Census 2001

Key findings and actions from the One Number Census Quality Assurance process

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1 Introduction

1.1 The aim of this report is to provide 2001 Census users with a detailed insight into the key actions and findings raised during the Quality Assurance review of the One Number Census (ONC) 2001 population estimates. It aims to highlight how the quality assurance process adhered to the strategy agreed with census users in December 2000 whilst further highlighting the rigorous additional analyses that were undertaken throughout the quality assurance process and adjustments that resulted from these analyses.

1.2 The report provides a brief overview of the ONC project and a summary of the types of people and households missed by the 2001 Census but imputed as a result of the ONC methodology and imputation system. A brief description of the quality assurance process that underpins the population estimates arising from the 2001 Census is also provided. Further detail on the ONC process is provided in the "One Number Census methodology and Quality Assurance process" [1] report. This is a supplementary paper that provides Census users with a comprehensive overview and description of the stages of the ONC process with further detail on the quality assurance methodology and description of the steps taken to quality assure the 2001 ONC estimates.

1.3 Within this report the actions and key findings resulting from the quality assurance process are explored in detail to illustrate the sorts of issues investigated and analysed during this process. Further evidence based on work done subsequent to the quality assurance process is provided to confirm the patterns and issues raised throughout the quality assurance process and to indicate where further investigation was needed. This work was carried out after the ONC estimates were available for each Local Authority area.

1.4 Further information is provided on the results of the 2001 Census in terms of the response rates to look at the pattern of underenumeration measured by the ONC.

Finally there is a section that outlines the dependency adjustment made to the ONC estimates. Please note that there are both pre and post-dependency figures in this report.

2 Overview and summary

2.1 The One Number Census process

2.1.1 Following evaluation of the 1991 Census a number of new initiatives were introduced to maximise coverage in the 2001 Census. These included:

- the use of just one population base in order to avoid the coverage issues that were experienced from the 1991 Census population definitions

- encouraging people to post back their census forms to enable census fieldstaff to focus on those most likely to have difficulty filling in their forms;

- smaller workloads for staff in the more difficult areas;

- redesigned and carefully tested forms and questions;

- a community liaison programme including translation of census material into 26 languages; and

- a focused programme of awareness raising and publicity.

2.1.2 However, as mentioned above, it was recognised that 100 per cent response would not be achieved. A pattern of falling census response rates is evident in many other census-taking countries. In addition the 1991 survey conducted to estimate those that were missed was not of a large enough scale to identify fully the extent and distribution of the under-enumeration. As a result, it was necessary to base the national population estimates for 1991 on demographic estimates. This process was only valid at a high level of aggregation and the census counts had to be adjusted down to local authority level to make them add up to the national total based on the demographic estimate [2].

2.1.3 In consultation, users were clear that for 2001 they wanted a fully adjusted set of counts covering 100 per cent of the population. The

ONC project was set up to meet this need. By conducting a redesigned and much larger post-enumeration survey (the CCS) and combining the results of both the census and CCS in what is known as a dual system approach, the aim of the project was to estimate and adjust the census database for under-enumeration so that all statistics add up to 'One Number' [3] .The estimation strategy is described in ONS (2001)[4]. It also aimed to ensure that robust results could be obtained for each local authority area. Central to the consultation was the acceptance that the census counts would have a confidence interval associated with them.

2.1.4 The ONC methodologies were researched and developed over a number of years by a joint team of statisticians from the ONS and the University of Southampton. The work was overseen by a Steering Committee that included experts from central government, statistical agencies overseas, other academic institutions and local government. In addition, census users were directly consulted at several stages in the methodological development process through census user group meetings and special workshops. It is important to emphasise that this methodology has had the most peer reviews and user consultations of all National Statistics - an example are the sixty publicly available research papers representing over five years of work on the National Statistics website. A description of the risk management process for the project is found in Holt *et al* (2001)[3].

2.1.5 The ONC process involved a number of stages:

- a CCS was designed and conducted independently of the census during May/June 2001;

- records from the CCS were matched to those from the 2001 census;

- populations of the sample areas were estimated from the results of the matching using dual system estimation techniques which enabled an estimate of those persons missed by both the census and the CCS to be made;

- populations for each local authority by age and sex were then estimated using a combination of standard regression and small area estimation techniques;

- households and persons estimated to have been missed by the census were then imputed to produce a fully adjusted census database; and finally

- all population estimates were carefully quality assured using demographic analysis and comparison with aggregate level administrative data.

Further detail on the ONC methodology and processes is outlined in the "ONC methodology and Quality Assurance process" [1] report.

2.2 Imputation summary

2.2.1 Despite every effort, it was always accepted that the 2001 Census would not enumerate 100 per cent of the population. Therefore, Census 2001 was designed from the outset to take full account of this. The ONC project aimed to integrate the 2001 Census counts with the estimated level of underenumeration in the Census.

2.2.2 The ONC process resulted in 3,197,058 people being imputed (6.1 per cent of the total resident population) in England and Wales. Of these:

- 53.1 per cent were males and 46.9 per cent were females;

- 24.0 per cent were aged under 15, 34.4 per cent were aged 20 – 24, and only 6.3 per cent were aged 65+;

- 76.8 per cent were white and 10.9 per cent were Asian or Asian British comprised of Indian, Pakistani, Bangladeshi or other Asian ethnic groups;

- 64.7 per cent were single (never married);

- 43.8 per cent were 'working'; and

- 30.4 per were imputed into households within terraced dwellings.

The ONC process resulted in 1,280,999 households being imputed for England and Wales. Of these:

- 49.2 per cent were one person households and 22.8 per cent were two person households, highlighting that the 2001 Census was more likely to miss those in households of these sizes; and

- 27.6 per cent of imputed households were purpose built blocks of flats or tenements.

Further detail on the imputation rates for a number of variables based on information collected in the 2001 Census is outlined in **Annex B**.

2.2.3 In order to have confidence in these figures, a stringent quality assurance process

was undertaken. This is described in detail in the "ONC methodology and Quality Assurance process" report. The focus of this report on the key findings and actions from the ONC QA process is to explain to users the discussions and further work undertaken to arrive at these results.

2.3 Overview of the ONC Quality Assurance process

2.3.1 The Quality Assurance process was an integral part of the ONC methodology and followed an agreed strategy that had been the subject of wide consultation with census users and was agreed in December 2000 with representatives from the local authorities (see ONS (2001))[4]. All the ONC population estimates were subjected to rigorous quality assurance. The population of each local authority by age and sex was considered in a consistent and detailed manner - involving comparison against diagnostic ranges derived from rolled-forward population estimates and aggregated administrative sources (such as birth registration and pensions data).

Further detail on the choice of comparators used in the quality assurance process is outlined in the accompanying "One Number Census methodology and Quality Assurance process" report.

These diagnostics provided the best indicators of population that were available prior to the census. It was never the intention for the census to be adjusted to these diagnostics. Where there was a difference between the ONC estimates and the diagnostic ranges, extensive checks of the ONC results and diagnostic ranges were undertaken with respect to, for example, sample sizes and outliers and contingency action was taken if any issues were identified.

2.3.2 The quality assurance process also included analysis at local authority, Design Group (DG) and regional level of a number of specific population subgroups known from 1991 to be prone to under-enumeration. These were full-time students, home armed forces, foreign armed forces (FAF) and their dependants and prisoners. The estimates for these subgroups were compared with data from other official sources to determine whether the results were plausible.

2.3.4 All ONC estimates were discussed and signed-off by an expert panel at a series of weekly meetings over the course of several months. These meetings adopted a rigorous and consistent approach throughout, with the results by age and sex for each of the 376 local authorities in England and Wales being considered in detail.

2.3.5 The Quality Assurance panel were also provided with detailed summaries of qualitative information from the field and processing operations, such as maps, fieldstaff debriefings, coding error rates and management information. These were examined in conjunction with the quantitative data in order to obtain a complete picture of the census within an area. Population Estimates Unit (PEU) intelligence was also compiled for each area in order to provide information on population history, including migration flows.

3 Key findings from the Quality Assurance process

Despite the wide range of detailed quantitative and qualitative information available to the quality assurance panel decisions to accept (or reject) the ONC estimates, sign-offs were often postponed until further work had been carried out. Where the ONC estimates differed from the diagnostic ranges, extensive checks of the ONC results were undertaken, as mentioned above, with respect to sample sizes, outliers, etc and contingency action was taken if any issues were identified.

The quality assurance panel frequently asked for additional information or analysis to be carried out and in some cases held back areas for consideration until other similar areas had been processed. Consequently, local authorities were not considered in isolation and were often presented many times to the quality assurance panel.

Throughout the quality assurance process a number of key findings were identified for further investigation. These findings were considered and further investigated. **Annex C** highlights the local authorities and key findings considered for each local authority during the quality assurance process.

3.1 Detailed findings identified from the Quality Assurance process

This section outlines the investigation into:

- 1991 Under-enumeration adjustments;

- London which was subject to detailed analysis to assess the plausibility of the Census results;

- Babies in areas with large ethnic populations; and

- Post-stratification;

3.1.1 1991 Under-enumeration adjustments

3.1.1.1 For many Local Authority Districts (LADs) it was noted during the ONC quality assurance process that the diagnostic range was higher than the ONC estimate for some recurring age-sex groups (mainly males aged 25 – 29, 30 – 34 and 35 – 39 year olds). In fact, the ONC estimates for males aged 25 – 39 were lower in around 75 per cent of authorities. This pattern was noted early on in the quality assurance process and meant that some early local authorities were held back for further consideration by the quality assurance panel. The pattern identified often coincided with large underenumeration adjustments made in the 1991 Census for the corresponding population cohort. It did not coincide with the 20 – 24 age groups whose corresponding cohort was subject to very small adjustments in 1991 and for whom non-response to surveys and Censuses is generally highest and where response to the 2001 Census had been found to be the most difficult.

This indicated the possibility that the 1991 post-Census underenumeration adjustment was too large in London, the Metropolitan areas and some other Non-metropolitan areas.

3.1.1.2 There were difficulties with the assessment of underenumeration in the 1991 Census. The 1991 post enumeration survey (the Census Validation Survey (CVS)), designed to measure underenumeration in the 1991 Census was not completely independent of the Census and was carried out to the same basic procedure as the 1991 Census. Therefore, people missed by the Census may not have been counted by the CVS.

3.1.1.3 Given the problems with the CVS, it was agreed that the total population for England and Wales in mid-1991 would be a number that was very close to that derived by updating from the 1981 Census. It was only this one figure that was used - the national total of the rolled-forward from 1981 estimates. It was necessary to adjust the mid-91 estimates by age and sex in order that they summed to the agreed national total. Thus the Census and CVS results had to be adjusted for underenumeration not identified by the CVS. This involved dividing England and Wales into eight area types and differential adjustments for underenumeration were made by area type, sex and age group.

3.1.1.4 For 2001, if the diagnostic range was noticeably higher than the ONC estimate then the adjustment for the corresponding cohort age-sex group in 1991 was examined. If a large adjustment was made in 1991, then the 2000 mid-year estimate (MYE) would still reflect that adjustment and in a significant number of areas this resulted in the MYE being higher than the patient register information used in the quality assurance process. This provided a further indication that the MYEs were inflated; they were higher than the patient register numbers which themselves are known to be inflated, particularly for young men, because they contain patients who have moved out of an area and not yet registered elsewhere. There were also other indications that arose from discussion within the quality assurance meetings that the MYEs were likely to be inflated because of difficulties in measuring migration, particularly outward migration.

3.1.1.5 Provided there was no evidence from the qualitative information used in the quality assurance to suggest a problem with the 2001 ONC estimate, the ONC estimate was judged to be more reliable than the 2000 MYE for local authorities in which this was noted. Each local authority was considered in turn, and the ONC estimate was accepted provided there were no other concerns expressed by the quality assurance panel to be further investigated or explained.

3.1.2 London investigation

3.1.2.1 ONS recognised that undertaking a Census in London and in particular in Inner London would be difficult. Strategies were put in place to help the field staff achieve a good enumeration. Clearly, there were difficulties with conducting the Census in much of Inner London, as shown by the very low response rates in some boroughs as shown in **Figure 1**.

Figure 1
2001 Census response rates by London Borough

All person response rates

- 91.8% and above
- 88.0% to 91.7%
- 83.4% to 87.9%
- 76.6% to 83.3%
- 64.4% to 76.5%
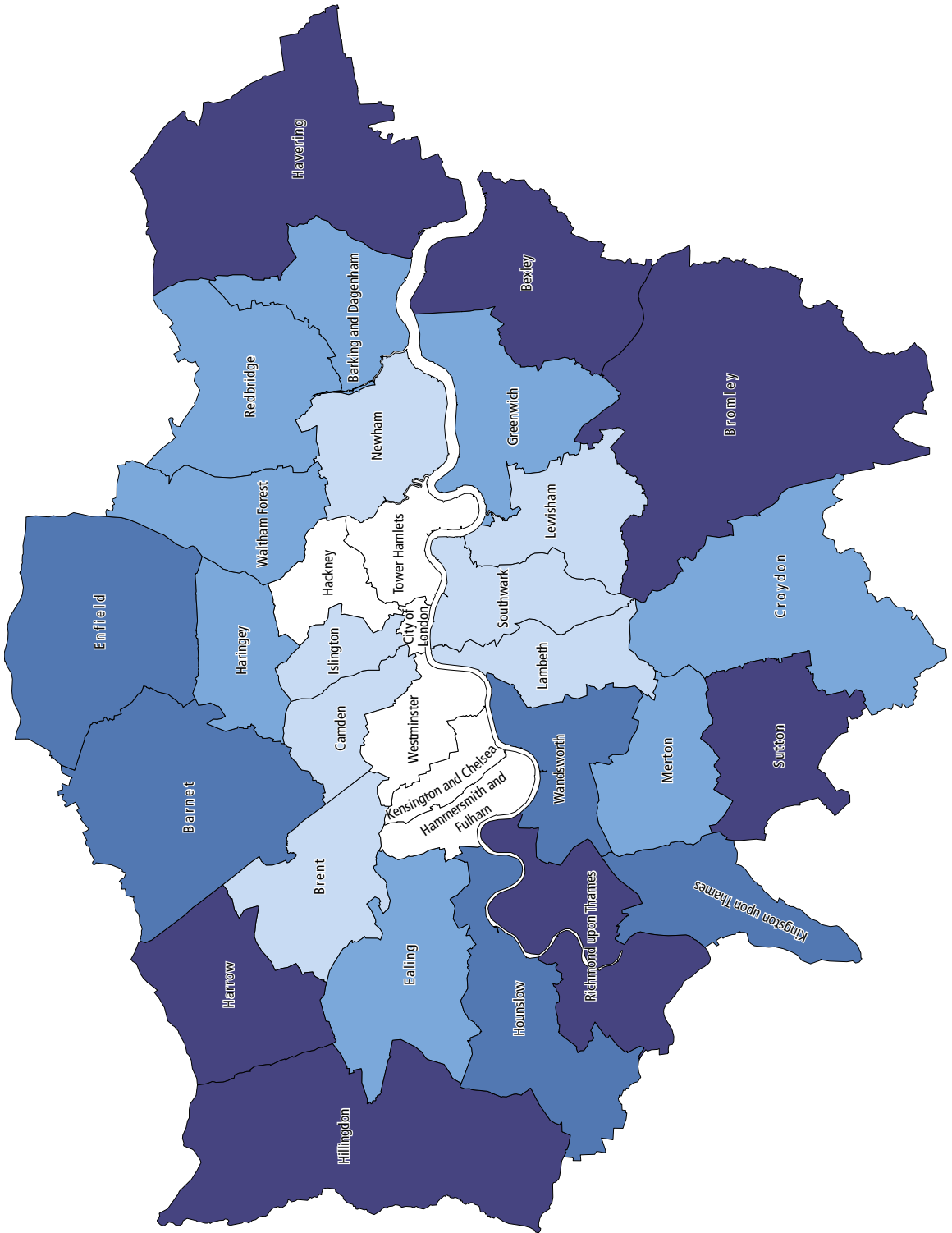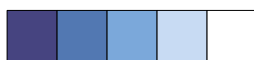
3.1.2.2 Consequently, London was subject to particularly detailed checks and analyses. Early London Boroughs were considered by the Quality Assurance panel but given the diversity and characteristics of the individual Boroughs, it was agreed that London should be subject to further analysis. London Boroughs were recognised as being different to other local authorities and within London there were clear differences in the characteristics of different Boroughs, particularly Westminster and Kensington & Chelsea. Therefore a number of checks and analyses were conducted with separate consideration given to Inner and Outer London because of their differing characteristics. For the purposes of the quality assurance procedures, Brent was included as an Inner London Borough as its characteristics were considered to be more akin to Inner London than Outer London

3.1.2.3 The various analyses undertaken were considered individually, for Inner and Outer London, by the quality assurance panel but were also re-visited together as part of the quality assurance process.

The analyses conducted for Inner and Outer London included the following:

- Comparison of the ONC estimate with the 2000 MYEs by age group and sex. This also included comparisons for specific age groups in particular those aged between 20 and 39 as these were the ages where the largest differences were noted;

- Census response rates and coverage of Hard to Count (HtC) strata by Borough;

- Investigation into the plausibility of the ONC sex ratios;

- Investigation into ONC household size by Borough for Inner London;

- Investigations into the coverage of population sub-groups in the ONC;

- Investigations into the coverage of ethnic minority groups by Borough; and

- Investigation into the allocation of Asylum Seekers and Visitor Switchers in MYEs by Borough.

3.1.2.4 When considering Westminster and Kensington & Chelsea the quality assurance panel were aware of the differences in the characteristics of these Boroughs compared to other Inner London Boroughs e.g. a high

incidence of second homes, asylum seekers and international migrants. Therefore in addition to the analyses outlined above an investigation was done at ward level to look at second homes and vacant properties to identify whether there was a large concentration of dummy forms left over after ONC imputation within wards. The results of each of the analyses above are detailed below for Inner and Outer London

Comparison of the ONC estimate with the 2000 MYEs by age group and sex

Inner London findings

3.1.2.5 The 2000 MYEs were used as one of the main comparators in the quality assurance process. Of the comparator data sources that had counts available for all age-sex groups, the 2000 MYEs were regarded to be the most reliable. Comparisons were therefore made between the 2000 MYEs and the ONC estimates.

On inspection, the ONC estimate for Inner London was 3.2 per cent below the 2000 MYE. The ONC estimates in Inner London for males aged 30 – 69 fell below the lower bound and the 2000 MYE despite noticeably large adjustments being made for undercount by the ONC. The quality assurance panel accepted that areas within London would have a large amount of undercount. In Westminster and Kensington & Chelsea in particular, the quality assurance panel considered the large differences between the ONC estimates and 2000 MYEs. The panel noted, despite the low overall response rate (74.0 per cent and 64.0 per cent, respectively) and postback rate that the adjustments made to the Census results in these two Boroughs were greater than those made elsewhere in the country (aside from Hackney (72.0 per cent)). In order to bring the ONC estimates in line with the diagnostic range the magnitude of the undercount noted for Westminster and Kensington & Chelsea as well as other Boroughs within Inner London would have had to have been much higher than estimated and for many age groups, in particular young men, this was regarded as implausible.

3.1.2.6. Further action was taken when considering Westminster to look at the ONC estimates against the 2001 Greater London Authority (GLA) projections. This comparison showed whilst the ONC estimates were lower than the GLA projections for Westminster (18.7 per cent lower) that the magnitude of the difference was notably lower than the difference between the ONC estimate and the 2000 MYEs (34.9 per cent lower). Moreover,

the difference between the 2000 MYEs and the 2001 GLA projections for Westminster was in the region of 13.7 per cent. Conclusions from this investigation pointed to the fact that the 2000 MYEs were too high in Westminster. It should be noted, whilst a comparison was made between the 2001 GLA projections and the ONC estimates that no adjustment was made to the ONC estimates based on this comparison.

Outer London findings

3.1.2.7 When compared to the 2000 MYE, the ONC estimate for Outer London was 2.4 per cent lower. The ONC estimates in Outer London for males aged 25 – 54 fell below the lower bound and the 2000 MYE despite noticeably large adjustments being made for undercount by the ONC. Similarly to Inner London boroughs, the quality assurance panel accepted that areas within Outer London would have a large amount of undercount and that the undercount would have had to be higher than estimated in order to bring the ONC estimates in line with the diagnostic range. Again this was regarded as implausible.

Census response rates and coverage of HtC strata by Borough

3.1.2.8 The CCS sampled over 16, 000 postcodes within England and Wales. The sample of postcodes was not simply a random choice - information was used from the 1991 Census to derive a 'Hard to Count' index. This index had 3 levels - Easy, Medium and Hard - and each postcode was allocated to one of these groups based upon its levels of the following 1991 Census variables, which are believed to be a good indicator of where the census might miss people:

    a) Multi-occupied households (e.g. bedsits that are within the same building)

    b) Privately rented households

    c) 1991 unemployment levels

    d) Language difficulty

    e) Imputed residents in the 1991 Census (i.e. where the 1991 Census had problems finding people)

3.1.2.9 The sample of postcodes were selected within each of the three hard to count categories, although a slightly higher proportion were selected in the hardest to count categories (this was to ensure that the amount of information collected within the harder areas was boosted).

3.1.2.10 For the Census results to be plausible, the pattern of underenumeration measured

by the ONC had to be realistic. Therefore the response rate at the national and local level was examined.

3.1.2.11 In 2001, coverage of the census in England and Wales is 100 per cent. Total overall response was 98 per cent. This includes some 4 per cent of the population estimated to be resident in households identified by enumerators but from whom no completed census form was returned. Census response in 2001 for England and Wales is therefore estimated to be 94 per cent, 2 per cent lower than in 1991.

Inner London findings

3.1.2.12. The results from this analysis as illustrated in **Table 1**, revealed that the overall response rate for Inner London was 78.0 per cent compared to 94.0 per cent for England and Wales. It was anticipated that the response rate for both Inner and Outer London would be lower than the figure for England and Wales. Of the Inner London Boroughs, Kensington & Chelsea had the lowest overall response rate (64.0 per cent) and Wandsworth the highest (89.0 per cent).

3.1.2.13 When looked at by HtC, as expected, there was a very small proportion of the ONC estimate for Inner London in HtC 1 areas (0.3 per cent) with HtC 2 areas accounting for just 9.1 per cent of the ONC estimate. The remaining 90.7 per cent of overall ONC estimate in Inner London was in HtC3 areas (the most difficult areas to enumerate) compared to just 20 per cent nationally. The ONC estimates largely comprising HtC 3 areas highlighted the difficulty enumerators had and the difficult task of undertaking a Census in Inner London.

