

ENQUIRIES AND PROBLEMS

Estimates of Population Size : Hearth Tax

Dear Sir,

A Local History Group associated with the Adult Education Department of Nottingham University has made an aggregative survey of the Parish Registers of Wirksworth (Derbyshire) from 1613 to 1840. Annual totals of baptisms, burials and marriages have been recorded throughout the period and 9-year moving averages calculated and graphed. These figures are being used to calculate other statistics such as crude baptism, burial and marriage rates. These demand an estimate of the population of the parish at as many dates as possible in the pre-census period. My attempt to use Hearth Tax returns to estimate the population in 1670 may interest other readers, and I would welcome comment.

A. The facts are as follows:

1. Hearth Tax returns (from a transcript kindly furnished by Mr. F.N. Fisher of Derby) for the TOWNSHIP of Wirksworth:

	Charged		Not charged	
	Entries	Hearths	Entries	Hearths
1664	232	378	217	217
1670	241	440	Not shown	

The charged hearths for 1670 are made up as follows:

3	houses with 8	hearths
0		7
5		6
5		5
13		4
19		3
58		2
<u>135</u>		1
238		

There is a discrepancy between 238 and 241, but this will not seriously affect the estimate.

2. The 9-year moving averages for 1670 for the whole parish are

Baptisms 139 Burials 136 Marriages 23

The Township was, at this period, providing between 60% and 64% of the total baptisms for the parish.

- B. I have assumed that the number of uncharged hearths for 1670 remains at 217 and that the population of the township is also between 60% and 64% of that of the whole parish. I am aware that neither assumption can strictly be justified, but I would not expect either to cause an unacceptable error in an estimate of this kind.
- C. I made four calculations:
1. Using Gregory King's multipliers (6.4 for 8-hearth houses etc., down to 3.7 for one-hearth houses) we get a total of 927 for the charged houses.
It is not clear what should be done with the uncharged houses.
 - a. Using Gregory King's multiplier of 3.7 for single hearths we add 803, making a total of 1730 for the township and so 2700-2880 for the parish.
 - b. Eversley ("Population in Worcestershire, 1660-1850" from "Population in History") suggests that "most of the exemptions would be one-hearth houses, occupied, in many cases, by pauper couples or widows." I am not convinced that this argument justifies reducing Gregory King's multiplier, but if we do reduce it, say, to 2, we get a total for the township of 1361 and an estimate for the parish of 2130-2270.
 2. In actual fact, Eversley ("Population in Worcestershire"), having only the return of charged houses, multiplies this by 4.5. This method would give a township estimate of 1085 and an estimate for the whole parish of 1695-1810.
 3. Yet another method is to apply a multiplier of 4.5 to the TOTAL of charged and uncharged houses. This gives an estimate for the township of 2060 and for the whole parish of 3220-3440.

D. These four estimates give the following rates:

Estimated vital rates (per thousand population)

Estimated Population	Baptism	Burial	Marriage
1a. 2700-2880	48.51	47-50	8.0- 8.5
1b. 2130-2270	61-65	60-64	10.1-10.8
2. 1695-1810	77-82	75-80	12.7 -13.6
3. 3220-3440	40-43	40-42	6.7 - 7.1

The rates for estimate 2 are quite inadmissible so that, whatever the situation in Worcestershire, Eversley's method does not appear to be valid for Wirksworth. The rates for estimate 1b, too, appear so high as to be unlikely. This leaves us with a range of 2700-3440. I am inclined to think that an estimate of 3100 would be reasonable and, so far as I can at present determine, it would fit in with one or two other scraps of evidence.

In the absence of any figures for Wirksworth in the Compton Census returns I am not finding it easy to arrive at estimates for other dates in the 17th and 18th centuries; suggestions would be most welcome.

Yours sincerely,

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The use of Hearth Tax returns as the basis for estimating the size of a population raises a whole host of problems. Here I shall concentrate on two which seem to me to be amongst the most important.

The first is the problem of the exempt or 'not charged' households. These can be numerous; indeed in Wirksworth there were almost as many exempt as taxed households. It is therefore obviously important to discover whether the Hearth Tax return which is being used includes or excludes exempt households. Failure to do so may lead to a population estimate being based only on the charged households, and Estimate 2 above shows how absurd such an estimate can be.

The second problem is whether to take the number of hearths or the number of houses given in the Hearth Tax return as the basis of calculation. The number of hearths can be used to estimate the population by taking advantage of Gregory King's figures for the numbers of people to be found in houses with different numbers of hearths. This method is explained and used in arriving at Estimates 1A and 1B above. When the number of houses is used to estimate the population, this is usually simply multiplied by Gregory King's figure for the average household size of 4.5, as in Estimates 2 and 3 above. In general we have found that most communities do in fact have an average household size of around 4.5. But the figure can vary enormously, especially amongst small settlements, and in central parishes in large towns not only is the average household size often considerably higher than this but there is also often more than one household in the house. For Wirksworth, however, an average household size of around 4.5 is probably about right.

Although this second method of estimating population seems much cruder than the first, it may in fact be more accurate. This is because we do not know whether the communities which Gregory King surveyed to obtain his figures of the number of people in houses with different numbers of hearths are typical or not: one-hearth houses, for example, may have been bigger in large towns than in villages. But probably more damaging is the fact that the hearth was the unit of taxation. This means that hearths are more likely to have been understated, or concealed, than are houses, and in consequence population estimates based on numbers of hearths may be too low. In this connection it is interesting that Estimate 1A for Wirksworth, which is based on the number of hearths, gives a lower population figure than Estimate 3, which is based on the number of houses.

However we arrive at our population estimates we can always keep some check on them by considering whether the vital rates which they produce are plausible or not.

Generally speaking baptism rates of more than 50 per thousand, and burial rates of more than 50 per thousand, unless one is clearly in a short period of 'crisis' mortality, are improbable. If we obtain rates as high as this we should first suspect our population estimate. As pointed out above, this consideration rules out Estimates 1B and 2 which produce baptism and burial rates well above 50 per thousand. Estimate 1A produces rates which are just plausible, but which would be suspicious if they were to continue for any length of time. Estimate 3, however, gives acceptable figures, as does the author's own final estimate.

Estimating the size of a population from the Hearth Tax returns is clearly fraught with difficulties, and one would probably prefer to use the Compton Census returns, though these too have their problems. For Wirksworth no Compton Census return exists, and for every community there are large periods for which no evidence exist on which any kind of an estimate can be based. Since the operation of interpolating population estimates for the years between two known population sizes is even more perilous; one might well wonder whether it might not be better to avoid calculating vital rates at all.

In most cases the raw figures of baptisms or burials convey as good a picture of the demographic situation as do the more usually calculated baptism and burial rates. These indeed are nothing more than the raw figures divided by an imperfectly estimated population size. The results obtained by both methods are essentially the same, and all that the calculation of the traditional rates achieves is the introduction of an element of inaccuracy into the figures. Often the traditional rates are calculated to allow comparisons to be made between parishes where comparison of the actual numbers of baptisms and burials would otherwise be difficult, because, for example, they were running at very different levels. But here too rates can be derived from the raw totals of events themselves, for example, a fertility rate can be derived, avoiding all the problems of population estimates yet allowing comparisons to be made either with other communities or with the same community at a later date, by dividing the number of baptisms by the number of marriages, or a 'growth rate' calculated by expressing the surplus of baptisms over burials as a percentage of the number of baptisms. Some questions may prove to require the calculation of the traditional rates, but the difficulties which beset the task of estimating the total population of a community at any time in the past are so great that it is well worth while considering whether some other form of expression would not really be preferable.

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