



**The distribution of household crowding in New
Zealand: An analysis based on 1991 to 2006
Census data**

2012

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H E K A I N G A O R A N G A

Citation: Baker MG, Goodyear R, Telfar Barnard L, Howden-Chapman P. *The distribution of household crowding in New Zealand: An analysis based on 1991 to 2006 Census data*. Wellington: He Kainga Oranga/ Housing and Health Research Programme, University of Otago, 2012.

Published in 2012 by He Kainga Oranga / Housing and Health Research Programme, University of Otago, PO Box 7343, Wellington South, New Zealand

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Acknowledgements

He Kainga Oranga/Housing and Health Research Programme at the University of Otago, Wellington, would like to acknowledge support for this project from Te Kete Hauora, Māori Health Directorate, Ministry of Health and from Statistics New Zealand.

We also wish to acknowledge statistical advice from Dr Michael Keall.

1. Executive summary

Introduction

Exposure to household crowding is an important risk factor for infectious diseases including pneumonia, meningococcal disease, and tuberculosis. This study aimed to produce a detailed description of household crowding across the 1991 – 2006 Censuses, with a specific focus on Māori and Pacific housing conditions and ethnic and socio-economic inequalities.

Methods

This study was based on housing data derived from the 1991, 1996, 2001, and 2006 Censuses. It was analysed at the unit record level in collaboration with Statistics NZ.

Household crowding can be derived from Census data on household composition (number of people and their ages and couple status) and the number of rooms in the house. This analysis initially compared results obtained using four different indexes, three based on number of bedrooms in the house (Canadian National Occupancy Standard [CNOS], Equivalised Crowding Index, and British Bedroom Standard) and one based on total rooms (American Crowding Index). It then used the CNOS to describe the distribution of household crowding over time and according to major socio-demographic characteristics of the population. The analysis focussed on reporting the proportion of people exposed to household crowding, rather than the proportion of households which are crowded (which is the usual way these data are presented and which inevitably understates the proportion of people exposed).

Ethnicity was analysed using ‘total response’ ethnicity where those recording multiple ethnicities were included in all of the ethnic groups that they nominated. The population was divided into four ‘major’ ethnic groups using level one ethnic group categories, as follows: total Māori; total Pacific peoples; total Asian (limited analysis in this report); European/Other (including Middle Eastern, Latin American, African [MELAA] from 2006).

Results

After declining for many decades, exposure to household crowding appears to have levelled out in New Zealand (NZ), with the 2006 Census showing 10.4% of the population as being exposed to household crowding (1+ bedroom deficit), a slight increase from 10.1% exposed in 2001 but less than 11.9% in 1991. The proportion exposed to severe household crowding (2+ bedroom deficit) was 3.5% in 2006, which was the same level as in 1991. Even though the proportion of those exposed to severe crowding has remained the same, population growth means there has been a 15.8% rise in absolute numbers of people living in severely crowded households.

The distribution of exposure to household crowding is very uneven with much higher levels for children relative to adults, and for Māori and Pacific peoples relative to European/Other. Using the CNOS the proportions exposed to household crowding (1+ bedroom deficit) in 2006 were 42.6% for Pacific peoples, 22.8% for Māori, 19.6% for Asians, and 4.7% for European/Other. Household crowding also varied across Pacific populations, being 51.8% for Tongans, 42.2% for Samoans, 39.7% for Cook Island Māori, and 37.3% for other Pacific peoples.

About 28% of Māori children under 5 years of age were exposed to household crowding in 2006, with 10.1% exposed to severe crowding (2+ bedroom deficit). The risk is even higher for Pacific children where 45.4% were exposed to household crowding, with 20.6% exposed to severe crowding (2+ bedroom deficit). By contrast, only 8.2% of European/Other children under 5 years of age were exposed to household crowding, with 1.9% exposed to severe crowding (2+ bedroom deficit). For severe crowding, levels of exposure rose over the 1991-2006 period for children under

15 years and under 5 years. This rise was largest for Pacific children, but also evident for European/Other children. For children under 5 years of age, ethnic inequalities have persisted over this period. For Māori children, the relative risk of exposure to severe household crowding, compared with European/Other, was 6.3 (95% CI 6.1-6.6) in 1991, and 5.4 (95% CI 5.2-5.7) in 2006. For Pacific children, the relative risk of exposure to severe household crowding was 11.2 (95% CI 10.7-11.6) in 1991, and 11.1 (95% CI 10.6-11.5) in 2006.

There is an important relationship between tenure, ethnicity and crowding levels. Crowding is consistently higher in rental housing (6.6% severely crowded in 2006) compared with housing that is owned (1.8% severely crowded). Crowding has also been rising in rental housing over the 1991 to 2006 period, particularly in Housing New Zealand Corporation (HNZC) housing (from 12.1% severely crowded in 1991 to 19.4% in 2006), but shown no consistent change in housing owned by the occupier. These patterns are strongly influenced by declining levels of home ownership and shifts in the ethnic composition of housing. Māori and Pacific peoples in particular are increasingly living in rental housing. Pacific peoples are also making up an increasing proportion of tenants in HNZC housing which inevitably increases average levels of household crowding in these properties (because of the strong association between Pacific ethnicity and household crowding). In addition, the social allocation system that HNZC uses to select tenants considers factors such as low income, which can further concentrate vulnerable households in HNZC properties.

Various forms of multi-family households also increased over the period 1991–2006, both in terms of their proportion of household types and their level of household crowding. By 2006, multi-family households were 2.8% of household types, with 18.6% severely crowded. One-parent households living with others were 2.3% of households, with 10.5% exposed to severe crowding. Couples with children living with others were 2.2% of households, with 9.2% exposed to severe crowding.

Exposure to household crowding is associated with a range of indicators of socio-economic deprivation, notably living in rental housing (particularly social housing, where tenants are selected for extreme disadvantage), low equivalised household income, being unemployed, and lack of educational qualifications. People living in crowded housing are far more likely to be active smokers, increasing the risk of passive smoke exposure for others in such households.

Discussion and conclusion

Household crowding, particularly at more severe levels, is a relatively uncommon exposure for most populations in NZ. However, for some socio-demographic groups, particularly Māori, Pacific peoples, and children, levels of exposure are relatively high. These populations also experience the highest rates of hospitalisation for infectious diseases, with rates for Māori and Pacific peoples typically more than two times higher than those experienced by Europeans/Others. Additionally, hospitalisation rates for Māori and Pacific peoples are rising more rapidly than for other ethnic groups, resulting in increasing health inequalities. These findings, combined with other evidence, suggest that household crowding is making a considerable contribution to infectious disease burden in NZ.

Findings from this report support the need to identify interventions aimed at reducing household crowding for Pacific and Māori households in NZ, particularly those with children. The HNZC Healthy Housing Programme focuses on such populations in Auckland, Northland and Wellington. It includes a set of interventions to reduce household crowding, improve housing conditions, and link households to health and social services. Evaluations of the Healthy Housing Programme show that it has been highly successful in lowering hospitalisation rates for children.

A major strength of this current analysis is that it is based on Census data, so is using total NZ population data rather than a sample, such as the HNZC population. Because the data analysis was

largely conducted by a Statistics NZ staff member (RG), it has used individual records rather than aggregated data, so the estimates are precise.

Important limitations include the lack of an internationally standardised method for measuring household crowding, as reflected in the range of definitions in use. There is similarly no internationally agreed threshold for defining ‘overcrowding’. This analysis excludes people living in non-private dwellings, such as boarding houses and night shelters, because household and room data are not collected for these dwellings. Consequently, the calculation of crowding exposure is probably conservative. The Census can only record some dimensions of household crowding so there is potential for ‘functional crowding’ to be even greater than that estimated here (for example, in situations where families may sleep in a single room to keep warm over winter). Census variables inevitably contain some errors and missing values. This latter difficulty limited our ability to analyse socio-economic status for people in crowded households. Household variables such as tenure and sector of landlord also have some non-response limitations.

Further research would be useful to better understand what household crowding means in practice, for example, how people use rooms within households and how they adapt to higher levels of household crowding. It would be valuable to relate findings on the distribution of household crowding to the incidence and distribution of infectious diseases in these same populations. The policy, programme, and research focus should now shift towards shaping the design of interventions to reduce exposure to household crowding. NZ is well placed to conduct high-quality evaluations of such interventions and add to the evidence base on the health impacts of housing improvements.

2. Introduction

Infectious diseases emerged as an increasing public health problem in NZ during the 1990s. Hospitalisation rates from infectious diseases increased by about 50% during that decade.¹ NZ experienced a severe and prolonged meningococcal disease epidemic, which began in 1991 and resulted in disease rates that were about 10 times higher than pre-epidemic levels.² Several specific infectious diseases were shown to have particularly high rates, notably rheumatic fever,³ childhood pneumonia,⁴ and skin infections.⁵

Exposure to household crowding is an important risk factor for transmission of infectious diseases. In NZ this exposure has been linked to a significantly increased risk of meningococcal disease,⁶ tuberculosis,⁷ rheumatic fever,⁸ and pneumonia.⁴

This project aimed to produce a detailed description of household crowding across the 1991 – 2006 censuses, with a specific focus on Māori and Pacific housing conditions and ethnic and socio-economic inequalities. Specific aims were:

1. To assess how sensitive estimates of the prevalence of household crowding are to the definitions used, in total and for Māori, Pacific, and other ethnic groups, in particular:

- Effects of different household crowding definitions;
- Effects of different units of analysis, notably household vs. individual;
- Effect of different crowding thresholds (e.g. 1+ bedroom deficit, 2+ bedroom deficit).

2. To describe how exposure to household crowding is distributed by time and place and according to major socio-demographic groups:

- Distribution by time (1991 to 2006);
- Geographic distribution (District Health Board (DHB));
- Distribution by age, sex, ethnicity, household composition;
- Distribution by socio-economic status (equivalised income, employment status, and highest qualification);
- Distribution by tenure and landlord type;
- Distribution of tobacco smoke exposure across crowded households.

3. To assess ethnic inequalities in exposure to household crowding and whether they have changed over time.

3. Methods

3.1. Defining household crowding

'Household crowding' is generally used to mean that a household has fewer bedrooms, or less space, than a defined norm for the number of people residing there. How crowding is defined and measured has been well-described by both Statistics NZ and the Ministry of Social Development's Living Standards Report.^{9,10} Both agencies note that while perceptions and measures of crowding may be cultural and subjective, the effects of crowding are not.

Crowding indices generally measure either people per room (or bedroom), or people per square metre. People per bedroom measures also consider the age and gender of children, and the relationships between adults, in determining whether or not the household is crowded.

The first part of this report investigates the effects of using different measures of household crowding (Table 1). The subsequent analyses then present results using the Canadian National Occupancy Standard (CNOS). The CNOS measure was selected because it is measurable with available census data. Census data do not include the house or bedroom floor area, so indices which rely on floor area would not be practical. In addition, it is thought that recording of bedroom numbers is far more complete and accurate than recording of total rooms in houses. The CNOS is also the measure most widely used in previous NZ crowding research.^{11,12} After reviewing four potential measures, Statistics NZ has concluded that CNOS is the most appropriate measure for use in NZ.¹³ The Australian Bureau of Statistics also uses the CNOS to measure crowding, including levels in indigenous populations (Aboriginal and Torres Strait Islanders).

From a 'health risk' point of view, the CNOS may not necessarily be the most valid measure. It requires a separate bedroom for a couple and for children of different sexes between 5 and 17 years of age (i.e. two children under 17 may share a room if they are the same sex and/or under 5 years of age). The equivalised index may provide a better overall measure of crowding. Viruses and bacteria are probably indifferent to whether or not children sharing a bedroom are the same sex, so describing a two-bedroom dwelling housing two parents, an 8-year old and a 12-year old as crowded if the children are of opposite sex, but not if they are the same sex, is a cultural rather than an aetiological view. However, recent research has suggested the equivalised index may not well represent perceptions of crowding among Pacific peoples in particular, and the CNOS is a better, though still imperfect, fit.¹⁴ Cultural differences in the perception of crowding may have little effect on disease transmission, but cultural differences in use of dwelling space, such as the use of 'living' spaces as sleeping areas, may be important and, as the differential crowding rates within the Pacific peoples ethnic group suggest, may well vary considerably between Pacific communities.¹⁵

3.2. Obtaining crowding data

Crowding data were extracted from NZ census records by Statistics NZ. The key data fields used are described in the appendix.

The scope of the report covers households in private occupied dwellings, which include all separate houses, units, and apartments; mobile dwellings such as caravans; improvised dwellings such as garages; and dwellings in motor camps, if they are the usual residence of a household. It excludes people living in non-private dwellings, such as boarding houses and night shelters, as household and room data are not collected for these dwellings. The calculation of crowding also excludes visitors to the household.¹⁶

3.3. Analysis

The exposure measure presented in this report is generally expressed as the percentage of people exposed to household crowding of a stated degree of severity. A '1+ bedroom deficit' means that the house is crowded according to the CNOS and needs one or more bedrooms to meet the housing needs of the occupants. A '2+ bedroom deficit' means that the house is severely crowded, and needs at least two additional bedrooms to meet the needs of the occupants. A small number of analyses present results according to the level of exposure as 1 bedroom and 2+ bedroom deficits, or as 1 bedroom, 2 bedroom, and 3+ bedroom deficits.

