenth century, the sixteenth century and the early seventeenth, and the period 1750-1815. Falling or stationary population with depressed agricultural profits but higher mass incomes might be said to be characteristic of the intervening periods."[590]

Habakkuk cited the work of Postan, Phelps-Brown, Fisher, Coleman, Mingay, Chambers and Thomas in support of his argument,[591] and subsequently there has been much research − particularly by medievalists − examining the general impact of population change on the English economy and society.[592] Hatcher for example has concluded that in later medieval and early Tudor

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Boserup, *Woman's Role in Economic Development* (New York 1970); E. Boserup, *Economic and Demographic Relationships in Development* (Baltimore 1990).

590 Habakkuk, 'The economic history of modern Britain', p. 148.

591 *Ibid*, pp. 147-148.

592 Hatcher, 'England in the aftermath of the black death'.

England population "was one of the major determinants not only of both aggregate and per capita output, but also the distribution of wealth and structure of society."[593] The exogenous influence of population has been easier to establish for the medieval period because of the role of plague in shaping demographic change, although there is the difficulty of accurately measuring changes in population, mortality and fertility during the medieval era.

I will explore this thesis in relation to the period of the classical industrial revolution, arguing that population growth resulting from reduced mortality contributed to the growth of the economy and the development of capitalism through the creation of "surplus labour". This resulted in a range of economic, demographic and social consequences which will explored in some detail.

The Impact Of Demographic Change On The Standard of Living.

There has been a prolonged controversy about the standard of living and how it changed over time, with no real consensus on how average real incomes changed during the eighteenth and early nineteenth centuries.[594] This controversy has largely resulted from the uncertain reliability of data and the complexity of the issues involved.

In the absence of reliable data on real incomes, economic historians have attempted to use average height as a measure of "the biological standard of living". Findings on the eighteenth century period are contradictory, with Floud, Wachter and Gregory finding a general increase in mean height between 1740 and 1800,[595] and Komlos concluding that there was a

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593 J. Hatcher, *Plague, Population and the English Economy, 1348-1530* (London 1977), p. 11.

594 For the latest evidence on this debate, C.H. Feinstein, 'Pessimism perpetuated: real wages and the standard of living in Britain during and after the industrial revolution', *Journal of Economic History*, Vol. 58 (1998); P.H. Lindert, 'Three centuries of inequality in Britain and America', A.B. Atkinson and F. Bourguignon (eds.), *Handbook of Income Distribution* (Amsterdam 2000).

595 R. Floud and B. Harris, 'Health, height, and welfare: Britain, 1700-1980', R.H. Steckel and R. Floud (eds.), *Health and Welfare during Industrialization* (Chicago 1997), p. 102.

significant decline between 1730 and 1790.[596] Both sets of findings are based on the same data on military recruits, and the contradictory findings are the result of uncertainties regarding sample composition, changes in minimum height requirements and other difficulties.[597] Komlos has also used information on the heights of American runaway servants born in England, and this shows virtually no change in mean height of men born between the 1710s and the 1750s.[598]

One of the problems with all height data is that it tends to be truncated and for limited periods of time. However, a continuous dataset is available from the seventeenth to the nineteenth century. Legal and local authorities placed advertisements in newspapers which described criminals, runaway apprentices, and husbands fleeing from the maintenance of their families. These advertisements usually included estimates of height, and I have carried out a study of the *Northampton Mercury*, covering a wide number of Midland counties.

Table 9.1: Mean Height Of Men Aged 23-50, 1700-1799.[599]

Period Of Birth	*Number of Cases*	*Mean Height (Inches)*
1700-1724	64	67.3
1725-1749	84	67.2
1750-1774	94	67.4
1775-1799	72	67.5

For the period 1700-1750, the above figures are very similar to those compiled by Komlos on runaway servants of English origin

596 Komlos, 'Shrinking in a growing economy?', p.781.

597 *Ibid*, p. 132, 133.

598 J. Komlos, 'A Malthusian episode revisited: the height of British and Irish servants in colonial America', *Economic History Review*, Vol. 46 (1993), p. 777. Komlos has since published data on American militia men born in England which suggests that there was a significant dip in mean height in the 1720s, but there are the usual problems of the reliability of data based on military recruits, with uncertainties regarding changes in minimum height requirements. See J. Komlos and F. Cinnirella, 'European heights in the early 18th century', *Economic and Human Biology*, Vol. 30 (2005).

599 I extracted all cases with information on height in the period covered by Table 9.1. I would like to thank Bernard Harris for help in preparing these figures.

for 1710-1760.[600] The latter data along with that in table 9.1 suggest that there was no significant change in mean height during the eighteenth century. However, recently some scholars have argued that there was probably no one-to-one relationship between standard of living and height.[601] There has also been controversy over whether smallpox influenced height independently of nutritional status.[602]

The qualitative evidence seems to suggest a worsening of living conditions in the early period of industrialisation.[603] This can be illustrated through the writings of Charles Shaw, who gave the following autobiographical account of his life in the Potteries in the 1830s and 1840s:

"All the great events of the town took place … [in] the market place. During the severity of winter I have seen one of its sides nearly filled with stacked coals. The other side was stacked with loaves of bread, and such bread. I feel the taste of it even yet, as if made of ground straw, and alum, and plaster of Paris. These things were stacked there by the parish authorities to relieve the destitution of the poor. Destitution, for the many, was a chronic condition in those days, but when winter came in with its stoppage of work, this destitution became acute, and special measures had to be taken to relieve it. The crowd in the market-place on such a day formed a ghastly sight. Pinched faces of men, with a stern, cold silence of manner. Moaning women, with crying children in their arms, loudly proclaiming their sufferings and wrongs. Men and women with loaves or coals, rapidly departing on all sides to carry some relief to their wretched homes − homes, well, called

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600 Komlos, 'Malthusian episode revisited' p. 777.

601 J. Komlos, 'Shrinking in a growing economy? The mystery of physical stature during the industrial revolution', *Journal of Economic History*, Vol. 58 (1998); Lindert, 'Early inequality'.

602 For recent publications on this controversy, see D. Oxley, '"The seat of death and terror": urbanization, stunting, and smallpox', *Economic History Review*, Vol. 56 (2003); T. Leunig and H.J. Voth, 'Comment on "Seat of death and terror"', *Economic History Review,* Vol. 59 (2006); D. Oxley, '"Pitied but not pitied" or, does smallpox make you small', *Economic History Review*, Vol. 59 (2006).

603 See P.E Razzell and R. Wainwright, (eds.), *The Victorian Working Class* (London 1973).

such … This relief, wretched as it was, just kept back the latent desperation in the hearts of these people."[604]

Population had doubled in the first fifty years of the nineteenth century in England, and although the economy had grown rapidly during this period, it was insufficient to prevent the poverty described by Shaw, particularly in the absence of a significant re-distribution of income.[605]

There is however uncertainty about changes in the structure and distribution of wealth and income in eighteenth and nineteenth century England.[606] Lindert has recently summarised a number of partial conclusions to emerge from the latest research: "the only period between 1688 and 1914 in which the rent/ wage ratio clearly rose was circa 1750-1810, roughly the period in which the social tables [of Gregory King, Massie and others] show their only rise [of income] in the top-decile and top-quintile … By contrast the separate estimates of wealth-holding inequality and of earnings inequality do not follow the same chronology … When one follows the average levels of estimated new worth by social classes − landed gentry, merchants, yeomen, craftsmen, and so forth − one finds a striking widening of the wealth gaps between

604 C. Shaw, *When I Was a Child* (Firle 1980), pp. 42-43.

605 P.H. Lindert, 'When did inequality rise in Britain and America', *Journal of Income Distribution*, Vol. 9 (2000), p.19.

606 C.H. Feinstein, 'The rise and fall of the Williamson curve', *Journal of Economic History*, Vol. 44 (1988); Feinstein, 'Pessimism perpetuated'; S. Horrell and J. Humphries, 'Old questions, new data and alternative perspectives: families living standards in the industrial revolution', *Journal of Economic History*, Vol. 52 (1992); R.V. Jackson, 'Inequality of incomes and lifespans in England since 1688', *Economic History Review*, Vol. 47 (1994); P.H. Lindert, 'Unequal English wealth since 1670', *Journal of Political Economy*, Vol. 94 (1986); P.H. Lindert, 'Who owned Victorian England? The debate over landed wealth and inequality', *Agricultural History*, Vol. 61 (1987); P.H. Lindert, 'Three centuries of inequality'; P.H. Lindert, 'When did inequality rise in Britain and America?', *Journal of Income Distribution*, Vol. 9 (2000); P.H. Lindert and J.G. Williamson, 'Revising England's social tables, 1688-1812', *Explorations in Economic History*, Vol. 19 (1982); P.H. Lindert and J.G. Williamson, 'Reinterpreting Britain's social tables, 1688-1913', *Explorations in Economic History*, Vol. 20 (1983); L.C. Soltow, 'Long-run changes in British income inequality', *Economic History Review*, Vol. 21 (1968); J.G. Williamson, 'Earnings inequality in nineteenth century Britain', *Journal of Economic History*, Vol. 40 (1980); J.G. Williamson, *Did British Capitalism Breed Inequality?* (Boston 1985).

