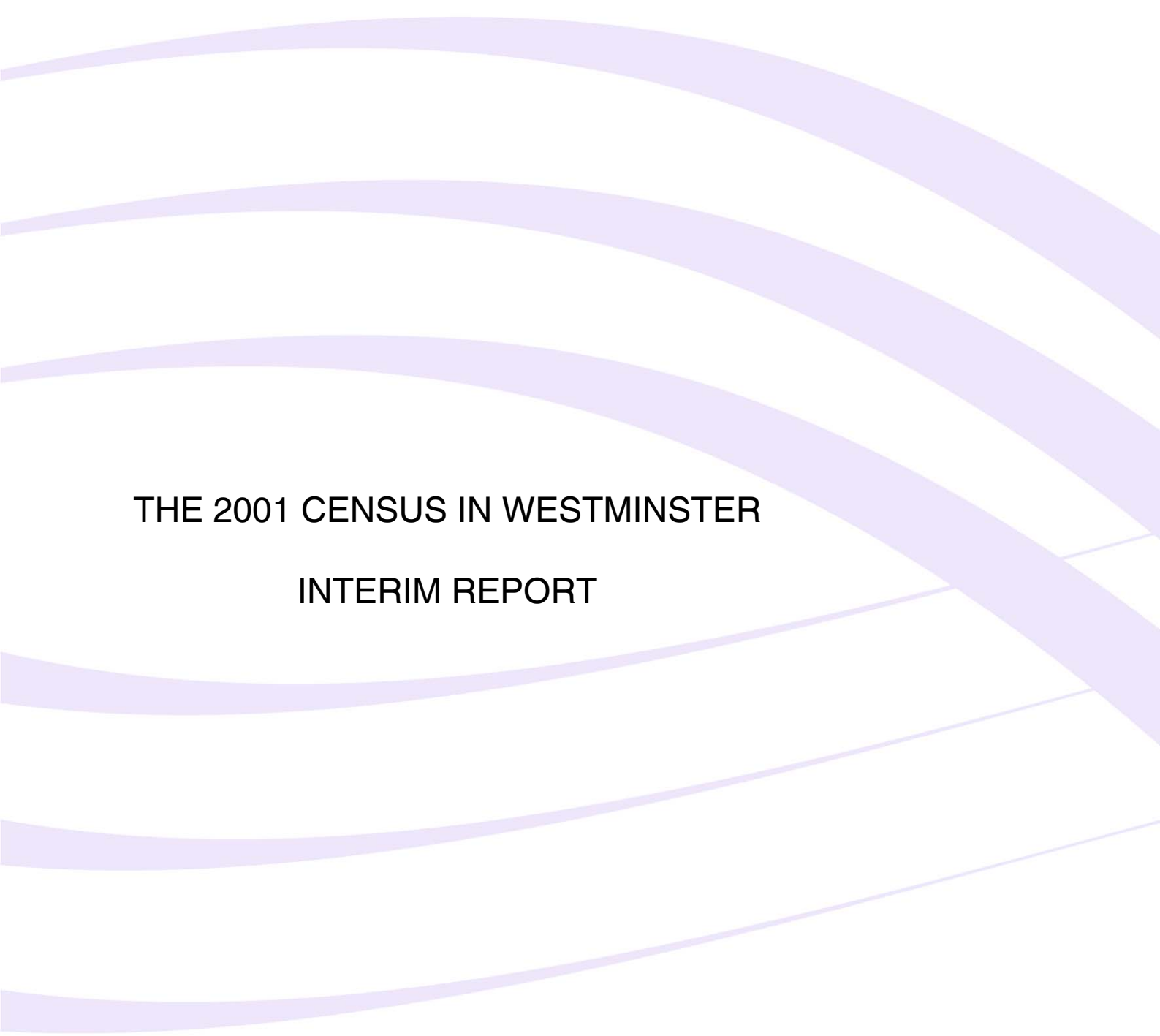


Statistics Commission



THE 2001 CENSUS IN WESTMINSTER INTERIM REPORT

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Statistics Commission

THE 2001 CENSUS IN WESTMINSTER

INTERIM REPORT

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FOREWORD BY THE CHAIRMAN OF THE STATISTICS COMMISSION

This interim report touches on an issue of fundamental importance to the future of official statistics. We know that conducting surveys in many countries – and certainly in Britain – is proving harder as society changes. People seemingly feel less inclined to co-operate or are more difficult to access. In these circumstances, a modern, survey-based Census, using the latest methods, may not be able to cope with the challenge of enumerating the most ‘hard to count’ areas of England and Wales. That has important implications.

The 2001 Census was in many respects the most sophisticated ever conducted. Yet evidence we have examined on the use of One Number Census methodology in 2001 indicates that, when the initial enumeration misses as much of the resident population as it did in Westminster, even sophisticated estimation techniques may not entirely compensate for the initial absence of reliable data. In simple terms, there is too much uncertainty about the final results in the ‘most hard to count’ areas.

The work undertaken by, and on behalf of, the Statistics Commission leads us to the conclusion that the results of the 2001 Census in Westminster City Council’s area are substantially less reliable than implied by the published confidence intervals. These ranges only capture the uncertainty associated with the sampling involved in the process. Many other sources of uncertainty are present but are much less readily quantified. The Office for National Statistics did not have enough reliable information available to provide a confident estimate in this case. We believe that the problems of estimation were compounded by the fact that the concept of ‘usually resident population’ is particularly difficult to measure in the centre of one of the world’s major cities.

Some of the organisations most concerned about this problem, notably Westminster City Council, are convinced that the official estimates for their areas are too low. Because of the uncertainties in the estimates, we cannot say whether or not they are right. The published estimates for Westminster remain possible, though they are towards the bottom of a wide range of plausible estimates. Further research which is now being undertaken may throw more light on this question in the coming months.

However, we can now make several important recommendations for the future and these are set out in the report. They are not just recommendations for the Office for National Statistics. They require a concerted effort across central and local government and we believe they should be given urgent attention.



Professor David Rhind
Chairman, Statistics Commission

Statistics Commission

THE 2001 CENSUS IN WESTMINSTER – INTERIM REPORT

Summary of Conclusions

1. The 2001 Census was conducted according to the best methodology available for a conventional Census; but the method failed to cope adequately with the most extreme circumstances.
2. There is greater uncertainty about the Westminster results than is reflected in the published confidence intervals.
3. Some of the judgements made in advance of the Census about dealing with 'hard to count' areas are open to question.
4. A more multi-lateral approach to population estimates is needed in future.

Summary of Recommendations

1. ONS should revisit the Westminster population estimates.
2. A 2006 population count should be pursued, at least for the areas that proved most difficult to count in the 2001 Census. In practice this likely to mean some areas of inner London.
3. The quality of migration data should be addressed with urgency.
4. A national address register should be a priority for government.
5. ONS should do more to explain their methods.
6. Government should address its data requirements more systematically.
7. Other measures of population should be developed as alternatives to 'usually resident' population.

Introduction

The 2001 Census estimated the population of Westminster at 181,286. Westminster City Council has argued that this figure is substantially too low and has presented various evidence to support its case. The Statistics Commission has undertaken a review of the issues, the evidence and the research undertaken by other parties.

This is an interim report. Set out below are the Commission's initial conclusions and recommendations. We will publish a final report once we have considered the results of further research currently being undertaken under the joint sponsorship of Westminster City Council and the Office for National Statistics. This research involves the systematic matching of addresses used in the Census enumeration with those from local administrative sources and examination of the reasons for any 'unmatched' addresses. The results are expected to be available in January or February 2004.

Whilst the ongoing research may lead to some strengthening of our conclusions and recommendations, the Commission believes it will be helpful to the interested parties to set out our interim conclusions at this time because:

- a considerable period has passed and there would be little benefit in further delay
- other than the address-matching study, we believe that virtually all that can be known is now known about the way in which the Census was conducted
- one of our main recommendations – relating to the need for a 2006 population count – will be facilitated by preparatory actions taken regardless of the outcome.

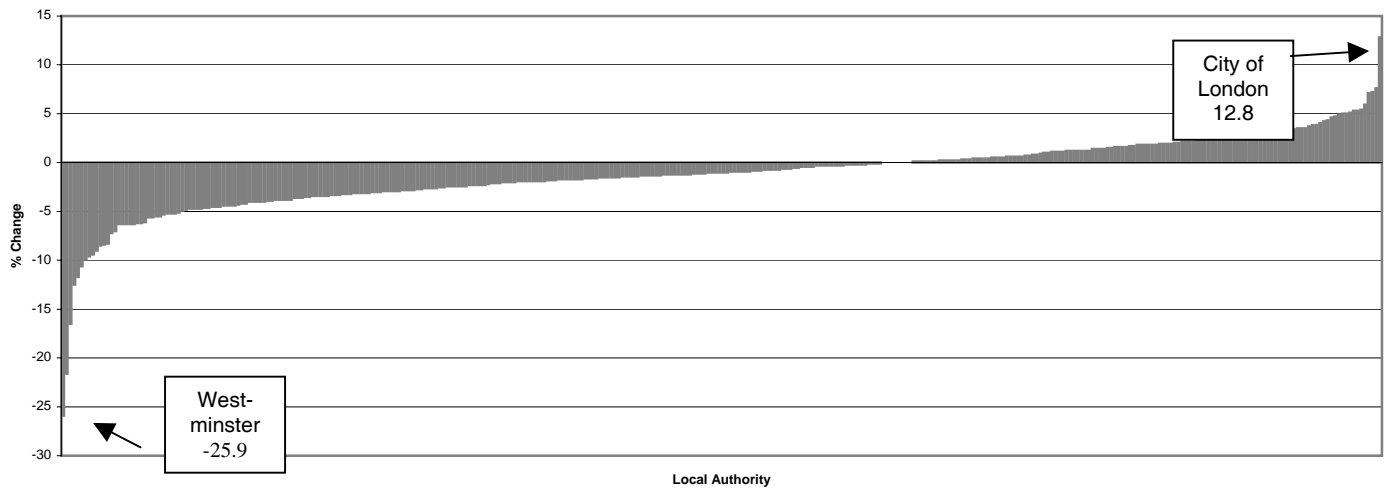
Of the hundreds of local authority areas covered by the Census in England and Wales, only the results for Westminster have been examined in detail by the Commission. We decided to look closely at this case both because Westminster approached the Commission for advice and because it is the extreme case when the difference between the previously published estimates of population (the Mid-Year Estimates) and the 2001 Census figures are compared (see **Figure 1**).

Westminster was also one of the local authority areas with the lowest coverage in the initial Census count (**Figure 2**) and this characteristic – as we show in Paper 1 – has an important influence on the calculations needed to estimate the missing population.

However, although the focus of the report is on Westminster, our recommendations take account of the possibility that results for some other local authority areas may have been subject to similar difficulties. In practice, the problems of large disparities between Census and previously predicted populations, and of low Census response rates are largely concentrated on certain London boroughs. The lowest 14 response rates in England and Wales were in London boroughs.

