

2001 Census Disclosure Control in England and Wales

Alternative Options

Summary

1. The Population Census is the central element of the system of population and demographic statistics in the United Kingdom, by which we measure and understand population change, and can project the future form and size of the key groups in the UK population. The Census is our most significant source of information about people in small areas, and in communities that are too small, or too disparate to measure by other means. Over the past century, the Census has played an increasing part as a source of social and economic statistics about small communities, complementing the national surveys and studies we obtain through social surveys. The Census, through its place in population statistics, is the benchmark for validating a great variety of government and commercial surveys of households, and enabling their results to be nationally representative. It is the Census that provides the benchmark for critical democratic processes such as electoral boundary setting, and which helps us validate other aspects of the electoral process, such as registration. We constantly strive for near perfect compliance by the public in the Census, above all other public activities.
2. Protecting the confidentiality of details about individual people becomes less simple with each Census, as the amount of accessible and publicly available information about individuals has increased. We also know of more information that can be matched statistically with the Census, and electoral rolls are now more widely used in electronic form. Alongside this, for the 2001 Census, we are releasing a larger range of small area statistics, notably because we no longer obtain any key measures from just 10 per cent of the population. We plan to publish much more small area information from all public records over the next three years, with Neighbourhood Statistics.
3. We have a clear, well published goal:
...In releasing statistics from the Census, all possible steps will be taken to prevent the inadvertent disclosure of information about identifiable individuals and households.
4. Since the 1991 Census, the Internet has transformed the potential for making census results widely accessible to citizens. Changing attitudes to the trust in which public agencies are held and concerns about the importance of privacy of personal information also place new and more onerous demands on bodies responsible for protecting such information supplied in confidence. Analysis of the disclosure control issue has been carried out in this changing context and reflects the essential obligations on the Registrar General to:
 - (a) Ensure that census results are freely available and accessible to all and can effectively be used in combination with other information, such as Neighbourhood Statistics. The *2001 Census*

Output Prospectus <http://www.statistics.gov.uk/census2001/op.asp> that has been prepared in consultation with a wide range of users and representative groups sets out plans to make an unprecedented range and depth of census information available that is more comprehensive, more detailed and more accessible than ever before. The potential for further flexibly defined outputs and outputs that link to other information to create an even richer understanding of the society in which we live is significant.

(b) Guarantee the confidentiality of information supplied by citizens on their census form. The Registrar General considers that to meet this obligation as placed in the census legislation it should not be possible for someone to recognise their own information or information about someone they know from census outputs with sufficient confidence that they would be prepared to act on that information as though it were true.

5. Given the operational imperatives associated with an operation of the size and complexity of the Census, the only feasible solutions to counter the risks to confidentiality are those that do not put any timing pressure on processing, and are consistent with ONS' current output systems. This restricts ONS to methods related to adjustment of the post tabulated data.

6. The steps to achieve this have been more iterative over the last year than desirable, and have continued a position of uncertainty that slows the capacity of users to plan ahead. We have had Advisory Group Papers AG(01) 08 and AG(01)06 explaining ONS plans for rounding all Census output to either a zero or multiple of 3. These generated strong responses, among which was a meeting - recorded in Advisory Group Paper AG(02)(01) - of user representatives with the Registrar General for England and Wales and other ONS officials on 13 December 2001. The meeting discussed the impact of the decision, and concluded that ONS and user representatives would work together to produce a further paper to address the issues raised at the meeting and elsewhere. In the light of the views expressed and other comments made to the Registrar General, ONS has looked to alternatives that give the same confidentiality protection as that which resulted from the decisions taken last Autumn.

7. Advisory Group Paper AG(02)02 announced that ONS was actively researching whether an alternative method to the rounding to base 3 method that had been previously proposed could be implemented, which would address some of the major concerns that have been expressed by users. The method being researched was one whereby only small counts are adjusted, in association with a change in the mix of other methods that are also applied.

8. In addition, AG(02)(02) announced that in the light of the decision to raise the population thresholds for the smallest output geography to 100 persons and 40 households, ONS would provide summary counts and percentages for those civil parishes (England), communities (Wales) and other administrative areas with populations below the 2001 Census threshold but above the 1991 threshold. Such summary output would be a subset of the proposed Key Statistics (see <http://www.statistics.gov.uk/census2001/op.asp>).

9. This paper brings together information on two alternative approaches to achieving the required confidentiality protection in the census outputs - Option 1: the rounding to base three method, and Option 2: the small cell adjustment method. Both are operationally feasible. They have different advantages and disadvantages from the user perspective. Annexes A and B respectively provide information about the Options 1 and 2. These include examples of tables that have been adjusted by each method. Annex C provides details of the other disclosure control measures to be

adopted for the 2001 Census output in England and Wales, which will be applied along with either Option 1 or 2.

10. It should be noted that the disclosure control measures to be applied to anonymised microdata (Samples of Anonymised Records) are subject to a separate assessment.

11. **Comments are invited by 31 May. In particular, ONS is seeking recipients views on:**

- **which adjustment method users see as preferable:**
 - **Option 1: rounding of all counts to base three; or**
 - **Option 2: small cell adjustment; and**
- **which information is needed for sub-threshold civil parishes (England), communities (Wales) and administrative areas.**

Please send comments to:

Census Advisory Group Secretary
ONS
Room 4300W
Segensworth Road
Titchfield
Fareham
Hampshire
PO15 5RR

Fax: 01329 813189
E-mail: cag.secretary@ons.gov.uk

12. ONS expects to announce the final adjustment approach in June.

Public assurances about confidentiality of Census information

13. The Registrar General has a legal obligation not to reveal information collected in confidence in the Census about individual people and households, and has given public assurances about what this means in practice. In presenting very detailed results from the Census, protecting individual information is of key importance. Traditionally the confidentiality of Census output is protected by a combination of a variety of 'disclosure control' methods.

14. The general strategy for ensuring the statistical confidentiality of 2001 Census output was stated in the Government's March 1999 White Paper *The 2001 Census of Population* (Cm 4253) - see <http://www.statistics.gov.uk/census2001/pdfs/whitepap.pdf> :

... In releasing statistics from the Census, all possible steps will be taken to prevent the inadvertent disclosure of information about identifiable individuals and households...

15. The White Paper goes on to say:

Precautions will be taken so that published tabulations and abstracts of statistical data do not reveal any information about identifiable individuals or households. Special precautions may apply particularly to statistical output for small areas. Measures to ensure disclosure control will include some, or all, of the following procedures:

restricting the number of output categories into which a variable may be classified, such as aggregated age groups;

where the number of people or households in an area falls below a minimum threshold, the statistical output except for basic headcounts will be amalgamated with that for a sufficiently large enough neighbouring area; and/or

modifying the data before the statistics are released.

16. The initial approach considered by ONS for the protection of confidentiality in census outputs, revolved around record swapping. The view was that this swapping created a degree of uncertainty about the accuracy of any specific information apparently disclosed about individuals. If there was uncertainty about the accuracy of this information, then an argument might be made that disclosure had not occurred.

17. Before coming to a decision on its approach, ONS reviewed carefully the logic of its position, and in particular considered the following issues:

- *The distribution of potential disclosure risk.* A very low, but equal risk of disclosure across the whole population is very different from a having a near zero risk for a large part of the population but a very high risk for particular subgroups; analyses need to focus on the distribution of risk, not average levels as the ONS promise to protect confidentiality extends to all subgroups. We recognise errors in census results, as a result of timing differences, the speed of population change, response error and adjustments for missing persons. We can obtain good estimates of these effects on average, for the country as a whole, and for smaller areas. We cannot ignore the level of confidentiality protection needed to avoid disclosure in areas where there has been little population change since the census, where people who have responded quite fully, with near complete answers.
- *The high visibility of unusual cells.* Census outputs will be generally available to the public, over the Internet. This means that people at a very local level, with local

knowledge, will be able to examine tables with ease. Recognition by people of themselves, their neighbours, or other members of community groups would be facilitated by this very broad access.