Where a percentage exposure is calculated, this is based on the census records where the response is specified, i.e. excludes unknowns. For some census variables, the proportion of unknowns is high, which limits the generalisability of the reported results. These situations are generally noted with specific tables.

Exposure to household crowding is presented according to a range of descriptive variables, singly, or cross-tabulated. Most of the analyses are repeated for each of the four Censuses included in this report (i.e. the Censuses of 1991, 1996, 2001, and 2006).

Ethnicity was analysed using 'total response' ethnicity. We divided the population into four 'major' ethnic groups using level one ethnic group categories, as follows:

- Total Māori;
- Total Pacific;
- Total Asian (limited analysis in this report);
- European/Other (including Middle Eastern, Latin American, African [MELAA] from 2006).

With 'total response' ethnicity, those recording multiple ethnicities were included in all of the ethnic groups that they nominated so some individuals were effectively counted more than once.¹⁷ This method divided the 2006 NZ population of 4.14 million into Māori (15%), Pacific peoples (7%), Asians (10%), and European/Other (77%).

A further sub-analysis was conducted using level two ethnic groups, with a particularly focus on Pacific groups: Samoans; Cook Islanders; Tongans; Niueans; Fijians; Tokelauans; and 'Other Pacific peoples'.

Other key socio-demographic and housing variables and exposures are described in detail in the appendix.

4. Results

4.1. Effect of different definitions of household crowding

This section considers the effects of different definitions of household crowding (Table 1) on its observed prevalence. In particular, it assesses the sensitivity of the estimates to the definitions used, for both the total population and separate ethnic groups.

As is shown in Table 2, levels of household crowding found by the 2006 Census vary according to: (i) the choice of crowding index; (ii) the threshold set (in the case of the CNOS and American Index); and (iii) the unit of analysis (household or residents).

For households the range in exposure across different crowding indices was 2.7-6.9%, and for residents 6.2-13.8%. The CNOS was selected as the most practical index for NZ use, so subsequent analyses will provide only CNOS results.¹³ As can be seen, the CNOS gives estimates of crowding that are intermediate between the British Bedroom Standard and the Equivalised Index, but about twice the level found through applying the American Index.

Both the CNOS and the American Index can generate results for different threshold levels of household crowding. Results for the CNOS divide easily according to the bedroom deficit level (1, 2, 3+). The threshold of 2+ bedroom deficit is useful for distinguishing severe household crowding and so will be reported for many of the analyses in this report.

Table 1. Features of different measures of household crowding

Index	Based on...	Uses couple status	Ages when pairs of boys and girls can share	Ages when pairs of same sex children can share	Ages when own room is required
American Crowding Index	rooms	no	n/a	n/a	n/a
British Bedroom Standard	bedrooms	yes	under 10	0-20	21+
Canadian National Occupancy Standard	bedrooms	yes	under 5	0-17	18+
Equivalised Crowding Index	bedrooms	yes	under 10	under 10	10+

Note: a household is considered crowded:

- if, under the ACI, there is more than one person per room and
- under the bedroom indexes, if there are insufficient bedrooms to accommodate the usual residents within the household. It is assumed that there should be no more than two people per bedroom.

Source: Statistics NZ working paper on crowding.¹³

Table 2. Household crowding levels from 2006 Census, by different crowding indexes, thresholds, and unit of analysis (households or residents), for total NZ population.

Index	Households		Residents	
	Number	% crowded	Number	% crowded
Crowding index				
American Index >1.0 person per room	37,500	2.7	228,800	6.2
British Bedroom Standard	59,100	4.2	324,600	8.7
Equivalised Index	95,400	6.9	516,900	13.8
CNOS – 1+ bedroom deficit	71,900	5.2	389,600	10.4
Crowding threshold for CNOS and American index				
CNOS – 1 bedroom deficit	53,400	3.8	258,500	6.9
CNOS – 2+ bedroom deficit	18,500	1.3	131,100	3.5
American Index – between 1.0 and 1.5 people per room	26,200	1.9	158,900	4.3
American Index – more than 1.5 people per room	11,300	0.8	69,900	1.9

All numbers have been randomly rounded to base 3, and further rounded to the nearest hundred.

For analyses of the health consequences of household crowding, the most useful unit of analysis is usually the percentage of NZ residents exposed to household crowding, as health effects will be directly related to this proportion. The comparisons shown in Table 2 demonstrate the importance of focussing on residents rather than households as the unit of analysis. Because average occupancy rates are higher in crowded households, compared with households that are not crowded, an analysis based on residents finds much higher proportions of people exposed than would be implied by just reporting the proportion of households that are crowded. For example, using the CNOS 1 bedroom deficit 3.8% of households are crowded, but 6.9% of the population are exposed to 1 bedroom deficit crowding in these houses. This effect is even more pronounced with severe crowding. While only 1.3% of households have a 2+ bedroom deficit, 3.5% of the population live in such households.

Table 3 below demonstrates the performance of these different crowding indicators when used to measure the proportion of major ethnic groups exposed to household crowding in NZ. All of these measures identify markedly higher levels of household crowding for Pacific peoples and Māori relative to European/Other. Using the CNOS the proportions exposed to household crowding in 2006 were 42.6% for Pacific peoples, 22.8% for Māori, and 4.7% for European/Other.

The performance of these indices was also assessed for the largest Pacific populations living in NZ: Tongans, Samoans, and Cook Islanders (with other groups included in 'Other Pacific peoples'). Among these Pacific peoples (Table 4), all indices show highest levels of household crowding for Tongans, followed by Samoans, Cook Islanders, and Other Pacific peoples. Using the CNOS the proportions exposed to household crowding in 2006 were 51.8% for Tongan, 42.2% for Samoan, 39.7% for Cook Island, and 37.3% for other Pacific peoples.

The remainder of this analysis will use the Canadian National Occupancy Standard (CNOS). In general, we focus on household residents rather than households (except when specifically noted). Most analyses show both crowded (1+ bedroom deficit), and severely crowded (2+ bedroom deficit) exposure levels.

Table 3. Household crowding levels from the 2006 Census, by different crowding indices and unit of analysis (households or residents), for different ethnic groups.

Index	Households (% crowded) ¹			Residents (% crowded)		
	Māori	Pacific	European & other ²	Māori	Pacific	European & other ²
American Index/People per room	7.0	19.4	0.9	9.5	19.7	1.7
British Bedroom Standard	11.4	25.0	1.7	19.3	37.6	2.7
Canadian National Occupancy Standard	13.6	28.8	2.2	22.8	42.6	4.7
Equivalised Index	17.6	34.3	3.5	29.6	50.1	6.1

¹ Ethnicity of eldest person in household

² People with only European and Other ethnicities

Table 4. Household crowding levels from 2006 Census, by different crowding indices, thresholds, and unit of analysis (households or residents), for level two Pacific ethnic groups.

Index	Households (% crowded) ¹				Residents (% crowded)			
	Cook Island	Samoa	Tongan	Other Pacific	Cook Island	Samoa	Tongan	Other Pacific
American Index	17.7	20.1	28.7	14.3	15.0	19.8	24.8	17.0
British Bedroom Standard	21.4	25.5	33.7	20.5	34.6	37.1	46.6	32.8
Canadian National Occupancy Standard	24.9	29.4	37.9	23.8	39.7	42.2	51.8	37.3
Equivalised Index	29.7	35.2	44.2	28.4	46.7	50.1	59.7	44.3

¹ Ethnicity of eldest person in household. These three Pacific peoples were selected as they are the largest groups living in NZ (2006 Census usually resident population in households: Samoans 125,340, Cook Islanders 54,849, Tongans 48,267, Other Pacific groups 45,360 (includes Niuean, Tokelauan, Fijian, Pacific not further defined and Other Pacific).

4.2. Distribution of crowding exposures, 1991 – 2006

The following section describes the distribution of exposure to household crowding by time, place, and person characteristics:

- Distribution by time (1991 to 2006);
- Geographic distribution (DHB in 2006);
- Distribution by age, sex, ethnicity, household composition type;
- Distribution by socio-economic position (Jensen equivalised income quintiles, employment status, housing tenure, and highest qualification gained);
- Distribution in relation to tobacco smoke exposure (1996, 2006).

4.2.1. Trends in crowding by year

Levels of household crowding exposure over the past four Censuses are shown in Table 5 and graphically in Figure 1 (and in more detail in the Appendix, Table A 1). Just over a tenth (10.4%) of people in NZ households lived in crowded conditions at the time of the 2006 Census according to the CNOS. Although this represents a proportional decline (from 11.9% of the population in 1991) the actual number of people living in crowded conditions rose slightly (by 2.4%).

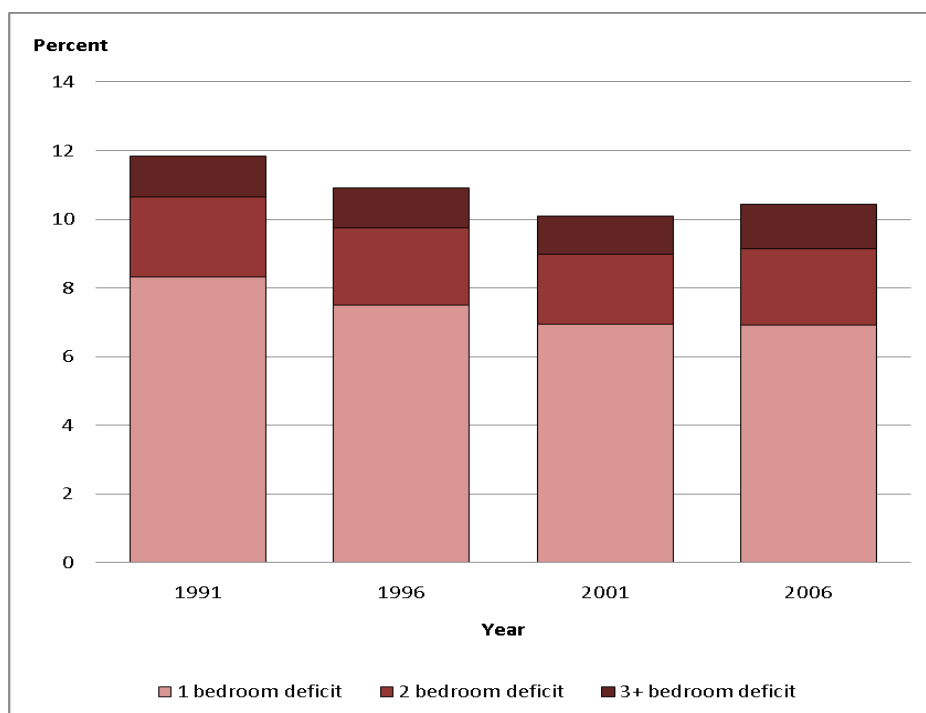
Levels of severe crowding (2+ bedroom deficit) have remained fairly static as a proportion of the total population, with 3.5% of the population exposed in 2006, which was the same as in 1991. Even though the proportion of those exposed to severe crowding has remained the same, population growth means there has been a 15.8% rise in absolute numbers of people living in severely crowded households.

Table 5. Number and proportion of households and residents that are crowded (CNOS) in NZ, 1991 – 2006 Censuses.

Time period	1991		1996		2001		2006	
Households	No.	%	No	%	No.	%	No.	%
Households with 1 bedroom deficit	57,030	4.9	53,020	4.3	49,640	3.9	53,400	3.8
Households with 2+ bedroom deficit	16,760	1.5	16,830	1.4	15,450	1.2	18,470	1.3
Total crowded households (1+ bedroom deficit)	73,790	6.4	69,860	5.7	65,090	5.1	71,870	5.2
Residents								
Residents in households with 1 bedroom deficit	267,300	8.3	253,500	7.5	239,500	6.9	258,500	6.9
Residents in households with 2+ bedroom deficit	113,200	3.5	116,100	3.4	108,900	3.2	131,100	3.5
Total residents in crowded households (1+ bedroom deficit)	380,500	11.9	369,700	10.9	348,400	10.1	389,600	10.4

All numbers have been randomly rounded to base 3, and then further rounded to the nearest 100.

Figure 1. Prevalence of exposure to household crowding and degree of crowding (CNOS), by census year, 1991-2006.



4.2.2. Geographical distribution of crowding (by CAU & DHB)

This section shows the geographic distribution of exposure to household crowding by District Health Boards (DHBs) across four census years for the total population. In addition, this section comments on the constancy of crowding levels over different census years.

DHBs with consistently high levels of household crowding (1+ bedroom deficit) were Counties Manukau, Auckland, Tairāwhiti, Northland and Lakes (Table 6, Table A 10). Over this observation period household crowding levels decreased in all DHBs except for Counties Manukau (which saw a small increase from 21.1% to 21.9% exposed). In the 2001-2006 period, exposure to household crowding increased in most DHBs, as part of a national trend towards increasing levels.