3.1.2.14 As would be expected, there was a good response in the few HtC 1 areas with the lowest overall response rate for Inner London in HtC 3 with 78.4 per cent compared to 87.5 per cent in HtC 2 and 98.0 per cent in HtC 1. The high proportion of HtC 3 and low response rate within this stratum influenced the overall response rate for Inner London. Within HtC 3, the lowest census response rate was in Kensington & Chelsea (63.8 per cent) and the highest in Wandsworth (88.8 per cent).

3.1.2.15 On inspection of the overall Census response rates and Census response rates by HtC, the Quality Assurance panel agreed that they were as anticipated and therefore there were no indications that the ONC estimates for any of the Inner London Boroughs were

Table 1

Population and coverage of HtC strata for Inner London Boroughs

London Borough	% total ONC estimate in: (pre-dependency)			Census response by HtC area - % (post-dependency)			Overall response rate (post-dependency)	% difference ONC - 2000 MYE pre-dependency)
	HtC1	HtC2	HtC3	HtC1	HtC2	HtC3		
City of London		33.8	66.2		72.9	74.5	74	10.0
Brent	0.03		99.97	100.0		79.4	79	2.4
Camden		10.2	89.8		87.2	75..3	77	-3.8
Hackney		3.0	97.0		78.8	71.9	72	-1.6
Hammersmith & Fulham		5.7	94.3		77.7	76.1	76	-1.6
Haringey	0.3		997.	100.0		83.4	83	-4.5
Islington		14.7	85.3		78.0	78.2	78	-3.2
Kensington & Chelsea		2.9	97.1		87.0	63.8	64	-18.1
Lambeth	0.3		99.7	100.0		78.7	79	-4.5
Lewisham	2.1	30.0	67.9	96.8	88.0	77.3	81	-1.2
Newham		16.9	83.1		86.5	78.3	80	-1.7
Southwark	0.6		99.4	100.0		76.6	77	1.4
Tower Hamlets		17.9	82.1		80.6	74.6	76	3.2
Wandsworth		14.6	85.4		91.3	88.8	89	-4.6
Westminster		10.0	90.0		89.1	72.4	74	-27.0
Inner London	0.3	9.1	90.7	98.0*	87.5*	78.4*	78	-4.7
England & Wales	40.0	40.0	20.0				94	-1.7

*Note: * pre-dependency*

implausible. With regards Kensington & Chelsea, it was anticipated that overall response rate and response rate within HtC 3 would be low as a result of barriers to enumeration within the Borough, including language problems, multiple occupation and the allocation of asylum seekers etc. ONS recognised that undertaking a Census in areas of Inner London would be difficult, and strategies were put into place to help the field staff achieve a good enumeration. The high adjustment for underenumeration reflected the ONC methodology to identify the enumeration problems resulting from the barriers.

Outer London findings

3.1.2.16 The analysis into response rates and coverage of the HtC strata, as illustrated in Table 2, shows that the overall response rate for Outer London was 90.0 per cent compared to 94.0 per cent for England and Wales. Of the Outer London Boroughs, Ealing had the lowest overall response rate (85.0 per cent) and Havering the highest (97.0 per cent).

3.1.2.17 Similarly to Inner London, there was a relatively small element of the ONC estimate for Outer London in HtC 1 areas (12.6 per cent). With regards the other HtC strata, there was 46.0 per cent of the ONC estimate within HtC 2 areas

and 41.3 per cent of overall ONC estimate in Outer London was in HtC3 areas compared to just 20 per cent nationally.

3.1.2.18 The lowest overall response rate for Outer London, as would be expected, was in HtC 3 with 87.7 per cent compared to 93.1 per cent in HtC 2 and 96.2 per cent in HtC1. The overall response rate for Outer London was influenced by the relatively high proportion of HtC 3 and low response rate within the stratum. Within HtC 3, the lowest overall response rate was in Greenwich (80.7 per cent) and the highest in Harrow 92.0 per cent. There was no correlation at the Borough level between overall response rate and percentage difference between the ONC and MYEs.

3.1.2.19 Similarly to the investigation into Census response rates for Inner London, the Quality Assurance panel agreed that the Census response rates and response rates by HtC were as expected for Outer London and therefore this further supported the ONC estimates for the Outer London Boroughs.

Table **2**

Population and coverage of HtC strata Outer London Boroughs excluding Brent

London Borough	% total ONC estimate in: (pre-dependency)			Census response by HtC area - % (post-dependency)			Overall response rate (post-dependency)	% difference ONC - 2000 MYE (pre-dependency)
	HtC1	HtC2	HtC3	HtC1	HtC2	HtC3		
Barking & Dagenham	46.5	46.2	7.3	92.5	80.4	85.8	86	3.4
Barnet		34.5	65.5		91.4	88.7	90	-10.3
Bexley	44.7	55.3		97.1	95.0		96	-1.3
Bromley	34.4	52.4	13.1	96.6	93.3	89.6	94	-2.9
Croydon	11.1	45.0	43.9	96.2	90.9	81.0	87	-5.0
Ealing		13.7	86.3		91.8	84.2	85	-4.4
Enfield		51.0	49.0		90.6	88.2	89	0.0
Greenwich		62.8	37.2		88.8	80.7	86	-4.4
Harrow		34.6	65.4		93.1	92.0	92	-4.6
Havering	60.6	39.4		97.2	95.6		97	-3.1
Hillingdon		77.5	22.5		94.2	87.7	93	-5.7
Hounslow		39.4	60.6		93.2	89.2	91	-1.1
Kingston upon Thames		60.6	39.4		92.9	89.4	91	-3.8
Merton		41.0	59.0		89.9	86.5	88	-2.1
Redbridge	7.3	47.8	44.9	94.4	91.1	81.6	87	0.6
Richmond upon Thames		51.5	48.5		95.0	90.6	93	-12.2
Sutton	21.7	68.9	9.4	95.2	95.4	83.6	94	-0.4
Waltham Forest	7.5	26.5	66.0	93.5	95.9	83.9	88	-1.5
Outer London exc. Brent	**12.6**	**46.0**	**41.3**	**96.2***	**93.1***	**87.7***	**90**	**-3.6**
England & Wales	**40.0**	**40.0**	**20.0**				**94**	**-1.7**

*Note: * pre-dependency*

3.1.2.20 Similarly to the Inner London Boroughs there were no indications that the ONC estimates for any of the Outer London Boroughs were implausible when looking at overall Census response rates and Census response rates by HtC.

Investigation into the plausibility of the ONC sex ratios

Inner and Outer London findings

3.1.2.21 The investigation into the sex ratios for Inner London revealed a very similar pattern to the pattern identified at the national level whereby the ONC estimates for males aged 25 – 44 were lower than the corresponding ONC estimates for females. This pattern was not specific to Inner London and was further reflected by Outer London as well as many other local authorities across England and Wales throughout the quality assurance process.

3.1.2.22 On inspection of the 2001 census sex ratios it was apparent that there was a similarity in the pattern demonstrated by the 1991 raw Census results. The post 1991 census underenumeration adjustments (particularly for males aged 25 – 29, 30 – 34 and 35 – 39)

were considered too large in London as well as metropolitan and non-metropolitan areas, and it was noted that these adjustments significantly changed the sex ratios in the 1991 MYEs for these areas.

Investigation into ONC household size by Borough for Inner London

Findings

3.1.2.23 The investigation into ONC household size, conducted for Inner London, aimed to identify whether the ONC household size counts for Inner London authorities appeared plausible. However, particular focus was placed on identifying whether the ONC Household size counts for Kensington & Chelsea and Westminster appeared plausible given the specific focus on these areas. Comparisons were made against a derived 2000 MYE average household size. In Kensington & Chelsea the average household size according to the ONC estimate was 1.96 residents, as shown by **Table 3** and in Westminster this figure was 1.92 resident. If the derived 2000 MYE average household sizes were correct for Kensington & Chelsea and Westminster, this would have had the effect of boosting the average household size to 2.35 and

Table 3
ONC Household size counts: Inner London Boroughs plus Brent

No. of residents	City of London	Brent	Camden	Hackney	Hammersmith & Fulham	Haringey	Islington	Kensington & Chelsea	Lambeth	Lewisham	Newham	Southwark	Tower Hamlets	Wandsworth	Westminster	Inner London (incl. Brent)
% OF TOTAL HOUSEHOLDS WITH RESIDENTS																
1	60.3	28.9	46.1	40.4	40.3	35.9	44.1	48.6	37.9	34.8	34.0	37.3	38.9	36.6	49.3	39.2
2	27.1	27.2	26.7	25.4	29.5	28.8	27.6	27.7	29.3	30.2	22.8	28.8	26.7	31.6	27.9	28.0
3	8.2	16.5	12.8	12.9	13.7	15.5	12.7	10.8	16.3	15.8	14.8	15.7	11.8	15.1	11.1	14.1
4	2.9	15.3	8.2	10.6	9.6	11.8	9.1	7.2	9.5	11.8	13.4	10.4	8.8	10.4	7.2	10.3
5	0.7	7.7	3.4	6.0	4.6	5.6	4.3	3.5	4.2	5.6	8.3	4.8	6.3	4.3	3.0	5.1
6+	0.7	4.4	2.8	4.6	2.2	2.7	2.2	2.2	2.8	1.8	6.7	3.0	7.5	2.0	1.5	3.2
PRIVATE HOUSEHOLD POPULATION	6,862	261,232	188,724	201,213	163,182	214,377	172,263	155,436	263,099	246,554	242,194	239,514	193,982	255,973	175,012	2,979,617
COMMUNAL ESTABLISHMENT POPULATION	319	2,234	9,298	1,612	2,056	2,128	3,526	3,485	3,071	2,363	1,690	5,353	2,101	4,406	6,272	49,914
TOTAL POPULATION	7,181	263,466	198,022	202,825	165,238	216,505	175,789	158,921	266,170	248,917	243,884	244,867	196,083	260,379	181,284	3,029,531
TOTAL HOUSEHOLDS	4,342	99,994	91,609	86,047	75,433	92,172	82,283	79,141	118,452	107,421	91,822	105,811	78,536	115,647	91,169	1,319,879
AVERAGE HOUSEHOLD SIZE	1.58	2.61	2.06	2.34	2.16	2.33	2.09	1.96	2.22	2.30	2.64	2.26	2.47	2.21	1.92	2.26
2000 MYE POPULATION	6,371	254,941	202,827	202,886	166,178	225,068	178,218	190,333	275,809	245,987	239,526	238,709	186,735	271,089	244,597	3,129,274
2000 MYE DERIVED AVERAGE HOUSEHOLD SIZE*	1.39	2.53	2.11	2.34	2.18	2.42	2.12	2.36	2.30	2.27	2.59	2.21	2.35	2.31	2.61	2.33

Note: * ONC Communal establishment population deducted from the 2000 MYE divided by ONC count of households

2.37 residents respectively - above that for Inner London as a whole. It was questioned whether this was plausible especially since nearly 50 per cent of households in Kensington & Chelsea and Westminster were single person households.

3.1.2.24 With regards to the other Inner London Boroughs, Newham had the highest average ONC household size (2.64 persons) and the City of London had the lowest as might be expected (1.58 persons).

3.1.2.25 Newham had the highest proportion of ONC households with five and six or more residents 8.3 per cent and 6.7 per cent respectively. This was expected given the high proportion of ethnic minority groups residing in this borough - 66.2 per cent (figure includes all ethnic groups apart from White British).

Investigation into the coverage of population subgroups in the ONC

Inner London findings

3.1.2.26 With regard population subgroups, such as students, armed forces personnel and prisoners, the ONC estimates compared well with comparator data across Inner London. Any initial concerns of a shortfall in the ONC estimates for full time students was dispelled by comparing with Higher Education Statistics Agency (HESA) and Learning Skills Council (LSC) data for Inner London and London.

Outer London findings

3.1.2.27 With regards ONC estimates of full time students, comparisons were made with comparator HESA and LSC data for Outer London. Results showed that the ONC figures compared well and were in fact slightly higher than would have been expected perhaps indicating that a number of students live in Outer London but travel into Inner London to undertake their studies. The aggregated London chart confirmed that the ONC estimates compared well with the comparator data. This is shown in **Figure 2**.

3.1.2.28 Overall the presence of armed forces personnel in Outer London was small. The ONC estimates for Outer London were lower than the comparator 2000 MYEs of home armed forces but compared well with the 2001 Defence Analytical Services Agency (DASA). The aggregated London chart is shown in **Figure 3**.

3.1.2.29 On inspection of male prisoners the ONC counts for Outer London, despite being small, compared well with the comparator 2000 MYEs of prisoners. There were no female prisoners counted by the Census or estimated by the 2000 MYEs in Outer London.

Figure 2

Comparison of full time students with HESA and LSC data
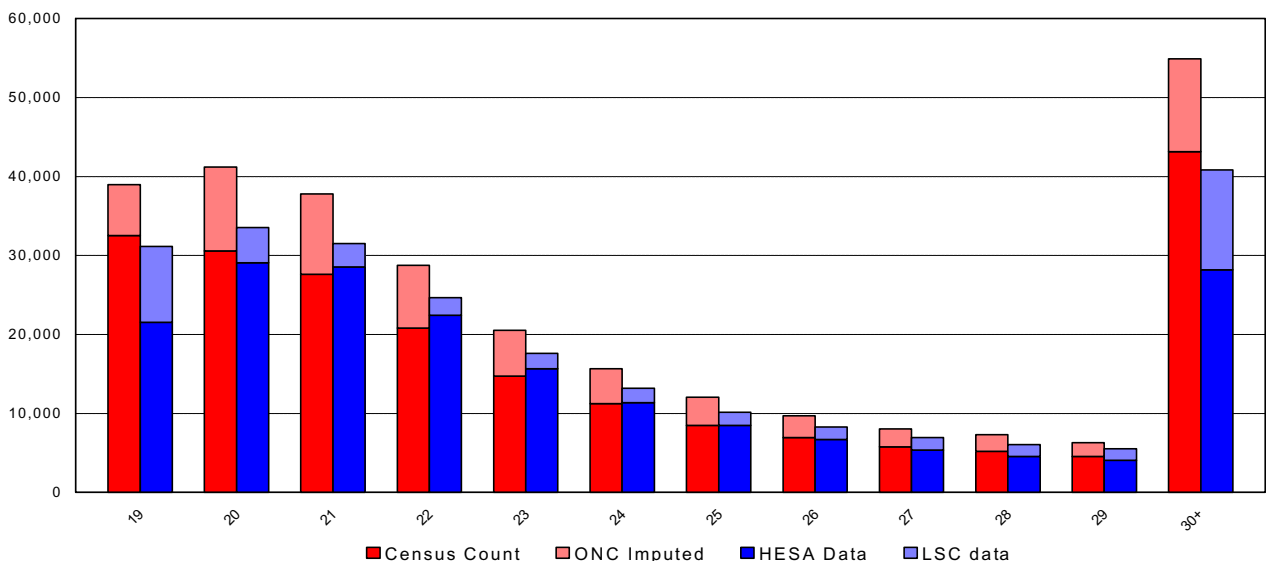
Figure 3

Comparison of home armed forces with DASA data
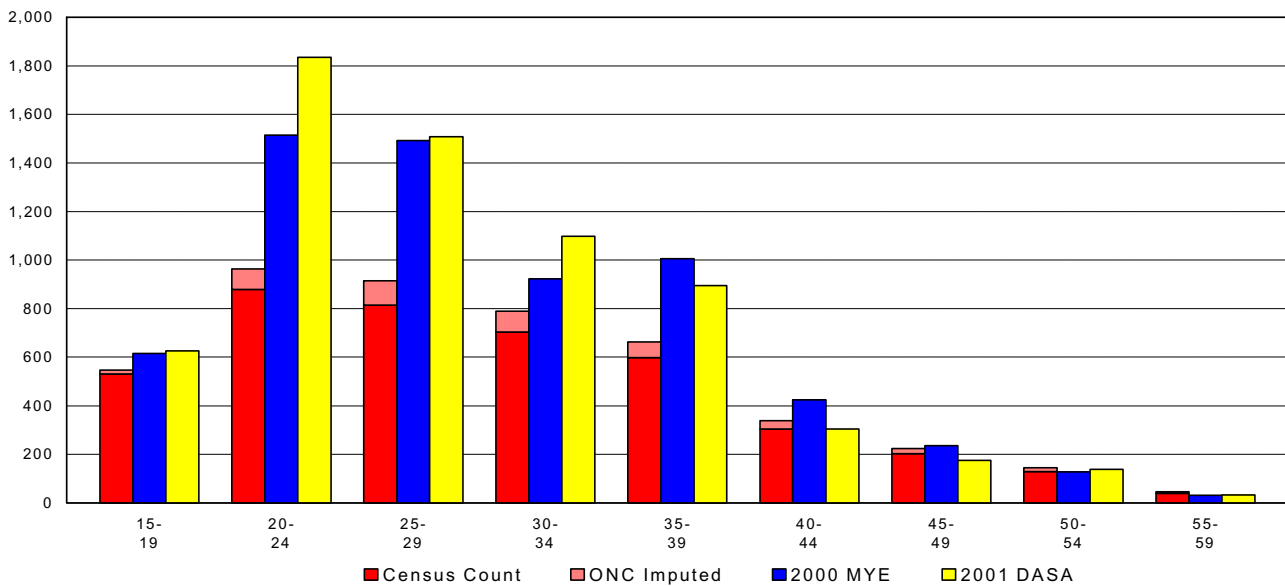
Investigation into the coverage of ethnic minority groups by Borough

Inner London findings

3.1.2.30 The investigation into the coverage of ethnic minority groups, shown in **Table 4**, compared ONC estimates with 2000 projections from the London Research Centre (LRC). It was difficult to make direct comparisons between the ONC and LRC data due to definitional differences for persons of mixed race. The ONC definition classified mixed race people as non-white whilst the LRC could categorise them as white. Despite this, the percentages of the total population by Borough within the minority ethnic groups were broadly comparable between ONC and LRC.

3.1.2.31 The Boroughs with the largest non-white ethnic group population by percentage for both the ONC and LRC were in Newham (60.6 per cent in ONC), Brent (54.7 per cent in ONC) and Tower Hamlets (48.6 per cent in ONC). For Inner London the ONC indicated 36.1 per cent of the population within non-white ethnic groups compared to 35.0 per cent by the LRC.

Outer London findings

3.1.2.32 Despite the definitional differences for persons of mixed race the results from the investigation into the coverage of ethnic minority groups showed in general that the percentages of the total population by Borough within the non-white ethnic groups were comparable between the ONC and LRC as shown in **Table 5**.

3.1.2.33 The Borough with the largest ethnic minority population by percentage for the ONC was Ealing (41.3 per cent compared to 40.8 per cent in LRC) followed by Harrow (41.2 per cent compared to 37.1 per cent from the LRC) and Redbridge (36.5 per cent in ONC compared to 31.7 per cent in LRC). For Outer London the ONC indicated 23.5 per cent of the population within ethnic minorities compared to 21.3 per cent by the LRC.

Table **4**

Comparison of ethnic groups by London Borough ONC and LRC (GLA) 2000 projections.

Borough	ONC Total Ethnic Minority	ONC White Ethnic Group	ONC Total Ethnic Minority %	LRC(GLA) 2000 Total Ethnic Minority %	% Points difference (ONC-LRC)
City of London	1,110	6,075	15.4	24.1	-8.7
Brent	144,186	119,278	54.7	53.4	1.3
Camden	53,124	144,896	26.8	26.2	0.6
Hackney	82,356	120,468	40.6	38.8	1.8
Hammersmith & Fulham	36,640	128,602	22.2	23.0	-0.8
Haringey	74,425	142,082	34.4	36.9	2.5
Islington	43,333	132,464	24.6	26.8	-2.2
Kensington & Chelsea	33,995	124,924	21.4	20.2	1.2
Lambeth	100,111	166,058	37.6	37.0	0.6
Lewisham	84,824	164,098	34.1	31.1	3.0
Newham	147,761	96,130	60.6	54.2	6.4
Southwark	90,550	154,316	37.0	32.2	4.8
Tower Hamlets	95,307	100,799	48.6	43.5	5.1
Wandsworth	57,402	202,978	22.0	24.5	-2.5
Westminster	48,571	132,715	26.8	30.1	-3.3
Total Inner London plus Brent	**1,093,695**	**1,935,883**	**36.1**	**35.0**	**1.1**

Source: ONC and LRC 1999 round ethnic group projections P1 (Martin Storkey thesis)

Definition of Minority Ethnic Group used:

LRC	ONC
Black Caribbean	Mixed
Black African	Asian
Black Other	Black
Indian	Chinese or other
Pakistani	
Bangladeshi	i.e. all non-white
Chinese	
Other Asian	
Other Asian	
i.e. all non-white	

Table **5**

Comparison of ethnic groups by Outer London authority with LRC 2000 projections

Borough	ONC Total Ethnic Minority	ONC White Ethnic Group	ONC Total Ethnic Minority %	LRC(GLA) 2000 Total Ethnic Minority %	% Points difference (ONC-LRC)
Barking & Dagenham	24,277	139,667	14.8	11.6	3.2
Barnet	81,696	232,868	26.0	25.1	0.9
Bexley	18,797	199,510	8.6	7.8	0.8
Bromley	24,866	270,666	7.9	7.2	0.7
Croydon	98,642	231,945	29.8	23.4	6.4
Ealing	124,207	176,741	41.3	40.8	0.5
Enfield	62,610	210,949	22.9	21.0	1.9
Greenwich	49,068	165,335	22.9	18.9	4.0
Harrow	85,271	121,543	41.2	37.1	4.1
Havering	10,827	213,421	4.8	4.3	0.5
Hillingdon	50,886	192,120	20.9	18.1	2.8
Hounslow	74,587	137,754	35.1	34.7	0.4
Kingston-upon-Thames	22,881	124,392	15.5	13.5	2.0
Merton	47,025	140,883	25.0	22.3	2.7
Redbridge	87,048	151,587	36.5	31.7	4.8
Richmond-upon-Thames	15,550	156,785	9.0	7.9	1.1
Sutton	19,417	160,351	10.8	8.5	2.3
Waltham Forest	77,538	140,803	35.5	35.1	0.4
Total Outer London excl. Brent	**975,193**	**3,167,320**	**23.5**	**21.3**	**2.3**

Investigation into Asylum Seekers and Visitor Switchers in MYEs by Borough

3.1.2.34 This analysis investigated the allocation of asylum seekers and visitor switchers in the MYEs and compared them to the London Asylum Seekers Consortium (LASC) data. A visitor switcher can be identified as someone who enters the UK initially as a visitor but who subsequently applies for permanent residency once they have arrived. These people are not counted as migrants by the International Passenger Survey (IPS) as their intention on arrival to the UK is to visit rather than to migrate.

3.1.2.35 The LASC data did not include visitor switchers. Despite this, comparisons were made between the 2000 MYEs of Asylum Seekers/ Visitor Switchers (ASVS) with numbers of asylum seekers from the LASC by comparing the respective numbers within each Borough as a percentage of the totals within London.