- *The number of tables available for each population group.* In the 2001 Census there will be more tables at the fine geographic levels than ever before. For example, the Census Area Statistics alone will provide around a third more counts in total than was produced from the 1991 Small Area Statistics, and will cover all topics at 100 per cent this time around. This allows for a greater build up of information across tables for rarer subgroups of the population. For example, without any form of disclosure protection, information about a family with a unique ethnic background in an area, may be visible in terms of the specific ages of the individuals, their occupations, their religion, labour force status, or marital status.
- *The concept of disclosure.* It would be a simplification to assume that confidentiality has been protected as long as there is any degree of uncertainty about the accuracy of the information apparently disclosed about an individual. Disclosure might be considered to have occurred when a third party receives, and is reasonably confident about, information that can in fact be ascertained to be correct.

18. These issues, considered together, led ONS to judge that, if statistical counts were released to the extent and level of detail proposed, without any adjustment of the cell counts, it would be subjecting some more visible population subgroups to an avoidable risk of disclosure occurring. ONS would not be meeting its legal obligations to respondents in these subgroups.

19. ONS also noted that:

- the desire for geographical flexibility in the output - (that is, producing statistics for user specified areas) would have implications for disclosure, and some methods of assuring confidentiality would provide scope for greater geographic flexibility in outputs than other methods; and
- analyses of tables showed that using a threshold of 50 persons and/or 20 households - similar to that used in the 1991 Census - for releasing Census Area Statistics gave very large frequencies of tables with cell counts of 1s and 0s.

20. In reviewing its approach, ONS judged that it would not be fulfilling its legal obligations to the public, and ensuring that *all possible steps will be taken to prevent the inadvertent disclosure of information about identifiable individuals and households*, if cell counts of one or other small cells were simply left visible within the tables. ONS concluded that further measures were necessary to make unusual households and people significantly less visible in the outputs, and therefore significantly less subject to risk of disclosure, than would otherwise be the case.

Additional disclosure control measures considered by ONS

21. Having concluded that additional disclosure control measures were necessary ONS then looked at the options available. The criteria in selecting methods centred around those that:

- would remove or modify cells containing a single observation;
- would reduce the propensity of large numbers of small counts for tables for small populations;
- were operationally feasible to implement; and
- would have minimal effect on, and not harm the statistical integrity of, the output.

Options to remove or modify cells containing a single observation

21. The two principal methods considered were cell suppression and cell adjustment.

(i) Cell suppression

Cell suppression is a method whereby cells that are considered to be disclosive would be suppressed - that is, no count would be given - and the count amalgamated with another cell. While this approach had some advantages, it was considered operationally infeasible given that it must be applied to a very large suite of tables (over 20 million). It would take a large and unknown amount of time to develop and fully test an automated output system to produce the tables.

(ii) Cell adjustment methods

(a) Barnadisation

The method used in the 1991 Census (so called 'barnadisation' whereby cell counts were randomly modified by the addition 0, +1, or -1) was briefly considered but dismissed on the grounds that it would not necessarily modify cells containing a single observation. No system to automate it for the 2001 Census existed.

(b) Cell adjustment - rounding

Rounding is a method that can take various forms. In its traditional form, counts are rounded to a nearest multiple of some number, usually 3 or 5. Other forms of rounding have a controlling element in that a count is not necessarily rounded to the nearest multiple but can be rounded up or down in such a way that when cells are added rounding errors are minimised. Both types of rounding can in theory be applied to all cells or just those that are seen to be most at risk. Rounding in one form or another is commonly applied to statistical output and indeed is used in output from Censuses in other countries for example, Canada and New Zealand.

Rounding will allow ONS to offer greater geographical flexibility in output than is the case with other methods.

Disadvantages in applying it to Census output were seen to be that:

- without considerable effort in specifying a complicated method it would be unlikely that tables would be internally additive (marginal totals and subtotals would be independently rounded) and that counts for the same population in different tables would not necessarily be rounded in the same way;
- all cells in all tables would have to be rounded because unique cells may be obtained by deduction. For example, say a decision was taken to only round

cells of less than 5 and this method was made public. A table containing two cells shows 20 people aged 65 or over and 19 people aged 65 to 84. By simple deduction, there is 1 person aged 85 or over; and

- tables for all geographical areas would need to be rounded because unique cells occur at all levels of geography and while higher area levels in themselves offer some protection, the availability of the same analyses for all geographical levels mean that the precise output area for unique cells can be traced.

(iii) Small cell adjustment

This is a method similar to that used for the Australian Census output whereby only small cells are adjusted. This method has an advantage over rounding methods in that tables can be relatively easily made to be internally additive. Disadvantages were seen to be that:

- like rounding, counts for the same population in different tables would not necessarily be adjusted in the same way; and,
- because only small cells are adjusted, knowledge of the adjustment method had the risk of allowing cells containing a single observation to be deduced, thus under this approach the method itself would need to remain confidential.

Options to reduce the propensity of unique cells and zeros in tables for small populations

23. The options here were cell suppression and population thresholds. Cell suppression is covered above and population thresholds were already proposed - see above. The issue under consideration was therefore whether or not the threshold should be increased. In doing so, ONS noted research showing that there was a significant increase in the number of 'unique' cells in tables with populations of less than 100, and using thresholds of 50 people and/or 20 households, the average cell size in the proposed Census tables for Output Areas could be as low as 0.5. The minimum average cell size in Census tables for small areas in other countries was higher.

24. The principal disadvantage with increasing the threshold noted by ONS was that detailed Census results (other than basic counts of households and people) would not be available for small administrative areas (notably small civil parishes (England) and communities (Wales)) below the threshold.

Outcome

25. Having considered the above options, the need for additional confidentiality protection, and the operational imperatives associated with a time critical operation the size of the Census, the Registrar General decided in late 2001 that ONS would introduce rounding to either zero or a multiple of 3, for all tables to be produced for England and Wales.

26. He also concluded that there should continue to be a minimum threshold of the numbers of persons and households for the release of output, and that these should be raised to 100 resident persons *and* 40 resident households for the release of Census Area Statistics and that all output areas should be designed to be above these thresholds. The threshold for publishing the Standard Tables (more detailed tables available for geographical areas at ward level and above) would be 1,000 persons and 400 households.

27. Since announcing these outcomes, in the light of the views since expressed and other comments made to the Registrar General, ONS has reconsidered the decisions taken last Autumn.

28. ONS has reconsidered whether an alternative method can be implemented to the rounding to base 3 method, which will meet the major concerns that have been expressed by users since the original decisions were taken. Given the operational constraints under which ONS is working to achieve the output timetable, any solution to counter the risks to confidentiality must be able to be readily implemented within the ONS Output production system.

29. ONS considers that, under certain conditions, the method of adjusting only small counts offers a feasible alternative to the rounding to base three method and has advantages that are significant for UK census users in that it targets the small cells, reducing the overall levels of perturbation and that tables will be internally additive. However, its use will require that limited information about the method will be available to users. Also as it does not provide a mechanism for protecting against disclosure when user specified geographies are requested, requests for output for alternative geographies using individual addresses as 'building bricks' will not be available without additional constraints. Output Areas will probably be the smallest building brick generally available.

30. ONS has been testing the feasibility of implementing the small cell adjustment method over the past few weeks and this work is ongoing. However, operational constraints mean that time is extremely short, and there is a risk that the timing of the Census output could be slightly delayed with this option. Further information will be given when it is available.

31. In the light of the decision to raise the population thresholds for the smallest output geography to 100 persons and 40 households, ONS will provide summary counts and percentages for those civil parishes (England), communities (Wales) and other administrative areas with populations below the 2001 Census threshold but above the 1991 threshold. Such summary output would be a subset of the proposed Key Statistics (see <http://www.statistics.gov.uk/census2001/op.asp>). **User views are sought on what information is needed for such areas.**

Conclusion

32. ONS recognises that the decision to apply additional disclosure control measures is of concern to users of Census data. Decisions were only taken after a thorough assessment of the risks and disadvantages. ONS have looked at a number of options to examine their feasibility within our operational constraints, and our requirements to remove the visibility of unusual households and individuals in our tables. There are two options available.