Table 6. Prevalence of exposure to household crowding (1+ bedroom deficit), by DHB and census year, 1991-2006.

DHB area	Percentage of people living in households with a 1+ bedroom deficit (CNOS)				Change 1991 to 2006
	1991-2006 Censuses				
	1991	1996	2001	2006	
Auckland	17.0	17.7	16.4	16.5	-0.5
Bay of Plenty	12.5	11.3	9.6	9.6	-2.9
Canterbury	8.0	6.7	5.3	5.9	-2.1
Capital and Coast	11.4	10.4	9.5	9.0	-2.4
Counties Manukau	21.1	21.3	21.2	21.9	+0.8
Hawke's Bay	12.5	10.9	10.5	10.5	-2.0
Hutt	11.9	10.7	10.1	10.6	-1.3
Lakes	14.2	13.5	11.5	11.7	-2.5
Midcentral	9.5	7.8	6.6	6.6	-2.9
Nelson Marlborough	7.9	6.2	5.5	5.1	-2.8
Northland	14.5	13.2	11.6	11.9	-2.6
Otago	6.9	5.2	4.0	4.2	-2.7
South Canterbury	5.8	3.9	2.8	2.9	-2.9
Southland	8.4	5.8	4.4	4.4	-4.0
Tairāwhiti	16.9	15.6	14.6	15.2	-1.7
Taranaki	8.8	6.9	5.8	6.1	-2.7
Waikato	11.7	10.4	9.5	9.7	-2.0
Wairarapa	8.4	6.8	5.8	5.3	-3.1
Waitemata	9.7	9.4	9.1	9.4	-0.3
West Coast	7.6	6.0	4.2	4.2	-3.4
Whanganui	10.1	8.1	7.6	7.8	-2.3
Total NZ	11.8	10.9	10.1	10.4	-1.4

Exposures to severe household crowding (2+ bedroom deficit) followed a broadly similar pattern to crowding levels generally (Table 7, Table A 11). DHBs with the highest proportion of severe household crowding were Counties Manukau (where almost 10% of the population are exposed to this level of household crowding), Auckland, and Tairāwhiti. Counties Manukau, and to a lesser extent Waitemata, were the only DHBs to experience an increase in severe household crowding over the total observation period. In the 2001-2006 period, exposure to severe household crowding increased in most DHBs, as part of a national trend towards increasing levels.

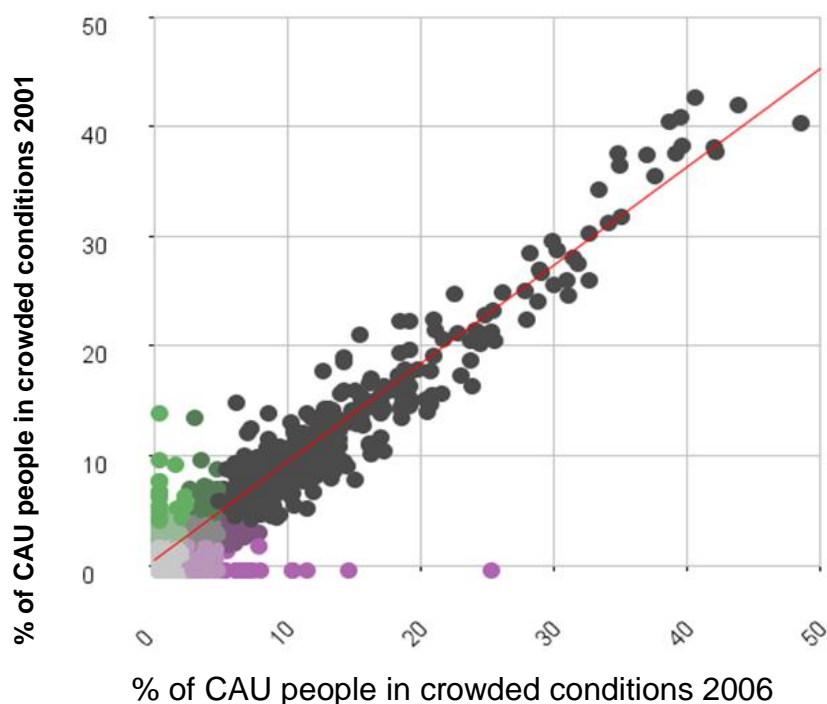
In general, the levels of household crowding in DHBs reflected the geographic distribution of populations with high levels of household crowding, notably Māori and Pacific peoples. Other key determinants are also likely to have influenced these regional patterns, including changes in unemployment levels and the proportion of rental properties. Further analysis of these regional patterns is beyond the scope of this report.

Table 7. Prevalence of exposure to household crowding (2+ bedroom deficit) by DHB and census year, 1991-2006.

DHB area	Percentage of people living in households with a 2+ bedroom deficit (CNOS)				Change 1991 to 2006
	1991-2006 Censuses				
	1991	2006	2001	2006	
Auckland	5.9	6.3	5.6	5.9	0.0
Bay of Plenty	4.0	3.5	3.0	3.3	-0.7
Canterbury	1.5	1.4	1.0	1.4	-0.1
Capital and Coast	3.2	3.2	2.5	2.6	-0.6
Counties Manukau	9.0	9.3	9.1	9.6	+0.6
Hawke’s Bay	3.6	3.3	3.3	3.5	-0.1
Hutt	3.2	2.9	3.0	3.1	-0.1
Lakes	4.1	4.2	3.5	4.0	-0.1
Midcentral	2.2	1.7	1.5	1.6	-0.6
Nelson Marlborough	1.3	1.2	1.0	1.2	-0.1
Northland	4.8	4.3	3.7	4.2	-0.6
Otago	1.2	0.9	0.6	0.7	-0.5
South Canterbury	1.0	0.6	0.4	0.4	-0.6
Southland	1.6	1.0	0.8	1.0	-0.6
Tairawhiti	6.1	5.9	4.6	5.2	-0.9
Taranaki	1.8	1.4	1.1	1.4	-0.4
Waikato	3.2	3.1	2.8	3.1	-0.1
Wairarapa	1.5	1.2	1.2	1.1	-0.4
Waitemata	2.7	2.7	2.6	2.9	+0.2
West Coast	1.3	1.2	0.6	0.7	-0.6
Whanganui	2.6	2.1	1.8	2.3	-0.3
Total NZ	3.5	3.4	3.2	3.5	0.0

Household crowding at the Census Area Unit (CAU) level appeared relatively stable over time. The percentage of people living in crowded conditions for each CAU in 2006 was highly correlated with the proportion in 2001 (Figure 2). Area units that were crowded in 2001 had a high correlation (0.9430) of being crowded in 2006 ($R^2=0.889$). This finding is consistent with the maintenance of patterns of behaviour by social and economic factors, as well as factors associated with ethnicity, e.g. experience of discrimination in housing.¹⁸ Some CAUs have very small populations so crowding levels are unstable and may appear to change dramatically between censuses (these CAUs may appear as outliers in Figure 2 with their level of crowding appearing as nil percent in 2001 or 2006). This data presentation (Figure 2) uses GeoVista, a Java-based geo-visualisation tool created at Penn State University (www.geovista.psu.edu/grants/cdcesda/software/).

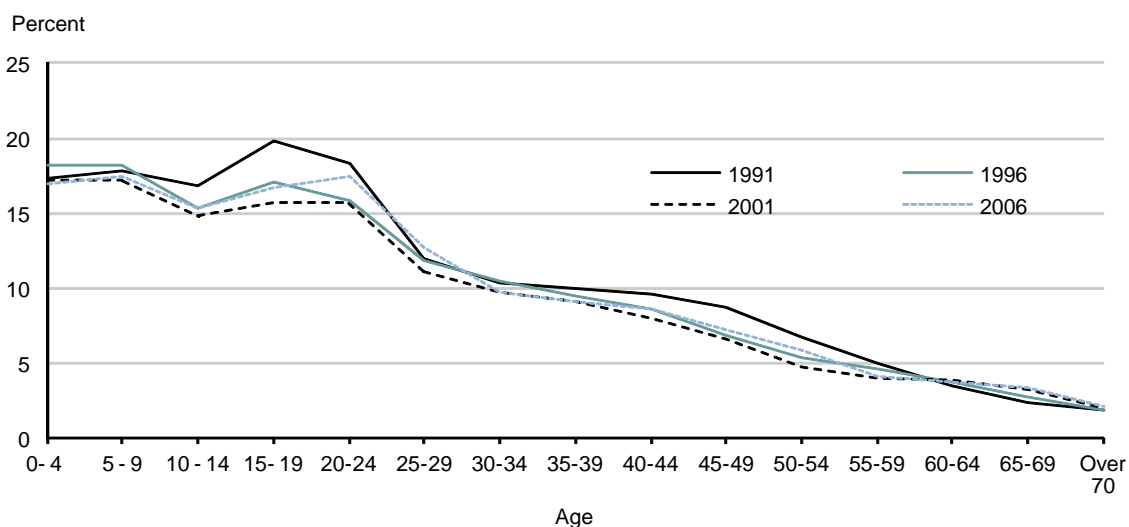
Figure 2. Percentage of people living in crowded conditions for each CAU in 2001, by percentage in 2006 (calculated using GeoVista).



4.2.3. Age and sex distribution of crowding

Crowding is experienced disproportionately by different age groups (Figure 3, Table A 2). Children, in particular, and adults who live in households with children, are more likely to experience crowding than other adults. This association between likelihood of crowding and presence of children in a household has remained similar over the study period.

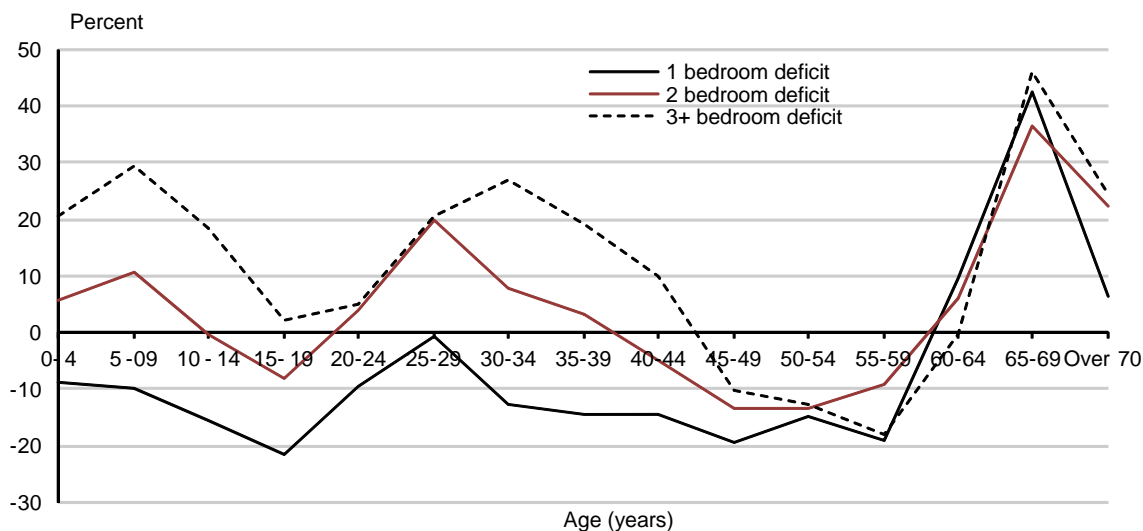
Figure 3. Prevalence of exposure to household crowding (1+bedroom deficit) by age group and census year, 1991-2006.



Source: Statistics NZ

The distribution of crowding by age group has remained fairly constant. Although crowding declined between 1991 and 2006 for most age groups in the one bedroom deficit category, there was a small increase in the proportion of severe crowding in some age groups, particularly children, and adults in age-groups most likely to have children (or grandchildren) living at home (Figure 4).

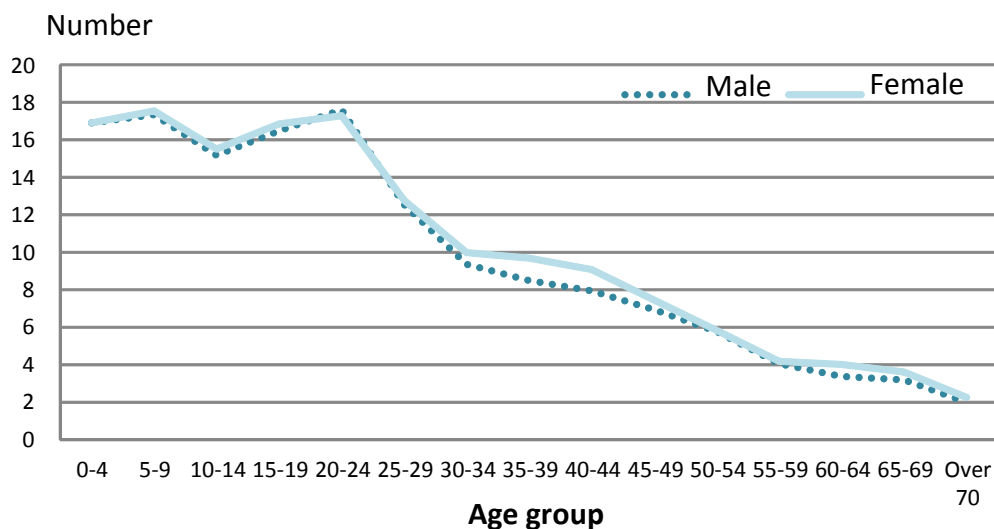
Figure 4. Percentage change in proportion of crowded residents (CNOS), by age group and crowding level, comparing 2006 to 1991 Census years.



