Exemplar Burials Data: Colyton*

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Introduction

This document describes some of the preliminary analysis which it would be useful to do on any of the burials data for the 404 parishes used in E.A. Wrigley and R.S. Schofield's book *The Population History of England 1541-1871: a Reconstruction*.[2] The parish of Colyton in Devon is used as the exemplar. Colyton was one of the first English parishes that was subjected to the serious analysis of its parish register data.[3] This paper focuses on describing the burials data rather than trying to relate them to other data sets, and follows closely the suggestions made in the booklet *Parish Register Aggregate Analyses*.[4]

The burials data

The burials data for Colyton are contained in the spreadsheet 'Colyton' in the folder for the county of Devon. Within the spreadsheet they are in the worksheets 'bur_year', 'bur_10', 'bur_50', 'bur_orig' and 'crisis'. The data for burial registration in Colyton cover the years 1538-1837, but there are certain years for which the data were deemed to be defective by the original researchers. These years are 1540-1542, 1554, 1555 and 1562-1564. For these years, the worksheets 'bur_year', 'bur_10' and 'bur_50' contain the corrected totals of events, and the worksheet 'bur_orig' contains the original data as taken from the register. The worksheet

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2 E.A. Wrigley and R.S. Schofield, *The Population History of England 1541-1871: a Reconstruction* (Cambridge, 1989).

3 See, for example, E.A. Wrigley, 'Family limitation in pre-industrial England', *Economic History Review* 19 (1966), pp. 82-109; E.A. Wrigley, 'The changing occupational structure of Colyton over two centuries', *Local Population Studies* 18 (1977), pp. 9-21. For a wide-ranging study of the social and demographic evolution of the parish, see P.M. Sharpe, *Population and Society in an East Devon Parish: Reproducing Colyton 1540-1840* (Exeter, 2002).

4 R.S. Schofield and A. Hinde, *Parish Register Aggregate Analyses*, 2nd edn (Alton, 2020).

'crisis' contains data on the various mortality crises in Colyton between 1538 and 1837.

It would be worth looking at the original data for years that have been corrected and comparing them with the corrected data. This is because the methods used to make the corrections 'were designed to give reasonable results over a large number of parishes, and often represented a compromise between many conflicting considerations', so they may not be ideal for any individual parish.[5] In the case of Colyton's burials, the original data for the years that have been corrected are shown in Table 1.

Table 1 Original and corrected burials data for years that have been corrected: Colyton

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1540	2	3	0(3)	2	0(2)	0(1)	0(1)	0(1)	0(1)	0(1)	0(2)	0(1)
1541	0(2)	0(2)	0(2)	0(2)	0(2)	0(1)	0(1)	2	1	1	0(1)	0(1)
1542	0(2)	0(2)	0(2)	1(3)	2	0(1)	0(2)	0(1)	0(2)	0(2)	0(2)	1
1554	7	0	1	0	0	1	0	0	2	1	0(2)	0(2)
1555	0(2)	1(2)	0(4)	1(5)	0(2)	0(2)	0(2)	1	5	1	1	0
1562	2	0	1	1	1	1	0(2)	1(2)	0(1)	0(2)	0(1)	0(2)
1563	0(4)	3	1	1(3)	0(2)	2(3)	0(3)	0(2)	3	0	0(1)	0
1564	1(2)	0	1	0(2)	0(2)	0(2)	1	0	2	0	0	0

Note: The original totals are shown outside the parentheses. The corrected totals are in parentheses where corrections were made.

Source: Parish registers of Colyton, Devon.

Inspection of Table 1 reveals that most of the corrections involve adding burials to months, or runs of months, during which the recorded number of burials was suspiciously low. Such are, for example, November 1554 to July 1555, during which only two burials were recorded in the register. The process by which the corrections were done is described by E.A. Wrigley and R.S. Schofield in *The*

5 Schofield and Hinde, *Parish Register Aggregate Analyses*, p. 9.

Population History of England 1541-1871: a Reconstruction.[6] It involved establishing the underlying trend in the number of burials over several years either side of the year(s) of defective registration.[7] This gave an estimated number of burials that should have taken place in each of the months for which registration was defective if the evolution of the numbers of burials over time had followed the trend. However, since burials were not evenly distributed across the months of the year, Wrigley and Schofield 'generated a set of monthly frequencies from all the parishes that were fully registered to use as a guide to [seasonal] periodical variation occurring during defective periods'.[8] The estimated values from the trend were then adjusted to allow for this seasonal variation and the results were rounded to the nearest whole burial. A check was then made to see whether the sum of the corrected rounded monthly values came to the same total as the sum of the corrected unrounded monthly values and, if it did not, the difference 'was randomly distributed among the months comprising the defective period with a probability of selection proportionate to the number of events recorded for that month'.[9]

Seasonal indices

The spreadsheet 'Colyton' includes a worksheet 'bur_50' which is reproduced in Table 2. The seasonality of burials in Colyton is not especially strong in any part of the period between 1538 and 1837. However there is a tendency for more burials to be recorded in the first half of the calendar year than in the second half.

