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Re-assessing Josiah Russell's Measurements of Late Medieval Mortality Using the Inquisitions *Post Mortem*

L.R. Poos, J.E. Oeppen and R.M. Smith

In 1948 Josiah Russell published what was a remarkably innovative study in the demographic history of medieval England.[1] It principally involved exploitation of evidence in the Domesday Survey, bishops' registers, an array of manorial extents, the poll taxes and the inquisitions *post mortem*. Russell's approach displayed a competence in demographic methodology that was unusual, indeed precocious, for a historian of population at this time. The book, one could claim, was unique in an era that pre-dated the formal emergence of historical demography in the 1960s by almost three decades. It revealed a striking willingness to experiment with formal demographic methodology on sources that had never been created with the purpose of recording the flow of vital events or measuring demographic stocks. While over the years its shortcomings have been exposed, it contains much material that is of immense value for medieval English demographic analysis. Its findings continue to be cited and none more so than the estimates Russell made of life expectancy of the tenants-in-chief of the crown based upon the inquisitions *post mortem* (IPMs). In this chapter the focus will be on Russell's use of the IPMs in the form of a reassessment of his approaches with a view to establishing means of refining estimates of adult life expectancy and the seasonality of mortality from these sources.

Estimating Adult Life Expectancy

In recent years the work undertaken by John Hatcher and his colleagues, and Barbara Harvey with the technical assistance of Jim Oeppen, working respectively on Benedictine communities at Christ Church Canterbury, Durham Priory and Westminster Abbey, has generated the most robustly established evidence on male adult life expectancy from any status group in the English population

[1] J.C. Russell, *British Medieval Population* (Albuquerque, NM, 1948) [hereafter Russell].

in the period c.1390–c.1520.[2] The evidence available for these communities has made it possible to track individuals from the point of their profession to death and to establish above all precise details on the populations at risk to die, which is essential for accurate estimation of life expectancy. The research on these communities has yielded findings on the trend and level of male life expectancy that have certainly challenged many of the views that were previously held about the chronology of mortality during this late medieval period. The key finding has been the apparent presence in these monastic communities of a significant worsening in life chances after c.1460, followed by what would appear to be a notable recovery in the early decades of the sixteenth century, although not to a level that was better than that prevailing c.1460. During this period the estimated life expectancy at age 25 would appear to have been particularly low, although matched within the pre-industrial era by mortality estimates for similar ages in the early modern period from seventeenth-century urban settings. Furthermore the trajectory of mortality change discovered through this work on the late medieval Benedictine houses would appear to run counter to what had been a more prevalent view of ameliorating death rates in the last quarter of the fifteenth century. It has nevertheless to be acknowledged that what was once the orthodox view of late fifteenth-century demographic recovery as a precursor of Tudor demographic growth was based on relatively flimsy demographic evidence concerning possible reductions in epidemic outbreaks on a national scale and some potentially very fragile and ambiguous estimations of increasing replacement ratios in evidence principally derived from fifteenth-century wills.[3] In the first case study of one of these three monastic communities to be published John Hatcher did make a comparison between age-specific death rates that had been calculated by Russell for tenants-in-chief and those that he had estimated for the monks at Christ Church Canterbury for overlapping periods in the fifteenth century.[4] This was done with a view to reflecting on the typicality of the monastic mortality experiences and was a comparison also extended to mortality estimates for adult members of the peerage that Joel Rosenthal has constructed from *The Complete Peerage*. Hatcher noted the measure of consonance between his data and that derived from the IPMs. However, he went on to stress that 'too much significance should not be attached to this, since there are considerable differences in the quality of the sources from which the life tables have been

2 J. Hatcher, 'Mortality in the Fifteenth Century: Some New Evidence', *EcHR* xxxix (1986), 19–38; J. Hatcher, A.J. Piper and D. Stone, 'Monastic Mortality: Durham Priory, 1395–1529', *EcHR* lix (2010), 667–87; B. Harvey, *Living and Dying in England 1100–1540: The Monastic Experience* (Oxford, 1993).

3 J.M.W. Bean, 'Plague, Population and Economic Decline in the Later Middle Ages', *EcHR* xv (1963), 423–37; R.S. Gottfried, 'Population, Plague and the Sweating Sickness: Demographic Movements in the Later Fifteenth Century', *Journal of British Studies* 17 (1977), 12–37.