1810 and 1875. The top landed groups and merchants accumulated at a prodigious rate, it would seem, with their wealth growing faster than that of professionals, shopkeepers, yeomen, or craftsmen … [although] even the middling groups gained in absolute real wealth and held their share of the population, instead of slipping down into the proletariat."[607]

Lindert argues that much of the widening of income inequality in the period 1750-1810 was due to a shift in the relative prices of the commodities consumed by the different social classes: "the rich spent a much lower share of their incomes on food than did the poor, and the rich also paid out a smaller share of their income in housing rents. The relative price of food rose something like 25 per cent 1760-1800, then fell back after 1815. Real housing rents quadrupled between 1760 and 1835, again relative to the overall cost of living index."[608]

Lindert believes that demographic factors were more important than economic variables in the growth of inequality during the period 1760-1810,[609] although he implies that the widening of inequality in the subsequent period may have been due more to economic forces. He has linked these different interpretations with two distinct intellectual traditions: the "first follows Malthus and Ricardo in inferring that income gaps were destined to grow wider as a rising population pressed against land, pushing workers down to subsistence while landowners prospered. The second, Marxian, tradition implied that the industrial forces would cause the same widening."[610] I will argue that these two intellectual traditions can be partly reconciled by focusing on the concept of "surplus labour",[611] and that this is a core feature of

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607 Lindert, 'Three centuries of inequality', pp. 175-178

608 *Ibid*, p. 183.

609 Lindert, 'Early inequality', p. 6.

610 Lindert, 'When did inequality', p. 11.

611 It is necessary to broaden the concept of surplus labour beyond Marx's use of the term. This broadened concept was used by Lewis in his work on the role of surplus labour in economic development. See W.A. Lewis, 'Economic development and unlimited supplies of labour', *The Manchester School of Economic and Social Studies*, Vol. 22 (1954). Lewis's work has influenced the thinking of a number of subsequent scholars including Fei and Ranis. See J.C.H.

demographic and economic development in England during the eighteenth and nineteenth centuries.

The Social Consequences Of Demographic Change.

Most work to date has tended to neglect changes in the social origins of elites as an indication of the changing structure of inequality. In 1963 I published a paper on the social origins of army officers in the Indian and British Home Army.[612] The main findings on the Indian army were as follows:

Table 9.2: Social Origins of Indian Army Officers, 1758-1834. [613]

Period	*Number In Sample*	*Proportional Distribution By Socio-Economic Status*		
		Aristocracy %	Landed Gentry %	Middle Class %
1758-1774	448	2	6	92
1775-1804	626	3	14	83
1805-1834	950	5	19	76

Table 9.2 shows that there was an increase in the numbers of Indian army officers from the aristocracy and landed gentry between 1758 and 1834. Evidence on the home army reveals an even greater rise in the proportion of gentry officers during the same period: increasing from 16 per cent in 1780 to 32 per cent in 1830 [614] – and this was despite a doubling of numbers of officers in the army. It is likely that the increase in aristocratic and gentry officers was due to growing numbers in these groups, mainly resulting from decreasing mortality.[615] On this basis we would

Fei and G. Ranis, *Development of the Labour Surplus Economy: Theory and Policy* (Illinois 1964).

612 P.E. Razzell, 'Social origins of officers in the Indian and British home army: 1758-1962', *British Journal of Sociology*, Vol. 14 (1963).

613 *Ibid*, p. 249.

614 *Ibid*, p. 253.

615 The impact of population increases is most accurately measured by replacement rates, and according to Hollingsworth's figures the male

expect similar changes in other institutions, particularly with reference to positions of power and privilege. To explore this hypothesis I have analysed the social origins of leading office-holders in the church, army, navy, law and civil service for the period 1500-1849.[616]

I have initially analysed the social origins of all Anglican bishops and archbishops listed in the *Dictionary of National Biography*. [617]

Table 9.3: Social Origins And The Occupations Of Fathers Of Bishops and Archbishops In Great Britain, 1530-1849.[618]

Period Of Birth	Aristocracy %	Gentry, Clergy & Professional %	Merchants, Tradesmen & Others %
1530-1649	2	55	43
1650-1749	11	34	56
1750-1849	23	47	30

There was an increase in the proportion of aristocratic bishops and archbishops from the sixteenth century onwards, mirrored by a decline in the number originating from merchant, trade and other backgrounds.

There was a significant decrease in the proportion of cases with no information on parental background − 48 per cent of the

replacement rate amongst the aristocracy increased from 0.791 in 1700-24 to 1.420 in 1775-99, virtually doubling during this period. See Hollingsworth, T.H., 'The demography of the English peerage', *Population Studies,* Supplement 18 (1964), p. 33.

616 There are a number of difficulties, not least the lack of complete information on the social origins of occupants of elite positions in the early period, particularly during the sixteenth century. The categorisation of social origins is also somewhat arbitrary as the aristocratic and gentry categories are reliant on fluid contemporary definitions as to who was eligible for these statuses.

617 From work carried out on *Fasti Ecclesiai Anglicanae* (Canterbury, Rochester and Winchester dioceses) it appears that of the thirty archbishops and bishops appointed after 1700, only two are not listed in the *D.N.B.*, suggesting that this publication is a comprehensive source for this occupational group.

618 The total sample sizes in each period are as follows: 1530-1649: 131; 1650-1749: 79; 1750-1849: 123.

total in 1530-1649 to 7 per cent in 1750-1849.[619] As many of the unknown cases were probably too obscure to reach the attention of contemporary biographers, it is likely that Table 9.3 understates the decline in the percentage of fathers who were merchants, tradesmen or from other low-status occupations.

The status categories may also conceal some of the more subtle sociological differences between different periods. In the sixteenth century, there was a tendency for the fathers of bishops and archbishops to be manual workers and artisans rather than wealthy merchants, whereas the reverse was true in the later periods. Many of the sons of tradesmen, artisans and farmers had been educated at local grammar schools in the sixteenth and seventeenth centuries, whereas by the nineteenth century, sons of merchants and tradesmen were mainly sent to private and the newly fashionable public schools along with their fellow bishops and archbishops from more elite backgrounds.

Lawrence Stone noted the process of polarisation that had taken place earlier in English society during the sixteenth century as a result of population growth: "the excess supply of labour relative to demand not only increased unemployment, but forced down real wages to an alarming degree ... [there was] a polarisation of society into rich and poor: the upper classes became relatively more numerous and their real incomes rose; the poor also became more numerous and their real incomes fell."[620]

Even sharper differences were found amongst other elite occupations for a later period. The following table summarises data on the occupations of fathers of senior army and navy officers, judges, senior churchmen, and leading civil servants selected from volumes 1 to 5 of the *Dictionary of National Biography*.[621]

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619 The numbers of cases with no information are as follows: 1530-1649: 122; 1650-1749: 28; 1750-1849: 9. The proportions with no information in these periods are 48%, 26% and 7%.

620 Quoted in Chambers, *Population*, *Economy and Society*, p. 139.

621 All army officers over the rank of lieutenant-general were selected for analysis, along with navy officers above the rank of vice-admiral, all judges, bishops and archbishops, and senior members of the civil service. The sample sizes with information on parental background are as follows: 1550-1649: 107; 1650-1749: 93; 1750-1849: 185. The number with no information (percentage of all cases in brackets) is as follows: 1550-1649: 63 (37%), 1650-1749: 44 (32%), 1750-1849: 48 (21%). The decline in the percentage of cases with no information

Table 9.4: Social Origins Of Elite Occupations In Great Britain, 1550-1849.

Period Of Birth	*Aristocracy* %	*Gentry & Professional* %	*Merchants, Tradesmen & Others* %
1550-1649	3%	70%	27%
1650-1749	22%	67%	12%
1750-1849	16%	81%	4%

Again the trend was for the aristocracy to enter elite occupations in greater numbers, and for sons of merchants, tradesmen and others to virtually disappear from these professions by the nineteenth century. The timing of these changes fits with the demographic patterns discussed earlier, with the increase of the aristocracy into elite occupations occurring in the eighteenth century.

Habakkuk provided some evidence in support of this conclusion, arguing that demographic pressures resulted in estate owners reducing "the endowment per child and encouraging younger sons to seek professional careers."[622] The aristocracy presumably used their connections and influence to place their younger sons in positions of power and wealth, excluding sons of merchants, tradesmen and farmers.