Figure 1. This chart gives percentage differences comparing 2001 Census results with 2000 Mid Year Estimates for English local authorities. The differences are ranked from those where the Census results were most below the MYE to the converse.

Percentage Population Change 2001 Census vs Original 2000 Mid Year Estimates English Local Authorities



Source ONS: www.statistics.gov.uk/census2001/downloads/Comparison_ONC2001_MYE2000.xls

Figure 2: Local authority areas with the lowest Census response rates – England & Wales 2001

Local authority area	response rate
Kensington and Chelsea	64%
Hackney	72%
City of London	74%
Westminster	74%
Tower Hamlets	76%
Hammersmith and Fulham	76%
Camden	77%
Southwark	77%
Islington	78%
Lambeth	79%
Brent	79%
Newham	80%
Lewisham	81%
Haringey	83%
Slough UA	85%
Ealing	85%
Greenwich	86%
Ceredigion	86%
Luton UA	86%
Barking & Dagenham	86%
Redbridge	87%
Croydon	87%
Rushmoor	88%
Waltham Forest	88%
Merton	88%
Liverpool	89%
Wandsworth	89%
Enfield	89%

Source ONS: www.statistics.gov.uk/census2001/downloads/responserates.xls

Conclusions

1. The 2001 Census was conducted according to the best methodology available for a conventional Census; but the method failed to cope adequately with the most extreme of circumstances

The Statistics Commission has concluded that the One Number Census (ONC) methodology was the best available at that time for a conventional Census. No alternative approach, that would have been viable in 2001, would have produced more reliable results overall. Indeed, it seems likely that – in more difficult circumstances for field work than ever before – the 2001 Census overall was significantly better than its most recent predecessors.

A substantial effort was made by the Office for National Statistics to predict difficulties in advance and take precautionary measures to limit their impact. In the case of Westminster there were however some greater than foreseen problems with the fieldwork which contributed to low coverage in the initial count and uncertainty in the final estimates.

The Census figures are not straightforward counts. The initial Census counts, made during the enumeration process, were augmented by estimates of the number of people missed in the initial count. These estimates were derived mainly from a separate Census Coverage Survey (CCS) conducted a few weeks after the Census itself. The CCS was one of the largest sample surveys ever conducted in the UK.

Further adjustments were then made to the resulting estimates to compensate for lack of statistical independence between the Census and CCS. In the case of Westminster the controversy surrounding the population estimates centres mainly on this second set of adjustments. **Paper 1** discusses the calculations for Westminster and explains the nature of the adjustments.

In publishing the Census population figures, the Office for National Statistics gave statistical confidence intervals for its estimates. It is important to understand that a confidence interval does not represent the upper and lower limits for the estimate. It is rather a range which will include the true value in about 19 cases out of 20, on the basis of probability. In the case of Westminster the published confidence interval was between 173,000 and 190,000. This range does not take into account factors other than statistical variation due to the sample nature of the Census Coverage Survey. Consideration of these other factors suggests that

the possible 'true range' within which the Westminster population falls is larger – and this leads to the next conclusion.

2. There is greater uncertainty about the Westminster results than is reflected in the published confidence intervals

It is impossible to know the population of Westminster on Census night in 2001 with certainty. The accuracy of all estimates depends on the methods used and the local circumstances. The evidence we have seen convinces us that the One Number Census methodology, and indeed any such survey-based census methodology, is liable to work imperfectly in the most extreme circumstances.

The analysis of the calculations for Westminster set out in **Paper 1** shows that the process of adjusting the initial Census count involved steps that relied on uncertain information, and that the level of uncertainty was substantially amplified due to Westminster's low response in the initial enumeration. Because of the nature of assumptions made in the calculation, the estimate is much more likely to be too low than too high. The range of plausible alternative estimates includes values substantially above the published estimate. However, in the absence of persuasive evidence to support any particular alternative figure, the Statistics Commission is not able to identify any one figure as being preferable to the published estimate.

The Commission has considered carefully the arguments put forward by Westminster City Council to suggest that the true figure lies above the published range, and the arguments put forward by the Office for National Statistics for assuming that the true figure is within the range. It has been suggested, for example, that ONS used an incomplete list of residential addresses for the Census enumeration in Westminster and that this led to too low an estimate. However, an incomplete address list would not *necessarily* have this effect as long as the rest of the Census methodology correctly captured the problem and corrected for it – and there is no simple way of knowing whether this happened. The extent to which weaknesses of this kind were present in the case of Westminster, and then not corrected for appropriately in the later stages of estimation, is the subject of the address-matching study.

As a footnote to this conclusion, it is a fact that whatever the true population in Westminster on Census night, the population now – 2 years later – could be significantly different. The churn in population in inner urban areas, and especially in Westminster, is high, with up to a

quarter of the electorate on the electoral register changing annually. We know that methods currently used for measuring migration into and out of the UK, and between local authority areas, are unreliable. Particularly unreliable are the estimates of international emigration and immigration into and out of Central London. Without improved methods, up-dating population census figures is liable to error. Add to this the difficulty of measuring 'the usually resident population' in such areas and the merits of seeking other ways to complement the Census becomes evident. It is also questionable whether 'usually resident population' actually measures an appropriate population base to inform certain key decisions, such as the allocation of local government funding or health needs-related expenditure.

3. Some of the judgements made in advance of the Census about dealing with 'hard to count' areas are open to question

The Commission has some reservations about the judgements made in advance of the Census on the special measures to be taken to cope with the hardest to count areas such as Westminster. Though several London boroughs offered help to carry out the Census based on their local knowledge, the Office for National Statistics took the view that this would not be appropriate because local authorities had a vested financial interest in the population count. Whilst statistical work must not be open to influence by anyone likely to benefit, or lose out, depending on the results, the loss of local knowledge was – as it transpired – a high price to pay.

It would be wrong, though, to give the impression that there was no co-operation. Westminster offered paid leave to Council staff to work as enumerators after discussion with ONS. Despite this degree of co-operation, the Commission believes that discussions between ONS, the Local Government Association and local authorities, and actions arising from these discussions, could have gone further and the most hard to count local authority areas could have had their own samples in the Census Coverage Survey. Addressing these points would not necessarily have led to different estimates, but it might very well have lent greater authority to the estimates.

4. A more multi-lateral approach to population estimates is needed in future

The Statistics Commission has concluded that the practice of conducting a Census according to rules that severely restrict the involvement of outside agencies and alternative information sources should in future be modified. A more multi-lateral approach should draw on as much relevant evidence as possible, but with strict controls to prevent partisan

interests affecting the results. We recognise that this may require legislative changes and may not have been an option for the 2001 Census.

We also believe that ONS did not communicate with interested parties as effectively as it might have. Though there was much consultation prior to the Census and numerous documents available on the ONS website, many of these were highly technical and, in some respects, incomplete. The considerable efforts ONS made to validate the population estimates in each local authority area against diagnostic ranges – that is, to check Census results against alternative information sources such as administrative records – were not described in written form until a year after the first results were released.

We understand the scale of the efforts made to carry out the Census, but we believe that ONS should in future devote more resources to dealing with non-expert representatives of local authorities and other public bodies and see the job of developing wide understanding of the methods to be used as an essential element in the preparations for a Census. There is however also an obligation upon the user community, including local authorities, to ensure that they understand what is proposed and that this understanding extends to elected members as well as technical staff.

Recommendations

1. ONS should revisit the Westminster population estimates

The Office for National Statistics should revisit the Westminster population estimates when the results of the further research are known (about January 2004) and consider the implications of this work for the estimates for other local authority areas. We do not expect ONS to *negotiate* a revised figure with Westminster City Council but would expect the parties to continue to try to reach agreement on the implications of the research findings. Revised mid-2001 population estimates were released on 26 September resulting in the mid-year estimate for Westminster being increased by 4,700, but these adjustments are not directly related to the issues we raise about the estimation of the odds ratio (see Paper 1).

We are concerned that revisions to the Mid-Year Estimates for 2001 and subsequent years may further distance these figures from the published Census figures, and thus lead to undermining both the value of Census figures and public confidence in the more recent

estimates. We ask ONS to review their decision not to adjust the Census figures in the most difficult to estimate areas.

2. A 2006 population count should be pursued, at least for the areas that proved most difficult to count in the 2001 Census. In practice this is likely to mean some areas of inner London

The Statistics Commission recommends that further survey work should be undertaken, at least in those areas of the country that presented the greatest difficulties, using updated methodology which exploits lessons learned from the 2001 Census. In practice this largely relates to certain parts of London. We recommend that the National Statistician should propose a way forward after consulting local authorities and other key interests. Whilst the National Statistician must make the final decision on questions of methodology and timing, we believe this would be most appropriately carried out in 2006 ie half-way through the normal inter-censal period. The results could not give any certain indication of the true 2001 situation but could address the need for robust population estimates for resource allocation and other purposes. We would expect any such count to take advantage of the local knowledge of local authorities.

3. The quality of migration data should be addressed with urgency

Government should take urgent steps to enhance the quality of migration information – which is presently wholly inadequate. We believe proposals recently made by ONS on this front, and in relation to improving demographic information, have much to commend them. This may involve major changes in administrative practice, not just in statistical systems. To generate reliable international migration estimates might require new administrative records of change of address when people move to or from the UK. There are no easy solutions. Statistical surveys are not likely to be adequate.

4. A national address register should be a priority for government

Central to the taking of almost any form of count of the population is a definitive and frequently up-dated national address register. The quality of the address lists used in the 2001 Census was a material contribution to the low response rates in certain areas. Thus a single definitive national address database used by all public authorities would be a major step forward. Attempts to achieve this over the last decade have been bedevilled by the number of government departments and other bodies involved; those involved include the

local authority community, the Post Office, Ordnance Survey, HM Land Registry, ONS and private sector bodies. There is currently confusion about where authority lies and there is now a need for leadership. The present situation is unacceptable and must be resolved. Clear responsibility for the task needs to be assigned.

We understand that ONS proposes to develop in collaboration with other parties a comprehensive Address Register, agreed as a national standard. This would build on existing registers and the collaborative project that has enhanced the national postcode directory. We see this as a very positive step as long as it gets the support across government needed to make it a success.

5. ONS should do more to explain their methods

ONS should make renewed efforts to explain in simple terms to all interested parties the complex methods used within the One Number Census and those to be used in any future exercises. Public confidence in statistics depends in part on finding effective ways to explain matters of this kind.

6. Government must address its data requirements more systematically

Those government departments that rely on Census results to guide the allocation of public funding, or other key decisions, should address formally the level of accuracy they require and the cost-benefit implications of achieving that level. The primary responsibility for this rests with these departments rather than ONS. ONS does however have a responsibility to make clear any concerns it has about the feasibility of collecting information to these defined accuracies and the suitability of the data for these key uses. The relevant government departments should engage with ONS more directly in discussing these matters.