The two options compared

33. Option 1 involves 'rounding', or randomly adjusting, all cells, and Option 2 restricts adjustments to the small cells. Option 1 has the advantage of providing a base for more flexible treatment of geography, while Option 2 has the advantage of perturbing less data. Both create some problems of consistency of data between tables with common margins, but Option 2 ensures that there is internal consistency within a table. Within the context of other error sources to which the data is subject, neither adds substantially to the error level of the data from a statistical perspective, though clearly in each case there is a minor additional element to the noise component. Both methods have the feature that random added noise is potentially additive over cells, although on average, adjustments across cells will tend to cancel. As the margins are achieved by adding cells in Option 2, the noise added to the margins can be greater in this case, if there are a large number of small cells, than in Option 1.

34. Further information on both options is given at Annexes A and B so that users may consider the advantages and disadvantages of both methods. The full method used cannot be disclosed for either option but in the case of Option 2, where the overall level of perturbation of data is less, the information that will be available on the method will be very restricted.

35. **Comments are invited by 31 May. In particular, ONS is seeking views on:**

- **which adjustment method users see as preferable:**
 - **Option 1: rounding of all counts to base three; or**
 - **Option 2: small cell adjustment; and**
- **the information users need for sub-threshold civil parishes (England), communities (Wales) and administrative areas.**

Please send comments to:

Census Advisory Group Secretary
ONS
Room 4300W
Segensworth Road
Titchfield
Fareham
Hampshire
PO15 5RR

Fax: 01329 813189
E-mail: cag.secretary@ons.gov.uk

36. ONS expects to announce the final adjustment approach in June.

Annex A

Option 1 - Rounding to base three

- All counts will be rounded to a multiple of three.
- A count is most likely to be rounded to the nearest multiple of three but not always. The precise probabilities of a count being rounded to the nearest multiple of three or another multiple is confidential to protect the method itself.
- A count that is already a multiple of three will remain the same.
- A rounded count of zero is most likely to represent an unrounded count of zero or 1.
- Totals and subtotals are independently rounded as this will give the most accurate figure for the total. Totals and subtotals will therefore not necessarily be the sum of the constituent (rounded) cells.
- Tables for higher geographical levels will be independently rounded therefore will not necessarily be the sum of the lower geographical component units.
- Tables will be independently adjusted. This means that counts of the same population in two different tables may not necessarily be the same. ONS recognises, however, that guidance will be necessary to assist users as to which count should be used when several counts of the same population are available and that a technical solution will be necessary within the Neighbourhood Statistics system to identify which count should be used.
- The aggregation of rounded counts can lead to an aggregation of rounding 'error'. However, the rounding is carried out in such a way that if rounded counts are aggregated the result is unbiased. The following gives an indication of the typical rounding error arising from aggregating 5, 10 or 20 rounded counts:
 - If 5 rounded counts are added, at least 95% of the time the aggregate rounded count will be within approximately 10 of the true aggregate count.
 - If 10 rounded counts are added, at least 95% of the time the aggregate rounded count will be within approximately 15 of the true aggregate count.
 - If 20 rounded counts are added, at least 95% of the time the aggregate rounded count will be within approximately 20 of the true aggregate count.
- In most cases, rounding will not have any major affect on the statistical conclusions to be drawn from the data and the results can be used with confidence. However:
 - No reliance should be placed on the exactness of small cell counts as they are impacted proportionately more than larger cells not only by rounding, but also by respondent and processing errors.
 - When calculating proportions, percentages or ratios from cross-classified or small area tables, the random error introduced can be ignored except when very small cells are involved, in which case the impact on percentages and ratios can be significant.
 - Some cells will be rounded to zero. Caution should be exercised in deducing that there are no people or households in an area having particular characteristics.

- All output will be produced from one database, adjusted for estimated undercount. The tables from this one database will provide consistent pictures of this one population, and hence be consistent with the One Number Census Strategy.

Examples of tables with counts rounded to base 3

**Examples of 1991 Census tables for Enumeration Districts, Parishes, Wards,
a Local Authority District and a larger geographical area with counts rounded to base 3.**

**1991 Census Small Area Statistics level tables for three 1991 Enumeration Districts (ED)
(EDs 1, 2 and 3) each with approximately 10% non white ethnic group.**

ED 1 - Rounded

	<i>Total Persons</i>	White	<i>Black Groups</i>	Black Caribbean	Black African	Black Other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	Chinese and other groups
Total Persons	471	420	36	30	-	3	12	3	9	-	3
Male											
Total	231	210	18	15	-	3	3	-	3	-	-
Economically active	189	168	15	12	-	3	6	-	3	-	-
Unemployed	24	18	3	3	-	-	-	-	-	-	-
Economically inactive	45	42	3	3	-	-	-	-	-	-	-
Female											
Total	234	210	15	15	3	3	6	-	3	-	-
Economically active	132	120	12	9	3	-	-	-	-	-	-
Unemployed	6	6	-	-	-	-	-	-	-	-	-
Economically inactive	102	90	6	6	-	-	6	3	6	-	-

ED 2 – Rounded

	<i>Total Persons</i>	White	<i>Black Groups</i>	Black Caribbean	Black African	Black Other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	Chinese and other groups
Total Persons	480	447	12	12	-	-	18	9	12	-	3
Male											
Total	237	219	3	6	-	-	6	3	6	-	-
Economically active	192	180	3	3	-	-	6	-	3	-	-
Unemployed	24	21	-	3	-	-	3	-	3	-	-
Economically inactive	42	39	-	-	-	-	3	-	3	-	-
Female											
Total	249	225	9	6	-	3	12	6	6	-	3
Economically active	168	156	6	6	-	-	6	3	3	-	-
Unemployed	9	6	-	-	-	-	-	-	-	-	-
Economically inactive	78	69	3	3	-	-	6	-	3	-	3

ED 3 – Rounded

	<i>Total Persons</i>	White	<i>Black Groups</i>	Black Caribbean	Black African	Black Other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	Chinese and other groups
Total Persons	396	372	18	12	3	3	3	-	-	-	3
Male											
Total	201	189	9	6	-	3	-	-	-	-	3
Economically active	186	180	6	6	-	-	-	-	-	-	-
Unemployed	12	9	-	-	-	-	-	-	-	-	-
Economically inactive	12	9	-	-	-	-	-	-	-	-	-
Female											
Total	198	186	9	6	3	3	-	-	-	-	3
Economically active	153	141	9	3	3	-	-	-	-	-	3
Unemployed	9	9	-	3	-	-	-	-	-	-	-
Economically inactive	45	45	-	-	-	-	-	-	-	-	-

1991 Census Local Base Statistics level table for a 1991 Ward (Ward 1) with approximately 10% non white ethnic group

Ward 1 - Rounded

	<i>Total persons</i>	White	<i>Black groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	<i>Chinese and other groups</i>	Chinese	Other groups	Persons born in Ireland
TOTAL PERSONS	5751	5259	315	267	15	36	120	27	87	6	57	6	51	165
Males aged 16 and over	2838	2604	147	123	3	21	60	9	45	3	27	6	21	75
Economically active	2301	2094	135	114	6	15	51	9	36	3	21	3	18	51
Employees	1743	1599	102	81	3	15	27	6	21	3	15	-	15	36
Self employed	291	279	6	6	-	3	3	3	-	-	-	-	-	9
On government scheme	12	12	-	-	-	-	3	-	-	-	-	-	-	-
Unemployed	255	204	27	24	-	3	18	3	15	-	6	3	3	6
Economically inactive	540	510	12	9	-	3	9	-	9	-	6	3	3	27
Students	60	45	6	3	-	3	3	-	6	-	6	3	3	-
Permanently sick	93	87	6	6	-	3	3	-	3	-	-	-	-	9
Retired	366	363	-	3	-	-	3	-	3	-	-	-	3	15
Other inactive	18	15	3	-	-	-	3	-	3	-	-	-	-	-
Females aged 16 and over	2913	2655	168	144	12	12	60	15	42	3	30	3	27	87
Economically active	1662	1506	123	102	9	9	18	9	9	-	18	3	15	48
Employees	1500	1362	108	90	9	9	12	6	6	-	15	-	15	45
Self employed	57	54	-	-	-	-	3	3	-	-	-	-	-	-
On government scheme	9	3	3	3	-	-	-	-	-	-	3	-	-	-
Unemployed	99	84	15	15	-	-	3	3	-	-	-	3	-	3
Economically inactive	1254	1152	45	39	3	3	45	6	33	3	12	-	12	42
Students	75	63	3	3	-	-	6	3	3	-	3	-	-	-
Permanently sick	72	60	12	9	-	-	-	-	3	-	-	-	-	3
Retired	495	492	3	3	-	-	-	-	-	-	-	-	-	21
Other inactive	612	540	27	24	3	3	33	6	30	3	12	-	12	18

1991 Census Local Base Statistics level table for a large 1991 Ward (Ward 2) with approximately 50% non white ethnic group.

