

Data Management and Analysis Group

2001 Census: Local Authority Population Studies

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2001 Census: Local Authority Population Studies

Summary

The Office for National Statistics (ONS) published today the results of a series of studies designed to improve population estimates in the areas that proved hardest to count in the 2001 Census. The results of this work confirm the analysis contained in reports by the Statistics Commission and the Local Government Association, as well as by ONS, that the One Number Census (ONC) worked well in most areas but that there were a few extreme cases where it was not able to adjust sufficiently for underenumeration. This *Briefing* is based upon the ONS report but extends it in relation to the London boroughs and the *London Plan* projections.

The results from the ONS analysis indicate that further revisions to the 2001 Census based population figures of around 60,000 for England & Wales as a whole should be made. These revisions are confined to 15 LAs. Manchester and Westminster are the most extreme authorities with smaller revisions for 13 other authorities. The range of adjustment for the 15 LAs is given below:

Bristol	5800
Cardiff	3000
Derby	7800
Hartlepool	1500
Kingston upon Hull	6600
Manchester	26200
Middlesbrough	5800
Milton Keynes	3800
Newcastle upon Tyne	4400
Southwark	4800
Stockton on Tees	5200
Sunderland	3800
Wandsworth	5000
Westminster	17500
Wirral	2800

Despite this extensive study, there still remain inevitable uncertainties. The ONS report describes the work that has been carried out further to investigate these issues and presents emerging results. **These will feed into the revised mid-year population estimates (MYEs) for 2001 and 2002, which are to be published alongside the mid-2003 estimates on 9th September 2004.**

ONS future work will incorporate evidence now gained, both about those authorities where an adjustment will be made this year and those where there is no, or insufficient, evidence to make an adjustment, either up or down.

The potential impact of this announcement on the population of Greater London is that the estimate for mid-2001 will rise from 7.308 million to about 7.325 million, and possibly as high as 7.335 million. For mid-2002 the rise will be from 7.355 million to about 7.374 million, and possibly to 7.385 million. **These changes are likely to have little influence the current *London Plan* population in 2016 of 8.108 million. The most likely revised projection for 2016 is around 8.150 million. This would imply an additional number of required homes between 2001 and 2016 of about 11 thousand.**

Camden, Croydon, Kensington & Chelsea and Tower Hamlets had been on the shortlist for these Studies but there was no conclusive evidence to change their estimates.

Introduction

The methodology for the 2001 Census results based on the ONC approach was designed to produce the best possible estimates of population in September 2002. The ONC was designed to take full account of people missed by the Census count itself. The design of the Census Coverage Survey was such that it was possible to make tailored allowance for areas that were predicted to be the most hard to count. However, results from the 2001 Census identified a difference of 1.1 million between the Census results and Mid-Year

Population Estimates (MYEs) rolled forward from earlier Censuses. ONS has since conducted and reported extensive research to establish the main reasons for this difference.

The Local Government Association published its report 'The 2001 One Number Census and its quality assurance' in September 2003. ONS acknowledges and agrees with the main conclusion of this report - which is that the ONC worked well in most areas and that there were a few extreme cases where it was not able to adjust sufficiently for underenumeration. The Statistics Commission published its interim report 'The 2001 Census in Westminster Interim Report' in October 2003. ONS again agrees with the main conclusion of this report - that the ONC was the best methodology available for a conventional Census but that the method could not correct for the most extreme circumstances, one of which was in Westminster.

The ONS report describes the work that has been carried out further to investigate these issues and presents emerging results. *These will feed into the revised Mid-Year Population Estimates (MYEs) for 2001 and 2002, and the 2003 MYEs to be published on 9th September 2004. The revised MYEs will take account of the revisions already made in to the 2001 estimates in 2003, based on an analysis of the Longitudinal Study, and the unattributable population change component.*

The results from the ONS analysis indicate that further revisions to the 2001 Census based population figures of around 60,000 for England & Wales as a whole should be made. These revisions, which are within the confidence interval for the population as a whole, are confined to 15 LAs. Manchester and Westminster are the most extreme authorities, with smaller revisions to 13 other LAs.