4 Hatcher, 'Mortality', 37–8; J.T. Rosenthal, 'Medieval Longevity: The Secular Peerage, 1350–1500', *Population Studies* 27 (1973), 287–93.

constructed, in the methods which have been applied to them, and in the nature of the populations at risk.'[5]

Subsequently the major participants in the move to establish well-founded measures of life expectancy for the later middle ages have been reluctant to invoke the estimates that Russell made and published in 1948 for purposes of comparison. Russell published estimates of life expectancy at age 25 (e25) for eight 25-year cohorts born from the thirteenth to mid-fifteenth century.[6] These e25s are plotted in Figure 8.1 alongside estimates of e25 for the monks of Westminster Abbey., Durham Priory and Christ Church Canterbury. The IPM-based data do not extend into the early sixteenth century and they only overlap in the first half of the fifteenth century, when they are relatively close to the estimates that were derived for Westminster and Canterbury houses and show a tendency to turn down, which also mirrors the trends in all three Benedictine populations. This comparison of the situation in the mid-fifteenth century tends to confirm the observation made by Hatcher about the similarities between tenants-in-chief and monks with respect to their adult life chances during the time periods when the evidence for the two populations overlap. It also reveals a notably depressed e25 among the tenants-in-chief in the mid-fourteenth century, which reflects the impact of the catastrophic epidemic outbreak of 1348–9. However, it is noticeable that e25s from these estimates track a course significantly below 25 years for much of the fourteenth and the first third of the fifteenth century, which suggests the prevalence of an exceptionally severe adult mortality regime by pre-industrial standards, whether comparisons are made with high- or low-status social groups, both before and after 1348–9.

Russell's methodology used in the creation of estimates of life expectancy has not been carefully scrutinised and this is surely needed given Hatcher's warnings regarding comparability of method and demographic assumptions noted above. The inquisitions recorded the admission of heirs to feudal property, at known ages and dates, and simple linkage of an heir's admission and their subsequent death would appear to provide an unassailable record of the person's life span. The data nonetheless do possess certain limitations: the great majority of cases pertain to males, few of whom were very young upon admission to property (rendering difficult any estimate of female or male infant and child mortality), and the persons concerned were generally from the upper ranks of English society rather than peasants or the poor. However, these are also some of the evidential biases the tenants-in-chief share with the residents of the Benedictine houses with whom they have been compared. The purpose of the administrative process that generated these inquisitions was to safeguard the fiscal and tenurial interests of the crown *vis-à-vis* its feudal tenants. It is simple to describe how they worked in theory. Whenever anyone died while holding

5 Hatcher, 'Mortality', 37

6 Russell, 186.

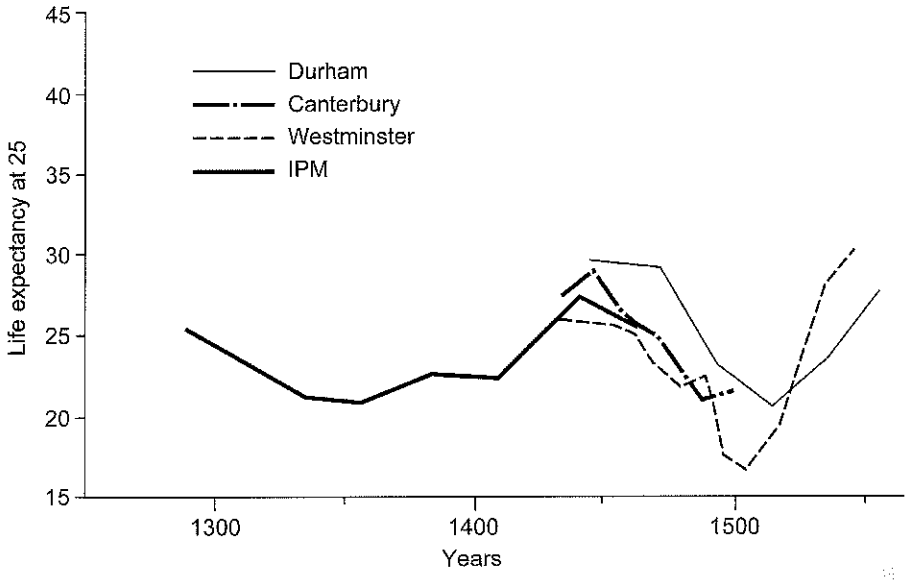

Figure 8.1 Life expectancy at age 25 of tenants-in-chief based on J.C. Russell's *British Medieval Population* and on three English monastic communities