In *Parish Register Aggregate Analyses*, the suggestion is made to 'apply a statistical test to evaluate the probability of a chance occurrence of an observed pattern … before embarking on finding any explanations'.[10] One test suggested there is the Kolmogorov-Smirnov test, which 'can be used to evaluate a single distribution against the hypothesis of "no seasonality" '.[11]

We can illustrate the use of the Kolmogorov-Smirnov test using the burials data from Colyton for the period 1550-1599. To perform the test we need to calculate the following for each month of the year during the period:

(1) the probability that a burial would happen on or before the last day of each month using the actual distribution;

6 Wrigley and Schofield, *Population History of England*, pp. 30-2 and 705-7.
7 Wrigley and Schofield, *Population History of England*, p. 31.
8 Wrigley and Schofield, *Population History of England*, p. 31.
9 Wrigley and Schofield, *Population History of England*, p. 31.
10 Schofield and Hinde, *Parish Register Aggregate Analyses*, p. 14.
11 Schofield and Hinde, *Parish Register Aggregate Analyses*, p. 14.

(2) the probability that a burial would happen on or before the last day of each month under the null hypothesis of 'no seasonality';
(3) the total number of burials in the period.

Table 2 Indices of the seasonality of burials: Colyton 1537-1837

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1538-1549	74	109	104	184	114	77	89	79	102	89	87	94
1550-1599	107	103	117	112	126	102	75	104	99	80	98	80
1600-1649	106	94	98	113	113	101	107	100	94	98	84	91
1650-1699	109	112	129	108	107	86	89	100	87	84	84	105
1700-1749	101	117	123	111	113	97	85	90	94	95	76	100
1750-1799	115	118	111	116	109	105	83	87	80	81	96	100
1800-1837	104	124	100	119	106	105	93	90	72	81	85	122

Note: The numbers in this table give the number of burials in that month in the relevant period as a percentage of the 'uniform daily rate', which is the number of burials we should expect in that month in the relevant period if baptisms were uniformly distributed across the calendar year. The details of the method of calculation are given in R.S. Schofield and A. Hinde, *Parish Register Aggregate Analyses*, 2nd edn (Alton, 2020), p. 14.

Source: Parish registers of Colyton, Devon.

We can calculate (1) and (3) from the worksheet 'bur_10' by adding up across the five decades of the 1550s, 1560s, 1570s, 1580s and 1590s (see Table 3). The total number of burials in the period is 1,445. There were 131 in January, 115 in February, 143 in March, and so on. The number of burials occurring before the end of January is just 131, the number of burials in January. The number of burials occurring before the end of February is 131 + 115 = 246, the number of burials in January plus the number of burials in February. We can calculate the number of burials occurring before the end of each subsequent month in a similar manner. Finally, we calculate the probability of a burial occurring before the end of each month by dividing these numbers by 1,445 (the total number of burials). All these calculations are shown in Table 3.

Table 3 **Application of the Kolmogorov-Smirnov test to the burial data for Colyton 1550-1599**

Quantity calculated	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Observed number of burials	131	115	143	133	154	121	92	127	117	98	116	98
Observed number by the last day of each month	131	246	389	522	676	797	889	1,016	1,133	1,231	1,347	1,445
Number of burials assuming uniform distribution	122	112	123	119	123	119	123	123	119	123	119	123
Number by the last day of each month assuming uniform distribution	123	234	357	476	598	717	840	962	1,081	1,204	1,322	1,445
Probability of burial happening by the last day of each month using observed data	0.091	0.170	0.269	0.361	0.468	0.552	0.615	0.703	0.784	0.852	0.932	1.000
Probability of burial happening by the last day of each month assuming uniform distribution	0.085	0.162	0.247	0.329	0.414	0.496	0.581	0.666	0.748	0.833	0.915	1.000
Absolute difference between probabilities	0.006	0.008	0.022	0.032	0.054	0.055	0.034	0.037	0.036	0.019	0.017	0.000

Note: The numbers presented here have been rounded to the nearest whole number for burials, and to three decimal places for probabilities.

To calculate (2) we need first to distribute the observed number of burials across the months of the year assuming a uniform distribution. If the average year has 365.25 days, and there are a total of 1,445 burials, then the number of burials in

each month is equal to 1,445 x (the number of days in the month divided by 365.25). For January, this will be 1,445 x 31/365.25 = 122; for February it will be 1,445 x 28.25/365.25 = 112 (rounding to the nearest whole number in each case). We then calculate the number of burials occurring before the end of each month by cumulating these monthly totals up to and including the month in question, and compute the probabilities by dividing these cumulative numbers by 1,445.

The final stage in the application of the Kolmogorov-Smirnov test is to calculate the absolute difference between the two probabilities for each month using the observed data and the null hypothesis of 'no seasonality'.[12] These differences are shown in the last row of Table 3. For January the difference is 0.006, for February 0.008, and so on. The largest difference occurs for June at 0.055. Are these differences statistically significant? Another way of putting this is to ask: what is the chance that we would obtain differences between the observed data and the uniform distribution as big or greater than these if the long-run seasonal pattern really were uniform and the differences were just generated by random fluctuations? The Kolmogorov-Smirnov test enables us to quantify this. The test looks at the month with the largest difference in the two probabilities. If this largest difference is greater than 1.36 divided by the square root of the total number of burials used in the calculation, then the chance of getting a difference as large as this were baptisms uniformly distributed across the year is less than 1 in 20. If the largest difference is greater than 1.63 divided by the square root of the total number of burials used in the calculation, then this chance is less than 1 in 100. Using the results in Table 3, the largest difference in the probabilities is for June at 0.055. If we divide 1.63 by the square root of 1,445 we obtain 0.043. Since 0.055 is greater than 0.043 we conclude that the chance of obtaining the data we have if the null hypothesis were true is less than 1 in 100. Therefore it is likely that the number of burials in Colyton varied non-randomly from season to season during the period 1550-1599. Similar calculations could be done for the other periods.