Source: Statistics NZ

Exposure to household crowding was broadly similar for males and females (Figure 5). One difference was that females had a slight excess exposure in the 30-50 year age group probably reflecting their over-representation in sole parent households.

Figure 5. Prevalence of exposure to household crowding (1+bedroom deficit) by gender and age, 2006



4.2.4. Ethnic distribution of crowding

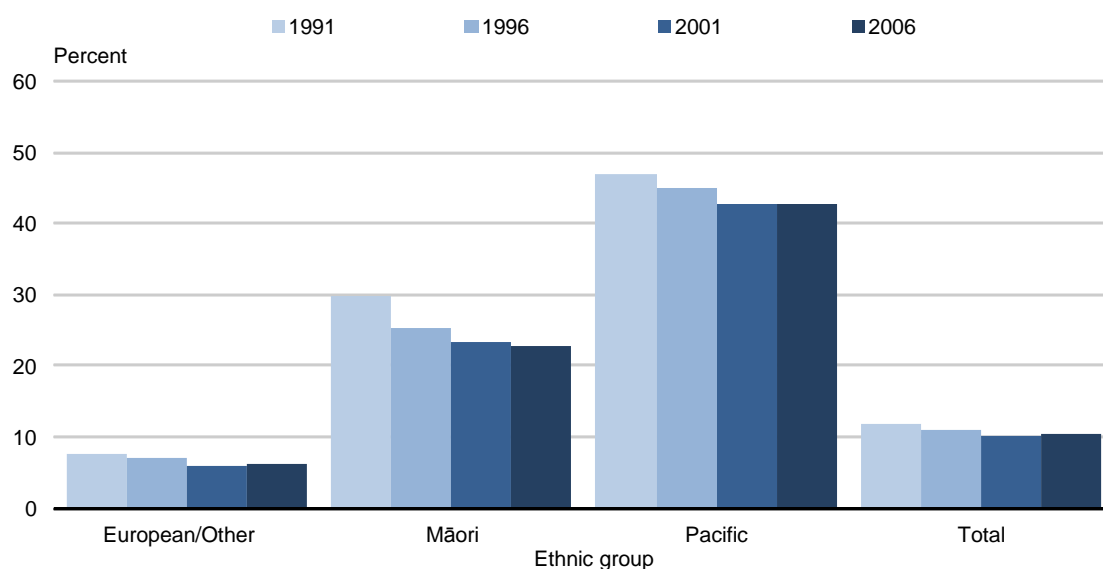
This section presents a comparison of the prevalence and severity of crowding between different ethnic groups both in total and over time.

Crowding levels (1+ bedroom deficit) are markedly higher for Pacific peoples and Māori compared with European/Others (Figure 6, Table A 3). Exposure to household crowding has decreased for all ethnic groups across the last four Census periods (except for a slight increase for European/Other from 2001 to 2006). The pattern for severe crowding (2+ bedroom deficit) is broadly similar except that the increase from 2001 to 2006 was apparent for all major ethnic groupings (Figure 7, Table A 3).

There are also important variations in household crowding levels for level 2 ethnic groups (Figure 8, Table A 4) with the highest levels seen in Pacific peoples, but also relatively high levels in most migrant populations, notably African, South East Asian, Middle Eastern and Indian (all with 20% or more exposed to household crowded in 2006).

We have included a limited analysis of trends in household crowding over time for Pacific peoples (Level 2 ethnicity classification, Table A 5). These data show that household crowding has remained a common exposure for all Pacific groups over these four censuses. There was some decline for Tokelauans and Samoans over this period, but exposure remained consistently high for Tongans (over 50% across these four censuses, with about 25% exposed to severe crowding).

Figure 6. Prevalence of exposure to household crowding (1+ bedroom deficit) by ethnic group and census year, 1991-2006.



Source: Statistics NZ

Figure 7. Prevalence of exposure to household crowding (2+ bedroom deficit) by ethnic group and census year, 1991-2006.

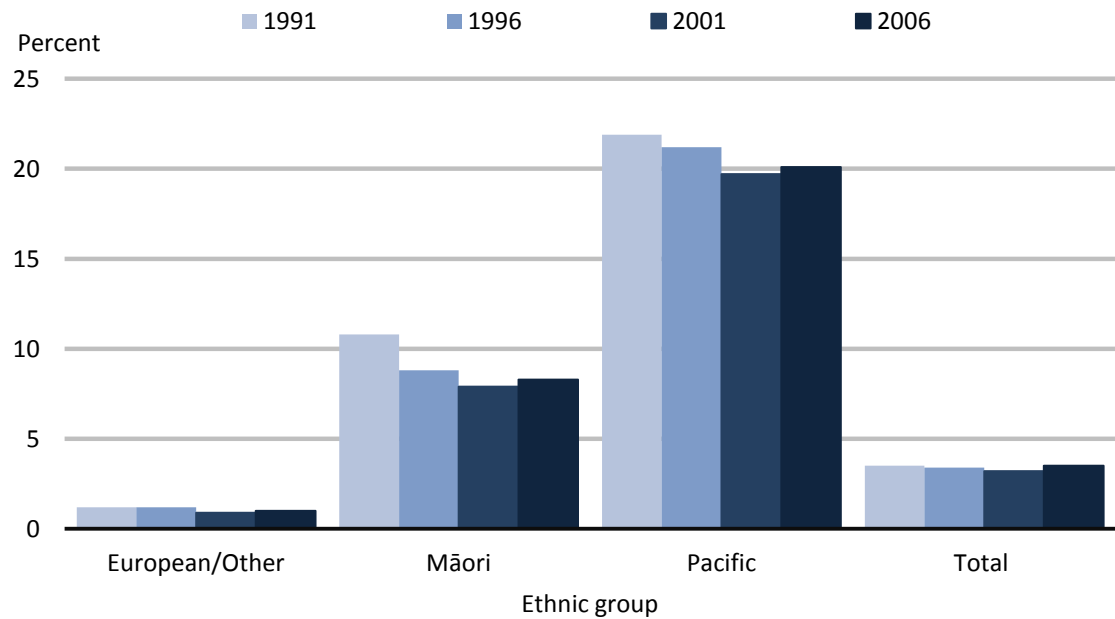
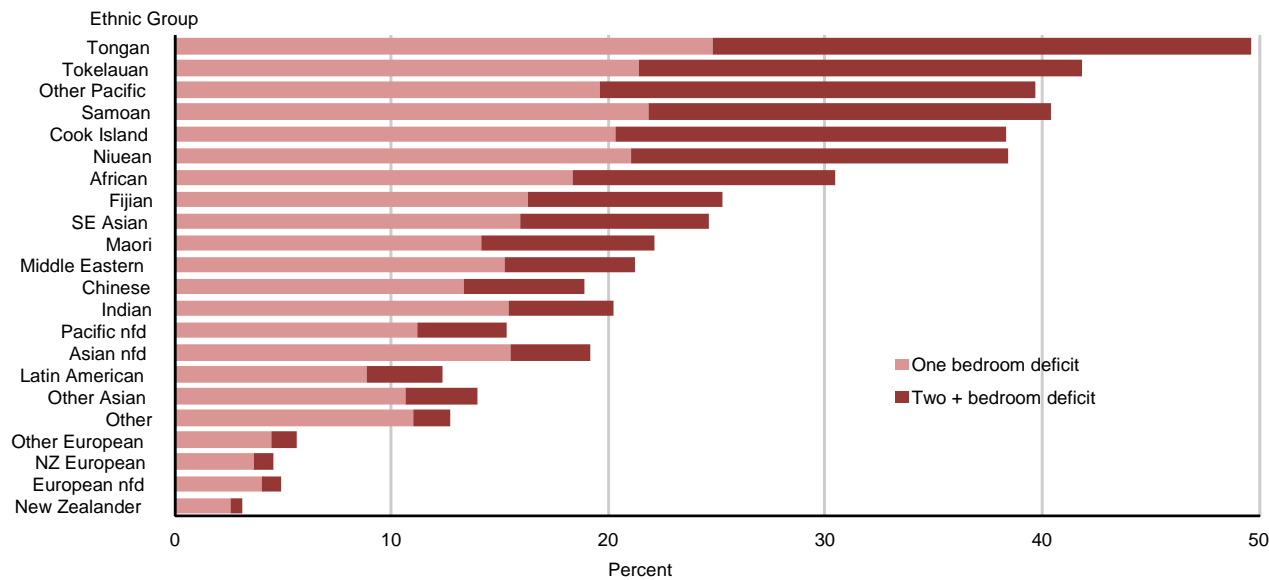
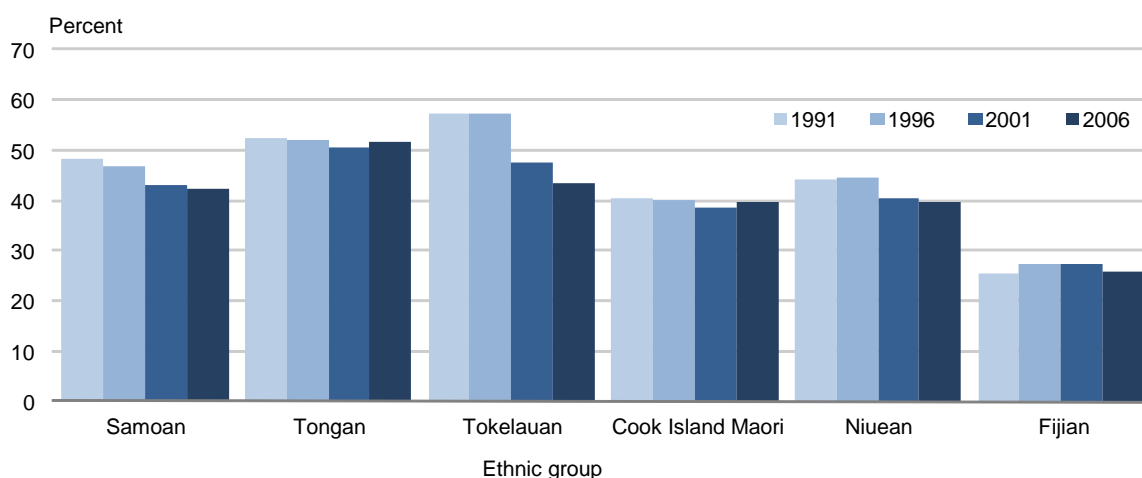


Figure 8. Prevalence of exposure to household crowding (1 and 2+ bedroom deficit) by level 2 ethnic group, 2006.



As people may identify with more than one ethnic group, percentages will add up to more than 100 percent.
 NFD: Not further defined.
 Source: Statistics NZ

Figure 9. Prevalence of exposure to household crowding (1+ bedroom deficit) by Pacific ethnic groups (level 2) and census year, 1991-2006.



Source: Statistics NZ

4.2.5. Geographical distribution of crowding by ethnic grouping

Predictably, levels of household crowding by ethnicity also varied across DHBs for major ethnic groups: European/Other (Table A 12), Māori (Table A 13) and Pacific (Table A 14). For Māori household crowding levels were uniformly elevated across a range of DHBs, including Counties Manukau, Hawke's Bay, Tairāwhiti, Bay of Plenty, Northland, Waikato, Lakes, Auckland, and Hutt. For Pacific peoples (Table A 14), household crowding appeared particularly concentrated in Counties Manukau and Auckland DHBs, though levels were the highest for any ethnic group in all DHBs.

Exposure to household crowding was much lower for the European/Other population (Table A 12), but again showed regional differences similar to Pacific peoples, with relatively higher crowding levels in the Counties Manukau and Auckland DHBs. This pattern may reflect the contribution of migrant populations to the European/Other population category.

4.2.6. Age and ethnic distribution of crowding

The following figures show the distribution of exposure to household crowding by age group for four ethnic groups at the time of the 2006 Census (Table A 6). This analysis is split according to crowding level (1 and 2+ bedroom deficit).