freehold property directly from the crown, the chancery issued a writ ordering a local jury to declare what property the deceased held and who the deceased's heir was; the resulting information comprised the inquisition. If the deceased held property in more than one county, a jury from each county usually returned a separate inquisition. The record also included notation of the age of the heir, the primary purpose being to determine whether the heir was above or below the legal minimum age for holding property at common law in one's own right (21 for males, 14 for females). Another type of record that forms part of the same archival series as the inquisitions *post mortem* is the proof of age, a different inquest at which the jury declared that a deceased tenant-in-chief's heir had now reached the age of majority and was entitled to receive his or her property. Every inquisition is dated, and after the second quarter of the fourteenth century the record almost always gives the date of death of the deceased. Earlier this information is present only infrequently, which means that for most of the earlier inquisitions one must presume that a fairly short time span elapsed between the tenant's death and the inquisition. In the current investigation the concern is with dating events within a calendar year, so this shortcoming is unlikely to cause much inaccuracy. This would be a more significant issue if we were concerned with charting the seasonality of death, which was another demographic exercise attempted by Russell with data constructed from the IPMs, to which we will turn later in this discussion.

With evidence available in the form outlined above it would appear to be straightforward to link an heir's admission to property, at a given date and at a

given age, with that heir's own subsequent death at a subsequent known date, to derive that heir's life expectancy at the age at which he or she entered the property. As with any process of nominal linkage, the primary uncertainty generally centres upon identity of name and individual, but in this case the additional information about property and location can provide reasonable corroboration and linkage. However, in methodological terms the major difficulty with the inquisitions *post mortem* is that the population under observation, in this case the tenants-in-chief, was not a fixed unchanging group. A variety of events would remove an heir, having once been admitted to property and thus to the record, from subsequent observation in the inquisitions, or cause a record to be created of the death of a tenant who had not been previously admitted as an heir. Tenants could sell property, or the crown could seize it for treason or other reasons. Conversely, people who had not entered observation by being named as heirs in the inquisitions could purchase property or receive it from the crown and subsequently appear in inquisitions after they died. Increasingly in the fourteenth and fifteenth centuries, tenants could also execute legal settlements whose very purpose was to remove them from the fiscal burdens and uncertainties incumbent upon feudal tenure (and thus from these records). Moreover, at times when a tenant-in-chief's estate came into the crown's hands (temporarily, in the case of an heir's minority, or permanently, due to escheat or confiscation), those who held their property from the tenant-in-chief then found themselves subject to the same relationship with the crown as the tenant-in-chief had been, and this entered the record of the inquisition *post mortem*. Undoubtedly some inquisitions have simply been lost. For all these reasons, the population liable to appear in the inquisitions' records constituted a group ever in flux.

The calendared IPMs carry for their demographic exploitation the advantage that the editors have chosen to include observations that were mentioned in the manuscript records of individuals in contexts other than their own deaths or successions. Most typically, if one is trying to trace the totality of tenant A's appearances in the record series, one may see, in the course of an entirely unrelated person's inquisition, tenant A named coincidentally as the lord or tenant of some of the deceased's property, signifying that tenant A was alive at the time of that record; or alternatively, tenant A's widow or heirs may be so named, signifying that tenant A had died by the time of that record. The probability of observing tenant A in the record in these contexts then depends upon the random demographic events of other persons' life-histories, as well as the extent of tenant A's own landholding. For instance, it might be supposed that the wealthier and more powerful tenant A is, and the more widely spread his or her landholdings were geographically, the more likely tenant A is to appear in these coincidental contexts.

