



## Information Paper

# Census of Population and Housing, Data Quality — Undercount

Australia

2001



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**Census of Population and  
Housing, Data Quality —  
Undercount**

**Australia**

**2001**

**Dennis Trewin  
Australian Statistician**

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# CHAPTER 1

## OVERVIEW .....

### INTRODUCTION

In the Census, some people are missed and some are counted more than once. Usually, more people are missed than are over counted. The difference between the census count and the true population is called the net undercount of the Census.

This publication provides estimates of the net undercount for the 2001 Census, as well as information on how the estimates were calculated. Data on net undercount is used to calculate estimates of the resident population of Australia, to enable users of census data to allow for undercount in their analyses, and to identify improvements for the 2006 Census.

### MAIN FINDINGS

The 2001 Census missed 1.8% of people who were present in Australia on Census Night. Net undercount in the 2001 Census was higher than for the 1996 Census (1.6%), but the same as the 1991 Census (1.8%).

The extent of net undercount varied for different population groups. Some of the observations included:

- the undercount rate was highest for the Northern Territory and lowest for the Australian Capital Territory
- people not at their usual address on Census Night, 7 August 2001, were more likely to be missed than those at home
- young adult males had a high undercount rate while older people had a relatively low undercount rate
- married people had lower undercount rates than people who were never married or separated
- people born in New Zealand had a higher undercount rate than people born in other countries, including Australia.

WHAT IS UNDERCOUNT?

Tuesday, 7 August 2001 was Census Night. On Census Night every person present in Australia, excluding foreign diplomats and their families, should have been included on a Census form at the place where they stayed. However, some people were missed while others were counted more than once.

'Undercount' refers to the number of people missed in the Census. Some of the reasons why people were missed include:

- they were travelling and were difficult to contact
- they mistakenly thought they were counted elsewhere
- there was insufficient space on the Census form in the household where they were staying
- the person completing the form thought that, for example, young babies, the elderly or visitors should not be included
- they did not wish to be included due to concerns about the confidentiality of information or a more general reluctance to participate
- the dwelling they were in was missed because it was difficult to find (for example, in a remote or non-residential area)
- the dwelling they were in was mistakenly classed as unoccupied.

'Overcount' refers to the number of people counted more than once. Some of the reasons this occurs include:

- when people are included on the Census form at the dwelling where they usually live, even though they stayed, and were counted, elsewhere on Census Night
- they were overseas on Census Night and so should not have been counted at all, but were included on the Census form at the dwelling where they usually live
- the dwelling they were in was determined to be a non-contact, because the collector determined someone was there on Census Night but did not make contact with a resident. In this case, the processing system will impute a dwelling population of the number of persons that has been enumerated, on average, for other private dwellings in the same Collection District (CD).

The difference between gross undercount and overcount, is the Net measure. In the 2001 Census in Australia, it is estimated that the proportion of people missed was 2.7%, while overcount was 0.9%, giving a net undercount rate of 1.8%.

PLACE OF ENUMERATION  
AND PLACE OF USUAL  
RESIDENCE

The Australian Census counts people where they actually are on Census Night rather than where they usually live. There is, however, a need for data based on usual residence and Census counts are available on two bases:

- Place of Enumeration: the people counted in the area on Census Night
- Place of Usual Residence: the people counted in the Census and counted where they usually live.



PLACE OF ENUMERATION  
AND PLACE OF USUAL  
RESIDENCE *continued*

Usual residence is defined as the place at which a person has lived or intends to live for six months or more. While for most people their usual residence was the same as their actual location, some people spent Census Night at a place other than where they usually lived. Thus, they had a different place of enumeration and place of usual residence.

People visiting Australia on Census Night are included in the counts and estimates for place of enumeration but not those for place of usual residence.

Estimates presented in this publication are on a place of usual residence basis.

Usual residents of Australia who are temporarily overseas on Census Night are not included in Census counts on either a place of usual residence or place of enumeration basis. However, counts of these people are obtained from overseas arrivals and departures data and they are accounted for in the estimates of the resident population of Australia.

SYSTEM CREATED  
RECORDS

Net undercount estimates in this publication are calculated in relation to the final Census counts. Census counts already include some records imputed for people for whom no response was obtained and who would otherwise have been missed in the Census. These are called System Created Records (SCRs).

The people imputed for in this way have not been included in net undercount. However, in 2001 a level of processing induced overcount was detected and an adjustment has been included in net undercount (see Appendix 2).

Imputation of this kind occurred when:

- the collector was unable to contact the occupants of a dwelling to collect the form but believed that the dwelling was occupied
- the people in a dwelling said that they would mail back a Census form but did not do so
- the people in the dwelling refused to complete a Census form.

Where possible, collectors tried to obtain information on the number of people present in the dwelling, as well as their age and sex. Where no information could be obtained, the number of males and females was imputed during processing, based on the average number of males and females for occupied private dwellings in the area. The ages of these people were imputed on the basis of the age distribution for their sex for the state or territory where they were located. Their marital status was also imputed taking account of the age and sex imputed.

In the 2001 Census there were 409,823 System Created Records (person) imputed, comprising 2.2% of the final 2001 Census count. This is an increase from 1996, when 246,192 persons were imputed, comprising 1.4% of the final 1996 Census count.

More information about SCRs, and this data, can be found in Chapter 5.

WHY MEASURE  
UNDERCOUNT?

There are a number of reasons why measuring undercount in the Census is important:

- to enable estimation of the resident population from Census counts
- to provide users with an assessment of the completeness of the Census counts, allowing them to take this into account when using Census information

## WHY MEASURE

UNDERCOUNT? *continued*

- to evaluate the effectiveness of Census collection procedures so that improvements can be made for future censuses.

Accurate resident population estimates are required for demographic, social and economic studies as well as for the allocation of seats in the Federal House of Representatives and Commonwealth payments to states and territories and local government.

Net undercount can bias Census counts because the characteristics of people missed might be different from those of the people counted. In Australia, rates of net undercount vary significantly for different population groups. Importantly, they vary according to factors such as age, sex, ethnicity and geographic area. The impact of undercount should be taken into account when using Census data.

ESTIMATED RESIDENT  
POPULATION

Estimates of undercount in the Census are used to adjust the place of usual residence Census counts, to estimate the resident population of Australia at 7 August 2001. Further adjustment is made for the number of usual residents of Australia temporarily overseas.

The way in which Estimated Resident Population (ERP) is derived from Census counts is set out in table 2.1.

**2.1** ESTIMATED RESIDENT POPULATION

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT(a)	Aust.(b)
	'000	'000	'000	'000	'000	'000	'000	'000	'000
Census count, place of enumeration	6 371.7	4 645.0	3 655.1	1 467.3	1 851.3	456.7	210.7	311.9	18 972.4
Plus residents absent interstate	67.8	79.1	30.7	24.0	15.8	9.9	3.9	9.8	241.0
Less interstate visitors	52.4	30.2	94.3	12.9	19.5	4.1	18.5	9.0	241.0
Less overseas visitors	60.6	32.9	69.5	8.3	19.2	1.8	7.9	2.8	203.1
Census count, place of usual residence	6 326.6	4 661.0	3 522.0	1 470.1	1 828.3	460.7	188.1	310.0	18 769.2
Plus adjustment for undercount	130.2	67.3	68.5	24.3	37.6	7.4	7.5	3.3	346.2
Plus residents Temporarily Overseas	128.4	86.1	46.5	18.3	38.5	3.7	2.3	6.4	330.2
equals ERP as at 7 August 2001	6 585.2	4 814.4	3 637.1	1 512.6	1 904.4	471.8	197.9	319.7	19 445.6

(a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

Table 2.2 contains data on undercount on a usual residence basis, as used in the derivation of the ERP. Undercount is greatest in the Northern Territory, with New South Wales, Western Australia, and Queensland in the next group, while Victoria, and the Australian Capital Territory, have the lowest rates.