ONS needs to produce single point estimates for the population of each Local Authority but it must always be recognised that there is uncertainty around these estimates. In the case of the most difficult areas, even after this further work the sampling variability around the results is as much as plus or minus 5% (with 95% confidence). In some cases therefore, the revisions that will be made are within the original confidence intervals published in 2002 but now represent better point estimates within those ranges.

Background

Results from the 2001 Census were published in September 2002. These results identified a difference of about 1.1 million (2 per cent) between the Census results and the MYEs rolled forward from the 1981 Census. The explanation of the difference between the 2001 Census based mid-2001 population estimates and the rolled forward population estimates is summarised numerically in the table below, with all adjustments detailed immediately under the table.

Intercensal Discrepancy	1,140,000
1991 Adjustment (a)	351,000
Migration Adjustment (b)	305,000
Longitudinal Study Adjustment (c)	193,000
Unexplained difference	291,000
<i>Manchester Adjustment</i>	<i>26,000</i>
<i>Westminster Adjustment</i>	<i>17,000</i>
<i>LA Studies Adjustment</i>	<i>60,000</i>
<i>Longitudinal Study Consequential Adjustment (Clawback)</i>	<i>-20,000</i>
Remaining unexplained difference	208,000

- a) The 2001 Census provided evidence that the 1991 base used to produce the mid-1991 population was too high. This was due to overestimation of the impact of underenumeration in the 1991 Census. The 1991 base was reduced by 351,000.
- b) Migration is the most difficult component of population change to measure accurately due to the paucity of high quality data sources, particularly on emigration. Detailed research into the data sources and methods resulted in changes in methodology for compiling estimates of total international migration. The revisions reduced the net inward migration, and hence the population estimates, by 305,000 over the decade.
- c) Further research including demographic analysis of sex ratios, fertility and mortality indicated a possible underestimate of adult men aged 25-49 and in particular those aged 25-34. Evidence from the Longitudinal Study (LS) was used to identify how many males aged 25-49 were underestimated nationally and how they were distributed across England & Wales. An adjustment based on the LS, published on 26th September 2003, added around 193,000 to the population of England and Wales across 60 Local Authorities. Most of the added people were young adult men aged 25-34.

After making the adjustments already published, the majority of the 1.1 million difference was explained. However, there remained about 291,000 that were unexplained. The further studies reported here reduced the unexplained difference to around 208,000. This is likely to be attributable to remaining difficulties in estimating migration accurately and issues associated with the usual residence definition.

The *2001 Census: Manchester and Westminster Matching Studies* were set up to investigate potential discrepancies between the administrative address lists of Manchester and Westminster City Councils, and the address list collated by ONS for the 2001 Census. Quality assurance of the ONC had shown that these two authorities were the most extreme of all Local Authorities. Manchester had the greatest difference between its Census-based population estimates and the administrative sources used in the quality assurance process. Westminster had the largest population change between the 2000 MYE and the 2001 Census results. As a result of the initial matching work, ONS released a provisional adjustment for Manchester in November 2003 of 14,000 addresses and 24,500 people. ONS then continued the study to gain a fuller understanding of what happened in Manchester and to complete the matching work in Westminster. This study has resulted in an estimate for both authorities of the population by which the Census has undercounted. This is given below and will provide the basis for calculation of the MYEs.