Once an heir has appeared in the record of an ancestor's inquisition *post mortem*, one may or may not find that heir recorded subsequently in connection with his or her own death. One may however be able to observe the heir in a number of different datable contexts that indicate that he or she is either

still alive at that subsequent date, or has died by then. To undertake a fuller investigation of the variability of the population at risk created by some of these aforementioned characteristics of persons appearing in the IPMs, we have drawn three samples, each of 500 males admitted to property, and thereafter traced all subsequent appearances of those heirs.[7] Only males have been used in these samples, since as a result of the rule of primogeniture operating under common law males were favoured as heirs and so too few females appear in the records to make possible the creation of meaningfully large samples. For each person in the samples the following data are available: year of ancestor's inquisition and age of heir at that date; year of each subsequent appearance of heir; and context of appearance (heir's own death, heir known still to be alive at that date, or heir known to be dead at that date). All events are dated by calendar year (new style, with year beginning at 1 January). Strict criteria for nominative linkage have been adopted. The three samples begin at roughly quarter-century intervals: in 1301, 1327 and 1352, yielding one cohort born and dead largely by the Black Death, another born soon enough before the Black Death to have been affected by it, and a third entering into observation after the epidemic.

With the benefit of hindsight and the subsequent developments in statistical methodology of survival analysis, it is obvious that there are a number of features of Russell's use of the IPM data that lead to problems with the interpretation of the results. The most important is that he used a method to estimate life expectancy that is only appropriate for two situations: when the data are complete where 'complete' means that the entry into observation and the death of each individual are known, and where the incompleteness is purely random in its incidence. The method Russell used is really only appropriate for aggregate populations with complete registration of individuals.

Incompleteness or 'losses' arise because of the nature of the data and the way it has to be processed. A record that defines the entry of an individual into observation and gives an age at entry has to be 'linked' to a subsequent record that reports the death of the individual. In drawing samples of the IPM data, it is impossible to find an unambiguous link to a subsequent death for between 50 and 60 per cent of the heirs. Russell's text is not completely clear about how he coped with such cases, but he states, 'We must remember that the available information varies greatly from person to person. Less than half of the cards give other than the death of a man.'[8] Since he was working backwards in the linkage process from death to entry, this seems to support our independently generated findings.

If such failures to link events occur at random, any estimates derived from the data will have a wider margin of uncertainty than if the data were complete, but they should not be biased. In other words, if the true life expectancy at age 25

[7] This analysis must be regarded as presenting a set of provisional findings until larger samples that are also more chronologically extensive can be completed.

[8] Russell, 116.

were 30 years, then we would expect our estimate to be 30, plus or minus some unknown error. Conversely, if the processes that prevent linkage are themselves a function of age or time then the results will be biased upwards or downwards from 30, and still be subject to an uncertainty interval. The longer the time period that elapsed from heir appearing in the record to the time of another event being observed for him, the more likely some other transaction will have occurred which would remove him from further observation in the record. *Hence* the longer a person lives, the less likely it is that he will be linked and life expectancy will be under-estimated. On the other hand, if 'visibility' in the records is a function of power and wealth, both of which might be positively associated with age, the survivorship will be over-estimated, since those who die young and 'poor' will tend to be missed.

Since the publication of Russell's work there have been a number of breakthroughs in the analysis of mortality from incomplete data, particularly in AIDS-related epidemiological research which makes use of what are truncated and interval-censored data.[9] Inquisitions *post mortem* are good examples of a data type that displays these attributes. The techniques that have evolved to deal with these problems maximise the information for the individuals whose records are incomplete. This is exactly the opposite of Russell's approach since he writes:

> How far may documents outside of the inquisitions and proofs be admitted as evidence? It would seem that any documents showing dates of persons entered in the lists would be significant as long as the deaths might be any age group. After all, this information shows in any case a completed life. On the other hand, it would not seem fair to use data which would only show people alive beyond the original date of entrance into consideration. These data could not be used in the simpler method of calculation of life and the introduction of them into the life-tables would add many years of life with no equivalent deaths.[10]

His argument above is correct if those possessing a complete record are an unbiased group. In a medical context this would be the equivalent of arguing that a person who had a heart transplant and is still alive, or eventually died of something other than heart disease, could not be included in any study that is directed to measuring the effectiveness of the operation. No surgeon attempting to secure a measure of his survival efficacy would allow such omissions from a surveillance test.