In the absence of more comprehensive detailed research, we can only speculate on what the full consequences of demographic change were.[623] The increased competition for place

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will again tend to lead to an under-statement of the proportion of people with merchant, trade and other backgrounds, particularly in the early period.

622 H.J. Habakkuk, *Marriage, Debt, and the Estate System: English Landownership 1650-1950* (Oxford 1994), p. 637.

623 Not only is there a lack of detailed information on the social origins of men occupying elite positions, but there is at present no data on the numbers of elite occupations. In the case of the army, it would appear that the number of officers doubled between 1780 and 1830, allowing more opportunities independent of demographic change. The increase in the number of positions is not likely to have been the same in all occupations, so that for example in the church the number of clergy probably did not increase all that greatly during the period. There is also the difficulty of having accurate demographic information on the aristocracy and gentry, as Hollingsworth's data has not yet been scrutinised in detail for its quality and reliability.

and position affected all members of the middle and upper classes, and this competition would not have been confined to positions within the church, army, navy, legal profession and civil service. There were great economic opportunities for both the landed and trading classes, through the enclosure of land and the development of the newly expanding enterprises associated with industrialisation. Additionally, the expansion of world trade and the establishment of overseas colonies, provided a wide source of employment for the sons of middle and upper class families.

This was not just an abstract question of economic gain, but was an issue of survival for these groups, who were confronted with the problem of providing portions, positions and situations for their increasing numbers of surviving sons and daughters.

The Impact of Demographic Change On Marriage Patterns.

Malthus's writings reflect the anxieties of his contemporaries in their concern to prevent a deterioration in their standard of living and economic privileges. His "preventative" method applied particularly to the middle and upper classes, whereas the "positive" checks were mainly applicable to the poor.[624] Although Malthus's theory of population stressed the economic basis of marriage and fertility − a growth in wealth leading to earlier marriage and a rise in fertility − in practice he reversed this analysis when describing actual English population growth: "It is not … among the higher ranks of society, that we have most reason to apprehend the too great frequency of marriage …[it is] squalid poverty, particularly joined with idleness, [which] is a state the most unfavourable to chastity …"[625]

Malthus gave in practice a sociological rather than an economic analysis of marriage: "The labouring poor, to use a vulgar expression, seem always to live from hand to mouth. Their

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624 The evidence in footnote 273, p. 131 suggests that the daughters of elite families married widely and at an early age in the late seventeenth century. It is likely that by the nineteenth century many daughters in these families remained unmarried or married at a later age, illustrating Malthus's "preventative" check. See Hollingsworth, 'The demography', pp. 21, 25.

625 T.R. Malthus, *An Essay on the Principal of Population*, Vol. 2 (Cambridge 1989), pp. 114, 150.

present wants employ their whole attention; and they seldom think of the future. Even when they have an opportunity of saving, they seldom exercise it; but all that they can earn beyond their present necessities goes, generally speaking, to the alehouse … The desire of immediate gratification, and the removal of the restraints to it from prudence … prompt universally to early marriage ..."[626]

He argued that the "carelessness and want of frugality" so prevalent among the poor, was "contrary to the disposition generally to be remarked among petty tradesmen and small farmers,"[627] and that

"poverty itself, which appears to be the great spur to industry, when it has once passed certain limits, almost ceases to operate. The indigence which is hopeless destroys all vigorous exertion … It is the hope of bettering our condition, and the fear of want, rather than want itself, that is the best stimulus to industry, and its most constant and best directed efforts will almost invariably be found among a class of people above the class of the wretchedly poor."[628]

It was this emphasis on "bettering our condition" that led Malthus to stress education and economic independence as the best way of encouraging frugality and a postponement of marriage:

"… to better the condition of the lower classes of society, our object should be to … [cultivate] a spirit of independence, a decent pride, and a taste for cleanliness and comfort among the poor. These habits would be best inculcated by a system of general education and, when strongly fixed, would be the most powerful means of preventing their marrying … [and] consequently raise them nearer to the middle classes of society."[629]

Malthus is expressing here the insight which has informed much of the literature on modern birth control practices: that education − particularly of women − combined with economic opportunity, is

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626 Malthus, *An Essay on the Principal of Population* Vol. 1, pp. 359, 439.

627 *Ibid,* p. 359.

628 *Ibid,* Vol. 2, p. 439.

629 *Ibid*, p. 155.

the most powerful way of encouraging fertility reduction. This ran contrary to his general theory of population − that economic growth will inevitably lead to earlier marriage and increased fertility − and the historical evidence also reveals a much more complex pattern regarding the relationship between wealth and marriage than Malthus allowed for.

It is possible to see in Malthus's writings a reflection of the divergence in marriage patterns that took place between different socio-economic groups in the eighteenth and early nineteenth century, with the age of marriage rising amongst the middle and upper classes, but falling amongst the labouring poor. The mean age of marriage of aristocratic women rose during the eighteenth century from 23.5 years for those born in 1700-24 to 25.5 for the 1775-99 birth cohort, matched by the proportion of aristocratic women never marrying − rising from 16.3 per cent for women aged 50 in 1700-24, to 23.9 per cent amongst those aged 50 in 1800-24.[630] In the pre-industrial period the labouring poor married later than the middle and upper classes, whereas by the end of the eighteenth and beginning of the nineteenth century, the reverse was the case. The following table summarises data on marriage ages amongst different occupational groups listed in Gloucestershire marriage licences during 1637-80:

Table 9.5: Median Age at First Marriage Of Women Marrying In Gloucestershire, 1637-1680.[631]

Occupational Group	*Number In Sample*	*Median Age At Marriage (Years)*
Gentlemen	303	22.0
Yeomen	1192	24.4
Husbandmen	166	26.8

There was a strong gradient between socio-economic status and age at marriage in Gloucestershire, with the wealthier occupational groups marrying at an earlier age.[632]

630 Hollingsworth, 'The demography', pp. 21, 25.

631 Chambers, 'The course', p. 332. The figures are an average of the medians in the original table.

Changes in the relationship between socio-economic status and age of marriage are illustrated by the data for Nottinghamshire (See Table 5.2, p.128). The contrast in the marriage ages of wives of labourers and professionals & gentlemen in the period 1670-1769 is as follows:

Table 9.6: Mean Age Of Marriage (Years) Of Spinsters By Occupation Of Groom, Nottinghamshire, 1670-1769.[633]

Period	*Labourers*	*Professional & Gentlemen*
1670-1689	26.1	23.8
1690-1709	25.8	23.9
1710-1729	25.9	24.0
1730-1749	25.6	24.0
1750-1769	25.0	24.7

The wives of labourers were on average more than two years older than those marrying professionals & gentlemen in 1670-1689, whereas by 1750-1769 the mean age of marriage was similar in the two groups. This was the result of a fall in the average age of marriage of labourers' brides of about one year, with a similar but reverse rise for wives of professionals and gentlemen.

The transition in the pattern of socio-economic status and marriage age continued throughout the eighteenth century, evidenced by the following table for Sussex.[634]

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632 Michael Drake found something similar in Halifax, Yorkshire in the mid-seventeenth century. The median age of women marrying by occupational group was as follows: yeomen: 23; cloth trade: 25; labourers: 30. See Drake, 'An elementary', p. 443.

633 See Table 5.2, p. 128.

634 See F.W.D. Penfold (ed.), 'Sussex marriage licences for the Archdeaconary of Lewes, 1772-1837', *Sussex Record Society*, Vols. 25 and 26 (1917 and 1919); D. Macleod (ed.), 'Sussex marriage licences for the Archdeaconary of Chichester, 1731-74' , *Sussex Record Society*, Vol. 32 (1926); D. Macleod, (ed.), 'Sussex marriage licences for the Archdeaconary of Chichester, 1775-1800' , *Sussex Record Society*, Vol. 35 (1929). The labourers that I selected from these registers were matched with the next case from the list of yeomen, professional or gentlemen marriages.

Table 9.7: Proportion Of Spinsters Marrying Under Twenty-One In The Archdeaconaries Of Chichester And Lewes, Sussex, 1754-1839.

Archdeaconary Of Chichester				
Period	*Labourers*		*Yeomen, Gentlemen & Professionals*	
	Number	Proportion Under 21 %	Number	Proportion Under 21 %
1754-69	142	9	142	22
1770-99	163	25	163	14
Archdeaconary Of Lewes				
Period	*Labourers*		*Yeomen, Gentlemen & Professionals*	
	Number	Proportion Under 21 %	Number	Proportion Under 21 %
1754-69	145	28	145	16
1770-99	224	36	224	16

By the latter half of the nineteenth century, it was the poorer socio-economic groups who were marrying earlier, and as the compiler of the 1911 Fertility Census wrote, "generally speaking, the proportion of early marriage increases and of late marriage decreases as we descend the social scale ..."[635] The figures for key social groups − professionals, unskilled workers and agricultural labourers − are summarised as follows:

Table 9.8: Mean Age At Marriage of Women Enumerated In The 1911 Fertility Census, England And Wales.[636]

Social Class	*Mean Age At Marriage (Years)*
I	25.2
IV	23.0
VIII	23.4

635 *Census of England & Wales, 1911*, Vol. XIII, p. lxxxix.