Ward 2 - Rounded

	<i>Total persons</i>	White	<i>Black groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	<i>Chinese and other groups</i>	Chinese	Other groups	Persons born in Ireland
TOTAL PERSONS	18444	9870	3531	3132	123	279	4554	882	2169	1500	489	75	414	1245
Males aged 16 and over	8673	4623	1536	1377	57	105	2277	438	1092	741	237	30	204	669
Economically active	5946	3096	1143	1014	42	87	1551	312	783	459	156	18	135	384
Employees	3180	1764	639	570	21	48	726	165	375	183	60	6	48	183
Self employed	369	165	30	24	3	-	165	48	81	36	9	6	6	27
On government scheme	192	84	45	42	3	3	57	12	33	12	6	-	6	3
Unemployed	2199	1086	429	378	15	36	606	87	291	228	81	6	72	174
Economically inactive	2730	1530	396	366	15	15	723	126	315	285	81	15	69	282
Students	510	105	63	45	12	9	288	48	135	105	51	9	42	3
Permanently sick	762	435	117	108	3	6	198	33	75	96	9	-	12	117
Retired	1323	933	201	192	3	3	177	39	81	57	15	6	12	153
Other inactive	138	57	18	18	-	-	60	6	27	27	6	3	3	9
Females aged 16 and over	9771	5244	1995	1752	69	174	2277	444	1077	759	252	42	210	579
Economically active	3948	2046	1194	1050	45	99	600	219	216	159	108	15	90	207
Employees	2676	1518	816	729	24	63	279	135	84	60	60	9	54	147
Self employed	105	48	9	9	-	-	42	24	12	6	-	-	-	6
On government scheme	162	33	78	63	3	12	42	12	12	18	12	-	9	-
Unemployed	1008	444	291	252	15	27	234	51	105	78	36	6	30	54
Economically inactive	5826	3201	801	702	24	75	1680	222	861	597	144	27	117	372
Students	441	99	111	84	6	18	195	45	69	81	36	15	18	3
Permanently sick	522	321	102	87	6	6	93	27	42	27	6	-	3	51
Retired	1842	1527	210	207	3	-	93	30	42	21	12	3	9	186
Other inactive	3021	1251	378	324	9	48	1296	117	711	465	93	6	90	132

1991 Census Local Base Statistics level tables for an area with approximately 125,000 people (Area 1).

Area 1 - Rounded

	<i>Total persons</i>	White	<i>Black groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	<i>Chinese and other groups</i>	Chinese	Other groups	Persons born in Ireland
TOTAL PERSONS	124851	116733	2841	2361	144	333	4035	759	3207	66	1248	240	1005	2193
Males aged 16 and over	61401	57312	1410	1146	84	180	2097	381	1674	42	582	114	468	984
Economically active	49134	45741	1230	1005	72	156	1674	294	1341	36	489	96	393	765
Employees	36870	34653	885	720	54	108	1005	198	783	24	327	66	261	546
Self employed	8490	8166	87	66	9	12	162	63	90	9	72	24	45	159
On government scheme	282	201	30	18	3	9	39	3	36	3	12	-	15	-
Unemployed	3492	2721	234	201	12	24	465	27	435	3	75	3	69	60
Economically inactive	12264	11571	177	144	9	27	423	84	333	3	93	15	75	216
Students	3006	2664	57	30	9	21	222	54	168	-	60	9	51	15
Permanently sick	1137	981	51	45	-	6	96	9	87	-	12	-	12	39
Retired	7818	7659	57	57	-	-	84	21	63	3	18	6	12	159
Other inactive	303	264	12	12	-	3	21	3	21	-	6	3	3	6
Females aged 16 and over	63456	59421	1428	1215	63	153	1938	378	1533	27	666	129	537	1212
Economically active	35451	33459	1014	867	42	102	612	231	372	6	369	75	291	690
Employees	31143	29574	870	750	36	84	399	162	237	6	303	63	240	606
Self employed	2454	2373	9	6	-	-	51	42	6	-	24	12	15	42
On government scheme	153	126	12	9	-	-	9	6	6	3	3	3	3	3
Unemployed	1698	1389	123	102	3	18	153	27	126	-	39	3	33	39
Economically inactive	28005	25959	417	348	21	51	1329	147	1158	21	297	51	246	519
Students	2778	2484	78	57	3	18	150	39	111	3	63	15	48	12
Permanently sick	987	879	54	48	3	3	45	6	39	-	9	-	9	15
Retired	9735	9618	45	42	3	3	51	21	33	-	24	3	18	210
Other inactive	14505	12978	240	201	15	24	1083	87	975	18	204	33	171	285

1991 Census Local Base Statistics table for a larger geographical area (Area 2).

Area 2 - Rounded

	<i>Total persons</i>	White	<i>Black groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	<i>Chinese and other groups</i>	Chinese	Other groups	Persons born in Ireland
TOTAL PERSONS	743457	614727	39393	33618	2010	3762	77694	34545	36630	6516	11646	2562	9084	37422
Males aged 16 and over	353583	290061	18603	15819	1101	1683	39006	17148	18594	3267	5910	1317	4596	18885
Economically active	254283	207168	14415	12267	738	1413	28536	13089	13332	2118	4161	789	3372	11976
Employees	177996	150780	9111	7875	420	813	15666	8022	6675	972	2439	477	1965	7302
Self employed	27681	22371	750	618	60	72	4089	2361	1506	222	474	171	303	1659
On government scheme	4764	3222	567	438	51	75	807	315	447	45	171	15	153	123
Unemployed	43839	30798	3993	3333	204	456	7974	2391	4701	879	1077	123	954	2892
Economically inactive	99297	82896	4185	3555	363	267	10470	4062	5262	1146	1749	528	1221	6912
Students	15984	9282	972	579	231	162	4653	1896	2319	435	1077	393	684	117
Permanently sick	19296	15255	1068	966	33	66	2700	834	1470	393	276	30	243	2145
Retired	60231	55911	1791	1698	72	21	2259	1068	999	189	270	75	195	4440
Other inactive	3786	2448	351	309	24	15	858	264	468	126	132	33	96	213
Females aged 16 and over	389877	324666	20790	17799	909	2082	38685	17394	18039	3252	5733	1245	4488	18534
Economically active	185070	155079	13611	11760	540	1311	13767	9117	3969	684	2610	522	2085	8094
Employees	155397	134643	10611	9309	375	927	8400	6462	1641	300	1743	360	1383	6993
Self employed	7179	5709	180	141	24	18	1143	891	234	21	144	75	69	249
On government scheme	3300	1956	567	444	33	87	630	252	312	66	144	15	129	54
Unemployed	19194	12771	2253	1869	108	282	3591	1512	1776	300	579	75	501	795
Economically inactive	204804	169584	7176	6036	369	768	24921	8280	14070	2568	3126	720	2403	10440
Students	14826	9447	1287	924	138	222	3276	1617	1344	315	819	267	552	102
Permanently sick	13521	10923	951	867	33	51	1491	762	639	90	150	12	138	1116
Retired	88263	84681	1737	1686	30	24	1593	957	564	75	252	102	153	5379
Other inactive	88194	64533	3201	2562	168	471	18561	4947	11526	2091	1899	339	1560	3840

1991 Census Small Area Statistics table for two 1991 Civil Parishes (parishes 1 and 2) each with low proportion of non-white ethnic group.

