SEASONAL VARIATION PATTERNS IN BAPTISMS AND BURIALS FOR RUISLIP, MIDDLESEX

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Introduction

The parish registers for Ruislip, Middlesex are extant for the following periods:

Baptisms 1689-1840 (defective 1757-1761)
Marriages 1694-1840 (defective 1718-1744)
Burials 1695-1840 (missing 1706-1708)

During these periods, Ruislip was essentially a rural area and was little affected by any urban development until the opening of a railway station some three miles away at Pinner in 1838.

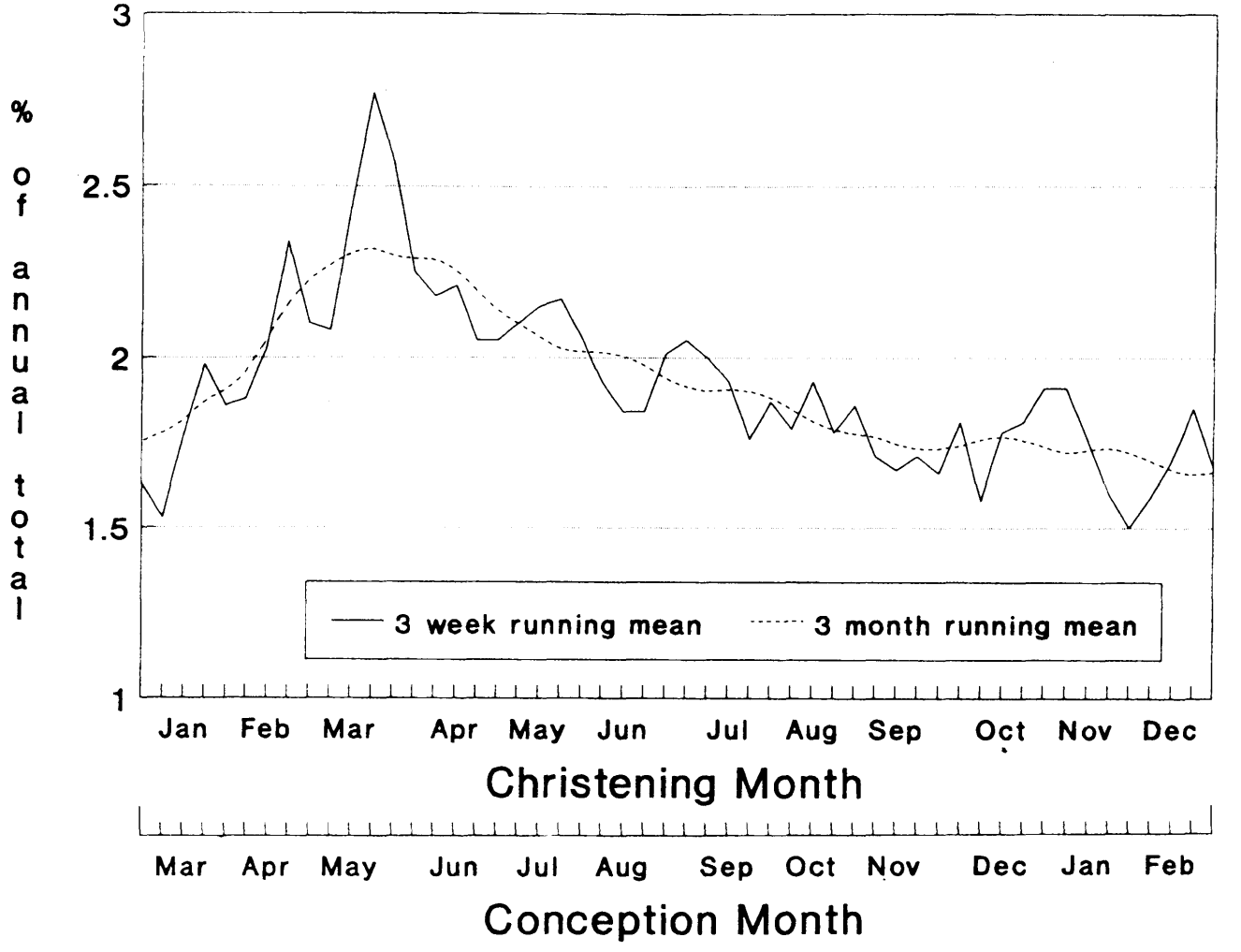
In a preliminary statistical study,[1] annual and seasonal burial and baptism patterns were compared for the two periods 1710-50 and 1770-1810. The present article examines the seasonal variation patterns only, mainly for the period 1762-1836, in more detail using three methods to examine the variations of both baptisms and burials.

