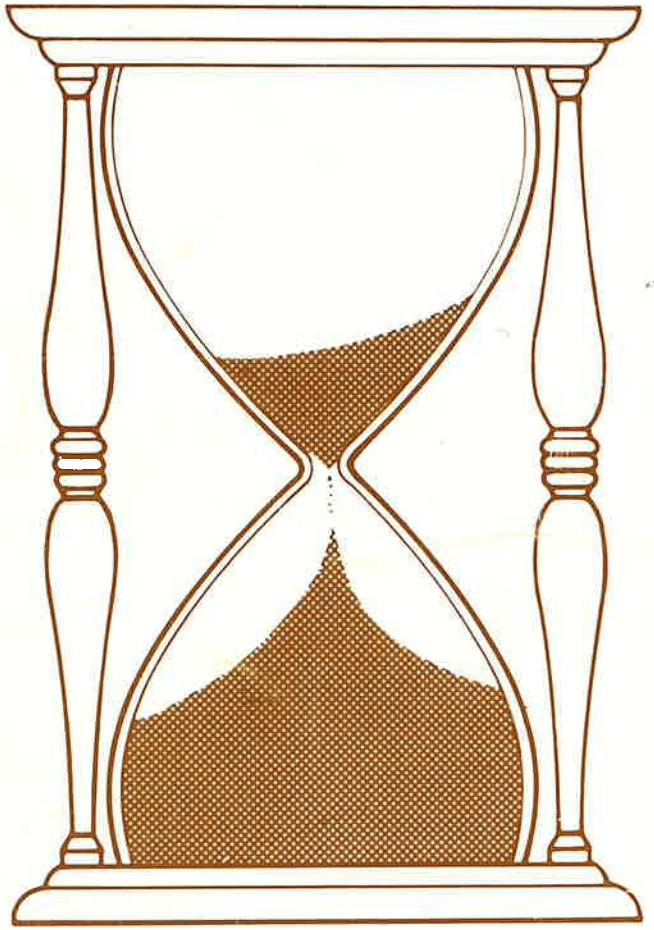

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Historical Geography Research Series

A CHRONOLOGY OF EPIDEMIC DISEASE AND MORTALITY IN SOUTHEAST ENGLAND, 1601-1800

M. J. DOBSON

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HISTORICAL GEOGRAPHY RESEARCH SERIES

No. 19

A CHRONOLOGY OF EPIDEMIC DISEASE AND MORTALITY IN SOUTHEAST ENGLAND, 1601-1800

by

M.J. Dobson

(University of Oxford)

CONTENTS

FIGURES

TABLES

A CHRONOLOGY OF EPIDEMIC DISEASE AND MORTALITY IN SOUTHEAST ENGLAND, 1601-1800

INTRODUCTION

The history of disease and mortality

The population history of England during the early modern period has long fascinated scholars from diverse disciplines. In recent decades, the subject has passed from a status of quantitative ignorance to one of technical complexity and historical demographers are now beginning to unravel the main trends of our population history. Many exciting findings have emerged from the analysis of ecclesiastical parish registers of baptisms, burials and marriages and important and intimate statistical details of past generations are now being revealed.(1)

Yet, in spite of the wealth of demographic information that has resulted from these studies, there still remain vital and equally tantalizing areas of our population history which await the exploration of historical demographers. One such field, which forms the focus of this study, is the chronology of disease and mortality in past times. Historical demographers have begun to collate series of monthly and annual burial figures for parishes throughout England and Wales.(2) Medical and social historians have described the changing incidence and spread of some of the major diseases of the early modern period.(3) Economic and climatic historians have investigated fluctuations in harvest prices(4) and climate(5) while others have searched for links with patterns of disease.(6)

But there are only a few studies for the early modern period which chronologically link, year by year, season by season, the short-term fluctuations of mortality with the underlying cause or causes of death at the regional or national scale. Recent work done in this area is, as yet, too piecemeal or too localized for us to gain a full appreciation of the demographic and geographical impact of epidemic diseases and famines in the past (7) whilst the monumental two volume History of Epidemics in Britain, written by Charles Creighton in 1894 is, now, too dated to match against the mortality series of today's demographers.(8)

This paper aims to provide a framework for describing the annual movement of disease and mortality in one geographical region during the early modern period. The region selected is Southeast England, comprising the three counties of Kent, Essex and East Sussex and the chronology covers the years 1601-1800. The annual chronology of

epidemic disease and mortality, accompanied by notes on weather and harvest conditions, is presented in tabular form (pages 9-11)and serves as a year by year portrayal of the prevailing conditions in Southeast England between 1601 and 1800. The chronology itself is preceded by a brief discussion of the approaches and sources applicable to the chronological study of epidemic disease and mortality as well as a short summary of some of the main findings to emerge from the Southeast England survey.(9)

The chronology and its interpretation will need verification and expansion as additional material comes to light but it is hoped that this Southeast England study will stand as a starting point for future demographic and epidemiological investigations. A series of such chronological accounts, linking demographic, epidemiological and environmental events for different parishes and regions across the country will allow us to survey the level of mortality and the range of diseases afflicting past generations from one year to the next and across contrasting communities. They will permit us to penetrate more fully than has, hitherto, been attempted the instability of life and death in the pre-industrial world.

Annual fluctuations in mortality in Southeast England, 1601-1800

The first step in this survey is the collection and analysis of mortality data. Parish registers provided the main quantitative source for the demographic events, and months, seasons and calendar years (January to December) the most appropriate units of time.(10) Annual baptism and burial figures were counted for 165 parish registers in the counties of Essex, Kent and East Sussex and the more time-consuming seasonal and monthly totals were taken from 65 parish registers.(11) The 165 parish register annual sample and the 65 parish register monthly sample were selected by a systematic rather than a random process: choice was dictated both by the availability of reasonably complete annual and monthly data and by the desire to select parishes which were representative of the various geographical environments and different urban and rural community types of Southeast England.(12) As such it comprised the closest representation of different community types and population groups which could be achieved within the inherent limitations of historical research.

The annual series of burials and baptisms for the 165 parishes were entered into the computer using an interactive program.(13) The data remained in an uncorrected form and any gaps in the series were treated as missing values. The baptism and burial figures were also kept as totals of ecclesiastical events rather than estimated crude vital rates per 1000 population. The almost impossible task of correcting 165 individual parish registers on an annual and monthly basis was unwarranted

in the present context while any attempt to estimate annual parish population totals and crude rates was too fraught with difficulties to be justified.(14)

A range of techniques was built into the computer program, using Fortran statements, to measure the trends and fluctuations of baptisms and burials for each individual parish.(15) In addition, the annual and monthly data were aggregated for regional groups and similar techniques of time-series analysis applied. For instance, baptism and burials were totalled year by year for all parishes in the sample whose annual data were almost entirely complete between 1601 and 1800. This created an aggregate series of 112 parishes(16) from which regional indices of mortality could be computed.

The various mortality indices, derived from individual parishes and the regional data sets, have all been used to compare the fluctuations of demographic events across Southeast England through the seventeenth and eighteenth centuries. Two of the indices have been used, in particular, to classify each year between 1601 and 1800 according, first, to the severity of regional mortality levels and, second, to the geographical distribution of local mortality peaks.

The regional mortality index, based on the 112 parish sample, was computed measuring annual burial fluctuations around the regional "average" number of burials. The average number of burials for the region could be determined in any variety of ways and in Appendix 2 several series have been tabulated showing the use of both long- and short-term averages or trends. A 51-year truncated moving average was chosen as the most appropriate base line for the regional index and for each year between 1601 and 1800 the total recorded burials for the 112 parishes were divided by their 51-year moving average and multiplied by 100.(17) This Southeast England regional index allows us to classify each year in terms of seven mortality types: crisis mortality, high mortality, unhealthy, average, healthy, very healthy and exceptionally healthy. The categories are based on a quantitative assessment of the degree to which total annual burials for the 112 parishes varied around the 51-year moving mean, as presented in Table 1.

The geographical index of local mortality peaks across the 165 Southeast England parishes was based on a statistical measure known as a"crisis mortality ratio" (C.M.R.). The C.M.R. determines the frequency and intensity of annual peaks of mortality in individual parishes, or the degree to which burials in each year exceeded or dipped below the annual average.(18) The C.M.R. calculates the intensity of a "crisis" by the equation:

$$I = \frac{D - M}{S}$$

Table 1: Criteria used to classify each year, 1601-1800, according to the level of regional mortality index

Deviation of annual burials around the 51-year moving mean	Classification of annual regional mortality level
over 40% above the mean	Crisis mortality
over 20% above the mean	High mortality
over 10% above the mean	Unhealthy
within 10% of the mean	Average
10% or more below the mean	Healthy
20% or more below the mean	Very healthy
40% or more below the mean	Exceptionally healthy

Table 2: Criteria used to classify each year, 1601-1800, according to the geographical distribution of mortality peaks

Percentage of parishes with C.M.R. over 1.5	Geographical classification of mortality peaks	Symbol used in chronology
over 30% in all 3 counties	Widespread	****
over 20% in at least 1 county	Extensive	***
between 11% and 20% in at least 1 county	Diffuse	**
10% or less in all 3 counties	Local	*

where I is the intensity of the "crisis", D is the number of deaths or burials in the year in question, M is a decentralized 11-year moving average which excludes D from the denominator, and S is the standard deviation of the 11-year decentralized moving average. The decentralized standard deviation serves to compensate for random fluctuations in small communities and also to highlight epidemic peaks in large towns. A quantitative definition of the intensity of a "mortality crisis" must, to some extent, remain arbitrary. The C.M.R. index is used here only as a way of pinpointing "unhealthy" years in a series. Whenever the intensity reached a level of over 1.5, it has been understood to refer not to a literal crisis but merely to a relatively mortal year within the parish series.(19) A geographical index of mortality for each year can, then, be classified according to the distribution of peaks of mortality across the 165 Southeast England parishes. Four categories are used:

widespread (****), extensive (***),

diffuse (**), and local (*),

and these are based on the percentage number of parishes under observation(20) which recorded a C.M.R. index of over 1.5, as set out in Table 2.

The annual mortality data classified according to these criteria are presented in Table 3 and Fig. 1. While the choice of classification is, of course, arbitrary it is intended that the presentation of the data in this way will readily permit us to identify those years which claimed a large or small toll of the population of Southeast England and, at the same time, determine how widespread or how many local parishes were affected by an epidemic.(21) Further illustration of the annual fluctuations between 1601 and 1800 is given in Figs. 2 and 3 which show, respectively, annual fluctuations against the 11-year truncated moving average of burials and annual burials per 100 annual baptisms in the 112 parishes of Southeast England.

Annual fluctuations in epidemic disease in Southeast England, 1601-1800

The annual mortality data for the Southeast England region and for individual parishes provide a general picture of mortality fluctuations in the past. They portray vividly the times of regional crisis mortality and the spread of mortality peaks across the countryside in the early modern period. Yet, such data, alone, tell us little of the cause of death in the past centuries. We are left with many unanswered questions as to why peaks of mortality occurred when and where they did, and, equally, when and where peaks of mortality failed to disturb the communities of Southeast England. The timing, the frequency, the seasonality and the geographical distribution of mortality

Table 3: Annual indices of mortality and geographical distribution of mortality peaks, Southeast England 1601-1800

(i) recorded annual burials divided by 51-year truncated moving average and multipled by 100
(ii) recorded annual burials per 100 recorded annual baptisms

(a) percentage number of parishes under observation recording C.M.R. of over 1.5.
(b) average C.M.R. for parishes with C.M.R. over 1.5.

Year	(i)	(ii)	Classification of year	Kent (a)	Essex (a)	East Sussex (a)	Kent (b)	Essex (b)	East Sussex (b)	Classification of geographical distribution
1601	70	75	Very healthy	4%	8%	4%	2.0	3.3	1.7	*
1602	75	75	Very healthy	6%	6%	10%	2.3	1.9	2.8	*
1603	108	100	Average	22%	11%	17%	5.4	5.4	4.6	***
1604	75	69	Very healthy	0%	9%	0%	-	3.8	-	*
1605	79	74	Very healthy	10%	9%	10%	3.6	2.3	2.8	*
1606	88	85	Healthy	4%	23%	6%	1.8	3.4	2.5	***
1607	81	75	Healthy	6%	11%	6%	1.9	3.7	2.0	**
1608	92	90	Average	4%	12%	15%	2.6	2.3	2.2	**
1609	98	103	Average	12%	6%	11%	3.4	3.0	2.2	**
1610	111	112	Unhealthy	14%	12%	11%	2.9	2.6	6.2	**
1611	102	94	Average	12%	9%	8%	2.3	2.6	1.9	**
1612	121	120	High mortality	22%	11%	22%	2.6	2.0	2.4	***
1613	104	117	Average	6%	6%	5%	2.0	2.1	2.4	*
1614	104	106	Average	4%	18%	11%	2.0	2.5	3.7	**
1615	109	105	Average	14%	3%	3%	2.2	3.7	3.4	**
1616	118	122	Unhealthy	24%	24%	24%	2.4	2.2	3.1	***
1617	100	102	Average	8%	21%	11%	2.6	2.5	2.6	***
1618	90	91	Average	10%	28%	3%	2.2	2.2	2.1	***
1619	91	83	Average	8%	8%	6%	2.9	2.9	1.8	*
1620	86	74	Healthy	0%	0%	6%	-	-	3.0	*
1621	86	68	Healthy	2%	0%	6%	2.2	-	2.2	*
1622	83	70	Healthy	2%	8%	3%	1.6	3.4	2.9	*
1623	97	96	Average	8%	9%	13%	2.1	3.2	2.3	**
1624	119	102	Unhealthy	29%	14%	13%	3.2	4.5	2.4	***
1625	159	164	Crisis mortality	44%	44%	24%	3.6	3.6	2.8	***
1626	120	122	Unhealthy	17%	11%	11%	2.0	2.1	3.9	**
1627	110	103	Average	8%	3%	26%	2.3	1.6	2.6	***
1628	94	83	Average	4%	3%	8%	2.1	1.6	2.3	*
1629	92	75	Average	6%	11%	8%	2.7	2.2	2.2	**
1630	104	92	Average	6%	8%	11%	3.3	1.9	2.3	**
1631	107	114	Average	21%	14%	18%	2.2	2.4	2.1	***
1632	92	84	Average	12%	3%	0%	2.7	1.8	-	**
1633	92	78	Average	4%	5%	3%	4.0	1.8	2.5	*
1634	92	81	Average	6%	3%	8%	2.2	2.7	2.2	*
1635	87	76	Healthy	2%	3%	0%	2.9	3.2	-	*
1636	94	85	Average	10%	0%	0%	2.5	-	-	*
1637	108	94	Average	12%	11%	5%	2.0	3.7	2.6	**
1638	158	148	Crisis mortality	46%	42%	41%	2.9	2.3	2.4	****
1639	140	142	High mortality	13%	38%	26%	2.1	2.9	2.9	***
1640	118	98	Unhealthy	6%	16%	26%	2.4	3.1	2.6	***
1641	108	94	Average	7%	5%	3%	2.1	2.1	1.5	*
1642	98	84	Average	0%	0%	0%	-	-	-	*
1643	100	83	Average	4%	3%	6%	2.7	1.6	5.1	*
1644	91	88	Average	2%	3%	4%	2.0	2.7	2.1	*
1645	77	73	Very healthy	7%	3%	4%	1.8	1.6	1.9	*
1646	86	86	Healthy	2%	3%	0%	2.6	3.3	-	*
1647	109	127	Average	36%	13%	21%	2.8	2.4	2.6	***
1648	105	124	Average	20%	13%	14%	2.1	3.7	1.7	**
1649	97	115	Average	7%	10%	7%	2.2	2.3	2.8	*
1650	74	90	Very healthy	2%	3%	7%	2.8	11.5	1.6	*
1651	86	101	Healthy	2%	3%	7%	2.6	2.1	2.3	*
1652	106	121	Average	17%	21%	11%	2.7	3.0	1.9	**
1653	113	145	Unhealthy	21%	18%	23%	3.1	2.3	2.9	***
1654	102	109	Average	22%	11%	0%	3.1	3.9	-	***
1655	73	73	Very healthy	0%	6%	0%	-	2.7	-	*
1656	81	83	Healthy	6%	3%	6%	3.5	2.5	2.5	*
1657	107	117	Average	13%	14%	18%	2.4	4.3	2.5	**
1658	125	158	High mortality	22%	31%	38%	2.6	2.9	2.7	***
1659	104	128	Average	9%	11%	6%	1.7	2.7	4.6	**
1660	80	92	Healthy	4%	3%	0%	2.1	2.2	-	*
1661	90	101	Average	8%	10%	9%	2.0	3.0	2.0	*
1662	90	113	Average	0%	5%	5%	-	2.0	2.1	*
1663	83	104	Healthy	4%	5%	5%	1.6	2.1	1.7	*
1664	87	90	Healthy	8%	15%	0%	1.9	2.1	-	**
1665	106	105	Average	14%	5%	16%	2.3	2.3	3.1	**
1666	116	114	Unhealthy	14%	21%	22%	3.2	6.2	2.9	***
1667	110	120	Average	23%	13%	5%	2.7	2.8	1.7	***
1668	99	104	Average	6%	5%	17%	2.4	2.3	2.2	**

1669	117	126	Unhealthy	27%	31%	22%	2.5	2.6	3.0	***
1670	101	106	Average	7%	14%	11%	3.6	1.9	2.9	**
1671	97	106	Average	5%	0%	9%	2.0	-	3.8	*
1672	93	92	Average	16%	5%	11%	2.5	3.4	2.9	**
1673	85	87	Healthy	15%	11%	6%	1.8	3.7	4.5	**
1674	85	92	Healthy	2%	3%	0%	2.1	4.2	-	*
1675	95	99	Average	5%	3%	3%	3.0	3.4	1.5	*
1676	82	79	Healthy	0%	5%	3%	-	2.3	1.9	*
1677	85	82	Healthy	2%	10%	0%	3.3	3.4	-	*
1678	124	136	High mortality	23%	18%	13%	2.8	2.8	2.5	***
1679	165	189	Crisis mortality	45%	44%	50%	2.9	2.5	2.7	****
1680	130	143	High mortality	22%	8%	27%	2.2	2.9	2.4	***
1681	136	155	High mortality	21%	8%	24%	2.2	3.2	2.4	***
1682	102	104	Average	2%	5%	5%	1.5	2.1	1.8	*
1683	94	89	Average	3%	8%	8%	1.8	1.8	1.7	*
1684	98	91	Average	2%	14%	0%	1.9	2.8	-	**
1685	108	105	Average	7%	13%	10%	1.8	3.1	2.4	**
1686	105	103	Average	14%	3%	5%	2.5	2.3	2.2	**
1687	94	86	Average	5%	5%	5%	3.4	2.6	2.5	*
1688	97	99	Average	12%	5%	18%	2.5	6.4	1.9	**
1689	106	105	Average	13%	8%	15%	2.2	2.7	2.6	**
1690	115	122	Unhealthy	20%	15%	12%	3.4	2.6	2.5	**
1691	91	90	Average	10%	10%	7%	2.8	2.2	2.4	*
1692	87	91	Healthy	10%	2%	2%	2.1	2.8	3.6	*
1693	91	89	Average	11%	7%	20%	2.7	2.5	3.2	**
1694	104	113	Average	19%	24%	7%	3.0	2.9	2.1	***
1695	83	80	Healthy	3%	7%	10%	2.2	3.2	2.1	*
1696	84	79	Healthy	3%	7%	10%	3.0	2.2	2.5	*
1697	92	87	Average	3%	11%	14%	2.2	2.4	1.9	**
1698	81	78	Healthy	3%	0%	7%	3.3	-	2.4	*
1699	82	81	Healthy	6%	4%	9%	2.1	3.8	3.4	*
1700	85	81	Healthy	6%	2%	2%	2.0	1.5	2.2	*
1701	90	89	Average	13%	11%	7%	3.1	2.6	2.6	**
1702	96	91	Average	16%	16%	9%	2.0	2.1	2.7	**
1703	104	99	Average	9%	7%	12%	3.5	2.1	2.6	**
1704	103	106	Average	11%	15%	14%	2.0	2.7	4.9	**
1705	115	111	Unhealthy	16%	25%	30%	2.9	2.7	2.8	***
1706	112	109	Unhealthy	19%	16%	24%	2.7	3.2	2.9	***
1707	89	88	Healthy	3%	6%	7%	2.7	2.9	2.0	*
1708	95	99	Average	10%	8%	13%	2.2	2.6	2.6	**
1709	89	97	Healthy	5%	2%	4%	2.4	2.0	1.8	*
1710	88	97	Healthy	15%	6%	4%	3.1	1.8	4.6	**
1711	86	87	Healthy	5%	15%	4%	3.1	3.0	2.4	**
1712	98	108	Average	10%	10%	13%	3.6	4.8	2.5	**
1713	94	103	Average	15%	12%	7%	2.8	3.5	2.4	**
1714	106	110	Average	24%	14%	11%	3.1	2.2	2.4	***
1715	86	86	Healthy	5%	4%	11%	2.1	2.8	2.6	**
1716	90	90	Average	6%	2%	9%	1.8	2.1	3.4	*
1717	80	76	Healthy	5%	2%	4%	2.2	3.7	2.9	*
1718	87	86	Healthy	6%	2%	9%	2.2	1.5	2.1	*
1719	132	132	High mortality	41%	25%	17%	2.5	2.4	2.9	***
1720	123	133	High mortality	26%	42%	24%	2.4	2.9	2.5	***
1721	105	100	Average	11%	6%	22%	2.3	4.6	4.6	**
1722	97	90	Average	6%	10%	2%	3.8	2.9	1.7	*
1723	90	80	Average	0%	4%	4%	-	2.0	1.9	*
1724	91	78	Average	3%	0%	7%	1.6	-	2.3	*
1725	82	80	Healthy	3%	2%	2%	2.8	1.6	1.5	*
1726	90	81	Average	5%	2%	4%	2.5	2.2	2.4	*
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1730	110	110	Average	11%	6%	24%	2.4	2.9	2.9	***
1731	108	97	Average	8%	6%	17%	3.0	1.8	2.6	**
1732	109	99	Average	8%	4%	11%	2.2	2.1	2.6	**
1733	102	97	Average	13%	8%	7%	2.2	1.8	2.9	**
1734	93	80	Average	10%	6%	13%	3.3	2.2	2.4	**
1735	92	81	Average	6%	2%	7%	2.1	1.6	1.8	*
1736	99	88	Average	3%	2%	9%	1.8	1.5	2.8	*
1737	106	99	Average	13%	21%	22%	2.8	2.1	1.8	***
1738	88	78	Healthy	2%	12%	4%	1.8	3.1	2.3	**
1739	90	81	Average	6%	8%	2%	2.5	2.7	1.9	*
1740	108	108	Average	16%	4%	13%	3.0	2.5	1.9	**
1741	131	137	High mortality	30%	34%	11%	4.3	2.7	2.3	***
1742	111	115	Unhealthy	23%	21%	9%	2.0	2.5	1.8	***
1743	95	99	Average	6%	10%	22%	2.6	2.3	2.7	***
1744	89	89	Healthy	3%	6%	2%	2.0	2.1	3.0	*
1745	88	85	Healthy	5%	4%	2%	2.2	2.2	1.7	*
1746	92	90	Average	8%	6%	7%	2.9	2.3	1.9	*
1747	100	99	Average	14%	12%	13%	2.2	2.8	2.1	**
1748	109	108	Average	18%	8%	29%	3.8	2.5	3.3	***
1749	101	98	Average	9%	13%	7%	2.5	3.0	3.1	**
1750	105	95	Average	20%	15%	13%	2.7	4.1	2.4	**
1751	86	87	Healthy	5%	10%	2%	2.4	4.8	2.3	*
1752	82	76	Healthy	15%	12%	9%	1.5	2.1	2.8	**

