ALLOWING FOR MIGRATION IN ESTIMATING EARLY POPULATION LEVELS

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Introduction

Parish surveys giving exact populations in the sixteenth or seventeenth centuries are rare.[1] Normally the local historian of this period has to make rough estimates of populations, based on such sources as the numbers of communicants at ecclesiastical visitations, the numbers of adult males taking the Oath of Protestation in 1642 and the numbers of householders subject to, or exempt from hearth taxes. More recently, aggregative analysis combined with back projection technique has made it possible to estimate populations from the average numbers of baptisms or burials per year as recorded in the parish registers. However, the average factors for converting numbers gleaned from these sources into real populations are only roughly known, and may not necessarily apply in a particular case. If estimates at different dates can be related to each other by reasonably reliable calculations of population changes, they can then be adjusted to obtain the best fit. These adjusted estimates are likely to be more accurate than those obtained from the separate sources.

The two components that need to be taken into account in calculating population changes are natural increase (births minus deaths, usually approximated by baptisms minus burials), and migration both into and out from the community. Subject to the possibility of incompleteness of the registration of vital events, parish registers usually allow reasonably accurate calculations of natural increase to be made. Only rarely, however, is there direct evidence of the level of migration before the recording of places of birth in the nineteenth century census enumerations.

A discussion of the main sources of information on mobility can be found in Hollingsworth.[4] One pre-census source which provides information on both the amount and distance of migration is a group of Yorkshire parish registers, in which baptismal records from 1777 to 1812 note the places of residence of the grand parents.[2] Another source of earlier mobility information, though of a sample of the population that may not be entirely representative, is provided by some diocesan court records that include biographies of witnesses.[3] A further source of information for migration is household listings. Those such as for Cardington, Bedfordshire, 1782,[5] which give information on the *de jure* as well as the *de facto* population are extremely rare. Consequently, migration is more often studied by combining lists of inhabitants for the same place at different times.[6] A pioneering example of the use of this sort of information is Laslett's study of the 1676 and 1688 listings for Clayworth, Nottinghamshire, and the 1618 and 1628 listings for Cogenhoe, Northamptonshire.[7] Such listings

allow the extent of migration to be calculated but not the distances that people have moved. Other sources mentioned by Hollingsworth, such as those marriage records that give the parish of origin of spouses, apprenticeship records that give the place of origin, freeman records that provide places of birth, and settlement papers that give the parish of origin, allow such distances to be studied, albeit for restricted samples of the population. Population changes without details of individuals can, of course, be used to estimate net migration. This was done, for example, for mid-Wharfedale in the period 1721-1812[8] and for Worcestershire between 1660 and 1850.[9]

If studies of population change are undertaken for places that lack sources of mobility information, there is a temptation to assume that in and out migration roughly compensate each other so that they can be ignored. But differences in local economies between neighbouring communities must often have caused unequal migrations, and one of the purposes of this article is to point out that serious errors may arise if the migration components are ignored. A method is suggested by which these components may be roughly estimated. This is first tested, using the Clayworth data, and then applied to the case of Beeston, Nottinghamshire.[10] The method involves noting the appearance and disappearance of surnames in the parish register, together with the numbers of continuing names, from which a further estimate of the population may be obtained.

Degree of mobility

Laslett's study of Clayworth over a limited twelve year period and Cogenhoe over ten years is one that does allow the calculation of rates of migration. In Clayworth, with 401 inhabitants in 1676 and 412 in 1688, 244 people disappeared between these two dates. Of these, 92 had died, 6 had married, and 53 were servants who must have moved away. At least 45 were household members who had moved away – there may have been more among the 48 names not accounted for.[11] Thus, an average of at least 8.2 people per year had moved away. On the other hand, 255 of the names in the 1688 list had appeared since 1676. These included 58 household members and 60 servants migrating in, corresponding to an average of 9.8 people per year.

Of the 185 named people in Cogenhoe in 1618 and the 180 in 1628, only 86 survived throughout the period. Of the 99 (53.5 per cent) who disappeared, about 40 household members and 18 servants moved away – an average of 5.8 people per year - and about 4 and 25, respectively, in these two categories moved in (totalling 2.9 people per year). About 21 of those disappearing and 23 of those appearing were not accounted for.