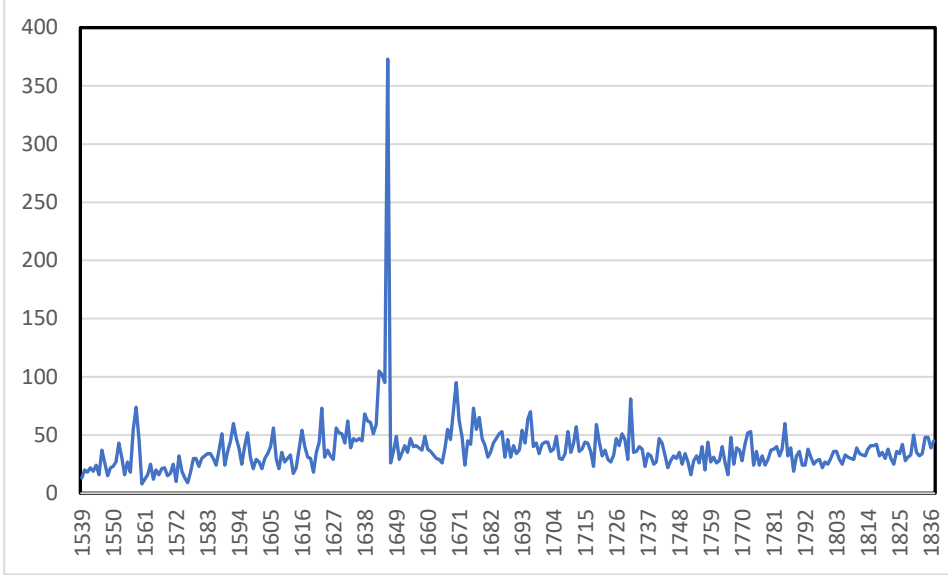
The Kolmogorov-Smirnov test is a 'minimalist' test in the sense that it tells you only whether or not two distributions exhibit a difference that it is statistically significant. It gives no information about the nature of the difference, still less about what might have caused the difference. The nature of the difference can be ascertained by looking at the two distributions carefully: the reasons for any difference must be sought through an understanding the context and the historical processes involved.

12 We refer to the 'absolute difference' because we do not care which of the two probabilities is the larger: all we are interested in is the difference between them.

Trend in burials over time

A most useful initial piece of analysis is to plot the corrected annual totals of burials for the period in question, in this case 1538-1837. However it seems sensible to omit the year 1538 as the register started part of the way through that year. The annual burial totals for the years 1539-1837 are shown for Colyton in Figure 1.

Figure 1 Annual burial totals: Colyton 1539-1837



Source: Parish registers of Colyton, Devon.

An immediate problem arises with this graph. In 1646 there were 373 burials recorded in Colyton, many times the number in a typical year. This demographic 'crisis' dominates the whole graph, and in order to plot it accurately the scale used is such that the run of data for 'normal' years is plotted right at the bottom of the chart.

In *Parish Register Aggregate Analyses* the authors suggest that

> [s]ince, for many purposes, what is at issue is not the absolute size of a fluctuation in a series, but its magnitude relative to the number of events normally being registered at that time, it is helpful to graph using a

> logarithmic vertical scale. This has the advantage of making equal proportionate fluctuations in the series diverge by the same vertical distance from the prevailing level of the series regardless of how high or low the latter many be. In this way the eye can pick out the major fluctuations quite easily.[13]

The use of the logarithmic scale has another advantage, in that it 'compresses' the vertical scale at large values and 'stretches out' the vertical scale at small values. It does this by making the distance between 1 burial and 10 burials on the vertical scale the same as the distance between 10 burials and 100 burials, between 100 and 1,000 burials and so on.

The Colyton burial series is plotted on a logarithmic scale in Figure 2. The variation across time follows broadly the same pattern as in Figure 1. However, the magnitude of the peak in burials in 1646 is greatly reduced. The general increase in the annual number of burials between 1540 and about 1640 is easier to see in Figure 2 than it was in Figure 1. There also seems to have been a slow decrease in the annual number of burials in the early eighteenth century and perhaps a slight increase in the early nineteenth century.

The fluctuations in the number of burials from year to year make it harder to visualise the underlying trend. One way to extract the trend is to calculate a *moving average*. The moving average for a given year is calculated by using the average of the given year and several years either side. In *Parish Register Aggregate Analyses* an 11-year moving average is suggested consisting of the given year and the five years either side, that is a 'window' of 11 years.[14] The longer the window used, the smoother the resulting series. There is a balance to be struck between using a window long enough to remove 'random' fluctuations and highlight the underlying trend, but not using a window so long that it hides medium-term changes that might be of substantive interest. There is also the problem that it is not possible to compute a moving average for the years at either end of the series. With an 11-year moving average we 'lose' five years at either end; with a 25-year moving average we would lose 12 years at either end.