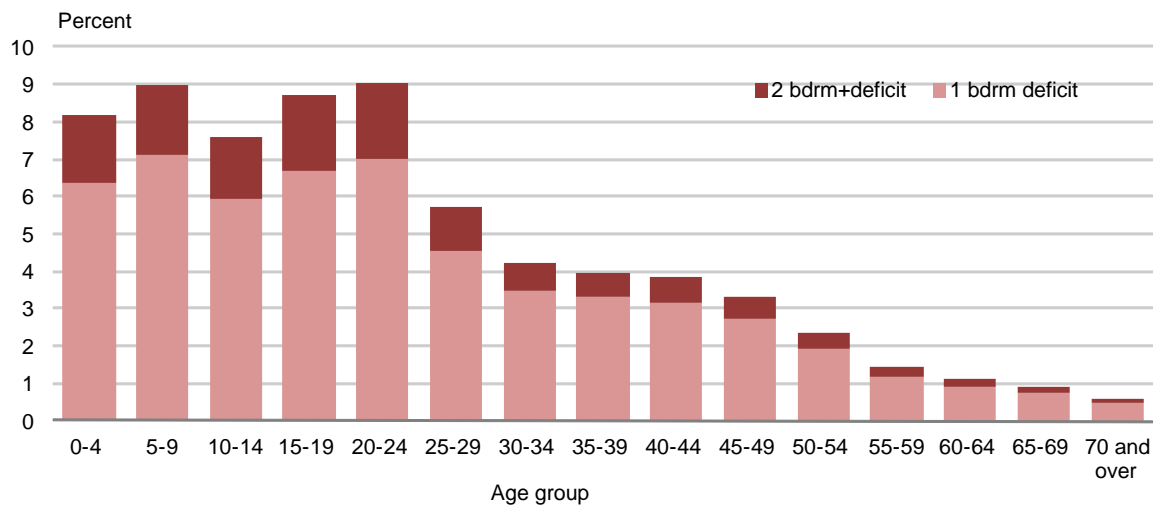
These figures again show how the overall level of household crowding, particularly 2+ bedroom deficit, is relatively low for the European/Other population (Figure 10) and progressively higher for Asians (Figure 13), Māori (Figure 11), and Pacific peoples (Figure 12).

In the European/Other ethnic group (Figure 10), in addition to the higher levels of exposure to crowding experienced by children, there is a second peak of crowding in young people (20-24 years). By contrast to the pattern for European/Other, there is a much higher level of exposure to household crowding for Māori and this exposure is more consistent throughout the life cycle (Figure 11). This pattern may reflect a higher proportion of extended families and the smaller economic resources available for many Māori households.

Pacific peoples are exposed to high levels of household crowding throughout their lives (Figure 12). At every age group, crowding levels are higher for Pacific peoples than the highest levels experienced by other ethnic groups in NZ. This pattern may reflect the higher proportion of extended and three-generational families in Pacific households and fewer economic resources to afford suitably sized dwellings even if they are available.

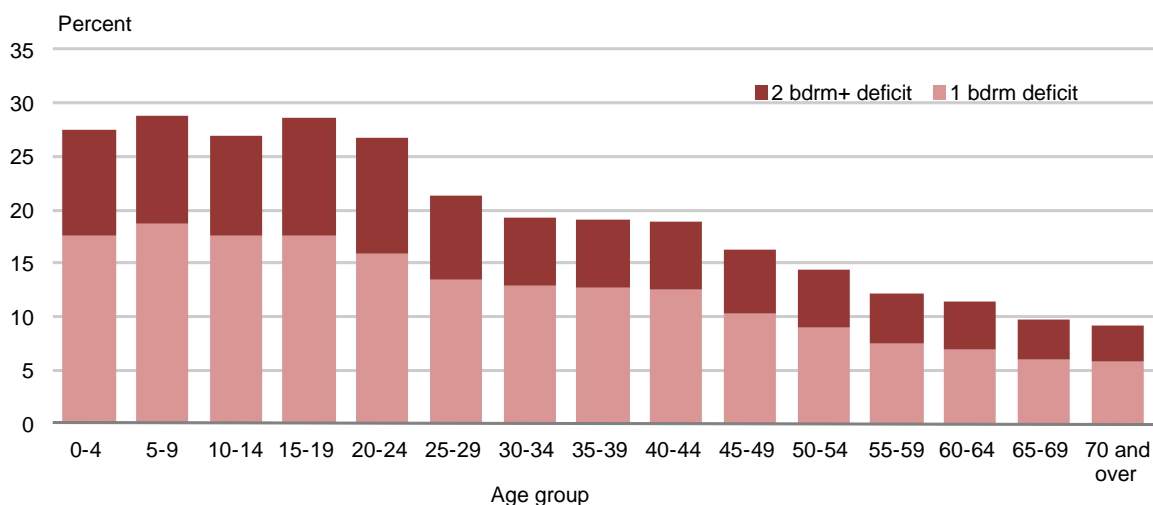
The pattern for Asian peoples (Figure 13) resembles that for Māori, though with a smaller proportion exposed to severe crowding. One distinctive feature is the peak crowding level seen in those aged 20-24 years which is likely to correspond to high numbers of Asian students in this age group who are sharing rental accommodation in NZ.

Figure 10. Prevalence of European/Other exposure to household crowding, by age group and severity of crowding, 2006 census.



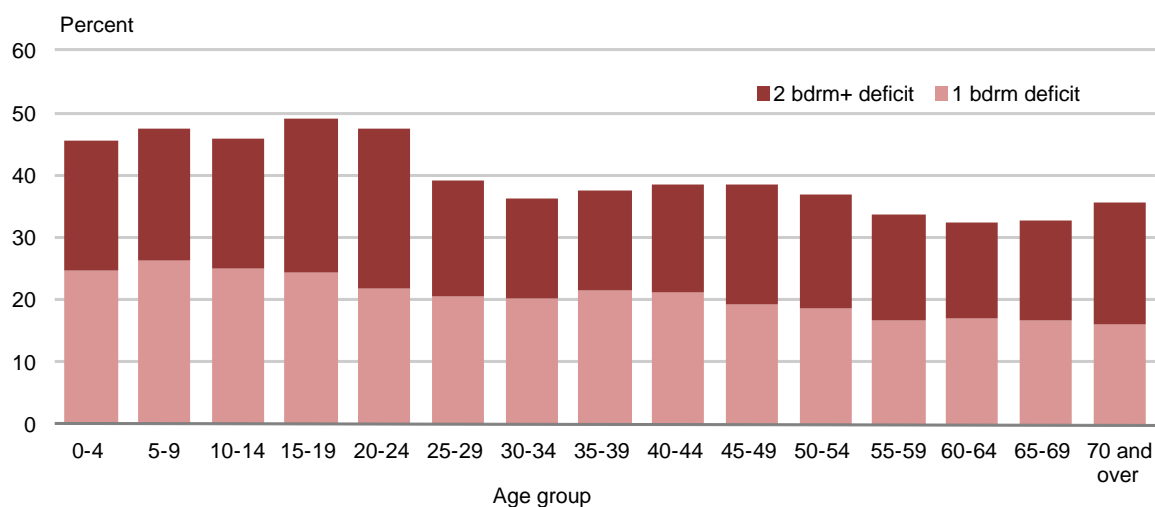
Source: Statistics NZ

Figure 11. Prevalence of Māori exposure to household crowding, by age group and severity of crowding, 2006 census.



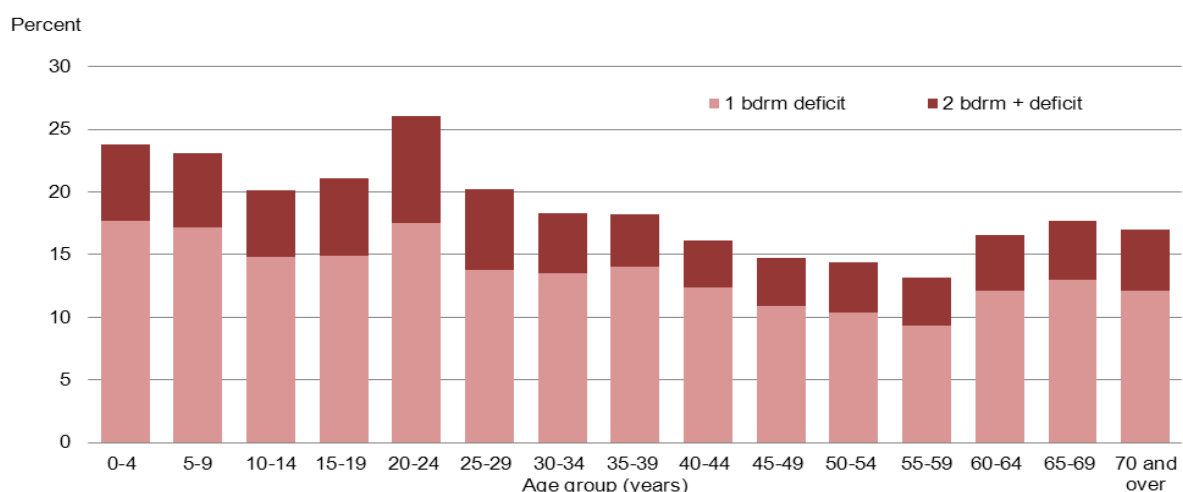
Source: Statistics NZ

Figure 12. Prevalence of Pacific peoples' exposure to household crowding, by age group and severity of crowding, 2006 census.



Source: Statistics NZ

Figure 13. Prevalence of Asian peoples' exposure to household crowding, by age group and severity of crowding, 2006 census.



Source: Statistics NZ

4.2.7. Ethnic distribution of childhood crowding between 1991 and 2006

For children in both the under 15 years age group (Figure 14) and under 5 years age group (Figure 16) total crowding (1+ bedroom deficit) decreased over the study period for Māori and European/Other, but increased slightly for Pacific peoples. However, severe crowding (2+ bedroom deficit) levels rose over this 20-year period for both the under 15 year age group (Figure 15) and under 5 year age group (Figure 17). This rise was largest for Pacific peoples, but also evident for European/Other children. Exposure to severe crowding remained fairly static for Māori children over this period. The overall effect was that the proportion of children under 15 years exposed to severe household crowding increased from 5.1% in 1991 to 5.7% in 2006 (Table A 7). There was a similar increase for children under 5 years of age 5.3% in 1991 to 6.0% in 2006 (Table A 8).

Figure 14. Prevalence of exposure to household crowding (1+ bedroom deficit), for children <15 years, by ethnic group and census year, 1991-2006.

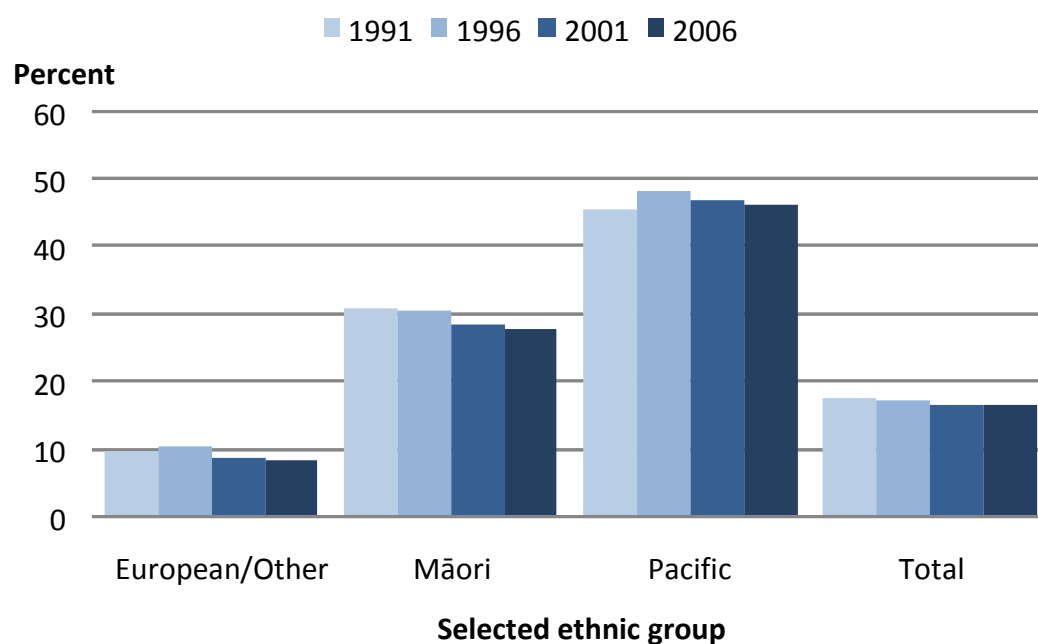


Figure 15. Prevalence of exposure to household crowding (2+ bedroom deficit), for children <15 years, by ethnic group and census year, 1991-2006.