## 2.2 NET UNDERCOUNT, Place of Usual Residence Basis

		NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT(a)	Aust.(b)
Persons	'000	130.1	67.3	68.5	24.3	37.4	7.4	7.8	3.3	346.1
Rate	%	2.0	1.4	1.9	1.6	2.0	1.6	4.0	1.0	1.8
Standard error	%	0.2	0.2	0.2	0.2	0.3	0.3	0.6	0.4	0.1

(a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

### ESTIMATED RESIDENT POPULATION *continued*

Estimates of the resident population are available from the Australian Bureau of Statistics (ABS) for each Statistical Local Area, by age and sex. While they are adjusted for undercount and other factors, they do not provide as much detailed information as the Census. Census counts can be obtained for small areas and small population groups and for a range of characteristics, including education and labour force status.

More information on estimates of the population of Australia is available in *Australian Demographic Statistics* (cat. no. 3101.0).

THE POST ENUMERATION SURVEY

In Australia, estimates of undercount in the Census are based on the results of the Post Enumeration Survey (PES). This survey is conducted about three weeks after Census Night. The purpose of the PES is to determine how many people were missed in the Census and how many were counted more than once.

The 2001 PES was a multistage area sample survey which was conducted during the period 27 August to 1 September 2001, with a week for follow-up from 3 September to 8 September. Census collectors were required to collect all forms from dwellings by 27 August 2001. In each selected household, a responsible adult member was interviewed and asked about all persons present or usually resident in the household. In addition to obtaining basic demographic information, questions were asked about each person's usual residence, location on Census Night and any other addresses where they might have been counted in the Census.

Using this address information, the corresponding Census forms were examined at the Census data processing centre to confirm how many times each person in the PES was counted in the Census. This is explained in more detail later in this Chapter.

In the 2001 PES, a sample of about 37,000 private dwellings were enumerated (about half of 1% of all dwellings in Australia). The total number of people included in the PES was about 84,000. The sampling fraction varied between states and territories, with the smaller states and territories having higher sampling fractions to ensure the reliability of estimates. More details about the reliability of PES estimates are given in the Technical Note at the end of this publication.

The aim of the PES was to provide an independent check of Census coverage. Because of this, it was important to conduct the PES as independently of the Census as possible. Thus, the field operations of the two collections were conducted separately and Census staff were not aware which areas would be included in the PES.

SCOPE AND COVERAGE

The scope of the Census included every person present in Australia on Census Night (with the exception of foreign diplomats and their families). While the PES had a similar scope, for practical reasons there were a number of areas, dwellings and people excluded or not able to be covered by the PES. Not included were:

- people who had gone overseas or had died since Census Night
- non-private dwellings such as hotels, motels, hospitals and other institutions
- homeless people (as the sample selected in the PES was based on the selection of dwellings)
- dwellings in very sparsely settled areas, where the cost of enumeration is very high
- Indigenous communities where special procedures were used in the Census (this is for conceptual as well as practical reasons).

## SCOPE AND COVERAGE

*continued*

Census enumeration of some Indigenous communities (located mostly in remote areas) involved close liaison with community organisations and employed members of the communities. The same contacts and employees would have had to be used in order to conduct the PES and, as such, it could not have been an independent check on Census coverage.

## MATCHING AND SEARCHING

The process of locating the Census forms corresponding to the addresses given in the PES involves two stages: matching and searching. Matching involved finding the form corresponding to the dwelling at which the PES interview took place while searching involved locating the forms at other addresses given in the interview.

Once a corresponding Census form was located, the next task was to match at the person level. This was done for each PES household member and involved examining the responses common to both the PES and Census forms (in particular, name) to determine whether they were counted or missed. While in most cases it was possible to identify a clear match on the basis of name, this was more difficult in some cases where, for example, a name was missing in the Census or a different name appeared to have been used. In these cases, a judgement on whether or not a person was matched was made on information such as age, sex, marital status, birthplace and relationship to other members in the Census household.

In some cases searching for a dwelling failed because of a lack of adequate address information. Where it was not possible to determine if a person was counted because of insufficient information, the decision to treat a respondent as matched or not matched was determined by imputation. The imputation was based on the results of searches for other people with similar characteristics.

People may have been missed in the Census when the dwelling they were in was missed. It is also possible, however, for people to have been missed even though the dwelling they were in was counted. An examination of the results of matching and searching revealed that around one-third of the people who were missed spent the night in a dwelling (or thought they were enumerated in a dwelling) that was counted.

This is explained in more detail in Appendix 1.

Once processing was completed, all records of names and addresses of people and dwellings in the PES were destroyed. No names or addresses of people or dwellings are stored on computer files.

## ESTIMATION OF UNDERCOUNT

Information from the PES was the main, but not the only, component used to estimate Census undercount.

The PES was used to produce counts of the number of people in the PES who should have been counted in the Census and the number who were actually counted. The ratio of these two numbers represents the net adjustment factor, the amount by which Census counts must be adjusted to allow for undercount.

The PES adjustment factor was weighted to take into account the chance of people being selected in the PES. The weighted adjustment factor was then applied to the Census count to produce an initial estimate of the population.

ESTIMATION OF  
UNDERCOUNT *continued*

This net adjustment factor takes into account both the people missed by the Census and the people counted more than once. It was calculated and applied separately for each part of state and territory by age and sex group.

The estimation procedure is illustrated in the equations below:

$$\text{adjustment factor} = \frac{\text{no. in PES who should have been counted in the Census}}{\text{no. in PES who were counted in the Census}}$$

$$\text{initial population estimate} = \text{census count} \times \text{weighted adjustment factor}$$

Special procedures were implemented for Census forms received after the start of the PES field work. These were needed to preserve the independence of the Census and PES as some people may have been prompted to return their Census forms by the arrival of the PES preliminary approach letter or the PES interviewer. Special procedures were also implemented for people in the PES who matched to Census dwellings where the people were imputed. For more details, see the Explanatory Notes.

Once initial population estimates had been calculated from the PES, a second stage of estimation took place using demographic methods. The initial population estimates at age by sex level were compared with data on the Australian population derived largely from records of births and deaths and overseas arrivals and departures. Some adjustments were made to PES estimates where there were inconsistencies with the other data.

These final population estimates were then used to calculate final estimates of the undercount rate, as shown below:

$$\text{final undercount rate} = \frac{\text{final population estimate} - \text{census count}}{\text{final population estimate}}$$

This publication presents final undercount rates.

RELIABILITY OF  
UNDERCOUNT ESTIMATES

As the estimates of undercount are based on data from a survey, they are subject to sampling error. Some of the estimates presented in the next chapter have high Standard Errors (SEs) and caution should be adopted when using these estimates. For more information about SEs see the Technical Note at the end of the publication.

The estimates of undercount are also subject to the non-sampling errors which occur in all collections, censuses and surveys. Examples of this kind of error include imperfections in reporting by respondents, errors made in collection of data and errors made in processing the data. Every effort is made in the Census and PES to reduce non-sampling error to a minimum by careful design of forms, training and supervision of collectors and interviewers and by using efficient operating procedures. Types of non-sampling error relating to Census counts are shown in the Explanatory Notes. The following paragraphs discuss sources of non-sampling error arising from the way the PES is conducted and the way estimates are derived from the survey.

RELIABILITY OF  
UNDERCOUNT ESTIMATES  
*continued*

In the 2001 PES a localised departure from operational procedures occurred for some households in Western Australia, Melbourne and Hobart. Primary Approach Letters (PALs) were sent a few days before the specified date, potentially leading to an overlap with Census form collection. To maintain the independence of PES from the Census, households where the PAL arrived before the Census form was collected, were discarded from PES processing. This affected 82 dwellings across Australia.

Other dwellings (refers to occupied private dwellings in caravan parks and retirement villages) became a greater challenge to PES processing than in 1996 because the number sampled in PES increased from 12 to 321. In both 1996 and 2001 these dwellings and their occupants were discarded from PES because the processing system did not adequately handle the hierarchy of forms used in the Census to enumerate people in these type of dwellings.