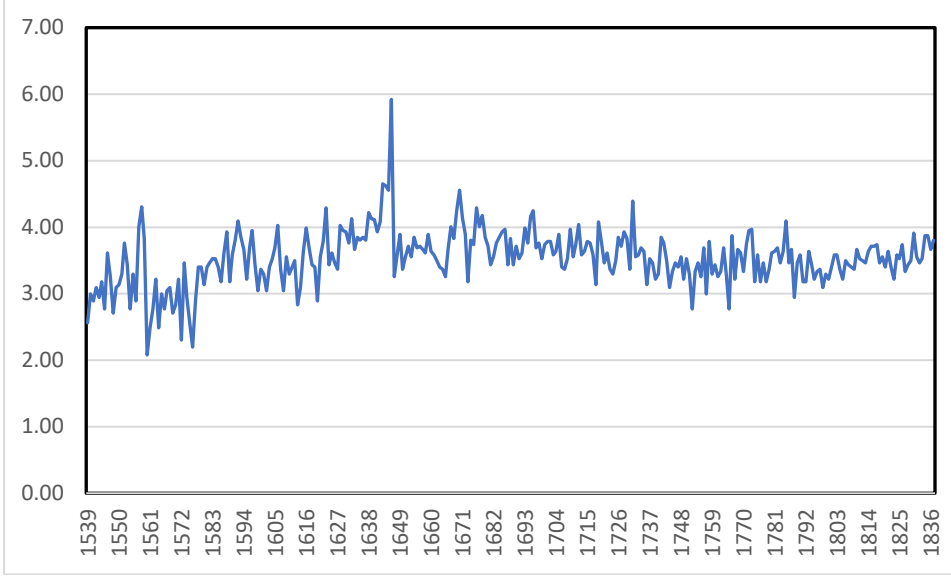
Figure 3 shows the original burial series for Colyton with an 11-year and a 25-year moving average superimposed, and Figure 4 shows the burial series for Colyton plotted on a logarithmic scale with an 11-year and a 25-year moving average superimposed. Looking at Figure 3, it is clear that the 11-year and, to a lesser extent, the 25-year moving average are affected by the huge peak in burials in 1646. In particular, the 1646 peak is so great that, as soon as it enters he

13 Schofield and Hinde, *Parish Register Aggregate Analyses*, pp. 14-15.

14 Schofield and Hinde, *Parish Register Aggregate Analyses*, p. 15.

calculation of the moving average (which is in 1641 for the 11-year moving average and in 1634 for the 25-year moving average) it leads to a 'jump up' in the moving average series and when it leaves the calculations (in 1652 and 1659 respectively) we see a 'step down'. The original data (Figure 3) also reveal a general upward trend in the number of burials from the beginning of the series in 1539 to the 1640s and a slow decline in the number of burials per year from around 1690 to around 1760. The plot on a logarithmic scale (Figure 4) does not have the 'jump up' and 'step down' in each of the moving average series to the same degree as Figure 3. The logarithmic moving averages are also helpful in revealing a wave-like pattern in the number of burials in the period before the 1640s, with troughs around 1570 and 1610 and a peak around 1590.

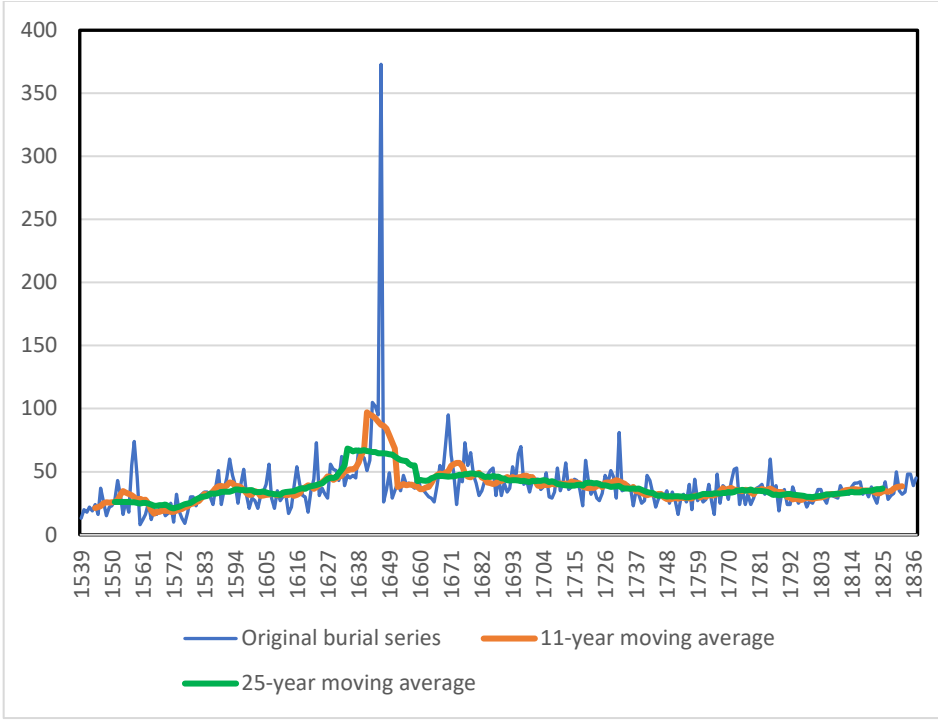
Figure 2 Annual burial totals: Colyton 1539-1837 plotted on a logarithmic scale



Note: The logarithm used here is the natural logarithm, or the logarithm to the base *e*.

Source: Parish registers of Colyton, Devon.