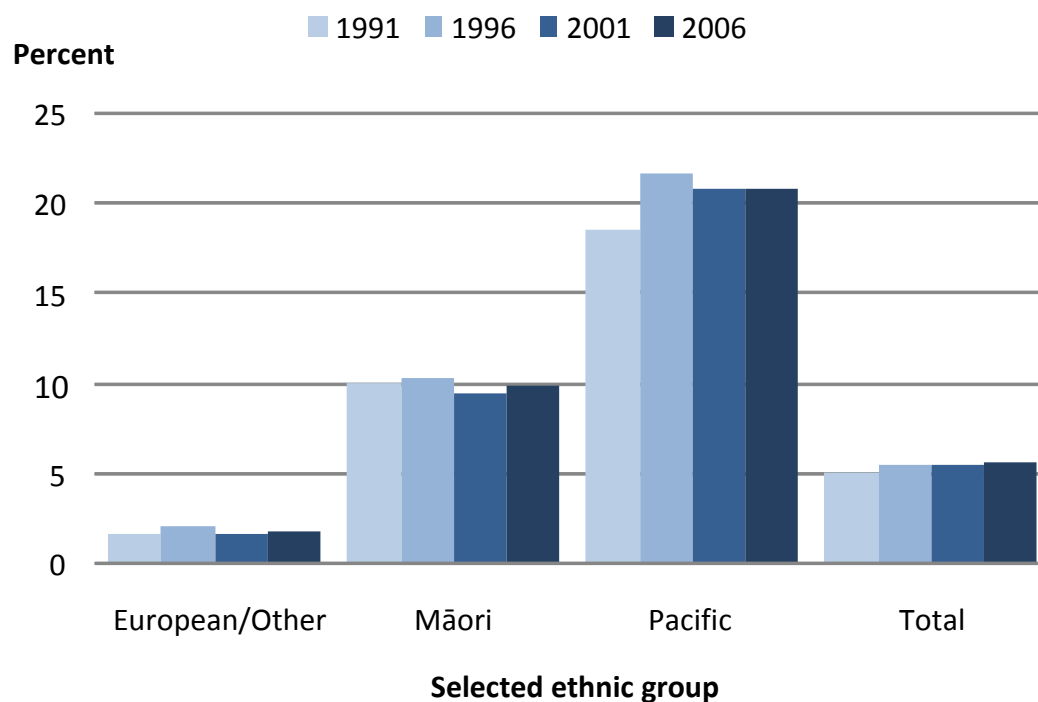


Figure 16. Prevalence of exposure to household crowding (1+ bedroom deficit), for children <5 years, by ethnic group and census year, 1991-2006.

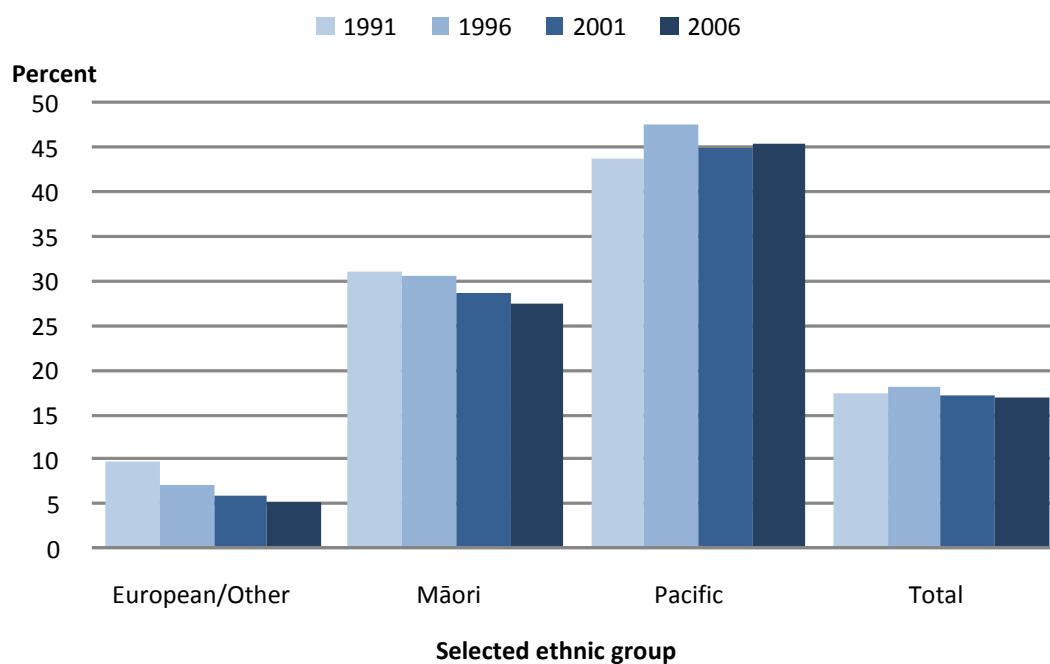
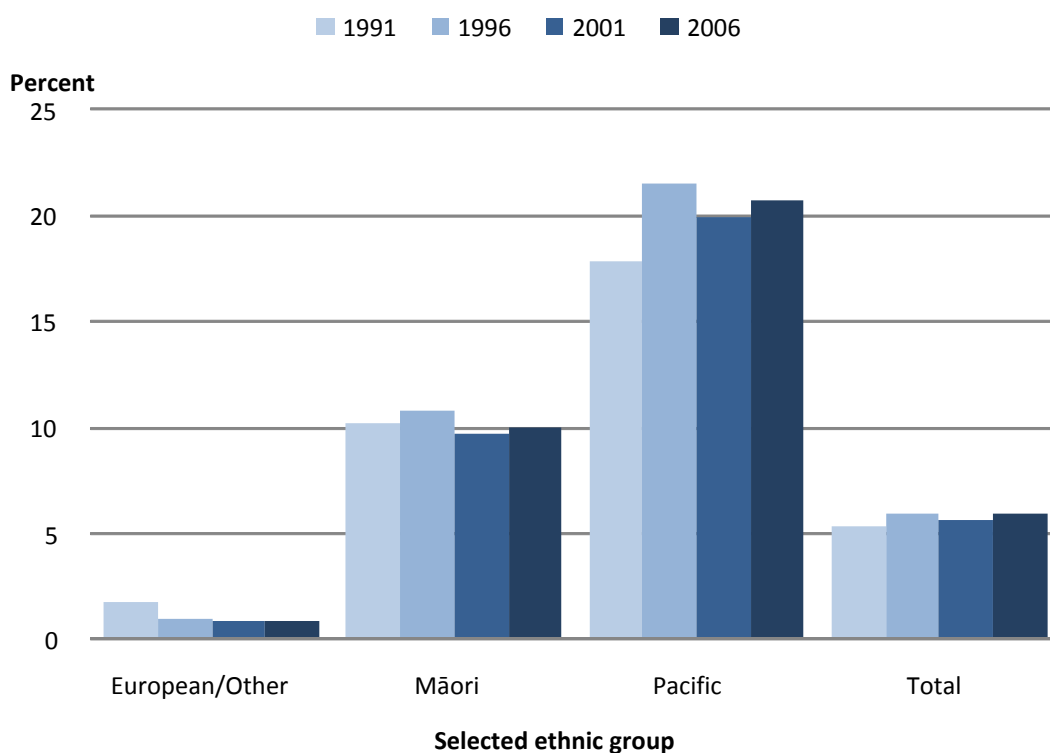


Figure 17. Prevalence of exposure to household crowding (2+ bedroom deficit), for children <5 years, by ethnic group and census year, 1991-2006.

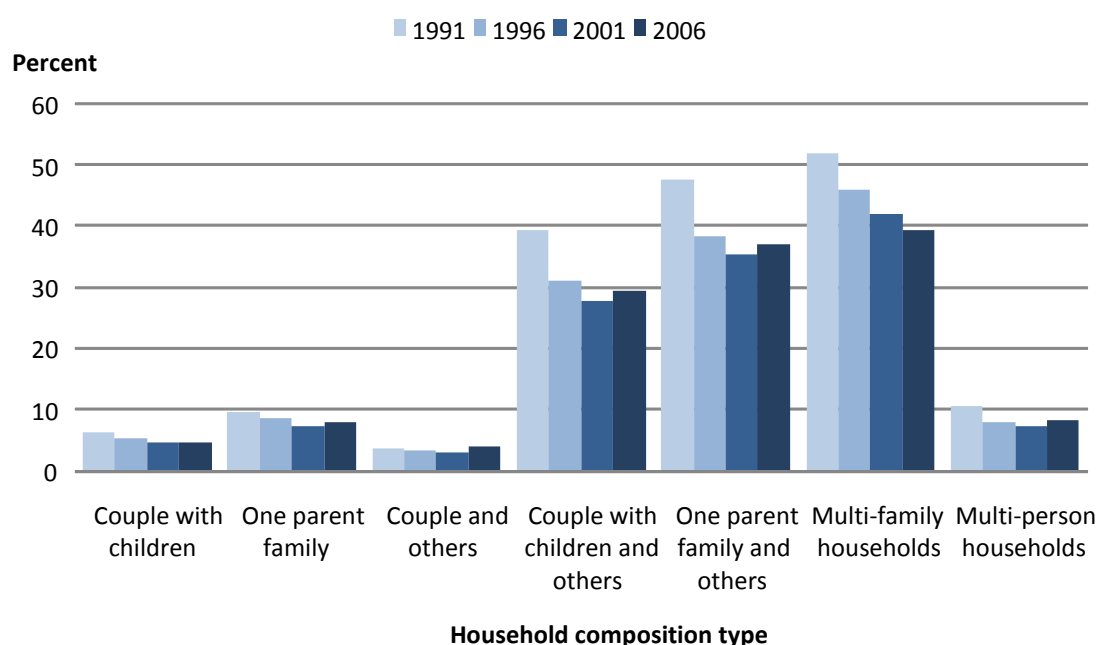


4.2.8. Trends in crowding by household type

Household crowding was markedly higher in some household types, notably multi-family households, one-parent households living with others, and couples with children living with others (Figure 18, Table A 9).

Overall, the proportion of households living in crowded dwellings declined over the period 1991–2006, with decreases in crowding for most household types. However, for severe household crowding (2+ bedroom deficit), levels of exposure rose for multi-family households, one-parent households living with others, and couples with children living with others (Table A 9). Importantly, the proportion of these three household types also increased over this period (multi-family households from 1.7% to 2.8% of households, one-parent households living with others from 2.2% to 2.3%, and couples with children living with others from 2.1% to 2.2%).

Figure 18. Prevalence of exposure to household crowding (1+ bedroom deficit), by household type and census year 1991-2006.



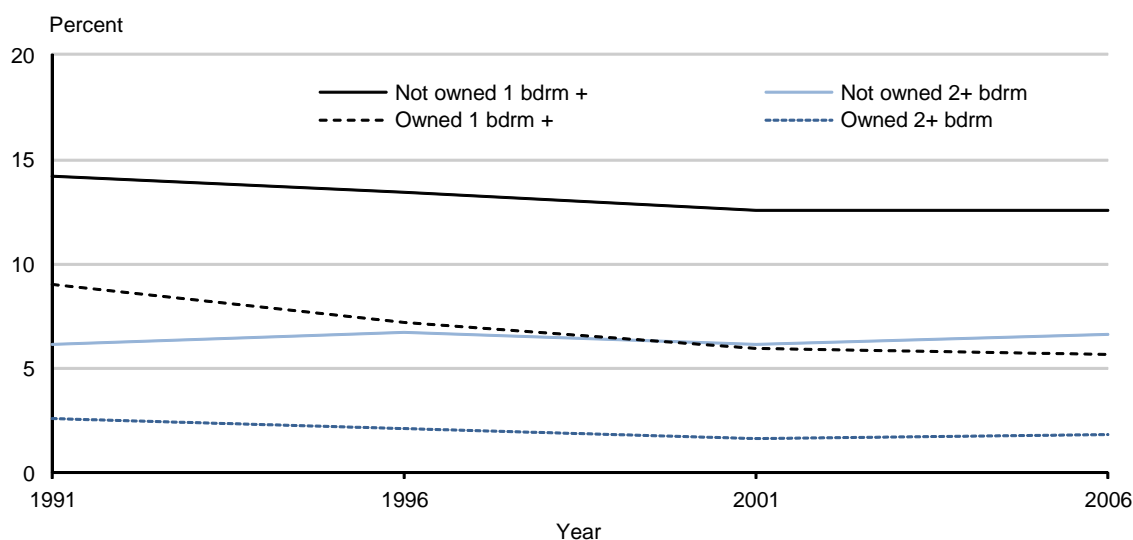
4.2.9. Crowding according to tenure and landlord sector

To examine crowding by housing tenure, we have divided the population in the standard way between those who own their own home (private person or private trust) and those in rental housing. The latter category further splits into private rental (person, business or trust), HNZA housing, and local authority/city council housing.

The analysis comparing household crowding levels over time shows that levels have generally declined over the four Census periods (Figure 19, Table A 15). The exception was higher levels of severe household crowding (2+ bedroom deficit) in rental housing which increased from 6.2% in 1991 to 6.6% in 2006. In the rental housing sector, the highest levels of household crowding have consistently been in HNZA properties (Table 8). Crowding levels in HNZA housing have generally risen across these four Census periods, particularly during the 1990s for more severe (2+ bedroom

deficit) crowding. There has also been a small increase in crowding in local authority housing. Crowding in private rental housing has shown little change over this period.

Figure 19. Prevalence of exposure to household crowding by home ownership status¹, 1991-2006.



Source: Statistics NZ

¹ Includes dwellings owned (with or without a mortgage and mortgage payments not further defined) and from 2001 dwellings owned through a family trust (with or without a mortgage and mortgage payments not further defined).

Table 8. Prevalence of exposure to household crowding, by tenure type and sector of landlord and census year, 1991-2006.