Local Authority	Adjustment	Percentage increase on original Census estimate	Reason for adjustment
Manchester	26200	6.7%	Evidence of enumeration failure in several wards resulting in missed addresses Evidence that Census Coverage Survey sample was unrepresentative of LA Evidence of dependence between the Census and Census Coverage Survey
Westminster	17500	9.6%	Evidence of enumeration failure in several wards resulting in missed addresses Unprocessed forms Evidence that a high number of outliers may have reduced the estimate Concerns about the robustness of estimation in the hardest to count areas
Total	43000		

As part of the future work programme that ONS announced late in 2003, a rolling programme of local authority studies was undertaken to identify where there are higher than usual risks that ONS population estimates might miss material changes at the local level. LAs were selected for study on the basis of criteria applied across all LAs. *These criteria identified areas where the Census based population estimates could have been at risk. 13 LAs (excluding Manchester and Westminster) were identified as needing a revision, which totalled 60300 across these LAs.*

Some of the additional people identified from the LA studies are the same people as were identified from the Longitudinal Study adjustment. As noted above this overlap amounts to some 20,000 people in total. When the 2001 mid-year estimates are revised ONS will 'clawback' this 20,000 people from amongst the 15 authorities populations. However, at present it is not clear how this will be done or the likely individual impacts.

After making all the adjustments detailed, there only remain about 208,000 of the original 1.1 million difference that is unexplained. This is likely to be attributable to remaining difficulties in estimating migration accurately and issues associated with the usual residence definition.

Programme of Local Authority Studies

ONS planned a series of studies geared towards understanding the extent of the differences between the Census results and evidence from other sources provided by the local authorities. Full details on the methods and results will be described in a report to be published alongside the population estimates on 9th September 2004. In November 2003 ONS selected LAs for study, based on a comparison of all 376 Local Authority Districts in England and Wales, using the following indicators of risk:

- Percentage reduction in population between the original 2000 and revised 2001 MYEs
- Census response rates
- Comparisons with administrative sources (for example Council Tax, Electoral Roll, Patient Registers)
- Factors associated with difficulty of enumeration, including the number of vacant properties and proportion of multi-occupied addresses

The LAs were ranked 376 - 1 on each measure. In order to reflect the relative merits and issues with each of the data sources used in the analysis, a weighting was added to each and an overall score for each LA calculated. The LAs were then ranked according to their final score, which resulted in the selection of 9 authorities for study.

The intention of the initial 9-area study was to work with each of the selected Local Authorities in order better to inform population estimates during the years prior to the next Census in 2011, and to contribute to planning the next Census. This work was to help ONS to understand specific problems in different areas of the country. As a result of meetings with the selected Local Authorities and some initial work including the Manchester and Westminster study, it became clear that there might have been some areas where the underlying assumptions of the ONC had been stretched. ONS reviewed the available evidence to enable a robust assessment of where these assumptions may have been stretched, indicating a possible risk in the Census results. The study assessed whether there was sufficient evidence to justify adjustments to the 2001 MYEs for any area, in order to feed into production of the 2003 MYEs in September 2004.

All LAs were reviewed on the basis of a series of indicators of risk that are believed to identify where underlying assumptions in the ONC may have been stretched. The indicators included some of those used to select the initial 9 LAs plus the following:

- Enumeration – analysis of Census fieldwork and analysis of Council Tax lists
- Census Coverage Survey (CCS) – assessment of sample balance
- ONC Process – analysis of response rates, outliers, change in Hard to Count (HtC) distribution
- Processing

This process selected a further 23 LAs for in depth assessment. *This list included Camden, Croydon, Kensington & Chelsea and Tower Hamlets.* A structured approach whittled the total list of 32 down to an additional 13 LAs.

The methods of adjustment adopted are designed to provide more robust estimates of population using the ONC framework by including a modified approach to allow for the specific unusual local circumstances. They also take into account the local and other evidence relevant to the estimation of the population in each area. The approaches used included the following:

- Estimating for localised extreme undercount
- Borrowing strength – from data collected for similar authorities
- Post-stratification of the Hard to Count Index

Where more than one issue was identified, a combination of methods has been applied.

The adjustments that have been made by ONS are in the small number of areas where there is evidence of a basis for making a better estimate of the population.

The table over page shows the 13 LAs (excluding Manchester and Westminster) where an adjustment has been made, the scale of the adjustment and the extreme circumstances for which the ONC could not compensate.