A potential weakness in the PES method is its dependence on matching as a means of deciding whether or not a given person or dwelling has been counted in the Census. The difficulties associated with the matching process mean that there is a risk of failing to match people who are actually included in the Census. The effect of not matching when there should have been a match would be to overstate net undercount in the Census. To minimise this, a second attempt was made to match all people who failed to match on the first attempt.

While the Census and PES are conducted independently of each other, they are very similar in many respects. Thus, some weaknesses in the Census may also be shared by the PES leading to an understatement of net undercount. For example, dwellings missed by a Census collector are often difficult to find and so are more likely to be missed by a PES interviewer as well. Also, people who avoid being included in the Census are just as likely to avoid being included in the PES.

## CHAPTER 4

# CHARACTERISTICS OF PERSONS UNDERCOUNTED IN THE 2001 CENSUS .....

### INTRODUCTION

This Chapter presents estimates of net undercount of persons in the 2001 Census for key demographic characteristics.

The estimates of net undercount are based on the PES and have been subject to slight demographic adjustments, as detailed in the previous chapter. The SEs presented in this section are calculated directly from the PES.

The demographic characteristics in the tables and graphs are based on the answers provided in the PES. For most households, the PES interviewer obtained responses for all members from one responsible adult. These answers are not always consistent with the answers obtained to the equivalent questions in the Census. There are a number of reasons a response may differ, including:

- a respondent having difficulties answering a question for themselves or another household member, either in the Census or the PES
- a respondent interpreting the question differently in the Census, which is conducted by self-enumeration, than in the PES, which is administered by an interviewer
- different respondents providing the PES and Census answers
- the correct answer changing between the Census and PES. Changes in age can be taken into account using the actual date of birth, but other changes, for example if the person married or divorced, can not be identified.

Where the inconsistencies are substantial, the people identified as having a particular characteristic in the PES may not be representative of the people with that characteristic in the Census. Thus, for some demographic groups, the undercount estimate based on the PES information may not accurately reflect the undercount rate in the Census. Where appropriate, this is noted in the discussion below.

The estimates of net undercount in this Chapter have been calculated on a place of usual residence basis.

### AUSTRALIA, STATES AND TERRITORIES

The 2001 Census counted 18,769,249 Australian residents. It is estimated that this count is 346,119 persons fewer than the number of residents who were actually present in Australia on Census Night, a net undercount rate of 1.8%. This rate is higher than the rate for the 1996 Census, which was 1.6%.

Table 4.1 and graph 4.2 set out the 2001 Census rates of net undercount for Australia, States and Territories, along with the rates from the 1986, 1991, and 1996 Censuses. The estimates were calculated from samples and are subject to sampling variation, indicated by the SEs provided in the table. Estimates that have high levels of variability relative to their size are indicated in the following tables by '\*' and '\*\*' (depending on the amount of variability). The levels of sampling variability are too high for these estimates to be



AUSTRALIA, STATES AND TERRITORIES *continued*

used for most practical purposes. See the Technical Note for more information on interpreting SEs.

As shown in table 4.1, there are some consistent patterns that emerge in the rates of undercount for the states and territories. In the past four censuses, the Northern Territory has had the highest undercount rate. The undercount rate for the Australian Capital Territory has been declining, and the rate for Victoria has also been declining since 1991.

All states and territories, apart from Victoria and the Australian Capital Territory, had a higher net undercount rate in 2001 than in 1996. The greatest increases were for the Northern Territory (3.1% in 1996 to 4.0% in 2001) and New South Wales (1.5% in 1996 to 2.0% in 2001).

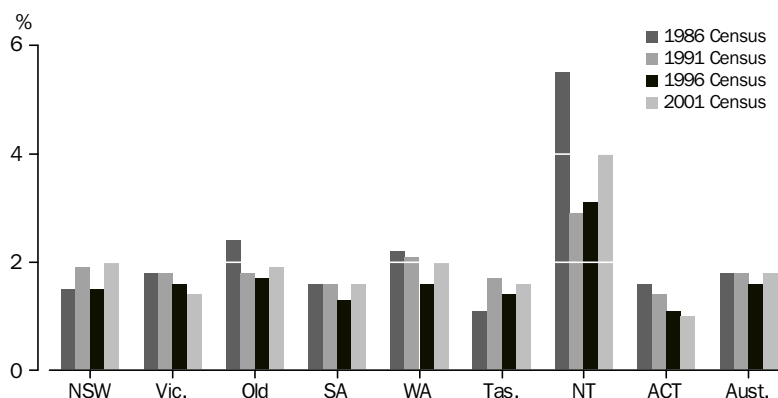
**4.1** NET UNDERCOUNT, Place of Usual Residence basis

	1986			1991			1996			2001		
	Number		Rate	Number		Rate	Number		Rate	Number		Rate
	no.	%	SE	no.	%	SE	no.	%	SE	no.	%	SE
New South Wales	81 200	1.5	0.2	109 200	1.9	0.1	91 400	1.5	0.2	130 106	2.0	0.2
Victoria	71 900	1.8	0.2	78 800	1.8	0.1	74 000	1.6	0.3	67 254	1.4	0.2
Queensland	62 700	2.4	0.2	52 100	1.8	0.1	57 300	1.7	0.3	68 514	1.9	0.2
South Australia	21 400	1.6	0.3	22 300	1.6	0.1	19 300	1.3	0.3	24 293	1.6	0.2
Western Australia	32 100	2.2	0.3	33 200	2.1	0.2	28 100	1.6	0.3	37 446	2.0	0.3
Tasmania	5 000	*1.1	0.3	7 700	1.7	0.2	6 600	*1.4	0.4	7 410	1.6	0.3
Northern Territory	8 300	5.5	1.4	4 800	2.9	0.7	5 700	*3.1	1.6	7 814	4.0	0.6
Australian Capital Territory(a)	4 000	*1.6	0.8	4 100	*1.4	0.2	3 400	1.1	0.3	3 282	*1.0	0.4
Australia(b)	286 600	1.8	0.1	312 300	1.8	0.1	285 800	1.6	0.1	346 119	1.8	0.1

\* estimate has a relative standard error of between 25% and 50% and should be used with caution  
 (a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

**4.2** NET UNDERCOUNT, Place of Usual Residence basis



Most countries conduct a post enumeration survey, with Australia and New Zealand using comparable methodology. The two countries have similar undercount rates (New Zealand's was 2.2% in 2001), and have similar issues with Census enumeration.

USUAL RESIDENT OR  
VISITOR STATUS

On Census Night people should be enumerated at the place where they spend the night. For most people, this will be the place where they usually live, but some people will spend Census Night at a location other than their usual residence. This could be in a non-private dwelling such as a motel or hospital, or may be with friends or relatives at another private dwelling. Additional difficulties are encountered in enumerating these people. For example, they may mistakenly believe they were included on the Census form at their usual residence, or they may be travelling and thus be difficult to contact and enumerate.

Table 4.3 and graph 4.4 present undercount rates for usual residents (people present at their usual residence on Census Night) and visitors (people who spent Census Night away from their usual residence). The net undercount rate for visitors was 12.2%, significantly higher than the rate for usual residents (1.2%).

The rate of net undercount of visitors was very high for the Northern Territory, almost twice that of any other state or territory. It is possible that this is an impact of the high number of visitors to the Northern Territory who stay in non-private dwellings, such as camping grounds and hostels.

The rate for the Australian Capital Territory should be treated with caution due to the high relative standard error (RSE) (\*\* indicates the RSE exceeds 50%).