The first method is to examine the variations on a weekly basis as suggested by Alan Dyer.[2] In this method, events occurring on 29 February and 31 December are neglected, the remaining 364 days are divided into 52 weeks and corresponding weekly values for each year in the period 1762-1840 summed. The results are then expressed as percentages of the total number of events and are plotted as three-week running averages.

In the second method, corresponding monthly values for each year in the period 1762-1840 are summed, the results are again expressed as a percentage of the total number of events and three-month running averages are calculated. So that these monthly values can be compared directly with the weekly values, the three-month running averages are scaled by a factor 12/52. The resulting values are then plotted on the same axes as the three-week running averages to give an indication of the trend of the cyclic variation over the year.

The third method is that adopted by Wrigley and Schofield.[3] In this method, corresponding monthly values are again summed within a period, but the results are expressed as index numbers. One hundred represents the total that would be expected on the basis of an 'even split' between the twelve months

Figure 1 Seasonal variation of baptisms



after taking into account the different number of days in each month. In order to take account of leap years, February is assumed to have 28.25 days and a year is assumed to be 365.25 days. To allow a direct comparison to be made with the Wrigley and Schofield data, the analysis period has been split into two, 1762-1799 and 1800-1836, to correspond to the last two Wrigley and Schofield periods.

For Ruislip, the number of baptisms and burials in each period is only in the order of 1,000 and, as the Wrigley and Schofield data relate to a much larger number of events (some 404 parishes), three-month running averages are again used for the Ruislip data so that the general shape of the cyclic variations can be more clearly seen. This averaging of the present data is considered reasonable to eliminate irregularities which, it is considered, are more likely to occur than in the patterns derived from the much larger number of events used by Wrigley and Schofield.

Baptisms

Dyer's article covered four different types of parish: rural, market town, city and London. The results for all four types were broadly similar, with a spring conception peak between April and June followed by a trough in summer and autumn and another peak at Christmas. In the rural parishes, the peaks and troughs were more pronounced and the timing of them was found to differ between the three urban groups.

The baptism results for Ruislip are shown in figure 1. The x-axis is calibrated in conception date as well as baptism date and, for this purpose, an interval of forty-two weeks was assumed between the conception and baptism. This is made of of a thirty-eight week gestation period plus a four week delay between birth and baptism. The four week period was assumed after examining the period 1787-1812 in which both birth and baptism dates are shown in the registers. A sample of 100 events was taken and a frequency histogram plotted from them showed a clear modal value of four. Dyer's article, which concentrated on the period 1580-1620, uses a one week delay between birth and baptism, giving an interval of only thirty-nine weeks between conception and baptism. The difference between these two birth/baptism intervals is perhaps explained by Wrigley and Schofield,[4] who state that, in the sixteenth century, baptism was very close to birth but in the latter part of the eighteenth century, there was a median interval of one month between the two events.

The three-week running averages, shown as a continuous line, give a pronounced gestation peak in the May/June period similar to that found by Dyer for rural parishes, but the other pronounced peaks and troughs found by Dyer are absent. Instead, there is a gradual fall towards the winter with the values remaining below the mean value from the end of September until April. Although a small rise occurs over the January period, this is no more significant than the rise which occurs in September, when Dyer's results show a pronounced trough. It is interesting to note that the May/June peak has lesser peaks occurring regularly on its rising and falling flanks. The trend, represented by the three-month running averages, is shown as a dotted line and exhibits a single peak in the early summer months and a trough in mid-winter. The magnitude of the spring peak for Ruislip (a rural parish) is almost the same as the rural parish peak of Dyer for a period of some 150 years earlier.

Figure 2 shows a comparison between the seasonality of baptisms for Ruislip for the periods 1762-99 and 1800-36 and those determined by Wrigley and Schofield[5] for roughly corresponding periods. The Ruislip data are plotted as three-month running averages. It can be seen that there is a close agreement between the two curves for both periods, the correlation coefficients being 0.89 for the earlier period and 0.90 for the later. If a ten-month interval is assumed between conception and baptism, then both periods show a spring conception peak and a winter trough for Ruislip. The peak for the period 1800-36 occurs about one month earlier than that of the period 1762-99 and the trough about one month later.