Inner London findings

3.1.2.36 The comparisons in Table 6 showed that the greatest positive percentage points difference between the two data sources was in Brent (3.7 percentage points), Kensington & Chelsea (3.2 percentage points), Camden (2.5 percentage points) and Westminster (2.4 percentage points). The quality assurance panel noted this difference. It was contended that the difference between the MYEs and the LASC data could be due to the over-allocation of asylum seekers and international migrants into Inner London and in particular into these areas. It was acknowledged that PEU within ONS allocated a large number of asylum seekers into Inner London possibly at the expense of other London Boroughs.

3.1.2.37 Conversely, the potential for under-recording in MYEs of Asylum seekers with negative percentage points difference was greatest in Newham (-5.2 percentage points), Islington (-4.4 percentage points) and Haringey (-3.9 percentage points).

3.1.2.38 While these differences were noted, no adjustment was made to the estimates. However, the methodology used to allocate asylum seekers to local authorities has since been revised as part of a wider initiative to improve estimates of migration.

Table 6

Comparison between the LASC and PEU by Inner London Borough of Asylum Seekers for the week ending 30th June 2000.

	LASC		PEU		% Points difference (PEU-LASC)
Borough	Total no. Asylum Seekers	% All London Boroughs	Total ASVS Mid-2000	% All London Boroughs	
Brent	1,789	2.8	4,862	6.5	3.7
Camden	1,742	2.7	3,869	5.2	2.5
City of London	228	0.4	56	0.1	-0.3
Hackney	2,607	4.0	3,306	4.4	0.4
Hammersmith & Fulham	2,228	3.5	3,365	4.5	1.0
Haringey	5,799	9.0	3,805	5.1	-3.9
Islington	4,582	7.1	2,021	2.7	-4.4
Kensington & Chelsea	1,855	2.9	4,569	6.1	3.2
Lambeth	3,181	4.9	3,022	4.0	-0.9
Lewisham	2,452	3.8	1,880	2.5	-1.3
Newham	5,785	9.0	2,804	3.8	-5.2
Southwark	3,686	5.7	2,809	3.8	-2.0
Tower Hamlets	918	1.4	436	0.6	-0.8
Wandsworth	1,072	1.7	1,904	2.5	0.9
Westminster	2,451	3.8	4,619	6.2	2.4
Total Inner London plus Brent	**40,375**	**62.7**	**43,327**	**58.0**	**-4.7**

Source: Westminster City Council, PEU

3.1.2.39 The LASC, led by the Association of London Government (ALG) and Westminster City Council, provides a variety of related services for London's local authorities. These include asylum seeker accommodation and support services, integration, central government lobbying, data collection and information provision.

Outer London findings
3.1.2.40 Within Outer London, the comparisons in **Table 7** showed that the greatest positive percentage points difference between the two was in Ealing (5.2 percentage points), Barnet (4.3 percentage points) and Croydon and Harrow (both 1.7 percentage points) possibly suggesting an over-allocation of asylum seekers to these areas in the MYEs, and an under-allocation in some other London Boroughs.

3.1.2.41 When looking at the negative percentage points difference (indicating the potential for under-recording in the MYEs of Asylum Seekers), Barking and Dagenham (-3.7 percentage points) had the greatest difference followed by Redbridge (-3.5 percentage points) and Waltham Forest (-2.7 percentage points).

Investigations into the second residences, vacant dwellings and dummy forms that did not have people imputed into them within Kensington & Chelsea and Westminster

Inner London findings
3.1.2.42 During the 2001 Census, dummy forms were created for households where the enumerators did not make contact with residents, including absent households, refusals, non-returns, second residences and vacant household spaces. These forms were used after the ONC estimation process to allocate households and persons estimated to have been missed by the Census. Within Kensington & Chelsea and Westminster, an investigation was undertaken at ward level to look at concentrations of second residences and vacant household spaces and the number of dummy forms left over after the ONC imputation process. However, no dummy forms were found to be left over in Westminster following the imputation process.

3.1.2.43 Within these Boroughs there were a few wards where there were concentrations of second residences/holiday homes as well as vacant spaces. Ward level maps were produced

Table 7

Comparison between the LASC and PEU by Outer London Borough of Asylum Seekers for the week ending 30th June 2000.

	LASC		PEU		% Points difference (PEU-LASC)
Borough	Total no. Asylum Seekers	% All London Boroughs	Total ASVS Mid-2000	% All London Boroughs	
Barking & Dagenham	2,740	4.3	386	0.5	-3.7
Barnet	1,393	2.2	4,852	6.5	4.3
Bexley	468	0.7	603	0.8	0.1
Bromley	653	1.0	1,232	1.6	0.6
Croydon	932	1.4	2,317	3.1	1.7
Ealing	1,342	2.1	5,465	7.3	5.2
Enfield	1,969	3.1	2,184	2.9	-0.1
Greenwich	1,885	2.9	1,239	1.7	-1.3
Harrow	819	1.3	2,197	2.9	1.7
Havering	738	1.1	402	0.5	-0.6
Hillingdon	1,975	3.1	1,282	1.7	-1.3
Hounslow	1,203	1.9	2,368	3.2	1.3
Kingston-upon-Thames	299	0.5	1,209	1.6	1.2
Merton	1,015	1.6	1,957	2.6	1.0
Redbridge	2,590	4.0	422	0.6	-3.5
Richmond-upon-Thames	868	1.3	1,634	2.2	0.8
Sutton	557	0.9	641	0.9	0.0
Waltham Forest	2,624	4.1	1,038	1.4	-2.7
Total Outer London excluding Brent	**24,070**	**37.3**	**31,428**	**42.0**	**4.7**

Source: Westminster City Council, PEU

to assess the distribution of second residences and vacant household spaces within Westminster and Kensington & Chelsea. On inspection, the quality assurance panel was in agreement that the distribution of these types of household spaces was as expected for the area. Results from the analysis into the number of dummy forms left over in Kensington and Chelsea after imputation represented a very small percentage of all households within wards and were therefore not considered to be an issue. Moreover, the dummy forms left over were not concentrated in the wards with the highest percentages of second residences/holiday accommodation and vacant spaces.

Conclusion from London Analysis

3.1.2.44 The Boroughs of London were each subject to the formal quality assurance checks outlined in brief in **section 2.3** within this report and in more detail in the accompanying "ONC methodology and Quality Assurance process" paper. They were subject to further quality assurance checks and analysis requested by the quality assurance panel. **Annex C** lists the Boroughs and the generic issues which were considered for each of them during the quality assurance process. The extensive analyses undertaken to look at the Census results for London Boroughs ensured all aspects of the Census data had been checked and the results, outlined throughout this section, were used to confirm the plausibility of the results.

3.1.2.45 ONS has been involved in extensive correspondence with representatives from Westminster City Council who have questioned the accuracy of their figures, since the publication of the first set of 2001 Census results on 30th September. ONS have been working with Westminster and sharing analyses to help them understand how their estimates were agreed during the quality assurance process. A report - "The Westminster Report - A review of the facts" has been produced that outlines the analysis supplied to Westminster to explain how the Census figures for the Borough were attained. This is available on the National Statistics website at **www.statistics.gov.uk/ StatBase/Product.asp?vlnk=10738**.

3.1.3 Babies in areas with large ethnic populations
3.1.3.1. Throughout the quality assurance process the quality assurance panel paid particular attention to where the ONC estimates for 0 year-olds were lower than the birth registration data. This comparator data source, which records all new births in the population

adjusted for infant deaths and migration, was regarded as key when quality assuring the ONC estimates for children aged less than one.

3.1.3.2 There was a recurring pattern noted particularly in London and Bradford where the ONC adjusted estimates for 0 year-olds were lower than the birth registration data. This was despite a plausible underenumeration pattern. Of particular concern to the quality assurance panel were the Inner London Boroughs of Hackney, Tower Hamlets, Newham, Haringey and Brent and the Outer London Boroughs of Redbridge and Waltham Forest. These Boroughs were of particular concern to the panel because birth registration was high relative to the ONC estimate of under ones. There was speculation that this pattern could, in part, be attributed to certain cultural practices amongst ethnic minority groups living in London and Bradford. One possible explanation was that children of ethnic minority groups were born in England and hence registered in England but then subsequently went abroad. This would have implications for the enumeration of these children in the census. Another possible explanation was that some women may come to England, give birth and then return to their country of residence. Again children would be registered but not necessarily enumerated in the census. Another possible explanation, of course, is that babies have been under-enumerated in the census.

3.1.3.3 Academics working in this field were contacted in order to explore these proposed theories, however none of the academics contacted had any evidence that any of the possible explanations offered did actually occur.

3.1.3.4 In addition, an analysis was conducted using the Census and CCS data to examine the patterns of babies and ethnicity in London. Several different factors were investigated and these include:

- the extra babies found by the CCS in Census households i.e. where babies are not counted by the census but may have been picked up by the CCS;

- CCS households with babies i.e. households that were missed entirely by the Census but counted by the CCS;

- the proportion of babies in the census in London;

- babies compared to older children; and

- the proportions of ethnic minority groups in London.

3.1.3.5 There was no known empirical evidence to suggest that any of the proposed theories was occurring in London, Bradford or any other Local Authority. The results from the further analysis into babies and ethnicity in London revealed that the proportion of babies missed by the Census did vary between ethnic groups although there was no clear patterns from which to draw any conclusions. However, the overall proportions of ethnic minorities within these areas were plausible and were similar to independent distributions, for example LRC ethnic projections.

3.1.3.6 Following this inconclusive investigative work no additional adjustments were made to the ONC estimates for this age group because there was insufficient evidence that adjustment was required. Subsequent contact with the Millennium Cohort research team, who have attempted to contact a sample of births from 2000 registration data, have highlighted that some of the babies cannot be traced. This work is ongoing and therefore no firm conclusions could be drawn.

3.1.3.7 However, the overall estimated underenumeration for babies in the ONC estimates was generally at the level that would be expected, and was consistent with the underenumeration pattern across similar areas without large ethnic minority populations. The underenumeration implied by the birth registration data in some areas was implausible in both extent and in comparison with underenumeration of those age-sex groups corresponding to the parent(s). There is also no qualitative information from the fieldwork that indicates that counting babies was a particular problem. Therefore no adjustments were made to the ONC estimates in light of this investigation.

3.1.4 Post stratification
3.1.4.1. Part of the ONC estimation strategy involved ensuring that the strata within which estimates were produced were as similar (internally homogenous) as possible in terms of their underenumeration characteristics. Within the ONC framework, the HtC was used to partition the sample into groups that represent areas that were expected to have a similar level of underenumeration in the 2001 Census. More information on the derivation of this index can be found at **www.statistics.gov.uk/census2001/pdfs/sc0015.pdf**. This stratification was established prior to the 2001 Census and CCS using small area level 1991 Census data

and made broad assumptions about the likely characteristics of underenumeration in 2001. For most of the Local Authorities in England and Wales, the pattern of underenumeration across the HtC index was as expected, with the highest levels of underenumeration in the hardest to count strata.

3.1.4.2 However, there were some areas where the quality assurance panel noted that the derived HtC index may not have been a good predictor of underenumeration, particularly if the area had undergone significant urban regeneration. The concern was that this could potentially introduce bias into the ONC estimates for such areas. Under these circumstances the quality assurance panel agreed that further investigative work should be done.

3.1.4.3 A contingency strategy had been developed as part of the ONC methodology to address the possibility that the HtC strata for estimation looked implausible. This post-stratification program recalculated the HtC index using an identical methodology, but using 2001 Census data, and then re-estimated for an area using the new strata. Areas that were of particular concern to the quality assurance panel were Knowsley, Liverpool, Wirral and Pendle.

3.1.4.4 The post-stratification program was run for these areas. Results showed that post-stratification had little effect on the ONC estimates for these areas. As a result the estimates produced from the post-stratification strategy did not replace the original ONC estimates.

4 Investigations resulting in adjustments
In addition to numerous key findings, a number of key generic themes and actions were identified which led to further investigations to try and explain why specific subgroups of the population were behaving differently to expectations. Annex C highlights the local authorities and generic issues considered for each local authority during the quality assurance process. Results from these investigations led to adjustments being made to the population subgroup under investigation.

4.1 Contingency measures
The key actions and adjustments resulting from the investigations are highlighted in this section and include the investigations undertaken to look at:

- Collapsing strata;
- Borrowing strength where the

contingency measure was used for situations where there was evidence that the CCS may have failed; and

- Borrowing strength for babies.

4.1.1 Collapsing strata

4.1.1.1 For the purposes of ONC estimation the population within each DG was divided into 37 age-sex groups. In addition, each postcode was classified into one of three HtC levels, 1 being the easiest and 3 the hardest. This means that there were 111 separate estimation strata in any given DG.

4.1.1.2 In some cases, however, it was not possible to estimate each of these groups separately. In these cases they were combined with another group, known as "collapsing strata". This was due to one or more of the following reasons:

Zero undercount - if no people were found in the CCS for an entire age-sex group then the estimated undercount would be zero. It was considered unlikely that 100 per cent coverage would in reality be achieved for any age-sex group.

Small sample size - sometimes very few people were found by the CCS in a particular age-sex or HtC group. These were liable to produce estimates with a large variance, reducing the confidence that could be put in the figures.

Differing adjustments - it would generally be expected that, except in a few known cases, the coverage levels of males and females of the same age would be similar, and also that coverage levels between two contiguous age groups would not differ by large amounts. There were some cases where the coverage levels of two groups were implausibly different on this basis. There were particular concerns with the coverage adjustments for 0 year-olds and this age group was subjected to specific checks (as outlined in **section 4.1.3**).

4.1.1.3 It was agreed therefore to collapse strata when one of the above conditions was met. Although this was applied as standard for DGs it was agreed that some judgement would be required for individual cases.

4.1.1.4 When collapsing, an age-sex group containing those aged 65 and over was collapsed with another age-sex group containing people aged over 65, since the characteristics of people above and below these ages are likely to be

quite different. Similarly, those aged 14 and under were collapsed with other age-sex groups containing people aged 14 and under

4.1.1.5 Except when considering different adjustments between sexes, collapsing of age-sex groups always took place between contiguous groups within the same sex. When there were two possible groups a degree of judgement was required, but generally groups with the most similar distribution of sample sizes across the HtC levels were collapsed together.

4.1.1.6.When collapsing HtC levels it was agreed that contiguous levels should be collapsed together, so that HtC1 or HtC3 would always be collapsed with HtC2. When it was necessary to collapse HtC2 with an adjacent level, a judgement was used based on the distribution of sample sizes across the age-sex groups.

4.1.1.7 Each DG was subjected to these checks prior to the Quality Assurance process, with decisions to collapse additional age-sex groups or HtC levels resulting from the quality assurance meetings. A list of the HtC levels and age-sex groups collapsed by DG is outlined in Annex D.

4.1.2 Borrowing strength

4.1.2.1 The quality assurance process included a contingency measure, which used the principle of "borrowing strength", for situations when there was evidence that the CCS may have failed. The CCS design was based not on LADs but on DGs. It 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. These cases were identified during the quality assurance procedures and a contingency strategy invoked.

4.1.2.2 "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 a DG of two or more LADs, and one for an entire DG.

4.1.2.3 When contingency was needed for only part of a DG, strength was borrowed from the other LADs within the same DG. 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.

4.1.2.4 When it was an entire DG, strength was borrowed from the five LADs considered most similar to each of the LADs 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 that had more local knowledge, and in some cases the areas to be used for borrowing strength were changed at the authority's request. Details on the Borrowing Strength methodology is outlined in **Annex E**

4.1.2.5 The two versions of the borrowing strength strategy were each used once. Strength was borrowed within a DG 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 DG 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 in **Table 8** below:

Table 8

Design groups where the contingency "borrowing strength" strategy was invoked

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

4.1.2.6 The list of similar areas was also used for comparative purposes during the quality assurance discussions. For instance, in a number of cases a particular local authority was held back for comparison with similar areas, especially those identified in the list for borrowing strength purposes. For example, Oxford showed a pattern very different from any area processed previously, and, given that it was similar in terms of being a large University city, was not signed off until the figures for Cambridge became available. In the event, both cities showed a near-identical pattern and this was considered strong evidence in favour of the Census results in these areas.

Figure 4

Borrowing strength ranges
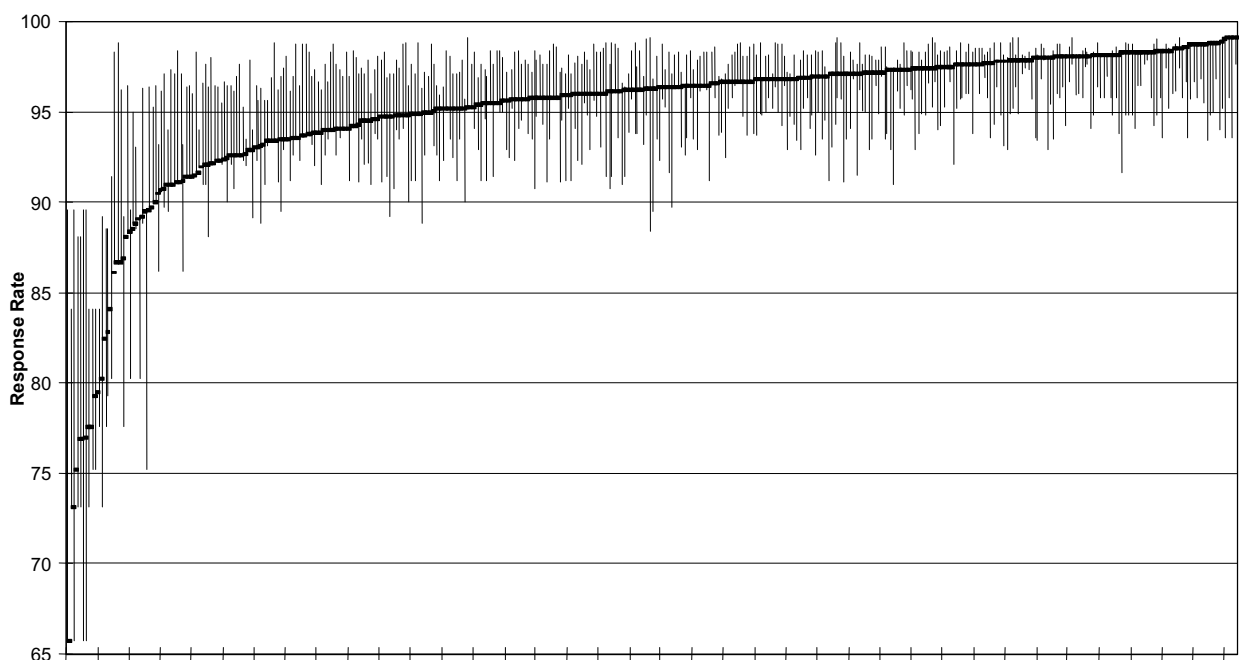
4.1.2.7 To demonstrate the similarity of response rates for these similar areas, **Figure 4** shows each local authority's response rate and the range of response rates for the five most similar areas. Although the ranges vary considerably in size, most areas have a response rate somewhere near the middle of the range. For nearly half of local authorities, the population estimate would have varied (up or down) by 1 per cent or less if borrowing strength had been invoked, and less than 1 in 40 would have changed by more than 5 per cent. The mean net change for all local authorities would have been just +0.2 per cent.

4.1.3 Borrowing strength for babies

4.1.3.1 Throughout the process the quality assurance panel paid particular attention to the ONC estimates for 0 year-olds as this was a group that, in the past, has been found to be difficult to enumerate. As part of this specific focus on 0 year-olds the quality assurance panel looked at the derived underenumeration rate for this group.

4.1.3.2.In some DGs no underenumeration adjustments were made for babies because the CCS did not find any additional 0 year-olds missed by the census. In one sense this is not surprising, as the sample sizes for a single age population in the CCS were generally small. However, the quality assurance panel felt that it was implausible that there had been no 0 year-olds missed by the Census and agreed in these areas that an adjustment to the ONC estimate for babies should be made.

4.1.3.3 In other areas, the underenumeration rates for 0 year-olds were higher than the underenumeration rates for the young age groups (i.e. the 1 − 4 year olds). Moreover, the quality assurance panel was concerned about the ONC estimate for a DG if it was notably different from the comparator data sources, particularly the birth registration data supplied by the PEU in ONS. Given that babies are a difficult group to enumerate, the quality assurance panel did not expect the underenumeration rate for 0 year-olds to be lower than for the 1 − 4 year old age group. In areas where this did occur an adjustment was made to the ONC estimate for babies.

4.1.3.4 Several approaches were considered to adjust the ONC estimates for babies where they were deemed necessary. One approach involved applying the ONC Contingency strategy. This approach used the borrowing strength strategy (outlined in further detail

(ONS (2000))5 available from the ONS website on **www.statistics.gov.uk/census2001/pdfs/ oncinfopaper.pdf**). This method used the mean adjustment made for the 0 year-olds across the five most similar LADs for each of the LADs within the DG in question. On review of the results the quality assurance panel felt that this method was implausible particularly when the area under investigation had a higher underenumeration rate than the five most similar areas. The second proposed approach involved borrowing strength within the DG under investigation from all other age groups. This involved using the overall estimated underenumeration for each LAD as the adjustment that should be made to babies. The third approach involved borrowing strength within each LAD from the age group that is most similar - the 1 − 4 year olds. This method used the mean estimated underenumeration for males and females 1 − 4 as the adjustment that should be made for babies. It was agreed after investigating these approaches that the third approach - borrowing strength from the 1 − 4 year olds within each LAD would be intuitively more plausible and in line with the collapsing strata strategy.

4.1.3.5 The criteria on which an adjustment was based looked at the difference in underenumeration between the 1 − 4s and babies and also the overall difference between the ONC estimate of babies and the birth registration data supplied by PEU. If these criteria were met (i.e. estimated underenumeration was lower for babies, and the estimate was lower than the comparator data) then the undercount adjustments applied to the 1 − 4 year olds were used for the 0 year-olds. The LADs whose ONC estimates for 0 year-olds were subjected to the adjustments can be found in Annex C.

4.2 Population subgroup analyses

As outlined in **section 2.3**, the quality assurance process included analysis for identified population subgroups known from 1991 to be prone to under-enumeration. The ONC estimates for these population subgroups were compared with relevant comparative data and were systematically presented to the quality assurance panel for review. Further detail on the population subgroup quality assurance process and comparator data sets is described in full in the "One Number Census Methodology and Quality Assurance" report.

Throughout the quality assurance process the quality assurance panel identified discrepancies,

reflected by numerous DGs, between the ONC estimates and the comparator data. The quality assurance panel concluded that further work was needed to address these discrepancies to explain why these specific subgroups of the population were behaving differently to expectations.