Re-assessment of these mobility figures in terms of numbers of households provides a more relevant comparison with the estimates that are to follow. In Clayworth, there were 98 households in 1676 and 91 in 1688,[12] of which 60 had persisted from the earlier listing. Of the 38 households that disappeared over the 12 year period, 10 were identified as moving out, and 19 of the 31 new households in 1688 had moved in from elsewhere. This represents an average rate of movement of about 0.8 households per year moving out and 1.6 per

year moving in. The numbers of individuals associated with these migrating households averaged 4.5 per household for those moving out and 3.1 per household for those moving in. Presumably the latter were generally younger families with fewer children.

In Cogenhoe, there were 33 households in each of the two years but only 25 of them had persisted from 1618 to 1628. All 8 of the disappearing households had moved out (averaging 0.8 per year) with an average household size of about 5.0. Of the new households, 4 had moved in (averaging 0.4 per year) having an average size probably more than the minimum 1.0, since there were 23 people not accounted for. Laslett notes that, in addition to these household members, there was a considerable movement of servants, many of whom changed their employment once a year, frequently involving movement to a different parish. This applied not only to the male servants, who were mainly employed in agricultural work, but also to the female domestic servants.

Much of the migration that took place is likely to have been over small distances, some only to adjacent parishes. The study by Levine of eighteenth century settlement certificates and removal orders for immigrants to Shepshed (Leicestershire) and Bottesford (Nottinghamshire) showed that only in 5.5 or 5.8 per cent of the cases, respectively, was migration over a distance of more than 15 miles.[13] On the other hand, only 17.5 or 12.5 per cent, respectively, were from adjoining villages. Similar evidence comes from the Cardington studies mentioned above.

Migration distances were analysed by occupational category proposed by Lamb and Maltby in a study of West Riding parishes[14] and were compared with Holderness' figures for the Plain of York.[15] In both studies, about 55 per cent of the farmers appeared not to have moved from the parish of residence of their parents, about 31 per cent had moved under 10 miles, and 11-15 per cent had come from further afield. For tradesmen and textile workers, about 48 per cent had remained in the same parish, 26-30 per cent had moved under 10 miles and 18-26 per cent further. The labourers, however, had been more mobile though, again, only over short distances. Only 32-38 per cent remained in the same parish, 38-43 per cent moved less than 10 miles, and 18-24 per cent moved further.

Studies have also been made of the ages at which migrants moved, for example, by Schofield, based on the 1782 Cardington listing,[16] and by Clark, derived from court witnesses in the period 1660 to 1730.[17] In the latter study, over 60 per cent of urban males and nearly 70 per cent of rural males had moved at least once, again usually within 10 miles. It is clear from these that there was much movement before the age of thirty, especially by men prior to marrying or, if after marriage, before having many children.

Effects of the neglect of mobility in estimating population changes

Between the dates of the two parish surveys in Clayworth, the numbers of burials exceeded the numbers of baptisms by 6, and the population increased by 11. In this case, then, neglect of migration in calculating the change in

population would have caused only a small error. The situation is different in places where there is more imbalance between in and out migration, especially if longer periods are studied, as is illustrated by the case of Laxton, Nottinghamshire.[18] Here, estimates of population change between the sixteenth and nineteenth centuries, based on natural increase only, showed a steady increase that was contrary to the rough indications from the various sources mentioned in the introduction. This could be corrected empirically by assuming a small excess of four people per year migrating out compared with those moving in. Even such a small imbalance caused a large cumulative effect on the population estimates in the long term.

A new method of estimating the amount of migration

The empirical method adopted for dealing in an approximate way with net migration away from Laxton, though better than making no allowance at all, is unsatisfactory since it is not based on any real evidence concerning the true extent of migration. The main sources of direct evidence have been outlined above but, in general, the local historian must rely on indirect evidence. This can be provided by parish registers, especially if the latter permit family reconstitutions. However, registers need to have been accurately compiled for at least two or three generations to allow reconstitution of a reasonable proportion of the families of any community. As Hollingsworth points out, omissions are indistinguishable from migrants.[19]

Most registers suffer from some degree of under-registration, due either to neglect, particularly during the Civil War and Commonwealth period, or as a result of baptisms and marriages carried out on nonconformist premises and not recorded in the parish register.[20] This is sometimes allowed for in a rather arbitrary way by multiplying by either a constant or a variable factor.[21]