1753	87	81	Healthy	6%	8%	9%	3.0	1.8	2.1	*
1754	96	86	Average	15%	4%	20%	2.4	2.5	2.2	**
1755	87	80	Healthy	9%	0%	7%	2.1	-	2.1	*
1756	93	82	Average	12%	8%	2%	1.9	2.5	2.7	**
1757	94	90	Average	9%	4%	9%	2.6	2.3	3.0	*
1758	92	86	Average	5%	6%	11%	4.3	2.3	2.4	**
1759	93	83	Average	6%	10%	11%	1.9	3.1	3.9	**
1760	98	92	Average	15%	12%	7%	2.4	1.9	3.5	**
1761	100	89	Average	8%	14%	11%	2.1	2.3	2.2	**
1762	118	105	Unhealthy	31%	28%	13%	2.5	2.4	2.6	***
1763	114	106	Unhealthy	18%	22%	20%	2.1	2.5	2.9	***
1764	92	78	Average	5%	2%	4%	1.7	2.3	1.9	*
1765	99	83	Average	8%	12%	2%	1.7	3.0	1.6	**
1766	103	90	Average	8%	16%	11%	1.9	1.9	2.6	**
1767	99	89	Average	8%	10%	4%	2.5	2.2	4.1	*
1768	111	101	Unhealthy	15%	12%	24%	2.2	2.6	2.9	***
1769	99	75	Average	6%	6%	18%	2.0	2.0	3.1	**
1770	98	82	Average	12%	4%	13%	2.4	2.7	2.1	**
1771	105	87	Average	12%	10%	2%	2.7	2.6	1.9	**
1772	95	78	Average	8%	10%	2%	3.8	3.2	2.8	*
1773	97	80	Average	11%	6%	13%	2.6	1.9	3.4	**
1774	95	78	Average	12%	6%	7%	2.5	1.7	2.4	**
1775	97	78	Average	0%	6%	4%	-	2.5	2.5	*
1776	87	67	Healthy	8%	0%	4%	2.4	-	2.9	*
1777	96	74	Average	15%	6%	11%	2.4	1.8	1.9	**
1778	101	81	Average	9%	10%	7%	2.9	2.6	1.9	*
1779	116	86	Unhealthy	13%	18%	18%	2.6	2.4	2.3	**
1780	126	103	High mortality	16%	36%	47%	2.6	2.5	3.0	***
1781	111	94	Unhealthy	23%	12%	11%	2.7	2.0	2.0	**
1782	118	96	Unhealthy	16%	14%	18%	2.4	2.4	2.7	**
1783	106	85	Average	9%	14%	2%	2.1	2.6	2.1	**
1784	100	81	Average	3%	6%	2%	2.2	2.7	1.8	*
1785	95	71	Average	9%	6%	4%	2.3	1.6	3.0	*
1786	99	73	Average	11%	9%	13%	2.0	2.2	2.4	**
1787	95	67	Average	12%	4%	9%	2.2	1.7	2.1	**
1788	95	71	Average	11%	2%	11%	1.9	1.5	2.5	**
1789	90	65	Average	3%	10%	11%	1.7	2.1	1.8	**
1790	93	66	Average	9%	6%	7%	2.0	2.3	1.6	*
1791	100	71	Average	11%	10%	2%	2.2	2.5	2.3	**
1792	94	61	Average	3%	10%	2%	2.4	2.1	2.1	*
1793	107	72	Average	12%	17%	16%	2.7	3.1	3.5	**
1794	111	75	Unhealthy	17%	16%	20%	2.7	2.6	2.4	**
1795	118	80	Unhealthy	25%	12%	18%	2.3	2.2	2.4	***
1796	97	63	Average	0%	4%	9%	-	2.6	2.5	*
1797	116	71	Unhealthy	6%	8%	13%	1.9	2.2	2.7	**
1798	106	63	Average	5%	4%	11%	1.8	2.2	2.0	**
1799	107	67	Average	10%	6%	4%	1.8	2.9	2.1	*
1800	118	76	Unhealthy	10%	6%	11%	2.7	2.7	2.6	**

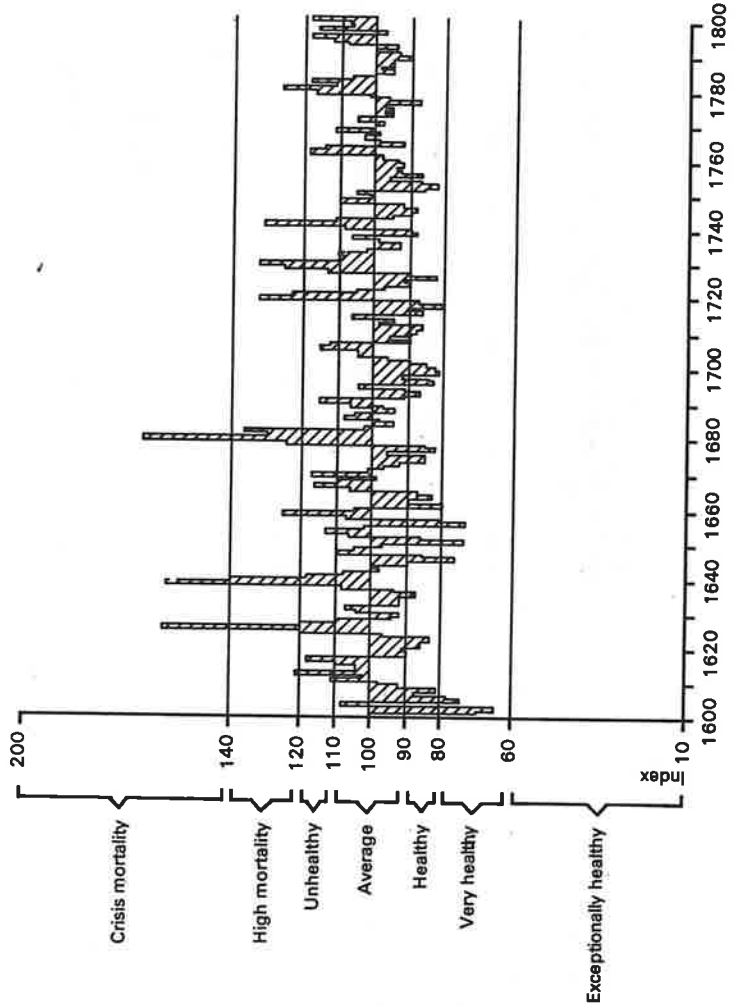

Figure 1 Annual fluctuations of mortality in Southeast England (112 parishes), 1601-1800

Table 4: Fifteen greatest annual deviations in burials above a 51-year moving average, 1601-1800

Year	Mortality Index (recorded annual burials divided by 51-year truncated moving average and multiplied by 100)
1679	165
1625	159
1638	158
1639	140
1681	136
1719	132
1729	132
1741	131
1680	130
1780	126
1658	125
1728	125
1678	124
1720	123
1612	121

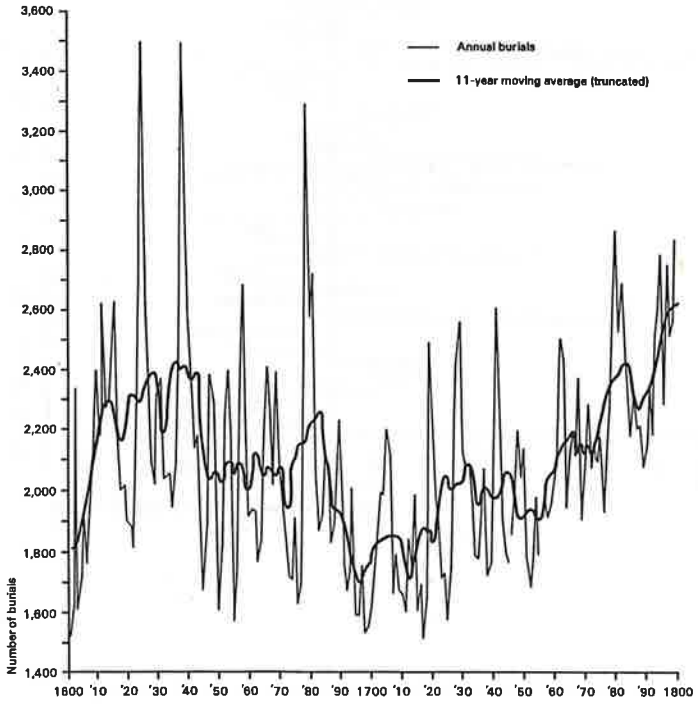

Figure 2 Average burials and 11-year truncated moving average of burials in Southeast England (112 parishes), 1601-1800

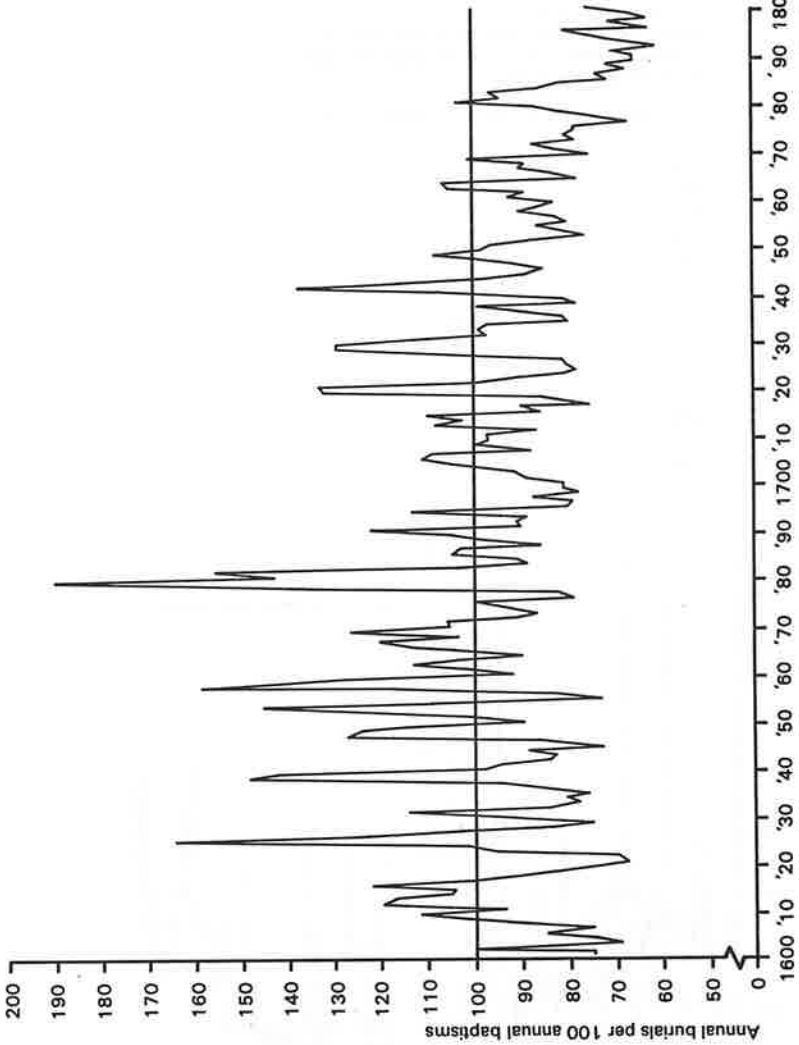

Figure 3 Annual burials per 100 annual baptisms in Southeast England (112 parishes), 1601-1800

fluctuations clearly each warrant further investigation.

The next step, therefore, is to match the mortality data with information on the prevailing diseases and environmental and economic fluctuations. We need to explain the peaks and dips in annual burials in terms of their disease causation. Parish burial registers - our most fruitful source for the historical study of mortality - document the final stage in the lives of seventeenth and eighteenth century townsfolk and villagers. They tell us the month and season of burial, the name of the deceased and, sometimes, an indication of age and status.(22) Yet the registers, themselves, rarely revealed the cause of death of each decedent - they say little of the symptoms which preceded death or the nature of the disease or casualty which precipitated the burial. For the most part, we are left only with a suggestive array of mortality statistics from which to infer the underlying patterns of causation and disease.(23)

For a more comprehensive appreciation of the regional dimension of disease in early modern society we must search beyond the demographic sources and draw information from a wider array of manuscripts and documents. Indeed, a wide range of epidemiological evidence can be drawn from historical records such as the overseer of the poor books, the churchwardens accounts, quarter session rolls, state papers, medical chronologies, medical texts and topographies, newspapers, journals, ledgers, personal diaries, family letters, bills of mortality, estate records, agricultural surveys, annals, probate inventories, weather journals, and coroners inquests. Together these records comprise a more fruitful collection than any single source. The overseer of the poor accounts, for instance, are a useful but little explored source for the history of disease. Page after page was filled with the sufferings of the poor in their times of sickness and health. The minutest expenditure on medical outlay, food or fuel for the poor, was often carefully detailed while, in seasons of epidemics, the surge in disease and mortality was reflected in the increased poor rates and poor relief. Closely related were the churchwardens accounts, the vestry accounts and the workhouse registers, while the quarter session rolls, serving a similar purpose of controlling and accounting for parochial affairs, also included in their scope a wealth of evidence on the nature, cause and problems of epidemic disease in the early modern period.

Of additional value are two groups of literary source material which described patterns of disease in time and in space. The first includes a number of medical chronologies which season by season, year by year, recounted the rise and fall of endemic and epidemic diseases in particular localities. Many of these were published as books, others in learned journals, while some remain only in manuscript form. They varied, too, in content and style. Some of the chronologies were kept

contemporaneously with the events they described. The chronologies of Hillary, Huxham, Rogers, Rutty, Sims, Willan and Woollcombe are some of the best running statistical accounts of disease and weather in the early modern period.(24) Others such as Thomas Short in the eighteenth century and Charles Creighton in the nineteenth century delved far back into the past and attempted to describe the major "plagues" and "pestilences" which had occurred from the beginning of the world to the year of compilation.(25) These chronologies, used with care and matched against the seasonal and annual fluctuations of mortality figures from local parish registers, can often elucidate the troughs and peaks of health and disease. The second set of literary works are the medical and regional topographies. Their compilers were interested in variations in disease patterns across regions and countries. They observed that certain localities were less healthy and more subject to epidemic and endemic diseases than others and, accordingly, reported in their topographies the supposed causes and consequences of those differences. Sometimes their accounts contained statistical data on morbidity patterns and they portrayed also vivid impressions of the health and environmental conditions within each surveyed community. Although the topographic acounts were undoubtedly subjective, they do furnish us with a much needed source for comparing mortality and disease across the parishes of Southeast England and thus give us a feel for variations in space as well as time.

More penetrating and more personal were the many bundles of letters, family papers, journals and diaries which have been left by former generations. Some of the diaries provided an excellent description of epidemics raging in and about the diarist"s locality.(26) Other diaries included also information on major national epidemics while the rest, like the other personal documents, were less open to systematic quantification but, nevertheless, presented a fascinating insight into the realities of individual physical pain and suffering during historical epidemics. The mental images described in those writings are an illuminating addition to the dry morbidity and mortality figures of the statistical sources.

To these primary sources can be added c
secondary materials - historical studies of r
patterns, climatic fluctuations and harvest
Indeed, I have tried to sift through and c
as much information as possible which might relate to the annual and seasonal fluctuations of disease and mortality in Southeast England. Thus, whenever a reference to an epidemiological, meteorological or agricultural event was found for the period of study the information was transcribed onto an index card and filed chronologically by date. At present the collection contains some 2500 entries between the years 1601 and 1800 and it continues to expand.

A chronology of disease and mortality has, in this way, been built up extending over a period of some two centuries. The information obviously needs to be handled with care and caution. For some years the nature of the prevailing epidemic is beyond dispute - in other years it is much harder to pinpoint exactly the cause of disease and mortality or draw diagnoses from the early medical descriptions. The analysis, as presented in a chronological format, obviously emphasises fluctuations in epidemic disease and in those conditions leading to death: it does not give equal weight to important geographical and temporal variations in the incidence of certain endemic and chronic diseases, such as malaria, tuberculosis and a range of infantile complaints.(28) Yet, in spite of the limitations, the epidemiological data matched against the statistical series of mortality provides an insight into patterns of death in past times. The chronology highlights some of the major diseases afflicting Southeast England communities in the early modern period. It indicates the demographic severity and seasonal incidence of the most fatal visitations. And it describes the local, regional and national impact of the prevailing diseases.

Disease and mortality fluctuations: a summary

The infections that plagued the communities of Southeast England were diverse in their nature, changeable in their impact and variable in their diffusion. Typhoid fevers, dysentery, plague, smallpox, typhus, influenza, respiratory infections and measles were some of the leading diseases to appear on the chronology of seventeenth and eighteenth century Southeast England. Certain diseases figured frequently on the chronology - "fevers" were a continual menace and smallpox was an ever-present scourge. Other epidemics, notably bubonic plague, featured prominently on the list but the annual toll became less frequent over time. Several illnesses, such as influenza, were widespread in incidence but claimed only a minor share of the mortality curve. One disease, malaria, had a striking demographic impact within certain marshland environments but its incidence was so localized that it does not receive due recognition in a regional chronology. A few chronic infections like tuberculosis and pneumonia, though of undoubted historical importance, appeared rarely on the chronology - their continuous and insiduous toll from one year to the next being overshadowed by the more sudden and intense visitations of epidemic disease. Each of these diseases, acting in turn or simultaneously, added to the irregular and secular variations of mortality levels.(29) A detailed discussion of these epidemic fluctuations, their geographical characteristics, their links with endemic diseases, and their demographic contribution to the early modern period will shortly be published in R. Smith (Ed.). Regional and spatial demographic patterns in the past.

A few of the main points to emerge from this study will serve to preface the regional chronology of epidemic disease and mortality.

The most distinctive and severe of the regional mortality crises were those that affected a wide area of Southeast England. "Crisis mortality", as classified on the regional index, was reached in three years during the seventeenth and eighteenth century. 1625, 1638 and 1679 were the three individual years to experience the most severe regional upsurges in mortality with burials rising to more than 40% above the 51-year moving average (Fig.1 and Tables 3 and 4). The year 1679 was exceptionally unhealthy. Burials were 65% above average and for every 100 baptisms recorded there were 189 burials (Fig.3 and Table 3). 1678, 1680 and 1681 also experienced "high mortality" levels, making this run of years, 1678-1681, the most depressing in the entire period. The crisis years of 1625 and 1638 were, similarly, part of clusters of bad years with prolonged rises in mortality from 1624 to 1626 and 1638 to 1640, respectively. In each of these crisis periods the geographical distribution of mortality peaks was "widespread" or "extensive" with a high proportion of individual parishes experiencing a C.M.R. index of over 1.5. The distribution of mortality peaks in Kent, Essex and East Sussex has been plotted in Figs. 4 to 6. The years 1678 to 1681 are outstanding - in 1679, alone, almost half of all parishes in each county witnessed a mortality peak and many parishes were hit by the crisis in more than one successive year. In 1638 mortality levels peaked in at least 40% of parishes in Essex, Kent and East Sussex and in 1625 mortality peaks extended across some 44% of parishes in Essex and Kent, though the distribution was less widespread in East Sussex.

The mortality crises of these periods were both prolonged and widespread. And it was, indeed, the widespread geographical coverage of the peaks, rather than any severe localized intensity, which was responsible for the regional upsurge in mortality. This pattern of widespread but undramatic local mortality peaks also characterised six other occasions when regional mortality levels rose more than 20% above the 51-year moving mean (Fig. 1 and Table 3). 1612, 1658, 1719-1720, 1728-1729, 1741 and 1780 were years of "high mortality" on the regional index but the local epidemic peaks in these years were more noted for their diffusion than for their magnitude. Moreover, in all but one or two of these exceptionally unhealthy years, the epidemic giving rise to the peaks of mortality was generally "fever". The preeminence of "fever" on the chronology indicates its importance widespread significance in early modern times.

The term "fever" could have referred to many ailments in the seventeenth and eighteenth centuries including typhus, relapsing fever, typhoid, paratyphoid, dysentery, malaria, influenza, scarlet fever, cerebrospinal fever,

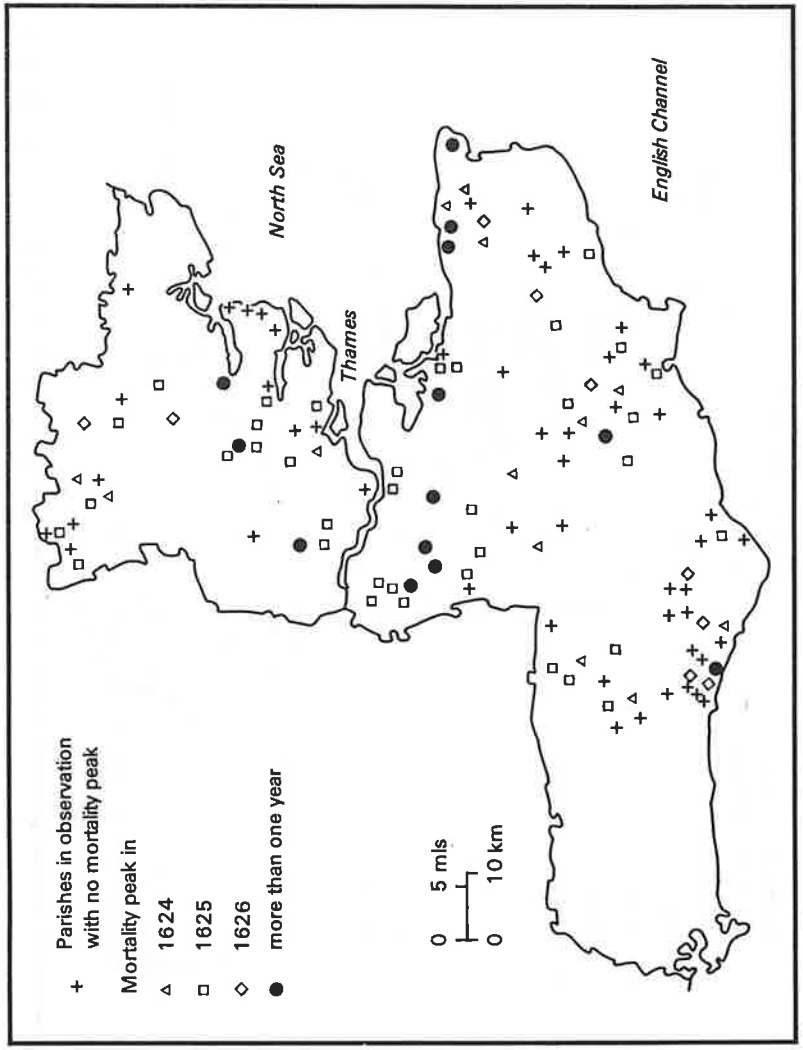

Figure 4 Geographical distribution of local mortality peaks, 1624-26

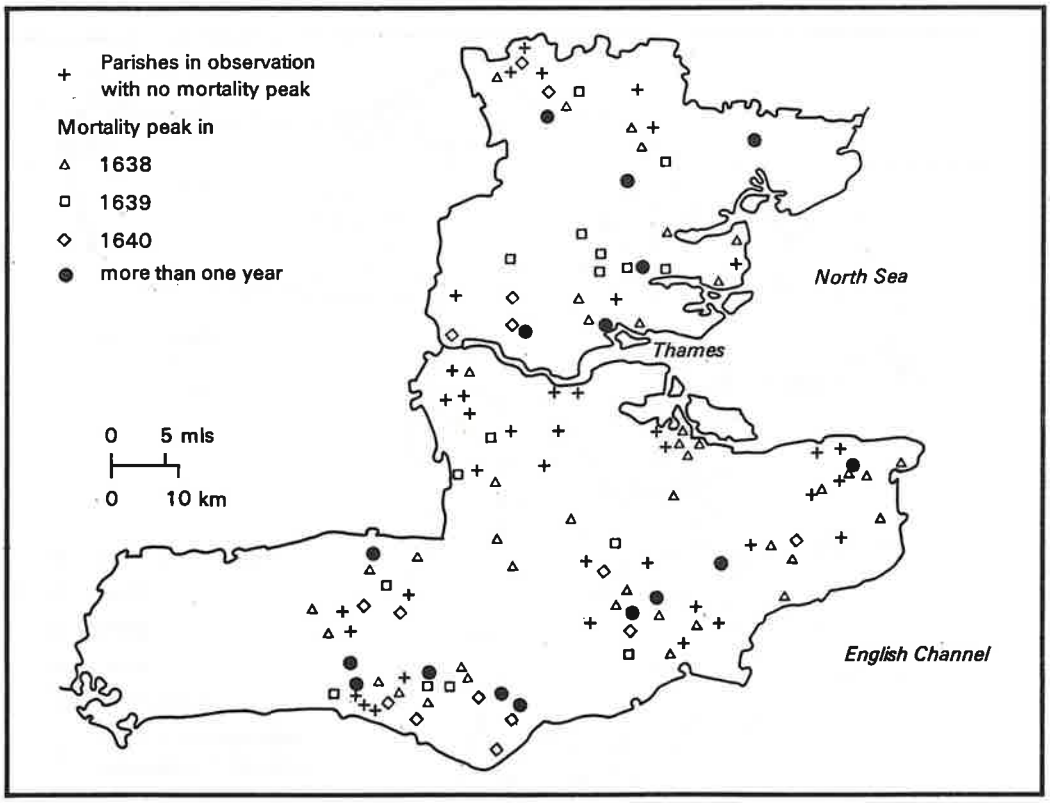

Figure 5 Geographical distribution of local mortality peaks, 1638–40

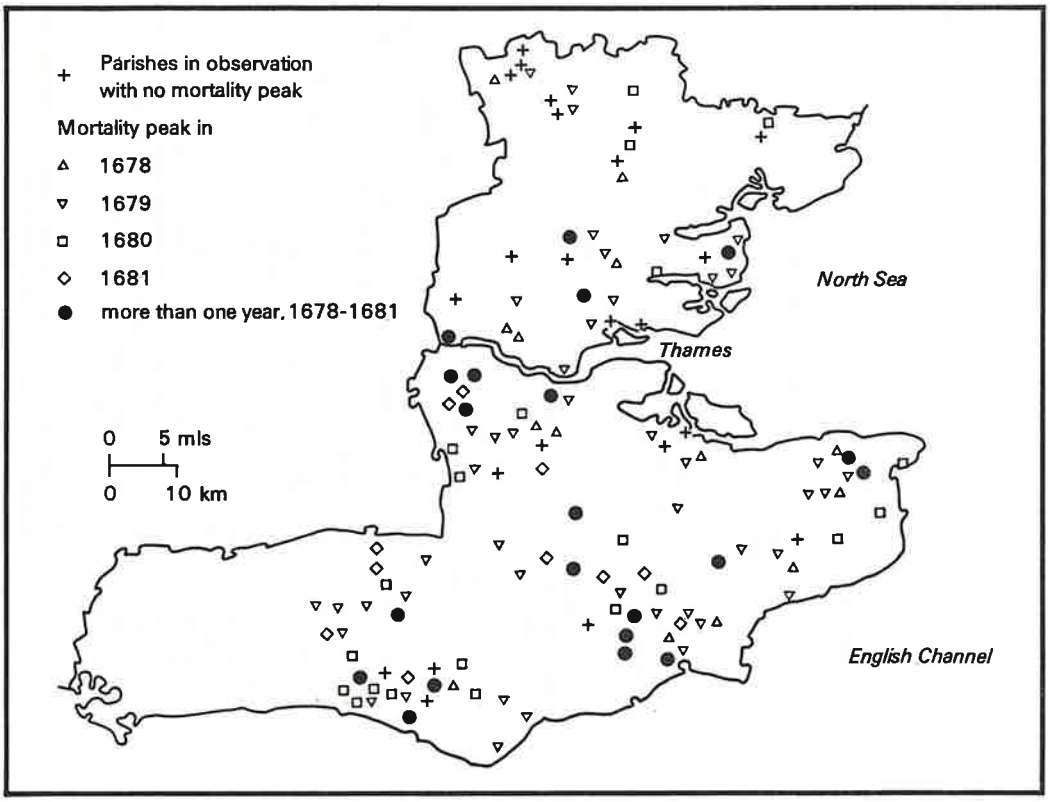

Figure 6 Geographical distribution of local mortality peaks, 1678–81

brucellosis and a variety of others. The clinical descriptions of the fevers, as presented by the physicians and laymen for each of the epidemic years, were far from adequate from a diagnostic viewpoint and it was not until well into the nineteenth century that a clear distinction was drawn between two of the major fevers, typhus and typhoid. Each of the fevers, however, has its own aetiology and its own epidemiology and some of the contemporary observations, together with our mortality data, concerning the geographical diffusion of the reigning fever, its case-fatality rate, age-distribution, and seasonal incidence, provide us with more illuminating clues. From such evidence, I have attempted to describe the nature and type of each of the "fever" epidemics and to identify them, accordingly, in the chronology. A number of different fevers do appear to have been responsible for the epidemic fluctuations of the early modern period, but in Southeast England the chronology indicates that during some of the most widespread, severe and prolonged epidemics it was the enteric fevers: typhoid, paratyphoid and dysentery: which played a principal role in elevating burial levels. Few historians have given adequate attention to the role of these intestinal diseases in the past(30) but their mode of transmission and their seasonal and climatic characteristics are all clearly reflected in the shape and geography of the most widespread mortality peaks of Southeast England.(31) Intestinal diseases, undoubtedly, deserve a more prominent place in the history of epidemic diseases.