636 *Ibid*, p. xc.

The review of the evidence above indicates that the association between wealth and early marriage reversed in the eighteenth century, with the middle and upper classes delaying marriage at the same time as the labouring poor began the opposite process of marrying earlier. The reasons for these trends are likely to be complex, and, in the case of labourers and other poor socio-economic groups, they are probably associated with the decline of female employment and the shrinking of economic opportunities during this period.[637] Also, as Drake has pointed out, the decline of economic opportunities probably had a differential impact on the marriage patterns of men and women.[638] Hudson has summarised recent evidence as follows:

"for women of the labouring classes and the poor … marriage was entered more readily and earlier when times were hard, when income earning opportunities were declining and prospects for the celibate were worsening … Where real wages were buoyant and job prospects good for young women, marriage could be delayed either by a woman's own pro-active choice or because of pressure from her family, reluctant to lose an income earner. If male marriage decisions were stimulated directly by rising earnings (and the jury is still out on this) it appears certain that female motivations were not."[639]

If this thesis is correct, the falling age at marriage among labouring women at the end of the eighteenth century was the result of a deteriorating living standards and shrinking economic opportunities. On the present argument, the decline in the standard of living was the result of population growth, creating both more unemployment and greater poverty, and indirectly leading to a fall in the age of marriage of poorer women. The increase in population was largely due to declining mortality, and unlike the poor, the upper and middle classes dealt with resulting population pressure by delaying marriage.

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637 See K.D.M. Snell, *Annals of the Labouring Poor* (Cambridge 1987); A.S. Kussmaul, *Servants in Husbandry in Early Modern England* (Cambridge 1981).

638 M. Drake, 'Age at marriage in the pre-industrial West', J, Bechofer (ed.), *Population Growth and the Brain Drain* (Edinburgh 1969).

639 P. Hudson, 'Industrialization in Britain: the challenge of micro-history', *Family and Community History*, Vol. 2 (1999), p. 4.

There were other aspects of the social structure affected by population growth, including patterns of literacy. There was a divergence in literacy rates between artisans, tradesmen, yeomen and husbandmen on the one hand, and labourers on the other. Lawrence Stone found that about 45 per cent of labourers in the Oxford Archdeaconary and Gloucester Diocese were illiterate in 1675, a proportion that did not significantly change during the rest of the seventeenth and the whole of the eighteenth century. Yeomen & husbandmen, and artisans & tradesmen all increased their literacy rates in this period: the former from 67 per cent in 1675 to 94 per cent by the beginning of the nineteenth century, and the latter from about 85 per cent to 96 per cent in the same period.[640] The lack of improvement in literacy amongst labourers was probably linked to their increasing pauperisation, making it difficult for them to achieve literacy and escape poverty, in the way described by Malthus.

There is also some evidence that the sale of goods consumed by the wealthy increased more rapidly that those consumed by the ordinary population. The output of tallow candles, used by poorer people, doubled between 1715 and the end of the century, whereas that of wax candles, used by the wealthier classes, increased nearly tenfold.[641] The production of high-quality white glass nearly quadrupled between 1747 and 1801, whereas that of common bottles only began to increase during the 1790s.[642] The import of silk more than doubled in the eighteenth century, whereas the production of strong beer increased by barely more than a half in the same period.[643] These changing patterns of consumption may have been partly a function of an earlier increase in population among the wealthy than the poor, but it is consistent with the trend of socio-economic polarisation, including changes in the social origins of the elites in the church, army, navy, judiciary and civil service, and the patterns of marriage and literacy.

640 L. Stone, 'Literacy and education in England, 1640-1900', *Past and Present*, Vol. 42 (1962), pp. 110, 111.

641 T.S. Ashton, *An Economic History of England in the Eighteenth Century* (London 1955), p. 60.

642 B.R. Mitchell and P. Deane, *Abstracts of British Historical Statistics Debt, and the Estate System* (Cambridge 1976), p. 267.

643 See P.E. Razzell, *Essays in English Population History* (London 1994), p. 75.

Habakkuk pointed out that before the middle of the eighteenth century high mortality had the effect of consolidating estates through land being "passed to a collateral who was already a landowner."[644] During the nineteenth century, reduced mortality probably had the effect of increasing pressure on the assets of estates, with the "net result in the long run" of increasing "the burden of encumbrances."[645] This suggests that increasing expectation of life created pressure towards a more equal ownership of land, but this was only one facet of a very complex interaction of demographic, economic and social factors. Habakkuk's findings are consistent with the earlier discussion of Malthusian pressures on the resources of the rich, leading to a series of "preventative" responses, including delayed marriage and a more effective exploitation of resources.

The Influence Of Demographic Factors On Economic Development.

Although no precise measurements are available, we can speculate that most economic activity in the eighteenth and early nineteenth centuries was primarily labour-intensive: the roads, houses, canals, workshops, railways, factories and the infra-structure of an industrial economy were built with labour using only a minimum of technology.

It was labour-intensive London rather than technological Lancashire which was the focus of manufacturing industry in the earliest phase of the industrial revolution,[646] and its chronicler was the great social commentator, Henry Mayhew. Mayhew was very aware of the importance of population for the development of the London economy, and the standard of living of its inhabitants. He analysed the increase of surplus labour under two headings: the growth in the number of labourers and the increase in the amount of labour extracted from the existing labour force, through what he called the "competitive system".

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644 Habakkuk, *Marriage, Debt, and the Estate System*, p. viii.

645 *Ibid*, p. 341.

646 A.L. Beier, 'Engine of manufacture: the trades of London', A.L. Beier and Roger Finlay (eds), *London 1500-1700: the Making of the Metropolis* (Basingstoke 1986).

He saw six ways of bringing about a growth in the number of labourers: "1. By the undue increase of apprentices. 2. By drafting into the ranks of labour those who should otherwise be engaged, as women and children. 3. By the importation of labourers from abroad. 4. By the migration of country labourers to towns, and so overcrowding the markets in the cities. 5. By the depression of other trades. 6. By the undue increase of the people themselves."[647] He grouped the means of increasing the amount of labour from a fixed labour force under seven headings: "1. By extra supervision when the workmen are paid by the day. 2. By increasing the workman's interest in his work, as in piece work, where the payment of the operative is made proportional to the quantity of work done by him ... 3. By large quantities of work given out at one time, as in 'lump-work' and 'contract work'. 4. By the domestic system of work, or giving out materials to be made up at the homes of the workpeople. 5. By the middleman system of labour. 6. By the prevalence of small masters. 7. By a reduced rate of pay, as forcing operatives to labour both longer and quicker, in order to make up the same amount of income."[648]

Although these categories are descriptively distinct, most of them relate to a "surplus of population", vulnerable to exploitation by those with wealth, willing to use the power of capital to provide employment but also to generate profit and wealth for themselves. For example, Mayhew makes it clear that many small masters only set up as "independent" traders because they had made unemployed through competition in the labour market. Children and women were often forced into the labour market by economic necessity, resulting from poverty and the erosion of domestic industry linked to a surplus of labour. Employers were able to bring labour in from the countryside and from abroad to break the power of unions, and Mayhew wrote in great detail about how real wages and employment fell in the period after the ending of the Napoleonic wars.

Workers were very aware of the factors responsible for the decrease in their wages. One of Mayhew's informants told him: "I believe the reduction of wages in our trade is due chiefly to the

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647 H. Mayhew, *The Morning Chronicle Survey of Labour and the Poor: the Metropolitan Districts* (Firle 1980), Vol. 1, p. 16.