Consequently, a number of key themes were highlighted and this led to several adjustments being made to specific population subgroups for certain areas. The following part of the report describes the issues and outlines the adjustments that were made for each population subgroup. These include:

- Full time students attending Higher Education establishments;

- Armed Forces personnel including home and FAF; and

- Prisoners

4.2.1 Full time students

4.2.1.1 As part of the ONC quality assurance process, initial comparisons were made for each DG between overall ONC counts of full-time students with comparator data. These comparator data included counts of full-time students by single year of age 19 – 29 and 30+ from the HESA and the Learning and Skills Council (LSC) and the Welsh Funding Council (WFC).

4.2.2.2 Generally counts of students from the ONC following imputation did compare well with the comparator HESA and LSC data. There were some areas however where there was concern expressed by the quality assurance panel that some students may have been missed from the Census. Often when the ONC population estimates of persons aged 20-24 looked low in comparison to the diagnostic ranges a specific note was made to pay particular attention to the student charts, produced as standard as part of the quality assurance process. These charts compared the 2001 Census counts, adjusted for underenumeration, with the comparator data for full time students.

4.2.2.3 Some discrepancies between ONC full time student counts and comparator data were expected as HESA and LSC data record students at their place of study rather than their home address. Many students reside in a different Local Authority to the one in which they study and it was therefore questioned whether the apparent difference seen in some areas was because students were travelling across the borders to study. Differences between the Census and HESA data could be accounted for by the

further definitions imposed by the comparator data as to where students are counted. HESA data assigns students to the administrative centre of the university rather than where the students are actually studying. In some cases a university campus is located in a different LAD to the administrative centre but the HESA data will include the students in the LAD where the administrative centre is. It was agreed therefore that a larger geographical comparison would need to be done to try and capture cross border flows of students.

4.2.2.4 Seven regional charts of full time students were produced that compared the HESA and LSC data to the ONC estimates. These captured all 101 DGs and hence all 376 LADs. These regional charts did not replace the DG level student charts but were used in conjunction with them and were made available to the quality assurance panel.

4.2.2.5 These regional charts provided a more reliable comparison between the HESA and LSC data and the ONC estimates to look at cross border flows when used in conjunction with the DG level full time student charts. No adjustments were deemed to be necessary following review of these regional charts but the panel agreed that this analysis was a key part of the quality assurance process for students.

4.2.2.6 Further work to look at the apparent differences between the ONC estimates and the diagnostic ranges in some Local Authorities involved looking into the possibility that students (both home and international) do not de-register from the GP patient records when they leave university. This is particularly noted amongst males who do not usually register with a doctor until they actually need to see one. Universities often require students to register with the campus doctor and hence the issue of de-registration is a particular problem in university areas. This issue surrounding de-registration may influence the degree of list inflation which would inflate the patient record figures (one of the administrative comparator data sources used in the quality assurance process) which in turn may inflate the diagnostic ranges. In order to try and address this issue the Department of Health (DoH) was contacted to discuss the patient record data.

4.2.2.7 On contact with the DoH, it was confirmed that list inflation for patient record data is very likely to occur in university towns and cities. The quality assurance panel judged

that based on this evidence, this would explain a great deal of the difference between the ONC and the diagnostic ranges in the following LADs: Bath and North East Somerset, Cambridge, Canterbury, Exeter, Havering, Liverpool, Oxford and Plymouth

4.2.2.8 If the quality assurance panel believed that the ONC estimates for students looked inconsistent with expectations then several actions were undertaken to look at students in more detail at the regional level, although no adjustments were made as a result of this.

4.2.2.9 As the CCS was not designed to cover large communal establishments, and in general did not cover them, attention was focussed at quality assurance meetings on DGs with an apparent 'shortage' of students.

4.2.2.10 Analysis to supplement the CCS was carried out for each individual area, identifying students enumerated at halls of residences, and adjusting their numbers if there was evidence of under-enumeration. Evidence was gathered from university websites and by e-mail/telephone contact with university accommodation officers to obtain detailed information on the accommodation and likely population on Census day of students at halls of residences. Reference was also made to Census enumerator field material to see how many forms for a particular hall of residence may have been issued. In addition, Communal Establishment individual forms were examined to confirm address details.

4.2.2.11 The evidence provided from individual university establishments was used to calculate a threshold that was used to decide whether a student adjustment was required or not. It was agreed by the quality assurance panel that student adjustments should be considered where the number of 'missing' students was 100 or more for a particular hall of residence and the notional response rate (calculated by comparing recorded students with indicative numbers of students) was below 75 per cent.

4.2.2.12 All areas with higher education establishments were subjected to this analysis. Following the student halls of residence analysis, 40 of the 376 LADs had student adjustments made. For each of these 40 LADs, adjustments were made to the communal establishment population, in 10 of these LADs adjustments were also made to the private household population. This was because some of the halls of residence had been classified, not

necessarily incorrectly, as households by the Census enumerators rather than as Communal Establishments. These households collectively formed the halls of residence. A list of the LADs that received student adjustments as a result of the halls of residence analysis is outlined in **Annex F.**

4.2.2 Home Armed Forces personnel

4.2.2.1 Differences between the ONC estimates and 2000 MYEs were noted early in the quality assurance process. The quality assurance panel noted that the ONC estimates were lower than 2000 MYEs in a number of areas containing high concentrations of Home Armed Forces. There was also some disparity between the number of Armed Forces recorded by DASA and the number captured by the Census. Conversely, in other areas there were noticeably more home armed forces than in either the 2000 MYEs or the 2001 DASA data.

These early findings prompted the establishment of a working group to investigate the reasons behind these differences.

4.2.2.2 The working group identified a number of issues contributing to the difference between the 2000 MYEs and the ONC estimates. These are summarised below.

- Definitional differences between the Census and DASA data - there were slight definitional differences as regards the length of time spent in an area to qualify as usually resident there.

- Error in the base-to-residence matrix used by the PEU to apportion the armed forces personnel working at a base to the surrounding LADs

- Form completion errors - armed forces personnel were advised to enter their occupation as either 'Commissioned Officer' or 'Other rank', instead many put their actual role such as chef, driver or engineer.

- Occupation and industry coding errors - armed forces personnel who gave their actual role rather than the role they were advised to put 'Commissioned Officer' or 'Other rank' were coded as civilians.

- Undercount in the Census.

The primary aim of the working group was to ascertain how many of the apparently missing armed forces were genuine undercount so that an adjustment could be made to compensate.

4.2.2.3 Further work was undertaken to investigate the enumeration of the home armed forces in the 2001 Census. The work done by the working group is outlined below:

- They identified areas with expected high concentrations of home armed forces, and examined the geographical location of the bases within them. This highlighted that some of the armed forces bases were close to area boundaries, which meant personnel could be living in the surrounding areas and travelling to the bases.

- They looked at the workplace postcode of a 10 per cent sample of armed forces personnel enumerated for selected areas where the Census counts were larger than the comparator data.

- They assessed the accuracy of DASA data in relation to the definitions used to place armed forces at a particular base.

- They assessed the quality of coding and form completion.

- They reviewed alternative sources of information regarding the numbers of armed forces living in communal accommodation.

4.2.2.4 This further work led to improvements in the information provided in the quality assurance process, including additional charts for aggregated areas to reflect cross border flows.

4.2.2.5 The analysis of workplace postcodes did highlight members of the home armed forces who worked a significant distance from their usual residence.

4.2.2.6 There was evidence that some armed forces personnel had been coded as civilians, reflecting form completion difficulties rather than errors in the coding system. The Census Quality report will include more information on the quality of the statistics for this subgroup, but it is clear that this explains most of the large differences. The information was fed into the quality assurance process so that the armed forces comparisons could take account of this.

4.2.2.7 Adjustments for undercount among the armed forces were distributed between the areas with the largest differences between the comparator data and were made to the populations of communal establishments. Following further discussions with officials at DASA, extra information was provided

detailing the number of people paying to live in communal accommodation, by establishment, for each of the services. This allowed us to distribute the adjustment for an area between the communal establishments within that DG. A total of 35 adjustments to defence communal establishments were made. The total adjustment made was based on a national comparison between the ONC estimates adjusted for the completion difficulties and the DASA total of home armed forces. The defence communal establishments that received an adjustment for undercount among the armed forces are detailed in **Annex G**.

4.2.3 FAF personnel

4.2.3.1 In some DGs, the ONC estimates for males and females aged up to 39 were well below the diagnostic range. Often these areas contained FAF bases. The quality assurance panel reviewed these areas to assess the impact of the presence of FAF on the ONC estimate. This work involved looking at a sample of images to see whether FAF personnel had completed their forms correctly and were coded correctly. Conversely, in some DGs, there were FAF present in areas that had no military bases.

4.2.3.2 Similarly to the home armed forces personnel, the ONC estimates for FAF were adjusted for coding and form completion issues. These ONC estimates were compared to the 2000 and 2001 MYEs and on inspection it was agreed that the census had counted FAF personnel and dependants (and hence they were on the database) but that they had not necessarily been coded as FAF personnel and dependants. Many had been classified as home armed forces. The ONC estimates with coding adjustment therefore looked acceptable and it was agreed that no adjustment would need to be made for FAF. The PEU received correspondence from some LADs expressing the view that the MYEs had been too high. This correspondence dated back to 1992 and was based on the view that the adjustment made for FAF in the 1991 census was too high. This will have contributed to the issue. It was also noted that much of decline in the estimate of FAF between 2000 MYE and the ONC estimates was due to a significant reduction in FAF based in England and Wales. This was particularly the case in Forest Heath, Suffolk

4.2.4 Prisoners

4.2.4.1 During the quality assurance process it was found that the 2001 Census had generally enumerated more people in prisons

than expected by the 2000 MYE. Whilst the magnitude of the number of prisoners was not great this pattern raised a question as to whether there was a definitional difference between the 2001 Census definition of a prisoner and the definition used to construct the 2000 MYE. In most cases the Census had enumerated more prisoners than expected but in some areas, particularly those with high security prisons, the Census enumerated less.

4.2.4.2 The MYEs definition of prisoners includes those persons who have been sentenced and have served 6 months or more of their sentence. The Census definition includes those sentenced for more than 6 months regardless of how long a person has served prior to Census day. In addition, the Census definition included those persons who had no other usual residence as well as young offenders within young offenders institutions. These differences in definition would therefore result in an expectation that the Census count of prisoners would be higher than the MYEs. A cumulative chart was constructed to highlight the number of prisoners counted by the Census compared to the estimated number of prisoners from the MYEs.

4.2.4.3 Given the definitional difference between ONC and MYE it was decided to accept the Census count on the condition that individual prisons were examined for evidence of significant underenumeration. This was done by comparing the Census counts with Home Office (HO) data for individual prisons. An adjustment was made if the difference was 100 or more and the notional response rate was below 75 per cent (the notional response rate being the ONC count divided by the HO figure as a percentage). The adjustments were made using a random selection of those already enumerated in the prisons as donors.

As a result of this check, a total of nine adjustments to prisons were made. **Table 9** gives a full list of these prisons and the LADs in which they are located:

Table 9

Prison establishment and location receiving adjustments

LAD Name	County	Establishment
Wychavon	Worcestershire	Long Lartin
Wakefield	West Yorkshire (Met County)	Wakefield
Waveney	Suffolk	Blundeston
East Riding of Yorkshire		Full Sutton
Maidstone	Kent	Maidstone
Leeds	West Yorkshire (Met County)	Leeds
Weymouth & Portland	Dorset	Weare
Manchester	Greater Manchester (Met County)	Manchester
Arun	West Sussex	Ford

5 Dependency

5.1 The key assumption underpinning the ONC methodology was independence between the Census and the CCS. This implied that the probability of an individual appearing on the CCS listing was not related to their appearance on the Census.

5.2 The importance of dependence was recognised during the planning of the ONC process. Throughout the development of the ONC process it was acknowledged that dependence was a possibility. Hence, the approach and methodology were designed to minimise the extent to which dependence would occur and to be robust for various levels of dependence.

5.3 Part of the ONC strategy involved testing the assumption of independence between the Census and the CCS. When the assumption of independence was tested, it was found that the assumption was invalid. The direction of the dependence observed was such that a person missed by the Census was more likely to be missed by the CCS than one who was found by the Census.

5.4 A series of high level Quality Assurance meetings involving members of senior management within ONS were established where the issue of dependence in England & Wales was discussed. Discussions held within these meetings confirmed that the bias in the ONC estimates was convincing enough to warrant an adjustment.

5.5 Therefore, the level of dependence was estimated for each DG in England & Wales and

the population estimates adjusted accordingly. This resulted in an estimated increase in population nationally of 230,000 persons. The adjustments for dependence based on this methodology were therefore accepted and the Census results were published after they had been adjusted. Further details on the dependency adjustment can be found at (Abbott *et al* (2003))6

6 Response rates

6.1 For the Census results to be plausible, the pattern of underenumeration measured by the ONC had to be realistic. Therefore the response rate at the national and local level was examined.

6.2 The overall response rate for England and Wales was 94 per cent, meaning that 6 per cent of the population was imputed from the CCS results rather than being counted by the Census. The undercount varied by age and sex as is shown in **Figure 5**. The group most poorly enumerated were males aged 20 – 24, with 13 per cent missed by the Census, while males aged 70 – 79 and females aged 60 – 79 were the best-enumerated groups, with only 2 per cent missed. The two peaks, for young children and those in their twenties and thirties, suggest that parents and children in the same households were being missed. Overall, the pattern is roughly as would be expected, with young children and those in their twenties and thirties most likely to be missed, the elderly least likely and males

generally more likely to be missed than females. This lends credence at national level to the adjustments made to the raw Census counts.

6.3 Underenumeration in the 2001 Census did not occur uniformly across all areas however, it can be seen from **Figure 6** that the majority of local authorities have a response rate in the high nineties. This is as would be expected - enumeration was good in most areas, less good in others with a few relatively poor. Response rates were lowest for inner city areas where characteristics known to be related to census non-response are most prevalent - multi-occupancy and higher proportions of non-English speaking population etc. Those with a response rate below 90 per cent are almost exclusively London boroughs, and other low rates are generally found in towns as shown by **Figure 8**.

6.4 **Figure 7** shows the same information for three specific male age groups, and illustrates how response rates vary across age groups and local authorities. Again the patterns are plausible. As might be expected from the national picture, the 60 – 64 group generally had the highest response rates and the 20 – 24 group the lowest. Even in the 20 – 24 age group, though, over half of local authorities had a response rate of over 90 per cent, and those below 80 per cent were mainly in London.

Figure 5

Census underenumeration by age-sex group
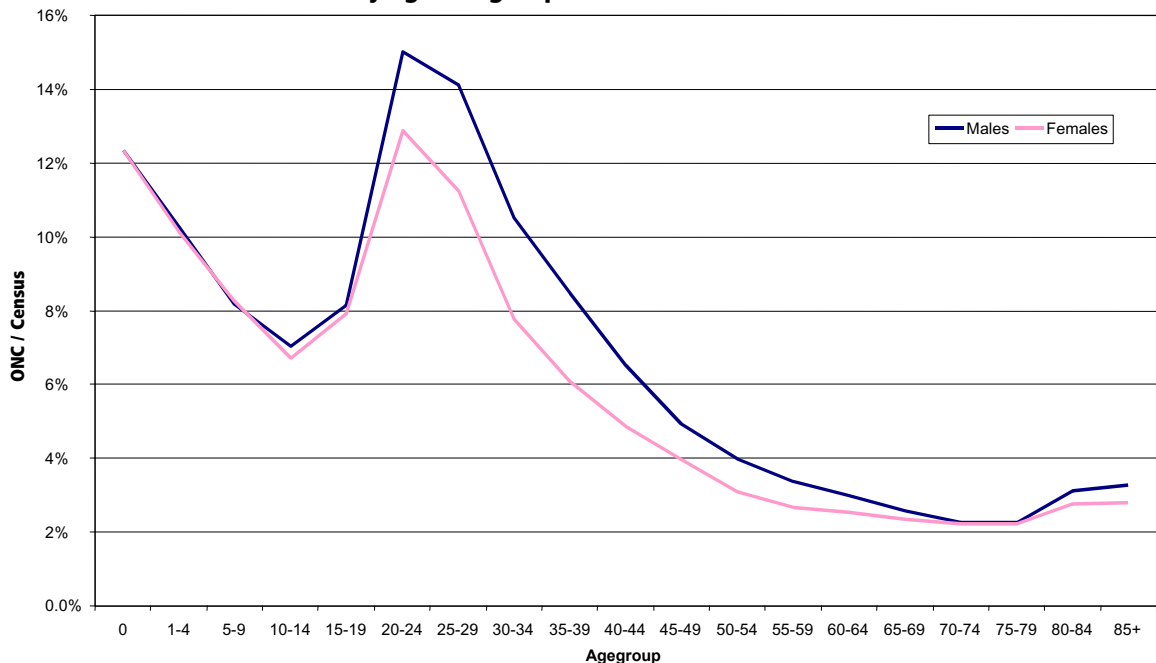
Figure 6

Census underenumeration by local authority district
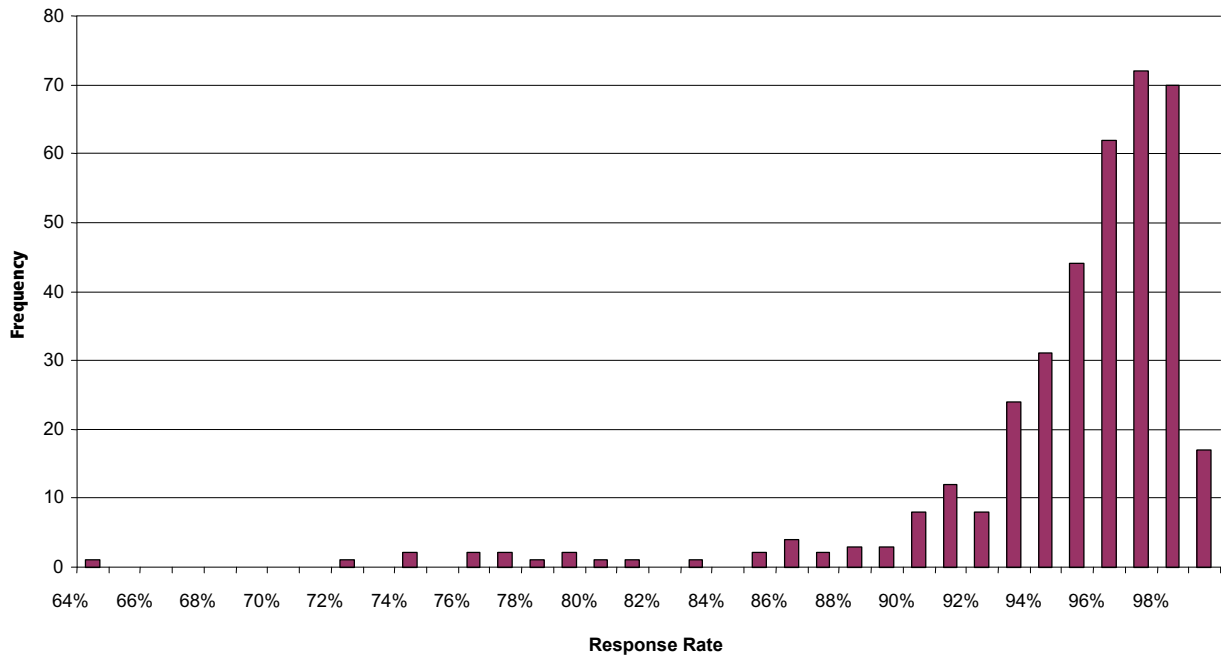
Figure 7

Census underenumeration by local authority for three age-sex groups

Distribution of LAD level
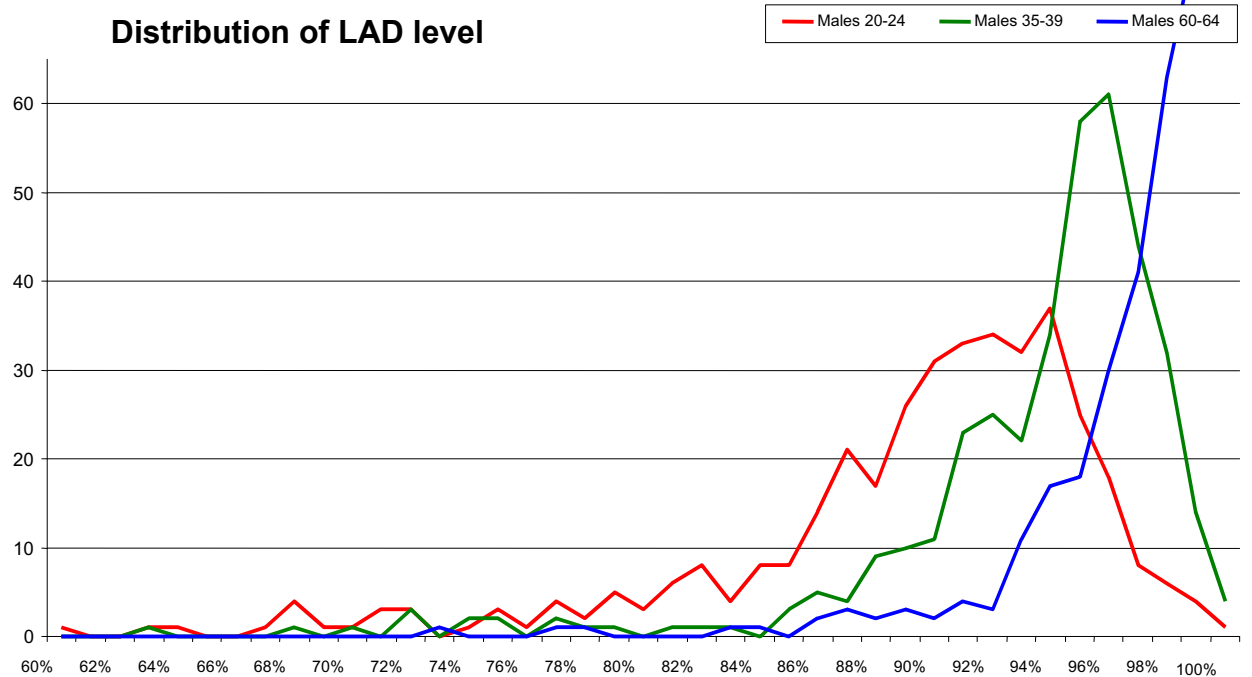
Figure 8
Overall response rates by local authority district

All person response rates

- 98.0% and above
- 96.0% to 97.9%
- 94.0% to 95.9%
- 92.0% to 93.9%
- 90.0% to 91.9%
- 64.4% to 89.9%