The worst regional mortality crises of the period were, thus, those that spread most widely across the countryside of Southeast England and the diseases contributing to those striking waves of mortality were fevers of the enteric group. By contrast, there were times when severe mortality losses were experienced at the local level but the epidemic failed to disrupt more than a small proportion of parishes within Southeast England. There were six years (1604, 1650, 1673, 1710, 1738 and 1751) when at least one parish recorded a C.M.R. index of over 6.0 and, yet, conditions at the regional level remained "healthy" or "very healthy". During a further 35 years, local mortality crises of a high intensity were recorded in one or two parishes without, simultaneously, pushing the regional mortality index above 10% of the average. These mortality conditions of limited geographical impact were very different from those that gave rise to years of regional mortality crises.

Again, the chronology indicates that a range of different diseases, acting independently or simultaneously, were responsible for these isolated epidemics but two diseases of historical importance: plague and smallpox: deserve further mention in this context. The well-known plague years of 1665 and 1666 are two years which historians expect to figure prominently on lists of crisis mortality. Yet, in Southeast England

regional mortality levels were not severely affected during this epidemic. 1665 was classified as a year of "average" mortality with a "diffuse" distribution of mortality peaks. 1666 proved an "unhealthy" year and the peaks were more "extensive" (Table 3). But, as Fig. 7 shows, this epidemic was geographically much more contained than the fever epidemics. On one occasion only - the epidemic of 1625 - did plague contribute to a substantial elevation of burials in many parishes of the three counties (Fig. 4). During most other "plague" years the disease was more notable for its localized intensity than for its widespread diffusion. Many parishes escaped entirely from a single visitation of plague in the seventeenth century and those parishes that did experience a rise in their C.M.R. index were scattered in their distribution (Table 3 and Fig. 7). The C.M.R. index for certain individual parishes, however, suggests that at a local level catastrophic losses occurred in places. Some urban parishes and a few isolated rural communities reached mortality levels of an unprecedented magnitude, and Bocking in Essex achieved a record C.M.R. index of 35. The local intensity of plague was of greater significance than its regional demographic impact.

Smallpox is recognised as one of the most frequent and infectious of major epidemics of past times. Its recurrent visitations were recorded in the overseer of the poor accounts, the quarter session records, family papers and parish registers and its year to year outbreaks in town and country parishes of Southeast England are documented in the chronology. Smallpox remained endemic in England for several hundred years and, in contrast to the spatial irregularity of plague, few places escaped an outbreak at one time or another. Yet, in spite of its constant presence, smallpox, like plague, seldom gave rise to a mortality "crisis" at the regional level. It was invariably responsible for local increases of mortality but rarely the cause of a simultaneous surge of burials across many Southeast England parishes. And, although the disease was highly contagious, epidemics of smallpox failed to coincide across contiguous parishes and often outbreaks were confined to a few houses and families. Its very serious nature and its frequent occurrence engendered both an immunological and a human response, through the use of pest houses and inoculation, to limit its powers of transmission.(32) It was a disease with an annual and geographical impact all of its own.

The mortality data, thus, indicate two contrasting patterns of crisis mortality. One in which moderate peaks in mortality were present across a wide distribution of parishes and another in which isolated and intense epidemics affected only a few parishes. A third type of demographic pattern in which very high mortality levels were recorded, simultaneously or successively, across a large number of parishes was rarely, if ever, witnessed in Southeast England during the seventeenth and eighteenth centuries. On no occasion in this period did a mortality

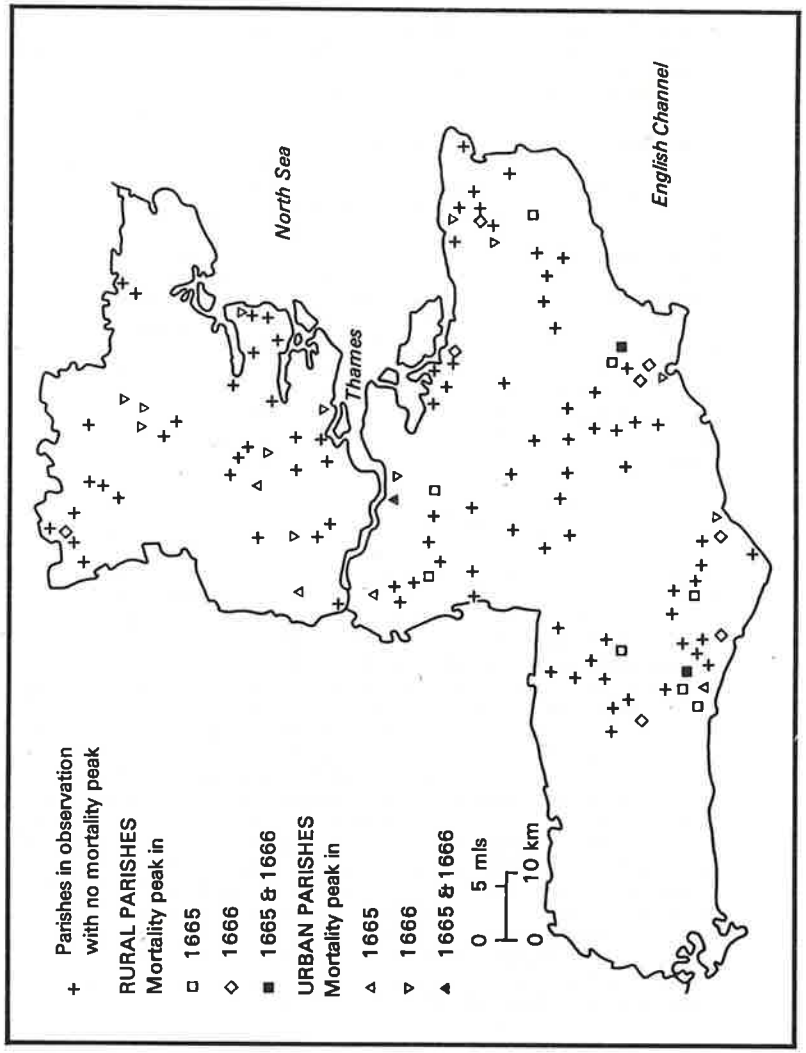

Figure 7 Geographical distribution of local mortality peaks, 1665-1666

crisis hit every parish simultaneously in the region. Peaks of mortality could be moderate and widespread or intense and localized but there were no years in which a devastating regional catastrophe occurred in Essex, Kent or Sussex. Southeast England was scarred by frequent intrusions of disease and death but this area was spared the very worst features of regional epidemic or famine-related diseases in the early modern period.(33) Indeed, the very absence of a severe regional "subsistence crisis" is one of the most notable features of the Southeast England chronology. There was no clear association between harvest prices and mortality peaks in this area(34) and the famine-related epidemic disease, typhus, spread only very occasionally within Southeast England.(35) Severely malnourished communities were uncommon in early modern Essex, Kent and Sussex(36) and this region appears to have avoided the worst implications of a regional demographic crisis.

Although the chronology for Southeast England makes grim reading, this area actually fared surprisingly well and perhaps better than other regions of the early modern period. Southeast England was spared major famines and epidemics of typhus; inoculation became important in controlling smallpox from an early date; plague, as elsewhere in England, had disappeared by the late seventeenth century but even prior to that time had been very localized within Southeast England; the urban communities did not experience the same insanitary and squalid conditions of the larger industrializing towns of the north; and those enteric fever epidemics which did spread far and wide were responsible for moderate local rather than substantial demographic peaks.

The bounds of this chronology now need to be pushed beyond the limits of space and time imposed by this individual piece of research. More evidence needs to be collected and collated from different parts of the country and from other European or New World countries. The mortality fluctuations and the disease patterns of Southeast England need to be set in the context of other regions to see whether there were, indeed, marked contrasts across space and also whether regional variations converged or diverged over time in response to changing economic, social and epidemiological factors. Information on annual and seasonal disease patterns prior to 1600 and beyond 1800 - perhaps to cover the period of Wrigley and Schofield's population history of England, 1541-1871 - could be included.(37) Moreover, much evidence contained in the chronology still remains to be interpreted. More detailed studies of individual epidemics(38) and broader studies of the role of disease in history(39) will be required before we can fully unravel the epidemiological mysteries of our past.

Finally, for anyone who has the same fascination for the darker sides of historical time and space, may I say that I would appreciate receiving any new information or

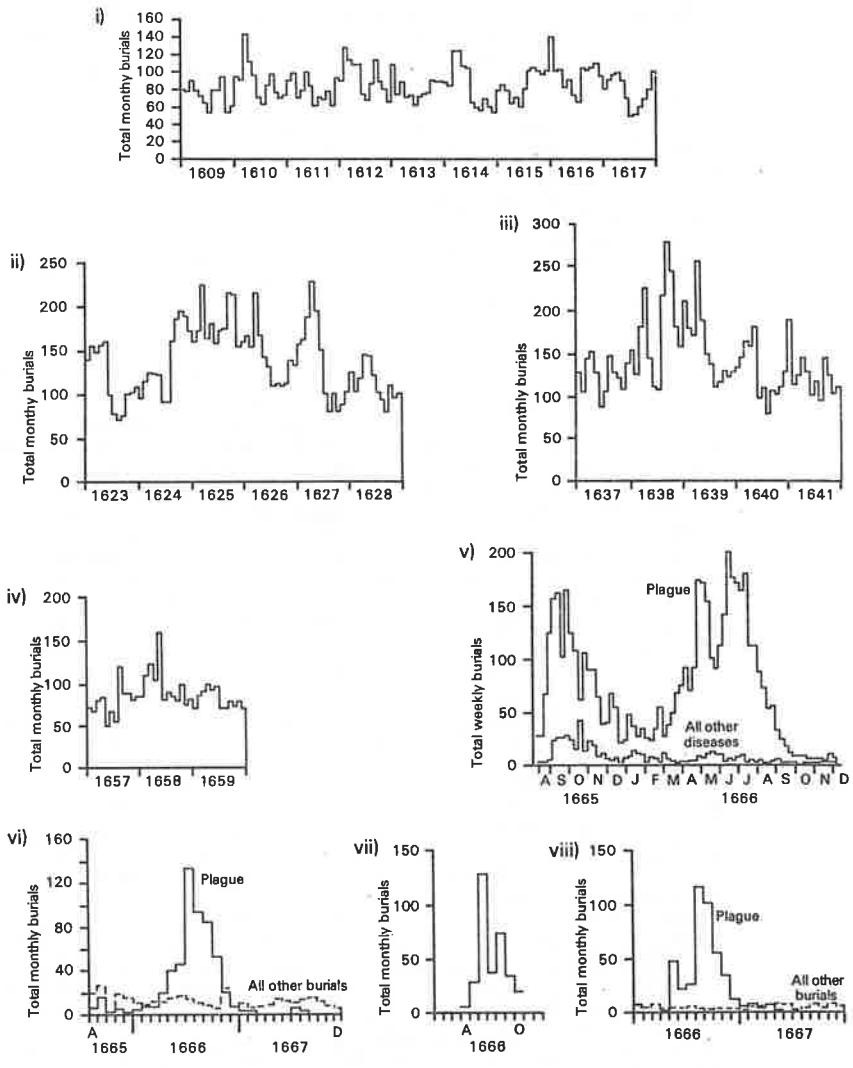

Figure 8 Monthly distribution of burials during peak mortality years in Southeast England

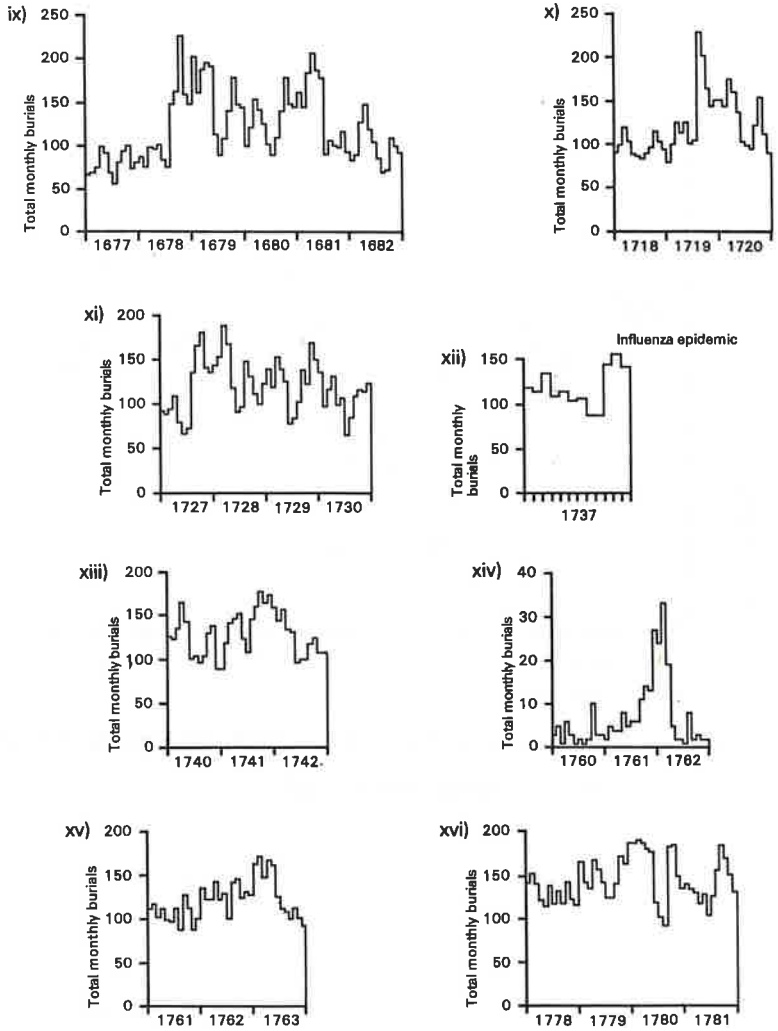

Figure 8 (continued)

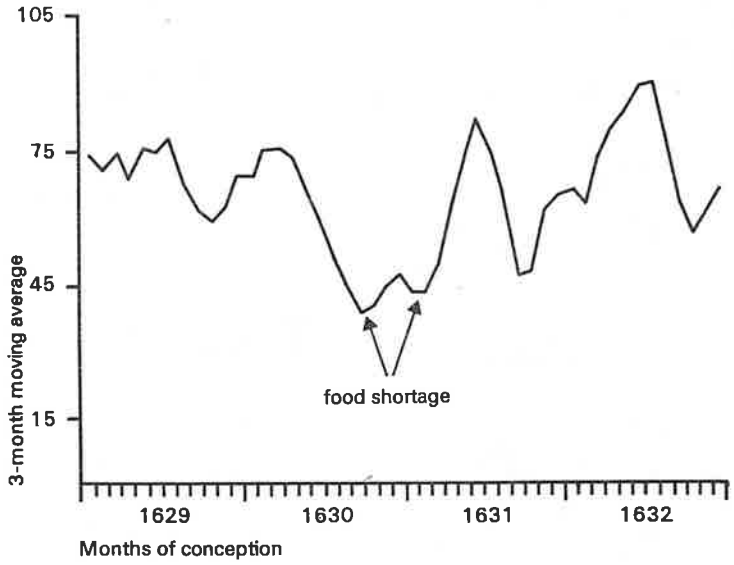

Figure 9 **Monthly distribution of conceptions leading to baptism in 17 parishes, 1629-1632**

alternative interpretations on this chronological study of disease and mortality. "The detective challenge", as Dyer has recently observed, "of tracking down the culprit which caused a particular spate of burials in clearly very appealing".(40) That challenge is one which, I hope, other historical geographers and demographers will share with me.

Footnotes

1 Recent English historical demographic studies include: M.W. Flinn, The European demographic system 1500-1800 (Brighton 1981); R. Smith, Population and its geography in England 1500-1730, pp. 199-237 of R. Dodgshon and R. Butlin (Eds.), An historical geography of England and Wales (New York 1978); E.A. Wrigley and R. Schofield, The population history of England 1541-1871. A reconstitution (London 1981); E.A. Wrigley and R. Schofield, English population history from family reconstitution: summary results 1600-1799 Population Studies 37 (1983) 157-84.

2 See Wrigley and Schofield, "The population history" ibid.; R.D. Lee, Methods and models for analysing historical series of births, deaths and marriages, pp. 337-70 of R.D. Lee (Ed.), Population patterns in the past (New York 1977).

3 For example, W.I. Beveridge, Influenza: the last great plague (London 1977); L.A. Clarkson, Death, disease and famine in pre-industrial England (Dublin 1975); M. Flinn, The stabilization of mortality in pre-industrial Western Europe Journal of European Economic History 3 (1974) 285-318. S. Kunitz, Speculations on the European mortality decline Economic History Review 2nd Ser. 36 (1983) pp. 349-64; T. McKeown, The modern rise of population (London 1976); W.H. McNeill, Plagues and peoples (Oxford 1977); J.D. Post, The last great subsistence crisis in the Western World (Baltimore 1977); J. Shrewsbury, A history of bubonic plague in the British Isles (Cambridge 1970).

4 W. Abel, Agricultural fluctuations in Europe (London 1980); W. Hoskins, Harvest fluctuations and English economic history 1620-1759 Agricultural History Review 16 (1968) 15-31; E.L. Jones, Seasons and prices. The role of the weather in English agricultural history (London 1964); E. Le Roy Ladurie, Times of feast, times of famine: a history of climate since the year 1000 (London 1972).

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Transactions 109 (1977) 73-116; D.M. Palliser, Epidemics in Tudor York Northern History 8 (1973) 45-63; D.M. Palliser, Dearth and disease in Staffordshire 1540-1670, pp.54-75 of C.W. Chalklin and M.A. Havinden (Eds.), Rural change and urban growth 1500-1800 (London 1974); R. Pickard, The population and epidemics of Exeter in pre-census times (Exeter 1947); C.D. Rogers, The Lancashire population crisis of 1623 (Manchester 1975); R. Schofield, 'Crisis' mortality Local Population Studies 9 (1972) 10-22; R. Schofield, Microdemography and epidemic mortality: two case studies pp. 53-67 of J. Sundin and E. Soderlund (Eds.), Time, Space and Man (Stockholm 1979); D.J. Schove, Chronology and historical geography of famine, plague and other pandemics Proceedings of the XXIII Congress of the History of Medicine (London 1972); P. Slack, Some aspects of epidemics in England (unpubl. D.Phil thesis, Univ. of Oxford 1972); P. Slack, Mortality crises and epidemics 1485-1610, pp. 9-59 of C. Webster (Ed.), Health, medicine and mortality in the sixteenth century (Cambridge 1979); J. Skinner, Crisis mortality in Buckinghamshire 1600-1750 Local Population Studies 28 (1982) 67-72. The analysis of local mortality crises for 404 English parishes presented in Wrigley and Schofield, "The population history". op.cit. is an excellent preliminary consideration of the chronological links between disease and mortality fluctuations in past times. Unfortunately the subject of disease is not dealt with in sufficient detail in the Wrigley and Schofield work. The best chronological treatment of the subject has been the work of Scottish historical demographers, see M. Flinn et al., Scottish population history from the seventeenth century to the 1930s (Cambridge 1977).

8 C. Creighton, A history of epidemics in Britain 2 vols. (Cambridge 1965, originally published 1894). See also C. Walford, A statistical chronology of plagues and pestilences as affecting human life, with an enquiry into their causes (London 1884).

9 A fuller discussion of the annual and seasonal mortality patterns and fluctuations of epidemic disease to complement this chronology of Southest England will shortly be published in R. Smith (Ed.), Regional and spatial demographic patterns in the past (Oxford, forthcoming).

10 Some of the annual series have also been collated using the harvest year - this is important where epidemics and mortality peaks extended over the winter quarter of the year.

11 These registers are listed in Appendix 1. Marriage totals have not, as yet, been included in the analysis.

12 The selection procedure is discussed in M.J. Dobson, Population, disease and mortality in Southeast England,

1600-1800 (unpubl. D.Phil. thesis, Univ. of Oxford 1982).

13 Designed by M. Shuchman.

14 The reasons for leaving the 165 parish annual data in an uncorrected form are discussed at greater length in Dobson, "Population" op.cit.

15 The statistical analysis of time series is discussed in R. Floud, An introduction to quantitative methods for historians (New Jersey 1973).

16 See Appendix 1. Occasional gaps in the registers were corrected either by using an alternative source or by interpolation based on burial fluctuations in an adjacent parish. The number of missing values in the 112 series was so small that the method of correction is unlikely to invalidate the results.

17 A second regional index of mortality based on annual recorded burials per 100 recorded baptisms provided another summary measure of Southeast England mortality fluctuations.

18 Crisis mortality measures are discussed in H. Charbonneau and A. Laruse (Eds.), The great mortalities: methodological studies of demographic crises in the past (Liege 1979). Measures of crisis mortality have also been used by historians in studies of single parishes or small areas.

19 A level of over 6.0 on the C.M.R. index has been used to indicate a mortality of severe local intensity.

20 Parishes under observation include all those parishes with complete burial figures for the year in question.

21 It is hoped that these classifications will prove of some value to historical demographers in the same way that Hoskins' summary of harvest fluctuations has proved of service to historians. See Hoskins, "Harvest fluctuations" op.cit. It is, however, likely that some short crises are missed by dealing with the data on an annual unit of time. Further consideration of the monthly distribution of mortality peaks is dealt with in the Chronology. For an excellent statistical analysis of monthly mortality peaks see Wrigley and Schofield, "The population history" op.cit.

22 All this information can provide useful epidemiological clues and an analysis of parish burials by month, age, etc. have been incorporated into the chronology.