Parish 1 – Rounded

	<i>Total Persons</i>	White	<i>Black Groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	Chinese and other groups
Total Persons	669	663	-	3	-	-	-	-	-	-	6
Male											
Total	369	366	-	-	-	-	-	-	-	-	3
Economically active	336	333	-	-	-	-	-	-	-	-	3
Unemployed	3	3	-	-	-	-	-	-	-	-	-
Economically inactive	33	36	-	-	-	-	-	-	-	-	-
Female											
Total	300	294	-	-	-	-	-	-	-	-	6
Economically active	201	201	-	-	-	-	-	-	-	-	-
Unemployed	6	6	-	-	-	-	-	-	-	-	-
Economically inactive	99	93	3	-	-	-	-	-	-	-	3

Parish 2 - Rounded

	<i>Total Persons</i>	White	<i>Black Groups</i>	Black Caribbean	Black African	Black other	<i>Indian, Pakistani and B'deshi</i>	Indian	Pakistani	B'deshi	Chinese and other groups
Total Persons	1851	1842	6	3	-	3	3	-	-	-	3
Male											
Total	924	921	3	3	-	3	3	3	-	-	-
Economically active	741	738	3	-	-	-	-	3	-	-	-
Unemployed	42	42	-	-	-	3	-	-	-	-	-
Economically inactive	186	186	-	-	-	-	-	-	-	-	-
Female											
Total	924	921	3	3	-	-	3	-	-	-	3
Economically active	504	501	-	3	-	-	-	-	-	-	3
Unemployed	21	21	-	-	-	-	-	-	-	-	-
Economically inactive	423	417	-	-	-	-	3	-	-	-	3

1991 Census Small Area Statistics tables for three 1991 EDs (EDs 4, 5 and 6)

ED 4 - Rounded

	Total persons	Total males	Males Single, widowed or divorced	Males Married	Total females	Females Single, widowed or divorced	Females Married
ALL AGES	444	219	99	117	228	117	114
0 - 4	9	9	9	-	3	-	-
5 - 9	18	9	9	-	9	9	-
10 - 14	21	9	9	-	9	12	-
15	3	-	3	-	3	3	-
16 - 17	3	6	3	-	-	3	-
18 - 19	12	9	12	-	-	-	-
20 - 24	15	9	6	-	6	3	3
25 - 29	12	9	9	-	-	3	-
30 - 34	15	9	3	9	6	-	6
35 - 39	18	6	3	-	12	-	9
40 - 44	24	15	3	9	12	-	12
45 - 49	33	18	-	15	18	3	12
50 - 54	30	12	6	9	15	-	12
55 - 59	24	12	-	12	12	3	9
60 - 64	39	21	3	15	18	3	12
65 - 69	39	15	3	12	24	9	15
70 - 74	33	15	6	9	15	6	9
75 - 79	39	18	6	15	18	12	9
80 - 84	18	6	3	3	12	9	3
85 - 89	24	3	-	3	18	18	-
90 and over	15	3	3	-	12	12	-

ED 5 - Rounded

	Total persons	Total males	Males Single, widowed or divorced	Males Married	Total females	Females Single, widowed or divorced	Females Married
ALL AGES	369	153	90	63	213	141	72
0 - 4	21	15	12	-	6	6	-
5 - 9	15	15	15	-	3	3	-
10 - 14	9	3	3	-	9	9	-
15	-	-	-	-	-	-	-
16 - 17	6	3	-	-	6	6	-
18 - 19	9	6	3	-	3	3	-
20 - 24	24	12	12	-	12	12	-
25 - 29	15	6	3	-	9	6	6
30 - 34	9	6	6	3	3	-	3
35 - 39	9	3	-	3	6	3	3
40 - 44	18	9	-	6	9	3	6
45 - 49	24	9	6	6	12	3	9
50 - 54	15	6	-	6	9	-	6
55 - 59	15	3	-	6	9	6	3
60 - 64	27	9	6	6	15	9	6
65 - 69	27	9	3	9	18	6	12
70 - 74	36	15	3	12	21	9	12
75 - 79	33	9	3	6	21	15	6
80 - 84	24	9	9	-	18	15	-
85 - 89	15	3	-	3	12	12	-
90 and over	6	-	-	-	3	3	-

ED 6 - Rounded

	Total persons	Total males	Males Single, widowed or divorced	Males Married	Total females	Females Single, widowed or divorced	Females Married
ALL AGES	447	204	81	120	243	117	123
0 - 4	27	18	18	-	9	9	-
5 - 9	24	12	12	-	12	15	-
10 - 14	27	18	18	-	9	9	-
15	6	3	3	-	6	6	-
16 - 17	12	3	3	-	6	6	-
18 - 19	9	3	3	-	6	6	-
20 - 24	12	-	-	-	9	9	-
25 - 29	21	9	3	6	12	6	6
30 - 34	18	9	6	3	9	6	6
35 - 39	21	12	-	9	12	3	9
40 - 44	24	6	-	9	15	3	15
45 - 49	48	24	3	21	21	-	21
50 - 54	24	9	3	9	12	-	12
55 - 59	27	15	-	12	12	-	12
60 - 64	21	9	-	9	12	-	9
65 - 69	48	21	3	18	27	12	15
70 - 74	27	12	-	9	18	9	6
75 - 79	21	9	-	6	12	6	3
80 - 84	12	3	3	-	9	6	3
85 - 89	12	6	-	6	6	-	6
90 and over	6	3	3	-	3	3	-

**1991 Census Small Area Statistics tables for two 1991 civil parishes
(parishes 3 and 4) with a population between 50 and 100 residents.**

Parish 3 - Rounded

	Total		Male		Female		
	Total	Single widowed or divorced	Married	Total	Single widowed or divorced	Married	
All ages	72	27	12	18	42	24	18
0-4	6	6	3	-	3	3	-
5-9	6	3	3	-	6	3	-
10-14	3	-	-	-	6	3	-
15	-	-	-	-	-	-	-
16-17	6	-	-	-	3	3	-
18-19	-	-	-	-	-	3	-
20-24	-	-	-	-	-	3	-
25-29	3	-	-	-	3	-	-
30-34	9	3	-	-	6	-	3
35-39	9	6	-	6	3	-	3
40-44	6	3	-	3	3	3	-
45-49	6	3	-	3	3	-	-
50-54	6	-	-	-	3	-	3
55-59	3	3	-	-	3	-	-
60-64	3	-	-	-	-	-	-
65-69	3	-	-	-	-	-	-
70-74	-	-	-	-	-	-	3
75-79	-	-	-	-	-	3	-
80-84	-	-	-	-	-	3	-
85-89	-	-	-	-	-	-	-
90 & over	-	-	-	-	-	-	-

Parish 4 - Rounded

	Total		Male		Female		
	Total	Single widowed or divorced	Married	Total	Single widowed or divorced	Married	
All ages	93	45	18	30	45	18	27
0-4	6	3	3	-	3	3	-
5-9	-	-	-	-	3	-	-
10-14	6	3	3	-	3	3	-
15	-	-	-	-	-	-	-
16-17	-	-	-	-	-	-	-
18-19	3	-	3	-	3	-	-
20-24	6	3	3	-	3	3	-
25-29	6	3	-	-	6	3	-
30-34	3	3	-	-	3	-	-
35-39	6	3	-	-	6	-	6
40-44	12	6	3	6	6	-	6
45-49	9	6	-	6	3	-	3
50-54	6	3	-	3	3	-	3
55-59	9	6	-	3	3	-	3
60-64	9	6	-	3	3	3	-
65-69	6	-	-	-	3	-	3
70-74	-	-	-	-	-	-	-
75-79	-	-	-	-	-	-	-
80-84	3	-	-	-	-	-	-
85-89	-	-	-	-	-	-	-
90 & over	-	-	-	-	-	-	-

Annex B

Option 2 – Small cell adjustment

ONS has been testing the feasibility of implementing Option 2 over the past few weeks and this work is ongoing. However, operational constraints mean that time is extremely short, and there is a risk that the timing of the Census output could be slightly delayed if this option was subsequently chosen. Further information will be given when it is available.