Isles of Scilly
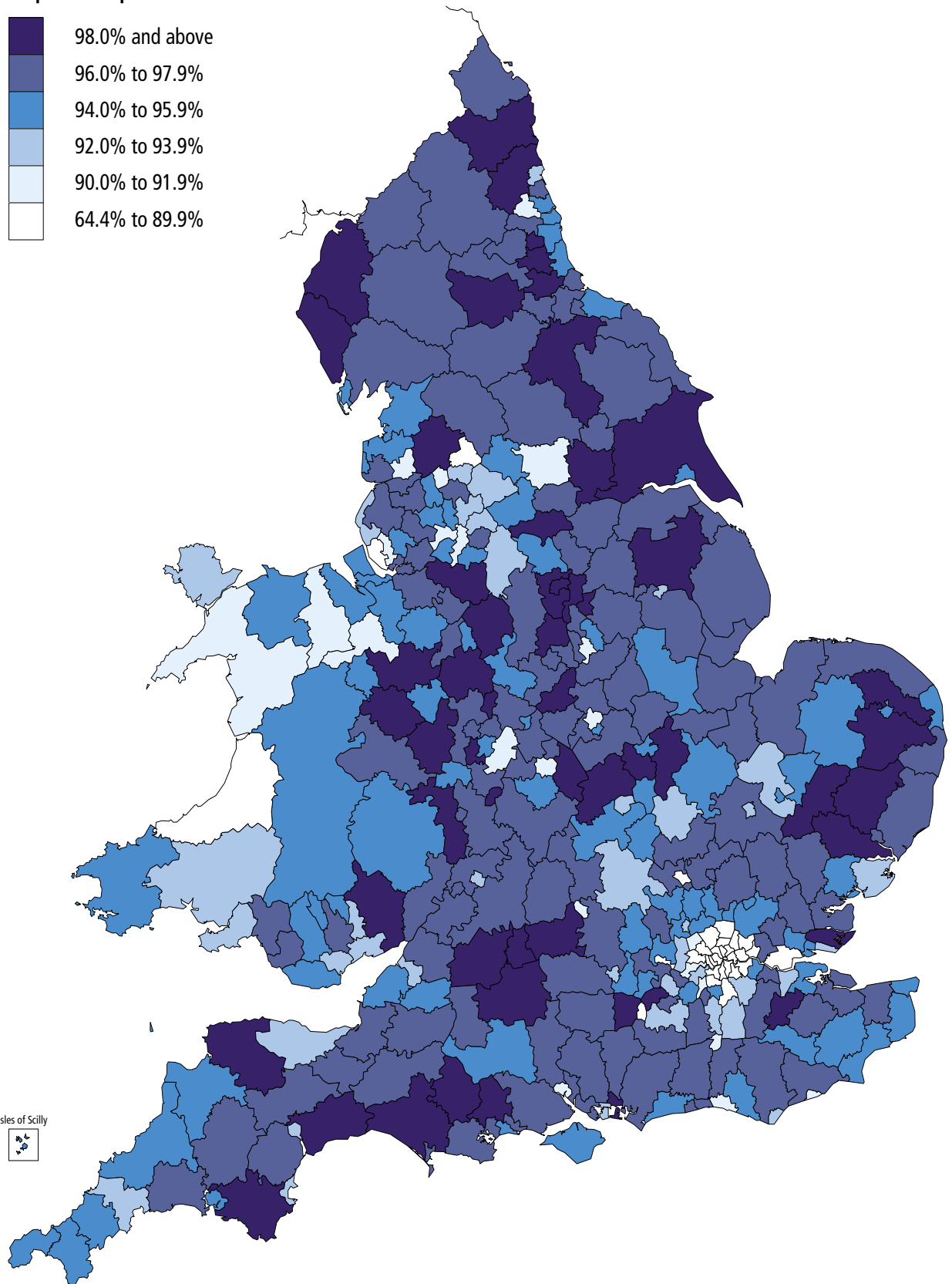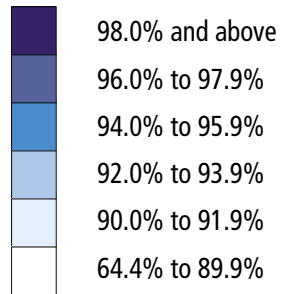
7 Further analysis and findings resulting from the quality assurance process

Further work has also been undertaken which did not form part of the formal quality assurance procedure but which provided further credibility to the plausibility of the ONC results. These involved comparisons with the range of aggregated administrative data sources and rolled-forward population estimates used in the quality assurance process. Further detail on the range of comparators used in the quality assurance process is outlined in the accompanying "One Number Census methodology and Quality Assurance process" paper. The analysis that was carried out is described below.

7.1 Comparisons with administrative and demographic data used in the Quality Assurance Process

7.1.1 Comparison with administrative sources
7.1.1.1 The most accurate and nationally consistent administrative sources are generally considered to be child benefit and pensions data, and for this reason they were used as comparator data in the ONC quality assurance process. The child benefit and pensions data used (from the Department for Work and Pensions (DWP)) were cleaned by an expert at the University of Oxford to overcome the standard measurement error issues with raw counts of such data. **Figures 7 and 8** show the distributions of

differences between benefits data and Census counts for the relevant age groups. Green bars show a Census figure higher than the benefit count for the area, while those coloured red represent the reverse. As might be expected, the Census often counts more people than are registered for benefit, either because they do not claim the benefit or are not entitled to it, for instance children of FAF. The three areas with a particularly large excess of Census over child benefit figures are Forest Heath, Suffolk (which has a very high proportion of FAF), Kensington & Chelsea and the City of London. Occasionally there are more people registered for benefits than counted in the Census, the largest differences for child benefit being in Halton in Cheshire, Middlesbrough and Manchester. This may be due to people moving to a different area without informing the relevant agency, especially if they have their benefit paid directly into a bank account. This is less likely to happen with pensioners than children, and indeed there is a smaller proportion of local authorities where pensioner numbers exceed the Census count. The largest excess of Census over pension figures is in Kensington & Chelsea, while Wandsworth and Waltham Forest are the areas with the largest excess of pensioner numbers.

7.1.1.2 The distributions in **figure 9 and 10** are broadly in agreement with that which would be expected for an accurate census count.

Figure 9

Differences between Census and child benefit numbers by local authority
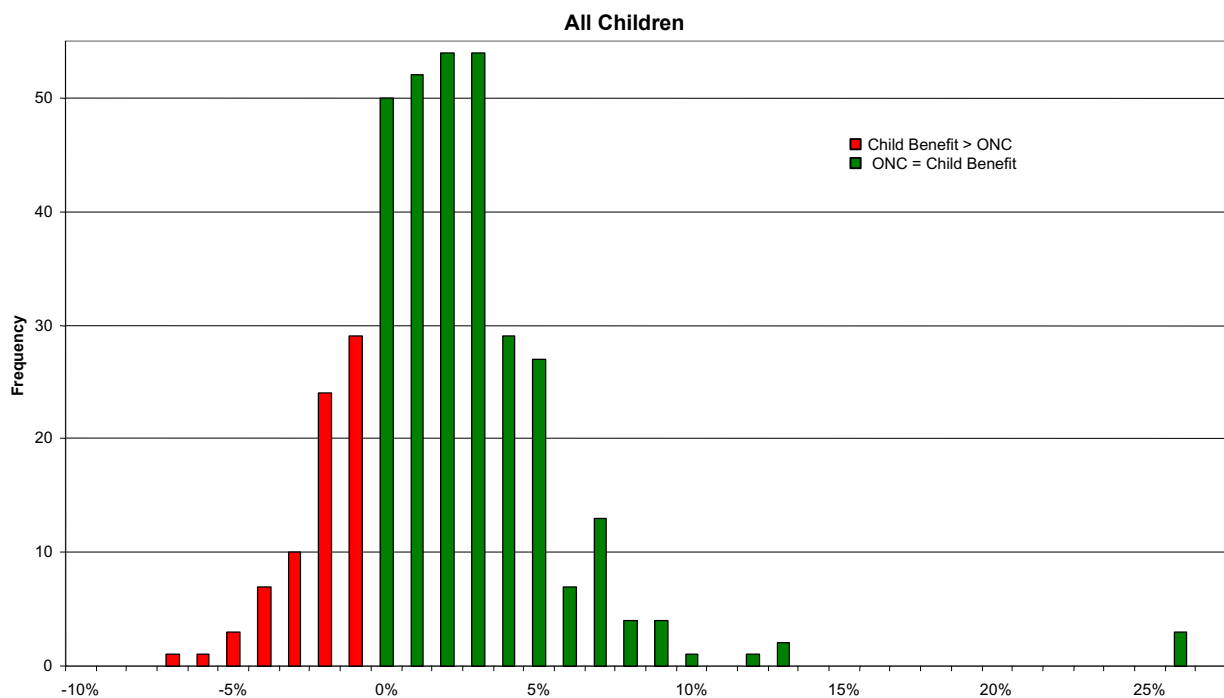
Figure 9

Differences between Census and pension numbers by local authority

All persons 65+

Frequency

Legend: ■ Pensions > ONC ■ ONC = Pensions

Distribution of differences between Pensions and ONC across LADs
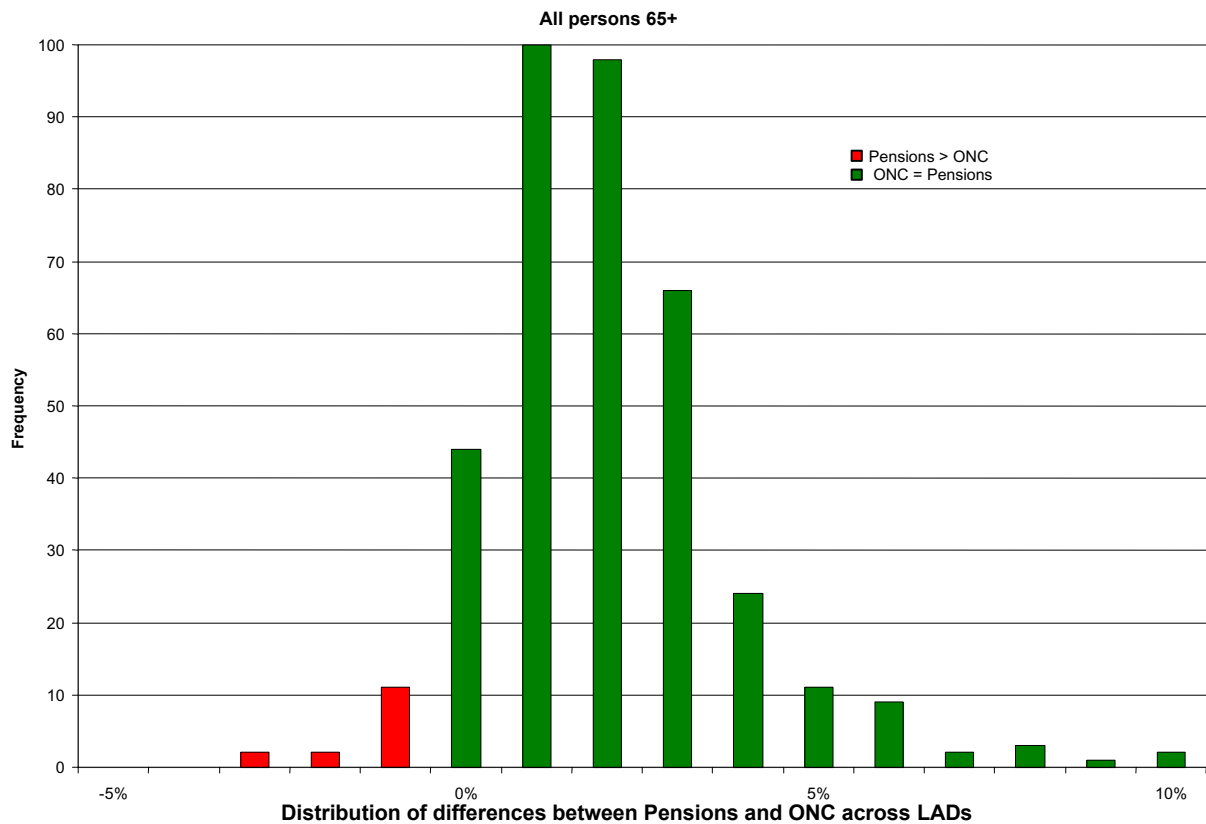
7.1.2 Comparison with MYEs

7.1.2.1 Benefits data such as those described in the previous section only relate to specific sections of the population, whereas the MYEs are published each year for every age-sex group in every local authority. The MYEs were also used as comparator data in the quality assurance process. These estimates are produced by ONS's PEU and are normally based on the most recent Census, adjusted for births, deaths and migration (although as mentioned in **section 4.1.1**, the 1991 Census counts were differentially adjusted for undercoverage in 1991 in a way that ensured the estimates summed to the national total based on the demographic estimate of the population in 1991 rather than the census. This adjustment is explained in Heady et al (1994))2. Almost 100 per cent of births and deaths in the UK are registered and so estimates of natural change are of a high quality.

7.1.2.2 However, since there is no compulsory address register the migration figures are necessarily based on survey and proxy data and so can only ever be estimates. International migration is estimated from the IPS and HO data in respect of people who are unlikely to be captured by the IPS on entry to the UK. Sub-national migration is derived from patient register using data on re-registrations with a GP

following a change of resident address (although prior to the mid-1999 estimates, changes in the numbers registered on electoral registers were used to help make internal migration estimates at local area level). The data sources and their limitations are explored in more detail in the article 'Implications of 2001 Census for local authority district mid-year population estimates' [7]

7.1.2.3 Even after the adjustment for undercount made by the ONC, the Census figures did not always coincide with the MYEs based on the 1981 Census. It is therefore essential to assess whether the evidence supports the contention that the census results are closer to the "truth" than the MYEs or vice versa. **Figures 11a and 11b** show the level of undercount that was estimated, and the level that would need to be assumed if the MYEs were the true population. In a number of cases the undercount would have had to be much higher than estimated, but in the case of young men it would have been higher than seems reasonable. For instance in the case of males aged 25 – 29, the MYEs imply that, nationally, over one in four would have failed to fill in a Census form. There is no evidence of such a catastrophic failure, which suggests that the MYEs cannot be considered a more reliable estimate of the population than the ONC results for these key age-sex groups.

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Figure **11a**

Underenumeration adjustment necessary for ONC figures to match MYEs for males

Underenumeration of Census - Males
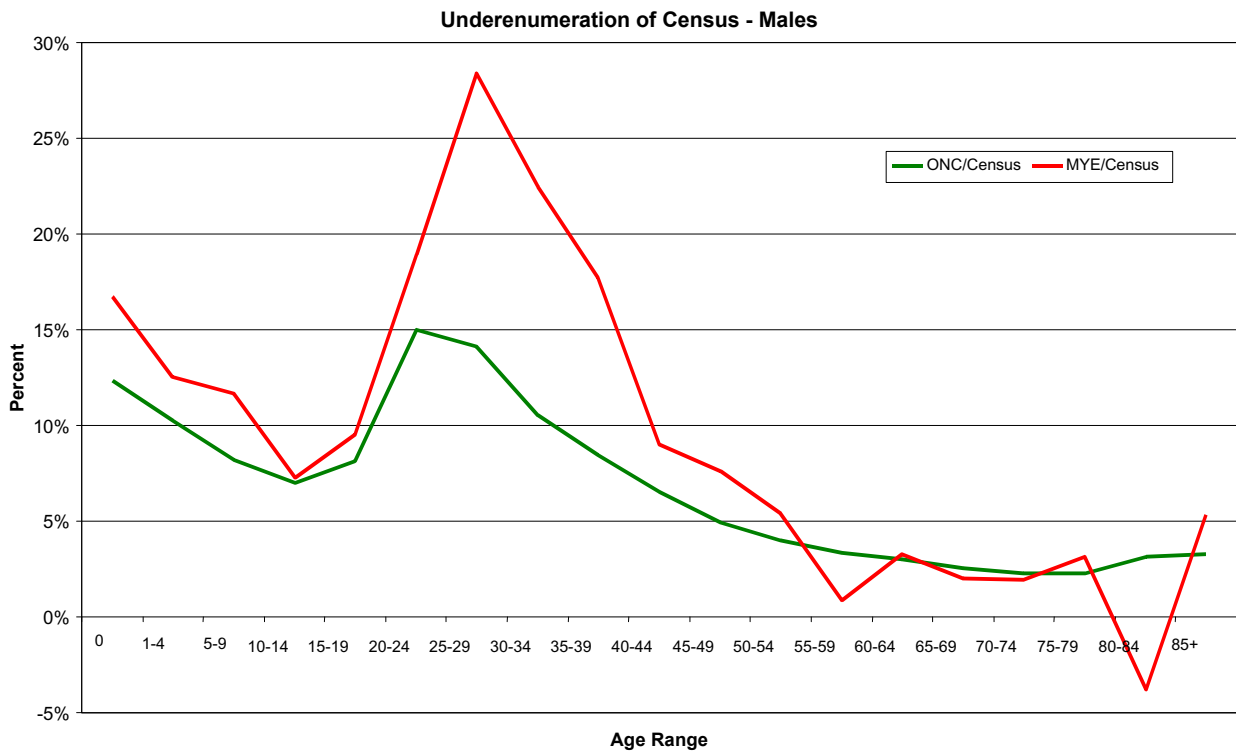
Figure **11b**

Underenumeration adjustment necessary for ONC figures to match MYEs for females

Underenumeration of Census - Females
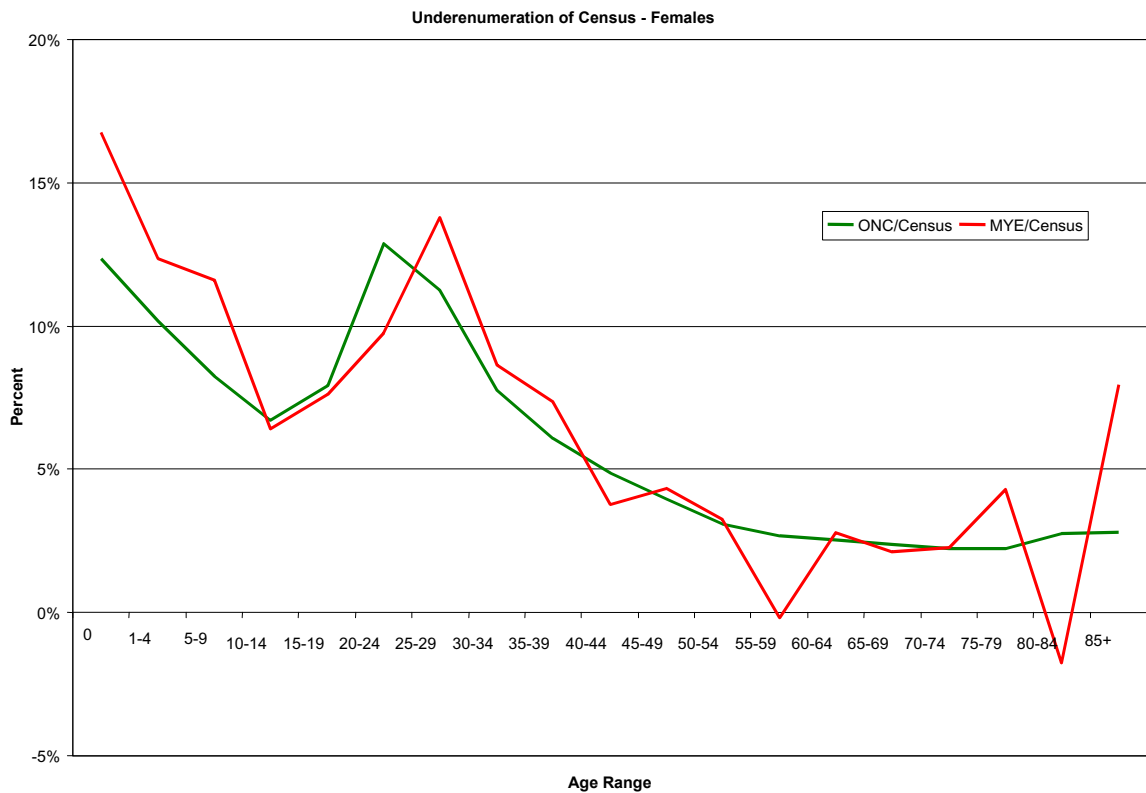
7.1.2.4 In order to explore this further, a comparison is made between the MYEs and the patient registers. It is generally accepted that patient registers suffer from a degree of list inflation and their quality varies geographically. Certain people may be less likely to register with a doctor after moving and may not register until they actually need to see a doctor. For example, it is generally accepted that men go to the doctor less frequently than women, and so there may be a greater time lag for males to re-register with a doctor following a move. Some interim moves may never be recorded. Since universities often require their students to register with the campus doctor, this is likely to be a particular problem in relation to migration from university towns. In addition, people moving abroad do not generally de-register. Again this may be especially troublesome in student areas, where there are often large populations of foreign students. There is also a certain amount of duplication caused when people lose their NHS number and cannot be traced. ONS carried out extensive research to investigate whether patient registers represented a suitable source of internal migration data. That research is described elsewhere. (See Scott and Kilbey (1999)8 and Chappell *et al* (2000))9. The findings were that data from patient registers could be used to provide migration estimates that are consistent and plausible over time. Research is on going into whether there is a need to revise internal migration estimates in the light of the results of the 2001 Census. ONS will report on the necessity and feasibility of producing revised internal migration estimates in late 2003.

7.1.2.5 While the patient registers can be used to estimate migration, the problems described above on list inflation mean that it is not possible to use patient registers as a comparator data source on it's own. However, by adjusting the patient registers for list inflation so that they are in line with the mid year estimates, it was possible to include them in the diagnostic ranges.