Figure 3 Colyton burials 1539-1837: original data and moving averages



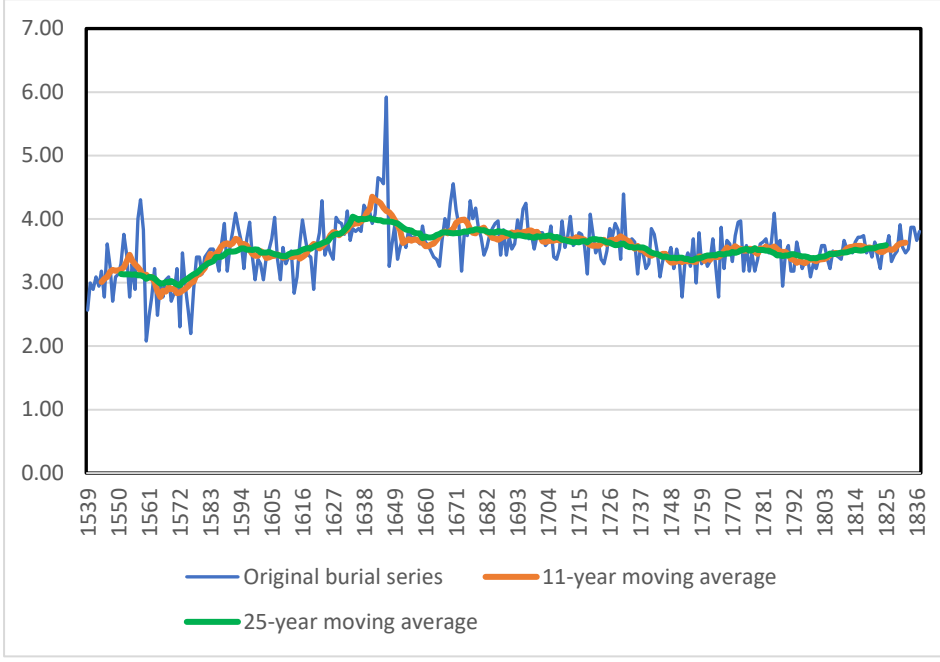
Source: Parish registers of Colyton, Devon.

Figure 5 plots the difference between the original figures in the series and the 11-year moving average. This graph is difficult to interpret because the massive deviation in 1646 dwarfs that in all the other years. The huge spike in burials in 1646 actually has two effects on this graph: not only does it cause the large deviation in the year 1646 itself, but it also raises the moving average for the five years either side of 1646 and this leads to negative deviations in these years.

For a graph which is easier to interpret, we can examine the differences between the original series and the 11-year moving average plotted on a logarithmic scale (Figure 6).[15] This is a measure of the size of the fluctuations in the annual data. The

15 There is a technical issue to be watched for. When drawing up this graph, it is important to implement the following steps in order: (1) take the natural logarithms of the original data; (2) compute the moving average using the natural logarithms; (3) compute the difference between the natural logarithm of the number of burials for each year and the moving average using the natural logarithms. If you first calculate the deviations using the original data (that

Figure 4 **Colyton burials 1539-1837: original data and moving averages plotted on a logarithmic scale**



Note: The logarithm used here is the natural logarithm, or the logarithm to the base *e*.

Source: Parish registers of Colyton, Devon.

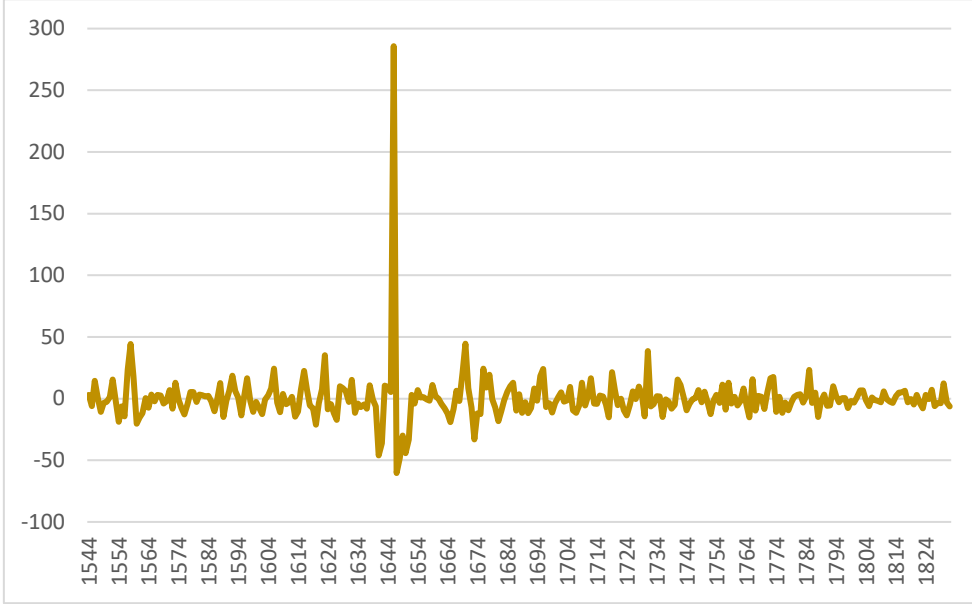
fluctuations appear to be rather larger before the 1660s than they were afterwards, although their magnitude does gradually increase during the eighteenth century. For a more objective summary of the trend over time in the size of the fluctuations we can calculate the mean absolute percentage deviation from trend, something which is achieved by adding together the individual annual percentage deviations from trend in each quarter-century, treating negative deviations as if they were positive, and dividing by the total number of years for which the adding up has been done.[16] Table 4 shows the outcome. The variability of the burial series is high in the periods1550-1574 and 1625-1649. Between 1625 and 1649 it is inflated by

is the numbers plotted in Figure 5) and then try to take their logarithms, Excel will return error messages as it is not possible to take the logarithm of a negative number.

16 Schofield and Hinde, *Parish Register Aggregate Analyses*, p. 15.

the great peaks of mortality in the 1640s, and the volatility in the period 1550-1574 reinforces the pattern seen in Figure 6. It is noteworthy how the level of short-term variability in mortality in the parish diminishes after 1650. The increase in volatility during the eighteenth century is also brought out by the rise in the mean absolute deviation from 17.9 to 23.7 per cent between 1700-1724 and 1750-1774.