7. Other measures of population need to be developed as alternatives to ‘usually resident’ population

Because of the variety of indicators of demand for public services required across the UK, alternatives to the single concept of ‘usually resident’ population should be developed. The Statistics Commission welcomes the fact that ONS is now considering the scope for alternative population estimates – such as the ‘working day population’ which would be much higher than the usually resident population for areas such as Westminster. The recent ONS report *A Demographic Statistics Service for the 21st Century* considers alternative measures that may prove valuable for resource allocation and other purposes.

The background to our conclusions is explained in the papers that follow the report:

- **Paper 1:** A simplified explanation of the calculation of the Census estimate for Westminster
- **Paper 2:** The population of Westminster in 2001: A Review of the Evidence Submitted to the Statistics Commission in 2003 by the City of Westminster, the Office for National Statistics and Other Parties, by Professor Philip Rees FBA.
- **Paper 3:** Reports and evidence considered by the Statistics Commission.

In making this report, we have sought to explain what we have found in language understandable by non-experts in population matters. The report is however based on discussions with many experts and a study of all of the voluminous information now available. The factual basis of this report has been checked with the Office for National Statistics. Matters of judgement are however solely the responsibility of the Commission.

The Statistics Commission wishes to acknowledge the assistance of many individuals and organisations in the preparation of this report. It is particularly indebted to Professor Phillip Rees of Leeds University who prepared Paper 2 and advised on the evidence more generally; Professor Bernard Silverman, Master of St Peter's College Oxford, who advised the Commission on the statistical methods employed; officials from the Office for National Statistics and all who gave evidence.

PAPER 1

A SIMPLIFIED EXPLANATION OF THE CALCULATION OF THE CENSUS ESTIMATE FOR WESTMINSTER

2001 Census estimate of the
population of Westminster (29 April 2001) **181,286**

Number actually counted in the Census
as usually resident in Westminster **134,212**

The number of people missed but
added through estimation **47,074**

Westminster had one of the lowest response rates among local authority areas and thus one of the largest proportions that had to be estimated. This paper sets out in simplified terms how the estimate of over 47,000 missed people was derived and considers the level of uncertainty associated with the process.

The essence of the Census Coverage Survey (CCS) is to estimate the proportion of people missed in the Census enumeration and increase the total count accordingly – referred to below as STAGE 1. There is then a second set of adjustments to deal with lack of independence between the Census and CCS – STAGE 2 below.

STAGE 1 – the CCS-based adjustment

The part of the CCS that is relevant to the Westminster estimate relates to the Central London Estimation Area (an area including Westminster but also City of London, Camden and Kensington and Chelsea). A random sample of Post-Code Areas across this Estimation Area – containing about 2% of the population – were visited in the CCS.

The Central London part of the CCS was not designed specifically to be representative of Westminster. This introduces a degree of uncertainty. If those areas of Westminster that were included in the CCS tended to have household characteristics untypical of Westminster as a whole, then the resulting population estimate could have been affected.

The CCS for Central London identified 8,686 residents, of whom **3,292** lived in Westminster. The details for these individuals were then matched against Census records to see which of them had been found in the Census enumeration and which had not. The Census enumeration records for people in the selected post-code areas were also checked to see which had been interviewed in the CCS and which had not. Thus individuals were identified as either having been counted in both the Census and the CCS, or just in the Census, or just in the CCS.

The results:

- Westminster residents counted in the CCS **3292** (100.00%)
 - of which also counted in Census **2478** (75.27%)
 - of which **not** counted in Census **814** (24.73%)

- Westminster residents counted in the Census
(in the CCS area) **3336** (100.00%)
 - of which also counted in the CCS **2478** (74.28%)
 - of which **not** counted in the CCS **858** (25.72%)

From these results, a formula can be used to derive an estimate of the **total** population in the Westminster CCS area – including estimated numbers that were missed by **both** the Census and CCS. This is called the Dual System Estimator (DSE) and is calculated as:

$$\frac{3336 \times 3292}{2478} = 4432 \text{ (estimated total population in these postcode areas)}$$

The following sum gives the estimated number missed in both the Census and CCS

$$4432 - 2478 - 814 - 858 = 282 \text{ (missed in both)}$$

In practice, the Office for National Statistics used a more sophisticated approach that doesn't use the aggregate figures, as here, but rather works with more detailed figures for individual age and sex bands in each of the individual post-code areas. However the principle is essentially the same. The ONS approach resulted in slightly lower figures for the total numbers and the number missed: **4416** total, **266** missed in both Census and CCS.

From the results above, it can be seen that an estimate of the coverage of the Census is $3336 \div 4416 = 75.54\%$ (using the ONS figures). *We have quoted this figure with two decimal places simply to make it easy to recognise later; it is not likely to be accurate to that level.*

Applying that assumption to the Census count for the whole of Westminster (134,212 counted residents less 6172 in communal establishments who are not affected by this

calculation, leading to 128,040 people) gives an estimate for the total of Westminster residents of:

$$\frac{128,040 \times 100}{75.54} + 6172 = 175,672$$

Again ONS used a more sophisticated method of making this calculation and got a slightly higher result: **178,750**. *(The ONS approach involved fitting a regression model to the values for those post-code areas for which there were both Census and CCS counts and then applying that regression model to the post-code areas from which there were only Census counts. This makes best use of the available data).*

Up to this point in the calculations, a **very important assumption** is made: that the probability of being counted in the CCS is the same whether or not the household was counted in the Census. This assumption is called ‘independence’. In reality, the assumption of independence is unlikely to be justified. People who are not counted in the Census are generally more likely to be missed by the CCS than people who *were* counted in the Census. The estimation of the amount of dependence in an area is a critical step for those areas where Census coverage was low. It is much less critical elsewhere.

It may help in understanding dependence to think of the CCS as a thorough house-to-house search to identify people who live in an area. If this search finds everyone, then the assumption of independence holds – because their chances of being in the CCS are not affected by what happened in the Census. If the CCS misses some people but there is no particular tendency for these to have been people who were missed in the Census, then still independence holds. If however the people missed are disproportionately the same people as missed in the Census, then the independence assumption is invalid. Intuitively, it seems likely that some of those missed by the Census – those who wanted to avoid being identified for example – had more than an average chance of being missed by the CCS. So independence is not likely to be a totally valid assumption.

STAGE 2 – the dependency adjustment

The scale of correction needed to allow for lack of independence is difficult to estimate but in practice it is not a major effect in most local authority areas. However, the correction

becomes very much more important when, as in the case of Westminster, the estimated Census coverage is so low.

To correct for the lack of independence, statistical methods dictate that a further adjustment should be made to the total calculated so far (ie 178,750). The adjustment by which the total will be multiplied is calculated as follows (using the Westminster figures cited above): $1 + (b - 1) \times (1 - 0.7527) \times (1 - 0.7428)$

which is the same as $1 + 0.064(b - 1)$

where **b**, called the **odds-ratio**, is an estimate of how much more likely a person is to be counted in the CCS if he or she is also counted in the Census, compared with the case where the person was missed in the Census. The lowest meaningful value of **b** is 1, which would mean that the chances of being counted in the CCS are not affected by whether the person was counted in the Census – ie complete independence. A value of 2 would mean that a person missed in the Census would be twice as likely to be missed in the CCS as other people who had been counted in the Census ...and so on.

Note: ONS calculated both household level odds-ratios and person level ones and these do show some differences. This paper does not discuss this aspect as it is not directly relevant to the issues being considered. However, the step from household to person level ratios does involve another set of assumptions.

How the odds-ratio is calculated

The formula for calculating the odds-ratio **b** is easiest to follow if the figures computed above for Westminster are used to illustrate it – but it should be noted that this is just for illustration. The approach actually used in the Census did not involve this particular calculation – as explained further later. Using the Westminster figures to illustrate the formula it is:

$$b = \frac{2478 \times (T - 2478 - 814 - 858)}{814 \times 858}$$

T is a separate estimate of the population in the area – called the ‘third estimate’. In practice this process has two steps; the first operates at the level of numbers of households and the second operates at the level of individual people. But the sum above illustrates the concept.

Now **T** is, by definition, difficult to estimate reliably. It is one of the quantities that the Census itself is intended to measure – so obviously it isn’t known in advance. The way it was estimated for Census purposes was to take the average of two quantities – the number of

residential addresses held by the Post Office (adjusted by a factor to convert from addresses to households) and the number of households identified in the Census by the enumerators – and then adjust the figure to give an estimate in terms of people rather than households.

It is clear that the odds-ratio **b** is difficult to estimate and introduces further uncertainty. It appears to the Statistics Commission that the difficulty of estimating **b** accurately tends to increase for the areas of the country where the Census coverage tends to be low. The reason for this is essentially that the circumstances which make an area ‘hard to count’ – such as unwilling households – also make it hard to be sure about the level of dependence. These areas are also precisely the ones in which the dependency adjustment will have the greatest effect on the final total. So not only is the calculation more uncertain in these areas, it is more important too.

To illustrate how problematic the estimation of the odds-ratios can be, ONS provided the Commission with some data for the Central London areas defined as ‘most hard to count’. These data were not in fact used in producing the Census estimates but are nonetheless informative. They show that the calculation of **b** for this area ‘goes wrong’ (due to the estimate of **T** being lower than the total to be subtracted from it) and thus **b** would be set to **1.0** because there is no basis for any other value. What makes this striking is that for the ‘middling hard to count’ parts of Central London, the value of **b** calculated in the same way comes out at **7.2**. *It seems highly improbable to the Commission that the level of dependence genuinely swaps over from an extreme low value to a very high one just between the two levels on the ‘hard to count’ index.*

It would be wrong to assume however that a high odds-ratio automatically leads to a large adjustment in terms of numbers of people added. A lot depends on the coverage in the initial enumeration. If the initial coverage is high, the odds-ratio will not have a large impact on the final estimate.

In practice, the odds-ratios used for the Central London Estimation Area were actually the values of **b** derived for the larger ‘Inner London’ area – on the grounds that the latter estimates would be more robust (the values used were 1.6 for the ‘most hard to count’ areas and 3.7 for the ‘middling hard to count’ areas when measured at the household level). This

is a defensible step but, to the extent that Westminster is untypical of Inner London, it introduces still more uncertainty. Having calculated the necessary adjustments for the Central London Area as a whole, the ‘extra population’ was then allocated to the different local authority areas in proportion to the estimated amount of undercounting in the Census in each area. Thus there was never a specific value of **b** for Westminster as a whole. But the net effect of these various steps was to produce an adjustment for Westminster which equated to a value of **b** of about 1.22 (measured at the person level) – that is to say a value near the bottom of the plausible range. Use of this dependency adjustment added some 2,500 people to the Westminster total. This took the 178,750 figure derived under the Stage 1 adjustments to 181,286.