648 Mayhew, *The Morning Chronicle Survey*, Vol. 1, pp. 16, 17.

supra-abundance of workmen; that is the real cause of our prices having gone down, because when men are scarce, or work is plentiful, they *will* have good wages. From the year 1798 our wages began to increase partly because the number of hands was decreased by war, and partly because foreign orders were much greater than now."[649]

In this situation, where labour supply greatly exceeded its demand, conditions of work became very harsh, enabling employers to extract much more labour from their workers than under previous periods. One of Mayhew's informants working in the carpentry and joinery trade gave the following account of his working conditions:

"I work at what is called the strapping shop ... and have not worked at nothing else for these many years past in London. I call 'strapping', doing as much work as a human being or a horse possibly can in a day ... with the foreman's eyes constantly fixed upon you, from six o'clock in the morning to six o'clock at night. The shop in which I work is for all the world like a prison − the silent system is as strictly carried out there as in a model gaol. If a man was to ask a common question of his neighbour, except it was connected with his trade, he would be discharged there and then. If a journeyman makes the least mistake, he is packed off just the same. A man working in such places is almost always in fear; for the most trifling things he is thrown out in an instant ... I suppose since I knew the trade a man does four times the work he did formerly ..."[650]

No doubt similar conditions could be found in parts of the developing world today, partly resulting from similar kinds of demographic and economic conditions. England was one of the first countries to undergo a demographic transition, with a fall in mortality occurring largely independently of economic change. Modern capitalism first emerged in England, where a surplus of labour was exploited by those owning capital, to protect their own

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649 Mayhew, *The Morning Chronicle Survey*, Vol. 1, p. 19.
650 *Ibid,* pp. 17, 18.

standard of living which was threatened by their own increasing numbers.[651]

Changes in the organisation of production − through the enclosure movement in the countryside and the introduction of the "competitive system" in industrial villages and towns − enabled an efficient exploitation of capital resources and labour. Also, as we have seen, the aristocracy and gentry increased their dominance in the army, church, navy, judiciary and civil service, creating pressure on the middle classes to focus more on trading and manufacturing activity, and to exploit their resources and opportunities more effectively.

Conclusion

This essay's main arguments cover a range of complex and difficult issues, but can be summarized in the form of the following hypotheses:

1. Population growth was the result of changes exogenous to the economy, but affected economic development through a range of variables, including increasing prices, a creation of a labour surplus, a fall in labour costs, and a stimulation of demand particularly for goods and services consumed by the rich and wealthy.
2. Population increase was a central variable in the genesis of English capitalism through the creation of 'surplus labour', and had an autonomous influence on economic growth.
3. Population also had a major impact on the social structure of the country:
   a. the growth in the numbers of the aristocracy and gentry led to their dominance of the army, church, navy, judiciary and civil

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[651] As Chambers and others have pointed out there were multiple reasons why capitalism developed in England before it did elsewhere, including the development of technology, relatively low rates of taxation, the breakdown of monopolies, the deregulation of the economy associated with the erosion of the guild and apprenticeship system, the development of effective legal regulation of property transactions, institutional factors such as the relative lack of political corruption, and the growth of colonialism for the development of overseas trade. See Chambers, *Population, Economy and Society*; D.C. North, *Institutions, Institutional Change and Economic Performance* (Cambridge 1990).

service, as well as creating pressure for the exploitation of capital resources − particularly the ownership of land − leading to the enclosure movement and other innovations in agriculture.

b. the growth in the numbers of the middle classes and their increasing exclusion from major positions of office, led them to focus more forcefully on the development of industrial and commercial enterprise associated with the industrial revolution.

c. the growth of the non-wealth owning population made it vulnerable to economic exploitation, providing the basis of cheap labour which laid the foundation for the industrial and agricultural revolutions.

4. The changes listed under heading three led to an increasing polarisation between the rich and the poor, affecting among other things, patterns in the consumption of goods, the age at marriage, and literacy rates.

5. Although population growth resulted in an increase in poverty amongst the majority of the population in the earlier phases of the industrial revolution, without the improvements in agriculture and manufacturing industry associated with the development of capitalism, England may have suffered the same fate as Ireland, destitution and widespread famine.[652]

[652] See Razzell, *Essays in English Population History*, pp. 58-81 for a discussion of these issues.

10. MORTALITY, POPULATION AND POVERTY: A HISTORICAL PERSPECTIVE.[653]

Introduction

The relationship between economic development and population change has long been a matter of controversy.[654] One of the most influential contributors to the debate was Adam Smith, who argued that economic factors acted mainly through the influence of poverty on mortality levels.[655] Malthus emphasized in his theoretical writings the influence of wealth levels on both changing fertility and mortality, although in his empirical work on English population he stressed the role of non-economic factors in reducing mortality.[656] However, although Smith, Malthus and others argued that economic factors had a major influence on all forms of mortality, as we have seen, there is increasing evidence that economic development and wealth had little or no influence on English mortality before the twentieth century.[657]

The main thesis of this book is that exogenous shifts in mortality have had a significant independent influence on population and economic change. A part of this argument focuses on the role of surplus labour, but whereas Marx saw surplus labour as resulting mainly from economic developments, it is viewed here as arising primarily from exogenous demographic change.

The relationship between economics and demography will be considered with respect to the influence of economic development and wealth/ poverty on mortality and population, as

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653 Written jointly with Christine Spence, and previously unpublished.

654 J. Simon, *Theory of Population and Economic Growth* (Oxford 1986); D. Hodgson, 'Orthodoxy and revisionism in American demography', *Population and Development Review*, Vol. 14 (1988).

655 Smith, *An Inquiry*, Vol. 1, p. 97.

656 T.R. Malthus, *An Essay on the Principal of Population,* Vol. 1 (Cambridge 1989), pp. 15, 71-73, 92, 192-93.

657 Essays 3-5 of the present volume. See also E.A. Wrigley and R. S. Schofield, *The Population History of England 1541-1871* (London 1981), pp. 413-16; E.A. Wrigley, R.S. Davies, J.E. Oeppen and R.S. Schofield, *English Population History from Family Reconstitution, 1580-1837* (Cambridge 1997), pp. 201-204.

well as the effects of health/mortality improvements on population growth and the incidence and distribution of poverty. This two-way interaction of demographic and economic factors will be discussed in the light of both the long-term English historical experience, and that of developing countries in the last sixty years.[658]

There have been a number of previous studies linking population growth with increasing poverty, some of which have emphasized the role of declining mortality.[659] There has been no attempt however to integrate recent research on long-term historical trends with a current analysis of population and poverty in developing countries. The main aim of this essay is to present such a historical perspective, which is important for generating a theoretical and general understanding of the relationship between demographic and economic change, including the long-term genesis of economic inequality and poverty.

I

Poverty, The Decline Of Mortality And The Growth Of Population In Developing Countries.

There is a parallel between the historical demography of England and the demographic experience of third world countries, although the scale and rapidity of falling infant and child mortality was

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658 Data on economic development and mortality in developing countries although generally available, is subject to a degree of unreliability, particularly on adult mortality. See United Nations, *Health and Mortality: Issues of Global Concern − Proceedings of the Symposium on Health and Mortality, Brussels, 19-22 November 1997* (New York 1999).

659 Malthus discussed extensively the impact of population growth on poverty, but saw this as a part of a systematic long-term cycle involving economic factors. For studies which emphasize the exogenous role of mortality see K. Davis, 'The population spectre: rapidly declining death rate in densely populated countries', *The American Economic Review*, Vol. 46 (1956); J. Kosa, A. Antonovsky and I.K. Zola, *Poverty and Health: a Sociological Analysis* (Cambridge , MA. 1969); M.D. Morris, *Measuring the Condition of the World's Poor: the Physical Quality of Life Index* (New York 1979).

greater in the latter.[660] Developing countries have been able to benefit from some of the medical and other technologies developed elsewhere, partly explaining their more rapid mortality reduction. However, many of the processes responsible for the falls in mortality were similar in both cases.

Population growth in the developing world has largely been due to mortality reductions, much of which occurred as a result of non-economic developments. Preston concluded from a statistical analysis of available data that “factors exogenous to a country’s current level of income probably accounted for 75-90 per cent of the growth in life expectancy for the world as a whole between the 1930s and 1960s. Income growth *per se* accounts for only 10-25 per cent.”[661]

Wang and colleagues have recently come to a similar conclusion about the relatively unimportant role of per capita income in shaping mortality levels. From a multiple regression analysis of data on 115 middle and low income countries, they concluded that changes in income contributed between 17 and 25 per cent, and education 27 to 41 per cent to the reduction of child and adult mortality in the period 1960-90. They attributed the rest of the decline − between 39 and 50 per cent − to technical factors, including medical and other improvements.[662] Educational and medical improvements require a degree of economic input, but more at the level of public rather than private investment.

Anand and Ravallion ascribed a larger role to growing income in improving life expectancy, but primarily through its indirect effect on other factors. They concluded that two-thirds of increasing life expectancy was due to public health spending, and the rest was a result of a reduction in income poverty. They however heavily qualify this conclusion:

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660 Combined infant and child mortality amongst the general population fell by approximately 50 per cent between 1750-99 and 1800-49 in Bedfordshire and London, similar to the reductions in many developing countries during the last half-century.

661 S. Preston , ‘The changing relation between mortality and level of economic development’, *Population Studies*, Vol. 29 (1975).

662 J. Wang, D.T. Jamsion, E. Bos, A. Preker, and J. Peabody, *Measuring Country Performance on Health: Selected Indicators for 115 Countries* (Washington: The World Bank 1999).