In the re-analysis of the IPM samples, we have tried to find a 'last-alive' date within the ancillary information for every individual who enters observation but cannot be linked to a death. In some cases, it is possible to define an interval in

9 For example, see D.M. Heisey and E.V. Nordheim, 'Modelling Age-Specific Survival in Nesting Studies, Using a General Approach for Doubly-Censored and Truncated Data', *Biometrics* 51 (1995), 651–60; J. Sun, 'Empirical Estimation of a Distribution Function with Truncated and Doubly Interval-Censored Data and Its Application to AIDS Studies', *Biometrics* 51 (1995), 1096–104.

10 Russell, 115.

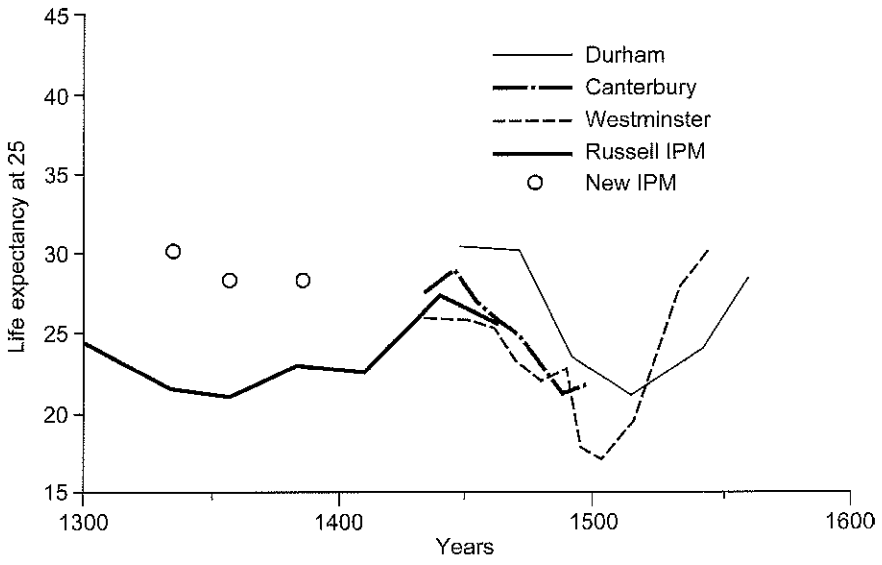

Figure 8.2 Life expectancy at age 25 of tenants-in-chief based on J.C Russell's *British Medieval Population*, on revised estimates for tenants-in-chief and on three English monastic communities

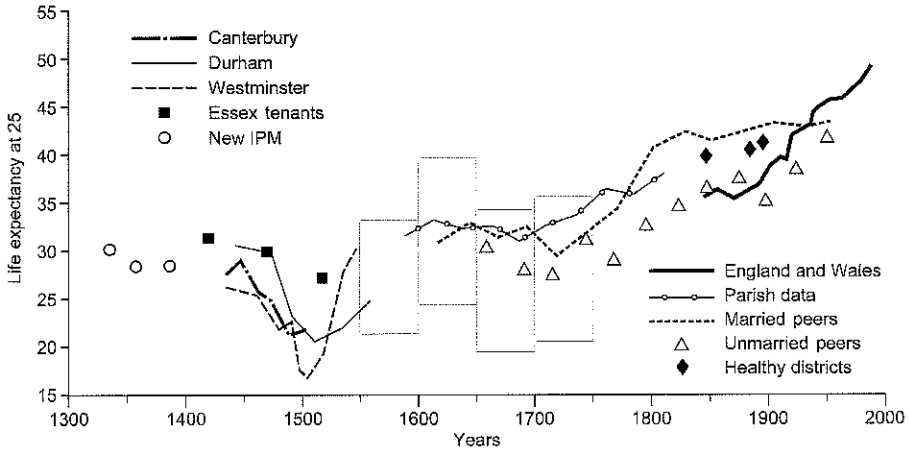

Figure 8.3 Life expectancy at age 25 of various populations, c.1300–2000

which the death must have occurred because a wife is described as 'widowed'. These two groups cover almost 30 per cent of the entrants, leaving somewhat less than a quarter who enter observation and disappear without trace. Although larger samples are needed, the use of modern methods of analysis appropriate to these types of incomplete data suggests that Russell's estimates of life expectancy at age 25 can be as much as 25 per cent too low. These new estimates confirm

our *a priori* view that Russell's estimates were biased and that the bias was downwards, indicating that the process that leads to linkage failure is positively related to age and time. From Figure 8.2 it can be seen that if our estimates are to be preferred, adding another 25 per cent to the Russell-based line for at least the periods in the fourteenth and early fifteenth century would significantly raise the suggested life expectancy of the tenants-in-chief. Of course, if Russell's own estimates for the fifteenth century were to be raised by the same percentage in the mid- to late fifteenth century, the tenants-in-chief would have a mortality significantly lower than that found among the monks.