23 Cause of death was not officially recorded in burial registers until the nineteenth century, while hospital records of causes of casualties for the seventeenth and eighteenth centuries are few and far between. Some of

the London parish registers and bills of mortality included information on cause of death. See, for example, T. Forbes, Births and deaths in a London parish: the record from the registers, 1654-1693 and 1729-1743 Bulletin of the History of Medicine 55 (1981) 371-9. Swedish parish records are particularly informative: see, A. Imhof and B. Lindskog, Les causes de mortalite en Swede et en Finlande entre 1749 et 1773 Annales E.S.C. 29 (1974) 915-33 and L. Widen, Mortality and causes of death in Sweden during the eighteenth century Statistick Tidskrift 13 (1975) 93-104.

24 W. Hillary, An account of the principal variations of the weather and the concomitant epidemical diseases from 1726 to 1734 at Ripon (London 1740); J. Huxham, Observations on the air and epidemic diseases from the year 1727 to 1737, together with a short dissertation on the Devonshire colic (London 1759); J. Rogers, An essay on epidemic disorders and more particularly on the endemical epidemics of the city of Cork (Cork 1734); J. Rutty, A chronological history of the weather and seasons and of the prevailing diseases in Dublin (London 1770); J. Sims, Observations on epidemic disorders with remarks on nervous and malignant fevers (London 1773); R. Willan, Reports on the diseases in London particularly during the years 1796-97-98-99 and 1800 (London 1801); W. Woollcombe, Remarks on the frequency and fatality of the different diseases, particularly on the progressive increase of consumption: with observations on the influence of the season on mortality (London 1808).

25 T. Short, Chronological history of the air, weather, seasons and meteors etc. (London 1749); T. Short, New observations on city, town and country bills of mortality (London 1750, reprinted Farnborough 1973); T. Short, A comparative history of the increase and decrease of mankind (London 1767, reprinted Farnborough, 1973); C. Creighton, "A history of epidemics" op.cit.

26 Two diaries of particular importance for this Southeast England study were R. Josselin, The diary of Ralph Josselin 1616-1683, ed. A. Macfarlane (British Academy Records of the Social and Economic History of England and Wales, iii, New series 1976) and E. Freke, Mrs Elizabeth Freke: her diary 1671-1741 (Cork 1913).

27 See footnotes 3 to 8. Other references to the primary and secondary sources used in this study are listed at the end of the chronology.

28 Some of these non-epidemic diseases are considered by the author elsewhere. See for example Dobson, "Population" op.cit. and M. Dobson, "Marsh fever" - the geography of malaria in England Journal of Historical Geography 6 (1980) 357-89.

29 It is important to note that for many of the years on the chronology, several diseases were simultaneously afflicting local communities - the predominant epidemic disease comprising only a partial reflection of the total disease environment.

30 Wrigley and Schofield, "The population history" op.cit., 659 also stress the importance of dysentery.

31 This evidence is discussed in more depth in Dobson, "Population" op.cit.

32 Again, for a fuller discussion see Dobson, "Population" op.cit.

33 In this important respect, Southeast England seems to have been favoured over northern and south-western regions of the country and to have enjoyed a relative freedom from a disease so universal in Ireland and parts of Europe. See, for example, J. Post, Food shortage, climatic variability, and epidemic disease in pre-industrial Europe: the mortality peak in the early 1740s (Cornell, 1985).

34 A number of bivariate and multivariate statistical procedures have been used in order to see whether there were any immediate or lagged associations between monthly, seasonal or annual mortality fluctuations and a range of parameters, reflecting harvest prices, wages and climatic conditions. Some interesting associations are revealed between climate and mortality, as discussed in Dobson, "Population" op.cit., but there appears to be only a very weak relationship between harvest prices and mortality in Southeast England. For similar conclusions see also Wrigley and Schofield, "The population history" op.cit. and R. Schofield, "The impact of scarcity and plenty" op. cit. Some interesting comparisons of harvest price and mortality relationships have been made with respect to France and England, see, for example, A. Appleby, "Grain prices" op. cit. and D. Weir, "Life under pressure" op. cit. Clearly, it will be important to extend such comparative assessments to regions within Britain and to see whether Southeast England really was better off than other areas.

35 Typhus fever was a disease which smouldered at an endemic level in county gaols and in the congested parts of towns and cities but it did not often affect the rural hinterland of Southeast England. The only major typhus epidemics on the chronology are those of 1741, following the severe harvest of 1740, and those associated with the Napoleonic Wars at the end of the period.

36 For further discussion of this point see Dobson, "Population" op.cit.

37 Wrigley and Schofield, "The population history" op.cit.

38 As, for example, the work of Professor John Post of Northeastern University, Boston, U.S.A. Post has already made very helpful contributions to interpreting some of the epidemics included in this study.

39 The works of McNeill, op.cit. and Mckeown, op. cit. are of undoubted importance in this respect.

40 A. Dyer, What to read on medical history Local Historian 16 (1984) 32.

A CHRONOLOGY OF EPIDEMIC DISEASE AND MORTALITY IN SOUTHEAST ENGLAND, 1601-1800

(The sources are given in square brackets at the end of each year. The underlined numbers refer to the corresponding numbered items at the end of the chronology, the roman characters refer to the page references and figures in round brackets to volume numbers. The roman numbers following the initials P.R. refer to parish registers and these are listed at the end of the chronology)

1601 Very Healthy *

S.E. England: No diseases of note

1602 Very Healthy *

S.E. England: Plague in St. Pancras, Chichester, "the name and number of those buried from the plague in the parish of St. Pancras, from August to December the third, being nineteen persons". Mention of the "sickness" at Warbleton, Sussex. Dry Summer.

Elsewhere: Localised outbreaks of plague e.g. Chester.

[45, 193; 214, 172; 211; P.R. 67]

1603 Average ***

S.E. England: Plague deaths recorded in many registers and accounts: "then were all the shires in England grieviously visited...note the work of God". Special rate levied in Twyford Hundred, Kent on July 20 1603 to relieve sufferers of a "grievous plague". A report in October stated that Kent was so generally infected with plague that few towns on the road from London to Dover were free from it. Accounts of the corporation of Canterbury contained entries of sums paid for watching shut-up houses, for carrying away dead etc. In Essex plague "swept off great numbers" of the townsfolk of Colchester. In Chelmsford,

25 deaths out of 51 were attributed to plague in the parish register between July 30 and December 30 1603. In Rye, Sussex July 15: "the sickness is much more increased this week and is dispersed in all places about the city". The tiny Sussex parish of Pyecombe witnessed a severe epidemic decimating 15% of the population. By August 10, many places in Sussex were "clere from the said infection of the plague".

Elsewhere: Plague widespread though most severe in Southern and Eastern England. Short (1750) believed that plague was imported by soldiers from Ostend. Webster (1797) noted simultaneous eruption in all parts of the kingdom. Creighton (1894) described spread of plague by escape of infected Londoners.

[43, 173; 174; 164, 115; 155; 198 (i), 289; 200, 269; 165 (4); 204, 84; 214, 17, 44 (1) 492; 10,96; 175, 478; 39, 243; 119; 221, 673; P.R. 39; 33; 46; 74; 64; 27; 20; 14; 7; 36; 47]

1604 Very Healthy *

S.E. England: Plague probably remained active in some towns eg. Colchester a corpse was searched and found covered in "manie great spottes". In Maldon, Essex there was "an assessment of reliefe for persons visited" in 1604. In Bexley, Kent there were deaths from "de peste" in spring 1604 and an isolated outbreak in Canterbury.

Elsewhere: Localised outbreaks of plague.

[222, 1; 204, 83; 200, 278; 27, 119; P.R. 7]

1605 Very Healthy *

S.E. England: No diseases of note. Price of corn so elevated in Essex "that it is far above the statute and likely to grow higher whereby the poor people are ready to mutiny and are like to suffer great want and penure".

Elsewhere: Plague epidemic in Manchester.

[67; 200]

1606 Healthy ***

S.E. England: Plague (?) in Mayfield ssex.

Elsewhere: Evidence of plague in nor. of England.

[37, 108; 27, 131; P.R. 37]

1607 Healthy **

S.E. England: Plague in Chelmsford, Essex and Arlington, Sussex. A petitioner of Tollesbury, Essex described "the tyme of the sickness". The winter of 1607-8 was the "severest that had been known for an age".

Elsewhere: Localised outbreaks of plague.

[7, 26; 211; 37, 124; 156 (2), 865; 214. 173; 68; P.R. 14; 3]

1608 Average **

S.E. England: Severe winter. Thames frozen early 1608. Widespread flooding in fen and marshland districts in January 1608 "it is to bee feared that this swelling of waters in the wombe of this our beautiful kingdo'e will ingender more strange and more incurable diseases, and infecte the whole nation". Plague recorded in some registers. In West Hanningfield, Essex, Thomas Clovill was not baptised in the church in January "because there was one buryed the weeke before that was thought to die of the plague". In Brighton, Sussex "many hundred" died March 1608 to January 1609. In Chichester August 10 "Willowby...and his wife were the first buried of the sicknes, god for his sonne Christ Jesus sake cease yt and take away this heavie punishment from us Lord in mercy take it away". Shrewsbury (1970) also suggests typhus fever in Southeast England. High corn prices and "an extreme dearth of corn... by reason of extreme frosts (as the like were never seen) the winter going before, which caused much corn to fall away". The poor of Chelmsford petitioned against the artificially high price of corn from which "not only us the poor handicraftmen aforesaid but generally all poor-men shall feel the smart thereof and be utterly undone".

Elsewhere: Outbreaks of plague in parts of England.

[208; 45, 359; 165 (4), 535; 200, 298; 160, 185; 211; 69; 222, 18; P.R. 15; 68; 7]

1609 Average **

S.E. England: Plague again visited many parishes. June 1 a letter from Rochester reported it prevalent in Kent. By October it had "spread to many villages". At Sandwich it was said that "a very great sickness" had killed "a thousand five hundred and upwards". At Sittingbourne "many persons buried who died of the plague". Diary of

Thomas Cocks recorded payment for "rat's bane 3d to kyll the ratt's in my chamber". Measles, typhus and smallpox also prevalent.

Elsewhere: Widespread visitation of plague - severe in London.

[39, 302-3; 200, 299; 44 (1), 500; 40; P.R. 56; 63]

1610 Unhealthy **

S.E. England: Plague remained in some places. The Justices of Canterbury were appealing for relief for people of Sandwich where 193 households were afflicted by the plague. Smallpox also prevalent and may have contributed to concentration of deaths in spring months (Figure 8i).

Elsewhere: High mortality in Scotland attributed to "a great visitation of the young children with the plague of pocks (smallpox)" and in Leicestershire to an "infection...so great whereat it come it scarce left any".

[194, 226; 161, 100; 211; 37, 37; 127; P.R. 2; 37].

1611 Average **

S.E. England: No diseases of note

1612 High mortality ***

S.E. England: Malignant fever severely afflicted the nation: "it is thought that the disease was no other than the ordinary ague that hath reigned and raged all over England since the latter end of summer...the extremity of the disease seemed to lie in his head". Creighton (1894) suggests epidemic of typhus. Two seasonal peaks of mortality in Southeast England: spring and autumn (Figure 8i): may indicate prevalence of both typhus and an enteric infection such as typhoid or dysentery. Spring and summer excessively dry.

Elsewhere: Widespread occurrence of fever. Prince Henry eldest son of James I died of the fever in November.

[44, 536; 214, 175]

1613 Average *

S.E. England: No diseases of note.

[114, 361; 10, 98].

1614 Average **

S.E. England: Smallpox prevailed with great severity in England. Sharp peak of mortality in spring in Southeast England.

[10, 98; 211]

1615 Average **

S.E. England: Severe winter from January to March. In 1814 republished a 1615 text: The Cold Yeare: A Deep Snow in which Men and Cattle Perished, written in a Dialogue between a London Shopkeeper and a Northcountryman. Very dry summer and dearth followed.

[212; 27, 192]

1616 Unhealthy ***

S.E. England: Sickly season in much of the country but little evidence concerning nature of disease. Creighton (1894) suggests typhus. In Southest England sharp peak of mortality in January 1616 and a prolonged rise in autumn months after a hot, dry summer may indicate typhus and typhoid, as in 1612.

Elsewhere: Epidemic widespread.

[96, 117; 44 (1), 537; 211]

1617 Average ***

S.E. England: No diseases of note though during the warm winter of 1616-17 it was feared that a "great plague and famine" would ensue as "want of wheat is beginning to be felt severely now".

[8, 423]

1618 Average ***

S.E. England: No diseases of note. Three smallpox deaths in one house recorded in Meopham, Kent.

[P.R. 38]

1619 Average *

S.E. England: No diseases of note.

1620 Healthy *

S.E. England: No diseases of note. The most abundant harvest "within living memory".

[120, 19]

1621 Healthy *

S.E. England: No diseases of note. The summer was "very cold and wet" and the winter of 1621-22 "very severe". The harvest was poor.

[222, 42; 211]

1622 Healthy *

S.E. England: No evidence of epidemic disease or high mortality in Southeast England in spite of a very poor harvest and high corn prices. In Essex reference was made to the "unseasonableness of the last summer together with the sudden rising of the price of corn and the scarcity which was found in the many counties of the realm".

Elsewhere: Famine conditions began to affect Scotland. High prices in north England.

[1; 222, 55; 37, 30; 10, 100; 44 (1), 507; 44 (2), 31; 96, 117; 120, 19]

1623 Average **

S.E. England: Again Southeast England seems to have avoided the worst implications of the severe famine disturbing the north of England and Scotland. Typhus (spotted fever) was epidemic in northern parts and many were dying directly from the effects of starvation. In London smallpox and typhus were also taking a large toll; Chamberlain wrote that the spotted fever "reigns almost everywhere...it is spread far and wide, and takes hold of whole households...God keep it from among us for we are in danger". The heightened mortality in the early months of 1623 in Southeast England may indicate prevalence of

typhus but the summer and autumn months appear particularly healthy. (Figure 8ii).

Elsewhere: In Scotland this was "the worst example of a subsistence crisis in the entire 17th century". (Flinn, 1977). Effects of harvest failure felt in northern England.

[44 (2), 31; 2, 126, 148; 200, 315; 198 (1), 306; 166, 498; 96, 117; 157, 120; 221, 340, 666]

1624 Unhealthy ***

S.E. England: Typhus, plague and dysentery appear to have been responsible for the increasing rise in burials during 1624. At the beginning of the year the effects of the cold winter 1623-24 were general. In Sussex "this yeare fell the greatest snow which was in mans memory and did abide from the ende of January untill April" and in Essex, the confession of Robert Whitehead who stole and ate a sheep in the winter of 1623-4 suggests hungry times: "beinge a verie poore man and haveinge a wiefe and seaven small children and being very hungry". Resistance to infection had probably reached a low ebb and communities of Southeast England were now feeling the beginnings of a "mortality crisis". Great mortality was noted in Sandwich in January 1624 and typhus reached Canterbury soon after. Burials rose even more sharply after the hot, dry summer of 1624, probably as a result of widespread dysentery and local plague outbreaks. Plague was at Folkestone and a meeting at New Romney was cancelled "by reason of the great infection and the danger of the mortall plague". Deaths in Southeast England remained elevated for some 24 months (Figures 4 and 8ii). It was the plague epidemic of 1624-26 which received most notice in the accounts.

Elsewhere: Disease probably widespread.

[66; 44 (1), 507; 155; P.R. 33; 52; 5; 65]

1625 Crisis mortality ***

S.E. England: Plague epidemic of 1625 was the second worst mortality crisis in Southeast England during the 17th and 18th century (Figure 8ii). Burials totalled 3496 in 112 parishes - a figure one and a half times normal level; baptisms were 86% below average. Ashford, Kent suffered especially badly: "at the latter end of the summer of the year 1625, the plague raged dreadfully in this town and neighbourhood, insomuch that the justices of the peace, finding the inhabitants unable to support and relieve the sick who were poor and in necessity, taxed this and the neighbouring hundreds...lest...the sick should be forced, for the succour of their lives, to break forth of the

towne, to the great danger of the country". 140 burials recorded in Ashford - about 4 times annual average. Chelmsford, Essex was also severely visited with 71 plague deaths and 241 burials in 1625: in the account book parishioners were paid for burying the dead, building coffins, perfuming and white-washing the church "in the time of God's visitation". In Hastings, Sussex an order was issued on August 10 "for watch and ward to be kept to restrain strangers repairing to the Town in order to avoid the danger of infection from the plague now universally raging in divers parts of this kingdom" and in Rye, despite similar strict precautions, a total of 198 burials (two and a half times the average) were recorded of which at least 56 citizens died of plague. Bromley had "ben long tyme visited with the infection of the plague"; severe restrictions were placed on the inhabitants of Maidstone during "this time of plague"; Canterbury was avoided by the King and Queen in July "for the great infection"; in Balcombe plague destroyed "many of the inhabitants" (probably 10%); at Sutton at Hone plague "raged greatly here at that time" and, in general, plague and poverty combined to cause severe hardship. Smallpox and an unidentified "ague" epidemic also contributed to the extensive mortality in Southeast England. The unseasonably cold spring and summer was an unusual pattern for plague.

Elsewhere: Plague in many localities of Britain, especially in Southern and Eastern England, though Creighton (1894) asserts "probably all the plague deaths in the provinces altogether, in 1625 and 1626, would not have made a fifth part of the mortality in London".

[51; 204, 90; 44 (1) 525; 165 (4); 119; 200, 337; 222, 86; 164 (1), 25; 219, 46; 198 (1) 307; 116 (2), 349; 116 (7), 536; 157, 127; 214, 181; 213, 73; 175, 478; 96, 125; 39, 321; 10, 100; 27, 120; 155; 24, 170; 29; 55; 221, 677; P.R. 56; 4; 14; 38; 43].

1626 Unhealthy **

S.E. England: Plague remained in some Southeastern localities and Colchester was severely attacked in 1626. In mid-July, 20 houses were officially reported to be infected and by September the inhabitants of Colchester and Sudbury were forbidden to attend Braintree fair because their towns were then "very much infected". Burials in St. Peter's Colchester reached 79 - 4 times the normal. Colchester was subsequently unable to fit out a ship for the King's fleet "on account of the heavy visitation of their town by the plague". Canterbury may also have experienced a recrudescence of plague as 12 of the 61 burials registered in the Stranger's Church were marked "contagion". The year was "so colde and wett yt harvest was not in while Hullantide" and the Vicar of Mountfield, Sussex wrote: "for ye former part of this

summer there was an extraordinary greate time of raine and apparant daunger of famine. Whereupon a publicke fast was ordained throughout ye kingdome to be kept on this 2nd of August was accordingly being performed it pleased the Lord in great mercy ye very famine day to send a comfortable sunshine and after this, very favourable and faire harvest together, ye like whereof hath seldom been nor so little intermission nor mixture of raine".

Elsewhere: Localised outbreaks of plague.

[49, 140; 44 (1), 526; 200, 348; 27, 192; 221; P.R. 42; 65; 18]

1627 Average ***

S.E. England: Few diseases of note. Plague seems to have died out in Southeast England although it made a brief appearance at Chichester in the autumn. The unusually high mortality in the winter and cold spring of 1627 contrasted with the healthy cold summer and wet autumn (Figure 8ii).

[200, 352; 211]

1628 Average *

S.E. England: The first smallpox epidemic occurred in London in 1628 and in Meopham, n-w Kent, 4 out of 13 burials were attributed to the "pocks". Smallpox did little to raise regional mortality rate.

[44 (2), 435; P.R. 38]

1629 Average **

S.E. England: No diseases of note. A low burial:baptism ratio of 75 in Southeast England probably reflects a mini baby-boom after the unhealthy years of the mid-1620s.

[159, 216]

1630 Average **

S.E. England: Plague was reported in several Kent towns. May 1 it was stated that 6 or 7 plague deaths had occurred in 5 houses in Greenwich. A few days later the number had risen to 12 with more than 20 houses segregated "partly infected, partly of such as have visited those which were". 74 persons died of plague in Greenwich in 1630.

The town of Faversham announced on May 12 stringent measures to prevent importation of plague: "whereas we are given to understand that the daungerous and infectious sickness of the plague is begunne and dispersed into manie townes and villages of this kingdome and within this countie of Kent and geves great cause of feare of cominge allso into this town, and therefore in all discretion, we are to use the best meanes we can, both to God, and by all outward instrumentall meanes as shall be fittinge" to prevent the plague. Faversham was, nevertheless, visited as were Gravesend, Strood, Milton, Romford, Aylesford and Canterbury. A severe summer drought, high corn prices and harvest failure received more attention than plague in local records. In June, the Sandwich magistrates reported that "there has been more complaint for want of corn than all this year before" and in the 18 months between June 1629 and autumn 1630 prices in Southeast England more than doubled. Scarcity was very apparent in Essex and in the north of the county many hundreds of poor had "no bedds to lye in, nor foode, but (live) from hand to mouth to mainteyne themselves theire wives and children". Hart (1633) wrote about the "hard pinching yeere" of 1630 "which deprived many of life, and many so pinched with poverty that the wound is not yet healed". Burial data do not suggest any immediate effect of hard times on mortality rate in Southeast England but conceptions during the harvest failure fell substantially (Figure 9) and remained lower than normal till the following spring.

Elsewhere: Plague in several parts of England. The subsistence crisis, combined with a plague epidemic and outbreaks of ergotism felt severely in France in 1630 and 1631.

[5, 242; 200, 356; 165 (4), 473; 39, 355; 43, 170; 204, 35, 95; 10, 101; 114, 23, 361; 27, 195; 211; 2, 155; P.R. 50, 65]

1631 Average ***

S.E. England: Plague suspected in Greenwich: two houses segregated in April, their contents burnt and their occupants removed to a pest house - but suspicion unfounded. The effects of food shortage again stressed in local records. Privy Council published the Book of Orders to "preserve" the poor "against famyne and the diseases which follow the want of wholesome foode". Bread was distributed to the poor - in Waltham Holy Cross churchwardens accounts listed subscribers who gave money to buy bread "in the time of scearcitie and dearth of corne". Stress was greatest in northern Essex: "although the poore doe suffer much in respect of the high prices of corne, they are in far greater misery in the most populous partes of the countrey whose trades consist in the making of bayes, by reason that the clothiers doe forbeare to sett the poore weavers on worke, alledging that they

already disbursed more than they are able". A hot dry summer.

Elsewhere: Plague epidemic in parts of the country - London and Southeast appear to have escaped.

[30; 188, 57; 31; 32; 54; 160, 187; 200, 363; 204, 35]

1632 Average **

S.E. England: No diseases of note. Poor harvest.

[156 (2), 465; 120]

1633 Average *

S.E. England: No diseases of note. Shrewsbury (1970) describes the year 1633 and 1634 as one of the few periods in the English annals of bubonic plague when the country was apparently completely free from the disease. However, plague appears to have been imported into the Thames port of Milton-next-Gravesend in 1633 from the following reference "buried a dutch woman whoe dyed of the plague".

[200, 371; P.R. 39]

1634 Average *

S.E. England: Smallpox, not plague, was probably present in Southeast England. The Mayor of Rye wrote on August 22 "whereas it is reported abroad in the country that the infectious disease of the plague is in our town which false rumour causes the country to forbear to resort to other places to provide and furnish themselves with such necessaries as they want, wherefore we have thought good to signifie to your Worship, that herein we are greatly wronged for, we thank God, our town is clear of that infectious disease, only (as it hath been in many other places) we have some few houses in our town visited with the smallpox of which sickness to our knowledge there have not died about five or six persons". Burials in Rye were one and a half times above average in 1634. There was a dry, warm summer and the year ended with a period of severe snow and frost.

Elsewhere: Smallpox epidemic in London.

[44 (1), 465; 119; 156 (2) 1465; P.R. 52]

1635 Healthy *

S.E. England: Smallpox and plague both reported in Southeast England though neither appears to have elevated mortality levels. Plague made its appearance at Greenwich and Sandwich in 1635 with accompanying cases at Canterbury. The summer was very dry and hot and the autumn so mild and fine that it was described as "summer-like" until the end of November.

Elsewhere: Smallpox prevalent in several parts of the country. In Cheshire "smal pock...this yeare was a fatal sicknes". In Bristol smallpox was "never by memory of man so fearful and infectious". In Scotland a great mortality especially of young children was caused by smallpox. North of Scotland was suffering from a severe famine.

[104, 208; 96, 31, 130; 204, 21, 143; 211; 44 (1) 528; 156 (2), 465]

1636 Average *

S.E. England: Smallpox and plague again reported in Southeast England but with little effct on regional death rate. In Kent "the sickness (smallpox)" was "in many places in the country". Plague badly affected Faversham, Kent: the infection began in May 1636 and lasted until November. 78 persons during that time were marked in the burial register as having died of plague. Deptford was also visited and 65 burials out of 147 were registered as plague. Plague continued to disrupt port of Sandwich and a few plague deaths occurred in West Hanningfield and Chelmsford. The summer was unusually hot: at the end of May it was recorded that "the heat which does not usually trouble this country over much has become very great accompanied by so great a drought that no one remembers the like...As a consequence, with the plague in addition, this will certainly cause a great scarcity of everything".