"Over the past 10 years, a number of studies have used household or individual level data to look at the determinants of health and educational outcomes in developing countries. Methodologies and data have differed greatly amongst these studies, and the usual estimation problems in micro-econometric work clouds inferences. While some studies predict (say) a positive effect of rising incomes on health, others indicate little or no effect …"[663]

Some of the uncertainty about the factors involved in mortality decline is the result of the poor quality of data. Problems of measurement can be illustrated by changes that the World Bank made in its 2000/01 Development Report to the findings of its previous 1999/00 Report. It revised the 1980-89 and 1990-99 figures for world population increase downwards by about 40%, making varying and different adjustments to individual country data.[664] Given these difficulties, any generalisations about trends in world population and mortality must be qualified by a large degree of uncertainty about the quality of evidence.

However, the majority of research studies suggest a minimal role for increasing per capita GDP in reducing child mortality in developing countries, and this can be illustrated by the following table.

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663 S. Anand and M. Ravallion, 'Human development in poor countries: on the role of private incomes and public services', *Journal of Economic Perspectives*, Vol. 7 (1993).

664 P. Svedberg, *Income Distribution Across Countries: How is it Measured and What do the Results Show?* (Institute for International Economic Studies. Stockholm 2001); World Bank, *Entering the 21st Century. World Development Report 1999/00*, (Washington 2000); The World Bank, *Attacking Poverty. World Development Report 2000/01* (Washington 2001).

Table 10.1: GDP Per Capita Annual Growth Rates And The Reduction Of Under Five Mortality In Third World Countries, 1970-2002.[665]

Region	*GDP Per Capita Purchasing Power Parity US$ Billions 2002*	*% GDP Per Capita PPP Annual Growth Rate, 1975-2002*	*Under 5 Mortality Rate Per 1000, 1970*	*Under 5 Mortality Rate Per 1000, 2002*	*% Reduction In Under Five Mortality Rate, 1970-2002*
Latin America & Caribbean	7223	0.7	123	34	72
Central, Eastern Europe & CIS	7192	-1.5	43	22	49
Arab States	5069	0.1	197	62	69
East Asia & Pacific	4768	5.9	122	42	66
South Asia	2658	2.4	206	95	54
Sub-Saharan Africa	1790	-0.8	231	178	23

All regions covered in Table 10.1 experienced significant falls in under-five child mortality, and there appears to have been little relationship between changes in per capita income and mortality reduction. However, there is some association between absolute level of GDP and improvement in child mortality, even when possible complicating factors such as distribution of GDP and the effect of AIDS in Africa and Asia are excluded.[666]

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665 United Nations Development Programme World Bank, *Attacking Poverty. World Development Report 2000/01* (Washington 2001); United Nations Development Programme. *Cultural Liberty in Today's Diverse World. Human Development Report* (New York 2004).

666 UNAIDS, *Report on the Global HIV/AIDS Epidemic* (New York, July 2004).

Much of the reduction in mortality depicted in Table 10.1 is probably due to medical initiatives carried out by local, national and international bodies, including vaccination programmes, the provision of sulfa drugs and antibiotics, re-hydration fluids, improvement in water supplies and public and private hygiene, programmes for the eradication of malaria and other health measures.[667]

Caldwell in a classic paper on routes to low mortality in three relatively poor countries − Sri Lanka, Costa Rica, and Kerala, India − has suggested that there are a number of factors which are important for the reduction of mortality: (1) a substantial degree of female autonomy; (2) an open political system; (3) significant inputs into both health services and education, particularly for female children; (4) health services accessible to all; (5) efficient health services; (6) a nutritional floor particularly for the poor; (7) universal immunization; and (8) antenatal and postnatal health services provided by trained personnel.[668]

Caldwell has argued that countries can take different routes to achieve low mortality,[669] but most of the significant factors identified are not directly related to personal levels of income − with the exception of a minimally adequate level of nutrition, which is clearly important.[670] Most of the factors identified require public health expenditure, and perhaps a degree of income redistribution. Many socialist countries achieved significant reductions in mortality in spite of minimal economic development, and this was largely the result of investment in

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667 Preston, 'The changing relation'; J. Caldwell, 'Routes to low mortality in poor countries', *Population and Development Review*, Vol. 12 (1986). For a detailed study of the reduction of mortality brought about mainly by non-economic developments see J.C. Riley, *Poverty and Life Expectancy: The Jamaica Paradox* (Cambridge 2005).

668 Caldwell, 'Routes to low mortality'.

669 *Ibid.*

670 For a discussion of the effect of famine on mortality see T. Dyson and C. O' Grada, *Famine Demography: Perspectives from the Past and Present* (Oxford 2002). The relationship between nutrition and mortality is a very complex one and varies in different historical situations, depending on the incidence of disease and the level of malnutrition. See P.G. Lunn, 'Nutrition, immunity and infection, R. Schofield, D. Reher and A. Bideau (eds.), *The Decline of Mortality in Europe* (Oxford 1991).

medical and other public health services.[671] Cuba is perhaps the most striking example of this approach to achieving low mortality, and today has a very high life expectancy in spite of low personal incomes.[672]

Recently Riley has argued that not all the factors enumerated by Caldwell are necessary for reducing mortality, concluding that "it is difficult to associate the superior achievers [in mortality reduction] with political and civil freedoms …. They represent countries from across the political spectrum."[673] He has also pointed out that many non-socialist countries achieved rapid mortality reductions in the twentieth century, including Jamaica which experienced falls in age-specific mortality of over 50 per cent between 1920-22 and 1949-51 even with a high incidence of poverty.[674] However, Riley concluded that most of the health gains in the period 1920-51 were the result of the actions of individuals making improvements to personal health and hygiene, which were only partly due to the health education campaigns initiated by the colonial administration and various international bodies.[675]

To explore further the relationship between poverty, mortality and population, we have looked at countries with negative per capita gross domestic product annual growth between 1975 and 2002. The following table summarises United Nations data for these countries by two regions − outside and within Sub-Saharan Africa − arranged in order of child mortality reductions between 1970 and 2002.

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671 Riley, *Poverty and Life Expectancy*, pp. 2-5.

672 United Nations Development Programme, *Cultural Liberty*; Riley, *Poverty and Life Expectancy*, p.4.

673 Riley, *Rising Life Expectancy*, p. 135.

674 *Ibid*, p. 74.

675 *Ibid*, p. 193.

Table 10.2: Mortality, Negative Economic Growth, Health Expenditure And Immunization.[676]

Name of Country	*Increase in Life Expectancy at Birth 1970-2002 (Years)*	*Per Capita Gross Domestic Product PPP Annual Growth Rate, 1975-2002 %*	*Health Expenditure Per Capita PPP US$ 2001*	*One-year-olds fully immunized against measles 2002 %*
Outside Sub-Saharan Africa				
Iraq	4	-9.6	97	90
Latvia	1	-0.5	509	98
Madagascar	5	-1.6	20	61
Djibouti	5	-4.6	90	62
Haiti	1	-2.3	56	53
Moldova	4	-5.4	112	94
Kyrgyzstan	6	-3.6	108	98
Comoros	12	-1.0	29	71
Mean Average Of Eight Countries With The Lowest Mortality Reductions	5	-2.4	128	78
Venezuela	8	-1.0	386	78
Bolivia	17	-0.4	125	79
Nicaragua	14	-2.9	158	98
Iran	15	-0.4	422	99
Peru	14	-0.6	231	95
Kuwait	10	-1.2	612	99
Saudi Arabia	18	-2.5	591	97
United Arab Emirates	13	-2.8	921	94
Mean Average Of Seven Countries With The Highest Mortality Reductions	14	-1.5	431	92

676 United Nations Development Programme, *Cultural Liberty*.

Name of Country	*Increase in Life Expectancy at Birth 1970-2002 (Years)*	*Per Capita Gross Domestic Product PPP Annual Growth Rate, 1975-2002 %*	*Health Expenditure Per Capita PPP US$ 2001*	*One-year-olds fully immunized against measles 2002 %*
Sub-Saharan Africa				
Zambia	-17	-2.1	52	85
Nigeria	8	-0.6	31	40
Rwanda	-5	-0.6	44	69
Angola	2	-1.5	70	74
Burundi	-3	-0.9	19	75
Niger	8	-1.9	22	48
Sierra Leone	-1	-3.3	26	60
Cameroon	1	-0.6	42	62
Mean Average Of Eight Countries With The Lowest Mortality Reductions	-0.9	-1.4	38	64
Cote de Ivoire	-4	-2.0	127	56
Central African Republic	-3	-1.5	58	35
Togo	4	-1.2	45	58
Mali	10	-0.2	30	33
Senegal	11	-0.1	63	54
Namibia	-6	-0.2	342	68
Gambia	16	-0.2	78	90
Mean Average Of Seven Countries With The Highest Mortality Reductions	4	-1.1	106	56

There are a number of factors influencing mortality which are not covered by Table 10.2 − such as war and civil conflict − and no account is taken of distribution of income which is clearly an important factor. The table does show however that in spite of negative per capita income growth between 1975 and 2002 there were substantial gains in life expectancy in most of these countries. Although per capita income growth appears to have had little influence on mortality, absolute levels of income were important. Countries in the second group spent similar proportions of total GDP on health expenditure as elsewhere − between 4 and 5 per cent − but the absolute amount they invested was significantly greater because of their overall wealth. Their reductions in child mortality and their increasing life expectancy were much higher than in the other countries.