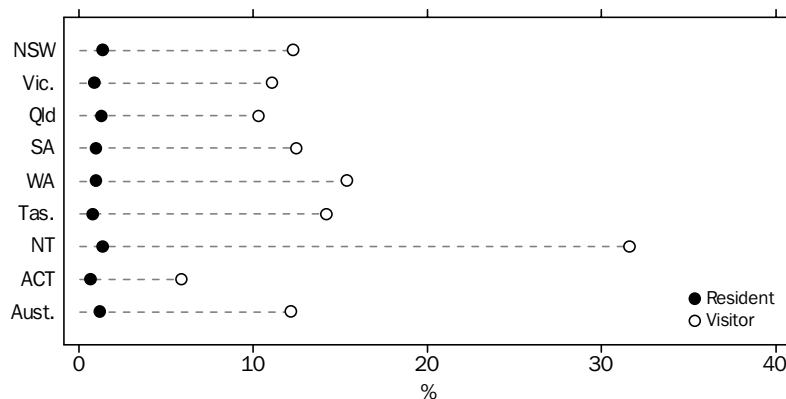
**4.3** NET UNDERCOUNT, Place of Usual Residence basis—Resident/Visitor

	RESIDENT			VISITOR			TOTAL					
	<i>Number</i>			<i>Rate</i>			<i>Number</i>			<i>Rate</i>		
	no.	%	SE	no.	%	SE	no.	%	SE	no.	%	SE
New South Wales	86 673	1.4	0.2	43 434	12.3	2.0	130 107	2.0	0.2			
Victoria	40 714	0.9	0.2	26 539	11.1	1.9	67 253	1.4	0.2			
Queensland	44 488	1.3	0.2	24 026	10.3	2.1	68 514	1.9	0.2			
South Australia	13 910	1.0	0.2	10 383	12.5	2.1	24 293	1.6	0.2			
Western Australia	17 802	1.0	0.2	19 644	15.4	2.5	37 446	2.0	0.3			
Tasmania	3 306	*0.8	0.2	4 104	14.2	2.8	7 410	1.6	0.3			
Northern Territory	2 581	*1.4	0.4	5 233	31.6	3.9	7 814	4.0	0.6			
Australian Capital Territory	2 142	*0.7	0.3	1 139	**5.9	4.2	3 281	*1.0	0.4			
Australia	211 616	1.2	0.1	134 502	12.2	1.0	346 118	1.8	0.1			

\* estimate has a relative standard error of between 25% and 50% and should be used with caution  
 \*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

USUAL RESIDENT OR VISITOR STATUS *continued*

**4.4** NET UNDERCOUNT, Place of Usual Residence basis—Resident/Visitor



CAPITAL CITY AND BALANCE OF STATE

The regional differences in net undercount rates for capital cities and the balance of each state are given in table 4.5 and graph 4.6. Capital cities are defined as the capital city statistical division (SD) in each state. Balance of state areas comprise all SDs outside the capital city SD boundaries.

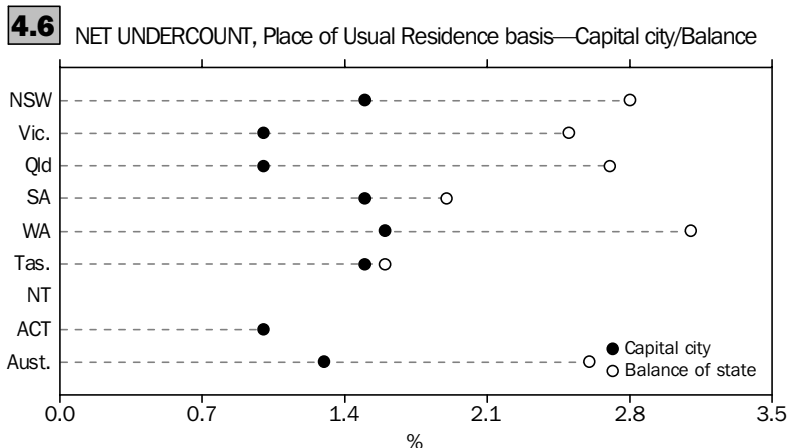
Different problems are encountered in enumerating urban and rural areas and these are reflected in the capital city/ balance of state rates. In urban areas, locating dwellings is generally easier but contacting the occupants and getting their cooperation can be more difficult. In rural and remote areas, where dwellings may be scattered over a wider area, locating the dwellings can cause considerable difficulties.

In 2001 the total net undercount rates were 2.6% for balance of state compared to 1.3% for capital cities. The difference between the two rates was less in 1996, when the net undercount rate for balance of state was 1.7% compared to 1.5% for capital cities. Queensland shows the largest difference between the capital city (Brisbane) and balance of the state.

**4.5** NET UNDERCOUNT, Place of Usual Residence basis—Capital City/Balance

	CAPITAL CITY			BALANCE OF STATE			TOTAL		
	Number	Rate	SE	Number	Rate	SE	Number	Rate	SE
	no.	%		no.	%		no.	%	
New South Wales	61 724	1.5	0.2	68 383	2.8	0.4	130 107	2.0	0.2
Victoria	34 074	1.0	0.2	33 180	2.5	0.4	67 254	1.4	0.2
Queensland	15 573	1.0	0.2	52 941	2.7	0.4	68 514	1.9	0.2
South Australia	16 536	1.5	0.2	7 757	*1.9	0.5	24 293	1.6	0.2
Western Australia	21 768	1.6	0.3	15 678	3.1	0.7	37 446	2.0	0.3
Tasmania	2 962	*1.5	0.4	4 447	1.6	0.4	7 409	1.6	0.3
Northern Territory	..	..	..	..	..	..	7 814	4.0	0.6
Australian Capital Territory(a)	3 282	*1.0	0.4	..	..	..	3 282	*1.0	0.4
Australia(b)	155 919	1.3	0.1	182 386	2.6	0.2	346 119	1.8	0.1

\* estimate has a relative standard error of between 25% and 50% and should be used with caution  
 .. not applicable  
 (a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.  
 (b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.



AGE AND SEX

The likelihood of enumerating a person in the Census is closely linked to the age and sex of that person. As has been observed in previous censuses in Australia, as well as in censuses overseas, young adult males are the group least likely to be enumerated in the Census. This trend has been observed in Simpson et al. 1997 along with two other common trends: that young children are less likely to be enumerated than children in their teens and older adults are more likely to be enumerated than younger adults.

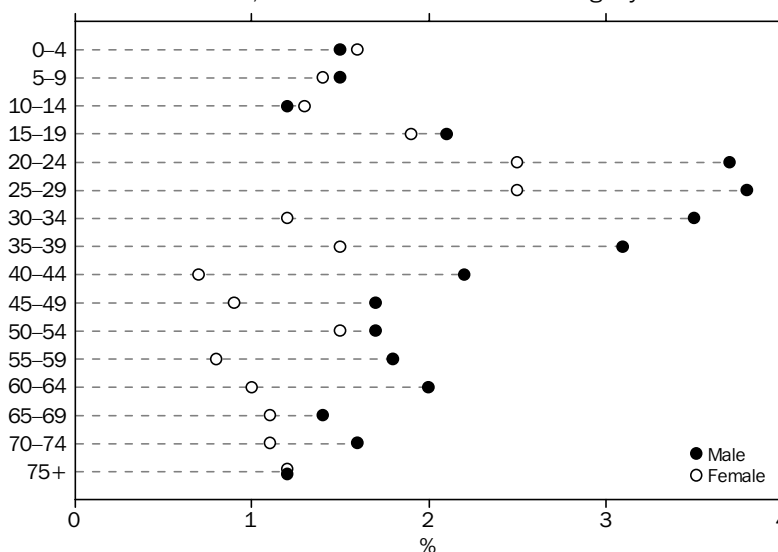
Table 4.7 and graph 4.8 confirm these trends for the 2001 Australian Census. In particular, young adult males had the highest undercount rates at 3.7% for males aged 20–24 and 3.8% for males aged 25–29. More generally, males had a higher undercount rate (2.2%) compared to females (1.4%) and children aged 0–9 had higher undercount rates than children aged 10–14. The lowest undercount rates were observed for these children (10–14 years), and people aged 65–69, and 75 and over.