- Small cells only are adjusted*.
- The level of adjustment imposed on data in this option will be considerably less than that imposed under Option 1.
- Totals and subtotals in tables will be calculated as the sum of the adjusted data so that all tables are internally additive. Within tables, totals and subtotals will be the sum of the adjusted constituent counts.
- Tables will be independently adjusted. This means that counts of the same population in two different tables may not necessarily be the same. ONS recognises, however, that guidance will be necessary to assist users as to which count should be used when several counts of the same population are available and that a technical solution will be necessary within the Neighbourhood Statistics system to identify which count should be used.
- The magnitude of the adjustment will generally have little impact on the conclusions that can validly be drawn from the data, given other sources of error and variability in the data. The small variance which may be associated with derived totals can, for the most part, be ignored. However:
 - Caution should be taken in interpreting small cell counts as they are impacted to a greater proportion than larger cells not only by disclosure control adjustment, but also by respondent and processing errors.
 - When calculating proportions, percentages or ratios from cross-classified or small area tables, the random error introduced can be ignored except when very small cells are involved, in which case the impact on percentages and ratios can be significant.
 - Some small cells will be randomly altered to zero. Caution should be exercised in deducing that there are no people or households in an area having particular characteristics.
- Tables for higher geographical levels will be independently adjusted therefore will not necessarily be the sum of the lower geographical component units.
- All output will be produced from one database, adjusted for estimated undercount. The tables from this one database will provide consistent pictures of this one population, and hence be consistent with the One Number Census Strategy.
- Information on the method will be restricted to the information given here, including the definition of 'small'. This is so as not to compromise the method itself.

Examples of tables with small cells adjusted

Small Cell Adjustment method - Examples of 1991 Census tables

Enumeration Districts

<i>ED 7</i>	All People	0 to 15	16 to 34	35 to 49	50 to 59	60 to 64	65 to 84	85 and over
All People								
Total	416	84	143	72	29	16	66	6
Has a health problem	38	3	3	3	5	-	21	3
Does not have a health problem	378	81	140	69	24	16	45	3
Male								
Total	229	53	85	37	18	9	27	-
Has a health problem	23	3	3	3	5	-	9	-
Does not have a health problem	206	50	82	34	13	9	18	-
Female								
Total	187	31	58	35	11	7	39	6
Has a health problem	15	-	-	-	-	-	12	3
Does not have a health problem	172	31	58	35	11	7	27	3

<i>ED 8</i>	All People	0 to 15	16 to 34	35 to 49	50 to 59	60 to 64	65 to 84	85 and over
All People								
Total	457	81	81	105	67	26	94	3
Has a health problem	60	3	6	7	12	3	26	3
Does not have a health problem	397	78	75	98	55	23	68	-
Male								
Total	222	44	41	53	30	11	43	-
Has a health problem	27	3	3	3	6	-	12	-
Does not have a health problem	195	41	38	50	24	11	31	-
Female								
Total	235	37	40	52	37	15	51	3
Has a health problem	33	-	3	4	6	3	14	3
Does not have a health problem	202	37	37	48	31	12	37	-

<i>ED 9</i>	All People	0 to 15	16 to 34	35 to 49	50 to 59	60 to 64	65 to 84	85 and over
All People								
Total	463	140	144	94	40	18	21	6
Has a health problem	41	3	-	3	8	6	15	6
Does not have a health problem	422	137	144	91	32	12	6	-
Male								
Total	241	86	64	49	19	11	9	3
Has a health problem	22	3	-	3	4	3	6	3
Does not have a health problem	219	83	64	46	15	8	3	-
Female								
Total	222	54	80	45	21	7	12	3
Has a health problem	19	-	-	-	4	3	9	3
Does not have a health problem	203	54	80	45	17	4	3	-

Wards

Ward 3	All People			Male			Female		
	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem
All People	1739	316	1423	808	125	683	931	191	740
sub total : 0 to 15	251	3	248	131	3	128	120	-	120
0 to 4	89	-	89	41	-	41	48	-	48
5 to 9	77	-	77	41	-	41	36	-	36
10 to 14	70	3	67	37	3	34	33	-	33
15	15	-	15	12	-	12	3	-	3
sub total : 16 to 24	245	9	236	109	3	106	136	6	130
16 to 17	38	-	38	27	-	27	11	-	11
18 to 19	43	6	37	15	3	12	28	3	25
20 to 24	164	3	161	67	-	67	97	3	94
sub total : 25 to 44	505	28	477	267	13	254	238	15	223
25 to 29	169	7	162	92	3	89	77	4	73
30 to 34	121	7	114	69	4	65	52	3	49
35 to 39	111	3	108	61	3	58	50	-	50
40 to 44	104	11	93	45	3	42	59	8	51
sub total : 45 to 64	312	78	234	159	42	117	153	36	117
45 to 49	72	10	62	41	7	34	31	3	28
50 to 54	90	22	68	48	11	37	42	11	31
55 to 59	71	20	51	36	10	26	35	10	25
60 to 64	79	26	53	34	14	20	45	12	33
sub total : 65 and over	426	198	228	142	64	78	284	134	150
65 to 69	94	37	57	49	19	30	45	18	27
70 to 74	111	42	69	35	14	21	76	28	48
75 to 79	112	56	56	33	16	17	79	40	39
80 to 84	66	35	31	18	8	10	48	27	21
85 to 89	35	25	10	4	4	-	31	21	10
90 and over	8	3	5	3	3	-	5	-	5

<i>Ward 4</i>	All People			Male			Female		
	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem
All People	2996	480	2516	1398	231	1167	1598	249	1349
sub total : 0 to 15	587	11	576	284	5	279	303	6	297
0 to 4	199	-	199	97	-	97	102	-	102
5 to 9	172	-	172	83	-	83	89	-	89
10 to 14	186	8	178	92	5	87	94	3	91
15	30	3	27	12	-	12	18	3	15
sub total : 16 to 24	290	20	270	158	11	147	132	9	123
16 to 17	65	3	62	45	3	42	20	-	20
18 to 19	68	7	61	35	4	31	33	3	30
20 to 24	157	10	147	78	4	74	79	6	73
sub total : 25 to 44	663	44	619	307	23	284	356	21	335
25 to 29	152	11	141	71	8	63	81	3	78
30 to 34	158	13	145	61	6	55	97	7	90
35 to 39	154	8	146	75	5	70	79	3	76
40 to 44	199	12	187	100	4	96	99	8	91
sub total : 45 to 64	724	114	610	335	59	276	389	55	334
45 to 49	191	18	173	96	9	87	95	9	86
50 to 54	151	25	126	63	11	52	88	14	74
55 to 59	156	22	134	69	12	57	87	10	77
60 to 64	226	49	177	107	27	80	119	22	97
sub total : 65 and over	732	291	441	314	133	181	418	158	260
65 to 69	223	68	155	105	44	61	118	24	94
70 to 74	204	67	137	95	31	64	109	36	73
75 to 79	162	64	98	67	27	40	95	37	58
80 to 84	77	44	33	31	19	12	46	25	21
85 to 89	47	33	14	13	9	4	34	24	10
90 and over	19	15	4	3	3	-	16	12	4

<i>Ward 5</i>	All People			Male			Female		
	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem
All People	5660	988	4672	2648	440	2208	3012	548	2464
sub total : 0 to 15	869	16	853	460	10	450	409	6	403
0 to 4	261	3	258	134	-	134	127	3	124
5 to 9	242	4	238	132	4	128	110	-	110
10 to 14	305	6	299	162	3	159	143	3	140
15	61	3	58	32	3	29	29	-	29
sub total : 16 to 24	716	25	691	347	14	333	369	11	358
16 to 17	157	-	157	80	-	80	77	-	77
18 to 19	150	3	147	72	-	72	78	3	75
20 to 24	409	22	387	195	14	181	214	8	206
sub total : 25 to 44	1338	116	1222	668	60	608	670	56	614
25 to 29	352	23	329	179	10	169	173	13	160
30 to 34	281	25	256	154	17	137	127	8	119
35 to 39	327	25	302	156	15	141	171	10	161
40 to 44	378	43	335	179	18	161	199	25	174
sub total : 45 to 64	1316	216	1100	622	118	504	694	98	596
45 to 49	362	33	329	174	16	158	188	17	171
50 to 54	326	44	282	164	21	143	162	23	139
55 to 59	288	61	227	143	34	109	145	27	118
60 to 64	340	78	262	141	47	94	199	31	168
sub total : 65 and over	1421	615	806	551	238	313	870	377	493
65 to 69	380	105	275	170	48	122	210	57	153
70 to 74	353	125	228	140	60	80	213	65	148
75 to 79	306	130	176	125	51	74	181	79	102
80 to 84	239	152	87	84	57	27	155	95	60
85 to 89	108	71	37	28	18	10	80	53	27
90 and over	35	32	3	4	4	-	31	28	3