Conclusions

The odds-ratio **b** is a measure of the extent to which an individual who was missed in the Census count was more likely to be missed in the Census Coverage Survey than someone who was counted in the Census. For those areas of England and Wales that had a high coverage in the initial Census count, the value of **b** did not make much difference to the final estimate. However in the Westminster case, where the coverage was exceptionally low, **the estimated value of b was critical.**

This is illustrated below by looking at the effect of setting **b** to alternative values. The last two columns give the level of response in the Census and CCS implied by the values of **b**. As **b** increases these figures start to become increasingly unrealistic, so a very high value of **b** is improbable.

b	extra people in Westminster	total estimated for Westminster to the nearest thousand	percent response in enumeration (people)	percent response in CCS of people missed from Census
1	0	179,000	75	75
1.22	3,000	181,000	74	70
2	11,000	190,000	71	59
3	23,000	201,000	67	49
4	34,000	213,000	63	42
5	45,000	224,000	60	37
6	57,000	236,000	57	33
7	68,000	247,000	54	29

The estimation of **b** is problematic, requiring a separate 'third estimate' of the resident population. This approach does not always produce sensible results. Much depends on the robustness of the various estimates that come into play in the calculations. The value of **b** for Westminster implied by the final Census estimate was towards the bottom of the range of the plausible values and the evidence to support use of this specific value appears to be very slim – although it was consistent with such evidence as there was within the Census data itself.

The analysis in this paper suggests that a wide range of possible outcomes – nearly all higher than the published estimate – would have been at least plausible using the data available.

Uncertainty about the value of **b**, and about other steps in the process, is not taken into account in the published confidence intervals and this lends an unjustified impression of precision to the official estimates.

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PAPER 2

THE POPULATION OF WESTMINSTER IN 2001: A REVIEW OF THE EVIDENCE SUBMITTED TO THE STATISTICS COMMISSION IN 2003 BY THE CITY OF WESTMINSTER, THE OFFICE FOR NATIONAL STATISTICS AND OTHER PARTIES

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The Problem

The Office for National Statistics (ONS) undertook a full census of the population of England and Wales in 2001, published the first results on 30 September 2002 (age-sex tables and associated mid-2001 population estimates) and has since been rolling out a huge volume of outputs from the 2001 Census. ONS has used the 2001 Census statistics to revise radically the mid-year population estimates (MYEs) by age and sex for local authorities. For the City of Westminster the 2001 MYE population was 26% lower than the previous mid-2000 estimate. Such a reduction had a drastic impact on the allocation of central government revenues for Westminster services.

The City of Westminster made strong representations to ONS for revision of the 2001 estimate, assembling a variety of evidence to support their claim that the population of the Borough had grown throughout the 1991-2001 decade, rather than declined to 1995 and grown since then (as indicated by the ONS revised MYE series). They took their complaints to the Statistics Commission in December 2002. Westminster commissioned work on the borough's population estimate by MORI survey company and from a group of academic experts. They continued a vigorous dialogue with ONS.

ONS have responded through letter, by meeting with Westminster representatives and by producing a report explaining how the Westminster census count and mid-year estimates were produced. They have continued to produce reports explaining the One Number Census methods, including a very recent paper on the allowances made for dependency in the Dual System Estimator (DSE) method. ONS have argued strongly for the robustness of their census count and their revision of Local Authority (LA) and Unitary Authority (UA) MYEs.

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Westminster and ONS are collaborating on an investigation of one aspect of the census process: the possibility that substantial numbers of residential addresses were omitted from the census enumeration in Westminster. ONS and Westminster have jointly funded and commissioned an address matching analysis by Manchester Geomatics. The census address list is being matched against a master file constructed from eight address datasets. The files being used are AddressPoint™ (August 2000 and ONS 1998), Post Office Address Files (PAF 2001 release 4), Communal Establishments (LA records), Council Housing (LA records), Council Tax (LA records), Registered Social Landlords (LA records), Electoral Roll (LA records) and ONS Census additional records (confidential). The report is due for completion in December 2003.

This report reviews the arguments marshalled by the Local Authority and the Office for National Statistics, using documentation submitted to the Statistics Commission by the interested parties and other organisations.

Summary of actions taken

The key actions taken by the City of Westminster were to protest about the 2001 Census count and the 2001 MYE for the Borough (City of Westminster 2002, Milton 2003, Rogers 2003a), to commission a MORI survey based population estimate (MORI 2003), to secure a MORI critique of the ONC (Mortimore 2002), to request a review of the issues from an expert panel (City of Westminster 2002b, Hobcraft *et al.* 2003) and to enter into a dialogue through meetings and correspondence with the Office for National Statistics (Wilson 2003a, 2003b, 2003c; Rogers 2003b).

The key actions taken by ONS were to prepare responses to the Westminster protest document in the form of letters (Pullinger 2003a, Pullinger 2003b, ONS 2003d, ONS 2003f) and *The Westminster Report* (ONS 2003c), seeking to explain why ONS felt that the ONC and revised MYEs were robust. They also pointed to the documents pertaining to the ONC, which have recently been augmented by the publication of the Dependency Method report (Abbott *et al.* 2003). ONS has reviewed the need to improve international migration statistics (Walton 2003, ONS 2003j) and has already carried out revisions (ONS 2003e). ONS has reviewed its future plans for the development of population statistics (ONS 2003b, 2003c, 2003g, 2003h; Cook 2003a, 2003b, 2003c), which has led already to revisions to the ONC informed mid-2001 population estimates (ONS 2003i).

The key joint actions by the City of Westminster and ONS were to carry out an address matching exercise, commissioning a trusted third party (Manchester Geomatics) to see if there was evidence of missing addresses (Pullinger 2003b, ONS 2003a).

The key agreement was an undertaking by ONS to modify the MYE in the light of robustly identified missing residential addresses. It is important though to be clear what ONS have proposed. John Pullinger, Director, Economic and Social Reporting at the Office for National Statistics, writes in his letter of March 2003 to C.T. Wilson, Director of Legal and Administrative Services, City of Westminster:

'As I stated during our meeting on 21st March, once the matching exercise is complete we will look at this evidence along with all other evidence available to us and make a judgement on that basis. If we conclude that there is clear evidence that the Census has missed significant numbers of households, and that these have not been adequately accounted for by the One Number Census process, then we would be prepared to make an adjustment to the population estimates.' (Pullinger 2003b, p.2, para 3)

Note that ONS consider that adjustment of the ONC at this very late stage of output production is not feasible.

The Statistics Commission has responded to Westminster's concerns (Statistics Commission 2003a) by holding a series of meetings with the City of Westminster (Statistics Commission 2003b), with the Office for National Statistics (Rhind 2003, Statistics Commission 2003d, 2003e, Diamond 2003), with the Office of Deputy Prime Minister (Statistics Commission 2003c) and the Greater London Authority (Statistics Commission 2003f, 2003g, 2003h).

Context

The first results of the 2001 Census of Population were published by the Office for National Statistics on the 30 September 2002 along with the mid-2001 (30 June/1 July) populations of Local and Unitary Authorities in England and Wales. These results consisted of tables of counts by age and sex.

The results were a surprise in that they were considerably lower than the users of those statistics expected on the basis of the Mid-Year Population Estimate series from 1991 to 2000 grounded in the adjusted 1991 Census. The total population of the UK was 58,789 thousand (ONS 2002), whereas the pre-Census population estimates for mid-2000 had been 59,756 thousand with a one year national projection for mid-2001 of

59,987 thousand. The difference between the 2001 Census figure and the mid-2001 population was 1,198 thousand.

ONS, together with GROS and NISRA, adopted the 2001 Census as the base upon which to estimate the mid-2001 population of Local Authorities and Unitary Authorities. They revised the 1991 mid-year estimates back to a 1991 Census count base and away from the previous base of a rolled forward estimate based on the 1981 Census. The population estimate series was then revised between these census dates adjusting for the discrepancy in both the 1981-1991 decade (one third) and 1991-2001 decade (two-thirds).

The estimated population of every LA and UA in the country was changed, mainly downwards. The new population estimates are an important part of the method used by the Office of Deputy Prime Minister (ODPM) to allocate 75% of local government revenues that come from national taxation. The City of Westminster's population estimate in 2000 prior to the 2001 Census was 246 thousand, while its 2001 Census population was 181 thousand, 26% fewer. This had the potential consequence of reducing Westminster's local government annual allocation by around £60m. The reduction in allocation has been moderated by the floor mechanism used by the Office of the Deputy Prime Minister (ODPM), which resulted in a minimum increase of 3.5% for Financial Year 2002/3.

The City of Westminster was naturally extremely concerned about the decrease in its estimated 2001 population. Westminster Council officers and councillors took their concerns to the Office for National Statistics and have conducted a dialogue with the ONS, asking for an explanation of the decrease and a revision of the population estimate. The City of Westminster also approached the Statistics Commission in December 2002 and asked them to investigate their concerns with the ONS 2001 Census results and 2001 Mid-Year Population Estimates for Westminster.

The Statistics Commission requested both written documentation and oral evidence from the City of Westminster and the Office for National Statistics, and received documents and oral evidence from other parties, including the Greater London Authority, Manchester Geomatics, MORI polling/survey company and a group of academic experts commissioned by the City of Westminster to review the problem. Annex A lists the documents submitted in evidence and provided for this review. They include documents in the public domain and confidential transcripts and notes of meetings between the Statistics Commission and the parties

involved. Annex B provides a glossary of the numerous acronyms and technical terms used in the report.

Arguments by the City of Westminster

The principal arguments in favour of a *higher population estimate* for the Borough put forward by the City of Westminster are as follows (City of Westminster 2002, p1):

- their own estimate, based on Council Tax records and the Electoral Register, gives a figure of 231 thousand
- the Electoral Roll has increased by 26% since 1991
- the National Health Service (NHS) Patient Register count of patients has increased by 19%
- between 1991 and 2001 8 thousand new residential properties were built
- the number of domestic dwellings increased by 8.6% between 1991 and 2001
- the primary school roll has increased by 28% and the secondary school roll by 15%
- a survey-based estimate by MORI opinion polling organisation in late 2002, prepared for Westminster Council, produced a population estimate of 215 thousand.

Further, the City of Westminster identified *specific features of their borough's treatment in the 2001 Census* which meant that the population was not properly counted:

- ONS failed to devote sufficient resources to administering the 2001 Census in the Borough which has large numbers of houses in multiple occupation, hostels, hotels, gated buildings or buildings with a concierge, asylum seekers and student halls of residence
- as a result, many residential addresses were omitted from the 2001 Census with one estate being completely missed, one MP's residence being missed and instances and enumerators failing to list fully all residential addresses in enumeration districts
- the allowance for dependence in the ONS One Number Census (ONC) methodology was too low for the Central London Estimation Area, and alternative allowances would have led to higher estimates (Hobcraft *et al.* 2003, p.8)
- Westminster's reduction in population from expectation was so extreme that it would not be expected statistically (MORI report). Westminster had expected a Census

population within ± 5 percent of 245 thousand (the old mid-2000 estimate) less the average reduction in the population (about 2%) in the ONC, say 5 thousand. This would have yielded, at a minimum, a population count for Westminster of about 228 thousand. The ONC number for Westminster was 181 thousand.