Burials

The burials on a weekly basis are shown in figure 3. The trend, again indicated by a dotted line, shows a rise at the end of winter, a fall in early summer and another, lesser rise, towards the end of summer. This would seem to support the theory that deaths rise towards the end of winter due to poor diet throughout the winter months, fall as the better weather gives an improved diet and then rise again towards the end of summer due to hot weather related illnesses such as typhoid. Looking at the weekly pattern it would seem that the summer low mortality trough is very short in duration and that there are three

Figure 2a Baptisms index for Ruislip compared with Wrigley and Schofield's national figure, 1762-99

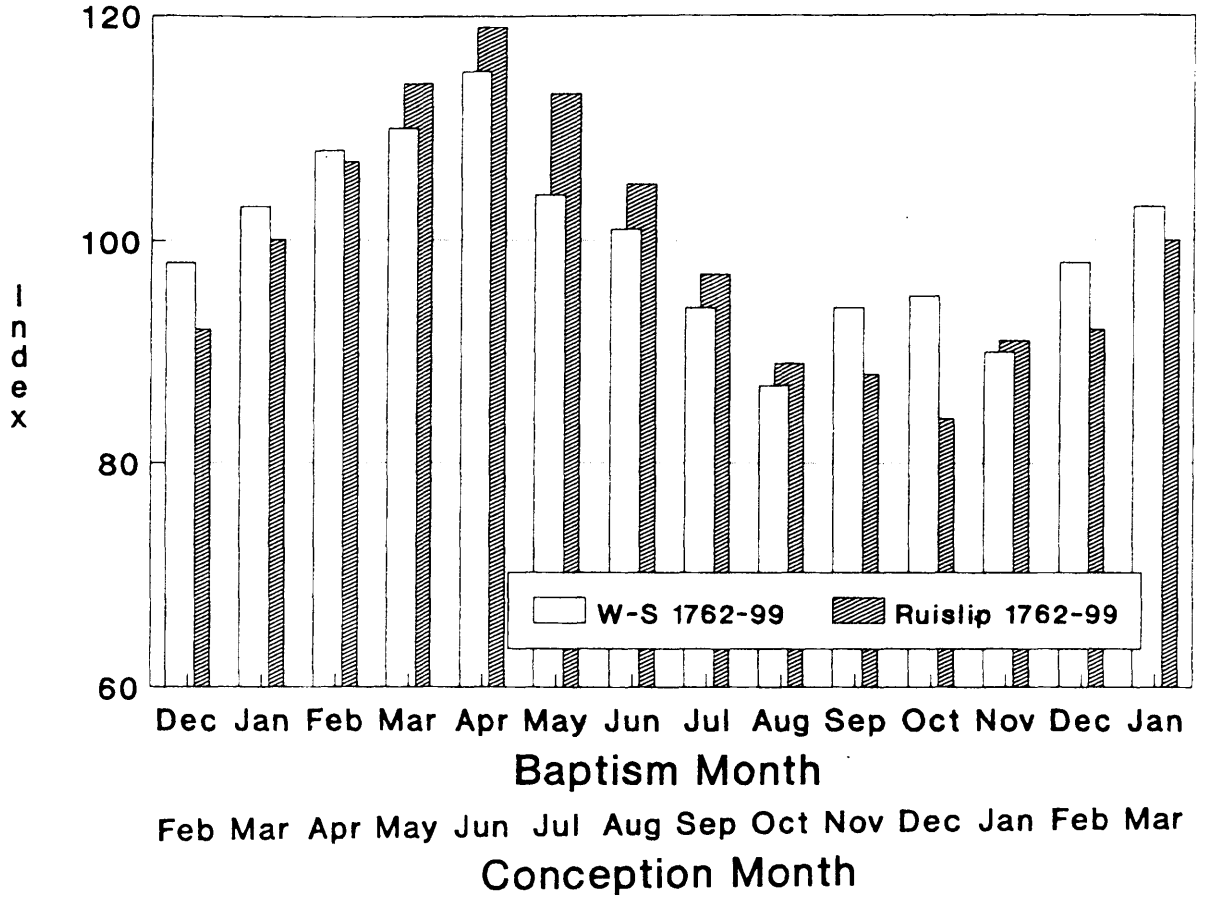


Figure 2b Baptisms index for Ruislip compared with Wrigley and Schofield's national figure, 1800-34