Elsewhere: Smallpox and plague in many parts of the country. Newcastle and London had severe epidemics.

[10, 103; 44 (1), 529, 531; 5, 242; 200, 377; 165 (4), 373; 116 (10), 171; 39, 355; 119; 156 (2) 465; 9, 423; 211; P.R. 68; 14]

1637 Average **

S.E. England: Plague remained in some of the towns visited the previous year. The plague continued to rage "with great violence" in Sandwich and on March 12 1637 there were 78 houses "visited" and 188 persons "infected". "On June 30, 24 houses and tenements were shut up, in which were 103 persons; from July 6 to October 5, there were buried in St. Clement's parish about ten every week, who

died of the plague". Deaths in Chelmsford rose to 128 and 51 died of the plague. In Sevenoaks, 6 persons of one family died of plague in April. Harvest was deficient. The year was described as "a very unkindly year....a cutting hungry year"

[116 (10), 171; 20, 707-8; 44 (1), 528; 165 (4), 373; 200, 377; 120; P.R. 14, 55]

1638 Crisis mortality ****

S.E. England: Malignant fever (typhoid or typhus) responsible for mortality peaks in many parishes in Southeast England. The year 1638 stands out as one of the worst regional mortality crises of the period with over 40% of sample parishes affected. In Wadhurst in the Weald of Sussex it was reported: "this yeare was an infectious summer, so that verie many died in many place here in Sussex also speciallie in the Downs". John Graunt, the 17th century pioneer of epidemiology, found that 1638 was the most "mortal" year in his Hampshire parish between 1570-1660. He described the disease as a "malignant fever...which raged so fiercely about harvest that there appeared scarce hands enough to take in the corn". Graunt believed the fever was not plague because it did not have a very high case fatality rate; he estimated seven were sick for every individual who died. Nor did the disease carry with it the usual plague symptoms such as sores, swellings and blue tokens. The mortality statistics for Southeast England reveal that the disease was, indeed, more notable for its rural diffusion than for its intensity (Figure 5). Creighton (1894) suggests spotted fever or typhus as the leading epidemic and this poverty- and famine-associated infection may have followed the deficient harvest of 1637. The outstanding peak of mortality in the harvest months of 1638 (Figure 8iii), with September 1638 recording one of the most severe monthly mortality peaks of the 17th and 18th centuries, following an excessively hot and dry summer is not, however, typical of the seasonal pattern of typhus. The widespread geographical incidence of the epidemic in the sparsely populated downland regions does not suggest a typhus epidemic, dependent on overcrowded and filthy conditions. Typhoid fever better explains the epidemiological findings and the spread of bacterial infection found an ideal climate in autumn 1638.

Elsewhere: Fever epidemic throughout southern and eastern England. The north of the country and Scotland less affected.

[44 (1) 541; 109; 164; 2, 191; 155, 200, 389; 204; 221, 679; P.R. 65, 72]

1639 High mortality ***

S.E. England: Fever may have continued to elevate burials through the winter and spring months of 1639. Smallpox may have taken an additional toll in the colder months of the year. The summer and autumn season proved much more healthy. By September 1639 Essex justices were also able to report "plenty of corn of all sorts generally in these counties" and references to local food shortages subsided. The year ended with the bad winter of 1639-40: "the winter was exceeding windy and tempestuous and thereupon much shiprack".

[33; 10, 103; 211; P.R. 65]

1640 Unhealthy ***

S.E. England: Fever (? typhus) may again explain the spring mortality peak. No diseases of note were mentioned in the accounts.

1641 Average *

S.E. England: Smallpox and/or plague reported in some parts of Southeast England. In Witham, Essex, "the pox and other sicknesses" were prevalent causing 140 families to be out of work besides the sick. The epidemic also led to hardship in Bocking where many were "in great want, likely to perish". The outbreak of "pox" had little effect on regional mortality rates. A good harvest.

Elsewhere: Smallpox and plague both epidemic in London.

[44 (2), 437; 44 (1), 465; 123, 485; 70]

1642 Average No peaks

S.E. England: Plague reported in parts of Sussex: the parishes of Bersted and Pagham disbursed money "for reliefe of the persons there lately infected" and in Heene 4 members of one family were buried "they all dying of the infectious disease of the plague as is supposed". Again no effect on regional mortality.

Elsewhere: Peaks of mortality in parts of England during the summer.

[93; 221, 655]

1643 Average *

S.E. England: Typhus fever was spread by the King's Army and the Earl of Essex along the Thames Valley. According to accounts, the effect was devastating: "as soon as it had entered an house, it run through the same that there was scarce one left well to administer to the sick... funerals increased daily and the malignity discovered itself in spots and pustles. The disease abated in harvest and ceased in winter". The first medical essay on the subject of typhus entitled Morbus Epidemicus Anni 1643, or the New Disease was written by Edward Greaves in this year. The disease did not have a marked effect on mortality in Southeast England. Plague was also recorded in Sandwich "when there were 109 houses affected, and 164 persons that needed relief".

Elsewhere: Regional epidemic of typhus followed route of armies and was especially severe in Southwest. It does not appear to have seriously affected Southeastern counties though Short (1749) asserts: "it spread over the whole kingdom". Isolated outbreaks of plague.

[217, 114; 198, 319; 44 (1), 543; 110; 127, 14; 116 (10), 172; 23, 39; 221]

1644 Average *

S.E. England: Plague and spotted fever (? typhus) reported by Josselin to be epidemic in Essex during "the feverishe times". "The plague that arrow of death is sadly at Colchester, brought by a woman that came to visitt her freinds, their have already divers dyed" and "the spotted fever is in towne with them whereof divers have dyed". Mortality in Colchester was, however, below average in 1644. In Minster in Sheppey, Kent were recorded "the Burials in the parish of Minister duringe the time of the Plague October 1644". In Sandwich by mid-August 120 houses were shut up and the town was suffering "an extreme visitacion of sicknesse". Attempts were made to isolate the town and prevent the movement to and from surrounding countryside. Plague also recorded in Stifford Essex.

[127, 15, 17; 200, 407; 49; 27; 96, 133; 148, 99, 101; P.R. 41; 58]

1645 Very Healthy *

S.E. England: No diseases of note in Southeast England though Josselin, the Essex diarist, wrote "yett the times sickly and many dyed suddenly".

Elsewhere: Plague very severe in Scotland and outbreaks elsewhere in the country.

[37, 83; 96, 133; 27, 50; 211; 157, 123; 44 (1) 557; 2,

127]

1646 Healthy *

S.E. England: Fevers in the countryside. Again Josselin described the times as "very sickly". The first of 5 successive harvest failures.

Elsewhere: Plague epidemic in some towns e.g. Colyton, Devon and London.

[127, 66, 69, 72; 220, 85]

1647 Average ***

S.E. England: Fevers, possibly including typhus, associated with severe scarcity were noted during the harvest months of 1647. Josselin recalled "this exceeding deare and scarce times; and in times of great sicknes and illnes, agues abounding more than in all my remembrance, last yeare and this also, feavers spotted rise in the country whether it arise from a distempered and infected aire I know not, but fruite rottes on the trees as last yeare though more, and many cattle die of the murraine". A strong complaint was lodged by the "poor inhabitants of Chelmsford and Moulsham being in much distress and ready to perish" as a result of excessively and artificially high corn prices. The sharp dip in the baptism curve of Southeast England parishes (Table 3) to 78% of the average level, 1637-1646, is a more outstanding demographic feature than the rise in mortality at this time. Baptisms remained depressed for several years.

Elsewhere: Plague had abated in London.

[127, 101, 102, 105; 63]

1648 Average **

S.E. England: Smallpox in parts of Southeast England. In Colchester the siege of 1648 resulted in the death of many "of the flux, and other distempers occasioned by bad diet". Josselin continues to stress that "the times are very dangerous in reference to the healths of people". The year was exceedingly wet and Boyle wrote: "how tedious a winter have we endured this summer?" A hard winter, 1648-9 followed and the Thames was frozen over.

[46, 31; 127, 152; 19 (2), 178; 211]

1649 Average *

S.E. England: Smallpox "about in divers places" and the "great dearth" continued. Short (1749) noted 1649 as the year "when a general Bloody flux was so fatal in England". Famine and associated diseases had no major effect on the death rate in Southeast England but baptisms were still below average.

Elsewhere: Lancashire was suffering from a severe subsistence crisis. The county was visited with "sword, pestilence and famine, all at one afflicting that county above other parts of the nation, by means whereof...many people have perished and died". A collection was made in Essex for the poor and sick of Lancashire. Famine in France lasted until 1652.

[127 154, 156-7, 161-9, 172; 198 (2), 411; 165 (4) 285; 28; 211]

1650 Very Healthy *

S.E. England: No diseases of note except scattered references to smallpox. Prices remained high and Josselin noted "corne at a great rate. 11s and 11s 6d a bushel at Colchester".

Elsewhere: Flux (? dysentery) in London. Plague very severe in Ireland. In Europe a widespread outbreak of ergotism prevailed after a hot summer.

[127, 188-9, 210, 215, 221; 44 (1), 566; 212]

1651 Healthy *

S.E. England: Smallpox cases reported in some towns "it was very sore and heavy at Halsted". No major epidemic.

Elsewhere: Fever prevailed in Northwest England. In Liverpool, "Sickman's Lane" marked the fatal spot of the 1651 epidemic.

[127, 235-273; 44 (1) 567; 211; 212; 199 (1), 329]

1652 Average **

S.E. England: Smallpox, measles and fever in parts of Southeast England. Josselin described the "wonderful sickly time" and asserted that "many died very suddenly". His own little children "have been looking into the grave this summer, and yett all preserved". A very hot dry summer and "waters are lower than ever...and so very

scarce in many places".

[127, 260-314; 214, 189]

1653 Unhealthy ***

S.E. England: No diseases specified. London was relatively free from plague, smallpox and fever. Josselin noted that "many were under eminent afflications and many dyed suddenly... its in many places a sickly time". But he does not elude to the responsible diseases. The dip in baptisms (Table 3) in 1653 is more striking and puzzling than the increase in mortality. The summer again very hot and dry. "Many springs stopt so that they run not others quite dried up". The harvest was abundant.

[127, 304-314; 44 (1) 533; 214, 189; 120]

1654 Average ***

S.E. England: No diseases of note. Public thanks were ordered for a supply of rain in August. Harvest was excellent.

Elsewhere: Plague broke out in Chester.

[214, 189; 120; 127, 323]

1655 Very Healthy *

S.E. England: No diseases of note. Wet summer and a good harvest.

[120]

1656 Healthy *

S.E. England: Smallpox in parts. In Waltham, Kent there was a "visitation of God by the small poxe". Josselin referred to "this aguish, and feavourish time".

Elsewhere: Smallpox general.

[127, 318; 147; 199]

1657 Average **

S.E. England: Ague or intermitting fever (typhoid) was

responsible for the sharp and universal peak in burials during the month of August (Figure 8iv). Burials in that month were almost 70% above the average August level. Josselin reported in August "their was never a more sickly time generally in England than now". In September he noted that "feavours...fil many places with pale faces" and later in that month was held "a publique fast in regard of the general visitation of sicknes, which was a feavour and ague very mortal in some places". The detailed description of the fever by Willis (1684) bears some resemblance to the clinical and epidemiological characteristics of typhoid: "the last Spring, and the time succeeding it, even to the end of the Summer, was all that half years space extremely dry and hot, but especially after the summer solstice, the heats were so intense for many weeks together, that day and night there was none that did not complain of the heat of the air...About the Calends of July, this feaver, at first sporadical or particular, began to break forth in some places, that perhaps one or two were taken in the same city or village... About the month August, this feaver began to spread far and near, among the people, that in every region and village many were sick of it, but it was much more frequent in the country, and smaller villages than in cities or towns. It was still like an intermitting feaver, unless that it seemed more infectious than that is wont, and with more cruel fits, and shorter intermissions and therefore was called the new Disease: besides, it underwent the note of a certain malignity, and gave knowledge of its contagion and deadliness, insomuch that it crept from house to house, infected with the same evil, most of the same family, and especially those familiarily conversing with the sick, yea, old men, and men of ripe age, it ordinarily took away... very many recovered of, that scarce one of thousand died".

Elsewhere: Fever epidemic widespread in rural areas - concentrated in autumn months. Far north and west of England escaped epidemic.

[127, 381ff; 212; 217, 137ff; 147; 198 (1), 331; 221, 680; 44 (1), 569]

1658 High mortality ***

S.E. England: Influenza epidemic (vernal fever) in the spring of 1658 followed by continued fever (? typhoid) in the autumn months. After the very hot summer and autumn of 1657 there was a long winter of intense frost and deep snow "so that no one living could remember such a year, for either excess both of heat and cold". During the winter "among our countrimen, there was a moderate state of health, and freedom from all popular diseases... About the end of April, suddenly a distemper arose, as if sent by some blast of the stars, which laid hold on very many together, that in some towns, in the space of a week above

a thousand people fell sick together. The particular symptom of this disease, which invaded the sick, as a troublesome cough, with great spitting, also a catarrh falling down on the palat, throat and nostrils: also it was accompanied with a feverish distemper, joyned with heat and thirst, want of appetite, a spontaneous weariness and a grievous pain in the back and limbs...such as were indued with an infirm body, or men of a more declining age, that were taken with this disease, not a few died of it; but the more strong, and almost all of an healthful constitution recovered". The influenza epidemic lasted about six months. Another excessively hot summer ensued and at the end of August the "new fever" returned raging chiefly through country houses and villages and as epidemic and contagious as the previous autumn (Figure 8iv). Willis (1684) added further symptoms to his account: the fever was continual, many were ill "in their brain and nervous stock", all complained of their head being "grievously distempered", in some "little broad and red spots" appeared and then disappeared, followed by "a benummedness of the senses and a sleepiness". Again the fatality rates were highest amongst the "weak and sickly". The clinical signs, together with its seasonal and geographical incidence, and the rate of transmission, are again suggestive of enteric fevers, but clearly further studies of this epidemic are needed.

Elsewhere: Influenza was universal. In the spring "a third part of mankind almost should be distempered with the same in the space of a month". Fever (? typhoid) was also widespread throughout the country particularly in the rural areas. In the autumn months "the whole nation groaned under a load of intermittents" and "almost the whole island resembled an hospital and there was scarcely a sufficient number, free from the fever, to administer to the necessities of those who were sick". The epidemics were also widespread over Europe.

[214, 192; 44 (1), 570; 217, 144ff; 198 (1), 331; 173, 168; 149; 99, 43; 127, 425, 431; 211; 10, 107; 199]

1659 Average **

S.E. England: Influenza recurred in the spring of 1659 with all the same symptoms of the previous year. The autumn, however, remained free from epidemic fevers.

Elsewhere: Influenza epidemic universal.

[215]

1660 Healthy *

S.E. England: No diseases of note. Deficient harvest and

wet autumn.

[120; 127, 459; 211; 44 (2), 437]

1661 Average *

S.E. England: Smallpox, measles and fevers were prevalent in parts of Southeast England. Pepys wrote "but it is such a sickly time both in the city and country everywhere (of a sort of fever) that never was heard of almost" and Willis described a "fever of the brain and nervous stock" which "raged mostly among children and youths". Creighton (1894) believed this was worm fever. Harvest prices reached an unprecedented level and consumption of contaminated food may have led to gastric problems and enteric fevers. Dependence on livestock (for which prices remained below average) as an alternative food source to grain may have led to the transmission of tapeworm, if the meat was improperly cooked.

Elsewhere: Smallpox epidemic in London and elsewhere in England. Famine in France.

[44 (2), 7, 439, 667; 217; 127, 337, 481, 483; 120]

1662 Average *

S.E. England: Fevers, possibly taeniasis or an animal transmitted disease was still prevalent. Disease was also prevalent amongst cattle: "AD 1662 great drought was experienced in England; springs were dried up, the rivers were very low and an epizootic prevailed with great mortality among cattle: it was of rather a remarkable character, being a disease of the liver; a small worm (entozoa) especially in sheep, it is said, seemed to prey on the liver, lung and bowels". The dip on the baptism curve in Southeast England may have been a consequence of the previous years' bad harvest.

[10, 108; 212; 127, 486]

1663 Healthy *

S.E. England: No diseases of note, except scattered references to smallpox. The winter was exceptionally severe and Josselin claimed "it was the hardest I ever remember".

Elsewhere: A malignant epidemic proceeding from "monstrous and incredible number of small worms" invaded the Venetian territories.

[127, 493; 211; 212; 199]

1664 Healthy **

S.E. England: Smallpox prevalent in Southeast England. The summer was very wet and further outbreaks of cattle disease occurred. There followed another very cold winter and "the Thames was a bridge of ice".

[127, 509; 214, 194; P.R. 65]

1665 Average ** [Note: Some Southeast England towns, not included in the regional index, experienced crisis mortality in 1665 and 1666.]

S.E. England: Bubonic plague was the outstanding epidemic of 1665 and 1666 (Figure 7 and Figures 8v to 8viii). In some towns of Southeast England the death rate was dramatic and plague raged for two successive years. In Colchester, plague claimed about 4700 victims during the period August 1665 and December 1666 (plus 98 buried in the Quakers Burial Ground) - perhaps over one half of the city's population and proportionately more than in the city of London (Figure 8v). Chelmsford was visited "with the contagion of the plague" in 1665. Several of the Kent Thames and Medway ports were "miserably infected". In Chatham the first plague burial was recorded on August 20 1665 and by late summer plague in Chatham and Rochester was increasing "very much" (Figure 8vi). In Sittingbourne an early victim was "Jude Sturgeon died (as is supposed of the sickness) having two swellings in his groine, was buried by his bro: aunt and nurse Sept 14th 1665". Pepys noted that in Greenwich, Woolwich and Deptford plague "begins to grow very great", by August 1665. In Deptford 374 died of the plague in 1665 and another 522 succumbed in the following year. Gillingham recorded its first plague death on October 7 1665 and the epidemic continued till November 1666. Many of the London suburbs and nearby towns received early visitations. Bromley recorded 8 plague deaths in 1665 and Heberden (1801) stated: "In 1665, every town within twenty miles of London was more or less infected". Along the coast, Hastings was attacked in 1665 and in Yardley 60 persons died of the disease between June 5 1665 and January 3 1666. Chichester was affected, too, and the people of nearby Bosham "influenced by humane and charitable principles, carried food to the diseased and famine-stricken people of the old city". Plague was reported in Dover from August 1665 and over two years this port "felt the heavy mis-fortune of the plague's carrying off a number of its inhabitants, 900 at least dying of this dreadful pestilence...for the burial of whom a piece of ground was bought in Hougham...since which it has been constantly known by the name of the Graves...the bodies of these unhappy sufferers were in general carried from the

pier in carts some few in coffins but most without". It is likely that between one quarter and one third of Dover's population died of the plague in this epidemic. Plague was established in Sandwich by September 1665 and a large burial toll in Harwich, Essex of 414 persons in 1665 suggests that this port was simultaneously hit by the epidemic. Other parts of Southeast England, however, remained free from the ravages of plague in 1665. The vicar of Great Burstead, Essex noted in November: "Memorandum yt in ye yeare 1665 ye yeare of ye great plague (wherein there dyed in London of all diseases neere an 100000) there dyed none in this parish for ye space of 12 weeks together...". Parishioners of Tenterden, Kent were issued with certificates to travel to the Isle of Wight because it was confirmed that "the parish of Tenterden aforesaid, and the places adjacent are free from the contagion and infection of the plague and so have been for the space of one year last past... first day of August 1665". The winter months saw a quiescence of plague in most parts of the country. The regional mortality index for 1665 shows that in spite of the severe demographic consequences of plague in certain towns and ports of Southeast England most of the area suffered only to a limited degree (Figure 7).

Elsewhere: The "Great Plague" of 1665-66 hit London severely (approximately 70,000 died of the plague). It also hit other provincial towns throughout England. Shrewsbury (1970) describes the London visitation as but "an incident in a great national outburst of the disease". He suggests that the port of London was not the only entry of plague, and other seaports formed separate foci from which the disease spread. Scotland was unaffected by the epidemic.

[49, 137; 200; 16; 53; 129; 65; 128; 41, 93; 94, 86-9; 177; 176, 332; 117, 80; 19, 543; 44 (1), 471, 678, 681, 687-8; 27, 118; 116 (9), 452, 525; 116 (2), 554; 46, 31; 164 (1), 65, 77, 88; 165 (4), 373; 154, 54; 89; 167, 38; 71; 90; 218, 139; 130; 131; 72; 65; 70; 52; 14; 221; P.R. 8; 16; 13; 23; 25; 6; 48; 24; 9]

1666 Unhealthy *** (Note: Some Southeast England towns, not included in the regional index, experienced "crisis" mortality. A second index was calculated for the two years 1665 and 1666 to include another 28 urban parishes with known plague epidemics (see Appendix 2). In the 140 parishes almost two times the number of burials took place in the "plague" years than in "normal" years giving a mortality index of 196. In the urban parishes, alone, burials were increased more than three-fold in 1665 and 1666 producing a mortality index of 335.]

S.E. England: Plague recrudesced in the spring and hot summer of 1666 and many of the Southeast England towns visited the previous summer experienced a massive upsurge

in mortality levels in 1666 (Figures 8v - 8viii). In Chatham "when the disorder raged at the highest degree" in the summer of 1666 "the burials amounted to 7,8 and 9 in the day" and in Dover as late as October 1666 many people were still dying of plague - 40 to 50 a week according to one reporter. Other ports and towns which had so far escaped or remained relatively free from the plague now felt its impact. Deal in Kent had been declared free of plague in August 1665 but the following July came a report that the "sickness was very sad at Deal" and although by late summer the disease was declining some "three quarters of those who stayed in the town had died of it". Maidstone and Canterbury had their first major onslaught in 1666. Bocking and Braintree in Essex had devastating outbreaks this year. In Bocking 441 persons died of the plague, perhaps one third of the population of this cloth town (Figure 8viii). Braintree recorded only 34 burials in the parish register but the town compiled a "Feoffe book of the poore" dated 1666, which began: "this year the plague raged very much in this towne, and divers persons were bountifull benefactors to the poor of Braintree". A subsequent document of 1684 listed "all those families which died in Braintree in the yeare 1665 of the Plague and of those which were visited only, from the 5th of September 1665 to the 15th of September 1666". A total of 665 people were "visited and died of the plague" and another 22 were "visited only". This implies a C.D.R. of over 400 per 1000 - a level rivalled only by Colchester. Moreover, it documents an unprecedented case fatality rate of 97%. Plague was also more widespread in the countryside of Southeast England during 1666 than it had been in 1665. The rural parish of Great Oakley, Essex recorded the deaths of 23 plague victims, most of whom were "buried in the night"; Pesthouse Lane reminds residents today of this 17th century epidemic. The rural incidence of plague did not, however, compare with its calamitous effect in urban communities and indeed, in much of the countryside "there was never known less sickness in the compasse of any one yeare, saving where the plague hath been". (Figure 7).

Elsewhere: Southeast England towns suffered more severely from plague in 1666 than in 1665 and the epidemic diffused more widely throughout the region. London by comparison recorded a fraction of the plague burials in 1666 than it had registered in 1665. Shrewsbury (1970) believes that there was a spontaneous loss of virulence of P. Pestis first in London and then in the provinces. He cites the report from Deal in the latter stages of the 1666 outbreak that "two hundred have sores; before few had sores but only swellings, and then they died". 1666 marks the last major outbreak of plague in Britain. Citizens, nevertheless, feared the disease for many decades to come.

[For sources see year 1665]

1667 Average ***

S.E. England: Plague had disappeared from most of the country by 1667. Chatham recorded a further 7 plague deaths in July and August 1667 (Figure 8vi), and the appearance of plague in the Wealden community of Biddenden marks its final imprint on Southeast England. In June 1667 "12 were buried at Betnams Wood of the plague" and "12 more had plague sores which recovered". All the infected houses in Biddenden were "shut up" and the overseers relieved the sick. The regional dip in baptisms (Table 3) is a noticeable aftermath of the plague years.

Elsewhere: Most regions free from plague. Bubonic plague never again reached epidemic proportions in Britain.

[12; P.R. 13]

1668 Average **

S.E. England: Smallpox or plague occurred in Pembury, Kent in May 1668: "Died of 'ye sickness' Benge and his wife and two daughters, John Sisby and his wife of Yalden, buried in the backsides". The place of burial suggests that the two families died of suspected plague but since smallpox was also prevalent at that time the two "poxes" may have been confused. A dry summer.

Elsewhere: Smallpox raged in London.