Area with approximately 70,000 population

Area 3	All People			Male			Female		
	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem
All People	71104	10173	60931	34210	4616	29594	36894	5557	31337
sub total : 0 to 15	13248	351	12897	6838	206	6632	6410	145	6265
0 to 4	4198	79	4119	2195	53	2142	2003	26	1977
5 to 9	4086	103	3983	2074	66	2008	2012	37	1975
10 to 14	4097	128	3969	2136	66	2070	1961	62	1899
15	867	41	826	433	21	412	434	20	414
sub total : 16 to 24	8169	317	7852	4182	188	3994	3987	129	3858
16 to 17	1809	61	1748	943	42	901	866	19	847
18 to 19	1787	71	1716	936	34	902	851	37	814
20 to 24	4573	185	4388	2303	112	2191	2270	73	2197
sub total : 25 to 44	18782	1110	17672	9489	615	8874	9293	495	8798
25 to 29	4851	216	4635	2514	118	2396	2337	98	2239
30 to 34	4381	241	4140	2228	150	2078	2153	91	2062
35 to 39	4374	247	4127	2154	131	2023	2220	116	2104
40 to 44	5176	406	4770	2593	216	2377	2583	190	2393
sub total : 45 to 64	15913	2477	13436	7739	1314	6425	8174	1163	7011
45 to 49	4691	417	4274	2340	215	2125	2351	202	2149
50 to 54	3773	467	3306	1874	220	1654	1899	247	1652
55 to 59	3653	686	2967	1741	360	1381	1912	326	1586
60 to 64	3796	907	2889	1784	519	1265	2012	388	1624
sub total : 65 and over	14992	5918	9074	5962	2293	3669	9030	3625	5405
65 to 69	4227	1143	3084	1889	587	1302	2338	556	1782
70 to 74	3802	1297	2505	1573	555	1018	2229	742	1487
75 to 79	3219	1290	1929	1256	481	775	1963	809	1154
80 to 84	2211	1160	1051	815	409	406	1396	751	645
85 to 89	1128	718	410	345	201	144	783	517	266
90 and over	405	310	95	84	60	24	321	250	71

Area with approximately 50,000 population

Area 4	All People			Male			Female		
	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem	Total	Has a health problem	Does not have a health problem
All People	53473	8582	44891	25071	3811	21260	28402	4771	23631
sub total : 0 to 15	9024	216	8808	4649	117	4532	4375	99	4276
0 to 4	2608	50	2558	1337	33	1304	1271	17	1254
5 to 9	2864	69	2795	1489	38	1451	1375	31	1344
10 to 14	2984	78	2906	1529	35	1494	1455	43	1412
15	568	19	549	294	11	283	274	8	266
sub total : 16 to 24	5192	188	5004	2619	89	2530	2573	99	2474
16 to 17	1258	34	1224	656	16	640	602	18	584
18 to 19	1245	45	1200	606	22	584	639	23	616
20 to 24	2689	109	2580	1357	51	1306	1332	58	1274
sub total : 25 to 44	12131	726	11405	5852	408	5444	6279	318	5961
25 to 29	2554	129	2425	1245	68	1177	1309	61	1248
30 to 34	2635	160	2475	1249	90	1159	1386	70	1316
35 to 39	3073	180	2893	1461	109	1352	1612	71	1541
40 to 44	3869	257	3612	1897	141	1756	1972	116	1856
Sub total : 45 to 64	13217	2063	11154	6275	1090	5185	6942	973	5969
45 to 49	3480	318	3162	1719	165	1554	1761	153	1608
50 to 54	2999	419	2580	1471	225	1246	1528	194	1334
55 to 59	3104	520	2584	1475	278	1197	1629	242	1387
60 to 64	3634	806	2828	1610	422	1188	2024	384	1640
Sub total : 65 and over	13909	5389	8520	5676	2107	3569	8233	3282	4951
65 to 69	3971	1011	2960	1805	517	1288	2166	494	1672
70 to 74	3335	1046	2289	1475	475	1000	1860	571	1289
75 to 79	2922	1162	1760	1174	469	705	1748	693	1055
80 to 84	2097	1094	1003	779	376	403	1318	718	600
85 to 89	1151	739	412	353	209	144	798	530	268
90 and over	433	337	96	90	61	29	343	276	67

Annex C

Disclosure Control measures to be applied to aggregate Census output in addition to either the method at Annex A or Annex B

Record swapping

The individual records on the database will be slightly modified by the adoption of a record swapping technique. A sample of records will be 'swapped' with similar records in other geographical areas. The proportion of records swapped is confidential.

Thresholds

Three thresholds will apply. The number of cells quoted in this context relates to the number of non-total cells in the tables for any one geographical area.

- For Standard Tables (25,000 cells), the geographical area must contain at least 1,000 residents and 400 resident households.
- For Census Area Statistics (CAS - 6,700 cells), the geographical area must contain at least 100 residents and 40 resident households.
- For those civil parishes (England), communities (Wales) and other administrative geographies below the CAS threshold and containing more than 50 people and 20 households*, a set of summary statistics will be produced. This will be a subset of the Key Statistics product (see *Output Prospectus*).
- For areas with less than 50 people or 20 households, only (rounded/ adjusted) counts of the total number of residents and resident households will be produced.

Administrative areas below the relevant threshold will be amalgamated with another area.

Design of tables

A general principle has been applied to the design of all 2001 Census output tables and that is that the average cell size in a table should be greater than or equal to 1. This will also apply to commissioned output.

* The 1991 Census equivalent threshold for was 50 people and 16 households. The increase in the household component to 20 reflects the change in average household size between 1991-2001.

Future geographical flexibility - need for additional measures

Option 2 - the small cell adjustment method - does not provide a mechanism for protecting against disclosure when user specified geographies are requested. This means there will be additional restrictions associated with its use. Requests for output for alternative geographies using individual addresses as 'building bricks' will not be available without additional adjustments. It may be that Output Areas will be the smallest building brick permissible.

Conditions of use

A condition of use of the Census output will be that nobody using the output should attempt to obtain, or claim to have obtained, information about an identifiable person or household.

Annex D

Issues raised by Census Users at the meeting on 13 December 2001, in correspondence, and elsewhere since decisions to introduce additional disclosure control measures were announced.

A number of users of Census data have raised concerns and issues about the additional disclosure control measures to be implemented for the output from the 2001 Census in England and Wales.

Request for information on other methods considered by ONS

Other methods considered by ONS are described in this paper but these were ruled out on operational feasibility grounds or on grounds of providing insufficient protection.

Given the operational constraints under which ONS must work to achieve the output timetable, the only feasible solution to counter the risks to confidentiality is a method that can be readily implemented within the ONS Output production system.

Request for details of the rounding/adjustment methods

Details of the methods are given at Annexes A and B. As much detail as possible is given without compromising the confidentiality of the methods themselves. Requests have been made for equations to show the probability that a number will be rounded up or down under Option 1 but this is not possible without undermining the protection that the method provides. Similarly, details on what constitutes a small count under Option 2 is not possible without compromising the method. Information is given, however, for Option 1 at Annex A, on the 'rounding error' through aggregating several rounded counts.

Examples of the methods in practice on some 1991 Census tables are shown at Annexes A and B. Only the post-rounded/adjusted data is shown, again to protect the methods.

The rounding or adjustment method itself will be applied at the tabulation stage. Standard methods are available in SuperCROSS but no assumption should be made about the method adopted by ONS or that either of the methods described in this paper is one of these standard methods.

Request for clarification on whether the mid-2001 population estimates would be rounded or adjusted.

Mid-2001 population estimates based on the 2001 Census, with an adjustment for births, deaths and migration between Census Day and 30 June 2001 will not be rounded or adjusted.

Concern about the effects of rounding or adjustment in aggregating rounded or adjusted counts

Rounding and adjustment is carried out in such a way that the results of adding rounded or adjusted counts together are unbiased. The aggregation of rounded or adjusted counts can however lead to an aggregation of rounding or adjustment 'error'. Details of the effects of aggregating several rounded counts are given at Annex A.

Concerns about additivity within tables

Using Option 1 (rounding to base 3), totals and subtotals are independently rounded. Totals and subtotals will therefore not necessarily be the sum of the constituent (rounded) cells.