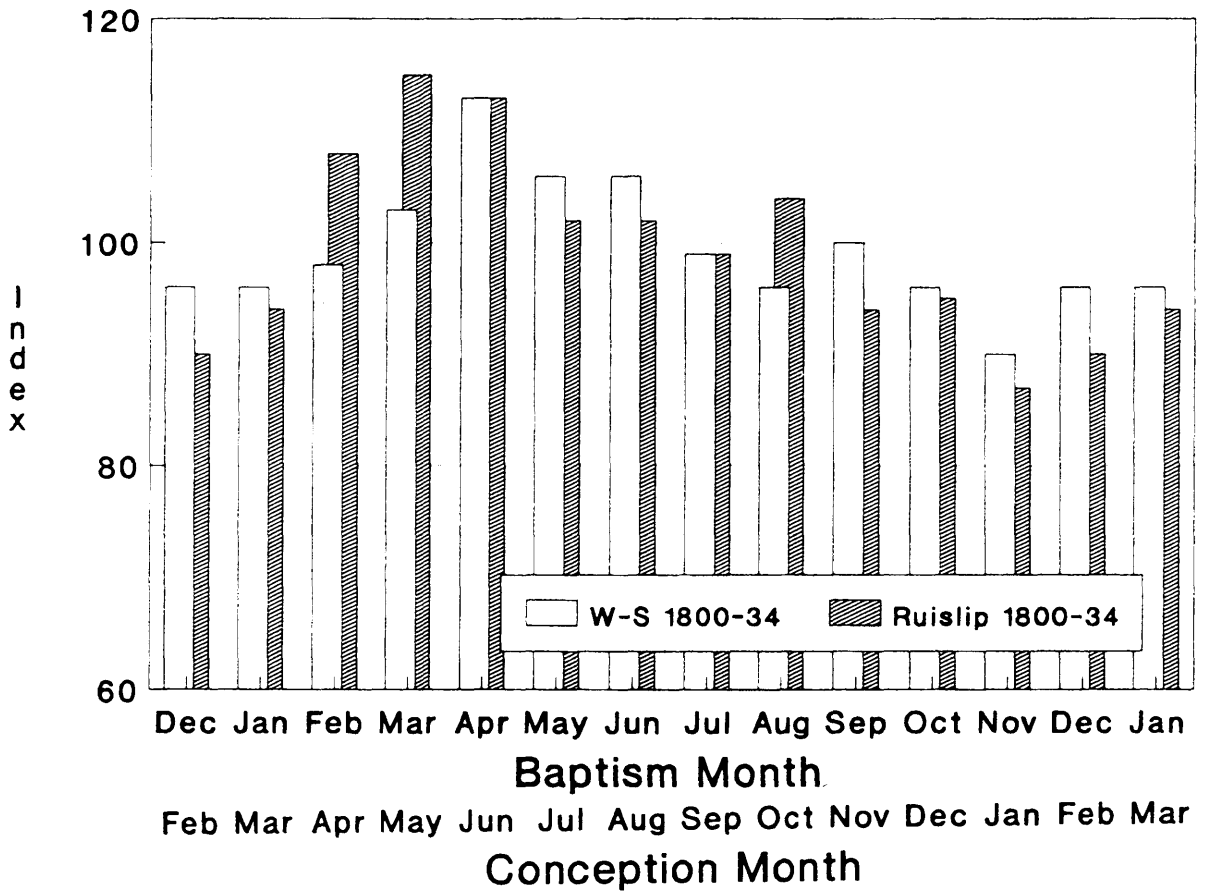
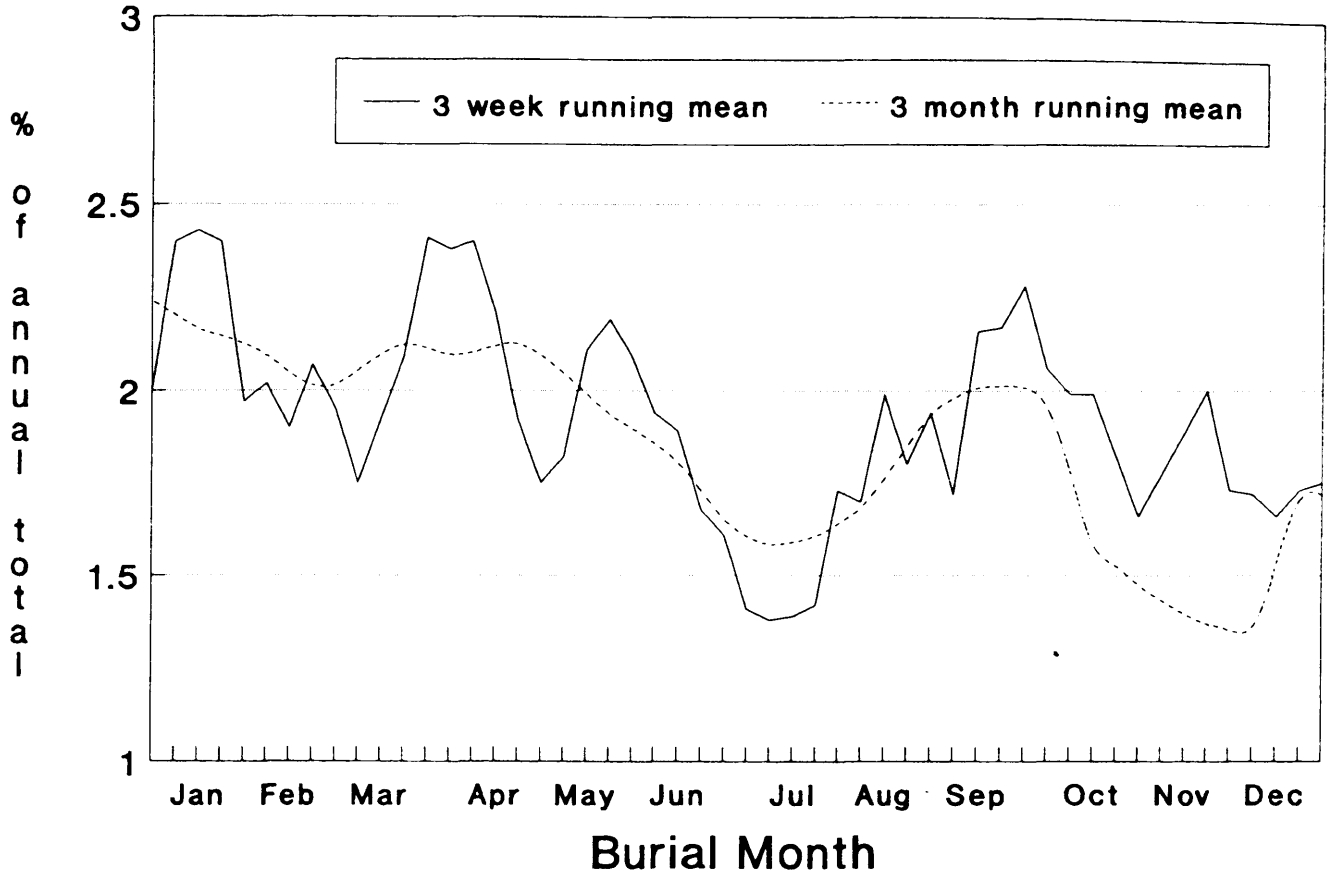