[154; 191]

1669 Unhealthy ***

S.E. England: Smallpox was noted in several communities. In Biddenden, Kent, the overseers of the poor were caring for "all those that were sick of the smallpox at the Parsonage". Cholera morbus or a 'plague in the guts' was widespread after the hot dry summer of 1669. Sydenham (1670) noted: "this yeare cholera morbus gripeing in the bowells without stooles and dysenterys became very epidemicall (of which there had scarce been any sprinkleings for about 10 years befor at least in this place)". This suggests a repetition of the summer epidemics of 1657 and 1658. It is impossible to identify the micro-organism responsible for the epidemic but faecal contamination of food, water or fomites could have led to the transmission of several intestinal pathogens. The infection was of limited seasonal incidence and "upon the invasion of winter and very hard weather the cholera morbus gripeing of the guts and dysentery...totally ceased and instead of them the smallpox (which in the sommer of this yeare as it had donne in the same season of the preceding yeare was almost gon) returned again and became

more rife in which posture it continues at the writing here of viz the beginning of the year 1670". (Sydenham).

Elsewhere: Smallpox and measles were "rife" in England. The cholera morbus was "very epidemicall" in the late summer and griping of the guts took a high toll in the London Bills of Mortality. Holland suffered from a severe "fever" at the same time.

[12; 212; 211; 18; 44 (2), 750; 99, 84ff; 199; 127, 548]

1670 Average **

S.E. England: Smallpox, measles and dysentery common in 1670. The dry scorching weather of the summer produced both "a scarcity of water" and the return of the enteric infections. Mortality in Southeast England did not reach the high levels of the previous season.

Elsewhere: Dysentery universal in autumn 1670.

[96, 156, 163-4; 127, 553-5; 173, 216; 88]

1671 Average *

S.E. England: Smallpox and the autumnal fever (dysentery or "Bloody flux") again prevalent. Millar (1770) claimed that "about the autumnal equinox, in 1671, an epidemic fever broke out, and spread over the whole kingdom...the sick were afflicted with unusual langour, watching vertigo, and frequently with violent head-ach...". This may refer to the same infection that had invaded England during the previous autumns but it had a limited effect on mortality levels in Southeast England.

Elsewhere: The autumnal fever prevailed universally both in town and country. It also raged "with violence in London and was exceedingly mortal".

[173, 261; 44 (2) 750]

1672 Average **

S.E. England: Smallpox in some communities. In Woodmancote, Sussex, Richard Boniface died of smallpox in February and was "tacitely layd in the churchyard".

[127, 566; P.R. 73]

1673 Healthy **

S.E. England: No epidemic disease of note. The summer was wet from June to September and 1673 recorded the first bad harvest for over a decade. A weaver from Leeds, Kent who was suffering from an "ague" was unable to provide bread for his hungry family. He requested an additional allowance for all poore people during "this hard unseasonable weather".

[133; 120]

1674 Healthy *

S.E. England: Measles and smallpox in Southeast England. In Wadhurst, Sussex the burial of Damaris Gower took place on November 1 "without funeral rites, not from any bad motive but on account of her having died from an infectious disease". A very cool summer.

Elsewhere: Measles and smallpox unusually severe in London in first half of year.

[44 (2) 635; 127, 546; 157, 124; P.R. 65]

1675 Average *

S.E. England: Smallpox in many communities. Influenza widespread in the month of November. Sydenham (1675) wrote an essay: The Epidemic Coughs of the year 1675, with pleurisies and pneumonias supervening. Josselin reported in November that "coughs (are) common". The influenza epidemic did not have a significant effect on the death rate of 1675 or 1676. 1675 was another cool summer.

Elsewhere: Influenza affected all parts of the country. In Scotland "the asthma, or coch, or cold with a feavour, turns the epidemick disease in town and country whereof many dyes". Scotland was also suffering from a dearth of corn.

[127, 582, 588; 96, 160; 44 (2), 326; 212]

1676 Healthy *

S.E. England: No diseases of note in Southeast England though smallpox and measles were "virulent" in parts of the country. 1676 experienced a severe drought from February to August in the Southeast.

[10; 212; 127, 591; 8, 424-5; 124, 39]

1677 Healthy *

S.E. England: Fevers, fluxes and smallpox, according to one observer, made "so general a visitation of sickness" in 1677 that "there is hardly any family free from one or other of them". Chelmsford, Essex was visited with "sicknesse". In Southeast England mortality levels were as yet below average.

[19 (5), 565; 60]

1678 High Mortality ***

S.E. England: Epidemic ague or intermittent fever (? enteric fever) produced a dramatic regional rise in mortality after the hot, dry summer of 1678 (Figures 6 and 8ix). Sydenham noted that "the constitution of...1678 was so favourable to intermittent fevers, that they might again take the name of epidemics...by the end of summer and at the beginning of autumn they were preeminently prevalent; so much so, as to exclude all other diseases from the name of epidemic". The symptoms were nausea, severe vomiting, weariness, pain in the body, bleeding at the nose, and occasional spots. The intermittent fever was apt to become continual. In Southeast England both children and adults succumbed to the disease. The nature of the fever remains puzzling but some kind of enteric fever, possibly typhoid, is suggested by the descriptions. Smallpox contributed to the high mortality levels during the winter. 1678 marked the first of the most unhealthy set of years in 17th and 18th century Southeast England. It was, however, the only year of the period 1678-1681 with a deficient harvest.

Elsewhere: Epidemic ague probably affected other parts of the country. In Holland the same epidemic was very severe.

[44 (2), 331; 158; 199]

1679 Crisis mortality **** [Note: The months August 1678 to May 1679 recorded twice the number of burials as the months August 1677 to May 1678 in the 50 parishes with monthly burial data (Figure 8ix).]

S.E. England: Smallpox, epidemic ague and influenza successively took their toll in 1679 producing the highest surplus of burials of any year in the 17th and 18th century. The regional mortality index was 165 and recorded burials were almost double the number of baptisms. Over 40% of all parishes in the sample were affected by the surge in mortality and its geographical extent is one of its most distinctive features (Figure 6).

The epidemic ague did not recur until the autumn months of 1679 - again following a hot, dry summer. But some physicians attributed the rise in mortality in the early months of 1679 to the combined effects of "weakened constitutions" from the 1678 autumnal fever and the onset of other infections, including smallpox. Some patients also experienced a relapse of the fever in the winter and spring months of 1678-79. It was, however, the second outbreak of epidemic ague in late August 1679 which again caused disturbance and, according to Sydenham, "a vast mortality". The disease once more presented the signs of an enteric fever and one 19th century writer, Bascombe, even suggested that Asiatic cholera made its first appearance in England at this time. In the cold wet month of November attention was quickly diverted to the wave of influenza which spread across England. Locke noted the increase in mortality: "an increase scarce ever known out of times of pestilential diseases. The epidemical disease yt came in at this time and caused this mortality was a dry but violent cough which produced in many a peripneumonia". The successive visitations of epidemic fever and influenza were reminiscent of the years 1657-59. On both occasions, it is likely that lowered resistance amongst the survivors of the former epidemic left them prone to fatal effects of influenza.

Elsewhere: The most widespread epidemic or group of epidemics in 17th and 18th century England. Influenza also universal.

[212; 44 (2), 331 ff; 127, 622; 157, 133; 222, 162; 48, 368; 17; 221]

1680 High mortality ***

S.E. England: Epidemic ague produced an upsurge in autumn burials for the third successive year. It was again widespread across Southeast England and one observer claimed that "amongst people ye Quartan Ague was almost in every house, and none in some escap'd it". In general, though, different sets of parishes were affected in each of the unhealthy years 1678-81 (Figure 6). Locke's description of the symptoms: "the fever of the intermittent kinde now reigning, has sometimes vomiting, great pains in the bowels and the back with red water as if there were a stone, and the Peruvian bark will not help" - again indicates an intestinal infection, but it remains impossible to implicate one specific organism or to determine the exact mode of transmission. A comet appeared as an ominous sign to the parishioners of Crowhurst, Sussex in December.

Elsewhere: Epidemic ague widespread, especially prevalent in rural areas. Areas of greatest intensity during this prolonged mortality surge were the Southeast, the East Midlands and the far Northeast. The west of the country

was relatively little affected.

[212, 55; 106, 48; 18; 27; 185; 44 (2) 21; 152; 94; 221, 681]

1681 High mortality ***

S.E. England: Smallpox and a bronchial disease combined to produce a high number of burials in the spring of 1681 (Figure 8ix). Sydenham implied that the smallpox of 1681 was of a more virulent type than usual - it may have had a worse effect on those communities already weakened by repetitive visitations of epidemic fevers and respiratory diseases. The autumn of 1681 appeared to be free from a recurrence of epidemic ague.

Elsewhere: Smallpox which was "confluent of the worst kind" reached epidemic proportions in London and 1681 recorded the highest number of smallpox deaths in London Bills between 1661-1700.

[44 (2), 457; 212; 10, 112; 152]

1682 Average *

S.E. England: Smallpox was the only noted disease and mortality levels in Southeast England returned to "normal". The summer was very wet with continual rain, hail and floods.

[211; 127, 640]

1683 Average *

S.E. England: No diseases of note. The winter of 1683-84 was the coldest on record with an average temperature for Central England of -1.2°C. The Thames was frozen over for many weeks and ice carnivals were held throughout January. In Tenterden, Kent the severe frost destroyed about "a third part of the sheep" and many places reported a scarcity of provisions.

Elsewhere: During the severe European winter a sickness called "hungry fever" raged on the continent especially in Germany. In Southwest England "the sharpness of the season tooke off the most parte of them that was aged and of them that was under infirmities".

[10, 113; 167; 156 (2) 465; 168, 393, 402; 222, 187; 212; 211; 43, 209]

1684 Average **

S.E. England: No diseases of note in Southeast England. The long dry cold of winter was followed by an excessively hot and dry summer. The winter of 1684-5 again cold and long.

Elsewhere: In London excessive mortality from "infantile diarrhoea" after hot dry summer.

[44 (2) 23-4; 156 (2), 465; 211; 222, 190]

1685 Average **

S.E. England: A "spotted fever" or "new fever" (? cerebrospinal fever) prevailed in parts of the country during 1685 and 1686. In Lancing, Sussex "many persons died of an infectious distemper". The epidemic has generally been ascribed to typhus fever. The clinical symptoms of this "new" disease, as presented by Sydenham, suggest possible prevalence of cerebrospinal fever. The racking pain in the head, neck and throat, the phrensy and delirium, the petechiae and livid blotches and the affect on the brain in fatal cases are leading symptoms of meningococcal infection. In severe epidemics, case fatality rates can be over 50% but a less invasive form of the infection (which does not affect the meninges) can also occur and may have been responsible for some of the "spotted fever" epidemics of early modern times. The winter of 1685-6 was very mild.

Elsewhere: "Spotted fever" was in London but its "effects were felt far more in other places".

[44 (2), 27, 87; 164 (2), 12; 166, 498]

1686 Average **

S.E. England: "Spotted fever" continued.

[44 (2), 27, 87]

1687 Average *

S.E. England: No diseases of note.

1688 Average **

S.E. England: The influenza or "hot catarrh" was

universal for several weeks in the middle of the year. Fatality rates were very low: "that never were so many people sick together nor did so few of them die" and one estimate put the case fatality rate at one in a thousand.

Elsewhere: The influenza spread all over England and was reported in Ireland. It was also prevalent throughout Europe.

[113, 89; 212; 157, 119; 198 (1), 455; 208, 119]

1689 Average **

S.E. England: No diseases of note in Southeast England.

Elsewhere: Typhus and dysentery were epidemic in Ireland.

[44 (2), 229]

1690 Unhealthy **

S.E. England: No indication of cause of mortality peaks. Typhus may have spread from other parts of the country to Southeast England. Short (1750) noted that "Tertians prevailed".

Elsewhere: Typhus epidemic in Southwest causing high mortality.

[179, 98; 199]

1691 Average *

S.E. England: Smallpox, typhus and influenza mentioned in records though none of these diseases had significant effect in Southeast England.

[212; 44 (2), 46]

1692 Healthy *

S.E. England: No diseases of note. 1692 was the first of a series of cold, wet summers and bad harvests. The 1690s have been commonly called the "seven ill years" with especially dire consequences in Scotland. In Southeast England, however, the decade was very healthy.

[120; 96, 164ff]

1693 Average **

S.E. England: Influenza may have prevailed in early winter. The summer had been "strange" and "changeable". The price of corn was exceptionally high.

Elsewhere: A severe mortality crisis affected France in 1693-94 resulting in a 10-15% mortality loss.

[94; 159, 219; 120]

1694 Average ***

S.E. England: Smallpox prevalent and on November 22 Evelyn recorded "a very sickly time, especially the smallpox of which divers considerable persons died". The summer was cool.

Elsewhere: Spotted fever (? typhus) and smallpox peaked in London. Subsistence crisis in Scotland.

[44 (2), 45, 458; 212; 202 (14), 44; P.R. 65]

1695 Healthy *

S.E. England: No diseases of note in Southeast England. A cold, wet spring and summer. Harvest still very poor.

Elsewhere: Famine-associated diseases prevalent in Scotland.

[96, 164ff; 120]

1696 Healthy *

S.E. England: No diseases of note in Southeast England. Another cold wet summer and deficient harvest.

Elsewhere: Mortality crisis continued in Scotland.

[120]

1697 Average **

S.E. England: A "plague fever" recorded by Kentish diarist Elizabeth Freke, "which rained much in London and abundance dyed of itt, and those thatt lived were marked by itt, of which I kept my bedd like to dye for neer two month..." No other sources mentioned epidemic, and

mortality levels in London and Southeast remained below average. Smallpox prevalent in Great Coggeshall, Essex and as a result the inhabitants were "not able to levy amongst themselves sufficient summes of money for the necessary reliefe of their poore".

Elsewhere: 1697 was the most unhealthy of this decade in Scotland with typhus playing a significant role in the mortality crisis. Dysentery "ravaged" parts of Wales.

[98; 96, 164ff; 212; 73]

1698 Healthy *

S.E. England: "Spotted fever" or typhus in parts of England but Southeast unaffected. Short (1749) described 1698: "a terrible war abroad, a scarcity, dearth, famine...the poor were compelled to feed on uncommon and unwholesome things. In October began that very fatal and contagious spotted fever, which prevailed all over England, and made sad havok of people". The year was very cold - a great snow reported in Kent in May and boats were lost at sea in Essex following "great winds".

Elsewhere: Mortality crisis continued in Scotland. Typhus epidemic in England.

[208, 118; 198 (1), 412; 203 (2); P.R. 56; 66]

1699 Healthy *

S.E. England: Smallpox prevalent. "Bloody flux" and typhus prevalent in north of England but Southeast again remained healthy. 1699 marked the return of warm summers and crop prices were average this year.

Elsewhere: Another excessive mortality in Scotland - the last bad year of the Scottish subsistence crisis.

[22; 94; 132]

1700 Healthy *

S.E. England: No diseases of note.

1701 Average **

S.E. England: No diseases of note.

1702 Average **

S.E. England: No diseases of note.

1703 Average **

S.E. England: No diseases of note. On November 26 one of the most tempestuous storms ever recorded in Britain - occasioned by the passage of a hurricane up the English Channel: "it layd naked most peoples dwelling houses, oat barns, stables and all other outhouses, and multitudes of them were levelled with ye ground, it blew down steeples, unript our churches and made thousands of tall and sturdy oaks, elmes and other trees root body and branch to submit to ye violence of an outragious blast...".

[211; 108, 112; 111, 26; 57; P.R. 70; 45; 11]

1704 Average **

S.E. England: Sore throats with fever (? scarlet fever) prevalent. Early summer very hot and dry.

[211; 98]

1705 Unhealthy ***

S.E. England: Measles prevalent in 1705 and 1706 - probably does not explain mortality peaks. No other epidemics noted. The year was dry until the end of August.

[44 (2), 641; 211]

1706 Unhealthy ***

S.E. England: No explanation for rise in mortality has been found.

1707 Healthy *

S.E. England: No diseases of note though some suffered from the excessive heat during the summer particularly on July 8 which for sometime after was known as Hot Tuesday.

[47, 17]

1708 Average **

S.E. England: Fevers prevalent in Essex. The winter of 1708-9 was one of the coldest of the period. But in England it "was not attended with any great mortality amongst mankind...because of the artificial defences human creatures use against extreme cold". (Arbuthnot, 1751)). In Aylesford, Kent the poor were given money during "ye hard weather".

Elsewhere: Smallpox rife in Ireland and continued so for several years.

[93; 212; 156 (2) 466; 4, 145; 195, 4; 10, 118; 47, 22; 135]

1709 Healthy *

S.E. England: Smallpox and "spotted fever" (? typhus) pushed up the London Bills but did not affect Southeast England. A malignant fever, possibly typhus, was reported in the naval station of Harwich, Essex and may have arisen in connection with transport from troops and Europe. The cold winter of 1708-9 lasted until early April 1709 and was followed by a very deficient harvest. Food prices reached their highest level in the period 1620-1760 and export of grain was prohibited in 1709 and 1710.

Elsewhere: Europe was badly affected during the shortage of 1708-10. Bubonic plague was epidemic in Eastern Europe and Northwest Europe experienced a major mortality crisis as a result of famine-associated diseases.

[189, 118; 44 (2), 54, 58; 195, 91; 4, 165; 159, 222; 198 (1), 442]

1710 Healthy **

S.E. England: Smallpox prevalent. Scarcity continued but Southeast England remained unaffected.

Elsewhere: Mortality crisis continued in Europe. Typhus reached its height in London in autumn 1710.

[44 (2), 57, 461; 189, 5, 118; 199, 188; 132, 2; 4, 165; 125]

1711 Healthy **

S.E. England: Smallpox prevalent especially in Essex. An

unusual mortality amongst adult males recorded in West Tilbury, Essex: "that the parish is very poor and near one halfe of the farmers in the said parish are dead by a late sickness and mortality therein and their widdows either left in debt or in great charge with children so that the said parishes in an utter incapacity to rebuild the said church".

Elsewhere: Smallpox in several parts of England.

[212; 94; 76]

1712 Average **

S.E. England: Smallpox prevalent. Petitioners of the parishes around Great Waltham, Essex described "this very sickly season by reason of the smallpox". In Chelmsford a widdow, Margaret Epes, kept a boarding school but in 1712 "the smallpox hapning in the house yoe petitioner was obliged to disperse her schollers and they being not yet come againe yoe petitioner is reduced to great extremitys". Influenza was widespread in the autumn "chiefly of a short three-day illness, of pain in the back and bones and great heavyness". It made little impression on mortality levels.

Elsewhere: Influenza was universal.

[94; 77; 75; 74 P.R. 14]

1713 Average **

S.E. England: Smallpox prevalent in some communities. In Tenterden fevers accounted for one half of all deaths. The harvest was poor.

Elsewhere: Dunkirk fever (? influenza) introduced from continent - not serious in England.

[169, 263; 58; 212; 120; 134; 56]

1714 Average ***

S.E. England: Smallpox and fevers prevalent and may have accounted for peaks of mortality. There is no indication of nature of fever but it occurred during "one of the driest years that has been yet observ'd there having fall'n that year in Essex not much above 11 inches of rain". A severe distemper occurred amongst cattle and many died: the cause according to many "was that the cattle were first infected by drinking some unwholesome standing water, where 'tis probable some poisonous insects

were lodged and bred; the summer having been extremely dry".

[4, 91, 165; 198 (2), 12; 43, 117; 94; 21]

1715 Healthy **

S.E. England: No diseases of note. The year "ended in a winter (1715-6) that had the longest continuous hard frost since 1683. Thames frozen over. Much snow".

[94]

1716 Average *

S.E. England: Smallpox prevalent - accounted for half the deaths in Rye in 1716. The cold winter of 1715-6 was followed by another dry spring and summer so that in the marshland parish of Dengie, Essex "there was not one gallon of water in the ditches".

[211; 94; P.R. 52]

1717 Healthy *

S.E. England: No diseases of note.

1718 Healthy *

S.E. England: An epidemic fever attracted attention after the hot, dry summer of 1718. In Southeast England only the October burials slightly elevated above average (Fig 8x).

[44 (2), 63]

1719 High mortality *** [Note: In Kent 41% of all parishes experienced a mortality peak.]

S.E. England: Fever (? enteric fever) and smallpox both contributed to the high mortality in 1719. Burials rose sharply in August 1719 and remained very high throughout autumn, winter and following spring (Figure 8x). The summer was one of the hottest in the century and the fever reached its height in August. One of the few clinical descriptions was from Wintringham in York: "it began with rigors, nausea and bilious vomiting, followed by alternate heats and chills with great lassitude and feeling of

heaviness...the patient was mostly delirious...about the 12th day it was not unusual for profuse and exhausting diarrhoea to come on". Creighton (1894) identified this as a typhus epidemic but emphasis on intestinal disorders and the seasonal pattern of epidemic are also indicative of an enteric fever. Smallpox mentioned in several parishes and this disease may have taken a higher toll than usual amongst a population already weakened by the autumnal fever. The pattern of weather, disease and mortality in this year and 1720 very similar to previous times of high mortality: 1638-9, 1657-8, 1669-70, 1678-9-80.

Elsewhere: Fever prevalent in many parts of the country - not limited to towns or distressed classes. In London infantile diarrhoea also peaked after hot summer.

[44 (2), 63; 212; 198 (2), 22; P.R. 62; 50; 35]

1720 High mortality *** [Note: In Essex 42% of all parishes experienced a mortality peak.]

S.E. England: Smallpox and the after-effects of the fever epidemic kept mortality at a high level until the summer of 1720. The summer was mainly dry but not as hot as that of 1719 and the return of the fever in the autumn months produced a less dramatic upsurge in burials (Figure 8x).

Elsewhere: Smallpox prevalent in several parts. In Shetland Isles so fatal it was called the "mortal pox". Bubonic plague in South France - its last major outbreak in northwest Europe.

[192; 212; 94; 136]

1721 Average **

S.E. England: Smallpox prevalent. In Braintree, Essex "small pocks terribly much and mortal" and burials more than double the average.

[94]

1722 Average *

S.E. England: Smallpox prevalent. In Chichester, Sussex there were 994 cases of smallpox and 168 deaths from that disease - a case fatality rate of 16.9%. Creighton (1894) described the years 1722 and 1723 as "one of the greatest smallpox periods in England".

Elsewhere: Sore throat attended with dizziness and pain in

limbs prevailed in London and "was fatal to numbers". High mortality in Scotland.

[44 (2), 518; 212; 10, 122; 194, 246; 221, 341]

1723 Average *

S.E. England: Smallpox prevalent. Short (1749) described the year as very sickly with a "very bad sort" of smallpox attended with purples. The regional death rate in Southeast England does not suggest an unhealthy year in this part of the country.

Elsewhere: Smallpox "fatal" in much of kingdom. In France smallpox especially severe.

[198 (2), 30, 68; 193; 159, 228; P.R. 50]

1724 Average *

S.E. England: Smallpox prevalent. In Cobham, Kent there were 105 cases of smallpox and 20 deaths (case fatality of 19%) and in Dedham, Essex, 339 cases and 106 deaths (case fatality of 31.3%).

Elsewhere: Devonshire colic (later identified as lead poisoning from cider vats) epidemic in Southwest England in autumn.

[194, 246; 44 (2), 518; 198 (2), 30; 212; 124 (2) 5ff]

1725 Healthy *

S.E. England: Smallpox prevalent. Fevers accounted for 36% of deaths in Tenterden. Summer was "most dreadful for continual rains, cold and tempests...not a day from May to October without rain" in Kent. The mean summer temperature in Central England was only 13.1°C.

Elsewhere: Smallpox very severe in parts of Worcestershire. It also destroyed one fifth of population of Banbury.

[95, 267; 168; 194, 240; 196; 212; 108, 113; 92]

1726 Average *

S.E. England: Smallpox again only disease noted in Southeast England. In Dover and Deal, Kent a smallpox epidemic began in autumn 1725 and continued till winter

1726. 503 were visited in Dover with 61 deaths (12.1%) and in Deal there were 362 cases and 33 deaths (9.1%).

Elsewhere: Smallpox prevalent in parts of England.

[44 (2), 518; 194, 246; 196, 5; 193; 212]

1727 Unhealthy **

S.E. England: Smallpox and fevers (? enteric fever, typhus or relapsing fever) prevalent. The rise in mortality following the warm dry summer and deficient harvest of 1727 was attributed to intermittent, remittent and putrid fevers (Figure 8xi). Huxham (1759) described a slow, nervous fever and Hillary (1740) reported that in northern England many of the poor, labouring people who used a "low diet" were affected by the inclemencies of the weather. Others commented on a "little fever" or "hysteric fever" with frequent relapses and jaundice. Three diseases with feverish symptoms probably prevalent in England - typhoid, typhus and relapsing fever - but difficult to say whether these raged simultaneously in affected localities or whether some parts of the country were struck by one infection and other parts by a different disease. Measles and coughs also noted in November and horses suffered from violent coughs in winter of 1727-8.

Elsewhere: The fever epidemics were noted in many parts of the country but according to Short (1749) "the mortality this year though pretty general, was far greater in some places than others". Wrigley and Schofield (1981) find greatest concentration of mortality peaks in the Northwest.