Figure 12a

Difference between patient registers and MYEs for males aged 20 – 24
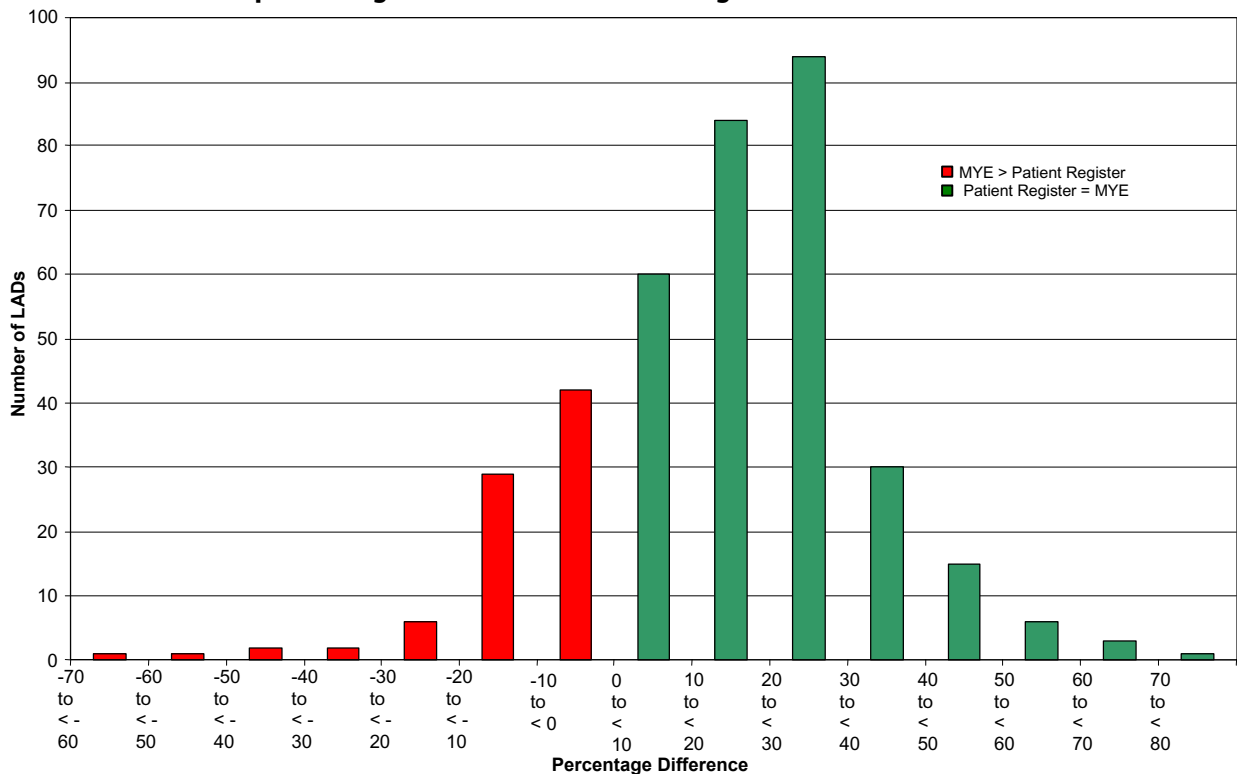
Figure **12b**

Difference between patient registers and MYEs for males aged 25 – 29
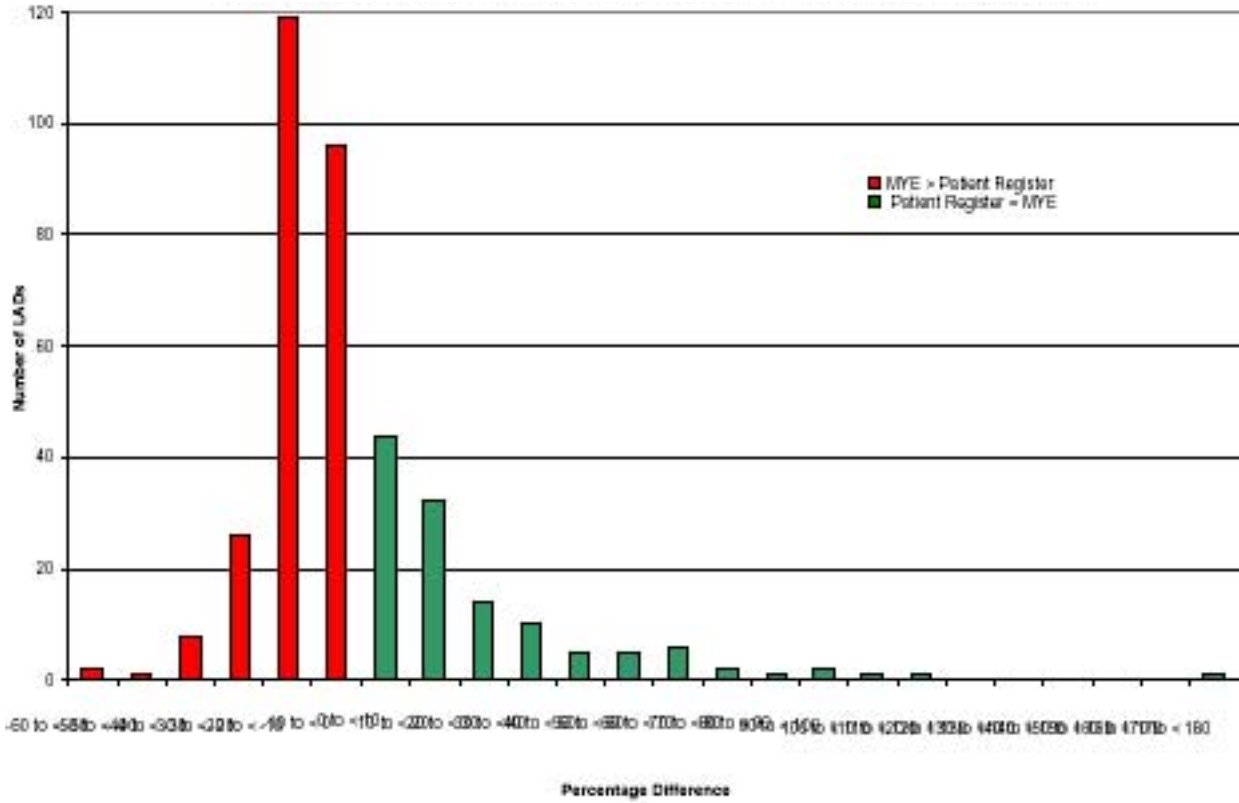
Figure **12c**

Difference between patient registers and MYEs for males aged 30 – 34
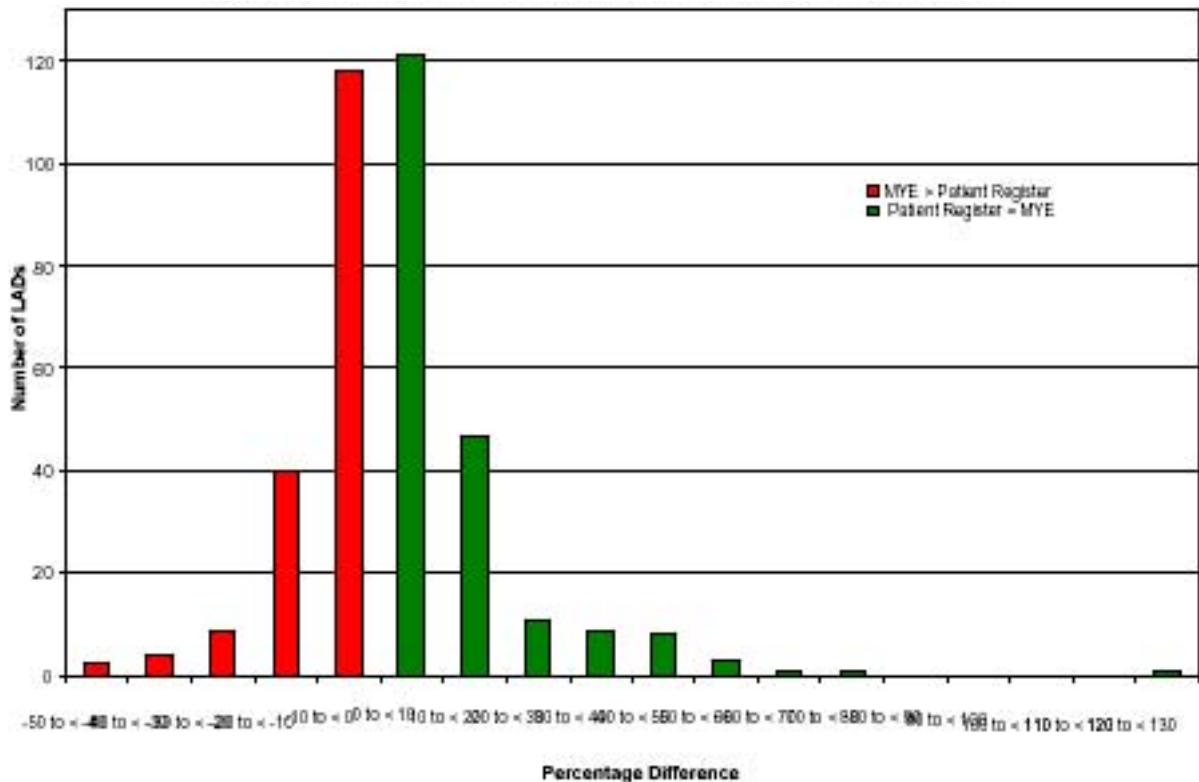
7.1.2.6 Given that inflation of the numbers on patient registers is expected, one could hypothesise that for young male age groups the numbers in the patient registers should be higher than the MYEs. **Figures 12a, 12b and 12c** show the distributions of differences between patient register numbers and MYEs for three key male age groups. The green bars indicate local authorities where the number of patient records exceeds the MYE, while for the red bars the reverse is true. For the 20 – 24 group the hypothesis holds. However, in the other two groups - particularly 25 – 29 - there is a large proportion of areas where the MYE is higher. This provides evidence that various factors may have caused the estimates to be somewhat high in these age groups. Two of these factors are issues with the 1991 Census adjustments (discussed below) and the reliability of migration estimates given the difficulty of making accurate estimates of migration particularly by age group and gender. There is further discussion of some of the issues affecting the quality of the mid-year population estimates elsewhere[7].

7.1.2.7 Given all the above, it is not sensible to consider either patient registers or the MYEs available at the time of the Census as highly accurate measures of the population. It would therefore be difficult to reject the figures produced by the ONC on this basis, although the comparator data were useful in indicating where further investigation of the ONC estimates was needed.

7.1.3 Sex ratios

7.1.3.1 There was also a comparison of the sex ratio; the ratio of the number of males to the number of females, for each five-year age group to a diagnostic range derived from the various administrative and demographic sources used in the quality assurance process. The sex ratios generally fell within the diagnostic range for most age groups, but tended to be below it for some ages in the 20s and 30s, indicating a lower proportion of males than expected. This characteristic dip in the ratio was repeated in approximately five sixths of all local authorities in England and Wales. The local authorities that did not show this pattern were generally those with large numbers of armed forces, and therefore a high number of young men. Since the pattern is so widespread, and as clear in areas of high Census response as those where the response is lower, it is unlikely to be due to problems with the conduct of the Census, the CCS or the ONC methodology. Each area

was sampled and estimated independently and considered by the quality assurance panel. An alternative explanation is a systematic difference between comparator data and Census counts for these particular groups. Since the only comparator data available for these age groups are MYEs and patient registers, the discussion above of the issues with these sources should be taken into account.

7.1.3.2 To assess further the plausibility of the dip in the sex ratio, it is necessary to look at the long-term trends of the age structure at the national level. **Figure 13** shows sex ratios by age group for every Census since 1971. For 1991 and 2001 it shows both the raw and adjusted counts. The dip in the twenties and thirties appears to have been becoming gradually more pronounced over the last 30 years, and although it does not show up in the adjusted 1991 figures, it does appear in the raw counts for that year. It appears from this that the assumptions regarding the sex ratio used to produce the 1991 MYEs in the early 90s were not entirely valid - indeed, the adjustment to the sex ratios looks excessive. The ONC method used to adjust the 2001 figures was far more rigorous, and based on much more data.

Figure 13

Comparison of sex ratios by age group, 1971 – 2001
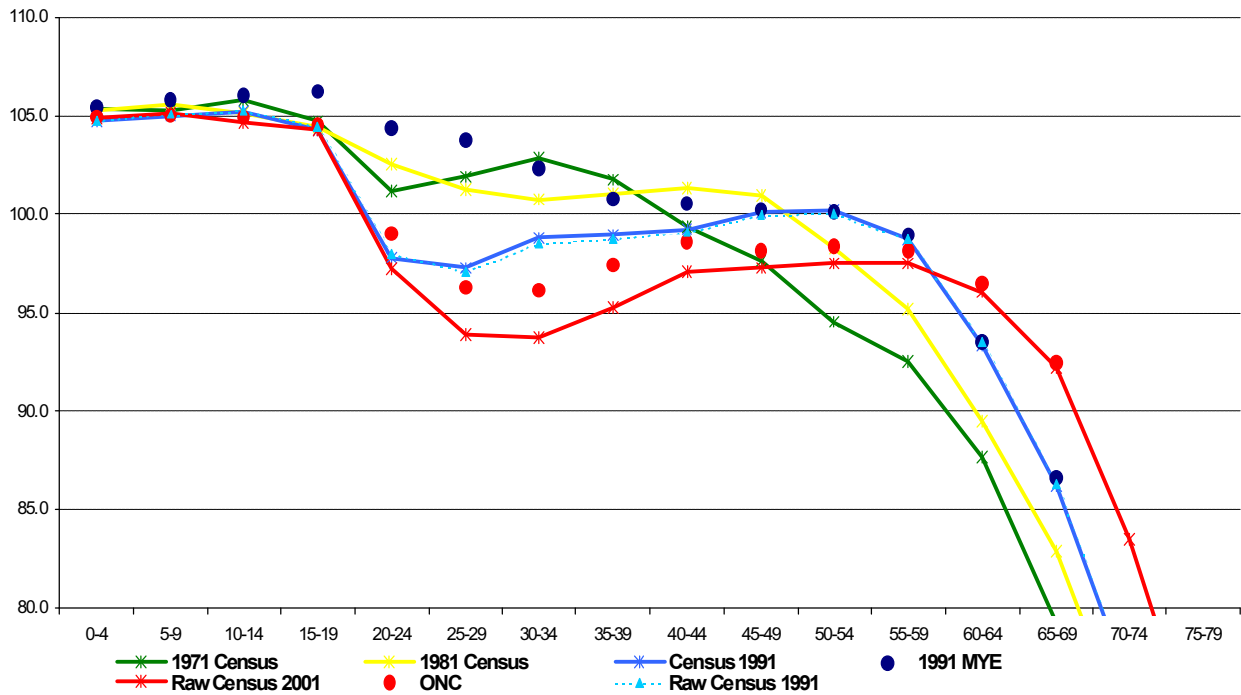
Notes: 1. Census 91 refers to census counts that reflect the absent household imputation

2. Raw Census 91 refer to the Census counts

-        3. 1991 MYEs reflect the post-91 underenumeration adjustments.

8 Conclusion

8.1 This report has provided an in-depth description and explanation of the key findings and issues raised throughout the ONC Quality Assurance process. It has highlighted the thoroughness of both the quality assurance process and the further investigative and analytical work that took place throughout the quality assurance process to ensure the plausibility of the ONC results.

8.2 In addition, it has included comparisons with key alternative sources of population counts used within the quality assurance process that have further provided credence to the plausibility of the ONC results.

8.3 This report does not include the studies that ONS has been carrying out since the publication of the ONC results and the subsequent population estimates. These studies include demographic analysis of sex ratios, fertility, mortality and migration, analysis of the Longitudinal Study, comparisons with a

range of administrative sources, investigation of Census data and processes, matching studies of address lists held by Local Authorities and those collected by the Census and the publication of a review "A demographic statistics service for the 21st century".

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References

1 ONS (2003) One Number Census Methodology and Quality Assurance Process [accompanying paper]

2 Heady, P., Smith, S. and Avery, V. (1994) 1991 *Census Validation Survey: coverage report*, London: HMSO.

3 Holt, T, Diamond, I. D., and Cruddas, M. (2001) Risk in official statistics: a case-study of the 2001 one-number census project. *Journal of the Royal Statistical Society* D, 50, Part 4, 441 – 456.

4 ONS (2001) One Number Census Methodology. One Number Census Steering Committee paper ONC(SC)01/01. Available at **www.statistics.gov.uk/census2001/pdfs/sc0101.pdf**

5 ONS (2000) A Quality Assurance and Contingency Strategy for the One Number Census. Advisory Group Paper AG(00)16. Available at **www.statistics .gov.uk/census2001/pdfs/oncinfopaper.pdf**

6 Abbott, O, Brown, J.J., Diamond, I.D. (2002) Dependence within the One Number Census. Draft technical paper available at **www.statistics.gov.uk/census2001/pdfs/dependency_paper.pdf**

7 Smith, J., Chappell, R., Whitworth, A. and Duncan, C. (2003). 'Implications of 2001 Census for local authority district mid-year population estimates.' *Population trends*. No,113.

8 Scott, A. and Kilbie, T. (1999) Can Patient Registers give an improved measure of internal migration in England and Wales? Population Trends 96, pp 44 – 44

9 Chappell, R. Vickers, L. and Evans, H. (2000). 'The use of Patient Registers to estimate migration.' *Population trends*. No.101 autumn 2000.

10 Diamond,I, Abbott, O, Jackson, N (2003). 'Key Issues in the Quality Assurance of the One Number Census.' Population Trends No. 113 autumn 2003.

Annex A: Glossary of acronyms

ALG
Association of London Government

ASVS
Asylum Seekers/Visitor Switchers

CCS
Census Coverage Survey

CVS
Census Validation Survey

DASA
Defence Analytical Services Agency

DG
Design Group

DOH
Department of Health

DWP
Department for Work and Pensions

FAF
Foreign Armed Forces

GLA
Greater London Authority

HESA
Higher Education Statistics Agency

HO
Home Office

HtC
Hard to Count

IPS
International Passenger Survey

LAD
Local Authority District

LASC
London Asylum Seekers Consortium

LRC
London Research Centre

LSC
Learning Skills Council

MYEs
Mid-year estimates

ONC
One Number Census

PEU
Population Estimates Unit

WFC
Welsh Funding Council

Annex B: Household and person imputation analysis

Imputation rates are available for a number of variables. This annex provides a more detailed insight into the types of people missed by the census but imputed as a result of the ONC methodology and imputation system.

Ethnic group

76.8 per cent of imputed people in England and Wales were imputed as 'White'. The remaining 23.1 per cent of imputed people were imputed into the 'non-white' category. The table below shows a further breakdown of the imputation rates for ethnic group for England and Fles. It further highlights how the imputation rates compare to the distribution of people within the ethnic groups.

Table B1

Imputation rates by ethnic group for England and Wales

Ethnic group	Percentage of Imputed (%)	Percentage of the population in each ethnic group (%)
British	71.1	87.5
Irish	1.6	1.2
Other White	4.1	2.6
White and Black Caribbean	0.6	0.5
White and Black African	0.2	0.2
White and Asian	0.4	0.4
Other Mixed	0.4	0.3
Indian	4.5	2.0
Pakistani	3.6	1.4
Bangladeshi	2.1	0.5
Other Asian	0.7	0.5
Black Caribbean	3.8	1.1
Black African	4.3	0.9
Other Black	0.4	0.2
Chinese	1.2	0.4
Other ethnic group	0.9	0.4

Within London, 56.9 per cent of imputed people were imputed as white. A much greater proportion of imputed people were imputed into the non-white ethnic minority group as might be expected with 20.6 per cent of imputed people imputed into the Black or Black British and 16.5 per cent imputed into the Asian or Asian British ethnic group.

Activity last week

In every region, the largest proportion of imputed persons were imputed as 'working' . This was also the case for 90 per cent of local authorities. The local authority of Hart had the largest proportion of persons imputed as working (72.7 per cent).

Table B2

Imputation rates by activity last week for England and Wales

Activity last week	Percentage of Imputed (%)	Percentage of the population for each activity last week (%)
Working	43.8	45.4
Looking for work, available to start within 2 weeks	4.7	2.6
Waiting to start a job and available to start within 2 weeks	0.2	0.1
Economically inactive - retired	3.7	9.8
Economically inactive - student	6.9	3.4
Economically inactive - looking after home/family	5	4.7
Economically inactive - permanently sick	4	4.0
Economically inactive - other	3.3	2.3
Xx	28.3	27.7

Of the 3.2 million people imputed across England and Wales, 6.9 per cent were imputed as students and 4 per cent imputed as being economically inactive due to permanent sickness. Of persons imputed, the greatest proportion imputed as students were in Durham (25.4 per cent).

Marital status

For England and Wales, 64.7 per cent of imputed people were imputed as single (never married), 18.4 per cent were married (first marriage), 7.4 per cent were divorced, 4.1 per cent were widowed, 2.9 per cent were separated (still legally married) and the remaining 2.6 per cent were re-married. This was further reflected at the regional and sub-national level.

Table B3

Imputation rates by marital staus for England and Wales

Marital status	Percentage of Imputed (%)	Percentage of the population with each marital status (%)
Single	64.7	44.2
Married (first marriage)	18.4	34.8
Re-married	2.6	5.9
Separated	2.9	1.9
Divorced	7.4	6.6
Widowed	4.1	6.7

Of the local authorities, all 376 had the highest proportion of persons imputed into the single category and of these North Devon had the highest proportion of imputed persons imputed as single (86.3 per cent).

Accommodation type

For England and Wales, aside from the 30.4 per cent of people imputed into terraced dwellings, 24.6 per cent were imputed into semi-detached dwellings, 20.9 per cent into purpose built blocks of flats or tenements, 11.7 per cent into detached dwellings, 9.3 per cent into part of a converted or shared house and the remaining 3.1 per cent were imputed into a commercial building, a caravan or other mobile or temporary structure or communal (following the adjustments made to prisoners, full time students and armed forces personnel). At the household level, aside from the households imputed into purpose built blocks of flats or tenements, 26.9 per cent were imputed into terraced dwellings and 20.2 per cent into semi-detached dwellings.

Table B4

Imputation rates by accomodation type for England and Wales

Accommodation type	Percentage of Imputed (%)	Percentage of the population in each accommodation type (%)
Detached	11.7	24.7
Semi-detached	24.6	33.9
Terraced	30.4	26.4
Purpose built block of flats or tenement	20.9	9.0
Part of a converted or shared house	9.3	2.9
Commercial building	2.1	0.9
A caravan or other mobile or temporary structure	0.2	0.3
Communal	0.8	1.8

At the English regional level and including Wales, seven out of the 10 areas had the greatest proportion of imputed persons imputed into terraced dwellings the largest being in the North West (40.8 per cent of imputed people). As might be expected, the greatest proportion of imputed persons imputed into purpose built blocks of flats or tenements was in London (39.2 per cent). Within Inner London, 47.7 per cent of imputed people were imputed into this accommodation type and within Outer London the figure was 27.9 per cent.

At the sub-national level 39 per cent of local authorities had the greatest proportion of imputed persons imputed into terraced dwellings and 44 per cent of local authorities had the greatest

proportion of households imputed as terraced dwellings. For individual local authorities, the greatest proportion of persons imputed in terraced dwellings and the greatest proportion of imputed terraced dwellings were in Pendle (64 per cent and 65.2 per cent respectively). Of the households imputed in East Dorset, 47.4 per cent were detached dwellings and 48.9 per cent of persons were imputed into detached dwellings in this authority. The highest proportion of persons imputed into semi-detached dwellings was in North East Derbyshire (50 per cent). As might be expected, in City of London the largest proportion of persons were imputed into purpose built blocks of flats or tenements (89.3 per cent) and the largest proportion of persons imputed into part of a converted or shared house were in Camden (35.6 per cent).