In addition, the City of Westminster contended the following about *ONS procedures*:

- ONS should not have abandoned its own figures, based on the International Passenger Survey, of immigration to Westminster
- ONS had failed to explain why young men were 'missing' from the 1991 and 2001 Censuses in such numbers in young adult ages
- ONS had not taken up offers by the City of Westminster of substantial help in the enumeration process by council staff (justified by the Borough's concentration of hard to enumerate areas and people).

Arguments by the Office for National Statistics

The Office for National Statistics has *addressed Westminster's concerns* by engagement with the City of Westminster either directly through correspondence or meetings or in evidence to the Statistics Commission responding to the points made by Westminster Council:

- ONS have used a large number of administrative records in the Quality Assurance process which compared the One Number Census with a plausible range of estimates based on these other records, including the previous set of mid-year estimates and patient registers (used by Westminster).
- ONS point out the Council Tax records do not necessarily provide a good basis for estimating the number of usual residents because in Westminster many homes are second homes and the occupants are usually resident elsewhere.
- School rolls do not necessarily reflect the population of children resident in the Borough when schools draw pupils from both inside and outside the borough.
- The survey based estimate by MORI assumed too high an average household size for imputed households as these are much more likely to be single person

households than responding households. There was a very high 95% confidence interval about the estimate of ± 60 thousand. The ONC figure fell within the MORI estimate range of 154 to 274 thousand.

ONS responded in some detail to the issues raised by Westminster Council about the *conduct of the census, the coverage survey and the One Number Census*:

- ONS admitted that there had been difficulties in recruiting census enumeration staff in Central London. They had welcomed Westminster's initiative to give council staff three days leave to undertake census officer or enumerator roles, and this suggestion had been widely used in London. ONS took the view that they could not accept Westminster's further offers of involvement in administering the census as this would lead to claims by other authorities of favoured treatment.
- ONS have agreed to fund, with the City of Westminster, an address matching exercise by Manchester Geomatics, which is currently proceeding. Address lists from a variety of sources are being compared with the census enumeration list to identify gaps. If evidence of missing residential addresses is firmly established, ONS have agreed to adjust the mid-year estimate population.
- ONS have explained and defended their innovative One Number Census procedures, designed by Professor Ian Diamond (then of Southampton University, now Chief Executive Economic and Social Research Council). They have provided, via the National Statistics website, large numbers of methodological papers including those of the Quality Assurance stage, in which ONC numbers by age and sex were checked against a range of plausible prior estimates. Note that these prior estimates were not used to adjust the ONC result.
- ONS contend that the ONC estimation methods could deal with outliers, when the response rate was low, through making an allowance for dependence.

ONS reviewed very critically, in the light of ONC results, *previous methods of post-census population estimation*:

- ONS now consider the International Passenger Survey (IPS) to be a flawed instrument for determining the LA destination of an immigrant, and a poor estimation

of emigration. Migrants are a small sample within a larger survey focussed on visitors/tourists. The coding of destination 'central to London' to Westminster exaggerated radically inflows to the Borough.

- ONS are carrying out a review of International Migration statistics which will be published soon. This review should examine the question of how many young men emigrated and how the sex ratio in the young adult ages is affected. Evidence from the censuses of overseas destinations is to be examined. [Note: review published September 2003]
- ONS contend that they did welcome the Westminster leave for staff to enumerate but did not wish to extend LA involvement in order to maintain consistency of estimates across all LAs and UAs.

Strengths and weaknesses of the arguments and what we know about the problem at this stage

The arguments put forward by Westminster and ONS were reviewed by several different parties.

The City of Westminster commissioned three pieces of work:

- a technical paper by Roger Mortimore, Associate Director, MORI, entitled *The 2001 Census in the City of Westminster* (Mortimore 2002)
- a research study by MORI on *The Population of the City of Westminster* (MORI 2003)
- *An Interim Report of Independent Panel of Census Experts to Chief Executive, City of Westminster Council* by John Hobcraft and colleagues (Hobcraft *et al.* 2003).

The Greater London Authority contributed the following:

- extensive oral evidence to The Statistics Commission (Statistics Commission 2003f)
- GLA 2000 Round of Demographic Projections, as used in 'Towards the London Plan', which includes a variety of projections (Greater London Authority 2001).

Members of Parliament (Buck 2003, Flight 2003, Leigh 2003) have also commented on the conduct of the 2001 Census and the use of census populations in producing the 2001 Mid-Year and subsequent estimates.

It is useful to try to pick out some of the main points made in these additional reports, but in a generic fashion.

The administration of the 2001 Census

The Census organisations including ONS decided to use enumerator delivery of census forms and postback procedures for collection. These were tested out in the 1999 census rehearsal. Postback had been used by other national statistical offices with success. The cost savings were considerable and enabled ONS to concentrate enumerator staff in hard to enumerate areas. There were, however, operational problems, some of which might have been anticipated such as forms and envelopes oversize for the standard UK postbox and overload at the Royal Mail. However, ONS staff and enumerators made an enormous effort to get the job done and a 94% response rate was achieved (higher than anticipated).

With hindsight, it is possible to say that more local help should have been accepted from LAs with lots of hard to count populations. But this could only have been done with full prior agreement of all LAs, in order to maintain the level playing field of National Statistics.

The argument was also put forward that the Census Coverage Survey (CCS) should have been larger to cope with anticipated problems such as those that emerged in Westminster. Then LAs with hard to count areas could have had their own sample. But this is a conclusion from hindsight. The CCS was already the biggest ever household survey ever attempted in this country and the most successful in terms of response.

The ONC procedures of ONS and ONS consultation on the procedures

All parties were agreed:

- that the One Number Census procedures were necessary to handle the anticipated lack of response in the 2001 Census
- that the ONC was statistically robust as long as response rates were reasonably high
- that the matching exercise within the ONC had worked well
- that ONS had been correct to add a final dependence adjustment.

However, there were aspects which deserve some further explanation.

ONS has produced a large number of papers on the ONC and makes these available on the National Statistics website. They have also presented the methodology to census users, particular LAs, in a large number of meetings. This consultation built solid general understanding of the method, received some useful feedback and contributed to its widely perceived success. Even Westminster were supportive but, of course, felt that it had not coped well with their extreme situation. However, from the Westminster and GLA evidence it is clear that not everyone understands the details.

The Westminster Expert Panel report (Hobcraft et al. 2003) and the ONS's document *The Westminster: a Review of the Facts* (ONS 2003c) both present simple example computations of the data capture/recapture technique, while the MORI appendix to the City of Westminster's *Evaluation of the Accuracy and Reliability of the 2001 Census* quotes the standard formula used to derive the 100% population from the 2001 Census:

$$E = CS/M$$

where E = estimated total population, C = population counted in the Census, S = population counted in the Survey and M = population matched in the Census and Survey. The derivation of the Dual System Estimator from the Hypothesis of Independence is explained in Annex C. The Westminster results are reported in Table 1.

Table 1: Results from the Census and the Census Coverage Survey, Westminster, 2001

		Coverage Survey		
		Counted	Missed	Totals
Census	Counted	2478	858	3336
	Missed	814	(266.5)	(1080.5)
	Totals	3292	(1124.5)	(4416.5)

Source: ONS (2003) *The Westminster Report: a Review of the Facts*, p.13.

Note: The figures not in brackets are observed counts. The bracketed figures are computed figures.

Now these figures are not simply the result of the application of the Dual System Estimator: $M=2478$, $C=3336$ and $S=3292$, because $E = (3336)(3292) / 2478 = 4431.8$ and the hypothesis of independence yields a different result for the count of persons missing in both Census and Survey. That calculation is $(1124.5/4416.5) \times (1080.5/4416.5)$ which yields 275.1. There are several reasons for the difference: (1) the DSE is applied to sample postcodes and aggregated to the Estimation Area, (2) the DSE is applied to age-sex groups, (3) the DSE is applied to the Estimation Area not the individual LA, which is connected via a regression model and (4) a dependency adjustment is made, which takes into account differing response at the LA level. The Final Draft of the report on dependency adjustment

has just been released (Abbott, Brown and Diamond 2003) and is under review by the Statistics Commission.

The main point to make from this discussion is that it is probably essential for the ONC team in the Office for National Statistics set out all of the algebra and arithmetic of the DSE and dependency computation for the City of Westminster LA in a completely transparent way. The chain of arithmetic calculation needs to be seen in its entirety. Now most users will find such an account challenging but statistically experienced LA officers should be able to follow the logic and check it using a spreadsheet and relevant supplied parameters. The ONC process is so important in providing the base for post 2001 MYE populations that such an extra step should be taken to ensure the trust in ONS's statistical estimates that Cook (2003c) rightly stresses is so vital.

Strengths and weaknesses of the various administrative data sources

There is a debate between Westminster and its experts on the one hand, and ONS and its staff on the other, as to the value of the administrative record indicators. Westminster argues that the chosen indicators show continuous growth through the 1991-2001 period. ONS argues that many of the indicators are prone to list inflation, mainly because removals from the lists lag behind additions.

ONS uses the following administrative sources or symptomatic indicators for Quality Assurance purposes, which are used to set up plausibility ranges for the 2001 ONC:

- previous mid-year estimates
- adjusted patient records
- child benefit records
- pensioner data
- schools Census data
- birth registrations
- extrapolated mid-year estimates.

Westminster uses the following as change indicators:

- original mid-year estimates (same as previous mid-year estimates)
- patient registers (same as adjusted patient records)
- electoral rolls
- Council Tax returns.

Let us review the arguments for the common indicators.

Previous/original MYEs

Westminster argues for retention of these, of course. But ONS had to revise the 1981-2001 MYE series as a result of the 2001 Census. That is one of the key purposes of a census – a reality check on population estimates. The Quality Assurance process led ONS to review and revise the 1991 MYEs because of the shortfalls in the 30-34 and 35-39 age groups for men, which had been inflated upwards in the 1991 estimates to agree with the national 1991 MYEs rolled forward from the 1981 Census.

Patient records/registers

The biases of NHS records are well known and include ‘driftwood’, the failure to remove migrants, ‘dead-wood’, people with duplicate records and ‘ghosts’, people who have died without being removed from the lists. All parties acknowledge these problems. However, there has been a programme by health authorities to clean their lists (because of financial distortions in GP payments) and Register accuracy improved over the 1990s. ONS reviewed this improvement prior to changing to a radically improved method of measuring internal migration. The 1997-98 review concluded, however, that the registration counts were not good enough yet to rely upon for population counts (Scott and Kilbey 1999). The relationship between the patient register count and the population count differs from place to place: Westminster houses a military population catered for by the Army Medical Service, adjusted for by ONS in their Quality Assurance procedures, and is likely to house a small minority of residents who use private medical services.