From Figure 8.2 it can be seen that if these new estimates – using what can be proposed as more appropriate methodologies to deal with the shortcomings of Russell's original approach to the IPMs – are preferred, the tenants-in-chief displayed adult mortality levels that fell within the range of the early modern estimates obtained from parish registers. In the late fourteenth century the levels of e25 applying to the tenants-in-chief and the residents of the three Benedictine houses were very similar. It is also worth noting that in the late fourteenth century the monastic samples and the tenants-in-chief displayed levels of e25 that were strikingly similar to those of the married English peerage after 1600 and some other relatively high-status groups. These estimates for the early modern peerage constitute revisions to those originally made by Hollingsworth which underestimated expectation of life at age 25 by two to four years.[11] The new estimates suggest that adult mortality within this status group was significantly closer to levels that have been computed for non-elite populations from a sample of twenty-five English parishes (ranges captured in the boxes in Figure 8.3).[12]

There is some basis to the view that in the fourteenth and early fifteenth centuries, but making allowance for the impact of the major mid-fourteenth-century epidemic catastrophe, e25s for tenants-in-chief and monks were on a par with those for parishioners and peers in the seventeenth century. More work, although it would involve a huge investment of academic labour, could be done using manorial court rolls, particularly by tracing males sworn into tithings at age 12 to their death and employing rigorous rules for the establishment of 'presence in observation'. Poos undertook pioneering work in this manner for manorial tenants in Essex and it is noteworthy that his estimates of e25 are similar to the revised levels for the tenants-in-chief, although drifting down in the fifteenth century.[13] These estimates are also remarkably similar to those

[11] T.H. Hollingsworth, 'The Demography of the British Peerage', supplement to *Population Studies* 18 (1962); idem, 'Mortality in the British Peerage Families since 1600', *Population* (1977), numéro special.

[12] R.M. Smith and J. Oeppen, 'Place and Status as Determinants of Infant Mortality c. 1550–1837', in *Infant Mortality: A Continuing Social Problem*, ed. E. Garrett *et al.* (2006), 71.

[13] L.R. Poos, *A Rural Society after the Black Death: Essex 1350–1525* (Cambridge, 1991), 115–20.

that Rebecca Oakes has recently computed from c.1390–1540 for scholars of Winchester College who moved subsequently to New College, Oxford.[14] These innovative investigations reveal more favourable mortality levels through the late fifteenth century than those experienced by the monks, although (like the Essex manorial tenants) sharing a worsening adult life expectancy noticeably in the second half of the fifteenth century.

Developments in the later fifteenth century are of vital importance in understanding post-Black Death mortality patterns as a whole. A means should, if possible, be found of effectively utilising the IPMs during that period for the purposes of more incisive demographic analysis. The techniques now available should make it possible to create much more robust demographic measurements than have been produced hitherto.

Estimating the Seasonality of Mortality[15]

It is widely accepted that bubonic plague assumed a very distinctive seasonal incidence. This seasonal pattern was a function of climatic conditions which favoured the development of fleas which carried the disease. In Western Europe plague epidemics were generally marked by an intensification of death frequencies in summer, to a peak occurring between July and September, before falling off in the colder period from October to January.[16] If it is assumed that there was a rising incidence of plague as a cause of death after 1349, it might also be hypothesised that a shift in mortality occurred from a seasonal pattern in which deaths peaked in the late autumn and winter to one in which late summer to early autumn fatalities predominated.