**4.7** NET UNDERCOUNT, Place of Usual Residence basis—Age by Sex

	MALE			FEMALE			PERSONS		
	Number	Rate		Number	Rate		Number	Rate	
	no.	%	SE	no.	%	SE	no.	%	SE
0–4	9 572	1.5	0.5	9 728	1.6	0.4	19 300	1.5	0.3
5–9	10 715	1.5	0.4	9 491	1.4	0.4	20 206	1.5	0.3
10–14	8 030	1.2	0.3	8 802	1.3	0.3	16 832	1.2	0.2
15–19	14 322	2.1	0.4	12 430	1.9	0.4	26 752	2.0	0.3
20–24	24 112	3.7	0.5	15 996	2.5	0.5	40 108	3.1	0.4
25–29	26 143	3.8	0.5	16 765	2.5	0.4	42 908	3.2	0.3
30–34	24 798	3.5	0.4	9 039	1.2	0.3	33 837	2.4	0.3
35–39	22 390	3.1	0.4	10 893	1.5	0.3	33 283	2.3	0.3
40–44	15 573	2.2	0.4	4 951	0.7	0.3	20 524	1.4	0.2
45–49	11 132	1.7	0.3	5 751	0.9	0.3	16 883	1.3	0.2
50–54	10 845	1.7	0.4	9 633	1.5	0.4	20 478	1.6	0.3
55–59	9 233	1.8	0.4	3 982	0.8	0.4	13 215	1.3	0.3
60–64	7 999	2.0	0.5	3 828	1.0	0.4	11 827	1.5	0.4
65–69	4 723	1.4	0.4	3 591	1.1	0.5	8 314	1.2	0.4
70–74	4 762	1.6	0.5	3 476	1.1	0.4	8 238	1.3	0.4
75 and over	5 341	1.2	0.4	8 073	1.2	0.3	13 414	1.2	0.3
Total all ages	209 690	2.2	0.1	136 429	1.4	0.1	346 119	1.8	0.1

AGE AND SEX *continued*

**4.8** NET UNDERCOUNT, Place of Usual Residence basis—Age by Sex



MARITAL STATUS

Table 4.9 sets out the rates of net undercount by marital status and sex. The final ERP estimates are published in *Marriages and Divorces, Australia* (cat. no. 3310.0).

The net undercount rates were highest for people who were identified as 'Separated' or 'Never Married' in the PES while they were lowest for people who were 'Married' or 'Widowed'. In part this reflects the undercount rates by age presented in the previous table, with young adults more likely to be never married and older persons more likely to be widowed. Again, these results largely reflect the experience in previous censuses in Australia and in censuses overseas (Simpson et al. 1997).

**4.9** NET UNDERCOUNT, Place of Usual Residence basis—Marital Status

	MALE			FEMALE			PERSONS		
	Number		Rate	Number		Rate	Number		Rate
	no.	%	SE	no.	%	SE	no.	%	SE
<b>Marital status</b>									
Never Married	98 786	3.7	0.3	52 618	2.4	0.3	151 404	3.1	0.2
Widowed	5 525	*3.3	1.0	10 800	*1.5	0.4	16 325	1.8	0.4
Divorced	15 831	3.6	0.6	3 346	**0.6	0.3	19 177	1.9	0.3
Separated	12 112	6.0	1.0	9 117	3.3	0.8	21 229	4.5	0.6
Married	49 051	1.2	0.1	32 388	0.8	0.1	81 439	1.0	0.1
Total	181 305	2.4	0.1	108 269	1.4	0.1	289 574	1.9	0.1

\* estimate has a relative standard error of between 25% and 50% and should be used with caution  
 \*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

COUNTRY OF BIRTH

As the Census is conducted by self-enumeration, people who have come to Australia from other countries and whose first language is not English could find completing the Census a more difficult task than other Australians. An Ethnic Enumeration Strategy has been used for several censuses to promote understanding of the Census among migrants to Australia and to provide assistance in a range of languages.

## COUNTRY OF BIRTH

*continued*

As can be seen in table 4.10, although there was considerable variation in rates of undercount among birthplace groups, the rates for people from non-English speaking countries were not generally higher than those for people born in Australia. There is no evidence that there was any systematic problem in enumerating people from other countries.

As in the 1996 Census, the undercount rate is highest for people born in New Zealand. At 3.3%, the 2001 undercount for New Zealanders has increased from that in the 1996 Census, which was 2.8%.

Another continuing trend observed in previous censuses is the relatively low undercount rate for people from some European countries, such as Italy and Greece. This may in part reflect the older age structure of migrants from these countries, many of whom arrived in Australia after the second world war. As observed earlier, older people tend to have lower undercount rates.

**4.10** NET UNDERCOUNT, Place of Usual Residence basis—Birthplace

COUNTRIES OF BIRTH	MALE			FEMALE			PERSONS		
	Number	Rate		Number	Rate		Number	Rate	
	no.	%	SE	no.	%	SE	no.	%	SE
Australia	162 200	2.2	0.1	112 000	1.5	0.1	274 200	1.9	0.1
New Zealand	8 900	4.8	1.1	3 000	*1.7	0.7	11 900	3.3	0.7
England	7 900	*1.8	0.5	600	**0.1	0.4	8 500	*1.0	0.4
Scotland	1 300	*1.8	0.8	1 300	**1.9	1.1	2 600	*1.8	0.7
Germany	1 400	**2.5	1.3	-300	-0.6	1.0	1 100	**0.9	0.9
Italy	1 800	**1.4	0.8	1 800	**1.5	0.8	3 600	*1.4	0.6
Greece	200	**0.3	1.2	-600	-0.9	1.2	-400	-0.3	1.0
Viet Nam	1 100	**1.3	1.4	2 000	**2.3	1.5	3 100	**1.8	1.2
Philippines	100	**0.1	1.2	600	**0.9	1.4	700	**0.6	1.2
China	2 500	**3.5	2.2	-200	-0.2	1.6	2 300	**1.5	1.6
Other (inc not stated)	22 300	2.1	0.4	16 100	1.5	0.4	38 400	1.8	0.3
Total	209 700	2.2	0.1	136 400	1.4	0.1	346 100	1.8	0.1

\* estimate has a relative standard error of between 25% and 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

## INDIGENOUS ORIGIN

The underenumeration rate for those people identifying as Indigenous in the 2001 Census was 6.1% (compared to just over 7% in 1996).

Approximately 85% of people identifying as Indigenous in the Census were in scope for inclusion in the PES. The PES does not cover people living in sparsely populated areas of Australia. Special enumeration methods are used by the Census in Indigenous communities in the sparsely populated areas which make it difficult to conduct an independent PES.

Estimates of the Indigenous population are available in the publications *Population Distribution, Indigenous Australians* (cat. no. 4705.0) and *Australian Demographic Statistics* (cat. no. 3101.0).

SYSTEM CREATED RECORDS IN THE 2001 CENSUS

System Created Records (SCRs) are created during Census processing for people for whom a Census form has not been received and the collector believes that they have been missed from the Census count.

For private dwellings, most SCRs are created where the collector has not been able to make contact with the household, yet believes that the dwelling was occupied on Census Night. Smaller numbers of SCRs are due to situations where people indicate a desire to mail back a Census form but do not do so, and where people refuse to complete a Census form. The term 'non-contact' dwelling is used to refer to all these situations. The number of person records created for the non-contact private dwellings is based on the average number of people in private dwellings for that collection district (CD).

Systems Created Records have values imputed for age, sex, marital status and usual residence only. Values for other variables are set to not stated or not applicable, depending on the imputed value for age. Almost 95% of SCRs (persons) are created in non-contact dwellings.