I have used parish registers in a way which is less exacting than family reconstitution, and which is relatively insensitive to under-registration, to obtain a rough estimate of the extent of both inward and outward migration. It is based on the appearance and disappearance of surnames, rather than of individuals.[22]

It is true, of course, that not all surnames in the community would appear in the parish register. Omissions would be mainly servants – mostly young people who from parish register evidence would be considered as still residing in some other parish in which they were baptised. Laslett has found, however, in a study of 21 English communities, that about half of the servants shared surnames with other members of the community.[23] Although some of these may have come from other parishes, many of them can be regarded as having been accounted for in population estimates based on parish register names, as though they were still living with their families. For the rest of the servants, one can normally do no better than assume that the numbers who have moved in from elsewhere are roughly compensated by the family members from the parish who have moved away to become servants elsewhere.[24] Alternatively, if the contribution to the total population from nuclear families can be estimated,

servants and others can be allowed for roughly by using Laslett's average number of 0.63 servants per household,[25] or the average total of 0.93 persons per household (20 per cent of the population) who were not members of the family.

It is also true that registers contain surnames of people who do not belong to the parish. These are most likely to be marriage partners from outside who did not remain in the parish. The partners of these people from within the parish who also moved away one can only assume to be roughly compensated by those who married elsewhere and moved in.

The most significant names, then, for estimating both the population levels and the extent of migration are those of the members of families resident for some years in the parish. As a rough rule, these surnames can be taken to be those for which there is more than one parish register entry within, say, a 20 year period.[26] Most resident family names should have occurred within this time, even if there were a slight under-registration of demographic events. For example, in a study of the Clayworth register for the years following the second of the rector's surveys in 1688, I found that 52 of the 77 family surnames in that survey had occurred in the register within 5 years, 63 within 10 years and 67 within 15 years. Families with the remaining ten surnames had probably moved away from the parish or died out by then.

The method adopted for obtaining a rough estimate of the extent of migration involves, as a first step, the construction of a table of the type illustrated in part by Figure 1, in which there is a horizontal row for each surname mentioned more than once in the parish register within the period under study (preferably not less than 25 years). The columns are the individual years of that period. Each demographic event recorded in the parish register for these names is then entered in the table with a **C** for each christening, an **M** for each marriage, and a **B** for each burial. (Each marriage is entered twice, once for the groom's surname and once for the bride's.) A line is then drawn across the table for each surname, spanning the years for which there are recorded events for that name. Where there is a long gap of, say, more than twenty years between events, a broken line is used to indicate doubt about the continuation of the name over this period. A similar broken line is used anywhere else in the table where there is doubt about a name's continuation (e.g., especially near the beginning and the end of the period). Brackets or short vertical lines are then drawn at the beginnings and ends of the lines to emphasise the commencement or termination of each name.

Near the beginning and end of the period under study, it is not possible, without further evidence, to distinguish between a gap in the occurrence of a name and its start or termination. Any opportunities of clarifying this situation should be taken but it must still be recognised that there must be uncertainties near the edges of the table. These are conveniently referred to as 'end effects'.

The next step in the procedure is to count, for each page of the table, the numbers of names starting, ending, continuing, and possibly continuing each year. These numbers are then added for all the pages. The year in which any

Figure 1 An illustration of the table used in conjunction with the proposed method

names (selected)	1577	78	79	80	81	82	83	84	85	86	87	88	89
Abbot											[M	---	---
Bacheler	---	---	---	---	---	---	---	M]					
Beardsley	[C	---	---	C---	C---	---	---	C	---	---	---	---	---
Bennet	---	---	C]										
Booth	---	---	---	---	---	---	---	M---	C---	B---	C	---	---
Dynes	---	---	---	---	C	---	---	---	---	---	B---	M]	
Fayles	[M	---	---	CC	---	---	C	---	---	---	B	---	---
James	---	---	---	---	C	---	C	---	C	---	---	C---	C-
Jellibrand						[MB	---	C	---	C	---	C	---
Kirkby			[C	---	---	---	---	M	---	B	---	MM	---
Lacie	---	---	---	BB	---	M	---	M---	MC	C	---	C---	M--- C-
Leep	---	CB	---	M---	B-	-	-	-	-	-	-	-	-
Mee	--C	---	C	---	B	---	B---	C	---	---	---	B	---
Owthram							[C	---	---	---	C	---	---
Rowson	---	---	---	---	---	---	B	---	---	---	B]		
Sampson				[C	---	M---	M---	B---	C]				
Sharwen	---	---	---	---	---	---	M	---	B-	-	-	-	-
Smalley	---	---	---	M	---	C	---	CM	---	C	---	MM	--B-
Widhouse	---	---	---	BB	---	---	---	---	---	---	---	B]	
Wilson										[C	---	---	C-
Starting	2	0	1	1	0	1	1	0	0	1	1	0	0
Ending	0	1	0	0	0	0	0	2	0	0	1	2	0
Continuing	12	13	13	14	15	14	15	14	14	13	13	12	12
?Continuing	0	0	0	0	0	1	1	1	1	2	2	2	2