Figure 3 Seasonal variation of burials



peak periods early in the year. Dyer shows a similar mortality pattern for Ludlow. This exhibits a similar peak for the first part of the year, but the following trough is of a much longer duration than that for Ruislip and there is no autumn peak.

Figure 4 shows a comparison between the seasonality of burials for Ruislip for the periods 1762-99 and 1800-36 and those determined by Wrigley and Schofield[6] for roughly corresponding periods. The Ruislip data are again plotted as three-month running averages. For the period 1762-99 it can be seen that again there is a close agreement between the Wrigley and Schofield pattern and that for Ruislip. The correlation coefficient in this instance is 0.71 which is still high when comparing two sets of only twelve items. Burials again seem to peak during the winter months as in figure 3 and drop off during the summer with a slight rise at the end of summer.

For the period 1800-36 however, the Ruislip pattern seems to be quite different from the Wrigley and Schofield one, the latter being very similar to that for the earlier period, with a winter peak, and a summer trough. The Ruislip pattern, however, exhibits two very pronounced peaks, one in spring and one in autumn. The reason for these two peaks becomes, possibly, clearer if the burials are broken down by age as in figure 4c.

Figure 4a Burial index for Ruislip compared with Wrigley and Schofield's national figure, 1762-99

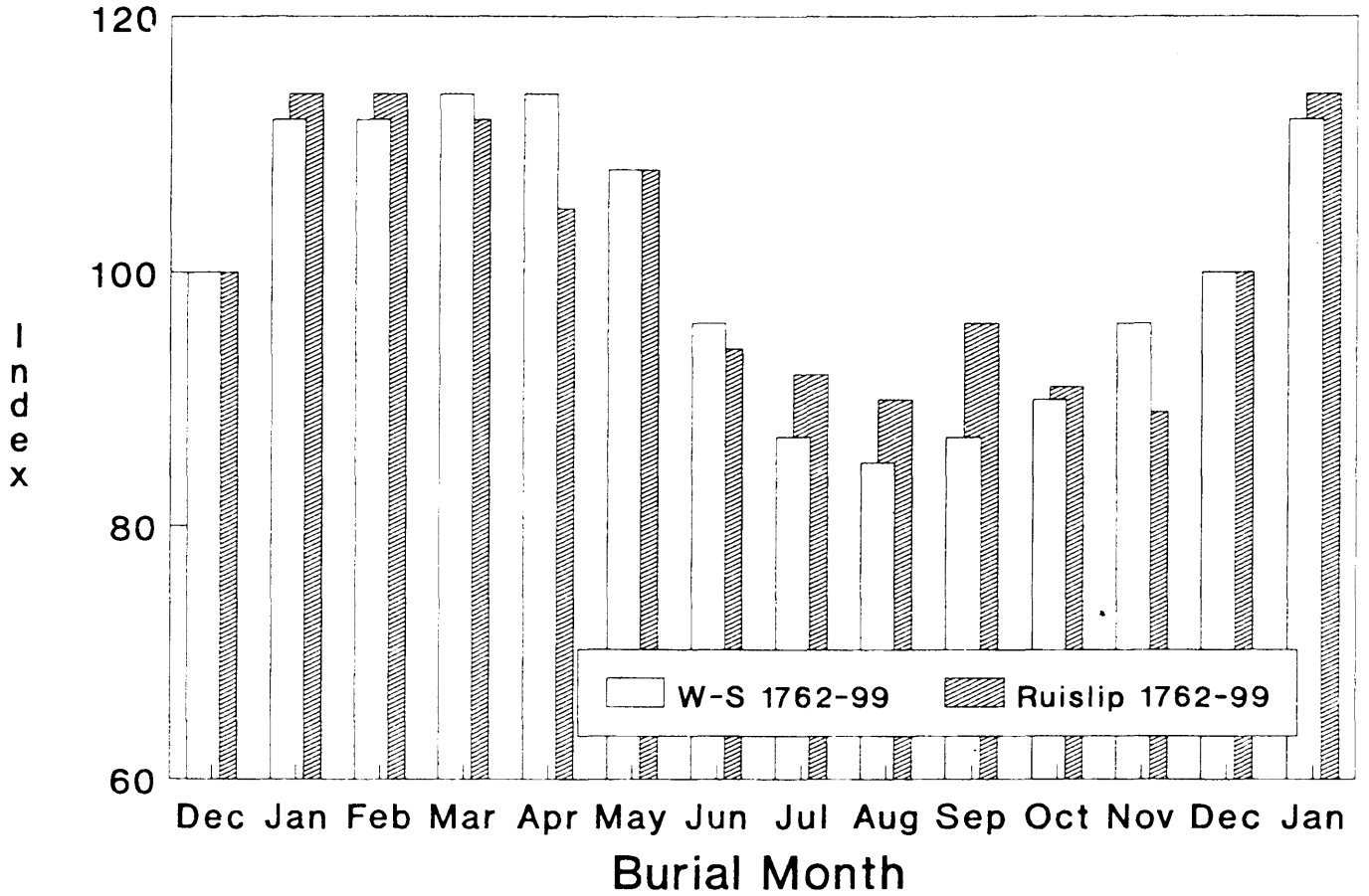


Figure 4b Burial index for Ruislip compared with Wrigley and Schofield's national figure, 1800-36