In the 2001 Census there were 409,823 System Created Records (person) imputed, comprising 2.2% of the final 2001 Census count. This is an increase from 1996, when 246,192 persons were imputed, comprising 1.4% of the final 1996 Census count. Table 5.1 provides this data state by state.

**5.1** SYSTEM CREATED RECORDS—1996 and 2001 Censuses

	1996			2001			Increase in SCRs 1996 to 2001
	Persons	SCRs	% of SCRs	Persons	SCRs	% of SCRs	
	no.	persons	%	no.	persons	%	
New South Wales	6 038 696	88 961	1.5	6 371 745	173 878	2.7	1.3
Victoria	4 373 520	57 388	1.3	4 644 950	97 618	2.1	0.8
Queensland	3 368 850	44 033	1.3	3 655 139	63 340	1.7	0.4
South Australia	1 427 936	14 487	1.0	1 467 261	17 959	1.2	0.2
Western Australia	1 726 095	24 909	1.4	1 851 252	36 551	2.0	0.5
Tasmania	459 659	5 007	1.1	456 652	5 983	1.3	0.2
Northern Territory	195 101	7 383	3.8	210 664	7 869	3.7	—
Australian Capital Territory(a)	299 243	3 954	1.3	311 947	6 608	2.1	0.8
Australia(b)	17 892 423	246 192	1.4	18 972 350	409 823	2.2	0.8

— nil or rounded to zero (including null cells)  
 (a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

SYSTEM CREATED  
RECORDS IN THE 2001  
CENSUS *continued*

Compared with 1996, the proportion of 'non-contact' dwellings more than doubled from around 0.9% of all dwellings in 1996, to 2.0% in 2001. Table 5.2 provides this data state by state.

**5.2** NON-CONTACT DWELLINGS—1996 and 2001 Censuses

	1996			2001			<i>Increase in Non- contacts 1996 to 2001</i>
	<i>Total Dwellings</i>	<i>Non- contact Dwellings</i>	<i>% of Non- contacts</i>	<i>Total Dwellings</i>	<i>Non- contact Dwellings</i>	<i>% of Non- contacts</i>	
	no.	no.	%	no.	no.	%	
New South Wales	2 394 212	23 822	1.0	2 578 042	63 343	2.5	1.5
Victoria	1 773 220	15 161	0.9	1 918 583	38 343	2.0	1.1
Queensland	1 329 799	9 977	0.8	1 487 193	24 355	1.6	0.9
South Australia	618 678	3 874	0.6	647 606	8 052	1.2	0.6
Western Australia	700 381	5 818	0.8	774 926	15 314	2.0	1.1
Tasmania	201 817	1 247	0.6	208 702	2 698	1.3	0.7
Northern Territory	61 316	1 199	2.0	72 389	2 147	3.0	1.0
Australian Capital Territory(a)	114 568	1 123	1.0	121 974	2 200	1.8	0.8
Australia(b)	7 195 169	62 234	0.9	7 810 352	156 460	2.0	1.1

(a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

In non-private dwellings (NPDs) (such as hotels, motels, etc.), SCRs are created where a person is listed on the Summary Form as being present on Census Night, but no Census personal form has been received. However NPDs are out of scope for the PES collection.

NON-CONTACT  
DWELLINGS AND  
UNOCCUPIED DWELLINGS

An unoccupied dwelling for Census purposes is different from a vacant dwelling. For a dwelling to be counted as unoccupied in the Census it need only be empty on Census Night itself. In situations where the collector has not been able to collect a form from a dwelling, the collector is faced with the choice of recording the dwelling as either non-contact or unoccupied.

Some of the reasons for the increase in non-contacts are as follows:

- In the 2001 Census, collectors reported difficulty contacting some householders, especially where there were access problems such as with security buildings or gated communities.
- In suburban areas, growing community concerns about security make it increasingly difficult to judge whether the residents are absent or not. If contact cannot be made with a household on delivery, the Census form is left in a discrete location where it can be recovered by the collector if the resident was away. In some cases these forms are being removed by friends or neighbours and the collector makes the assumption that the household is occupied (and a 'non-contact') rather than unoccupied.



NON-CONTACT  
DWELLINGS AND  
UNOCCUPIED DWELLINGS  
*continued*

- Different procedures applied in the 2001 Census for the treatment of apartment blocks with mixed occupancy which contained both units occupied by residents (either owner-occupied or rented long-term) and units occupied only by short-term visitors. These are prevalent in resort areas such as the Gold Coast, but also in the central business districts of major cities. In 1996, these were inconsistently treated — sometimes as a single non-private dwelling and at other times as a number of private dwellings. In 2001, if there was any doubt, the collector was instructed to treat these apartment blocks as a number of private dwellings.

*Further Investigation*

The Australian Bureau of Statistics is analysing the results of a number of studies undertaken to investigate this situation. A Census Paper covering these issues in greater detail will be published in late 2003.

## EXPLANATORY NOTES .....

### SCOPE AND COVERAGE OF THE 2001 CENSUS

**1** The 2001 Census of Population and Housing was held on 7 August 2001. The first Commonwealth Census was held in 1911 and since 1961 a Census has been taken every five years, a frequency which is specified in the *Census and Statistics Act 1905*. The objective of the Census is to measure accurately the number and key characteristics of people in Australia on Census Night, and the dwellings in which they live.

**2** The Census aims to count every person who spent Census Night in Australia. This includes Australian residents in Antarctica and people in the territories of Jervis Bay, Cocos (Keeling) Islands and Christmas Island. The other Australian External Territories, Norfolk Island and minor islands such as Heard and McDonald Islands, are outside the scope of the Australian Census. The only group of people who spend Census Night in Australia but are excluded from the Census are foreign diplomats and their families.

**3** The Census includes people on vessels in or between Australian ports, on board long-distance trains, buses or aircraft and on oil rigs off the Australian coast. People entering Australia before midnight on Census Night are counted while people leaving an Australian port for an overseas destination before midnight on Census Night are not. Visitors to Australia are included regardless of how long they have been in the country or how long they plan to stay. However, for people who intend to be in Australia for less than 12 months, only basic demographic data are available. The Census includes people camping out and the homeless.

**4** All private dwellings, except diplomatic dwellings, are included in the Census, whether occupied or unoccupied. Caravans in caravan parks, manufactured homes in manufactured home estates and self-care units in accommodation for the retired or the aged are counted only if occupied. Occupied non-private dwellings, such as hospitals, prisons, hotels, etc., were also included.

**5** Details about the 2001 Census content, collection operations, confidentiality and privacy protection, processing and evaluation activities are contained in *2001 Census — Nature and Content* (cat. no. 2008.0).

### SPECIAL PROCEDURES FOR LATE RETURNS AND IMPUTED RECORDS

**6** As was mentioned in the estimation section of Chapter 3, two groups were treated differently in the estimation procedures. These were:

- people whose Census form was received after the start of PES field work (late returns)
- people imputed where completed Census forms could not be obtained (System Created Records, see Chapter 2 for details).

**7** In effect, these special procedures are based on the assumption that these people have been counted the correct number of times in the Census. The actual method for estimating the population, taking into account the special procedures, is illustrated below:

$$\text{adjustment factor \#} = \frac{\text{no. in PES who should have been counted in the Census \#}}{\text{no. in PES who were counted in the Census \#}}$$

$$\text{initial population estimate} = \text{census count \#} \times \text{weighted adjustment factor \#} + \text{census count (late returns, imputed records)}$$

SPECIAL PROCEDURES FOR  
LATE RETURNS AND IMPUTED  
RECORDS *continued*

**8** As a result of this assumption, the overall estimate of net undercount would be expected to be a slight underestimate. However, the assumption is necessary because: late returns may have been prompted by the PES field work and including them would bias the estimates, and it is not possible to match to persons imputed in dwellings so undercount for imputed records cannot be accurately measured by the PES.