[118; 124; 196, 8; 198 (2), 40: 212; 44 (2), 72ff; 342; 161, 101; 92; 221, 68]

1728 High mortality ***

S.E. England: Respiratory infections and fevers of various kinds continued to elevate mortality levels in 1728. The first four months of 1728 were especially unhealthy (Figure 8xi) and those previously afflicted with putrid fever (? typhoid) were liable to relapses in this season. The autumn rise in burials was less steep than in 1727 and typhus fever (characterised by small red spots and purple petechiae), following a wet summer and a second deficient harvest, may have been the predominant fever. Smallpox was noted in some localities but, according to Huxham (1759) in Devon, the disease this year was "mild and seldom fatal".

Elsewhere: Epidemics again widespread spreading to eastern and southern areas. In the Midlands late 1720s proved one

of the worst mortality crises in the period 1670-1800. The grain shortage was limited to Britain.

[195, 5; 124, 6ff; 196, 11; 126; 35; 44 (2), 73; 208, 78; 3; 221]

1729 High mortality ***

S.E. England: Respiratory infections, erysipelas (? scarlet fever), fevers (? typhoid, typhus and relapsing fever), smallpox and influenza kept monthly burials at a high level with only a brief respite in June, July and August (Figure 7). Huxham (1759) noted that those who suffered from one disease were more prone to the fatal consequences of a second infection. The slow putrid fever described by Huxham in the late summer of 1729 may have been para-typhoid: he observed that "many were seized with this fever, yet few died". A simultaneous epidemic of smallpox of "a very bad kind" with purple and black spots carried off many victims. In Great Coggeshall smallpox raged between September 1729 and April 1730 - it contributed to a doubling of mortality levels and accounted for widespread poverty. In November raged a universal epidemic catarrh - probably influenza. It "scarce spared any one family" but the mortality was not proportional to the sick - the infection proved more fatal to the "consumptive, cachetic, aged, phlegmatic, gross bodied, plethoric, those afflicted with, or lately recovered from intermittents". In Southeast England influenza produced a peak in the November burials and undoubtedly its timing - following a succession of other epidemics - added to its severity.

Elsewhere: Smallpox raged "everywhere almost". Fevers widespread. Influenza universal in Britain, on the continent "and perhaps the globe".

[196, 15ff; 126; 198 (2), 53; 25, 16; P.R. 69]

1730 Average ***

S.E. England: Respiratory infections, smallpox and various fevers again common. But 1730 proved a healthier year in Southeast England than the three previous years. A smallpox epidemic in Hastings, Sussex lasted for one and a half years - 705 persons in the town had the disease and 97 died from it (case fatality rate of 13.7%). 206 people in the town escaped infection and 50 of those died of other diseases while the smallpox raged.

[126; 124, 50ff; 196, 19ff; 44 (2), 521; 194, 246]

1731 Average **

S.E. England: Smallpox in parts of Southeast England and a miliary fever (? scarlet fever) prevailed. A very dry year.

Elsewhere: Localised outbreaks of smallpox.

[198 (2), 68; 212; 196, 22ff; 195, 5; 124, 60ff]

1732 Average **

S.E. England: Respiratory infections and smallpox in parts of the country but 1732 generally a "most favourable and kindly season for health".

Elsewhere: A "pestilential fever" recorded in London during April.

[151; 4, 193ff; 212; 198 (2), 94; 10, 124; 124, 82ff]

1733 Average **

S.E. England: Influenza spread throughout the country in the early months of 1733. One sufferer wrote: "I never knew a more violent cold...ye whole house was an infirmary". The disease affected many people both in rural and town places but it proved mortal chiefly to "children, asthmatics and consumptive old men". The winter of 1733-4 was very mild.

Elsewhere: The influenza epidemic of the winter 1732-33 was described as "the most universal disease on record". It visited every country in Europe and reached America and the Caribbean: "the uniformity of the symptoms of the disease in every place was most remarkable".

[91; 4, 193ff; 196, 26ff; 183, 171; 212; 126; 124, 93ff; 44 (2), 346]

1734 Average **

S.E. England: Anginose fever, or scarlet fever, was prevalent in the spring months. It attacked children and young people. Smallpox also in Southeast England.

Elsewhere: Scarlet fever occurred throughout England.

[126; 122; 196, 39ff; 124, 107ff; 44 (2), 684; 50, 26; 59; P.R. 35]

1735 Average *

S.E. England: Scarlet fever again epidemic in spring and early winter. Smallpox, contagious fever (? typhus) and low putrid fever (? typhoid) also noted. The year was very wet "there being seldom three days together fair".

Elsewhere: Throat distemper (diptheria and scarlet fever) spread to New England. Typhus epidemic amongst the "poorer sort" in parts of Britain.

[124, 122ff; 34; 44 (2), 684; 196, 45ff; 208, 44; 198 (2), 99; 212; 126]

1736 Average *

S.E. England: Smallpox recorded in parts of the country. In Dartford workhouse, Kent several were infected with smallpox: noone was allowed out "for fear of spreading the distemper in the town". Respiratory and throat diseases continued in the cold, wet months up to July and on February 16 1735-6 an extraordinary spring tide caused widespread flooding and the loss of many animals. The late summer was very hot and swarms of gnats covered the countryside.

Elsewhere: A smallpox epidemic in Nottingham was especially fatal. Measles fatal in north of England: "bells seldom ceased knelling, the churchyard was full of little new graves".

[132; 137; 126; 124, 142ff; 208, 120; 94; 111, 28; 193, 264; 212; 198 (2), 227; 10, 125; 196, 55ff; P.R. 18; 57]

1737 Average ***

S.E. England: Influenza spread throughout the country in the late autumn of 1737 affecting many people more severely than the 1733 epidemic (Figure 8xii). Smallpox also prevalent.

Elsewhere: Influenza universal.

[212; 44 (2), 348; 196, 61ff; 124, 154ff]

1738 Healthy **

S.E. England: Smallpox prevalent. In St. Osyth, Essex 86 people died of smallpox between 1737 and 1738.

[126; 196, 69ff; P.R. 60]

1739 Average *

S.E. England: Angina maligna or scarlet fever prevalent in London area. The year was cold and wet and the winter of 1739-40 one of the coldest on record. In Kent an intense frost began in December and lasted 9 weeks. The Thames was frozen, streets were impassable from snow and the price of corn and coals rose sharply.

Elsewhere: Typhus in Ireland.

[212; 126; 196, 73ff; 44 (2), 78; 28]

1740 Average **

S.E. England: Respiratory and throat infections, smallpox and the effects of severe cold probably contributed to the rise in burials in the spring of 1740. Epidemics of typhus and dysentery were not severe in Southeast England in 1740. The opening months of 1740 saw the continuation of extreme cold weather. Indoor temperatures were below freezing. Some people perished directly from cold. In Charlton, Kent 11 pensioners at Morden College - almost one half of its occupants - died in the spring and summer "which succeeded the hard frost in 1739-40". In Chelmsford, Essex a humble petition was presented by the debtors of the county gaol on January 15 1739-40 showing that "we your poor petitioners on acct of the severity of the weather most humbly crave at this time your worship additional compassion on us, more especially they in the straw chambers many of them having been confined for above a year and have now nothing but the gaol allowance to live on" and Short (1749) concluded "great was the misery and necessity of the poor". The rest of the year was also unusually cold and dry: the annual mean temperature 6.8°C proved the lowest value in central England in entire period 1659-1973. Harvest of 1740 very deficient - prices 30% above the 31-year moving average.

Elsewhere: Famine conditions and associated diseases affected many parts of Europe. Ireland experienced a major demographic crisis in this and the following years with widespread epidemics of typhus and dysentery. Conditions exacerbated by failure of potato crop in 1740. Typhus imported into Southwest England in summer of 1740.

[189; 196, 80ff; 165 (4), 339; 159, 222; 115, 126; 9, 189; 198 (2), 253ff; 100, 34; 44 (2), 78ff, 522, 693; 181, 23; 178, 107; 203; 78; 210, 33; 211; 156 (2), 466; 212; 126; 10, 126; 214, 236; 96, 219]

1741 High mortality ***

S.E. England: The effects of cold weather and deficient harvest felt in Southeast England by 1741. Smallpox fatal in several parishes contributing to rise in spring burials (Figure 8xiii). In Chelmsford, Essex "the smallpox was very rife here that year". In Dartford, Kent the outbreak of 1741 was so severe that "the country people became so alarmed that the market was nearly deserted, and did not recover for some years". The malignant spotted fever - undoubtedly typhus - attracted most attention this year. It began in the late summer and quickly affected the poor "who had been half-starved the last two years". Those of a middling-sort were later attacked and the contagious nature of the disease was apparent as "the numbers of sick were vastly increased by infection". Case fatality rates higher amongst adults than children. The epidemic pushed up mortality levels and depressed baptisms in Southeast England (Figure 3) especially in the towns. Sussex the most rural of the three counties was least touched by the mortality crisis. The market town of Ashford, Kent recorded one of the highest mortalities in the sample - 8 times the usual number of burials were registered in each of the months July, August and September 1741. The C.M.R. index for Ashford that year was 19.1 with an estimated C.D.R. of 73 per 1000. Dysentery also spread across the country following the excessively dry summer of 1741. Great swarms of insects of various kinds were reported. The harvest proved better than the previous year but an embargo had to be placed on the export of grain and scarcity and poverty remained preeminent. The year ended with another cold season followed by destructive flooding - a winter as hazardous as the intense cold of the previous year. The interaction of hunger and disease still remains to be understood. In Southeast England epidemic disease was probably leading cause of high mortality in 1741 but nutritional deficiencies and extreme poverty added both a physiological and a behavioural component to the crisis.

Elsewhere: Typhus and dysentery - the classic famine fevers - reported in many parts of Britain and Europe. Especially severe in Ireland where "multitudes have perished and are daily perishing under hedges and ditches, some of fluxes and some through down right cruel want". West of England also badly affected by typhus and London Bills reached highest level since plague of 1665. In many European countries 1741 marks the last major demographic crisis of early modern period.

[178, 93; 107, 50; 192, 329; 186, 619; 198 (1), 267; 198 (2), 322; 211; 126; 212; 197; 44 (2), 78ff; 115, ix, 118; 196, 85ff; 189, 120; 179; 187, 85; 138; 139; 221, 669, 684; P.R. 14; 17]

1742 Unhealthy ***

S.E. England: Typhus and smallpox remained epidemic throughout winter and spring of 1741-42. In Southeast England mortality showed a steady monthly decrease - by autumn burials had reached average level in most communities (Figure 8xiii). Baptisms still below normal. Extremely dry year and in summer water was very scarce so that in some chalk regions people were "forced to go from door to door to beg a pail of water for the common necessarys of life". Harvest was good and grain prices continued at a low level for the next decade. Another arctic winter ensued in 1742-43.

Elsewhere: Epidemics less widespread than 1741.

[211; 126; 196, 94ff; 150, 68; 221]

1743 Average ***

S.E. England: Influenza widespread in spring. Harvest one of the most abundant in period and bread was "never cheaper than at present".

Elsewhere: Influenza universal in Europe. Scarlet fever epidemic in Ireland.

[101, 272; 44 (2), 349; 196, 98ff; 126; 124 (2), 99]

1744 Healthy *

S.E. England: Few epidemic diseases.

[124 (2); 196, 119ff; 126; 198 (2) 322]

1745 Healthy *

S.E. England: Smallpox prevalent in some communities.

Elsewhere: Scarlet fever or ulcerous sore throat in northern England.

[198 (2), 300; 196, 125ff; 44 (2), 696; P.R. 4]

1746 Average *

S.E. England: No diseases of note.

Elsewhere: Scarlet fever epidemic in Devon. Also in London by winter.

[44 (2), 696; 197, 201]

1747 Average **

S.E. England: Scarlet fever probably responsible for mortality peaks. Smallpox also prevalent. Summer was hot.

[126; 44 (2), 696; 97, 201]

1748 Average ***

S.E. England: Scarlet fever prevalent in Southeast England. The disease was characterised by a sore throat with white sloughs. Fever, nausea and vomiting occurred. The face of the patient turned red and swollen and the neck, breast and hands became a deep erysipelatous colour with perceptible swellings.

Elsewhere: Morbus strangulatiorius - scarlet fever or diptheria - fatal in Cornwall.

[97; 44 (2), 694]

1749 Average **

S.E. England: No diseases of note. Short (1749) described the decade 1740s: "In the general, we have had a very healthy time since the great fever of 1741-2 left us".

[198 (2), 322; 196, 147ff]

1750 Average **

S.E. England: No diseases of note.

[196, 152ff; 4, 165]

1751 Healthy *

S.E. England: Whooping cough affected children in London and adjacent villages. The first of a series of ten successive wet summers.

[102, 195; 196, 160ff; 97, 80ff; 201, 10]

1752 Healthy **

S.E. England: Smallpox prevalent. In Stisted, Essex Ann Wood aged 7 years died of the smallpox "ye only one of yt dyed of 21 yt had it".

Elsewhere: Smallpox frequent in London but of a mild kind.

[196, 167ff; 97, 91ff; P.R. 59]

1753 Healthy *

S.E. England: Smallpox prevalent. In Maidstone, Kent "70 persons out of the 209 that died in that year died of smallpox". Fothergill (1784) remarked that the year was especially healthy and even "consumptions, the common spring disease, have not been so numerous as in some preceding years". Summer warm.

[186, 619; 122; 126; 196, 171ff; 97, 103; 194, 151; P.R. 35]

1754 Average **

S.E. England: Smallpox prevalent. Intestinal infections occurred in summer and in London a dangerous remittent fever (? enteric) was reported in the autumn months and may have also occurred in surrounding villages. A distemper amongst horned cattle diffused through Essex.

[11, 54; 212; 196, 177ff; 97 116ff; 79; P.R. 53]

1755 Healthy *

S.E. England: No diseases of note.

[196, 184ff; 126]

1756 Average **

S.E. England: No diseases of note. Spring was wet followed by "the wettest summer in memory of man". Harvest was deficient and it was a year of scarcity.

Elsewhere: Typhus in north "it prevailed chiefly in poor families, where numbers were lodged in mean houses not always clean, but sordid and damp".

[120; 126; 196, 192ff; 44 (2), 126]

1757 Average *

S.E. England: No diseases of note and though bread riots were reported in parts of country, mortality levels in Southeast unaffected by scarcity of provisions. Baptisms dipped slightly in 1757. July was an exceptionally hot month described as a "jubilee summer".

Elsewhere: Typhus and typhoid epidemic in Ireland after deficient harvest of 1756. Typhus also in northern England.

[126; 120; 196, 198ff; 10, 129; 44 (2), 126]

1758 Average **

S.E. England: Smallpox prevalent.

[194, 240; 126; 196, 207ff]

1759 Average **

S.E. England: Smallpox prevalent. A hot dry summer and an excellent harvest.

[212; 196, 240ff; P.R. 15]

1760 Average **

S.E. England: Smallpox prevalent. In Maidstone, Kent the incumbent wrote: "Total burials - 223: of the smallpox from December 13 - 59. Besides those carried out of town 102".

Elsewhere: Scarlet fever epidemic in Yorkshire - 1 patient in 30 died from disease.

[122; 13, 285; 196, 246ff; P.R. 71; 40; 35]

1761 Average **

S.E. England: Smallpox prevalent. The epidemic at Maidstone continued and Brighton, Sussex experienced a doubling of annual death rates as a result of a smallpox epidemic from January 1761 to April 1762 (Figure 8xiv and 8xv).

Elsewhere: Dysentery in Ireland. Influenza in N. America and the West Indies.

[196, 256ff; 201, 10; 141; P.R. 35; 10]

1762 Unhealthy ***

S.E. England: Influenza widespread in spring and responsible for minor mortality peak in April (Figure 8xiv). Dysentery followed the unparalleled drought of summer and pushed up burials in Southeast England (Figures 8xiv and 8xv). Observers noted that it attacked the poorer classes and was more severe amongst children. The parishioners of Cobham, Kent noted that rats were much about in 1762.

Elsewhere: Influenza universal - described as "this fashionable cold". Dysentery also prevalent in many parts. The far north and north west especially badly affected.

[15; 212; 126; 172; 196, 207ff; 184, 646; 44 (2), 778; 221, 685]

1763 Unhealthy ***

S.E. England: Dysentery continued through the very cold winter of 1762-3 adding to the usual toll from respiratory infections and consumption (Figures 8xiv and 8xv). Smallpox also prevalent in some communities. The frost of January was compared with that of 1740 "though upon the whole it has not been attended with the same calamitous circumstances". The rest of the year was remarkably wet and several severe storms did much damage in Southeast England. The autumn months of 1763 proved healthy contrasting with the previous period of high mortality.

Elsewhere: In Shropshire "the scarlet fever carried off many infants this year".

[116 (4), 270; 27, 185; 126; 28; 211; 196, 288; 140; 80; 43, 178; 221]

1764 Average *

S.E. England: No diseases of note. The year again very wet and high tides and storms did great damage in coastal areas. Rutty (1770) concluded "the state of diseases in the summer of 1764 may be added to the other instances... of the comparative healthiness of wet seasons".

Elsewhere: In Derby it was reported that "the poor are almost famished" as a result of high prices.

[36; 196, 300ff]

1765 Average **

S.E. England: No diseases of note. In Westerham, Kent a localised outbreak of dysentery occurred among the foundlings in a branch hospital of the Guildford Street Charity. 27 children were ill with dysentery and most of them had complications from additional infection of whooping cough. Eight died of the disease.

[201, 13ff; 126, 41; 44 (2), 780; 196, 313ff; 212]

1766 Average **

S.E. England: Smallpox prevalent: "about the beginning of...summer the smallpox broke out in a most violent manner at Chelmsford in Essex, sweeping off every week many of the inhabitants". The burials totalled 114 or about 37% above average. Maidstone, Kent also had a major epidemic: a total of 180 persons were buried and 54 died from smallpox.

Elsewhere: Smallpox in Ireland caused "unheard of havock" and of the thousands who caught the infection scarcely one half escaped.

[121, 56; 186, 619; 182, 20; 201, 13ff; 193, 270; 190, 355; 122; 162, 19; 83; P.R. 14; 35]

1767 Average *

S.E. England: Respiratory infections and a non-fatal influenza epidemic occurred after a very cold January. It was reported in Charing, Kent "Jan'y this year begun with one of the deepest snows ever known" and according to one observer "the distresses of the poor in many places are inexpressible".

[201, 12, 45, 55, 70; 209, 38; 211; 103; P.R. 12]

1768 Unhealthy ***

S.E. England: Smallpox prevalent. Maidstone, Kent recorded 22 smallpox deaths and 185 burials and Bexley, Kent recorded 10 smallpox deaths and 44 burials. A disorderly parishioner of Tollesbury, Essex attempted to further "spread the distemper" by inoculating her children with the smallpox. The whole winter and spring of 1767-68

were again very cold and mortality levels may have risen in response to an increase in respiratory ailments and consumption. The autumn was also described as "sickly" with bilious infections. This year was one of the wettest on record.

[211; 182, 22; 201, 70, 80, 103; 223, 67; 201, 103; 84; P.R. 7; 35]

1769 Average **

S.E. England: Respiratory infections including a severe cough and fever (croup) amongst children universal in the dry spring.

Elsewhere: Chickenpox epidemic in Ireland.

[201, 115, 150ff; 97, 638; 182]

1770 Average **

S.E. England: Smallpox prevalent. At Lower Halstow, Kent "several people died of smallpox and putrid liver".

Elsewhere: Scarlet fever epidemic in Manchester.

[201, 102, 117, 134; 182, 6; P.R. 34]

1771 Average **

S.E. England: Smallpox prevalent. The spring was very cold and prices of provisions high.

Elsewhere: Typhoid and dysentery in Scandinavia following serious crop failures.

[201, 172-3; 194, 141, 126; 107, 52]

1772 Average *

S.E. England: No diseases of note. The early part of the year was wet and in Kent the roads "being so full of water, are very dangerous, on acct. of so many (7) wet summers and winters and more". The summer of 1772, however, was warm and dry and in the marshlands of Essex there was insufficient pasture for cattle. Prices remained high.

Elsewhere: Smallpox severe in Kendall and whooping cough prevalent in northern England.

[201, 173; 61; 194, 210; 185, 74; 126]

1773 Average **

S.E. England: Smallpox prevalent. Prices still high.

Elsewhere: Deaths from "fever" elevated in London Bills.

[44 (2), 137; P.R. 1]

1774 Average **

S.E. England: No diseases of note. The year was remarkable for floods and high waters. The temporary springs or nailbourns broke out on the downs of Kent and Sussex: "whenever they do break forth it is held by the common people as the forerunner of scarcity and dearness of corn and victuals". A contagious fever broke out amongst horned cattle in East Anglia.

Elsewhere: Malignant fever (? typhoid) in Chester. According to Haygarth (1774) it was "produced by human effluvia".

[116 (8), 79; 186, 131; 126; 82]

1775 Average *

S.E. England: Influenza widespread in the very wet autumn of 1775 - caused great illness amongst animals and humans but comparatively little mortality. It did, however, "aggravate every present malady and...it proved fatal...to several young children, disposing them to violent coughs and diarrhoeas".

Elsewhere: Influenza universal in Europe, Africa and Asia.

[96, 615ff; 44 (2), 359; 212; 117, 56; 171, 340ff; 153]

1776 Healthy *

S.E. England: No diseases of note except a local fever in Hothfield, Kent: the parish register recorded "2 deaths of an epidemical eruptive fever which went thro whole families chiefly amongst ye younger sort and hath done the same about seven years before". It is not easy to identify this infection but it may have been scarlet fever. January 1776 very cold and flooding caused havoc during the year. White noted "land springs have never

obtained more since the memory of man than during (these last ten or eleven years) nor has there been known a greater scarcity of all sorts of grain, considering the great improvements of modern husbandry. Such a run of wet seasons a century or two ago would, I am persuaded, have occasioned a famine".

Elsewhere: Smallpox epidemic in Dorset - followed by introduction of cheap inoculation.

[108, 121; 43, 177; 126; 211; P.R. 26; 31]

1777 Average **

S.E. England: Scarlet fever prevalent in villages around London from July to November 1777. It chiefly attacked children. Smallpox was also in several communities.

Elsewhere: Smallpox rife in Norwich.

[44 (2), 709; 212; 194, 132; 85; P.R. 30]

1778 Average *

S.E. England: No diseases of note. The summer was the first of four very hot summers.

Elsewhere: Scarlet fever epidemic in Midlands.

[44 (2), 710; 126]

1779 Unhealthy **

S.E. England: Epidemic ague or the "plague ague" as it was called in Kent began in the autumn of 1779 and continued through the spring of 1780, recurring again after the hot summers of 1780 and 1781. (Figure 8xvi). The nature of the disease is particularly puzzling and physicians at the time described it as a "new" ague. Smallpox also prevalent.

Elsewhere: Severe dysentery epidemic in France.

[159, 223; 44 (2), 366; 86; 87]

1780 High mortality ***

S.E. England: Epidemic ague (? brucellosis or mould poisoning from grain) responsible for last major mortality peak in Southeast England during period 1601-1800 and

concluded an era of periodic regional upsurges in burials. (Figure I). The ague generated peaks of mortality in many communities, especially in rural districts. In the predominantly agrarian county of East Sussex almost one half of the parishes experienced a rise in burial levels in 1780. Deaths in the little village of Patcham, Sussex trebled and a note in the parish register recalls "this year was remarkable for a violent distemper which carried off the person afflicted in the space of five days. The pleuracey and fever - doctors differing opinions some thought it infectious, others not, but generally no infection was to be feared. 3 died of it in April, 3 in May". Baker (1785) noted that the agues were "often attended with peculiarities extraordinary and alarming. For the cold fit was accompanied by spasm and stiffness of the whole body, the jaws being fixed, the eyes staring and pulse very small and weak... It is, however, certain that many country people whose illness had at its beginning put on the appearance of intermission, becoming delirious sank under it in four or five days". The exact course of the fever varied from patient to patient and "no two cases resembled each other except in very few circumstances". Peruvian bark failed to cure the fever in most cases. The epidemic was said to harass upland villages more than communities in adjacent valleys and to afflict all male labourers in the fields, while leaving women nearly exempt. The protean nature of the fever, its non-infectious character, its failure to respond to peruvian bark, its prevalence amongst farm labourers suggest a disease such as brucellosis which is transmitted to man by infected cattle. Brucellosis does, however, tend to produce prolonged sickness rather than rapid death and the spread of brucellosis would generally be slower than that indicated by the 1779-1781 epidemic. It would also be more prevalent in pasture regions. Another possible cause could be some form of mould poisoning from infected grain. This is a possibility that needs further investigation: as yet, the epidemic ague of this last wave of high mortality in Essex, Kent and Sussex still remains undifferentiated.

Elsewhere: Ague was epidemic in other parts of England - notably the agricultural counties.

[35, 31; 44 (2), 366; P.R. 44; 35]

1781 Unhealthy **

S.E. England: Epidemic ague remained the predominant disease in 1781 though mortality levels were lower than in two previous years, and baptisms exceeded burials. The summer of 1781 was one of the hottest on record and dysentery and typhoid may have contributed to the autumn rise in burials. (Figure 8xvi).