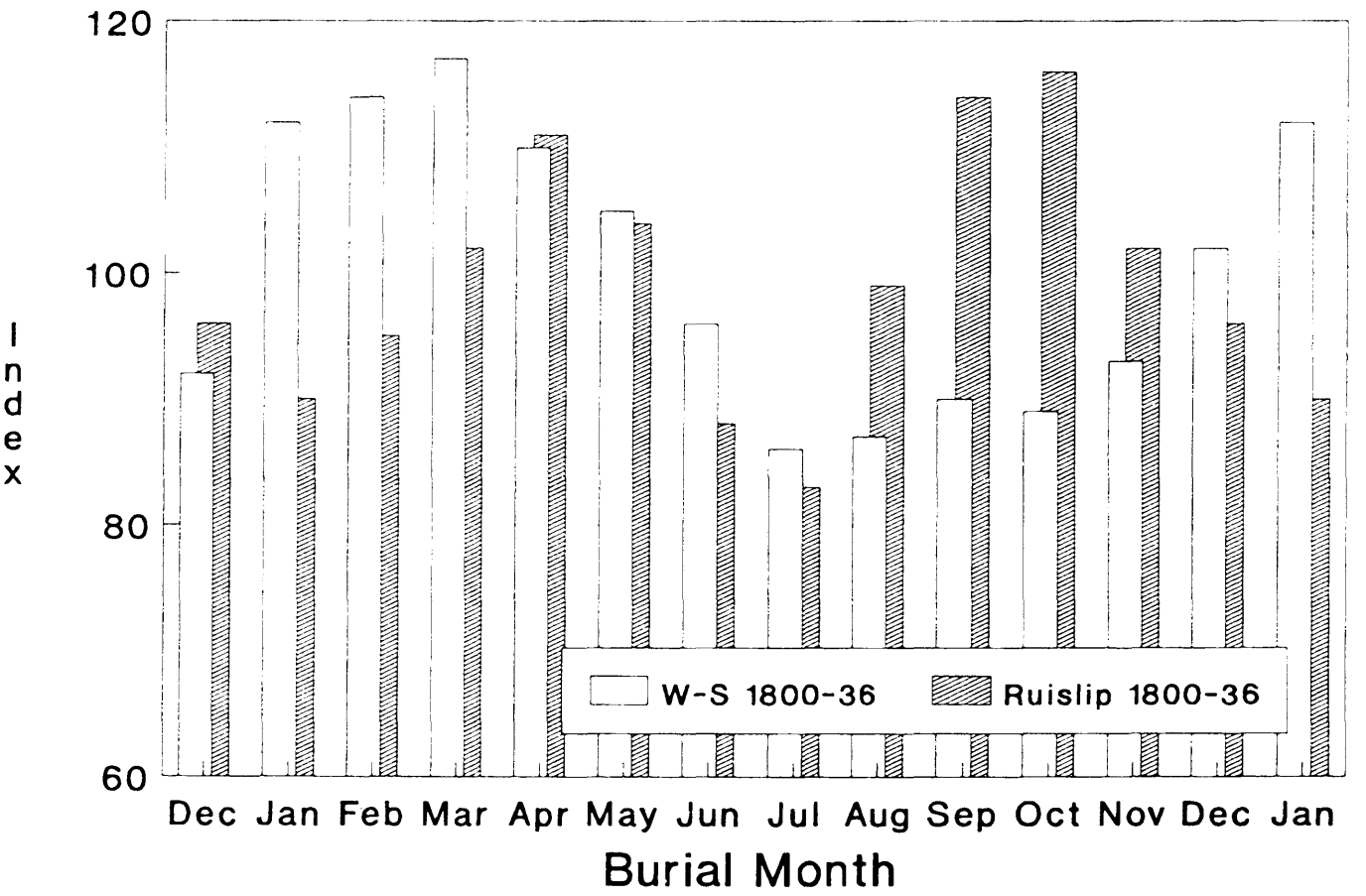