Council Tax records

Westminster argues that the council counts residential properties accurately and makes reasonable estimates of the average household size. A population estimate by Westminster City Council based on the dwelling count (occupied residences) for 2001 is 231,162. The MORI survey, which sought a complete enumeration of selected postcodes, produces a population estimate of 214,605 with a 95% confidence band of 154,383 to 274,827.

ONS points out that the MORI method assumes too high an average household size for non-responding households. The likelihood of single member households being missed is much higher than multi-member households.

ONS also argue that not all the dwellings in Westminster contain usually resident households. Many households will occupy more than one residence (first home, second home). Westminster contains a much higher than average proportion of second homes. Table KS016 from the 2001 Census Key Statistics for Local Authorities records that 3.2% of household spaces in England and Wales are vacant and 0.7% are second residences or holiday accommodation. In Westminster the corresponding percentages are 6.5% and 4.6%.

ONS (2003h) have recognised in the document *A Demographic Statistics Service for the 21st Century* (pp. 19-21) that there are a variety of population bases/definitions suited to different purposes, such as delivery of services to all persons spending residence time in an area. Development of core population estimates based on a small, manageable set of different definitions is planned. Council Tax records might provide inputs to one of these alternative definitions but should not be used, themselves, to estimate usual residents as defined in the mid-year estimates.

The electoral register/roll (ER)

Again both parties recognise the difficulties in using the ER as a population surrogate. Westminster argues strongly for its use. ONS did not employ it in their QA. The reason was that the ER is very variable across LAs in coverage of eligible populations also vary.

Westminster argue that it is still an important indicator of change and show how it has grown over the 1990s (City of Westminster, 2002, Figure 2.1). The Parliamentary electorate grew by approximately 10 thousand over the 1991-2001 decade.

It is difficult to judge the merit of the respective arguments without a much deeper study of the relationship between the ERs and MYEs across the country. In 1995 citizens of EU countries (other than the UK) resident in the UK became eligible to vote in local and European elections and were added to the Electoral Registers. A proper comparison would need to look at the ER estimating the numbers involved.

The immigration issue

One of the justifications for the ONS revision of the 1991-2001 population estimate series was concern that the volume of immigration to the Borough had been consistently over-estimated. This view was strongly supported by the evidence presented by the Greater London Authority (Data Management and Analysis), who had taken the view that the

OPCS/ONS estimates for Westminster based on demographic roll forward were consistently ahead of a housing capacity adjusted, multistate, cohort-component projection.

Immigrants to Westminster were probably over-estimated for two main reasons:

- The International Passenger Survey recorded a large number of intentions to migrate to central London, many of which were assigned to Westminster. The probability was that the knowledge of these migrants of the geography of London was vague and their actual destinations were much more widely spread.
- The method for assigning Asylum Seekers and Visitor Switchers (ASVS) to London as a whole and to London Boroughs was flimsy. The Home Office estimates that an arbitrary 85% of ASVS migrants have London destinations on slim precise evidence. Country of birth data from the 1991 Census for the main ASVS countries is then used to distribute this 85% to individual London boroughs.

The GLA has carried out a number of London borough projections from 1991 to 2001. The migration base of these projections is information on internal migration and immigration from the 1991 Census. Emigration was estimated by applying internal migration out-migration rates to resident populations and constraining these to gross emigration counts from the IPS. These inputs coupled with vital statistics over the decade and a housing capacity constraint produced projections closer to the ONC figure than any City of Westminster estimate (see Table 2 below). These projections slightly modified (Scenario 8.1) are the ones that the GLA consider provided the best estimate of Westminster’s population prior to the 2001 Census and the ONC. Using revised 1991 MYEs would lower the population estimates for 2001 closer to the ONC number.

Table 2: Selected populations for the City of Westminster from the GLA 2000 round projections

Projection	1991	1996	2001
1B –using LPAC Housing Capacity Guidelines	187.7	203.8	212.8
2 – using 1993-98 migration trends after 1999	187.7	203.8	243.6
London Plan – Scenario 8.1	187.7	203.8	215.2

Recommendations

[These are the personal recommendations of Professor Rees to the Statistics Commission.]

The following recommendations are put forward for consideration by the Statistics Commission. They arise from the summary and evaluation of the arguments set out above and a review of all of the documents presented to the Commission.

1. Publish the body of evidence along with the Statistics Commission report

The Statistics Commission should assemble an edited set of all the materials in one coherent set of documents (less the confidential transcripts but including the summaries) in date order with permission of the parties as an archive of documents on the Statistics Commission website (in scanned PDF format). This evidence can be summarised in the Statistics Commission report with some editorial comments on the themes and arguments in each document, a revised version of this review and a set of summary recommendations by the Statistics Commission.

2. Encourage the parties to come to a sensible agreement on the results of the address matching exercise and how that might change the Westminster mid-year population estimate for 2001

The agreement of ONS to adjust the Westminster population estimate in the light of the address matching exercise should be supported. There is also likely to be a small revision as a result of the revision of the 2001 and 2002 mid-year population estimates announced in ONS (2003i).

3. Find that the ONC methods were statistically sound and fit for purpose

This conclusion will need to be confirmed by the additional consultancy on the ONC agreed by the Statistics Commission. In support of this conclusion, the following arguments can be advanced. The ONC was thoroughly researched at all stages. Statisticians outside ONS and users were consulted at every step. The volume of research papers produced and made available for scrutiny on the National Statistics website (<http://www.statistics.gov.uk>) is without precedent. In addition, the methods have been rigorously explained in a set of peer reviewed journal papers (Brown *et al.* 1999; Holt *et al.* 2001). In addition, Hennell (2003) has recently carried out an independent and rigorous review of the consistency of the explanations for the 2001 Census results and finds the ONS arguments on over-compensation for the undercount of young males in 1991 and on the underestimation of their emigration over the period 1981-2001 generally plausible.

4. Ask ONS to prepare a transparent account of the arithmetic of the Westminster ONC population

The principle of the ONC method is widely understood by most knowledgeable census users. The principle is that an estimate of the full population can be made if two estimators are available, as long as these estimators are independent. The details of its application to Estimation Areas and the imputation of adjustments to Local Authorities are probably less widely understood. Even ONS (2001) misses out crucial details that are needed to understand exactly what was done. The adjustment for dependency (where independence does not fully hold) have now been fully explained (Abbott *et al.* 2003) but probably not widely understood. There is therefore a need for ONS to prepare a simple but fully explicit account of how the ONC estimate was achieved for a local authority (e.g. Westminster), in which the complete of chain of arithmetic is set out.

5. Support the investigation of how alternative population bases can be estimated and used

Part of the Westminster problem results from the need to support a population active in the borough that does not match the usually resident (in principal or first home) definition used in the census. ONS (2003h) proposes a set of alternative measures, the feasibility of which should be investigated, in conjunction with potential users, ODPM, the LAs, the NHS, for example.

6. Urge that swift consideration be given to the improvement of international migration estimates

ONS have already put forward a number of possible measures that could be taken (ONS 2003h, p.28). The evaluation of these measures can be done quite swiftly. They include introduction of landing cards for all incomers and embarkees, a successful practice in many other countries. This would probably need legislation to enact. Prior to this being passed the Labour Force Survey and the proposed Integrated Household Survey could be extended to include questions on emigration (from households that continue to reside in the UK).

7. Support the proposals for the development of a national address register

ONS (Cook 2003c) proposes to develop, in collaboration with other parties (GROS, NISRA, OSGB, OSNI, Royal Mail, LGA, ODPM, NHS) a comprehensive Address Register, agreed as the national standard. This would build on existing registers and the collaborative project that has enhanced the national postcode directory (the All Fields Postcode Directory enhanced by the Gridlink Project). This address register will help improve the operation of national surveys or mid-term Censuses and prepare the ground for the creation later in the decade of a national population register, should Parliament approve the creation of such a valuable information resource.

8. Support a feasibility study into a mid-term (2006) Census for London or for selected hard to enumerate local authorities

Such a mid-term Census would enable ONS to test the viability of their new population estimates, their new international migration measures and the utility of the national address register, well in advance of the next decennial census in 2011.

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ANNEX A: DOCUMENTS SUBMITTED TO THE STATISTICS COMMISSION

The documents are listed in date order and source. In the References list above the document citations are sorted into normal author, date, title order for ease of reference.

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ANNEX B: GLOSSARY OF ABBREVIATIONS USED

ASVS	Asylum Seekers and Visitor Switchers Important immigrant stream into the country. Visitor switchers are person who enter the country as visitors but then apply to stay.
CCS	Census Coverage Survey Large household survey administered shortly after the 2001 Census in order to estimate missing households and individuals.
DSE	Dual System Estimator The technique that uses two estimators (the Census count and Census Coverage Survey) to arrive at an estimate of the total population of the country at the time of the 2001 Census.
ER	Electoral Register A list of all persons who have the right to vote in one or more types of elections. It was traditionally a count in mid-October of each year (published the following mid-February) but now electors who have moved can register between the annual electoral enumerations.
ESRC	Economic and Social Research Council Funds social science research and postgraduate training in UK universities and recognized research institutions.
GLA	Greater London Authority The upper tier Local Government Authority for London. It has a team of experts who conduct demographic research on behalf of the GLA and London Boroughs.
GROS	General Register Office Scotland The government agency responsible for the population census and demographic statistics in Scotland. Collaborates closely with ONS and NISRA in the conduct and processing of the census of population.
IPS	International Passenger Survey A sample survey of incoming and outgoing passengers at the UK's principal airports and seaports. The survey contains a question about migration intention and destination (area within the country for immigrants or country abroad for emigrants).
LA	Local Authority The general term for unit of Local Government. The exact title and functions of LAs differ from one part of the country to another. For details, see "A Beginners' Guide to UK Geography" on the ONS website (http://www.statistics.gov.uk/).
LGA	Local Government Association The organisation that represents the interests of local government.
MORI	Market Opinion Research International One of the UK's largest market research and consultancy firms.
MYE	Mid-Year Estimate The estimated population of a territorial unit at midnight on 30 June/1 July.
NHS	National Health Service

The public body providing health care for most of the UK's population.