Figure 5 **Deviation of annual data from 11-year moving average: Colyton burials 1544-1832**



Source: Parish registers of Colyton, Devon.

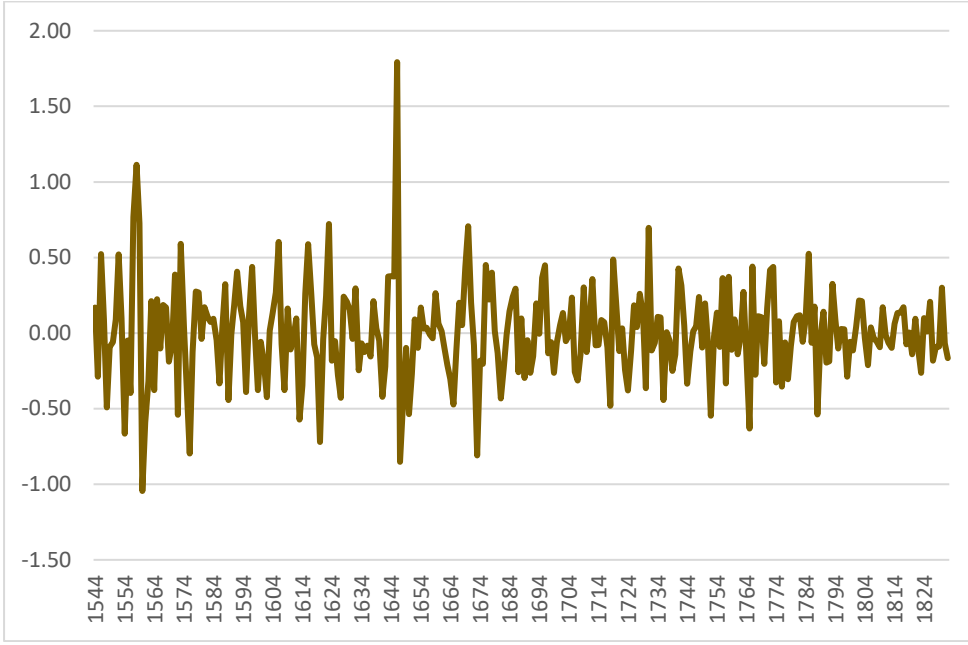
Comparison with other parishes and regions and with national trends

When working on the data for a particular parish, it is always worth comparing the patterns and trends observed in the parish with the national patterns and trends.

In *The Population History of England*, Wrigley and Schofield identified the 20 years in which the annual percentage deviation of the national death rate above or below

a moving average was the greatest.[17] There is a complication here, in that, when they drew up this list, Wrigley and Schofield used years running from 1 July to 30 June, as these were felt to be more appropriate for comparison with fluctuations in the standard of living, so that to effect a valid comparison we need

Figure 6 **Deviation of annual data from 11-year moving average: Colyton burials 1544-1832, using logarithmic data**



Notes: The logarithm used here is the natural logarithm, or the logarithm to the base *e*. There is a technical issue to be watched for. When drawing up this graph, it is important to implement the following steps in order: (1) take the natural logarithm of the original data; (2) compute the moving average using the natural logarithms; (3) compute the difference between the natural logarithm of the number of burials for each year and the moving average using the natural logarithms.

Source: Parish registers of Colyton, Devon.

17 Wrigley and Schofield, *Population History of England*, p. 322.

Table 4 **Mean absolute percentage deviation from 11-year moving average trend by quarter-century: Colyton burials 1550-1824**

Quarter century	Mean absolute percentage deviation from 11-year moving average trend
1550-1574	37.4
1575-1599	19.7
1600-1624	27.9
1625-1649	34.9
1650-1674	22.7
1675-1699	22.3
1700-1724	17.9
1725-1749	19.0
1750-1774	23.7
1775-1799	15.9
1800-1824	10.8

Source: Parish registers of Colyton, Devon.

to compute the numbers of burials for Colyton for years defined in a similar way. This is straightforward to do using the original monthly burials data.[18] Table 5 shows the ten years for which the percentage deviations above and below the national 25-year moving average death rate were greatest, and gives the corresponding percentage deviations for the burial series for Colyton (using a 25-year moving average).

In several of the years that the national death rate was most notably above the trend, the number of burials in Colyton was also unusually high. This was especially true of the years 1557-1559 and 1727-1729, which included the two most geographically widespread morality crises of the parish register period. There were, however, other years during which the national death rate was inflated by high mortality in other areas, but which spared Colyton (for example 1625-1626 and 1657-1658). Examining years in which the national death rate was below trend is

18 All the calculations carried out in the paper are reproduced in the Excel spreadsheet 'Colyton PLUS burials' in the worksheet 'bur_year', save the calculations for the Kolmogorov-Smirnov test, which are in the worksheet 'bur_10'. The spreadsheet contains the formulae used in the various calculations, which readers may follow through.