name makes its first or last appearance in the register would not normally correspond, of course, to the date of movement of a family of that name into or out of the parish. Moreover, single individuals, or a whole family bearing that name may have left the parish, still leaving relations to continue the name in the register. However, the first of these considerations merely introduces a timing error and the second causes a small underestimate of the number of people migrating. If rates of migration change only slowly, the timing error will be insignificant. With regard to the second point, some allowance can be made for the number of families associated with each surname, as explained later.

Because of the 'end effects' referred to above, only the central part of the period of years studied is likely to yield reliable statistics. This more reliable period is usually obvious in the trend of the totals obtained, and overall averages should be taken only over this central range. If there are clear trends in the totals, moving averages over the central period are helpful, but the timing error referred to above should be borne in mind.

The final stage in this analysis is to convert the numbers of surnames starting, ending, continuing and possibly continuing, into numbers of individuals. This can be the least certain part of the process but the local historian may have an indication from other work of the most appropriate factors to use. If not, for continuing households, Laslett's 'English standard' household of 4.75 persons, is a possible factor, bearing in mind that this would include servants and other inmates.[27] However, Arkell has pointed out that this figure is an average over the wide period 1574 to 1812 and that it falls to 4.5 if the period is restricted to 1650 to 1749.[28] He recommends a factor 4.3 to apply to hearth tax household numbers, in order to exclude lodgers, and he suggests that two-thirds of rural communities should have populations within 10 per cent of the estimate obtained by using this factor and three-quarters should be within 15 per cent. Laslett's figure becomes 3.82 if all non-kin are excluded but, again, for the period 1650 to 1745, Wall concludes that the average household size was 4.44 persons, of whom 3.56 were members of the family of the head of the household.[29]

If populations are calculated from continuing household numbers, lodgers and other inmates should be included, so I propose to use the factor range 4.3-4.5. For migrating households, however, a range of 3.4-3.7 (spanning Wall's 3.56) is probably more appropriate, since a substantial proportion are likely to have had a young household head with few, if any, children and non-kin members.

When a surname disappears from, or first appears in a parish register, it almost certainly represents only one household. Continuing surnames, however, will on average represent more than one. For Clayworth, Laslett quotes the approximate figures 30 per cent more households than surnames in 1676 and 20 per cent more in 1688.[30] For any community, abnormally high numbers of parish register events for particular names in the period studied (e.g. Lacie, in the Table) may provide a rough figure for the number of extra families or households for these names. For Beeston 1580-89, there were about 13 names with abnormally high numbers of parish register records, suggesting the need for about an 18 per cent inflation from names to families. A partial family reconstitution, however, suggests that the 76 surnames in 1593 might represent

about 100 family groupings, corresponding to an inflation of 32 per cent. In the absence of specific evidence, it would be safest to employ for rural communities an inflation factor in the range 1.2-1.3.

Test of the method using Clayworth data

With the aid of the two surveys for Clayworth, it is possible to check both the method of estimating the degree of mobility and the use of the number of continuing family surnames to estimate the total population. I have studied the parish registers for the period 1672- 1701 (actually as bishop's transcripts from 1672 to 1680),[31] and supplemented my findings from the list of names in the 1674 hearth tax assessment. On the basis of these sources, the average number of continuing surnames that were likely to belong to families (as distinct from servants and other single persons) over the ten year period 1678-87 inclusive was found to be 67.4. The average number of names possibly continuing was 1.7 and the numbers starting and ending were 1.1 and 1.2 per year, respectively. Even though errors produced by the 'end effects', referred to above, had been reduced by examining data relating to 6 years before the start of the 10 year period and to 13 years after it, it was realised that some names may have been missed or wrongly categorised. The extent of the remaining error was therefore ascertained by using the surveys to correct the parish register and hearth tax data, but only to the point of simulating the effect of studying the parish registers for a whole generation on either side of the 10 year period. In fact, only 14 family names were affected, and in most cases the error was only a change of a small number of years in the first or last mention of a name. As a result, the rate of termination of names remained unchanged at 1.2 per annum and the rate of commencement was slightly reduced to 0.9 per annum. Only eight of the corrected list of family names had received no mention in the parish register over the period between the two surveys in 1676 and 1688, and the majority of these names were represented by only one or two individuals in one or both surveys, and so were possibly not really family names. However, the corrections from the surveys increased the average number of names continuing to 71.1 and those possibly continuing to 3.6.