The association between high health expenditure and improved mortality was also found in Sub-Saharan Africa. Most Sub-Saharan African countries have experienced substantial improvements in under-five child mortality even when AIDS, which has affected adults more than children, is taken into consideration,[677]

Table 10.2 also indicates that in spite of falling per capita GDP most of these countries had active medical and vaccination programmes, illustrated by the high rates of immunization against measles. One of the reasons for the reduction in mortality despite growing poverty was the relative cheapness and technical effectiveness of medical and other non-economic public health interventions. For example, the US$ 3 billion spent by the Global Fund to date is only a fraction − 0.005 per cent − of the World's Gross Domestic Product in 2004: US$ 54,562 billion.[678] Nevertheless, the money invested by the World Health Organisation and Non-Governmental-Organisations has been successful in combating infection and disease, as evidenced by the elimination of smallpox in the 1970s.

Medical initiatives are focused and technical, and are likely to be easier to implement than complex economic development programmes, which involve a range of factors, including the rule of law, an absence of political corruption and ready access to capital markets. Countries can achieve spectacular mortality improvements even with very poor economic growth. For example, according to United Nations figures, Saudi Arabia improved its life expectancy by 18 years and reduced its child mortality rate from 185 to 28 per 1000 between 1975 and 2002, in

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677 UNAIDS, *Report on the Global HIV/AIDS Epidemic*.

678 International Monetary Fund, *The World Economic Outlook Database* (Washington 2003).

spite of a negative per capita income growth of minus 2.5 per cent per annum.[679]

Saudi Arabia is of course a relatively wealthy country − with a per capita annual income of $12,650 in 2002. However, even in a poor country like Gambia − with a per capita income of only $1,690 − increased its life expectancy by 16 years between 1975 and 2002, and its child mortality rate fell from 319 to 126 per 1000 during the same period. In 1990-2002, 59.3% of Gambia's population lived on less than $1 a day and 82.9% under $2 a day, and the proportion of undernourished people increased from 22% in 1990/92 to 27% in 1999/2001.[680]

All the above figures are of course subject to a large measure of uncertainty because of the unreliability of data. However, the evidence that does exist suggests that major improvements in life expectancy were not simply due to reductions in poverty. It is probable that the significant fall in mortality and the rapidly growing population were largely the result of successful medical interventions and public health programmes. In the absence of economic growth or the re-distribution of income, this is likely to increase unemployment and the growth of poverty.

II

The Influence Of Mortality And Population Change On Poverty Levels In England.

In his introduction to a discussion of the effect of the plague on population levels and the standard of living in the medieval period, Hatcher has summarized the conclusions from his research as follows:

"… the size of the population in later medieval and early Tudor England was one of the major determinants not only of aggregate and *per capita* output, but also of the distribution of wealth and

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679 United Nations Development Programme. *Cultural Liberty*.
680 United Nations Development Programme. *Cultural Liberty*.

the structure of society. Just as the abundance of people prior to 1348 played a major part in reducing the standards of living of the peasantry and strengthening the power of landlords, so the progressive shortage of people in the ensuing era played a major part in undermining demesne agriculture and bringing about a fundamental redistribution of wealth. The later fourteenth and fifteenth centuries saw the real wage-rates of craftsmen and labourers apparently reach levels not exceeded until the second half of the nineteenth century. These centuries also experienced one of the most decisive shifts ever in social structure and tenurial relationships, namely the decline of serfdom and customary land tenure."[681]

The exogenous influence of plague on the economy and social structure of medieval England has been widely accepted. Similarly, evidence cited earlier indicates that wealth/poverty played little role in shaping mortality patterns before the middle of the eighteenth century, and that after that date it was probably public health initiatives and medical and other improvements first introduced by the middle and upper classes, which led to the reduction of infant and child mortality.

The relationship between population change and economic development in the early modern period has been summarized by Habakkuk, quoted previously. There is probably a general consensus about the approximate size of population and per capita incomes before 1750, but there has been major disagreement over the standard of living in the period 1750-1850.[682] In one respect the controversy about the standard of living has been misplaced. Population was growing rapidly during the late eighteenth and nineteenth centuries, largely as a result of factors exogenous to economic development. Merely to avoid a decline in real incomes was a major achievement, made possible because of early industrialisation. Population also grew rapidly in Ireland, but unlike England, was unable to avoid famine, and this

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681 J. Hatcher, 'Plague, population and the English economy', in M. Anderson (ed.), *British Population History* (Cambridge 1996), pp. 15-60.

682 Harris, 'Public health'.

was partly a result of the absence of industrialisation and a lack of economic development during the same period.[683]

III

Surplus Labour In The Genesis Of Poverty In The Modern World

There are echoes in Habakkuk and Hatcher's work of Marx's analysis of surplus labour. Marx saw this form of labour as essentially linked to economic expropriation, whereas Habakkuk and Hatcher viewed it as originating mainly from exogenous population growth. Marx followed classical economics in seeing demography as a function of economics, and failed to give population an independent role in his general theory of history.[684] However, Habakkuk, Hatcher and Marx came to similar conclusions about economic and social conditions of early capitalism, although they reached these conclusions by different routes. There was a rise in poverty amongst the majority of the population, an increase in capital accumulation amongst the wealthy through their ability to exploit cheap labour, and a general increase in economic and social inequality.

There are parallels with the developing countries listed in Table 10.2. Medical and other interventions have led to a rapid doubling of population within 30 years.[685] In the absence of economic development, it is possible that such rapid population increase will lead to famine and a surge in mortality, as happened in Ethiopia in the 1970s.

However, even in Ethiopia, with its history of extreme poverty and mortality, expectation of life at birth increased by 4 years in the period after the famine. Child mortality reduced from

683 This lack of economic development in Ireland was partly the result of economic and other penalties imposed on it by England. See P.E. Razzell, 'Population growth and economic change in eighteenth and early nineteenth century England and Ireland', E.L. Jones and G.E. Mingay (eds.), *Land, Labour and Population in the Industrial Revolution* (London 1967).

684 K. Marx, *Capital: a Critique of Political Economy* (London1987).

685 M. King, 'Health is a sustainable state', *Lancet*, Vol. 336 (1990); J. Jarrett, *Collapse: How Societies Choose to Fail or Survive* (London 2005).

239 per 1000 to 171 per 1000 between 1970-75 and 2000-05 − and with high fertility, its population has increased from 33 to 69 million in the same period.[686]

The following table summarizes data on the relationship between demographic change, economic growth and changes in poverty levels.

Table 10.3: Mortality, Fertility, Population Growth, GDP Growth And Poverty.[687]

Region	*Reduction In Under Five Mortality Rate, 1970-2001* *%*	*Reduction In Fertility Rate, 1970-75 To 2000-05* *%*	*Annual Population Growth Rate, 1975-2001* *%*	*GDP Per Capita PPP Annual Growth Rate, 1975-2001* *%*	*Change In Number Living Below $2 A Day 1981 And 2001* *%*
East Asia & Pacific	66	60	1.4	5.9	-26
Latin America & Caribbean	72	51	1.9	0.7	+30
South Asia	54	41	2.1	2.4	+30
Arab States/ Middle East & North Africa	67	43	2.7	0.3	+34
Sub-Saharan Africa	23	21	2.8	-0.9	+79

The East Asian and Pacific countries − particularly China − have reduced poverty levels in the last twenty years. The factors

686 United Nations Development Programme. *Cultural Liberty*.

687 S. Chen and M. Ravallion, *How Have the World's Poorest Fared since the Early 1980s?* (Development Research Group, New York: World Bank 2004); United Nations Development Programme, *Cultural Liberty*.

responsible for this are complex, but two important factors appear to be successful economic development and a significant reduction in fertility. Other developing countries have been less successful in avoiding poverty, and this may be partly due to lack of international investment and support, together with rapid population growth fuelled by significant falls in mortality and smaller reductions in fertility.