As with any estimate there remain inevitable uncertainties, even after the extensive work of the LA Studies. The 95% confidence intervals in the final column are those used in the 2001 Census estimates published in September 2002. These are provided for information to give an indication of the level of uncertainty that will be present around any final point revised estimate of the population.

Local Authority	Adjustment	Percentage increase on original Census estimate	Reason for adjustment	% Confidence Interval (+/-) around the 2001 Census estimate
Bristol	5800	1.5%	Enumeration failure in three wards	6500
Cardiff	3000	1.1%	Evidence of insufficient ONC adjustment for two wards	4700
Derby	7800	3.6%	Enumeration failure in one ward HtC 3 was collapsed	2000
Hartlepool	1500	1.6%	Evidence that the HtC Index was unrepresentative	700
Kingston upon Hull	6600	2.6%	Evidence that HtC 3 response rate was over-estimated	3200
Middlesbrough	5800	4.3%	Evidence of enumeration failure in one ward Evidence that HtC Index was unrepresentative	1200
Milton Keynes	3800	1.8%	Evidence that HtC was not a good stratifier CCS unrepresentative	3100
Newcastle upon Tyne	4400	1.7%	Evidence of insufficient ONC adjustment across two wards	7600
Southwark	4800	2.0%	Evidence of enumeration failure in some wards Unprocessed forms	7500
Stockton on Tees	5200	2.9%	Evidence that the HtC Index was unrepresentative	1300
Sunderland	3800	1.4%	Evidence that the area has got 'harder' to count Insufficient CCS sample in HtC 3	3400
Wandsworth	5000	1.9%	Evidence that HtC was not a good stratifier	9200
Wirral	2800	0.9%	Evidence of enumeration failure in one ward HtC 3 was collapsed	6100
Total	60,300	0.1%		

Despite this extensive study, there still remain inevitable uncertainties. ONS future work will use evidence now gained, both about those authorities where an adjustment will be made this year and those where there is no or insufficient evidence to make an adjustment, either up or down.

The 2001 MYEs will use the adjustments published above. The population estimates will also take into account the likelihood that some of the additional people identified from the LA studies are the same people as were identified from the Longitudinal Study adjustment. As noted above this overlap amounts to

some 20,000 people in total. They will also take into account other minor amendments and corrections arising from the usual quality assurance process for the MYEs.

Future Work

ONS intends to continue to work with local authorities over the next few years, including the forward looking work with the areas originally identified for study in 2004 and with a new set of local authorities in 2005 and 2006. The objective of these studies is to carry out further work to investigate administrative sources, assess their reliability and determine the scope for utilising these sources in population statistics. The intention to conduct a mid-decade special population study for certain areas was officially recognised in the report 'A Demographic Statistics Service for the 21st Century'. ONS have set up a project, the aim of which is to reduce the risk that, when population estimates become available from the 2011 Census, users of population statistics are once again faced with large differences between these and the mid-year population estimates based on the 2001 Census. During the 1990s migration has become a major driver of population change. With imperfect sources for estimating migration, ten years is likely to be too long a period to make population estimates without some form of further assessment of those areas most at risk of divergence from the 2001 Census benchmark.

The *2007 Special Population Study* is part of ONS's programme of work, which includes the *Local Authority Population Studies* and the implementation of the action plan to the *National Statistics Quality Review on International Migration*. A central theme of this work is improving understanding of sources such as administrative data and investigating the scope for utilising those sources to help improve population statistics. The GLA will be represented on the Working Group in relation to the *2007 Special Population Study* and will be seeking to develop a co-ordinated programme of studies that will have wider benefits than purely improving population estimates. ONS has given an 'in principle' agreement to work with the GLA on this.

Through the *2001 Census: Manchester and Westminster Matching Studies* and *Local Authority Population Study*, ONS has gained a further insight into specific problems in different areas of the country and characteristics that can be difficult to enumerate. This knowledge will be taken forward and fed into the planning and development of the 2011 Census.