DATA QUALITY

**9** Census data are subject to a number of inaccuracies resulting from errors by respondents or mistakes in collection or processing. Whilst many of these are corrected by careful processing procedures, some still remain. The effect of the remaining errors is generally slight, although it may be more important for smaller groups in the population. The main kinds of errors to keep in mind are:

- Partial non-response: In some cases where an answer is not provided to a question an answer is imputed (often from other information on the form). In other cases a 'not stated' code is allocated.
- Processing error: While such errors can occur in any processing system, quality management is used continuously to improve the quality of processed data, and to identify and correct data of unacceptable quality.
- Random adjustment: Table cells containing small values are randomly adjusted or suppressed to avoid releasing information about particular individuals, families, or households. The effects of these changes is statistically insignificant.
- Respondent error: Because processing procedures cannot detect or repair all errors made by people in completing their forms, some remain in final data.
- Undercount: Although the Census aims to count each person, there are some people who are missed and others are counted more than once.

**10** For further information on sources of error in the Census, refer to the appropriate entries in the *2001 Census Dictionary*, (cat. no. 2901.0).

EFFECTS OF ROUNDING

**11** In this publication figures have been rounded to the nearest hundred. Where figures have been rounded, discrepancies may occur between totals and the sums of the component items.

RELATED PAPERS

**12** The following is a list of publications related to this ABS paper.

*Census 86: Data Quality – Undercount*, cat. no. 2607.0, ABS, Canberra.

*1991 Census Of Population and Housing: Data Quality – Undercount*, cat. no. 2940.0, ABS, Canberra.

*1991 Census Of Population and Housing: Data Quality – Undercount*, cat. no. 2940.0, ABS, Canberra.

*1996 Census Of Population and Housing: Data Quality – Undercount*, cat. no. 2940.0, ABS, Canberra.

Demography Working paper 2002/2 — *Estimated Resident Population and Effects of Census System Created Records*.

2001 Census of Population and Housing Fact Sheet — *Effects of Census Processes on Non-response Rates and Person Counts*.

Simpson, S. and Middleton, E. 1997, *Who is missed by a national Census? A review of empirical results from Australia, Britain, Canada and the USA*, CCSR Working Paper No. 2 – June 1997, Manchester.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
CD	Collection District
ERP	estimated resident population
NPD	non-private dwelling
PAL	primary approach letter
PES	post-enumeration survey
RSE	relative standard error
SCR	system-created record
SD	Statistical Division
SE	standard error

PEOPLE MISSED IN  
ENUMERATED DWELLINGS

As mentioned in Chapter 3, some people missed in the Census spent Census Night in dwellings that were enumerated, while others were in dwellings that were missed. This section presents a more detailed analysis of the data available. In the PES people are asked a number of questions about where they live and addresses where they might have been counted in the Census, including:

- if they or the person answering on their behalf thought they were counted on a Census form (and if so where) and
- where they were on Census Night.

The Census form corresponding to the PES address is checked to determine if the person was counted. A search was then conducted for all other addresses provided to determine if the person was counted anywhere else. The people included in the tables below are those for whom no match was found at either the PES address or the search address if one was given.

Sometimes not enough address information was supplied to try to find a dwelling. In these cases, the result of the search was imputed based on the success of searches for other similar people. Tables A1.1 and A1.2 include those people for whom a status of missed was imputed, with the search result categorised as 'Search Not Possible'.

The tables present unweighted data and so represent the actual number of people in the PES who were missed in the Census. The counts do not correspond to other counts included in this publication but do still give an indication of the trends.

**A1.1** ENUMERATION STATUS OF DWELLINGS, Undercounted People

	<i>Search not possible</i>	<i>Dwelling missed</i>	<i>Dwelling enumerated</i>	<i>No search address given</i>	<i>Total</i>
	no.	no.	no.	no.	no.
No, not counted	156	37	174	258	625
Yes, at census night dwelling	272	93	459	1 574	2 398
Yes, at another dwelling	79	14	56	8	157
Not stated	—	—	—	4	4
Total undercounted	507	144	689	1 844	3 184

— nil or rounded to zero (including null cells)

PEOPLE MISSED IN  
ENUMERATED DWELLINGS  
*continued*

**A1.2** ENUMERATION STATUS OF DWELLINGS, Undercounted People

	Search not possible	Dwelling missed	Dwelling enumerated	No search address given	Total
	%	%	%	%	%
No, not counted	4.9	1.2	5.5	8.1	19.6
Yes, at census night dwelling	8.5	2.9	14.4	49.4	75.3
Yes, at another dwelling	2.5	0.4	1.8	0.3	4.9
Not stated	—	—	—	0.1	0.1
Total undercounted	15.9	4.5	21.6	57.9	100.0

— nil or rounded to zero (including null cells)

People are meant to be counted at the dwelling where they are on Census Night. Of the 3,184 people who were missed,

- 57.9% did not give a search address, in most cases (85%) because they or the person answering on their behalf thought they had been counted
- 15.9% gave a search address which didn't have enough information to be able to uniquely identify the dwelling
- 21.6% gave a search address where the dwelling was counted
- 4.5% gave a search address where the dwelling was missed.

Although they are meant to be counted at their Census dwelling, some people will be counted at a dwelling other than where they were on Census Night. Of the 3,184 people missed, 20% thought that they weren't counted on a Census form and 75% thought that they were counted at the same address as where they were on Census Night.

This means that 157 people (5%) thought that they were included on a Census form other than where they were on Census Night.

Interestingly, some 80% of people who were missed thought that they were counted in the Census. There could be various reasons for this:

- some people might have mistakenly believed that they, or the person they were answering on behalf of, had been included on a Census form
- some people might have completed a form which wasn't collected or returned
- some people might not have wanted to admit to the PES interviewer that they, or the person they were answering on behalf of, were not included on a Census form.

DWELLINGS

Although all persons usually resident in Australia should be counted in the Census, not all dwellings can expect to receive a Census form. This is because not all dwellings are habitable or, in the case of a diplomatic dwelling, do not contain people within the scope of Census. Vacant dwellings are counted in the Census because although they are not occupied, they are habitable.

The number of dwellings missed by the Census does not include:

- Dwellings under construction
- Dwellings converted to a non-dwelling
- Derelict dwellings
- Dwellings which have been demolished
- Diplomatic dwellings
- Dwellings which were erroneously selected in the PES sample

From the PES sample, 910 dwellings were not counted in the Census, of which 553 were habitable and 357 were uninhabitable or diplomatic dwellings. This compares with 36,100 habitable dwellings in the scope of PES and gives an unweighted dwelling undercount rate of 1.5%.

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Table A2.1 shows the components of the net undercount which is then used to determine the ERP as shown in table 2.1 of this publication.

### **A2.1** COMPONENTS OF NET UNDERCOUNT

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT(a)	Aust.(b)
	no.	no.	no.	no.	no.	no.	no.	no.	no.
PES gross undercount	199 500	113 400	104 600	32 100	52 700	10 400	10 500	7 300	530 500
PES gross overcount	28 900	22 700	22 500	3 800	6 800	1 400	800	1 800	88 700
Processing induced overcount	37 500	21 300	11 900	3 500	7 600	1 300	1 800	2 100	87 100
Demographic adjustments	-3 000	-2 100	-1 700	-600	-900	-200	-100	-100	-8 700
Adjusted gross undercount	196 500	111 300	102 900	31 600	51 900	10 200	10 400	7 200	521 800
Adjusted gross overcount	66 400	44 000	34 400	7 300	14 400	2 700	2 500	3 900	175 700
Net undercount	130 100	67 300	68 500	24 300	37 400	7 400	7 800	3 300	346 100

(a) Prior to September quarter 1993, Jervis Bay Territory is included in estimates for the Australian Capital Territory. A.C.T. excludes Jervis Bay Territory from September quarter 1993.

(b) Australia includes 'Other Territories' from September quarter 1993. 'Other Territories' include Christmas Island, the Cocos (Keeling) Islands and Jervis Bay Territory.

