

Census 2001

One Number Census Quality Assurance information: Quality Assurance themes

Borrowing strength

Problem

The One Number Census (ONC) process relied on an independent Census Coverage Survey (CCS) which surveyed approximately 300,000 households in England and Wales. The CCS design was based not on Local Authority Districts (LADs) but on Estimation Areas (EAs), which were areas of one or more whole LADs with a total population of approximately 500,000. The design ensured that every LAD contained at least some CCS sample, but there was no guaranteed minimum sample size. It was possible that occasionally the CCS would not detect all people missed by the Census in a particular LAD, leading to reduced confidence in the final estimates. Where this was the case it would be detected during the quality assurance procedures, and a contingency strategy invoked.

Actions

“Borrowing strength” involved using information from other LADs in place of the CCS information for the LAD in question. There were two contingency processes, one used for a single LAD within an EA of two or more LADs, and one for an entire EA.

When contingency was needed for only part of an EA, strength was borrowed from the other LADs within the same EA. This involved simply excluding the part of the CCS sample that fell within the LAD in question, and then re-running the estimation process. The effect of this is to adjust the Census count for this LAD in line with the adjustments made to the surrounding LADs. When it was an entire EA, strength was borrowed from the five LADs considered most similar to the LAD in question. The most similar LADs

were defined using information from the 1991 Census, taking into account such factors as age structure, ethnicity, housing type and employment. A consultation exercise was carried out with local authorities who had more local knowledge, and in some cases the areas to be used for borrowing strength were changed at the authority’s request.

ONC estimation divided the population into 37 age-sex groups and three Hard to Count (HtC) groups, meaning that up to 111 separate adjustments were made to the population count in each EA. In some cases borrowing strength was not invoked for all three HtC levels, but for each age-sex-HtC group the following procedure was used:

- The adjustment factor for each of the five most similar LADs was calculated. For instance, if the Census counted 4000 people in a group and the ONC estimate was 4400 for the same group, the adjustment factor would be $4400/4000=1.1$.
- The mean adjustment over these five areas was calculated and applied to the original LAD. For instance, if the Census count was 5000 and the mean adjustment factor for the borrowing strength areas was 1.08, the new estimated count would be $5000*1.08=5400$.
- These new estimates were aggregated with the original estimates for any HtC levels where borrowing strength was not invoked, to produce a total population estimate for each age-sex group. These were rounded to the nearest whole number where necessary.

- New variance estimates were not calculated as part of the borrowing strength process. Instead, the variances calculated by the standard ONC process were retained, and it was these that were used to calculate confidence intervals for the estimates.

Results

The two versions of the borrowing strength strategy were used once each. Strength was borrowed within an EA for Shepway, where the CCS sample was found to be too small and insufficiently representative to make a meaningful estimate. In Sheffield, which was an entire EA in itself, problems with the CCS led to data being unavailable for roughly a third of the sampled postcodes in the harder to count areas. Strength was therefore borrowed from similar LADs for two of the three HtC groups. Details are given below:

Estimation Area	Local Authority	Strength borrowed from	Notes
NZ Sheffield	00CG Sheffield	00CK North Tyneside 00EH Darlington 00CH Gateshead 00DA Leeds 00BR Salford	Hard to Count groups 2 and 3 only
SV Eastern Kent	29UL Shepway	29UC Canterbury 29UE Dover 29UN Thanet	