Russell used evidence provided by inquisitions *post mortem* of tenants-in-chief of the crown to derive monthly distributions of deaths for the period from 1340 to 1500.[17] He compiled monthly totals of deaths reported in the IPMs for the pre-Black Death period, and for each succeeding quarter-century up to 1500.[18] For the period 1347–75 he provided two separate tabulations: one for

14 R.H.O. Oakes, 'Mortality and Life Expectancy: Winchester College and New College Oxford c. 1393–c. 1540' (unpublished Southampton University (Winchester) PhD thesis, 2008).

15 This section of the chapter is based on analysis originally appearing in L.R. Poos, 'Population and Resources in Two Fourteenth-Century Essex Communities: Great Waltham and High Easter 1327–1389' (unpublished Cambridge University PhD thesis, 1983), especially ch. 4 and appendix C.

16 For a useful discussion see P. Slack, *The Impact of Plague in Tudor and Stuart England* (1985), 64–9; D.J. Schove, 'Chronology and Historical Geography of Famine, Plague and other Pandemics', *Proc. XXIII Congress of History of Medicine* (1972), 1271.

17 Russell, 195–9.

18 Russell, 197.

'epidemic years', which he defined as 1348–50 (for the Black Death itself) and 1360–1, 1369 and 1374 (for the three major later epidemics mentioned by the chroniclers); and one which included all other years in the period. The distribution of deaths for 1348–50 indicates mortality peaks in winter and spring, but the later distributions displayed prominent peaks between August and October, which subsided only towards the end of the fifteenth century. Moreover this peak was apparent in the third quarter of the fourteenth century, not only in the 'epidemic' years but in the remainder of the period also. This inclined Russell to characterise the period as one of 'epidemic' plague, so recurrent as to dominate continuing mortality patterns even outside known epidemic years. Russell's data have subsequently been cited by other historians to support the argument of plague endemicity during the later middle ages.[19] But Russell's data as presented are incomplete, because he apparently included only those cases in which the inquisitions dated death by day and month (of the form '10 December') rather than by reference to saints' feasts (of the form 'Monday after St Nicholas' day').[20] To establish whether deaths dated by the two approaches generated monthly distributions that were indistinguishable, a complete dataset for the reign of Edward III was compiled, and its monthly distributions are presented in Table 8.1. This table presents the data in a slightly different form from Russell's. Distributions are given for the pre-Black Death period (1327–47, but predominantly comprised of events from about the 1340s, because only then did the sources begin to record death dates consistently), and for 1350–77, instead of Russell's 1351–75. For the later period the data are included for the entire period, and also for the entire period excluding the years 1361, 1369 and 1375, because these were the years of most outstanding high death totals. Finally the data for the Black Death itself (i.e. calendar years 1348–9) and for the later epidemic years are tabulated separately. For each distribution the actual number of deaths assigned to each month is given, then the number which would be expected to have occurred if the deaths were evenly spread throughout the year, and an index ratio of observed to expected figures.[21] For comparative purposes, Table 8.2 presents an index of monthly burial figures taken from aggregative analysis of English parish registers in 1540–99, which can be taken as representative of seasonal mortality patterns in early modern England (although this will include all age groups and both sexes).[22]

Comparing the totals of deaths compiled in Table 8.1 with Russell's table indicates that the latter represents fewer than half the cases contained in the

19 J. Hatcher, *Plague, Population and the English Economy 1348–1530* (1977), 50.

20 Russell, 99 n.12

21 This calculation allocates the total observed deaths for each period to individual months in proportion to the different number of days per month (counting February as 28.5 and an entire year as 365.25 days).

22 E.A. Wrigley and R.S. Schofield, *The Population History of England 1541–1871: A Reconstruction*, 2nd edn (Cambridge, 1989), 294