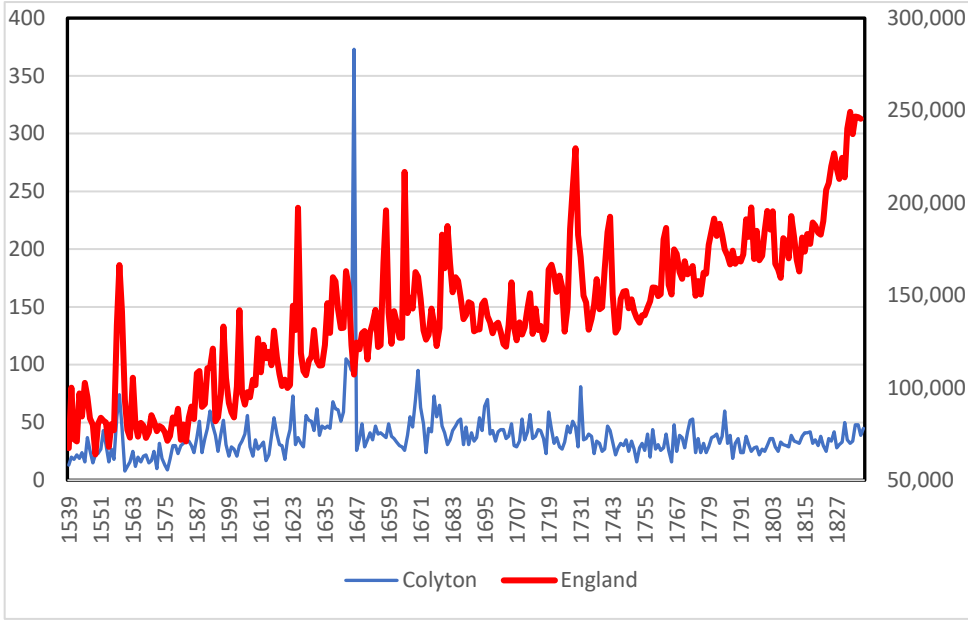
Table 5 **Years in which the greatest percentage deviations from a 25-year moving average are observed for the national death rate compared with corresponding deviations in the Colyton burial series**

	Year	Annual percentage deviation above or below moving average	
		National death rate	Colyton burials
Above	1558-1559	124.2	145.7
	1557-1558	60.5	194.1
	1625-1626	43.0	-4.9
	1657-1658	42.9	-35.9
	1728-1729	41.2	28.0
	1727-1728	37.2	46.8
	1680-1681	36.5	-20.5
	1741-1742	36.3	18.8
	1729-1730	35.4	-6.3
	1638-1639	35.1	-8.2
Below	1555-1556	-28.2	-27.3
	1553-1554	-28.1	-15.4
	1677-1678	-28.1	30.5
	1567-1568	-25.6	-9.8
	1541-1542	-19.7	na
	1600-1601	-19.7	-22.0
	1621-1622	-18.7	3.8
	1627-1628	-18.6	9.0
	1589-1590	-18.5	-6.3
	1725-1726	-18.1	5.0

Note: na – not available. It is not clear how the deviation from the 25-year moving average was computed by Wrigley and Schofield for the year 1541-1542, as the 25-year moving average for that year requires data for the years 1529-1530 to 1553-1554 inclusive, and the parish register series does not start until 1538.

Sources: Parish registers of Colyton, Devon; E.A. Wrigley and R.S. Schofield, *The Population History of England 1541-1871: a Reconstruction* (Cambridge, 1989), p. 322.

Figure 7 **Annual burial totals: Colyton 1539-1837 and estimated annual burial totals: England 1539-1837**



Source: Parish registers of Colyton, Devon; E.A. Wrigley and R.S. Schofield, *The Population History of England 1541-1871: a Reconstruction* (Cambridge, 1989), pp. 553-60.

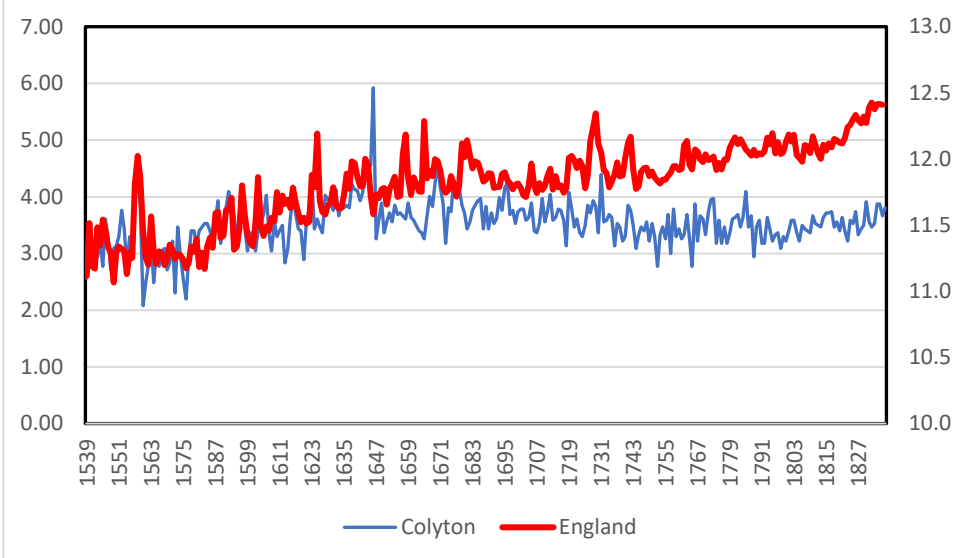
not so useful, as the absolute deviations in these years were relatively small (there is a minimum below which annual death rates will not fall). Nevertheless, in the most healthy year at the national level (1555-1556) Colyton also fared well.[19]

Finally in this section we can compare the pattern of burials over time in Colyton with that in England as a whole. Figure 7 shows the number of burials in Colyton each year from 1539 to 1837 plotted on the left-hand axis and the number of burials in England and Wales, plotted on the right-hand axis. Figure 8 shows the Colyton and whole of England series plotted on a logarithmic scale. As with Figure 5, for convenience we have used two different scales, one for Colyton on the left-hand axis and a second for England as a whole on the right-hand axis.