Briefly, each component can be described as:

#### PES Gross Undercount

- refers to the number of people missed in the Census as measured by the PES.

#### PES Gross Overcount

- refers to the number of people counted more than once in the Census as measured by the PES.

#### Processing Induced Overcount

- is the term used to refer to the finding that too many persons records were imputed in 2001 Census processing for non-contact dwellings. A review of procedures for measuring Census net undercount conducted in September 2002 has shown that on average the number of persons in non-contact dwellings is substantially lower than in other private dwellings. A consequence of this finding is that the practice of imputing persons using the average number of people in private dwellings within the same CD tends to over-estimate the number of people living in those dwellings.

#### Demographic adjustment

- is a term that encompasses a range of adjustments made to the population estimates during rebasing. It is foremost a data confrontation exercise, where a number of checks are made against other sources. However internal checks are also made as well as one-off changes for problem areas. In short they are:
  - age/sex internal consistency for undercount adjustments
  - some consistency against other years' PES
  - cohort size and sex ratio checks versus Medicare registrations, Demographic Estimates, ERP updated from the previous Census
  - checks of ages imputed in the Census
  - checks for Census 'vandals' in upper ages (adjustment for obviously implausible and unlikely census responses)

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*continued*

- assorted other issues that arise during processing, including SLA-specific adjustments.

Adjusted Gross Undercount

- takes into account (adds) the demographic adjustment to the gross undercount data.

Adjusted Gross Overcount

- comprises the gross overcount plus the processing induced overcount.

Net Undercount

- is simply the difference between gross measures (undercount and overcount), the Net measure. In this case, it is really the Net Adjusted Undercount.
- The Net measure is a convenient method, but it does not show the real situation, and infers that overcount 'cancels out' undercount. For example, if Gross Undercount was 5% and Gross Overcount was 5%, we had a miscount of 10% but a Net of 0. Further, the SCRs make an adjustment to the census count for non-contact occupied private dwellings.



SAMPLING ERRORS  
ASSOCIATED WITH  
STATISTICS PRODUCED FROM  
THE PES

**1** Statistics produced from the PES are subject to sampling error. Since only a sample of dwellings is included in the PES, estimates derived from the survey may differ from figures which would have been obtained if all dwellings had been included. One measure of the likely difference is given by the SE which indicates the extent to which an estimate might have varied by chance because only a sample was included.

**2** The particular sample selected for the PES was only one of a number of possible samples. Each possible sample would yield different estimates. The SE measures the variation of all the possible sample estimates around the figures which would have been obtained if all dwellings had been included.

**3** Given an estimate and the SE on that estimate, there are about two chances in three that the sample estimate will differ by less than one SE from the figure that would have been obtained if all dwellings had been included, and about nineteen chances in twenty that the difference will be less than two SEs.

**4** The following example illustrates the use of the concept of SE:

If an estimate of 1.3% has a SE of 0.1 percentage points there are two chances in three that the figure that would have been obtained if all dwellings had been included in the sample is in the range 1.3 per cent ± (1 x 0.1%) or 1.2 per cent to 1.4 per cent and nineteen chances in twenty that the figure is in the range 1.3 per cent ± (2 x 0.1%) or 1.1 per cent to 1.5 per cent.

**5** For ease of use, the SEs corresponding to the net undercount rates are given next to the rates in the tables throughout this publication.

SAMPLING ERRORS ON  
ESTIMATES OF DIFFERENCES

**6** The sampling error on the difference between two estimates can be derived from their SEs. For the difference between two estimates x and y produced from the PES the SE of the difference may be approximated by the following formula:

$$\text{Standard Error (x-y)} = \sqrt{[\text{Standard Error(x)}]^2 + [\text{Standard Error(y)}]^2}$$

**7** This approximation will be exact for differences between estimates in different states, for Capital City versus Balance of state, or for differences between estimates from different censuses. However, for estimates within the same region there will tend to be a negative correlation between the rates so that the approximation will tend to underestimate the true SE.

**8** For example, if the estimates of the rate of undercount for residents at home on Census Night for two states are 1.3 per cent and 2.2 per cent, with SEs of 0.1 and 0.2 percentage points respectively, using the formula above the SE on the difference 0.9 per cent is:

$$\sqrt{(0.1\%)^2 + (0.2\%)^2} = 0.22\%$$

**9** Therefore there are nineteen chances in twenty that the difference between the rates of undercount for usual residents at home on Census Night between these two states is within the range 0.9 ± (2 \* 0.22) or 0.46 to 1.34 percentage points.

## GLOSSARY .....

<b>Capital city or balance of state</b>	Capital cities are defined as areas covered by the capital city SD in each state and territory. The balance of state comprises all SDs in the state or territory other than the capital city SD.
<b>Dwelling</b>	<p>A dwelling is a building or structure in which people live. This can be a building, such as a house; part of a building, such as a flat; or it can be a caravan or tent, humpy or a park bench. Houses under construction, derelict houses, vacant tents, or converted garages, are not counted as dwellings in the Census. There are private and non-private dwellings.</p> <p>A private dwelling is normally a house, flat, part of a house, or even a room. Private dwellings can be either occupied or unoccupied, although in some situations only occupied dwellings are counted. The following accommodation types are also classed as private dwellings: a house attached to, or room above, shops or offices; an occupied caravan or unit in a caravan park or on a residential allotment; an occupied boat in a marina; an occupied dwelling in a manufactured home estate; an occupied self-care unit in a retirement village; a houseboat; or a tent if it is standing on its own block of land.</p> <p>Non-private dwellings are those dwellings not included above which provide a communal or transitory type of accommodation. These dwellings include hotels, motels, guest houses, prisons, religious and charitable institutions, defence establishments, hospitals and other communal dwellings. Only occupied non-private dwellings are included in the Census.</p>
<b>Estimated Resident Population (ERP)</b>	The ERP at Census date is formed by adding estimates of Australians overseas and the Census undercount to the Census count at place of usual residence. ERP estimates are also available quarterly for each post-censal year.
<b>Gross overcount</b>	The number of people in the Census who should not have been counted, either because they had already been counted or because they were overseas and should not have been counted at all. If a person was counted in the Census three times, they would be contribute two counts to the gross overcount.
<b>Gross undercount</b>	The number of people who should have been counted in the Census but were not.
<b>Net undercount</b>	The difference between the gross undercount and the gross overcount. This is the total effect of missing some people and counting others more than once.
<b>Other territories</b>	The Other territories comprise Jervis Bay Territory and the external territories of Christmas Island and Cocos (Keeling) Islands.
<b>Part of state</b>	Parts of state are the capital city and balance of state in each state and territory. In a number of processes, such as estimation, the different parts of state are dealt with separately.
<b>Place of enumeration Census count</b>	People are counted according to where they were on Census Night. Overseas visitors are included and Australians overseas are excluded from the counts. No adjustment is made for Census undercount.
<b>Place of enumeration net undercount</b>	This is the net undercount of the place of enumeration Census counts. It is the net percentage of people present (in Australia, or a particular state or territory) on Census Night who were not counted.
<b>Place of usual residence Census count</b>	People are counted according to their stated place of usual residence. Overseas visitors are included and Australians overseas are excluded from the counts. No adjustment is made for Census undercount.

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<b>Place of usual residence net undercount</b>	This is the net undercount of the usual residence Census counts. It is the net percentage of usual residents (of Australia, or a particular state or territory) present in Australia on Census Night who were not counted.
<b>Relative standard error</b>	The SE expressed as a percentage of the estimate. For more details see the Technical Note.
<b>Standard error</b>	A measure of the likely difference between the true value and the estimate. For more details see the technical note.
<b>Usual residence</b>	A person's usual residence is defined as being the place where they have lived or where they intend to live for 12 months or more.
<b>Usual resident or visitor status</b>	A person was a usual resident for the Census if they were at their usual residence on Census Night. Visitors were people who were not at their usual residence on Census Night.









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