Elsewhere: Ague "very epidemical in the eastern part of

the kingdom, and raged in Leicestershire, the lower part of Northamptonshire, Bedfordshire, and in the fens".

[44 (2), 367; 168; 2, 139]

1782 Unhealthy **

S.E. England: Influenza spread throughout the country in late spring: "the proportion of the inhabitants affected by it being in some places estimated at three fourths, in other places, at four fifths of the whole...the continuance of the distemper in any one place was not above six weeks". Those people who had escaped the influenza epidemic of 1775 invariably suffered from the 1782 visitation. The fatality rates were low but burials rose during the epidemic perhaps reflecting added complications to other prevailing infections. Howlett (1782) referred to the "peculiar unhealthiness of the last winter and spring" as one of the causes which "checked our growth in the town of Maidstone". The weather of 1782 was cold and wet and the harvest poor.

Elsewhere: Influenza world-wide. Harvest failure pronounced in Scotland: it "impaired the constitutions of multitudes in the lower orders and entailed on them consumptions and other fatal disorders". Smallpox severe in Rochdale, Yorkshire with a 25% fatality rate.

[170, 1-70; 172, 54-79; 43, 178; 44 (2), 362; 122, 22; 212; 182, 66; 202 (2), 35; 203 (2), 40]

1783 Average **

S.E. England: No diseases of note. Harvest prices remained high after a wet summer and autumn.

[126]

1784 Average *

S.E. England: Smallpox prevalent. Winter 1783-84 exceptionally cold and, according to one observer, "from different parts of the country we have accounts of more persons having been found dead in the roads, and others dug out of the snow, than ever was known in one year in the memory of man".

Elsewhere: Epidemic ague in several parts of country including London.

[44 (2), 367; 105; 144]

1785 Average *

S.E. England: Local outbreak of spotted fever (? typhus) in Salehurst, Sussex between March and July causing 26 deaths (all but one being adults) and an annual mortality level over two times the average.

Elsewhere: "Fevers" prevalent in parts of country. Dearth in France.

[38 (2), 308; 44 (2), 153; P.R. 54]

1786 Average **

S.E. England: Smallpox prevalent. Two victims of smallpox were refused affidavits in Foulness, Essex as the rector had not had the smallpox. The period 1785/6 was exceptionally dry.

[211; 202 (1), 23; P.R. 21]

1787 Average **

S.E. England: No diseases of note.

1788 Average **

S.E. England: Influenza widespread in summer but more mild than the 1782 epidemic. A severe frost began in November 1788 and lasted 8 weeks: a resident of West Tilbury, Essex died "by severity of the weather". In Sussex, one diarist recorded the cold weather and noted "the water was scarce and very bad many wells dry has been so very dry for so long time great numbers of fish perished as well as birds etc". 1788 was one of the driest years on record.

Elsewhere: Influenza universal. Scarlet fever epidemic in Scotland.

[44 (2), 163, 354-78; 205, 158; 203 (1), 137; 200, 121]

1789 Average **

S.E. England: No diseases of note. Rector of Roydon, Essex described the "exceeding wet season" from June to December followed by a "long continuance of dry weather" with no precipitation until April 9 1790.

[P.R. 51]

1790 Average *

S.E. England: Smallpox prevalent.

[145; 212; 126; P.R. 29]

1791 Average **

S.E. England: No diseases of note.

[126; 212]

1792 Average *

S.E. England: Smallpox prevalent. Canine madness (rabies) widespread amongst dogs in East Anglia.

[62; P.R. 66]

1793 Average **

S.E. England: Ulcerated sore throat and croup - scarlet fever and diptheria - prevalent in villages surrounding London. Very dry summer - some outbreaks of fever (enteric).

[44 (2), 717; 216, 2; 212; 126]

1794 Unhealthy **

S.E. England: Malignant fever (typhus and relapsing fever) prevalent and may have accounted for mortality peaks of 1794 and 1795. Chincough (whooping cough) responsible for 6 deaths in Eastchurch, Kent. Smallpox visited several families prompting inoculation of 3000 inhabitants of Lewes, Sussex. Harvest one-fifth below average for previous 10 years and price of corn almost doubled. In Essex "a scarcity amounting to a famine was apprehended about mid-summer". Winter of 1794-95 was extremely cold adding to distress of poor.

Elsewhere: Typhus epidemic in many parts of country.

[180, 109; 44 (2), 158; 125, 15; 60; P.R. 19]

1795 Unhealthy ***

S.E. England: Malignant fever (typhus and relapsing fever) accompanied scarcity, poverty and war with France pushing up mortality levels. Price of bread again dear, following a second deficient harvest and riots took place in Southeast England. In Essex "the scarcity was so great that black bread began to make its appearance even at the tables of well-to-do and wealthy" and in most parishes the poor rate swelled to unprecedented levels. (The Speenhamland system was introduced in 1795). Baptisms did not fall as they had done in previous years of harvest deficiency and they were well in excess of burials at this time. The winter of 1795-6 was very mild.

Elsewhere: Typhus epidemic in many parts of country.

[180, 109; 112, 259; 42, 174; 60; 211]

1796 Average *

S.E. England: Malignant fever (typhus and relapsing fever) remained in houses of poor. Willan (1801) noted "these fevers become highly contagious, especially when they occur in close, confined situations and in houses where little attention is paid to ventilation and cleanliness". The distress produced by high food prices still felt in 1796.

Elsewhere: Typhus in poor quarters of many towns, especially London and industrial north.

[212, 67; 126; 44 (2), 139; 81]

1797 Unhealthy **

S.E. England: Malignant fever (typhus and relapsing fever) may have accounted for increase in burials. In High Easter, Essex the rector noted "an infectious fever prevailed among the poor at this time".

Elsewhere: Typhus in many parts of the country.

[126; P.R. 28]

1798 Average **

S.E. England: Malignant fever (typhus and relapsing fever) remained prevalent. Dysentery also prevalent: in Rainham, Essex the death of William Taylor is recorded from "mortification of the B'Is". The rector claimed that "this man left home to work during the harvest..he worked very hard lived very low and drank water imprudently which bro't on a dysentery tho' without the smallest suspicion of its terminating fatally".

Elsewhere: Typhus more malignant in 1798. Smallpox burials high in London.

[216, 174; 44 (2), 139; 142; 146; 208, 73]

1799 Average *

S.E. England: Malignant fever (typhus) so bad in the houses of the poor that rumours of plague were spread around London and its environs. Smallpox also prevalent: in Chislehurst, Kent "the smallpox had broakin out in the poor house" encouraging a general inoculation.

Elsewhere: Typhus severe in poor quarters.

[44 (2), 34; 143; 208, 67]

1800 Unhealthy **

S.E. England: Malignant fever (typhus and relapsing fever) and an epidemic of dysentery following the very hot dry summer of 1800, added to the toll of burials in Southeast England. Crop scarcity continued and the 18th century ended on an unfavourable note.

[216, 285; 44 (2), 785; 211; 126]

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Appendix 1

List of 165 parish registers used for the annual and monthly mortality indices

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Essex

All Saints Maldon
Ardleigh
Ashledham
Baddow Great
Bocking
Bowers Gifford
Bradwell-juxta-Mare
Braintree
Burnham
Burstead Great
Chelmsford
Chesterford Great
Chesterford Little
Coggeshall Great
Dedham
Dengie
Dovercourt
Elmdon
Fambridge North
Foulness
Gosfield
Hadleigh
Halsted
Hanningfield East
Hanningfield West
Hornchurch
Ingatestone
Leigh
Littlebury
Notley White
Pitsea
Rayleigh
Romford
Saffron Walden
Sampford Great
Sampford Little
Southminster
St Lawrence
Stanford Rivers
Steeple
Stisted
Stow Maries
Thaxted
Thundersley
Tillingham
Upminster
Vange
Wansted
Wickford
Wimbish
Woodford
Writtle
Yeldham Great

Kent

Appledore
Ash
Littlebourne
Lower Halstow
Lyminge
Maidstone
Meopham
Milton-next-Gravesend
Milton-next-Sittingbourne
Murston
Newenden
Newington
Orpington
Reculver
Sandhurst
Sevenoaks
Shoreham
Sittingbourne
Snargate
Speldhurst
St. Lawrence Ramsgate
St. Paul's Canterbury
Stansted
Staplehurst
Stelling
Stodmarsh
Stone
Stourmouth
Sundridge
Tenterden
Tunbridge
Upchurch
Westerham
Wickhambreux
Wittersham
Womenswold
Wrotham
Wye
Yalding

Sussex

Ardingly
Arlington
Balcombe
Beddingham
Bolney
Brede
Brighton
Chalvington
Cowfold
Cuckfield
Eastbourne
East Grindstead
Falmer
Frant
Glynde
Hailsham
Horsted Keynes
Hove

Ashford
Benenden
Bexley
Biddenden
Brenzett
Bromley
Brookland
Chelsfield
Chislehurst
Chislet
Cranbrook
Cudham
Darenth
Eastry
Elmsted
Eltham
Eynsford
Fordwich
Goudhurst
Gravesend
Hastingleigh
Herne
Horton Kirby
Hythe
Iwade
Lamberhurst
Lenham
Hurstpierpoint
Icklesham
Iden
Iford
Kingston near Lewes
Laughton
Lindfield
Northiam
Ovingdean
Patcham
Pevensey
Piddinghoe
Playden
Preston
Pyecombe
Ringmer
Ripe
Rottingdean
Rye
Salehurst
St. John sub Castro Lewes
St. Michael's Lewes
Telscombe
Westham
Willingdon
Winchelsea
Woodmancote
Worth

Appendix 2

Annual indices of mortality, Southeast England 1601-1800 based on various averages and trend lines; and annual C.B.R. for England from E. Wrigley and R. Schofield, The population history of England 1541-1871: a reconstruction (London 1981) 531

$$\text{Index} = \frac{\text{Recorded burials in Year x}}{\text{'Average' burials in Year x}} \times 100$$

		Index based on						
		(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Recorded burial totals in 112 SE England parishes	Mean no. of burials 1601-1800	200-year trend 1601-1800	50-year trends	150-year trend & 50-year trend	11-year moving average (truncated)	51-year moving average (truncated)	National C.B.R.
1601	1505	72	73	73	68	84	70	20.5
1602	1627	78	79	79	74	91	75	24.4
1603	2333	112	114	113	106	129	108	34.2
1604	1610	77	79	78	73	87	75	23.3
1605	1713	82	84	82	78	90	79	21.6
1606	1902	91	93	91	87	99	88	23.0
1607	1763	84	86	84	80	87	81	22.0
1608	1988	95	97	95	91	95	92	24.1
1609	2120	102	103	101	97	102	98	23.2
1610	2394	115	117	114	110	111	111	28.9
1611	2194	105	107	104	101	98	102	24.6
1612	2615	125	127	123	120	115	121	27.8
1613	2272	109	111	107	104	99	104	26.0
1614	2306	110	112	108	106	101	104	26.8
1615	2421	116	118	113	111	107	109	25.0
1616	2627	126	128	123	121	118	118	29.1
1617	2230	107	109	104	103	102	100	25.8
1618	2001	96	97	93	92	93	90	23.7
1619	2019	97	98	94	93	93	91	22.0
1620	1908	91	93	88	88	83	86	22.5
1621	1887	90	92	87	87	82	86	21.3
1622	1826	87	89	84	84	80	83	21.3
1623	2143	103	104	98	99	94	97	30.3
1624	2635	126	128	120	122	116	119	27.6
1625	3496	168	170	159	162	152	159	41.6
1626	2624	126	128	119	122	112	120	25.2
1627	2425	116	118	110	113	103	110	23.0
1628	2094	100	102	95	98	88	94	22.3
1629	2028	97	98	92	95	85	92	23.8
1630	2294	110	111	103	107	99	104	23.9
1631	2373	114	115	107	111	109	107	26.8
1632	2041	98	99	91	96	94	92	23.4
1633	2050	98	99	92	96	91	92	22.6
1634	2056	99	100	92	91	88	92	22.5
1635	1947	93	94	87	91	81	87	24.4
1636	2092	100	101	93	98	87	94	28.8
1637	2394	115	116	106	113	100	108	25.6
1638	3487	167	169	154	163	145	158	31.5
1639	3080	148	149	135	145	129	140	31.2
1640	2589	124	125	114	122	110	118	28.2
1641	2380	114	115	104	112	101	108	26.0
1642	2136	102	103	93	101	90	98	25.9
1643	2179	104	106	95	103	92	100	31.8
1644	1987	95	96	87	94	89	91	30.3
1645	1677	80	81	73	80	79	77	24.1
1646	1888	90	91	82	90	92	86	20.8
1647	2381	114	115	103	113	117	109	24.0
1648	2291	110	111	99	109	112	105	23.2
1649	2107	101	102	91	100	103	97	24.9
1650	1609	77	78	69	77	80	74	25.2
1651	1830	88	88	84	87	91	86	22.2
1652	2231	107	108	102	107	108	106	25.0
1653	2394	115	116	111	114	115	113	26.0
1654	2187	105	106	102	105	105	102	27.5
1655	1572	75	76	73	75	77	73	23.5
1656	1751	84	84	82	84	84	81	23.5
1657	2310	111	112	108	111	111	107	32.1
1658	2676	128	129	126	129	131	125	38.0
1659	2223	107	107	105	107	112	104	27.7
1660	1718	82	83	81	83	86	80	24.4
1661	1938	93	94	92	93	94	90	27.8
1662	1930	92	93	92	93	91	90	26.8
1663	1770	85	85	85	86	85	83	25.2
1664	1833	88	88	88	89	89	87	25.1
1665	2206	106	106	106	107	108	106	43.0
1666	2400	115	116	116	116	116	116	28.1
1667	2255	108	109	109	109	109	110	29.8
1668	2021	96	97	98	98	99	99	28.7
1669	2387	114	115	117	116	117	117	32.8
1670	2065	99	100	101	101	101	101	32.4
1671	1966	94	95	97	96	98	97	30.2
1672	1899	91	91	94	93	93	93	26.8
1673	1724	83	83	85	84	88	85	25.7
1674	1708	82	82	85	84	83	85	26.1
1675	1904	91	92	95	93	91	95	29.0
1676	1629	78	78	82	80	76	82	27.5
1677	1696	81	82	85	83	79	85	24.9
1678	2476	119	119	125	122	115	124	26.7
1679	3284	157	158	166	161	152	165	37.2
1680	2574	123	124	131	127	117	130	33.8
1681	2712	130	130	138	134	123	136	38.9

1682	2040	98	98	104	101	91	102	35.0
1683	1870	90	90	96	92	83	94	31.8
1684	1920	92	92	99	95	87	98	33.6
1685	2108	101	101	109	104	100	108	33.3
1686	2039	98	98	106	101	100	105	31.5
1687	1836	88	88	96	91	94	94	28.9
1688	1893	91	91	99	94	99	97	29.3
1689	2061	99	99	108	102	107	106	30.6
1690	2227	107	107	117	111	117	115	30.5
1691	1769	85	85	93	88	95	91	27.3
1692	1674	80	80	89	83	91	87	27.5
1693	1737	83	83	92	87	96	91	27.4
1694	2002	96	96	107	100	113	104	30.2
1695	1594	76	76	85	80	92	83	30.7
1696	1596	77	77	86	80	94	84	28.9
1697	1750	84	84	94	88	103	92	28.1
1698	1536	74	74	83	77	89	81	26.8
1699	1557	75	75	85	78	89	82	27.7
1700	1617	77	77	88	81	91	85	27.9
1701	1790	86	86	99	90	99	90	26.7
1702	1839	88	88	101	93	101	96	25.2
1703	1994	95	95	109	101	109	104	24.8
1704	1980	95	95	108	100	108	103	27.0
1705	2194	105	105	119	111	119	115	31.5
1706	2113	101	101	115	107	114	112	26.6
1707	1665	80	80	90	84	90	89	25.2
1708	1787	86	86	97	91	97	95	27.0
1709	1679	80	80	91	85	91	89	25.7
1710	1658	79	79	89	84	92	88	26.4
1711	1600	77	77	86	81	91	86	28.5
1712	1834	88	88	98	93	108	98	30.1
1713	1754	84	84	94	90	103	94	25.8
1714	1980	95	95	105	101	112	106	28.4
1715	1602	77	77	85	82	88	86	26.2
1716	1690	81	81	89	87	91	90	26.5
1717	1510	72	72	80	77	80	80	24.9
1718	1643	78	78	86	84	88	87	25.6
1719	2483	119	119	130	128	133	132	31.8
1720	2323	111	111	122	119	127	123	32.4
1721	1977	94	94	103	102	108	105	31.4
1722	1840	88	88	96	95	98	97	29.7
1723	1714	82	82	89	88	87	90	31.3
1724	1735	83	83	90	90	85	91	30.1
1725	1578	76	75	82	82	78	82	25.4
1726	1738	83	83	90	90	87	90	27.7
1727	2176	104	104	112	113	109	113	35.5
1728	2402	115	114	123	125	119	125	39.8
1729	2551	122	122	131	132	126	132	44.7
1730	2122	102	101	108	110	105	110	36.2
1731	2076	99	99	106	108	101	108	34.1
1732	2086	100	99	106	109	100	109	29.8
1733	1961	94	93	99	102	96	102	29.0
1734	1787	86	85	90	93	90	93	26.0
1735	1767	85	84	89	92	91	92	26.9
1736	1918	92	91	97	100	96	99	28.1
1737	2063	99	98	104	108	103	106	30.6
1738	1722	83	82	86	90	87	88	27.4
1739	1767	85	84	88	93	90	90	27.5
1740	2124	102	101	106	112	108	108	31.1
1741	2601	125	124	129	137	132	131	34.7
1742	2212	106	105	110	117	111	111	36.7
1743	1903	91	90	94	100	95	95	29.0
1744	1799	86	86	89	95	89	89	25.0
1745	1766	85	84	87	93	86	88	25.2
1746	1850	89	88	91	98	91	92	27.9
1747	2017	97	96	99	107	104	100	28.6
1748	2197	105	104	108	117	116	109	28.6
1749	2035	96	97	99	108	107	101	26.8
1750	2128	102	101	104	113	112	105	27.5
1751	1756	84	83	93	93	110	86	26.3
1752	1682	81	80	89	89	87	82	25.4
1753	1778	85	84	93	93	93	87	24.8
1754	1971	94	94	103	103	104	96	25.4
1755	1788	86	85	92	92	94	87	25.2
1756	1926	92	91	99	99	102	93	25.7
1757	1961	94	93	100	100	100	94	26.2
1758	1908	91	90	96	96	94	92	27.4
1759	1951	93	92	98	98	95	93	27.3
1760	2058	99	98	103	103	100	98	26.4
1761	2098	101	99	104	104	100	100	26.5
1762	2494	120	118	123	123	118	118	31.3
1763	2416	116	114	118	118	112	114	32.4
1764	1942	93	92	94	94	90	92	27.2
1765	2101	101	99	101	101	97	99	26.1
1766	2192	105	104	105	105	100	103	30.0
1767	2110	101	100	100	100	97	99	29.5
1768	2358	113	112	111	111	110	111	27.8
1769	1906	91	90	89	89	90	99	27.2
1770	2117	101	100	99	99	99	98	28.6
1771	2276	109	108	105	105	107	105	27.2
1772	2072	99	98	95	95	98	95	27.3
1773	2135	102	101	97	97	100	97	27.6
1774	2090	100	99	95	95	97	95	24.8
1775	2166	104	102	98	98	97	97	25.9
1776	1929	92	91	86	86	85	87	24.6
1777	2135	102	101	95	95	92	96	26.2
1778	2269	109	107	100	100	97	101	25.9

1779	2611	125	123	115	115	111	116	28.0
1780	2847	136	134	124	124	120	126	29.0
1781	2519	121	120	109	109	106	111	29.7
1782	2679	128	126	116	116	112	118	28.4
1783	2408	115	114	103	103	100	106	29.3
1784	2278	109	107	97	97	95	100	28.5
1785	2174	104	103	92	92	93	95	27.3
1786	2285	109	108	96	96	99	99	26.7
1787	2196	105	104	92	92	97	95	25.8
1788	2201	105	104	92	92	98	95	26.8
1789	2073	99	98	86	86	91	90	25.6
1790	2149	103	101	88	88	93	93	25.8
1791	2323	111	109	95	95	100	100	25.4
1792	2181	104	103	89	89	92	94	25.9
1793	2497	120	118	101	101	104	107	28.4
1794	2600	125	122	105	105	107	111	26.9
1795	2770	133	130	111	111	111	118	29.1
1796	2285	129	108	91	91	90	97	25.1
1797	2743	131	129	108	108	107	116	27.2
1798	2510	120	118	99	99	97	106	24.9
1799	2563	123	121	100	100	98	107	25.1
1800	2832	136	133	110	110	108	118	26.7

1a) Average burials 1601-1800: 2089

2) Trend 1601-1800

Mean	2089
S.D.	: 354
Slope	: 0.32
Intercept	: 2057

3) Trend 1601-1650

Mean	:2195
S.D.	: 414
Slope	: 5.5
Intercept	:2053

4) Trend 1651-1700

Mean	:2002
S.D.	: 354
Slope	:-7.0
Intercept	:2181

5) Trend 1701-1750

Mean	:1935
S.D.	: 259
Slope	: 4.8
Intercept	:1812

6) Trend 1751-1800

Mean	:2226
S.D.	: 290
Slope	:14.2
Intercept	:1867

7) Trend 1601-1750

Mean	:2044
S.D.	:363
Slope	:-2.2
Intercept	:2207

Although the "healthy" and "unhealthy" years are clearly visible in each of the above series, the computed indices of mortality do vary slightly according to the choice of the "average" base line. The two series, (a) and (b), which use the overall average or the long-term trend of burials as the annual denominator adequately reflect the fluctuations in mortality until the second half of the eighteenth century. At this point, the growth in population and the consequent increase in burials is far steeper than that accounted for by the trend. Hence, annual increments of burials appear as sharp mortality peaks. The 11-year moving average, (e), compensates for the short term changes in average levels but an index based on this measure tends to underplay the magnitude of epidemics which recurred at frequent intervals. Intervals calculated from the 150- and 50-year trends (1601-1750, 1651-1700, 1701-1750, 1751-1800), (c) and (d), to some extent, exclude these difficulties but these series incorporate the problem of artificial breaks at the beginning and end of each trend line. A 51-year moving average, truncated at either end (ie. Year 1626 based on 51-year average, Year 1625 on 50-year average, Year 1624 on 49-year average etc.) presents a smoother path of background levels. This series also best controls for the downswing in population and burial numbers towards the later seventeenth century and the rapid rise in the second half of the eighteenth century and, at the same time, effectively reveals the annual peaks and dips of burials against the long-term movement of mortality.

Note

A second mortality index was calculated for the years 1665 and 1666 to include another 28 urban parishes with known plague epidemics. Burial totals in 1665 and 1666 were taken from the parish registers or from documentary evidence, as in the case of Colchester and Braintree, and added to the 112 parish register sample. Average annual burials for the years 1660-1664 and 1668-1672 were also computed for the 28 towns and 112 sample parishes. Colchester's average burial total was not available and was estimated at 400 burials per annum on the assumption that the C.D.R. was around 40 or 50 per 1000 population. The total number of burials in 1665 and 1666 for all 140 parishes was compared with the average number of burials during a "normal" two-year period. The results are described in the chronology.

PARISH REGISTERS CITED IN CHRONOLOGY

1. Appledore
2. Ardingley
3. Arlington
4. Ashford
5. Balcombe
6. Battle
7. Bexley
8. Bocking
9. Braintree
10. Brighton
11. Canterbury; St. Mary Magdalen
12. Charing
13. Catham
14. Chelmsford
15. Chichester: St. Peter the Great
16. Chislet
17. Colchester: All Saints
18. Colchester: St. Peters
19. Eastchurch
20. Fletching
21. Foulness
22. Gravesend
23. Great Burstead
24. Great Oakley
25. Hadlow
26. Headcorn
27. Heathfield
28. High Easter
29. High Halstow
30. Horton Kirby
31. Hothfield
32. Laughton
33. Lindfield
34. Lower Halstow
35. Maidstone
36. Maldon
37. Mayfield
38. Meopham
39. Milton-next-Gravesend
40. Milton next Sittingbourne
41. Minster in Sheppey
42. Mountfield
43. Orpington
44. Patcham
45. Purleigh
46. Pyecombe
47. Ripe
48. Rochester
49. Rolvenden
50. Romford
51. Roydon
52. Rye
53. Saffron Waldon
54. Salehurst
55. Sevenoaks
56. Sittingbourne
57. South Shoebury
58. Stifford
59. Stisted
60. St. Osyth
61. Stourmouth
62. Stow Maries
63. Strood
64. Uckfield
65. Wadhurst
66. Wansted
67. Warbleton
68. West Hanningfield
69. West Hoathly
70. Whitstable
71. Willingdon
72. Wittersham
73. Woodmancote
74. Worth

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