19 Care should be taken when concluding that 1555-1556 was an unusually 'healthy' year, as the moving average for this period is likely to have been inflated by the inclusion of the years of high mortality between 1556 and 1560.

The results show clearly that the number of burials in England and Wales was rising continuously throughout the period. Within this overall rising trend, there were peaks of mortality caused by epidemics and (to a lesser extent) subsistence crises. The epidemics of plague in 1625 and 1665, for example, are clearly visible,

Figure 8 **Annual burial totals: Colyton 1539-1837 and estimated annual burial totals: England 1539-1837 plotted on a logarithmic scale**



Source: Parish registers of Colyton, Devon; E.A. Wrigley and R.S. Schofield, *The Population History of England 1541-1871: a Reconstruction* (Cambridge, 1989), pp. 553-60.

as are the more widespread episodes of high mortality in the late 1550s and the late 1720s. Colyton shared in some of these but not all. In contrast with the national trend, the number of burials in Colyton showed remarkable stability over the three centuries, with between 30 and 50 burials in a 'normal' year from around 1600 until the 1830s.

The underlying rise in the number of burials in England as a whole is mainly due to population increase. For Colyton we do not have reliable population data before 1801, but we know that the population of the parish increased from 1,641

Table 6 Years of mortality 'crises' in Colyton

Year	National crisis identified
1551-1552	
1552-1553	
1557-1558	Y
1558-1559	Y
1572-1573	
1577-1578	
1582-1583	
1592-1593	Y
1615-1616	
1622-1623	
1642-1643	
1643-1644	Y
1645-1646	
1646-1647	
1670-1671	Y
1696-1697	
1719-1720	Y
1727-1728	Y
1731-1732	
1784-1785	
1787-1788	
1829-1830	

Note: Years run from July to June. 'Y' indicates that a national 'crisis' was present.

Sources: Parish registers of Colyton, Devon; E.A. Wrigley and R.S. Schofield, *The Population History of England, 1541-1871: a Reconstruction* (Cambridge, 1989), pp. 660-1.

in 1801 to 1,774 in 1811, 1,945 in 1821, 2,182 in 131 and 2,451 in 1841.[20] The increase in population from 1801 to 1831 was thus almost 33 per cent. In contrast, the average number of burials (using an 11-year moving average), rose from about

20 Census of Great Britain, 1851, *Population tables, I. Number of the inhabitants in 1801, 1811, 1821, 1831, 1841 and 1851. Vol. I*, British Parliamentary Papers 1852-53 LXXXV (C. 1631), p. 40.

30 to 38, an increase of 27 per cent. There seems, therefore, to have been a modest decline in the death rate in Colyton during the first four decades of the nineteenth century.

The differences in the temporal pattern between Colyton and England as a whole can only be understood by looking at the specific context of Colyton. A major reason for making the comparison between Colyton and the whole of England is to highlight features of the Colyton experience which were different from that in the country as a whole.

Crisis mortality

The Colyton burials data spreadsheet includes a worksheet called 'crisis', which lists periods when the number of burials in the parish rose to a level so far above the average number of burials that some unusual event seems likely to have been responsible. In most cases this will have been an epidemic, but it could also have been a subsistence crisis in the earlier decades of the period for which data are available. There has been a considerable amount of discussion about the criteria by which such periods are identified, and we shall not go into these again here.[21] In addition, a considerable amount of work on mortality crises at the regional level is included in *The Population History of England*.[22] Here, therefore, we simply compare the timing of mortality crises in Colyton with the national picture.

Table 6 lists the years in which a mortality crisis occurred in Colyton and shows whether or not a national crisis was identified in each of those years. In only a minority of Colyton's crisis years was there considered to be unusually high mortality at a national level, and these years included the well-known national crises of the late 1550s and the late 1720s. It is noteworthy that during the period when Colyton experienced its greatest crisis, November 1645 to October 1646, few of the other parishes among the 404 included in Wrigley and Schofield's data set were affected.

The magnitude of the great mortality of 1645 and 1646 in Colyton is worth commenting on here. Although we do not know the population of the parish before 1801, we can obtain an estimate of the impact of the crisis by supposing that the population of the parish in 1645-1646 was approximately the same as it was in

21 See Schofield and Hinde, *Parish Register Aggregate Analyses*, pp. 9 and 17; also A. Hinde, 'A review of methods for identifying mortality "crises" using parish register data', *Local Population Studies* 84 (2010), pp. 82-92; D. Connor and A. Hinde, 'Mortality in town and countryside in early modern England', *Local Population Studies* 89 (2012), pp. 54-67.

22 Wrigley and Schofield, *Population History of England*, pp. 645-93.

1801, at around 1,600. In the year 1646, 373 burials were recorded, forming about 23 per cent of the population.[23]

Conclusion

This short paper has illustrated the burials data in the file 'Colyton' and suggested some initial analyses which should be done before using the data to address more substantive questions about, for example, the association between demographic change and economic and social change in the parish. The analyses are generally straightforward and they are contained in the spreadsheet 'Colyton PLUS burials', which readers of this paper could study for further details. The spreadsheet 'Colyton PLUS burials' also includes the national series for England which are used in this paper.

23 This is a similar proportion to that suggested for the Hampshire town of Petersfield in the year 1666: see A. Hinde, 'Two Hampshire epidemics', *Local Population Studies Society Newsletter* 63 (2018), pp. 4-6, here at p. 6.