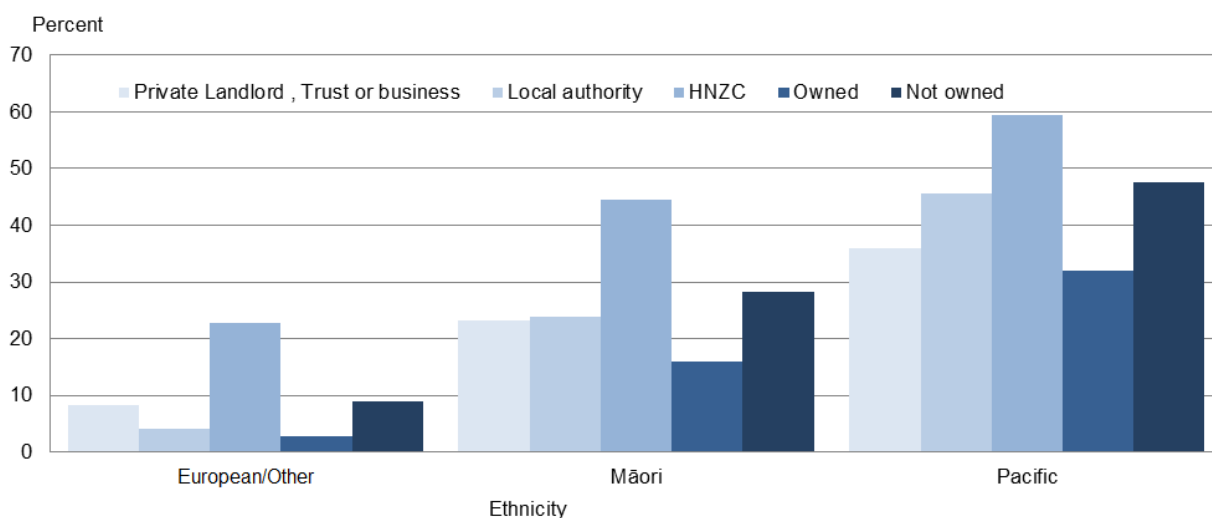
Tenure Type and Sector of Landlord	1991			1996			2001			2006		
	1+ bdrm deficit	2+ bdrm deficit	Not crowded	1+ bdrm deficit	2+ bdrm deficit	Not crowded	1+ bdrm deficit	2+ bdrm deficit	Not crowded	1+ bdrm deficit	2+ bdrm deficit	Not crowded
Not owned (total)	20.4	6.2	79.6	20.0	6.7	80.0	18.7	6.2	81.3	19.3	6.6	80.7
Private rental	16.8	4.0	83.2	14.9	3.5	85.1	15.2	3.9	84.8	15.1	4.1	84.9
HNZC	33.7	12.1	66.3	38.3	16.0	61.7	41.4	18.0	58.6	43.4	17.4	56.6
Council	10.9	3.4	89.1	12.1	3.3	87.9	11.4	3.8	88.3	13.0	4.0	87.0
Owned	9.0	2.6	91.0	7.2	2.1	92.8	6.0	1.7	94.0	5.7	1.8	94.3

Note: There is a considerable Census undercount of households renting through HNZC so these proportions must be taken as indicative only. This may affect proportions particularly in the much smaller 2+ bedroom deficit category. This undercount varies by Census year and was particularly high in 2006 (see information on variables in the appendix, page 39).

4.2.10. Crowding according to tenure type and ethnicity

As shown in Figure 20 and Table A 16, household crowding has an independent association with both tenure type/landlord sector and ethnicity. For the major ethnic groups, household crowding was most concentrated in rental housing, particularly HNZC housing. However, across all housing situations, crowding remained consistently higher for Pacific peoples and Māori compared with European/Other.

Figure 20. Prevalence of exposure to household crowding (1+ bedroom deficit), by tenure type/landlord sector and ethnic group, 2006



1) There was a 25 percent undercount of HNZC properties in 2006, which means that results should be interpreted with caution.

Source: Statistics NZ

The analysis of crowding level according to tenure type and ethnicity was carried out to better understand changes in crowding level in different tenure types/landlord sectors over time (Table A 16). This analysis shows that those who owned their own home had a very large drop in exposure to household crowding across all ethnic groups, particularly for Māori and European/Other. For the total of not owned (rental housing) the level of household crowding stayed fairly constant over this period. Within this group, household crowding declined in private rental housing but increased in HNZC housing for all ethnic groups. There was little consistent change for those in council housing.

A further change over time has been a shift in the size and ethnic makeup of different housing populations (Table A 16). A particularly striking change is the increase in number of Pacific peoples and Māori living in private rental housing. There was also a shift in the ethnic mix of people living in HNZC housing with a decline in European/Other and Māori tenants, and an increase in Pacific peoples.

These changes over time combine to partly explain the changes in crowding levels observed for different tenure types/sector of landlord (Table 8). In particular the rise in crowding levels seen for HNZC tenants is a combination of a shift in the ethnic makeup of the HNZC tenant population over this time period (notably an increase in the proportion of Pacific peoples living in HNZC properties) and an increase in crowding levels for all major ethnic groups living in these properties. An

important limitation with these data is the significant undercount of HNZC properties (15% in 2001 and 25% in 2006), which may limit conclusions about change over time.

Home ownership is declining for all major ethnic groups in NZ with an increase in those relying on rental housing (Table 9). This trend is more marked for Māori and Pacific peoples.

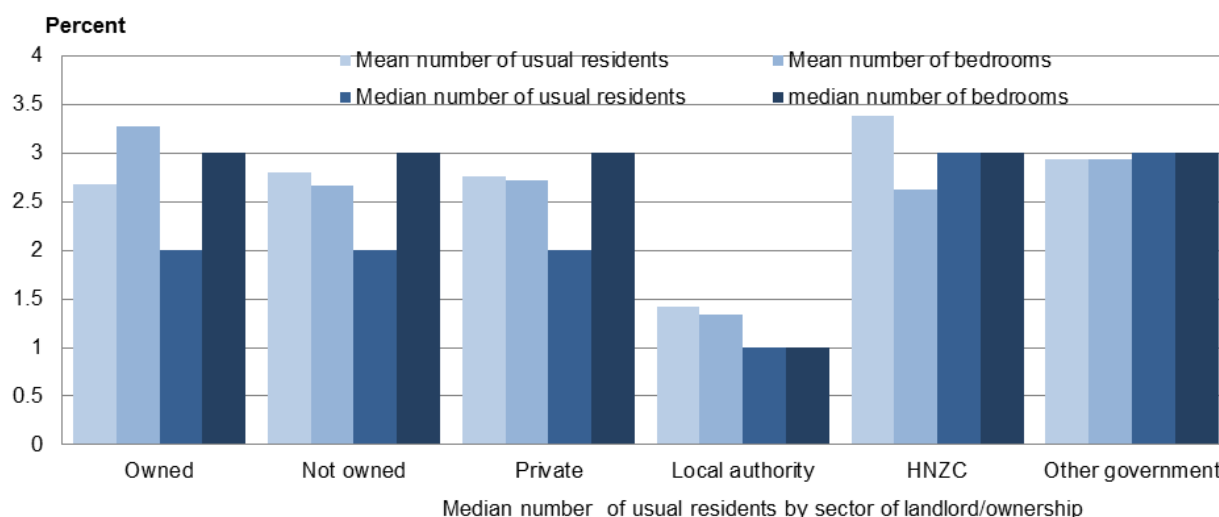
Table 9. Percentage of people living in housing that was owned or not owned by selected ethnic group and census year, 1991-2006

Year	Owned			Not owned		
	European/ Other ¹	Māori	Pacific	European/ Other ¹	Māori	Pacific
1991	79.3	57.4	49.3	20.7	42.6	50.7
1996	75.2	52.3	44.4	24.8	47.7	55.6
2001	72.4	47.0	38.2	27.6	53.0	61.8
2006	71.9	45.2	36.7	28.1	54.8	63.3

¹ The MELAA group has been added to European/Other in 2006 to make it consistent with previous Censuses.

These shifts in housing tenure have consequences for exposure to household crowding. As shown in Figure 21 (and Table A 17) the mean size of rental housing is smaller than privately owned homes (2.7 bedrooms compared with 3.3 bedrooms in privately owned homes in 2006). Māori and Pacific households are larger than European/Other (Figure 22). Consequently, a shift to greater use of rental housing will be associated with higher levels of household crowding for these ethnic groups.

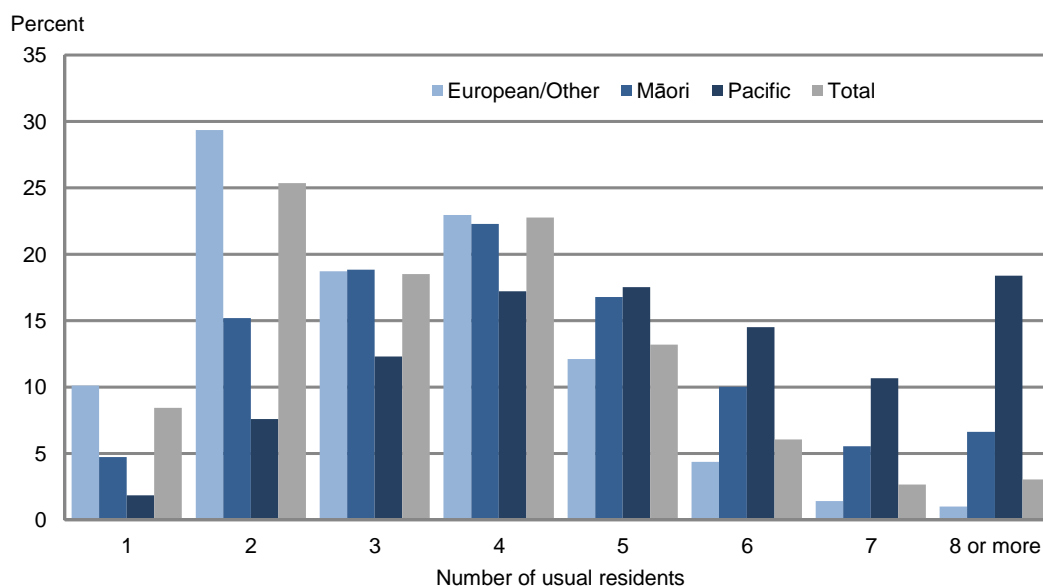
Figure 21 Mean and median size of houses and households by tenure type/landlord sector and census year, 1991 to 2006



1) There was a 25 percent undercount of HNZC properties in 2006.

Source: Statistics NZ

Figure 22. Number of usual residents per household by ethnicity, for people living in households, 2006 Census



4.2.11. Crowding and socioeconomic status (SES)

The most common measure of socioeconomic status in NZ health research is NZDep. However, the NZDep measure includes crowding as a component, so cannot be used here.¹⁹ Instead, we have measured a range of SES-related variables: household tenure (above); household income level; employment status; and education level. These socio-economic categories can be separated into household variables (tenure and household income) and individual variables (employment status and education level).

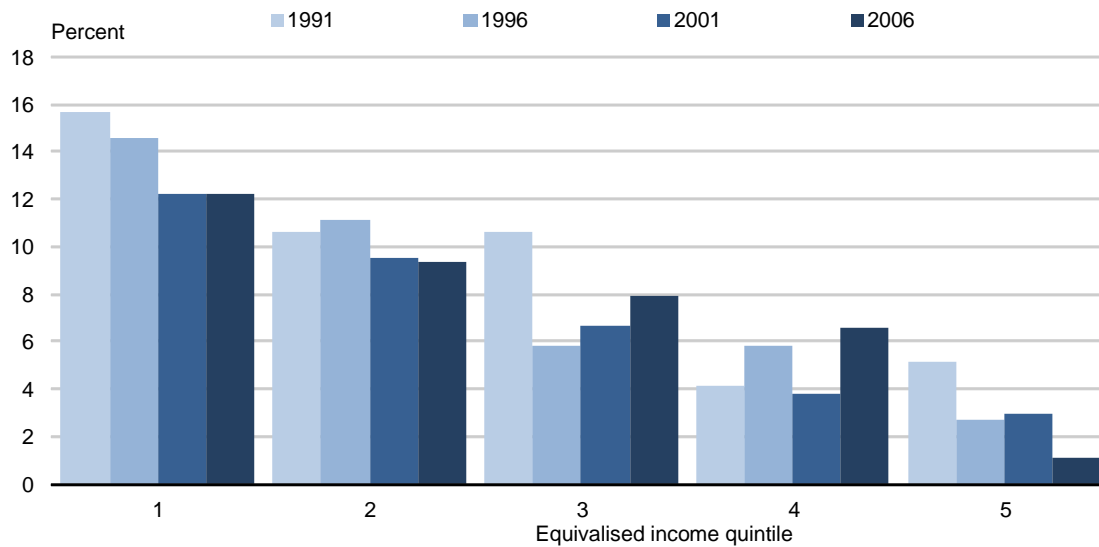
Household income

There are difficulties with using household income to explore variation in socio-economic characteristics between crowded and non-crowded households because crowded households are larger and often include more than one family group, making reported income less meaningful. Unadjusted household income varies little between crowded and non-crowded households as a result. We have used Jensen equivalised household income (equivalised income), which adjusts income based on the number and age of people in the household. There are, however, considerable issues with household income for larger households, particularly complex households that contain multiple families or individuals (see information about variables in the appendix). Because household income is calculated from personal income, if the income from one individual is missing, then household income cannot be calculated unless the income from the other members of the household falls into the highest income bracket (\$100,001 or more). As a result, crowded households have a very high non-response rate for household income of around 40%. Information about household income must therefore be regarded as indicative only and cannot be considered reliable. Because of this high level of non-response it has not been possible to give information for the severely crowded category.