In order to test the methods outlined above for estimating the levels of mobility and population, both the uncorrected and corrected figures will be used, to give an indication of the magnitude of error that might be expected from an incomplete parish register analysis. Applying the range of factors of 3.4-3.7 persons per surname to the numbers of starting and terminating names (centred on Wall's factor 3.56), we obtain estimates 3.7-4.1 individuals migrating in per year (or, using the corrected figure, 3.1-3.3 per year) and 4.1-4.4 per year moving away. Laslett reports 10 households or 45 household members (other than servants) moving out and 19 households or 58 household members migrating in, over the 12 years between the surveys.[32] The actual annual averages were therefore 1.6 households or 4.8 individuals moving in and 0.8 households or 3.8 individuals migrating out. In view of the approximate nature of my method (which cannot take account of the migration of only some of the members of any one family) and the uncertainty in Laslett's figures (since he could not account for 48 people missing in the 1688 list), the agreement is quite satisfactory.

To test the reliability of population estimates obtained by applying average factors to the numbers of continuing names, both uncorrected and corrected figures will again be used. Thus, both the uncorrected 67.4 continuing family surnames and the corrected 71.1 surnames have, first, to be inflated by the average range of factors 1.2-1.3, to estimate the number of families or households. The result is 81-88 or 85-92, compared with an actual number of households ninety-eight in 1676 and ninety-one or ninety-six in 1688. This is reasonable agreement but it is improved if the numbers of possibly continuing surnames is added, after similar inflation by 20-30 per cent. This adds 2 or 4-5 estimated further households, giving totals in the range 83-90 (uncorrected), or 89-97 (corrected). It must be recognised that there is some circularity of argument in using figures corrected with the aid of the surveys to compare with the survey figures. However, even if the uncorrected figures are compared, the agreement is quite acceptable. Also, it must be recognised that the factor range 1.2-1.3 for converting numbers of names into numbers of households, was derived partly from Clayworth and partly from Beeston data. As suggested above, local knowledge may indicate the best factors to use for other communities.

If only the estimated numbers of households were known, to obtain estimates of the numbers of family members or the total population these would now require multiplying by the range 3.4-3.7 to obtain the former, or by 4.3-4.5 for the latter. These result in estimates 282-332 (uncorrected) or 305-359 (corrected) family members, and 356-404 or 385- 437 for the total population. The last range spans both the 1676 and the 1688 populations, 401 and 412, and the top end of the uncorrected range is near to both. The method can be said to have given estimated levels of migration and continuing population that agree reasonably well with the actual levels.

Application of the method to Beeston, Nottinghamshire, in the late sixteenth and early seventeenth centuries

In a previous article I attempted to estimate the population of Beeston in 1593 (when the village suffered a visitation of the plague) and the changes in population over the subsequent few years.[33] This was done by attempting a family reconstitution from a rather limited set of data. The parish register starts in 1558 but is rather sparse for the first few years, and there is only a small proportion of individuals who can be followed from christening to burial. The plague in 1593 resulted in 141 burials up to the end of the old-style year but, in estimating the population at that time, migration was only partly allowed for. It is now realised that several families, previously counted as having moved away from Beeston at the time of the plague, probably left the parish before that crisis.

The technique described above has now been applied to the parish register data, initially for the period 1580-89, by which time the register was better kept, yet the 'end effect' errors resulting from the disruption of the plague and a gap in the register in 1610 would be reduced.