Tenure

30.1 per cent of imputed persons in England and Wales were imputed as buying with a mortgage followed by 24.8 per cent who were imputed as residing in a household space that was from a private landlord or letting agency. Of the 1.3 million households imputed for England and Wales, 29.1 per cent were imputed as households categorised as being of tenure type private landlord or letting agency and 23.6 per cent as tenure type buying with a mortgage.

Table **B5**

Imputation rates by tenure for England and Wales

Tenure (persons)	Percentage of Imputed (%)	Percentage of the population in each tenure group (%)
Owned outright	11	24.2
Buying with a mortgage	30.1	45.2
Shared ownership	2	0.6
Rented from council or Scottish Homes	19.1	12.2
Rented from RSL or HA	9.1	5.4
Private landlord/letting agency	24.8	7.8
Employer of a household member	0.3	0.3
Relative or friend of a household member	0.7	0.5
Other	0.3	0.3
Lives rent free	1.8	1.7
99	0.8	1.8

Of the local authorities, 59.6 per cent had the highest proportion of persons imputed as buying with a mortgage. The local authority with the greatest proportion of persons imputed as buying with a mortgage was Oadby and Wigston , Leicestershire (63.6 per cent). 45 per cent of all local authorities had the greatest proportion of households imputed as tenure type private landlord or letting agency with 34 per cent of local authorities having the greatest proportion of households imputed as tenure type buying with a mortgage.

Annex C: Matrix of key themes and findings

The matrix below highlights the key themes and findings that were investigated throughout the quality assurance process and the local authorities that were investigated, (although not necessarily adjusted) as part of the work done to look at the key themes.

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
SR	45UB	Adur							*		*	
NB	16UB	Allerdale							*			
NA	35UB	Alnwick			*							
KI	17UB	Amber Valley								*		
WE	00NA	Anglesey, Isle of										
SR	45UC	Arun							*			
KJ	37UB	Ashfield									*	
ST	29UB	Ashford	*		*							
KW	11UB	Aylesbury Vale	*	*	*						*	
ED	42UB	Babergh										
LJ	00AB	Barking and Dagenham					*		*		*	
LL	00AC	Barnet				*						
NP	00CC	Barnsley	*	*	*					*		
NB	16UC	Barrow-in-Furness							*			
EG	22UB	Basildon							*			
SL	24UB	Basingstoke and Deane			*				*			
KJ	37UC	Bassetlaw										
SE	00HA	Bath and North East Somerset	*						*		*	
KU	09UD	Bedford		*								
NA	35UC	Berwick-upon-Tweed										
LN	00AD	Bexley										
KP	00CN	Birmingham	*							*	*	
KM	31UB	Blaby										
NJ	00EX	Blackburn with Darwen									*	

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NH	00EY	Blackpool										
WA	00PL	Blaenau Gwent	*		*							
NA	35UD	Blyth Valley										
NS	00BL	Bolton							*		*	
EA	32UB	Boston	*		*				*			
SI	00HN	Bournemouth							*			
SN	00MA	Bracknell Forest								*	*	
NK	00CX	Bradford	*				*	*		*	*	
EF	22UC	Braintree										
ED	33UB	Breckland										
LK	00AE	Brent				*	*	*	*	*		
EG	22UD	Brentwood							*			
WD	00PB	Bridgend										
KC	39UB	Bridgnorth	*		*				*			
SR	00ML	Brighton and Hove	*						*			
SF	00HB	Bristol, City of	*					*	*	*		
EC	33UC	Broadland	*		*							
LH	00AF	Bromley	*		*							
KE	47UB	Bromsgrove	*	*	*							
KY	26UB	Broxbourne	*		*	*			*		*	
KK	37UD	Broxtowe							*			
NJ	30UD	Burnley	*									
NR	00BM	Bury	*						*	*	*	
WB	00PK	Caerphilly	*									
NQ	00CY	Calderdale	*						*		*	
EB	12UB	Cambridge	*									
LA	00AG	Camden							*		*	

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
KG	41UB	Cannock Chase	*		*				*			
SV	29UC	Canterbury	*									
SA	15UB	Caradon	*		*							
WC	00PT	Cardiff	*		*							
NB	16UD	Carlisle							*			
WE	00NU	Carmarthenshire										
SA	15UC	Carrick	*									
EH	22UE	Castle Point	*									
WE	00NQ	Ceredigion	*									
KL	31UC	Charnwood	*		*				*			
KD	23UB	Cheltenham	*	*	*	*			*			
KS	38UB	Cherwell	*		*				*			
KB	13UB	Chester										
KH	17UD	Chesterfield							*		*	
NE	20UB	Chester-le-Street	*									
SQ	45UD	Chichester	*					*	*		*	
KW	11UC	Chiltern								*	*	
NI	30UE	Chorley	*	*								
SI	19UC	Christchurch							*			
LA	00AA	City of London							*		*	
EF	22UG	Colchester	*		*							
KB	13UC	Congleton										
WF	00NE	Conwy							*			
NB	16UE	Copeland							*			
KT	34UB	Corby									*	
KD	23UC	Cotswold	*	*	*	*			*			

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
KC	00GA	County of Herefordshire	*		*				*			
KO	00CQ	Coventry	*						*		*	
NG	36UB	Craven				*						
SQ	45UE	Crawley						*	*		*	
KB	13UD	Crewe and Nantwich										
LG	00AH	Croydon						*	*		*	
NF	00EH	Darlington										
SU	29UD	Dartford	*	*								
KT	34UC	Daventry	*								*	
WF	00NG	Denbighshire							*			
KI	00FK	Derby								*		
KH	17UF	Derbyshire Dales							*		*	
NO	00CE	Doncaster	*		*						*	
SV	29UE	Dover										
KR	00CR	Dudley								*		
NE	20UE	Durham	*									
LE	00AJ	Ealing						*				
NE	20UF	Easington	*									
EB	12UC	East Cambridgeshire	*									
SB	18UB	East Devon										
SH	19UD	East Dorset							*		*	
SL	24UC	East Hampshire			*							
EA	32UC	East Lindsey	*		*				*			
KT	34UD	East Northamptonshire									*	

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NM	00FB	East Riding of Yorkshire		*					*			
KG	41UC	East Staffordshire	*		*				*			
SS	21UC	Eastbourne	*	*								
SJ	24UD	Eastleigh	*		*							
NB	16UF	Eden							*			
KB	13UE	Ellesmere Port and Neston										
SO	43UB	Elmbridge	*		*				*	*		
LL	00AK	Enfield				*						
EG	22UH	Epping Forest	*						*			
SO	43UC	Epsom and Ewell	*		*				*	*		
KI	17UG	Erewash								*		
SB	18UC	Exeter	*									
SK	24UE	Fareham			*			*				
EB	12UD	Fenland	*									
WF	00NJ	Flintshire							*			
ED	42UC	Forest Heath			*	*						
KD	23UD	Forest of Dean	*	*	*	*			*			
NH	30UF	Fylde										
NC	00CH	Gateshead										
KD	23UE	Gloucester	*	*	*	*		*	*			
SK	24UF	Gosport		*	*							
SU	29UG	Gravesham	*	*								
EC	33UD	Great Yarmouth	*	*	*							
LI	00AL	Greenwich	*	*			*			*		
SP	43UD	Guildford	*	*	*				*	*		

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
WE	00NC	Gwynedd										
LB	00AM	Hackney	*	*	*		*	*	*		*	
KA	00ET	Halton	*		*							
NG	36UC	Hambleton			*	*						
LD	00AN	Hammersmith and Fulham								*		
KM	31UD	Harborough										
LK	00AP	Haringey				*	*	*	*	*		
EG	22UJ	Harlow							*			
NG	36UD	Harrogate	*		*	*						
LM	00AQ	Harrow				*				*		
SL	24UG	Hart			*							
NF	00EB	Hartlepool										
SS	21UD	Hastings	*	*								
SK	24UH	Havant			*			*				
LN	00AR	Havering										
KY	26UE	Hertsmere	*		*	*			*		*	
KH	17UH	High Peak						*	*		*	
LM	00AS	Hillingdon	*			*				*		
KM	31UE	Hinckley and Bosworth										
SQ	45UF	Horsham						*	*		*	
LE	00AT	Hounslow						*				
KU	12UE	Huntingdonshire		*								
NJ	30UG	Hyndburn							*		*	
EE	42UD	Ipswich	*		*	*			*			
SA	15UH	Isles of Scilly	*									

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
LB	00AU	Islington	*	*	*		*	*	*		*	
SG	46UB	Kennet	*									
SA	15UD	Kerrier	*		*							
KT	34UE	Kettering	*									
EC	33UE	King's Lynn and West Norfolk	*		*						*	
NN	00FA	Kingston upon Hull, City of	*									
LF	00AX	Kingston upon Thames							*		*	
NQ	00CZ	Kirklees	*									
NV	00BX	Knowsley	*						*		*	*
LC	00AY	Lambeth	*	*				*	*		*	
NH	30UH	Lancaster	*									
NL	00DA	Leeds	*	*				*				
KL	00FN	Leicester	*		*			*				
SS	21UF	Lewes	*	*								
LH	00AZ	Lewisham	*		*							
KG	41UD	Lichfield	*		*				*			
EA	32UD	Lincoln	*		*				*			
NU	00BY	Liverpool	*						*			*
KV	00KA	Luton	*						*			
KA	13UG	Macclesfield	*	*	*							
ST	29UH	Maidstone	*	*	*							
EH	22UK	Maldon	*									
KE	47UC	Malvern Hills	*	*	*							
NX	00BN	Manchester	*						*	*		
KJ	37UF	Mansfield							*		*	

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
SU	00LC	Medway Towns	*	*								
KM	31UG	Melton										
SD	40UB	Mendip	*									
WB	00PH	Merthyr Tydfil	*									
LF	00BA	Merton							*		*	
SB	18UD	Mid Devon										
ED	42UE	Mid Suffolk										
SQ	45UG	Mid Sussex						*	*		*	
NF	00EC	Middlesbrough								*		
KU	00MG	Milton Keynes		*								
SP	43UE	Mole Valley	*	*	*				*	*		
WA	00PP	Monmouthshire		*	*							
WD	00NZ	Neath Port Talbot										
SH	24UJ	New Forest							*		*	
KJ	37UG	Newark and Sherwood									*	
NC	00CJ	Newcastle upon Tyne										
KF	41UE	Newcastle-under-Lyme	*		*				*			
LI	00BB	Newham	*	*			*					
WC	00PR	Newport	*		*							
SA	15UE	North Cornwall	*									
SB	18UE	North Devon										
SH	19UE	North Dorset			*							
KH	17UJ	North East Derbyshire							*		*	
NN	00FC	North East Lincolnshire	*									

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
KX	26UF	North Hertfordshire										
EA	32UE	North Kesteven	*		*				*	*		
NN	00FD	North Lincolnshire	*									
EC	33UF	North Norfolk	*		*							
KC	39UC	North Shropshire	*		*				*			
SE	00HC	North Somerset	*						*			
NA	00CK	North Tyneside										
KN	44UB	North Warwickshire	*						*			
KM	31UH	North West Leicestershire										
SG	46UC	North Wiltshire	*									
KT	34UF	Northampton									*	
EE	33UG	Norwich	*		*	*		*	*			
KN	44UC	Nuneaton and Bedworth	*						*			
KL	31UJ	Oadby and Wigston	*		*							
NR	00BP	Oldham	*						*	*	*	
KC	39UD	Oswestry	*		*				*			
KS	38UC	Oxford	*		*							
WE	00NS	Pembrokeshire										
NJ	30UJ	Pendle	*						*		*	*
SA	15UF	Penwith	*									
EB	00JA	Peterborough	*									
SC	00HG	Plymouth	*		*							
SI	00HP	Poole							*			
SK	00MR	Portsmouth			*							
WA	00NN	Powys			*							

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NI	30UK	Preston	*									
SH	19UG	Purbeck			*				*		*	
SM	00MC	Reading	*		*			*				
LJ	00BC	Redbridge					*		*		*	
NF	00EE	Redcar and Cleveland										
KE	47UD	Redditch	*	*	*							
SP	43UF	Reigate and Banstead	*	*	*				*	*		
SA	15UG	Restormel	*									
WB	00PF	Rhondda, Cynon, Taff	*									
NH	30UL	Ribble Valley										
LF	00BD	Richmond upon Thames							*	*	*	
NG	36UE	Richmondshire			*	*						
NR	00BQ	Rochdale	*						*	*	*	
EH	22UL	Rochford	*									
NJ	30UM	Rossendale									*	
SS	21UG	Rother	*	*								
NO	00CF	Rotherham	*		*						*	
KN	44UD	Rugby	*						*			
KK	37UJ	Rushcliffe							*			
SL	24UL	Rushmoor			*							
KM	00FP	Rutland			*							
NG	36UF	Ryedale				*						
NW	00BR	Salford	*						*			
SG	46UD	Salisbury	*									

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
KQ	00CS	Sandwell	*					*				
NG	36UG	Scarborough				*						
NE	20UG	Sedgefield	*									
SD	40UC	Sedgemoor	*									
NT	00CA	Sefton							*			
NG	36UH	Selby				*						
ST	29UK	Sevenoaks	*		*							
NZ	00CG	Sheffield	*							*		
SV	29UL	Shepway								*		
KC	39UE	Shrewsbury and Atcham	*		*				*			
SN	00MD	Slough								*	*	
KO	00CT	Solihull	*						*		*	
KV	09UE	South Bedfordshire	*						*			
KW	11UE	South Bucks									*	
EB	12UG	South Cambridgeshire	*									
KH	17UK	South Derbyshire	*		*				*		*	
SE	00HD	South Gloucestershire	*		*				*			
SC	18UG	South Hams	*		*							
EA	32UF	South Holland	*		*				*			
EA	32UG	South Kesteven	*		*				*			
NB	16UG	South Lakeland							*			
EE	33UH	South Norfolk	*		*				*			
KT	34UG	South Northamptonshire									*	
KS	38UD	South Oxfordshire	*		*							

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NI	30UN	South Ribble	*									
SD	40UD	South Somerset	*									
KG	41UF	South Staffordshire	*		*				*			
ND	00CL	South Tyneside			*							
SJ	00MS	Southampton	*		*							
EH	00KF	Southend-on-Sea	*									
LC	00BE	Southwark		*				*	*		*	
SO	43UH	Spelthorne	*		*				*	*		
KX	26UG	St. Albans	*							*		
ED	42UF	St. Edmundsbury										
NT	00BZ	St. Helens							*			
KF	41UG	Stafford	*	*	*				*			
KG	41UH	Staffordshire Moorlands	*		*				*			
KX	26UH	Stevenage								*		
NY	00BS	Stockport								*		
NF	00EF	Stockton-on-Tees										
KF	00GL	Stoke-on-Trent	*		*				*			
KN	44UE	Stratford-on-Avon	*						*			
KD	23UF	Stroud	*	*	*	*			*			
EE	42UG	Suffolk Coastal	*	*	*	*		*	*			
ND	00CM	Sunderland	*		*							
SO	43UJ	Surrey Heath	*		*			*	*	*		
LG	00BF	Sutton	*						*		*	
SU	29UM	Swale	*	*								
WD	00NX	Swansea						*				

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NY	00BT	Tameside								*		
KG	41UK	Tamworth	*		*				*			
SP	43UK	Tandridge	*	*	*				*	*		
SD	40UE	Taunton Deane	*									
NE	20UH	Teesdale	*	*								
SC	18UH	Teignbridge	*									
KC	00GF	Telford and Wrekin	*		*				*			
SJ	24UN	Test Valley	*		*							
KD	23UG	Tewkesbury	*	*	*	*			*			
SM	00HX	Thamesdown (Swindon from 1 April 19)	*		*							
SV	29UN	Thanet	*		*							
WC	00PD	The Vale of Glamorgan	*		*							
KY	26UJ	Three Rivers	*		*	*			*		*	
EG	00KG	Thurrock							*			
ST	29UP	Tonbridge and Malling	*		*							
SC	00HH	Torbay	*									
WA	00PM	Torfaen			*							
SB	18UK	Torridge										
LB	00BG	Tower Hamlets	*	*	*		*	*	*		*	
NW	00BU	Trafford	*						*			
ST	29UQ	Tunbridge Wells	*		*							
NA	35UF	Tynedale										
EF	22UQ	Uttlesford										
KS	38UE	Vale of White Horse	*		*							

Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
KB	13UH	Vale Royal										
NP	00DB	Wakefield	*	*	*							
KQ	00CU	Walsall	*					*				
LJ	00BH	Waltham Forest					*		*		*	
LD	00BJ	Wandsworth								*		
NA	35UG	Wansbeck										
KA	00EU	Warrington	*	*	*							
KN	44UF	Warwick	*						*			
KX	26UK	Watford								*		
EE	42UH	Waveney	*	*	*	*			*			
SP	43UL	Waverley	*	*	*				*	*		
SS	21UH	Wealden	*	*								
NE	20UJ	Wear Valley	*									
KT	34UH	Wellingborough	*								*	
KY	26UL	Welwyn Hatfield	*		*	*			*		*	
SM	00MB	West Berkshire	*		*							
SB	18UL	West Devon										
SH	19UH	West Dorset							*		*	
NI	30UP	West Lancashire	*									
EA	32UH	West Lindsey	*		*				*			
KS	38UF	West Oxfordshire	*		*				*			
SD	40UF	West Somerset	*									
SG	46UF	West Wiltshire	*									
LA	00BK	Westminster							*		*	
SH	19UJ	Weymouth and Portland							*		*	

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Design Group	LAD Code	LAD Name	Full time Students	Prisoners	Home Armed Forces	Foreign Armed Forces	Babies in areas with large ethnic populations	1991 Underenumeration adjustments	Collapsing strata	Borrowing strength	Borrowing Strength for Babies	Post Stratification
NS	00BW	Wigan							*		*	
SL	24UP	Winchester			*							
SN	00ME	Windsor and Maidenhead			*					*	*	
NV	00CB	Wirral	*									*
SO	43UM	Woking	*		*				*	*		
SN	00MF	Wokingham	*							*	*	
KR	00CW	Wolverhampton	*							*		
KE	47UE	Worcester	*	*	*							
SR	45UH	Worthing							*			
WF	00NL	Wrexham							*			
KE	47UF	Wychavon	*	*	*							
KW	11UF	Wycombe									*	
NH	30UQ	Wyre										
KE	47UG	Wyre Forest	*	*	*							
NM	00FF	York	*	*					*		*	

Annex D: HtC levels and age-sex groups collapsed by Design Group

The table below highlights the local authorities that were subject to the "Collapsing Strata" strategy imposed on DGs. It further highlights the HtC groups and age-sex groups that were collapsed as part of the quality assurance strategy.

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
EA Mid Lincolnshire	32UB Boston	2&3	Males 70-79
	32UC East Lindsey		Males and females 1-4
	32UD Lincoln		Males and females 10-14
	32UE North Kesteven		
	32UF South Holland		
	32UG South Kesteven		
	32UH West Lindsey		
EB Cambridgeshire	00JA Peterborough	None	Males 80+
	12UB Cambridge		Females 70-79
	12UC East Cambridgeshire		Males and females 1-4
	12UD Fenland		Males and females 5-9
	12UG South Cambridgeshire		Males and females 10-14
			Males and females 15-19
			Males and females 60-64
EC North Anglia	33UC Broadland	2&3	Males 80+
	33UD Great Yarmouth		Males and females 5-9
	33UE Kings Lynn and West Norfolk		Males and females 75-79
	33UF North Norfolk		
ED West Anglia	33UB Breckland	2&3	Males 40-44
	42UB Babergh		Males 70-79
	42UC Forest Heath		Females 40-49
	42UE Mid Suffolk		Females 65-74
	42UF St. Edmundsbury		Females 80+
			Males and females 5-9
			Males and females 10-14
EE South Norfolk and East Suffolk	33UG Norwich	2&3	Males 70-79
	33UH South Norfolk		Males 80+
	42UD Ipswich		Females 70-79
	42UG Suffolk Coastal		
	42UH Waveney		
EF Northern Essex	22UC Braintree	2&3	Males 25-34
	22UG Colchester		Females 80+
	22UN Tendring		
	22UQ Uttlesford		

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
EG Western Essex	00KG Thurrock	2&3	Males 65-74
	22UB Basildon		Males 75-84
	22UD Brentwood		Females 75-84
	22UH Epping Forest		Males and females 5-9
	22UJ Harlow		Males and females 85+
EH Eastern Essex	00KF Southend-on-Sea	2&3	Males 80+
	22UE Castle Point		Males and females 1-4
	22UF Chelmsford		Males and females 5-9
	22UK Maldon		
	22UL Rochford		
KA North Cheshire	00ET Halton	2&3	Males 70-79
	00EU Warrington		Females 60-69
	13UG Macclesfield		Females 70-79
			Females 80+
KB South Cheshire	13UB Chester	2&3	Females 75-80
	13UC Congleton		Males and females 1-4
	13UD Crewe and Nantwich		Males and females 5-9
	13UE Ellesmere Port and Neston		Males and females 85+
	13UH Vale Royal		
KC Shropshire and Herefordshire	00GA Herefordshire	2&3	Males 30-39
	00GF Telford and Wrekin		Males 75-84
	39UB Bridgnorth		Males and females 45-49
	39UC North Shropshire		
	39UD Oswestry		
	39UE Shrewsbury and Atcham		
	39UF South Shropshire		
KD Gloucestershire	23UB Cheltenham	None	Males 70-79
	23UC Cotswold		Males 80+
	23UD Forest of Dean		Females 65-74
	23UE Gloucester		
	23UF Stroud		
	23UG Tewkesbury		
KE Worcestershire	47UB Bromsgrove	2&3	Males 65-74
	47UC Malvern Hills		Males 75-84
	47UD Redditch		Females 70-79
	47UE Worcester		Females 80+
	47UF Wychavon		
	47UG Wyre Forest		
KF West Staffordshire	00GL Stoke on Trent	None	Males 40-49
	41UG Newcastle under Lyme		Males 60-69
	41UE Stafford		Males 70-79
			Males 80+
			Females 80+
			Males and females 30-34