- NISRA** **Northern Ireland Statistics and Research Agency**
The government agency responsible for the population census and demographic statistics in Northern Ireland. Collaborates closely with ONS and GROS in the conduct and processing of the census of population.
- ODPM** **Office of the Deputy Prime Minister**
The central government department responsible for local government in England and Wales that allocates to Local Authorities the central government grant for support of local services and functions. The MYE is a very important component in the resource allocation formula used to distribute this multi-billion pound grant.
- ONC** **One Number Census**
The procedures used to produce a robust estimate of the census population and constituent households and individuals. The procedures are necessary because of the rising level of non-response in the decennial census.
- ONS** **Office for National Statistics**
The government agency responsible for the population census and demographic statistics in England and Wales. Collaborates closely with GROS and NISRA in the conduct and processing of the census of population. It also has responsibility for the quality assurance and co-ordination of national statistics for the whole UK and in reporting those statistics to national and international agencies.
- OPCS** **Office of Population Censuses and Surveys**
The government agency formerly responsible for the population census and demographic statistics in England and Wales. It was amalgamated with the Central Statistical Office in 1996 to form the Office for National Statistics.
- PAF** **Post Office Address File**
The database of addresses used by the Post Office/Royal Mail for delivery of mail to residences, organisations and businesses. Published quarterly and used widely by government agencies, local authorities and academic researchers.
- QA** **Quality Assurance**
The procedures for checking the validity of population statistics (e.g. from the ONC).
- UA** **Unitary Authority**
One of the categories of Local Government units.
- UK** **United Kingdom of Great Britain and Northern Ireland**
The full name of the country.

ANNEX C: DERIVATION OF THE DUAL SYSTEM (DSE) ESTIMATOR

The DSE formula is derived from the hypothesis of independence in probability theory. We first develop a notation to represent the estimation problem. Table 1 defines the variables.

Table 1: A notation for counts from the full Census and the Census Coverage Survey

<i>Census</i>	<i>Census Coverage Survey</i>		Totals
	Counted S	Not Counted s	
Counted C	N(C,S)	N(C,s)	N(C)
Not Counted c	N(c,S)	N(c,s)	N(c)
Totals	N(S)	N(s)	N(T)

The variables and subscripts in the table are defined as follows:

N = number of people

C = counted in the Census Enumeration

c = not counted (missed) in the Census Enumeration

S = counted in the Census Coverage Survey

s = not counted (missed) in Census Coverage Survey

T = total

The accounting relationships for the row, column and grand totals embedded in the table are:

$$N(C) = N(C,S) + N(C, s)$$

$$N(c) = N(c,S) + N(c, C)$$

$$N(S) = N(C,S) + N(c, S)$$

$$N(s) = N(C,s) + N(c, s)$$

$$N(T) = N(C) + N(c) = N(S) + N(s)$$

The Hypothesis of Independence states that the joint probability of two events is the product of the probability of one event multiplied by the probability of the other event. Under the hypothesis of independence the joint probability of being missed in the census and in the census coverage survey is as follows:

$$P(c,s) = P(c) \times P(s) \tag{1}$$

where P = probability, P(c,s) is the joint probability of being missed in both census and survey, P(c) is the probability of being missed in the census and P(s) is the probability of being missed in the survey.

The number missed is therefore:

$$N(c,s) = P(c,s) \times N(T) = P(c) \times P(s) \times N(T) \quad (2)$$

The dual system estimator can be stated in this notation as:

$$N(T) = N(C) \times N(S) / N(C,S) \quad (3).$$

We need to derive equation (3) from equation (1).

It is easiest if we observe that the hypothesis of independence also means that we estimate the probability of being counted in both the Census and the Survey as:

$$P(C,S) = P(C) \times P(S) \quad (4)$$

and that:

$$N(C,S) = P(C,S) \times N(T) \quad (5).$$

Substituting the RH side of equation (4) for P(C,S) in equation (5), we obtain

$$N(C,S) = P(C) \times P(S) \times N(T) \quad (6).$$

We define the probability of being counted in the Census as:

$$P(C) = N(C)/N(T) \quad (7)$$

and the probability of being counted in the Survey as:

$$P(S) = N(S)/N(T) \quad (8)$$

so that the estimate of the number counted in both Census and Survey is:

$$N(C,S) = [N(C)/N(T)] \times [N(S)/N(T)] \times N(T) \quad (9).$$

Cancel N(T) on the right hand side, multiply both sides by N(T) and divide both sides by N(C,S). This yields

$$N(T) = N(C) \times N(S) / N(C,S) \quad (10).$$

This is the Dual System Estimator for the total population of interest.

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PAPER 3

REPORTS AND EVIDENCE CONSIDERED BY THE STATISTICS COMMISSION

Summarised below, in chronological order, are the main reports and evidence considered by the Commission. This paper does not list more general correspondence, documents or informal discussions.

Reports

Greater London Assembly, *Towards the London Plan*. 2001. 21p.

The GLA produces forecasts for individual London boroughs as well as Greater London as a whole. The forecasts for Greater London are bottom-up, ie there is no constraint on total. Figures in this report were completed by the GLA in July 2000, and were quoted in *Towards the London Plan*.

1991 Census data are central to the projections but a variety of other London data have been used. The population model in use was similar to the ONS one though there is no constraint to a previously prepared forecast.

Three different methodologies were used:

Projection 1B – using London Planning Advisory Committee (LPAC) guidelines:

These projections are based upon estimated net migration for 1991-96, and thereafter use dwelling stock figures. 2001 population in Westminster was estimated as **212,800**.

Projection 2 – Migration Trend

Projection is initially constrained by mid-year estimate net migration for the period 1991-98. An estimate of migration using various sources was made for 1998-1999. Thereafter, the average migration characteristics are assumed. 2001 population in Westminster was estimated as **243,600**.

Scenario 8.1

Projection 1B was felt to produce a reasonable overall figure for London but it was felt that estimates of migration into the Central London boroughs were too high. This is essentially Projection 1B with a projection more based on the predicted availability of housing. 2001 population in Westminster was estimated as **215, 200**.

Westminster City Council, *Evaluation of Accuracy and Reliability of 2001 Census*. November 2002. 44p. Available at:

<http://www.westminster.gov.uk/citygovernment/urbancommunities/loader.cfm?url=/commonspot/security/getfile.cfm&PageID=15846>

This report presents a range of administrative and other data relating to the population of Westminster and argues that this evidence indicates that the Census estimate is too low. It also contains a technical commentary by the market research company MORI on the ONC approach in Westminster.

Key points are:

- Westminster estimates its resident population to be **231,200**. This calculation is based mainly on information from the council tax register and electoral roll. This approach requires various assumptions to be made including an assumption about the size of households not on the electoral roll but for which there is a property on the council tax list.
- The boroughs surrounding Westminster have experienced considerable population growth since 1991 yet Westminster has experienced a decline according to the official figures from ONS.
- A number of indicators (including electoral roll, patient register, school rolls, number of domestic dwellings) all indicate steady growth from 1991 onwards.

Several reasons are cited as to why the ONS estimate might be different from Westminster's own. Firstly, there are suspicions of fieldwork problems in the Census based on reports that whole areas of the borough have been missed. Secondly, for Census purposes, Westminster is grouped with Camden and Kensington and Chelsea, and it is felt by Westminster that these boroughs are different from Westminster, and that the use of parameters averaged over the different areas could be misleading.

The MORI section of the report focuses on claimed inadequacies in the Census methodology, particularly problems in counting students. It makes some comparison of address lists and points out possible defects in the AddressPoint file of addresses used by ONS. MORI postulates several hypotheses for possible Census undercount and suggest a range of questions for ONS.

MORI, *The population of the City of Westminster: Executive summary*.

14 January 2003. 11p.

This study was conducted by MORI on behalf of Westminster City Council. Its aim was to measure the population of Westminster by means of a sample survey.

The method involved selecting a random sample of 81 postcodes, and aimed to collect population information on everyone in the sample postcode areas. Apart from personal interviews, information was collected by self-completion questionnaires, phone and intercom as well as from neighbours. Fieldwork took place over two months, 6 November 2002 to 5 January 2003, and a minimum of six calls were made to each address. Full information was obtained from 60% of addresses, partial information from 13%, with information on the remainder being imputed. The imputation was based on using average household size of occupied properties in the same postcode. The study produced an estimate of the population of **214,605** with a large confidence interval around that figure.

Hobcraft, J. Champion, T., Hepple, L. and King, D., *Interim Report of Independent Panel of Census Experts to Chief Executive, City of Westminster Council*. April 2003. 18p.

Westminster invited a panel of four academic experts to look at the issues independently. The report concludes that there is a *prima facie* case that the ONC estimate is too low. They do not suggest an alternative figure. Their case for not accepting the ONC estimate mainly rests on the following grounds:

- the symptomatic indicators of population available – patient registers, school censuses, benefit/pension records, electoral rolls and council tax records – all show different patterns over time that were at odds with those of the revised population estimates
- the rejection of the previous MYE for 2000 requires a fuller explanation
- the panel had compared the Quality Assurance data for Westminster with other LAs, and showed that Westminster was the most extreme outlier for England and Wales. They felt that the rejection of the QA evidence was not satisfactorily explained
- the panel had seen evidence from Westminster that suggested significant undercounting in the north of the borough.

They do calculate estimates of population based upon applying the increases in the symptomatic indicators of population change to the 1991 population figure, though they do not advocate a particular number. They believe that the results of the matching exercise will be needed before an estimate can be made though they believe that this will require careful consideration.

Office for National Statistics, *The Westminster report: a review of the facts*. **May 2003, minor revision August 2003. 51p.** [The report was put on the ONS website on 9 October. The MORI report on the 2001 Census for Westminster and the ONS response to the MORI Report are included as Annex D. Available at: <http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=10738>.]

ONS produced this report to address the criticisms that had been made. It contains some detailed information on the Census in Westminster as well as relevant data relating to Greater London. The main points are:

- ONS have taken various steps, for example smaller workloads for enumerators in recognition of potential enumeration problems.
- The ONC approach is a very well researched approach designed to cope with lower than expected response rates.
- The Quality Assurance programme was rigorous, and was subject to external observation.
- The size of the difference between the Census estimate, and the 2000 mid-year estimate is surprising but this discrepancy is ascribed to three factors: 1991 base was too high, difficulties in estimating migration, over-estimation of proportion of new migrants staying in the Westminster.
- The MORI survey is challenged on several grounds, including household definition and assumptions made on size of non-interviewed households.
- The report gives some detailed reasons, based on general observations, as to why the administrative sources used by Westminster to demonstrate population growth could not be relied upon.
- The report sets out the revised mid-year estimates. These show a dip from 1991 to 1995 with a rise onwards from that date. As there was a relatively steady excess of births over deaths each year, the trend reflects changes in net migration.
- The report seeks to refute the suggestion that Westminster was an extreme outlier by reworking the diagnostic ranges on the basis of the revised mid-year estimates. This analysis does then show that Westminster population is on a par with surrounding boroughs in terms of its relationship with the diagnostic ranges, but it should be noted that the reworked diagnostic ranges were not derived independently.