A count of surnames over this period showed averages of 2.6 starting per year, 1.0 terminating, 68.0 continuing and 5.2 possibly continuing. Apart from the first, these figures are similar to those quoted above for Clayworth, indicating communities of similar size. The reversal of magnitudes of numbers of names starting and ending, compared with Clayworth in 1678-87 (0.9 and 1.2, respectively) suggests that Beeston was a growing community in contrast with the almost static population of Clayworth. This view is supported by a comparison of the average numbers of christenings and burials over the ten year periods – Beeston 10.4 and 8.5 (i.e. more christenings than burials); Clayworth 16.0 and 17.4 (burials more than christenings).

Bearing in mind the rates of appearance and disappearance of surnames in Beeston mentioned above, the previous family reconstitution records have been reassessed. These now suggest about 100 as a more likely figure for the number of families or households just before the plague,[34] sharing 76 surnames and comprising about 386 individuals. This last number includes children who may have left home to become servants or apprentices elsewhere, but it is assumed that they are compensated by a similar number moving into Beeston but remaining unrecorded.

It is instructive to compare this reassessment with the estimate of population derived from the numbers of continuing surnames. Adding a nominal 20-30 per cent to the 68.0 surnames to obtain an estimate of the number of households yields the range 82-8. However, adding the number of possibly continuing names, similarly inflated, gives 88-95, in better agreement with the 100 obtained from the family reconstitution. When the range 88-95 households is multiplied by the range of factors 4.3-4.5 individuals per household, a population 378-428 is obtained. Although this is derived from a slightly low range of household numbers it spans the 386 estimated from the family reconstitution. Both these estimates, of the order of 400, are almost certainly an improvement on the estimate of 560 previously reported, bearing in mind the expected similarity to the population of Clayworth, mentioned above.

A reassessment of the distribution of the 141 plague burials now suggests that 125 of these shared forty-four family surnames and that they probably came from about 63 households. (For the remaining 16 people, the plague burial was the only record of that surname in the register.) Only in the case of four surnames were all those likely to have been alive just before the plague (totalling six people) wiped out in the crisis. However, for a further 16 surnames, representing about 42 survivors from 20 households, there were no further parish register entries after the plague. These survivors probably moved away from the parish, possibly to join relatives in nearby parishes. If so, this would leave a population of about 220 in Beeston. The family reconstitution suggests that, by the time of the Archdeacon's visitation in 1603, the number with family surnames had risen to about 320, of whom about 220 would be aged 16 or over.[35] This agrees well with the number of communicants, 241, recorded at the visitation, since it does not include people for whom there was only a single parish register entry or no entry at all. Wood used an average factor 1.6 in converting this number of communicants into an estimated population of 386,[36] but the 320 quoted above is only 1.45 times the 220 thought

to be of an age to take communion. The plague may have so affected the age distribution that this lower factor is appropriate for Beeston at that time.[37] If it is applied to the reported number of communicants, a population of 350 is obtained, which is 30 more than the estimate of those with family names – a reasonable increase.

These figures may be compared with estimates based on the numbers of continuing surnames in 1603. There were 63, with a further 6 possibly continuing. The corresponding numbers of households, obtained by multiplying by the range 1.2-1.3, would be 76-82 or, including those possibly continuing, 83-90. Then, assuming 4.3-4.5 people per household, the total population would be 327-363, or 357-405 if the number of possibly continuing names is included. The first of these ranges agrees well with the lower estimate obtained by applying the factor 1.45 to the number of communicants in 1603, whereas the second range agrees with Wood's estimate. Bearing in mind the suggestion made above, that the family size may have been lower than average in Beeston at this time as a consequence of the plague, it is to be expected that an estimate based on average household sizes would be rather high.

Conclusion

The use of family reconstitution and 'natural increase' methods in estimating pre-census populations and population changes can only give acceptable results if account is taken of migration into and out of the community under study. Although definite information concerning such movements is usually not available, rough approximations may be obtained by studying the rates of appearance and disappearance of surnames recorded in the parish register. Moreover, the numbers of surnames continuing from year to year can provide a rough estimate of the resident population.