Table 8.1 Seasonal patterns of mortality among tenants-in-chief of the crown

1327–47	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
Observed	34	37	35	36	35	23	31	39	35	33	43	29	410
Expected	34.8	31.7	34.8	33.7	34.8	33.7	34.8	34.8	33.7	34.8	33.7	34.8	
Index	98	117	101	107	101	68	89	112	104	95	128	83	
1350–77													
Observed	85	82	109	96	125	124	151	219	239	222	143	100	1695
Expected	143.9	131.1	143.9	139.2	143.9	139.2	143.9	143.9	139.2	143.9	139.2	143.9	
Index	59	63	76	69	87	89	105	152	172	154	103	69	
1350–77 excluding calendar years 1361, 1369 and 1375													
Observed	79	66	94	87	99	90	86	106	120	99	80	61	1067
Expected	90.6	82.5	90.6	87.6	90.6	87.6	90.6	90.6	87.6	90.6	87.6	90.6	
Index	87	80	104	99	109	103	95	117	137	109	91	67	
1348–49													
Observed	11	13	36	44	66	73	93	121	52	55	16	13	593
Expected	50.3	45.9	50.3	48.7	50.3	48.7	50.3	50.3	48.7	50.3	48.7	50.3	
Index	22	28	72	90	131	150	185	241	107	109	33	26	
1351, 1369 & 1375 only													
Observed	6	16	15	9	26	34	65	113	119	123	63	39	628
Expected	53.3	48.6	53.3	51.6	53.3	51.6	53.3	53.3	51.6	53.3	51.6	53.3	
Index	11	33	28	17	49	66	122	212	231	231	122	73	

Index: 100x (Observed/Expected)

Table 8.2 Seasonal Patterns of Burials in English Parishes 1530–1599

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Index	107	111	121	120	99	87	81	89	92	97	97	99

calendared IPMs. For instance, during the later non-epidemic years Table 8.1 indicates 1,067 deaths, compared with Russell's 350, a discrepancy much too large to be accounted for by the slight differences in periods covered by the respective tabulations. But there are also discrepancies of seasonal distribution between the tabulations. For the period 1327–47, Table 8.1 indicates that although a mortality peak between February and May is apparent, August and September also exhibit indices notably higher than Russell's data indicate. The distribution for the period 1350–77 does indeed indicate a heavy preponderance of mortality between July and October. But more than one-third of the events of this distribution are accounted for by the three years of crisis mortality, and, as the final distribution in Table 8.1 shows, mortality in these years was overwhelmingly dominated by deaths occurring in these four months. The same pattern is apparent in the Black Death itself, though the data as tabulated obscure the fact that all but 61 of the 593 deaths of tenants-in-chief fell in 1349 alone, and this distinctive seasonal pattern may be attributed to that year.

Removing the three crisis years from the later distribution considerably alters the monthly index. The spring mortality peak apparent in the earlier period is restored, and the levels of July to October are greatly reduced, although remaining apparently somewhat higher than the pre-Black Death distributions. A Kolmogorov-Smirnov two-sample test comparing the monthly frequencies of earlier and later periods confirms that, when the entire period 1350–77 is considered, the two distributions are significantly different, but when the three crisis years are removed, the test result is within the range required to accept a null hypothesis of no significant change in seasonal mortality from before to after the Black Death. Some of the discrepancy between Table 8.1 and Russell's figures may be attributed to the fact that Russell included 1374 as an epidemic year and not 1375, although the latter year accounted for many more deaths than the former (132 in the revised dataset, compared with 48). Thus including 1375 in the supposed non-epidemic data may have helped to distort their seasonal distribution. The high levels of autumnal mortality in both periods remain anomalous in comparison with parish register data, and if not reliably indicative of actual mortality may relate to administrative peculiarities of the inquisition system yet to be discovered. Nonetheless Russell's conclusions regarding plague epidemicity – plague mortality as a significant continuing factor in the mortality experience of English tenants-in-chief rather than being confined to particular epidemics – cannot be supported statistically by simple seasonal mortality patterns derived from the complete dataset for the reign of Edward III. Obviously there is much scope for more comprehensive seasonal analysis of mortality in the full IPM data, extending into the fifteenth-century set and using a more carefully specified methodology.

Conclusion

Clearly we do need to extend the application of the methods that have been employed in this relatively limited excursion involving a reassessment of mortality analysis that employs the IPMs to cover the fifteenth century, and the spate of newly edited volumes for the period of Henry VI's reign may add a valuable dataset for consideration along the lines adopted in this chapter.[23] However, we still have to surmount the difficulty of devising a means of working with the still-to-be-fully-calendared IPMs for the period after 1447, which must remain as a task of the highest priority if the precious datasets available for analysis of the demography of the later middle ages are to be effectively exploited.

[23] Recently edited *CIPM*, xxii–xxvi, covering the period 1422–47.