Using Option 2 (small cell adjustment), tables will be internally additive.

Concerns about consistency between tables

Under both methods, counts of the same population in two different tables will not necessarily be the same. A requirement to ensure consistency from one table to another is extremely complex to fulfil. This would add significantly to the timetable to the release of the results and so has been ruled out as an option.

ONS recognises, however, that guidance will be necessary to assist users as to which count should be used when several counts of the same population are available.

Geographical and statistical flexibility

A number of users have indicated that in any trade-off between flexible geography and rounding/adjustment, they would have been willing to forego geographical flexibility. While flexibility was a factor, it was not the prime factor, and so such a trade-off never arose as a possibility.

Adopting Option 1 (rounding to base 3) will allow full flexibility both now and in the future. It will be possible to offer flexibility within Neighbourhood Statistics where statistics from other small area datasets will be integrated with those from the Census and throughout the whole lifespan of the 2001 Census data where needs cannot yet be foreseen.

Adopting Option 2 (small cell adjustment) does not provide a mechanism for protecting against disclosure when user specified geographies are requested. This means there will be additional restrictions associated with its use. Requests in the future for output for alternative geographies using individual addresses as 'building bricks' will either not be accepted or further disclosure control measures will be necessary. Output Areas may be the smallest building brick permissible.

Restricting availability of detailed results to key users

Some users have suggested that all that is necessary is for results from the Census to be only made available in an unrounded/unadjusted format to identified or key users, or not made available via the internet. ONS does not see this as a viable option since a key aim of the Census and National Statistics generally is to disseminate statistics as widely as possible. The notion of restricting all cells of all tables (that is restricting the availability of Census data) for the sake of not perturbing the cells for the 'key users' is not a good trade-off.

Concerns about the loss of data for civil parishes (England) and communities (Wales) with populations below the threshold of 100 people and 40 households

ONS recognises that as a consequence of increasing the threshold, detailed statistics as proposed to be produced in the *Census Area Statistics* (CAS) will not be available for those civil parishes (England) and communities (Wales) with small populations and that this is particularly so in some rural parts of the country. It further recognises the importance of the availability of information to support policy initiatives and the planning of services for small rural parishes and communities.

The Registrar General has reconsidered carefully the decision to raise the threshold for the Census Area Statistics but has concluded that the basis on which the original decision was taken has not changed. Tables for areas of less than 100 people or 40 households will contain a large number of small counts as illustrated by the (rounded) examples for two parishes in North Yorkshire given at Annex A from the 1991 Census. Detailed tables for such small populations not only present an unacceptable risk for the 2001 Census for the reasons given above but also offer extremely limited analytical capability given the caution that must be used in analysing large numbers of small counts.

However, in the light of comments received about the consequences of increasing the thresholds, ONS has agreed that for those civil parishes (England), communities (Wales) and other administrative geographies below the CAS threshold and containing more than 50 people and 20 households, a set of summary statistics (a subset of the Key Statistics) will be produced (see Prospectus for more details). The same statistics will be available for those parishes/administrative areas which are above the threshold but which have been amalgamated with a sub-threshold parish/administrative areas. **User views are sought via this paper on what information is needed.**

For areas with less than 50 people or 20 households, only (rounded/adjusted) counts of the total number of residents and resident households will be produced.

Need for the threshold to be both 100 persons *and* 40 households, rather than 100 people *or* 40 households.

If only one condition was necessary to be met, some Output Areas may be produced with only one large communal establishment. Anyone with local knowledge would know the address of the establishment and detailed statistics would be available about people living in one identified establishment such as a student hall of residence. At the other extreme, an Output Area could be produced with just 40 people living in 40 households. Such scenarios would lead to the provision of Census output tables containing a lot of very small and visible counts.

Some Census output tables will however, provide, broad information about the population living in communal establishments in Output Areas.

Concerns about the effects of rounding/adjustment on the planned Origin and Destination Statistics

Counts in origin/destination matrices will be rounded or adjusted, including all counts of flows between areas in England and Wales and Scotland. While this will have the effect of 'coarsening' the geographical detail in the matrices, the estimates based on the aggregation of flows, though subject to a range of error, will be unbiased.

Further discussions have been taking place between ONS and Census users on Origin and Destination Statistics. For further information, please see the *Output Prospectus* (<http://www.statistics.gov.uk/census2001/op.asp>) and the Consultation document *Origin Destination Statistics - Final Specifications* (<http://www.statistics.gov.uk/census2001/origindestination.asp>). The latter notes that in particular circumstances, such as the City of London, Output Areas defined on resident populations will contain considerably larger numbers of workers. The document stated that ONS were open to suggestions of 'splitting' such output areas to create sub-output area workplace destination zones.

Need for record swapping as well as rounding/adjustment

Rounding or adjustment will be introduced as an additional disclosure control measure and not as a replacement for record swapping. Users can assume, however, that the level of swapping will be lower than it would have been had rounding or adjustment not been introduced but that the level of record swapping may need to be higher if Option 2 is chosen as opposed to Option 1.

The need to round/adjust all counts at all geographical levels

Option 1 Rounding needs to be applied for all counts and at all geographical levels because unique counts can occur at all geographical levels and/or be simply derived by the manipulation of two larger counts.

Option 2 (Small cell adjustment) does not adjust all counts and because of this, it does not protect against disclosure when user specified geographies are requested. This means there will be additional restrictions associated with its use. Requests for output for alternative geographies using individual addresses as 'building bricks' in the future will either not be accepted or further disclosure control measures will be necessary. Output Areas will probably be the smallest building brick permissible.

The need for population counts in the Postcode Directory to be rounded or adjusted.

Counts of the number of households and people for each postcode proposed to be produced in the *Postcode Directory* will be rounded or adjusted. Since Output Areas are constructed from individual postcode units, provision of unrounded or unadjusted counts would allow unrounded or unadjusted counts of the numbers of households and people for Output Areas to be obtained by aggregation and in some circumstances, unrounded/unadjusted multi-variate counts to be deduced.

For example, say an Output Area was constructed containing two postcode units, one with a population of 60 people and one with a population of 50 people. If the postcode unit populations were unadjusted or unrounded, it would be possible to determine the exact population of the Output Area - in this case 110 people. The total population is given in a number of Census Area Statistics tables and using an exact figure for this marginal total, users may be able to derive unadjusted/unrounded counts for the cells within the tables.

Risk of undermined confidence greater than perceived risk of disclosure

Maintaining the trust of the public in the ability of ONS (and National Statistics generally) to protect the confidentiality of the information supplied by the public is of paramount importance. Rounding or small cell adjustment will have no impact on the statistical conclusions to be drawn from the data. As such the rounded/adjusted data can be used with the same degree of confidence as would be the case without rounding or adjustment. The effects of rounding or adjustment are proportionately higher for small counts but small counts should only ever be used with caution, regardless of rounding or adjustment.

Any negative perceptions about tables not being internally additive if the rounding method is chosen will be covered by a note on each table to the effect that all cell counts have been independently rounded to base 3 and therefore totals will not necessarily be the sum of the constituent parts. Further guidance will also be provided in using rounded/adjusted data.

Concern that rounding or adjustment distracts from the One Number Census philosophy

All output will be produced from one database, adjusted for estimated undercount. The tables from this one database will provide consistent pictures of this one population, and hence be consistent with the One Number Census Strategy.

Differences in disclosure control methods within the UK

A separate assessment of disclosure risks and output requirements has been made for Scotland by GROS, and, although the protection of confidentiality remains equally paramount in Scotland, somewhat different arrangements have been judged to be appropriate by the Scottish Registrar General.

Output in Scotland will not be rounded or adjusted and the population threshold for Census Area Statistics will be 50 persons and 20 households. However, all areas for which results will be released in Scotland will be generated from a single set of output areas meeting this threshold.

There is no standard approach to census disclosure control that is adopted worldwide. ONS accepts that the situation of having different disclosure methods even within the UK may seem confusing. However, it is a matter for the Registrar General in each country. Differences reflect the fact that there is no clear cut methodology to determine a particular level of disclosure risk, and judgement relevant to the context must be applied.

For Northern Ireland, the Northern Ireland Statistics and Research Agency are considering whether additional measures are necessary and if so what they should be.