In making such analyses, it is best to discount surnames with only one parish register entry in the period of one generation (about 25 years), since it is unlikely that they represent resident families. Conversion of numbers of surnames into numbers of individuals may be carried out using average factors derived by Laslett in a study of 100 English communities within the period 1574 and 1821, as modified by Arkell and Wall if the earlier part of this period is studied. These suggest an average household size of 4.3-4.5 persons, of whom 3.4-3.7 were closely related to the head of the household, the rest being servants, lodgers, etc. Since migrating households were likely to be below average size, it is proposed that the range 3.4-3.7 is more appropriate when estimating the numbers of migrating individuals. Also, at the point of migration, it is probably safe to assume that there is only one household per surname. For estimating continuing populations, however, an average range of 1.2-1.3 households per surname is proposed for rural communities, and the factors 4.3-4.5 should then be applied to obtain an estimated range for the total population. (The 3.4-3.7 range would give an idea of the number of individuals sharing family surnames.)

It has been shown that application of these factors gives a good approximation to the population of Clayworth in the period 1676-88, and to the average rates

of migration between these dates. However, the agreement is slightly artificial since the 1.2-1.3 factor is partly based on Clayworth data. Further tests of the method are needed to confirm its validity. Applying the same factors to Beeston, just before the onset of a plague in 1593, suggests a revised total population of about 400-25. The 141 burials during and shortly after the plague, and migration away from Beeston at this time, may have reduced the population to about 220. Between then and an Archdeacon's visitation in 1603 when 241 communicants were recorded, the population according to family reconstitution may have risen to about 320 sharing family surnames, plus perhaps 30 others. Of these 320, it is estimated that about 220 would be of an age to take communion if this is taken to be 16 or over. A further estimate, based on the 63 continuing surnames and 6 possibly continuing at that time, gives 327-405 as the population. A compromise number 360 is therefore suggested, with a likely error in each direction of about 40.

Comparing these estimates for Beeston with those reported earlier it may be seen that the greatest difference occurs in the reduction of the suggested population just before the plague from about 560 to 400. The continuing population, after the ravages of the plague and associated movement away from Beeston, is not much changed, from about 240 to 220. Similarly, the previously expressed view, that the population had probably reached 400 again by the end of 1602, is now only slightly modified, to about 360. In fact, the main differences arise from the timing of the estimated outward migration, from being a substantial exodus during or just after the plague, to being a continuous movement, merely intensified during the plague period.

NOTES

1. Those known to the Cambridge Group for the History of Population and Social Structure in 1972 are included in the analysis by P. Laslett, 'Mean household size in England since the sixteenth century', in P. Laslett and R. Wall, (eds), **Household and Family in Past Time**, (Cambridge, 1972), 125-158 (listed on 130-1). For a more recent survey see M. Medlycott, 'A survey and guide of listings of inhabitants', **Local Population Studies**, 46 (1991), 50-3.
2. B. A. Holderness, 'Personal mobility in some rural parishes of Yorkshire, 1777-1822', **Yorkshire Archaeological Journal**, 168, 43, (1970), 444-454; M. Long and B. Maltby, 'Personal mobility in three West Riding parishes, 1777-1812', **Local Population Studies**, 24 (1980), 13-25.
3. P. Clark, 'Migration in England', **Past and Present**, 83 (1979), 57-90.
4. T.H. Hollingsworth, 'Historical studies of migration', **Annales de Démographie Historique**, (1970), 87-96.
5. N.L. Tranter, 'Population and social structure in a Bedfordshire parish: the Cardington listing of inhabitants, 1782', **Population Studies**, 21 (1967), 261-82.
6. R.S. Schofield, 'Age-specific mobility in an eighteenth century rural English parish', **Annales de Démographie Historique**, (1970), 261-74.
7. P. Laslett, 'Clayworth and Cogenhoe' in P. Laslett (ed.), **Family life and illicit love in earlier generations**, (Cambridge, 1977), 50- 101.
8. M.F. Pickles, 'Mid-Wharfedale 1721-1812: Economic and demographic change in a Pennine dale', **Local Population Studies**, 16 (1976), 12-44.
9. D.E.C. Eversley, 'A survey of population in an area of Worcestershire from 1660 to 1850 on the basis of parish registration', in D.V. Glass and D.E.C. Eversley, (eds), **Population in history, essays in historical demography**, (London, 1965), 394-419.
10. S.C. Wallwork, 'The rôle of the computer in community studies: Beeston, Nottinghamshire, 1593-1609', **Bulletin of Local History East Midland Region**, 22 (1987), 16-28.
11. Households are generally taken to include both the family members and the servants and lodgers (including journeymen and apprentices) living with the family. Such households would occasionally move from one place to another as a complete unit. In addition, servants would

move more frequently as individuals. However, with reference to the turnover of persons in Clayworth and Cogenhoe, Laslett states, 'Servants can all be treated as individuals in Clayworth, but in Cogenhoe some servants have to be treated as members of migrating households'. Laslett, 'Clayworth and Cogenhoe', 98.

