

# Australian Bureau of Statistics INFORMATION PAPER

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## CENSUS 81—EFFECTS OF INTRODUCED RANDOM ERROR

**PHONE INQUIRIES** for more information about these statistics—contact Mr Fred Dawes on Canberra (062) 52 5848 or any of our State offices.

other inquiries including copies of publications—contact Information Services on Canberra (062) 52 6627 or in any of our State offices.

**MAIL INQUIRIES** write to Information Services, ABS, P.O. Box 10, Belconnen, A.C.T. 2616 or any of our State offices.

### Introduction

The Australian Bureau of Statistics (ABS) has a long and continuing history of protecting the confidentiality of information which it receives from individuals and businesses. A policy of confidentiality is pursued not only for legal and ethical reasons, but also because successful data collection depends on the good will and co-operation developed with respondents. Any erosion of public confidence in the ABS's protection of confidentiality of information supplied could ultimately lead to a lowering of data quality and lesser service to statistical users.

On the 1981 Census schedule, households were assured that 'it would be an offence for any information relating to an identifiable person or household to be released'. This guarantee is embodied in the *Census and Statistics Act 1905*.

Widespread use of computers for storing and producing data has increased the need for measures to avoid the inadvertent release of identifiable information. At the same time, the number of census characteristics tabulated and the requests for more detail in census releases inevitably produce tables in which there are many cells with very small numbers. These may inadvertently allow the release of identifiable information, even though identifiers (such as names and addresses) are not available.

It has been necessary, therefore, for the ABS to make slight random adjustments to the data produced in the more detailed tabulations on microfiche and magnetic tape to avoid any risk of releasing identifiable information. These adjustments allow for a greater output of detailed data than would be possible from the use of other means for protecting the confidentiality of census data.

The random adjustments are insignificant in relative terms when the numbers are too small to be of statistical significance. They are designed to attach statistical significance to cells with values of say, 0 to 3 or differences between cells of similar magnitude. But in any case small numbers in the original data may be affected by such things as respondents omitting to answer particular questions or giving incorrect answers, or by the occasional error in coding or transcribing data in the course of ABS data processing.

### General description

Since a detailed description of the random adjustment procedures would indicate the degree of protection provided, only a general description of the procedures will be given.

Cross-classified and small area summary tables on microfiche or magnetic tape have been subjected to random adjustment processes which slightly change some of the data in a tabulation in an unbiased manner. The result is that the data for very small cells are insufficiently exact for identifiable data to be released but the information value of the tables is not impaired.

In the detailed cross-classified tables non-zero cells including totals have been randomly adjusted. Hence totals may be slightly greater or less than the sum of their components.

In the small area summary tables only small non-zero cells have been randomly adjusted. Unlike the detailed cross-classified tables, the column, row and person totals, sub-totals and overall totals in summary tables were derived after the random adjustment process was applied. A total will only contain random error if any of its cell components in a table are 3 or less.

Whenever two or more cells within a table that is subject to random adjustment are added to produce a total not directly published, or cells are added across tables for different populations, the result of the random adjustment process is that an unbiased estimate of the total is obtained but with a small variance associated with it. Except for totals which are very small or are obtained from aggregating numbers which are very small, the variance of the total can be ignored.

For areas with a population of less than 100 persons some of the small area summary tables which are finely classified are dominated by small cells. Because of possible respondent or processing error, as well as random adjustment, these tables are not of a statistical value to warrant their being published on microfiche. A page of six summary tables only will appear for these very small areas.

### Why random adjustment?

Random adjustment of the more detailed tables has been adopted by the ABS as it allows the maximum amount of detailed census data to be published while avoiding the risk of releasing identifiable data. While the method does slightly alter some of the data the effect is minimal and will not hinder the vast majority of uses of census data.

Alternative procedures studied by the ABS were considered to be inferior in one way or another. For example, suppression of confidential cells must be done in conjunction with the suppression of complementary cells to prevent deduction and is a tedious task with detailed census data. Furthermore, suppression can make some analyses impossible, particularly where the user wants to combine a number of cells to obtain totals not provided directly in the table.