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
KG East Staffordshire	41UB Cannock Chase	2&3	Males 40-49
	41UC East Staffordshire		Males 75-84
	41UD Lichfield		Females 50-59
	41UF South Staffordshire		Females 65-74
	41UH Staffordshire Moorlands		Females 75-84
	41UK Tamworth		Males and females 85+
KH Dales and North Derbyshire	17UC Bolsover	2&3	Babies and males 1-4
	17UD Chesterfield		Males 5-14
	17UF Derbyshire Dales		Females 5-14
	17UH High Peak		Females 20-29
	17UJ North East Derbyshire		Females 65-74
	17UK South Derbyshire		Males and females 35-39
KI East Derbyshire	00FK Derby	2&3	Males 50-59
	17UB Amber Valley		Males 65-74
	17UG Erewash		Males 80+
			Females 40-49
			Females 50-59
			Females 65-74
			Females 80+
			Males and females 1-4
			Males and females 5-9
KJ North Nottinghamshire	37UB Ashfield	2&3	Females 65-74
	37UC Bassetlaw		Males and females 1-4
	37UE Gedling		Males and females 10-14
	37UF Mansfield		Males and females 15-19
	37UG Newark and Sherwood		Males and females 20-24
			Males and females 25-29
			Males and females 80-84
			Males and females 85+
KK South Nottinghamshire	00FY Nottingham	None	Males 25-34
	37UD Broxtowe		Males 55-64
	37UJ Rushcliffe		Males 80+
			Males and females 5-9
KL Central Leicestershire	00FN Leicester	None	Males 20-29
	31UJ Oadby and Wigston		Males 75-84
	31UC Charnwood		Females 60-69
			Males and females 15-19
			Males and females 85+
KM Outer Leicestershire	00FP Rutland	2&3	Males 74-79
	31UB Blaby		Males 80+
	31UD Harborough		
	31UE Hinckley and Bosworth		
	31UG Melton		
	31UH North West Leicestershire		

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
KN Warwickshire	44UB North Warwickshire	2&3	Males and females 1-4
	44UC Nuneaton and Bedworth		Males and females 5-9
	44UD Rugby		Males and females 80-84
	44UE Stratford upon Avon		Males and females 85+
	44UF Warwick		
KO Coventry and Solihull	00CQ Coventry	None	Babies and 1-4
	00CT Solihull		Males 70-79
			Males 80+
			Females 70-79
			Females 80+
			Males and females 15-19
KP Birmingham	00CN Birmingham	None	Males 80+
			Males and females 5-9
			Males and females 60-64
KQ Sandwell and Walsall	00CS Sandwell	None	Males 80+
	00CU Walsall		Males and females 15-19
KR Dudley and Wolverhampton	00CR Dudley	None	Males 55-64
	00CW Wolverhampton		Males 70-79
			Males 80+
KS Oxfordshire	38UB Cherwell	None	Males 30-39
	38UC Oxford		Males 65-74
	38UD South Oxfordshire		Males 80+
	38UE Vale of White Horse		Males and females 20-24
	38UF West Oxfordshire		
KT Northamptonshire	34UB Corby	2&3	Babies and 1-4
	34UC Daventry		Males 75-84
	34UD East Northamptonshire		Females 75-84
	34UE Kettering		Males and females 5-9
	34UF Northampton		Males and females 15-19 (HtC2 only)
	34UG South Northamptonshire		Males and females 60-64
	34UH Wellingborough		Males and females 70-74
KU Milton Keynes, Bedford and Huntingdonshire	00MG Milton Keynes	None	Males 80+
	09UD Bedford		Females 80+
	12UE Huntingdonshire		Males and females 20-24
			Males and females 25-29
KV Mid and South Bedfordshire and Luton	00KA Luton	None	Males 80+
	09UC Mid Bedforshire		
	09UC South Bedforshire		
KW Buckinghamshire	11UB Aylesbury Vale	None	Males and females 15-19
	11UC Chiltern		Males and females 20-24
	11UE South Bucks		Males and females 30-34
	11UF Wycombe		Males and females 80-84
			Males and females 85+

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
KX North and West Hertfordshire	26UC Dacorum	None	Males 75-84
	26UF North Hertfordshire		Females 80+
	26UG St Albans		
	26UH Stevenage		
	26UK Watford		
KY South and East Hertfordshire	26UD East Hertfordshire	2&3	Babies and 1-4
	26UE Hertsmere		Males 55-64
	26UJ Three Rivers		Males 80+
	26UL Welwyn Hatfield		Males and females 20-24
LA Central London	00AA City of London	1&2	Males 80+
	00AG Camden		Males and females 1-4
	00AW Kensington and Chelsea		Males and females 10-14
	00BK Westminster		
LB Islington, Hackney and Tower Hamlets	00AM Hackney	1&2	Males 20-29
	00AU Islington		Males 80+
	00BG TowerHamlets		Males and females 1-4
LC Lambeth and Southwark	00AY Lambeth	2&3	Males 65-74
	00BE Southwark		Females 10-19
LD Hammersmith and Fulham and Wandsworth	00AN Hammersmith and Fulham	1&2	Males and females 40-44
	00BJ Wandsworth		Males and females 75-79
LE Ealing and Hounslow	00AJ Ealing	1&2	Males 80+
	00AT Hounslow		Females 80+
			Males and females 1-4(HtC2 only)
			Males and females 5-9
			Males and females 20-24(HtC2 only)
			Males and females 50-54
			Males and females 65-69(HtC2 only)
			Males and females 75-79(HtC2 only)
LF Richmond, Kingston upon Thames and Merton	00AX Kingston upon Thames	1&2	Babies and 1-4
	00BA Merton		Males and females 5-9
	00BD Richmond upon Thames		
LG Sutton and Croydon	00AH Croydon	None	Males 80+
	00BF Sutton		Females 30-39
			Males and females 1-4
LH Bromley and Lewisham	00AF Bromley	None	Males 80+
	00AZ Lewisham		Males and females 1-4
			Males and females 5-9
			Males and females 20-24(HtC2 only)

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
LI Greenwich and Newham	00AL Greenwich	1&2	Males 20-29
	00BB Newham		Males 50-59
			Males 70-79
			Males 80+
			Females 20-29
			Females 80+
			Males and females 1-4
			Males and females 15-19
LJ Barking and Dagenham, Redbridge and Waltham	00AB Barking and Dagenham	None	None
	00BC Redbridge		
	00BH Waltham Forest		
LK Haringey and Brent	00AE Brent	None	None
	00AP Haringey		
LL Barnet and Enfield	00AC Barnet	1&2	Males 20-29
	00AK Enfield		Males and females 70-74
LM Harrow and Hillingdon	00AQ Harrow	2&3	Males 20-29
	00AS Hillingdon		Males 30-39
			Males 75-84
			Males and females 5-9
			Males and females 65-69
			Males and females 70-74
			Males and females 40-44(HtC2 only)
			Males and females 85+
LN Bexley and Havering	00AD Bexley	2&3	Males 55-64
	00AR Havering		Females 30-39
			Females 60-69
			Females 80+
			Males and females 1-4
			Males and females 5-9
NA North Tyne and Wear	00CK North Tyneside	2&3	Males 25-34
	35UB Alnwick		Males 75-84
	35UC Berwick upon Tweed		Females 25-34
	35UD Blyth Valley		Females 75-84
	35UE Castle Morpeth		Males and females 85+
	35UF Tynedale		
	35UG Wansbeck		
NB Cumbria	16UB Allerdale	2&3	Males 20-29
	16UC Barrow in Furness		Males 70-79
	16UD Carlisle		
	16UE Copeland		
	16UF Eden		
	16UG South Lakeland		
NC Newcastle and Gateshead	00CH Gateshead	None	Males 70-79
	00CJ Newcastle upon Tyne		Males 80+
			Females 80+
			Males and females 1-4

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
ND South Tyneside and Sunderland	00CL South Tyneside	2&3	Males 70-79
	00CM Sunderland		Males 80+
			Females 65-74
			Females 80+
			Males and females 5-9
NE Durham	29UB Chester le Street	2&3	Males 50-59
	29UD Derwentside		Males 60-69
	29UE Durham		Males 70-79
	29UF Easington		Females 80+
	29UG Sedgefield		Males and females 5-9
	29UH Teesdale		
	29UJ Wear Valley		
NF Tees Valley	00EB Hartlepool	None	Males 1-9
	00EC Middlesbrough		Males 25-34
	00EE Redcar and Cleveland		Females 40-49
	00EF Stockton on Tees		Males and females 15-19
	00EH Darlington		
NG County of North Yorkshire	36UB Craven	None	Males 30-39
	36UC Hambleton		Males 70-79
	36UD Harrogate		Males 80+
	36UE Richmondshire		Females 65-74
	36UF Ryedale		Males and females 1-4
	36UG Scarborough		Males and females 5-9
	36UH Selby		Males and females 10-14
NH North Lancashire	00EY Blackpool	None	Males 80+
	30UF Fylde		Females 15-24
	30UH Lancaster		Females 80+
	30UL Ribble Valley		Males and females 5-9
	30UQ Wyre		
NI West Lancashire	30UE Chorley	2&3	Males 20-29
	30UK Preston		Males 70-79
	30UN South Ribble		Males 80+
	30UP West Lancashire		Females 20-29
			Females 70-79
			Males and females 15-19
NJ East Lancashire	00EX Blackburn with Darwen	None	Babies and 1-4
	30UD Burnley		Males 70-79
	30UG Hyndburn		Males 80+
	30UJ Pendle		Females 70-79
	30UM Rossendale		Females 80+
			Males and females 1-4
			Males and females 35-39
			Males and females 60-64
NK Bradford	00CX Bradford	None	Males 35-44
			Males 65-74
			Females 65-74
			Males and females 80-84
			Males and females 85+

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
NL Leeds	00DA Leeds	None	Males 70-79
			Males 80+
			Females 75-84
			Males and females 1-4
			Males and females 5-9
			Males and females 10-14
			Males and females 15-19
			Males and females 40-44
			Males and females 45-49
NM East Riding and York	00FB East Riding of Yorkshire	2&3	Males 65-74
	00FF York		Males 75-84
			Females 5-14
			Females 50-59
			Females 70-79
			Males and females 85+
NN Hull and North Lincolnshire	00FA Kingston upon Hull	None	Males 80+
	00FC North East Lincolnshire		Females 50-59
	00FD North Lincolnshire		Females 80+
			Males and females 5-9
			Males 20-29
NO Doncaster and Rotherham	00CE Doncaster	None	Males 60-69
	00CF Rotherham		Females 70-79
			Females 80+
NP Barnsley and Wakefield	00CC Barnsley	None	Males 80+
	00DB Wakefield		Females 55-64
			Females 65-74
			Females 80+
			Males and females 10-14
			Males and females 20-24
NQ Calderdale and Kirklees	00CY Calderdale	None	Males 30-39
	00CZ Kirklees		Males and females 5-9
			Males and females 10-14
			Males and females 20-24
			Males and females 50-54
			Males and females 65-69
			Males and females 80-84
			Males and females 85+
NR North Greater Manchester	00BM Bury	None	Males 70-79
	00BP Oldham		Males 80+
	00BQ Rochdale		Females 70-79
			Females 80+
			Males and females 1-4
			Males and females 20-24
			Males and females 30-34
			Males and females 45-49

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
NS Bolton and Wigan	00BL Bolton	None	Males 70-79
	00BW Wigan		Males 80+
			Females 60-69
			Females 70-79
			Females 80+
			Males and females 1-4
			Males and females 5-9
			Males and females 20-24
NT St.Helens and Sefton	00BZ St Helens	1&2	Males 79-84
	00CA Sefton		Females 70-79
			Males and females 10-14
			Males and females 15-19
			Males and females 20-24
			Males and females 85+
NU Liverpool	00BY Liverpool	None	Males 80+
			Females 80+
			Females 30-39
NV Wirral and Knowsley	00BX Knowsley	2&3	Males 25-34
	00CB Wirral		Females 25-34
			Females 70-79
			Females 80+
			Males and females 55-59
NW Salford and Trafford	00BR Salford	None	Males 55-64
	00BU Trafford		Males and females 85+
			Males and females 35-39
NX Manchester	00BN Manchester	1&2	Males 40-49
			Males 70-79
			Males 80+
			Females 70-79
			Males and females 1-4
			Males and females 5-9
			Males and females 10-14
			Males and females 55-59
NY Stockport and Tameside	00BS Stockport	2&3	Males 70-79
	00BT Tameside		Males 80+
			Females 45-54
			Females 75-84
			Males and females 1-4
			Males and females 5-9
NZ Sheffield	00CG Sheffield	None	None
SA Cornwall and Scilly	15UB Caradon	2&3	Males 70-79
	15UC Carrick		Males 80+
	15UD Kerrier		
	15UE North Cornwall		
	15UF Penwith		
	15UG Restormel		
	15UH Isles of Scilly		

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
SB North Devon	18UB East Devon	2&3	Males 65-74
	18UC Exeter		Females 25-34
	18UD Mid Devon		Females 65-74
	18UE North Devon		Males and females 1-4
	18UK Torridge		
	18UL West Devon		
SC South Devon and Teignbridge	00HG Plymouth	None	Males 80+
	00HH Torbay		Females 80+
	18UG South Hams		Males and females 1-4
	18UH Teignbridge		
SD Somerset	40UB Mendip	2&3	Males 80+
	40UC Sedgemoor		Females 60-69
	40UD South Somerset		
	40UE Taunton Deane		
	40UF West Somerset		
SE Avon	00HA Bath and North East Somerset	2&3	Males 65-74
	00HC North Somerset		Males 80+
	00HD South Gloucestershire		Females 70-79
			Females 80+
SF Bristol	00HB Bristol	None	Males 65-74
			Males 75-84
			Females 60-69
			Females 80+
			Males and females 1-4
			Males and females 45-49
SG Wiltshire	46UB Kennet	2&3	Males 70-79
	46UC North Wiltshire		Females 35-44
	46UD Salisbury		Females 50-59
	46UF West Wiltshire		Females 60-69
			Females 70-79
			Females 80+
			Males and females 1-4
			Males and females 20-24
SH Wessex	19UD East Dorset	None	Males and females 1-4
	19UE North Dorset		
	19UG Purbeck		
	19UK West Dorset		
	19UJ Weymouth and Portland		
	24UJ New Forest		
SI South East Dorset and Isle of Wight	00HM Bournemouth	None	Males 45-54
	00HP Poole		Males 65-74
	00MW Isle of Wight		Males 75-84
	19UC Christchurch		Males and females 5-9
			Males and females 10-14
			Males and females 20-24
			Males and females 85+

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
SJ Eastleigh and Southampton and Test Valley	**00MS Southampton**	**None**	**Females 55-64**
	24UD Eastleigh		**Females 65-74**
	24UN Test Valley		**Females 80+**
			Males and females 1-4
			Males and females 5-9
SK South Hampshire	**00MR Portsmouth**	**None**	**Males 65-74**
	24UE Fareham		**Females 55-64**
	24UF Gosport		**Females 80+**
	24UH Havant		
SL North Hampshire	**24UB Basingstoke and Deane**	**2&3**	**Males 65-74**
	24UC East Hampshire		**Males 80+**
	24UG Hart		**Females 65-74**
	24UL Rushmoor		**Males and females 1-4**
	24UP Winchester		
SM Swindon and West Berkshire	**00HX Swindon**	**None**	**Males 30-39**
	00MB West Berkshire		**Males 50-59**
	00MC Reading		**Males and females 1-4**
SN East Berkshire	**00MA Bracknell Forest**	**2&3**	**Babies and 1-4**
	00MD Slough		**Females 30-39**
	00ME Windsor and Maidenhead		**Males and females 1-4**
	00MF Wokingham		**Males and females 75-79**
			Males and females 80-84
			Males and females 85+
SO Northern Surrey	**43UB Elmbridge**	**2&3**	**Males 75-84**
	43UC Epsom and Ewell		**Females 40-49**
	43UG Runnymede 43UH Spelthorne		**Males and females 1-4**
	43UJ Surrey Heath		**Males and females 30-34**
	43UM Woking		
SP Southern Surrey	**43UD Guildford**	**2&3**	**None**
	43UE Mole Valley		
	43UF Reigate and Banstead		
	43UK Tandridge		
	43UL Waverley		
SQ North Sussex	**45UD Chichester**	**None**	**Babies and 1-4**
	45UE Crawley		**Males 15-24**
	45UF Horsham		**Males 55-64**
	45UG Mid Sussex		**Males 80+**
			Females 80+
SR South Sussex	**00ML Brighton and Hove**	**None**	**Males and females 1-4**
	45UB Adur		**Males and females 15-19(HtC2 only)**
	45UC Arun		
	45UH Worthing		

Design Group	Local Authorities	HtC groups collapsed	Age-sex groups collapsed
SS County of East Sussex	21UC Eastbourne	None	Males and females 1-4
	21UD Hastings		
	21UF Lewes		
	21UG Rother		
	21UH Wealden		
ST Southern Kent	29UB Ashford	None	Males 80+
	29UH Maidstone		Females 70-79
	29UK Sevenoaks		Males and females 1-4
	29UP Tonbridge and Malling		Males and females 15-19
	29UQ Tunbridge Wells		Males and females 65-69
SU Northern Kent	00LC Medway	None	Males 65-74
	29UD Dartford		Females 35-44
	29UG Gravesham		Females 80+
	29UM Swale		
SV Eastern Kent	29UC Canterbury	None	Males 70-79
	29UE Dover		Males 80+
	29UL Shepway		Females 5-14
	29UN Thanet		Females 80+
			Males and females 20-24
			Males and females 25-29
WA East Wales	00NN Powys	2&3	Males 50-59
	00PL Blaenau Gwent		Males 80+
	00PM Torfaen		Females 50-59
	00PP Monmouthshire		Females 65-74
			Females 80+
WB Welsh Valleys	00PF Rhondda, Cynon and Taff	2&3	Males 80+
	00PH Merthyr Tydfil		Females 70-79
	00PK Caerphilly		
WC Cardiff and Newport	00PD Vale of Glamorgan	None	Males 45-54
	00PR Newport		Males 70-79
	00PT Cardiff		Females 40-49
			Males and females 1-4
			Males and females 30-34
			Males and females 80-84
WD Swansea, Bridgend and Port Talbot	00NX Swansea	2&3	Males 25-34
	00NZ Neath Port Talbot		Females 60-69
	00PB Bridgend		Males and females 85+
WE West Wales	00NA Isle of Anglesey	None	Males 80+
	00NC Gwynedd		Females 80+
	00NQ Ceredigion		Males and females 5-9
	00NS Pembrokeshire		Males and females 20-24
	00NU Carmarthenshire		
WF North East Wales	00NE Conwy	2&3	Males 80+
	00NG Denbighshire		Males and females 1-4
	00NJ Flintshire		Males and females 5-9
	00NL Wrexham		Males 50-59

Annex E: Borrowing strength methodology

The quality assurance process included a contingency measure, which used the principle of "borrowing strength", for instances where there was evidence that the CCS may have failed.

The ONC estimation strategy divided the population into 37 age-sex groups and three HtC groups, meaning that up to 111 separate adjustments were made to the population count in each DG. 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

Annex F: LADs that received student halls of residence adjustments

LAD	Establishment(s)
Birmingham	Birmingham University, Central England University & Birmingham College of Food
Bradford	Bradford College
Brighton	Brighton University, Sussex University
Cardiff	Cardiff University
Ceredigion	University of Wales Aberystwyth
Charnwood	Loughborough University
Coventry	Coventry University
Derby	Derby University
Durham	Durham University
Enfield	Middlesex University
Greenwich	Greenwich University
Guildford	Surrey University
Hackney	Westminster University
Harrow	Brunel University, Harrow School
Islington	North London University
Kingston upon Hull	Hull University, Humberside University
Leeds	Leeds Metropolitan University
Leicester	Leicester University
Liverpool	John Moores University, Liverpool University, Liverpool Hope University
Luton	Luton University
Manchester	Manchester University, Manchester Metropolitan University, UMIST
Mid Bedfordshire	Cranfield University
Newcastle-upon-Tyne	Newcastle-upon-Tyne University, Northumbria University
Plymouth	Plymouth University
Portsmouth	Portsmouth University
Preston	Central Lancashire University
Runnymede	London University
Salford	Salford University
Southampton	Southampton Institute, Southampton University
Stafford	Staffordshire University
Sunderland	Sunderland University
Swansea	Swansea Institute
Teignbridge	College of St Mark & St John
Telford and Wrekin	Harper Adams University College
Tower Hamlets	London University, London Guildhall University
Wandsworth	London Institute, Surrey University
Westminster	Westminster University
Wrexham	North East Wales Institute
Wyre	Myerscough College
York	College of Ripon & York St Johns

Note 1. Where the number of missing students was 100 or more a hall of residence and the notional response rate was below 75 per cent

Annex G: Defence communal establishments that received an adjustment for undercount among the armed forces

LAD Name	Establishment
Aylesbury Vale	RAF Halton
Bracknell Forest	Royal Military Academy
Caradon	HMS Raleigh
East Hampshire	Prince Philip Barracks
East Hampshire	RAF Oakhanger
Fareham	HMS Collingwood
Gosport	HMS Sultan
Gosport	Fort Blockhouse
Hart	Gibraltar Barracks
Hart	RAF Odiham
Kennet	Mooltan Barracks
Kennet	Trenchard Lines
Kennet	Assaye Barracks
Kerrier	RNAS Culdrose
King's Lynn & West Norfolk	RAF Marham
North Norfolk	RAF Coltishall
Plymouth	HMS Drake
Plymouth	Stonehouse Barracks
Plymouth	Royal Citadel
Portsmouth	HMS Nelson
Portsmouth	HMS Excellent
Rushmoor	St. Omer Barracks
Rushmoor	Lille Barracks
Rushmoor	Arnhem Barracks
Salisbury	Erskine Barracks
South Hams	Royal Marine Camp, Bickleigh
Vale of White Horse	Royal Military College of Science
West Oxfordshire	RAF Brize Norton
West Wiltshire	Warminster Training Centre
Winchester	HMS Dryad
Winchester	Sir John Moore Barracks
Winchester	Worthy Down
Windsor & Maidenhead	Combermere Barracks
Wokingham	School Of Electrical & Aeronautical Engineering
Wycombe	RAF High Wycombe
LAD Name	Establishment
Aylesbury Vale	RAF Halton
Bracknell Forest	Royal Military Academy
Caradon	HMS Raleigh
East Hampshire	Prince Philip Barracks
Fareham	HMS Collingwood
Gosport	HMS Sultan
Gosport	Fort Blockhouse
Hart	Gibraltar Barracks
Hart	RAF Odiham

LAD Name	Establishment
Kennet	Mooltan Barracks
LAD Name	Establishment
King's Lynn & West Norfolk	RAF Marham
Kerrier	RNAS Culdrose
North Norfolk	RAF Coltishall
Plymouth	HMS Drake
Plymouth	Stonehouse Barracks
Plymouth	Royal Citadel
Portsmouth	HMS Nelson
Portsmouth	HMS Excellent
Rushmoor	St. Omer Barracks
Salisbury	Erskine Barracks
South Hams	Royal Marine Camp, Bickleigh
Vale of White Horse	Royal Military College of Science
West Oxfordshire	RAF Brize Norton
West Wiltshire	Warminster Training Centre
Winchester	HMS Dryad
Winchester	Sir John Moore Barracks
Windsor & Maidenhead	Combermere Barracks
Wokingham	School Of Electrical & Aeronautical Engineering
Wycombe	RAF High Wycombe