The Impacts on London

The adjustments outlined above for Southwark, Wandsworth and the City of Westminster will feed into the revised 2001 and 2002 mid-year estimates. In turn the revised estimates will reveal differences in the recent borough level migration trends that were used in the 2003 Round of GLA Demographic Projections to prepare the Scenario 8.1 forecast used in the London Plan. This section considers the possible impacts on the current and forecast London population of the revised estimates for these boroughs. The main calculations are shown below.

Potential Impact of LA Studies on London Population Estimates

(000s)	Southwark	Wandsworth	Westminster	Rest of London	Greater London
Original 2001 MYE	245.4	260.8	181.7	6500.1	7188.0
LS etc Adjustments	5.6	6.6	4.7	102.9	119.9
Revised 2001 MYE	251.1	267.5	186.4	6603.0	7307.9
LA Studies Adjustment	4.8	5.0	17.5	0.0	27.3
LS Clawback - High	4.8	5.0	4.7	0.0	14.5
LS Clawback - Medium	3.5	4.1	2.9	0.0	10.4
LS Clawback - Low	0.0	0.0	0.0	0.0	0.0
Re-revised 2001 MYE - Low	251.1	267.5	199.2	6603.0	7320.7
Re-revised 2001 MYE - Medium	252.4	268.4	201.0	6603.0	7324.8
Re-revised 2001 MYE - High	255.9	272.5	203.9	6603.0	7335.2
Original 2002 MYE	251.3	269.3	190.6	6644.1	7355.4
2001-02 Original Change	0.2	1.8	4.2	41.2	47.4
Unattributable Change	1.5	0.0	-6.8	4.0	-1.3
Revised Unattrib. Change Low	1.5	0.0	-5.5	4.0	0.0
Revised Unattrib. Change Medium	1.6	0.1	-5.3	4.0	0.4
Revised Unattrib. Change High	2.0	0.5	-5.0	4.0	1.4
Revised 2002 MYE - Low	251.3	269.3	204.7	6644.1	7369.4
Revised 2002 MYE - Medium	252.8	270.3	206.7	6644.1	7374.0
Revised 2002 MYE - High	256.6	274.8	209.9	6644.1	7385.4

The allocation of the 'clawback' from the original LS adjustments has been estimated three ways.

- The High Clawback assumes that the lower of either the LS adjustment or the LS Studies adjustment, this is not believed to be reasonable as it places over 14 thousand of the 20 thousand clawback to London.
- The Low Clawback assumes that all the clawback takes place outside London, which is also unlikely and leads to the high re-revised estimate of 7.335 million.
- The Medium Clawback assumes that the 20 thousand are apportioned across the 15 authorities in proportion to their share of the original LS adjustment.

This Medium Clawback assumption leads to a possible re-revised 2001 MYE for London of 7.325 million.

To go forward to 2002 requires that the new 2001 'estimates' will have reduced the 'unattributable change' element in the 2001-02 mid-year estimate change analysis as the gap between the rolled-forward estimates for 2000 and the latest assessment for 2001 has been closed. Again, three revisions are calculated linked to the range of revised estimates for 2001.

The Medium calculation is again thought to be the most likely and leads to a possible revised 2002 MYE for London of 7.374 million.

In order to calculate the impact of these figures on the projections prepared for the *London Plan* it is necessary to allow for the increased average annual net migration assumed to have come to London across the decade 1991 to 2001. In the revised medium estimates this is 1.7 thousand per year, with a high estimate of 2.7 thousand per year.

Hence a revised population for 2016 would be 8.150 million under the medium assumption and 8.176 million under the high assumption. This compares with the *London Plan* projection of 8.108 million.

In terms of additional growth across the fifteen years the medium assumption shows 25 thousand extra persons, equivalent to an additional number of households/homes of about 11 thousand. The high assumption shows about 41 thousand additional population growth, equivalent to about 17 thousand extra households/homes.

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