Collapsing rows or columns in tables to remove confidential cells creates considerable difficulties for users wishing to compare or aggregate the same tables across areas or sub-populations. If the same table is to be created for many areas, the end result with collapsing of rows or columns would be a very broadly described table of limited use.

Random adjustment of the data in the more detailed tables is considered to be the most satisfactory technique for avoiding the release of identifiable census data—the vast majority of useful data is maintained and the data can be added together to produce unbiased totals.

**To sum up:**

(a) No reliance should be placed on cells of five or less in the detailed cross-classified tables or three or less in the small area summary tables. Even without random error firm reliance should not be placed on small cells since possible response and processing errors have greatest impact on small cells.

(b) Some small cells have been randomly altered to zero. Hence caution should be exercised in stating that there are no persons in an area having certain characteristics.

(c) Many different classifications are used in census tables and the tables are produced for a variety of geographical areas. The effect of the introduced random error will be minimised if the statistic required is found direct from a tabulation rather than from aggregating more finely classified data. Similarly, rather than aggregating data from small areas to obtain statistics about a larger standard geographical area, published data for the larger area should be used wherever possible.

(d) 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.

**Related publications**

A general discussion of the statistics planned from the 1981 Census is contained in *Census 81—Data Release Plans* (2142.0) and its *Addendum*.

**Other related publications are:**

*Catalogue of 1981 Census Tables* (2139.0)(a)  
*Making Sense of Census 81* (2140.0)  
*Geographic Code List* (2141.0)(a)  
*Census 81—Data Release Plans* (2142.0)(a)  
*Census 81—Data Release Plans, Addendum* (2142.0)(a)  
*Census 81—Magnetic Tape Summary Files* (2143.0)  
*Census 81—Statistical Publications* (2144.0)(a)  
*Census 81—Microfiche* (2145.0)  
*Census 81—Maps* (2146.0)(a)  
*Census 81—Industry* (2147.0)  
*Census 81—Occupation* (2148.0)(a)  
*Census 81—Education Qualifications* (2149.0)  
*Census 81—Dwelling, Household, Family* (2150.0)  
*Census 81—Income* (2151.0)(a)  
*Census 81—Language* (2152.0)(a)  
*Census 81—Aboriginals and Torres Strait Islanders* (2153.0)  
*Census 81—Journey to Work* (2154.0)  
*Census 81—Usual Residence and Internal Migration* (2155.0)

(a) already available.

**Further inquiries**

If you require any further information about this topic or any other aspect of the 1981 Census, please contact one of the offices listed in the Appendix.

## APPENDIX

## INQUIRIES

<b>NEW SOUTH WALES</b>	Information Services St Andrew's House Sydney, NSW, 2000 (Box 796 GPO Sydney 2001) Phone (02) 268 4395-6-7 Telex AA20819	<b>WESTERN AUSTRALIA</b>	Information Services 1-3 St George's Terrace Perth, WA, 6000 Phone (09) 323 5140 Telex AA92041
<b>VICTORIA</b>	Information Services Commonwealth Banks Building Cnr Elizabeth & Flinders Streets Melbourne, VIC, 3000 (Box 2796Y GPO Melbourne 3001) Phone (03) 652 6192 Telex AA30086	<b>TASMANIA</b>	Information Services Australian Government Centre 10th Floor 188 Collins Street Hobart, TAS, 7000 (Box 66A GPO Hobart 7001) Phone (002) 20 4437 or 20 4495 Telex AA58098
<b>QUEENSLAND</b>	Information Services 345 Ann Street Brisbane, QLD, 4000 Phone (07) 335 482 Telex AA40271	<b>NORTHERN TERRITORY</b>	The Statistician—Northern Territory 7th Floor MLC Building 81 Smith Street Darwin, NT, 5790 (Box 3796 PO Darwin 5794) Phone (089) 80 2717 Telex AA85075
<b>SOUTH AUSTRALIA</b>	Information Services City Mutual Centre 10-20 Pulteney Street Adelaide, SA, 5000 (Box 2272 GPO Adelaide 5001) Phone (08) 228 9439 Telex AA82106	<b>AUSTRALIAN CAPITAL TERRITORY</b>	Information Services Australian Bureau of Statistics Box 10 PO Belconnen, ACT, 2616 Phone (062) 52 6627 Telex AA62020

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