The ecological consequences of population growth are well documented, but the economic and social effects have received less attention. Multi-national companies utilise "surplus labour" derived mainly from population growth, enabling the production of cheap manufactured goods and services for sale in the developed world and elsewhere. In recent years, 37 per cent of foreign direct investment has gone into developing countries, of which 90 percent has been invested in China, India and South-East Asia,[688] where there is not only a major pool of labour, but also a relatively well-educated population working for minimal wages.

These economic developments have probably been associated with a general polarisation of wealth. According to the Human Development Report data, the ratio of income of the poorest 20% to the richest 20% of the world's population has increased from 30 to 1 in 1960 to 59 to 1 in 1989.[689] However, these figures are controversial and there is no current consensus on changes in world income inequality in the period since 1960 to the end of the twentieth century.[690]

If the above overall conclusions are correct, they have general implications for the analysis of demography and its relationship to economics and sociology as disciplines. Most economists have followed Adam Smith and Malthus in assuming that demography is a function of economics, playing at best a very secondary role in economic and social development. Marxist economists and sociologists have attempted to modify this view by stressing the role of "surplus labour" in the growth of capitalism, but they see this surplus resulting mainly from economic development, rather than from exogenous demographic change.

688 P. Marfleet, Globalisation and the third world, *International Socialism Journal*, Vol. 81 (1998).

689 United Nations Development Programme, *Global Dimensions of Human Development: Human Development Report, 1992*, (New York).

690 Svedberg, *Income Distribution Across Countries*.

Surplus labour has undoubtedly been a major factor in economic and social change both historically and in the modern world, leading not only to unemployment and poverty, but a range of other problems, including child labour, sexual exploitation and forced migration.

The control of fertility has spread rapidly in developing countries, and if fertility continues to fall, it will lead to a general reduction in population growth, changing the balance of socio-economic forces between capital and labour. However, there is recent evidence that lack of funds for birth control has begun to significantly affect the increases in fertility, particularly in a number of African countries.[691] This could have serious consequences not only for population increase and environmental degradation, but also for the growth of surplus labour and social inequality.

[691] See J. Cleland, S. Berstein, A. Faundes, A. Glasier and J. Innis, 'Family planning: the unfinished agenda', *Lancet*, Vol. 368 (2006).

Conclusion

A number of unexpected and new findings have emerged from the research covered by this book, which challenge the current consensus on England's demographic history. Although there are still large areas of uncertainty, provisional evidence suggests the following conclusions:

1. Mortality was the major factor in determining population levels in the period 1550-1850.
2. There was a cyclical pattern of infant and child mortality which approximately doubled between the sixteenth and middle of the eighteenth century, before falling to below its original level in the late eighteenth and early nineteenth century.
3. Levels of infant and child mortality were similar amongst the wealthy and the poor in the sixteenth and seventeenth centuries. A social class gradient only emerged in the middle of the eighteenth century, when infant and child mortality diminished amongst the wealthy several decades before it did in the general population.
4. Adult mortality changed little between the end of the sixteenth century and the beginning of the eighteenth century, when it reduced sharply amongst all socio-economic groups. It diminished mainly in the first half of the eighteenth century, but continued to fall throughout the rest of the century, approximately halving between the beginning and end of the century.
5. Nuptiality and fertility played a minimal role in shaping population levels during the long eighteenth century. There was a rise in the proportion of women never married during the eighteenth century, particularly among the wealthy, but this was probably balanced by a fall in the mean age of marriage amongst the poor.
6. Mortality patterns were significantly influenced by 'place' − disease environment − during the seventeenth, eighteenth and nineteenth centuries.
7. Levels of infant and child mortality were largely shaped by changes in the disease environment, resulting from: i. An increase in the virulence of childhood diseases in the seventeenth and eighteenth centuries; ii. A decrease of mortality from the middle of the eighteenth century onwards due to a range of medical developments and improvements in personal, domestic and public hygiene.

8. The fall in adult mortality levels was independent of socio-economic status, and was probably the result of an autonomous reduction in disease virulence.
9. Population levels mirrored the pattern of mortality change: population increased rapidly in the sixteenth and early seventeenth century, stagnated during the period 1650-1750, and increased and accelerated in the late eighteenth and early nineteenth centuries.
10. Population changes were largely independent of economic developments in the period, and were mainly shaped by exogenous factors.

Economic developments resulting from population change were associated with a polarisation in English society, which led in the early nineteenth century to a growth in class consciousness and political radicalism. Much of this process was fuelled by the growth of "surplus labour" − a surplus that did not result mainly from economic processes, but primarily from an increase of population due to the reduction of mortality. In addition to these changes in English society, there were a number of linked developments, including the growing dominance of positions of power and privilege by the aristocracy and gentry. Other changes resulting from population growth were increasing variations in marriage and consumption patterns between socio-economic groups.

The findings in this book on England's population history are relevant to a number of current ideas in the fields of demography, epidemiology and economic history:

1. The significant increase in infant and child mortality during the eighteenth century coincided with a major reduction of adult mortality. This is at variance with life table models which assume that early and late forms of mortality are mathematically linked.
2. Theories of demographic transition assume a linear decline in mortality, but the cyclical pattern of infant and child mortality indicates that this assumption is incorrect. Demographic transition theory also assumes that reductions in mortality are quickly followed by a decline in fertility, yet the major fall in mortality during the eighteenth and early nineteenth centuries did not result in a general reduction of fertility.

3. Recent theories in epidemiology postulate a cohort association between infant and adult mortality.[692] The lack of an association between these forms of mortality in eighteenth century England raises about questions the general validity of these hypotheses.
4. A number of epidemiologists have argued that there is an intrinsic link between socio-economic status and adult mortality, resulting from status stress and other factors.[693] The absence of a correlation between socio-economic status and adult mortality before the twentieth century suggests that these ideas may not be applicable to historical populations.
5. It is widely assumed that poverty and inadequate nutrition are associated with higher levels of mortality.[694] The evidence in this book suggests there was a minimal association between poverty and infant and child mortality in England before the middle of the eighteenth century, and that adult mortality may have been higher amongst the wealthy than the poor before the twentieth century.
6. There is a current consensus that height not only reflects nutritional levels and the standard of living, but is also a measure of overall health. Available evidence indicates that the wealthy were significantly taller than the poor,[695] and yet adult mortality among the former was at least as great as that among the latter, challenging the assumption of a general link between height and health.
7. The debate about the effects of the industrial revolution on the standard of living has yet to be resolved, but in one respect the debate is misleading. Population probably grew mainly as a result of factors exogenous to the economy, and therefore even to

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692 See D.J.P. Barker, *Mothers, Babies, and Diseases in Later Life* (London 1994), pp. 1-13; D. Kuh and G. Davey Smith, 'When is mortality risk determined? Historical insights into the current debate', *Social History of Medicine*, Vol. 6 (1993), pp. 101-23.

693 See M. Marmot, *Status Syndrome: How Your Social Standing Directly Affects Your Health* (London 2004); R.G. Wilkinson, *Unhealthy Societies: the Afflictions of Inequality* (London 1996).

694 G. Davey Smith, D. Dorling and M. Shaw (eds.), *Poverty, Inequality and Health in Britain, 1800-2000: A Reader* (Bristol 2001); B. Harris, 'Public health, nutrition, and the decline of mortality: the McKeown thesis revisited', *Social History of Medicine,* Vol. 17 (2004).

695 R. Floud, K. Wachter and A. Gregory, *Height, Health and History: Nutritional Status in the United Kingdom, 1750-1980* (Cambridge 1991).

maintain the overall standard of living was a major achievement during a period − the nineteenth century − when population was doubling every fifty years.

8. The association between life-style − the over-consumption of food, strong alcohol, tobacco and the lack of physical activity − and poor health, has been assumed to be essentially a twentieth century phenomena. Evidence on the life-style and mortality among wealthy families in the period between the seventeen and nineteen centuries indicates that this was not the case.

Demographic factors during the period 1550-1850 were largely shaped by mortality patterns and disease environments. Some of these patterns were influenced by autonomous changes in disease virulence, although after the middle of the eighteenth century, scientific and cultural knowledge about disease became increasingly important. Additionally, the wealthy and educated − strongly influenced by the medical profession − played a leading role in the process of disease prevention.

The demographic and economic developments in the developing world in the last half century or so are similar in some respects to those in England in the eighteenth and nineteenth centuries. The falls in mortality were largely exogenous to economic development, and this was probably also the case in third world countries. The reduction in mortality has occurred even in very poor countries, and, in the absence of economic development or effective policies of income re-distribution, has led to a growth in poverty and inequality.

As in England, the growth of population in developing countries has created a surplus of labour, which has been harnessed by private companies for profit maximisation. This labour surplus has conferred an increasing advantage on those owning capital, a process which is only likely to alter when reductions in fertility stabilize levels of population growth, changing the balance of power between capital and labour, and shaping the long-development of global capitalism.

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