House of Commons: ODPM: Housing, Planning, Local Government and the Regions Committee, *Reducing Regional Disparities in Prosperity, Volume I: Report*. 4 July 2003. 9p. Available at:
<http://www.publications.parliament.uk/pa/cm200203/cmselect/cmodpm/492/492.pdf>

The report's emphasis is on the provision of regional economic data but the Census was considered because of the need for accurate population data. The committee had five recommendations relating to the Census which are given below:

- There is an urgent need to improve the alignment between different sources of population data. We recommend that in the small number of authorities where there remains a problem between the Council and ONS about the size of the population, following the 2001 Census, a data matching exercise should be undertaken by an

independent third party. This should be completed in time to feed in to next year's. Local Government Finance settlement and ONS should be bound by the result.

- 'It is astonishing that the Office of National Statistics does not know how many Census forms were delivered and it was naïve not to have subjected the system to thorough testing. Data on the number of follow-up visits by enumerators should also be centrally held.
- 'The ONS assumes that people know that the Census is based on usual residency rather than where they were on the night. This ignores years of custom and practice and unrealistically supposes that everyone reads their Census form in great detail before completing it. Specific attention needs to be drawn to this issue when the next Census is promoted.
- 'If inaccuracies are shown to have occurred in the 2001 Census, ODPM should revisit the Local Government Finance Settlement for 2003/04 so that no council loses out as a result of a badly run Census
- 'Clear and accurate information is essential for democratic decisions. Rebuilding confidence in the Office for National Statistics will be a long, slow process. Clear leadership and drive is now needed at the top of the ONS to restore confidence in it.'

Redfern,P., *An alternative view of the 2001 Census and future census-taking. (Plus transcript of discussion).* Paper presented before the Royal Statistical Society on 9 July 2003. Paper 16p. Transcript 28p. Paper available at: <http://www.rss.org.uk/publications/docs/090703a.pdf>. Transcript not yet available on the Web.

The paper's main thesis is that the 2001 Census results understate the number of young men, and that the claim that the shortfall is due to emigration cannot be substantiated. This conclusion is based on demographic analysis of sex ratios, plus an analysis of a sample of Welsh local authorities. The paper also comments on the definition of residency and proposals for a population register.

In the discussion, the National Statistician refuted the idea that ONS had abandoned demographic analysis, and said that a fuller analysis of the Welsh authorities gave a different picture.

Finance and Support Services Overview and Scrutiny Committee, Westminster City Council, *The 2001 Census in the City of Westminster.*
August 2003. 30p.

The report follows a special meeting organised by the committee on 15 April 2003 at which a number of witnesses gave evidence. It presents previous material in a relatively non-technical form. Its key conclusions are:

- Westminster's diverse population/property base made it a difficult area to count
- fieldwork problems impacted severely on the accuracy of the Census

- the quality assurance process was highly questionable in Westminster
- ONS only agreed to participate in further investigation after pressure from the City Council.

The report states that the committee will re-examine the Census issue once the results of the matching exercise are known. It will consider the need for an application under the Census Act for a rerun of the Census if the matching exercise demonstrates that the original Census count was understated and the ONS subsequently failed to amend Westminster's population.

Office for National Statistics, *Detailed Consideration of Report of Hobcraft et al.* August 2003. 6p.

The report is an annex to a letter from the National Statistician to the leader of Westminster City Council. He addresses specific points raised in the Hobcraft report (*see Hobcraft et al, Interim Report of Independent Panel of Census Experts to Chief Executive, City of Westminster Council*):

- **Census and CCS fieldwork:** problems in fieldwork are catered for by the fact that a larger than average adjustment was made
- **Quality Assurance process:** a detailed report of the quality assurance process is being prepared by ONS which will contain specific information on why the results for some local authorities are accepted despite falling outside the diagnostic ranges
- **Mid-year estimates:** it is standard practice to revise MYEs after a Census. The panel had criticised the use of the cohort method for making revisions but this is defended as an approach that had been approved by methodological experts
- **Symptomatic indicators:** ONS states that the three comparators used by Westminster show little growth or show slow growth until the middle of the decade, which ties in with the trend in the revised Westminster estimates
- **Migration:** the report announced a migration statistics review [Note: review published September 2003]
- **Dependency adjustment:** criticisms are said to be answered in the second dependency paper.

The report concludes that the Hobcraft report does not provide an analytical basis for concluding that there has been an undercount in Westminster. ONS does however indicate its willingness to revise estimates that it judges to be inaccurate once subsequent analyses become available.

Abbott, O., Brown, J. and Diamond, I., *Dependence in the 2001 One Number Census Project.* September 2003 (unpublished draft). 20p. [Revised and superseded version of a paper original published in December 2002, which is available at: http://www.statistics.gov.uk/census2001/pdfs/dependency_paper.pdf]

The report discusses in detailed technical terms the issues of dependence and testing of independence between the Census enumeration and the CCS. It also sets out the dependency adjustments made for each individual local authority area. Information from the two versions of the report form the basis for Paper 1 in the Statistics Commission report.

Ludi Simpson, Centre for Census and Survey Research, John Hobcraft, London School of Economics, Dave King, Anglia Polytechnic University, *One Number Census and its quality assurance: a review.* Research briefing 6.03.

Produced on behalf of the Local Government Association (LGA). September 2003. 35p.

Available at:

<http://www.lga.gov.uk/Documents/Publication/onumbercensus.pdf>

In February 2003, the LGA circulated to all local authorities in England and Wales a series of questions about concerns relating to the 2001 Census. Of the 62 responses received, the majority expressed concerns; 18 authorities said they had approached ONS with concerns about estimates for their areas. In the light of these concerns, the LGA commissioned the review, which was largely completed in April 2003 so does not cater for developments since then.

The review recommends that local authorities should use the detailed Census results as published but notes that the concerns expressed demonstrate a lack of confidence in the ONC and its quality assurance procedures. It makes the following recommendations:

- the evidence and expert judgments involved in the quality assurance of the ONC should be supported with published analyses
- issues of enumeration that make population sizes hard to estimate should be tackled in an open and scientific manner
- more use to be made of key administrative sources to measure the population
- developments in population statistics need to maintain confidence of users
- information learnt by ONS in particular on comparator datasets needs to be disseminated
- population definitions need to be reviewed and agreed.

Of particular relevance were comments in the report on the dependency adjustment where a number of questions were raised ranging from the claim that there was a lack of evidence for statistical independence between the Census and the CCS through to comments on poor quality of explanation. The view was expressed that the overall adjustment for dependency may be too low.

The Census quality assurance programme was criticised on the grounds that the comparator data were invariably rejected when the ONC estimates fell outside the diagnostic ranges.

Evidence from meetings

The following table lists the meetings that the Statistics Commission held with interested parties. Information on the key points discussed is given below the table.

Date	Organisation	Representatives	Documentation produced
2/05/03	Westminster City Council	Peter Rogers, Chief Executive Stephen Fitzgerald, Financial Consultant Nick McManus, Council Lead on Census matters Andrew Harvey, Councillor	Transcript
13/05/03	Office of the Deputy Prime Minister (ODPM)	The Rt. Hon Nick Raynsford, Minister for Local Government and the Regions Peter Capell, Head of Profession for Statistics Anna Wojtowicz, Private Secretary to the Minister	Note of meeting
13/05/03	Office for National Statistics	John Pullinger, Director, Economic & Social Reporting Directorate Lucy Baker, Senior Research Officer, Census Information Team	Transcript
12/06/03	Office for National Statistics	Professor Ian Diamond, Chief Executive ESRC (attending because of his role in 2001 Census) John Pullinger, Director, Economic & Social Reporting Directorate, ONS	Transcript Slide presentation
22/07/03	Greater London Authority	Rob Lewis, Head of Data Management and Analysis John Hollis, Demographic Consultant, Data Management and Analysis	Transcript Note of meeting

The following key points were taken from the meetings.

Westminster City Council

- The Mid-Year Estimate prior to the Census was regarded by Westminster as reasonable within 5-8%, so the Census estimate was completely unexpected. There was increasing pressure on resources – housing, schools, social services.

- Westminster flagged up concerns over fieldwork and offered ONS help but this was rejected.
- In some wards Westminster recorded more council housing than ONS had in total for ward.
- Westminster data failed the QA process more than figures for any other area. Westminster felt that ONS disregarded data without giving adequate reasons.
- Westminster had set up panel of experts to review the position.
- Ten years is too long to calibrate data. Administrative data should be utilised.

Office for National Statistics

- 1991 Census: several releases of the data had undermined confidence. There had been a small post-enumeration survey and a broad brush approach to adjusting for under-enumeration.
- Mid-year estimates had been effectively rolled forward from 1981 Census.
- In 1990s ONS had moved to using the NHS register to measure internal migration.
- ONS had relied heavily on the International Passenger Survey to measure migration into the country and had been slow to pick up that when respondents had said 'Central London' this may well have been only an initial destination.
- There had been limited concerns about the mid-year estimates prior to the Census release. No one had written in formally though the GLA had produced a lower forecast.
- There had been particular problems in recruiting field staff in London. Westminster had offered help but this has been rejected because of concerns about fairness and the effect on reliability of the CCS.
- The Census had followed through the strategy of the Census White Paper.
- The Quality Assessment Panel had up to 12 quality assurance meetings about Central London.
- Allocation of resources for fieldwork had been based on the 'hard to count' index. Ratio of field staff was 2:1 between hard and easy areas. With the benefit of hindsight, perhaps this should have been 10:1.
- They had discussed with GLA the possibility of undertaking a data collection exercise between Censuses.

In the subsequent discussions with Professor Ian Diamond:

- Judgement was used in making adjustment to 1991 Census results for under-enumeration. ONS now accepts that 1991 basepoint was wrong. Demographic analysis had not been rejected but more weight was now being given to 2001 Census results.
- Much work had been put into the Quality Assurance programme. There had been much consultation. It included qualitative data.
- In calculating the dependency adjustment, it was felt that ONS's alternative estimate of the number of households had an upwards bias. A judgement was made not to reduce the Census estimate when the alternative estimate was less than the Census estimate.

- The pattern of a shortfall in younger males was exhibited in 80% of estimation areas. The lesser shortfall in 35-39 old males was believable because experience has shown that by that age they tended to complete Census forms.
- The decline in Westminster's mid-year estimates in the early 1990s was consistent with population decline in surrounding boroughs.

Office of the Deputy Prime Minister

- Census data was very important. It was used extensively in the allocation of £44 billion of public funds.
- ODPM had not specified a level of accuracy required from the results.
- The Census estimates and resulting mid-year estimates had considerable impact on ODPM work.
- ODPM recognised the need for a mini-calibration between Censuses.

Greater London Assembly

- They suggested that prior to the Census results, estimates of international migration were producing figures for some London boroughs that were too high.
- Planning for the 2001 Census had been good.
- Conduct of the Census was as planned though the poor pay of field staff could have affected quality of the enumeration.
- The reduction in the mid-year estimate for Westminster looked to be too large.
- GLA was in contact with ONS regarding the possibility of a mid-term Census.

Statistics Commission
October 2003