12. The figure 91 excludes 5 small 'inmate' households that contained 9 people in 'comon-Houses on Alms'. For comparison with total population numbers, the figure should therefore be 96.
13. D. Levine, **Family formation in an age of nascent capitalism**, (New York, 1977), especially 38-9.
14. Long and Maltby, 'Personal mobility', 17-24.
15. Holderness, 'Personal mobility'.
16. Schofield, 'Age-specific mobility'.
17. Clark, 'Migration in England'.
18. J.V. Beckett, **A history of Laxton, England's last open-field village**, (Oxford, 1989), 324-6.
19. Hollingsworth, 'Historical studies', 93.
20. J.T. Krause, 'The changing adequacy of English registration, 1690-1837', in Glass and Eversley, **Population in history**, 379-93.
21. Eversley, 'Population of Worcestershire', 397-8; E.A. Wrigley and R.S. Schofield, **The population history of England 1541- 1871**, (London, 1981) 136-41; J.D. Chambers, 'Population change in a provincial town, Nottingham 1700-1800', in L.S. Pressnell, (ed.), **Studies in the industrial revolution, essays presented to T.S. Ashton**, (London, 1960), 97-124, especially 121.
22. Occurrences of surnames in parish registers have already been used in connection with migration studies, for example, see D. Souden and G. Lasker, 'Biological inter-relationships between parishes in East Kent: An analysis of Marriage Duty Act returns for 1705', **Local Population Studies** 21 (1978), 30-9, where the degree of linkage between parishes is calculated from the number of occurrences of the same surnames in pairs of parishes; also E.F. Buckatzsch, 'The consistency of local populations and migration in England before 1800', **Population Studies** 5 (1951-2), 62-9, in which the numbers of surviving names are used to calculate proportions migrating away from parishes at different periods; and R. Watson 'A study of surname distribution in a group of Cambridgeshire parishes, 1538-1840', **Local Population Studies** 15 (1975), 23-32, who studies both these aspects for the commonest surnames in eight Cambridgeshire parishes, for three periods of 100 years.
23. Laslett, 'Mean household size', 57.
24. Since servants usually totalled less than 20 per cent of the community, any error involved in making this assumption can only cause a small error in the estimate of the total population.
25. Laslett, 'Mean household size', 83.
26. The occasional registration of baptisms in more than one parish would cause slight over-estimates of the numbers of migrating and continuing names.
27. Laslett, 'Mean household size', 83.
28. T. Arkell, 'Multiplying factors for estimating population totals from the hearth tax', **Local Population Studies** 28 (1982), 51-7.
29. R. Wall, 'The household: demographic and economic change in England, 1650-1750', in R. Wall, J. Robin and P. Laslett, (eds), **Family forms in historic Europe**, (Cambridge, 1983), 497-8.
30. P. Laslett, 'Clayworth and Cogenhoe'.
31. This was expedited by Mrs Elizabeth Perkins' provision of transcriptions for some of the years. This assistance is gratefully acknowledged.
32. Laslett, **Family life**, 98-9.
33. Wallwork, 'The rôle of the computer'.
34. The figure 100 is an estimate of the number of people of the right age and family status likely to be heads of family groupings. It is not known, of course, whether all of these did, in fact, head separate households.
35. S.J. Wright, in her article 'Confirmation, catechism, and communion: the role of the young in the post-Reformation Church' (in S.J. Wright (ed.), **Parish, Church and people, local studies in lay religion 1350-1750**, (London, 1988), 203-27) points out that, although the age sixteen is generally adopted by historians when converting numbers of communicants into estimates of population, the age could well have been as low as fourteen, especially in earlier periods. However, because of the effects of the 1593 plague on the calculated demographic structure of Beeston in 1603, the estimated number of communicable age only rises to 225 if fourteen is taken as the minimum age.
36. A.C. Wood, 'An Archiepiscopal visitation of 1603', **Transactions, Thornton Society**, 46 (1942), 3-14.
37. The family reconstitution showed an abnormally small proportion of children aged 10 to 14 in 1603.