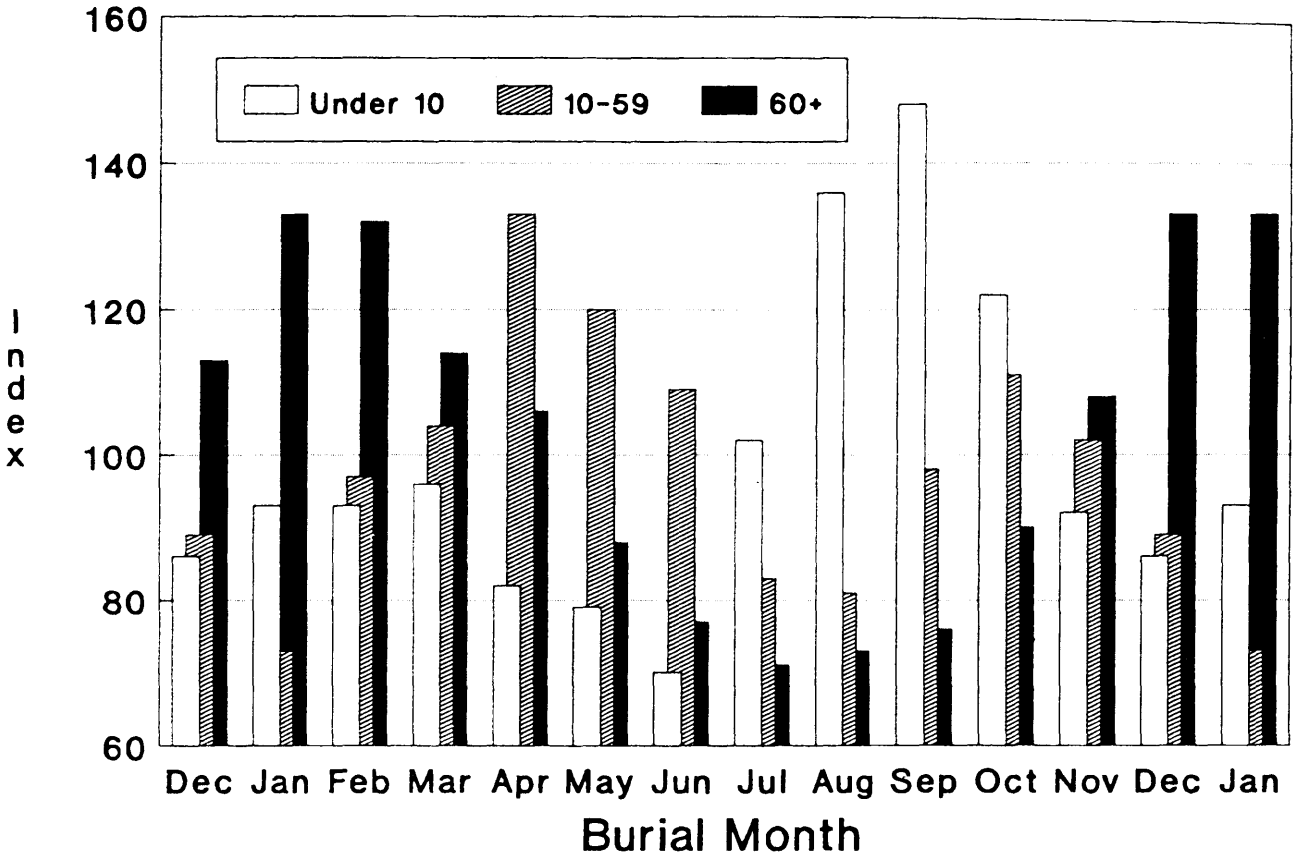


Figure 4c Age specific patterns to seasonal mortality



For the period 1811-40, the age at burial is given in the Ruislip parish registers and for this period, it was found that approximately one third of the burials were less than age ten years and approximately one third of the burials were sixty years or over. The burials for this period are therefore shown separately for the three groups:

less than ten years of age
ten years to fifty-nine years
sixty years and over

The results are plotted using the Wrigley and Schofield method so that they can be compared with figures 4a and 4b.

It can be seen that for the sixty plus group, there is a pronounced single peak throughout the winter months, whereas for the under ten's there is a pronounced peak in the late summer-early autumn and only a small rise during winter. The third group has two distinct peaks, one at the end of winter and one at the end of summer with a trough in the summer and winter. This would seem to suggest that young children were more susceptible to hot weather related illnesses and old people to cold weather related illnesses. The two peaks exhibited by the third group and by the pattern of figure 4b, would seem to be due to a combination of these two characteristics.

NOTES

1. D.A. Jacobs, 'Some christening and burial statistics for Ruislip', **Journal of the Ruislip, Northwood and Eastcote Local History Society**, 1990, pp.17-23.
2. A. Dyer, 'Seasonality of baptisms: an urban approach', **Local Population Studies**, 27, 1981, pp.26-34.
3. E.A. Wrigley and R.S. Schofield, **The population history of England, 1541-1871**, Cambridge, 1989, p.286.
4. Wrigley and Schofield, **Population history**, pp.96-7.
5. Wrigley and Schofield, **Population history**, p.287.
6. Wrigley and Schofield, **Population history**, p.294.

APPENDIX

Definition of mathematical functions used

mean value of a variable y: $\bar{y} = \Sigma y/n$

standard deviation of a variable y: $\sigma_y = \sqrt{\{(\Sigma y^2/n)-(\bar{y})^2\}}$

covariance of two variables x and y: $p = \{\Sigma(x.y)/n\}-\bar{x}.\bar{y}$

correlation coefficient between two variables x and y: $r_{xy} = p/(\sigma_x\sigma_y)$

where:

x and y are the male and female baptisms respectively

$\bar{x}$ and $\bar{y}$ are the mean values of the variables x, y respectively

σ_x and σ_y are the standard deviations of the variables x, y respectively

n is the total number of events

Σ signifies the summation of individual values of the expression following it. For example $\Sigma y = y_0+y_1+y_2+...$