As shown in Figure 23 and Table A 18, household crowding is strongly associated with being in the lowest income quintile (quintile one). But note the high non-response from Census respondents

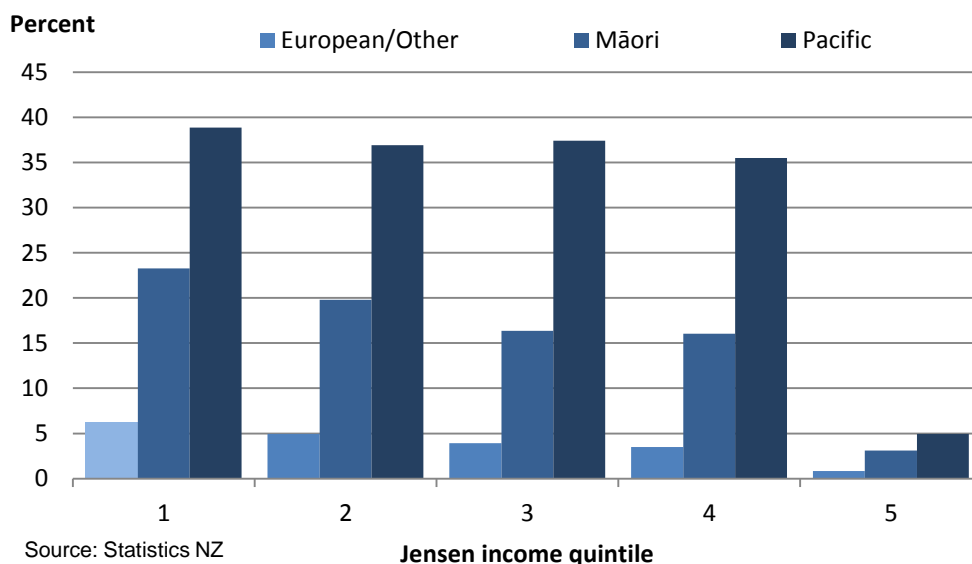
living in crowded households. In general, exposure to household crowding has declined across the four census periods, but the trend is not consistent across all income groups.

Figure 23. Prevalence of exposure to household crowding (1+ bedroom deficit), by equivalised income quintile and census year, 1991-2006.



Source: Statistics NZ

Figure 24. Prevalence of exposure to household crowding (1+ bedroom deficit), by equivalised income quintile and ethnic group, 2006.



Source: Statistics NZ

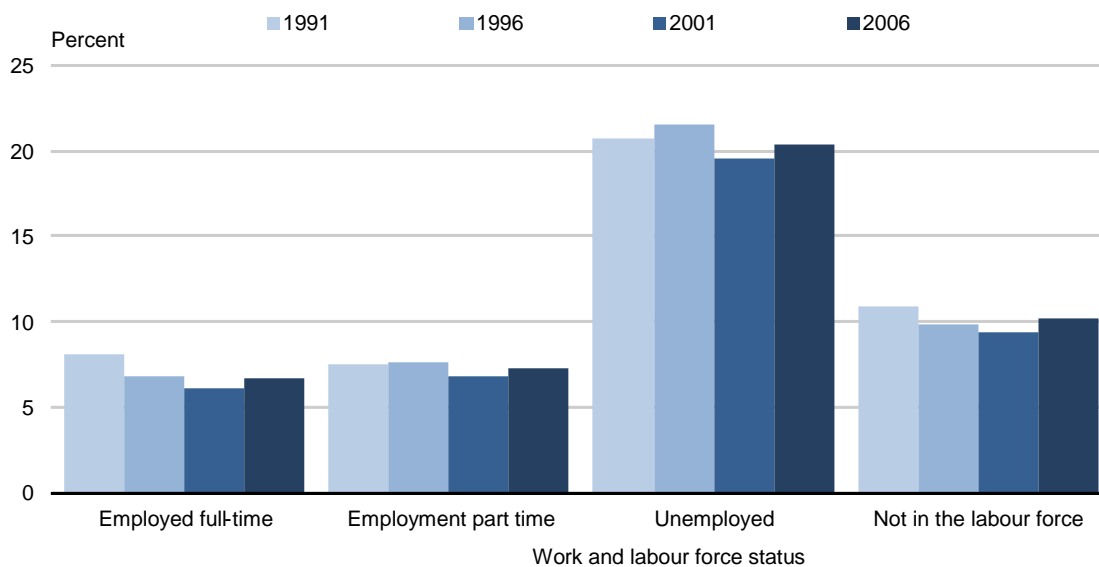
Note: Household income is missing for over 40 percent of households with Māori and Pacific people and 29% of households with European/MELAA/Other.

As shown in Figure 24 and Table A 21 household crowding has an independent association with both equivalised household income and ethnicity. In general, the association with ethnicity appears much stronger than with income quintile. Some caution should be applied when looking at the data, particularly for Māori and Pacific peoples, as a high percentage of Māori and Pacific people lived in households where information on household income was not available.

Employment status

As shown in Figure 25 and Table A 19, household crowding is strongly associated with being unemployed. These associations have been quite stable over the four censuses.

Figure 25. Prevalence of exposure to household crowding (1+ bedroom deficit), by work and labour force participation and census year, 1991-2006.

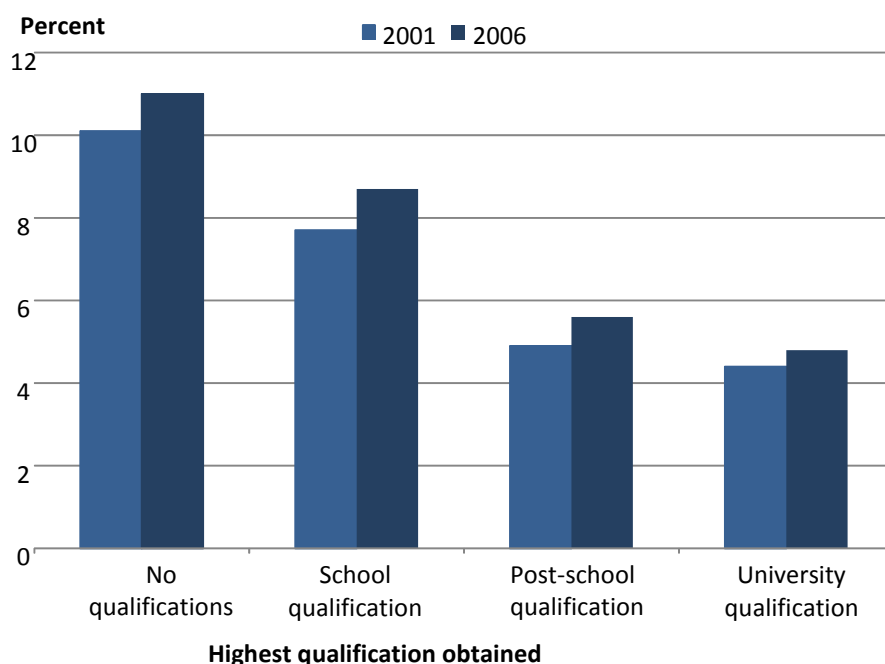


Source: Statistics NZ

Educational level

As shown in Figure 26 and Table A 20, household crowding is strongly associated with having no educational qualifications. These data are only available for the 2001 and 2006 Censuses.

Figure 26. Prevalence of exposure to household crowding (1 and 2+ bedroom deficit), by highest educational qualification obtained and census year, 2001-2006.



4.2.12. Distribution of tobacco smoke exposure across crowded households

The following tables (Table 10 and Table 11) show the distribution of active smoking and potential passive smoke exposure according to different categories of household crowding for the years where such data were collected by the Census (1996 and 2006). As reported previously,¹¹ smoking and exposure to smoking had a much higher prevalence among people living in crowded households. In 2006, the proportion of active smokers in the most crowded households (2+ bedroom deficit) was 35.8%, which is almost double the proportion in households which are not crowded (18.8%). Consequently, the potential for passive smoke exposure was more than doubled for those living in such households (66.6% for 2+ bedroom deficit households vs. 30.4% for those living in households not classified as crowded).

Although levels of smoking declined between 1996 and 2006, those falls in smoking and exposure to household smoking were lower among those living in crowded households than among households that were not crowded. This finding is unsurprising given the strong association between low income, unemployment and smoking.

Table 10. Prevalence of active smoking and exposure to passive smoking by crowding level, census years 1996 and 2006.

Crowding category	Percentage of people in crowding category who smoked regularly		Percentage of people in crowding category who were exposed to smoking ¹	
	1996	2006	1996	2006
2+ bedroom deficit	37.9	35.8	69.2	66.6
1+ bedroom deficit	35.6	32.6	61.0	57.8
Not crowded	22.0	18.8	35.4	30.4

¹ Exposed to smokers = having any active smoker in the house

Note: The smoking question was only included in the 1996 and 2006 Census.

Table 11. Prevalence of active smoking by crowding level and ethnicity, census years 1996 and 2006.

Crowding category	Percentage of people in crowding category who smoked regularly by ethnic group (total response)							
	1996				2006			
	European	Māori	Pacific	Asian	European	Māori	Pacific	Asian
2+ bedroom deficit	39.8	55.0	29.9	14.1	43.2	56.8	30.6	13.8
1+ bedroom deficit	35.4	52.0	29.7	13.2	35.9	53.1	30.3	12.0
Not crowded	21.0	39.8	29.5	11.7	18.2	37.6	28.0	10.1

4.2.13. Concentration of household crowding over time

The following section investigates whether exposure to household crowding has become more or less concentrated over time, i.e. whether inequalities are increasing or decreasing, and in particular whether the proportion of people exposed to household crowding in specific age and ethnic groups is rising or falling relative to other groups.

As illustrated in Figure 27 and Figure 28 (Table A 22 and Table A 23) patterns in the distribution of household crowding exposure across age and ethnic groups are moderately stable over time, particularly in the 1996 to 2006 period.

Figure 27. Prevalence of exposure to household crowding (1+ bedroom deficit), by age and ethnic group and census year, 1991-2006.

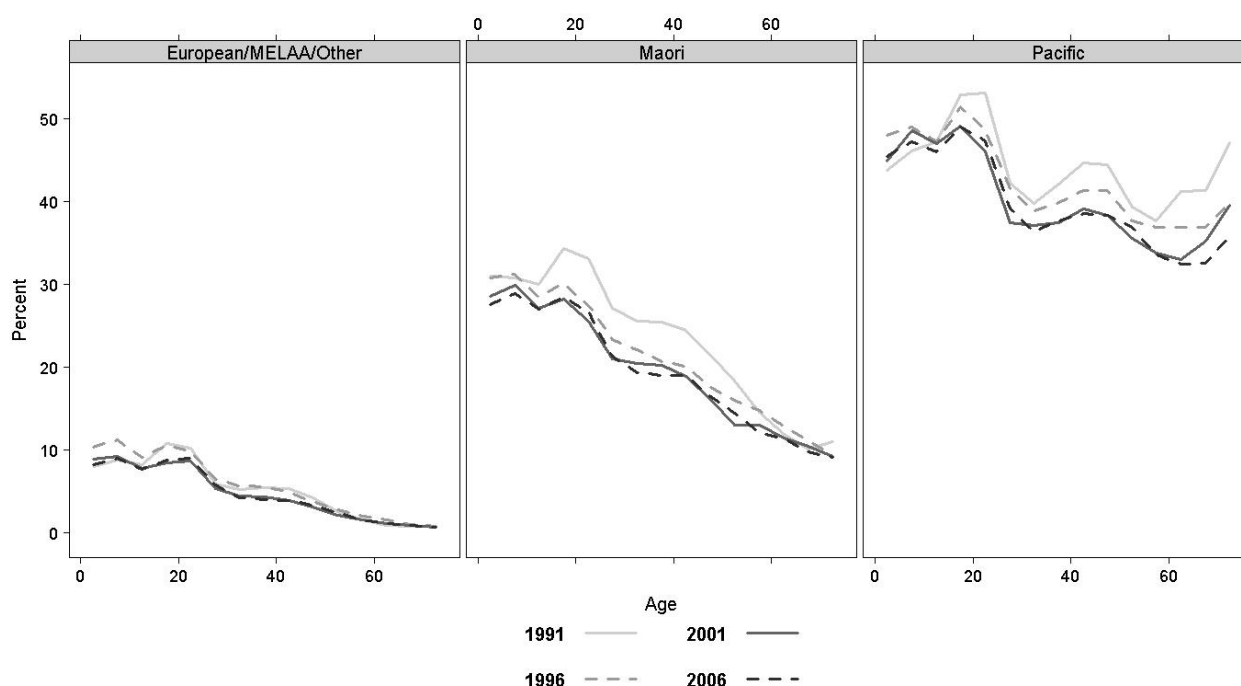
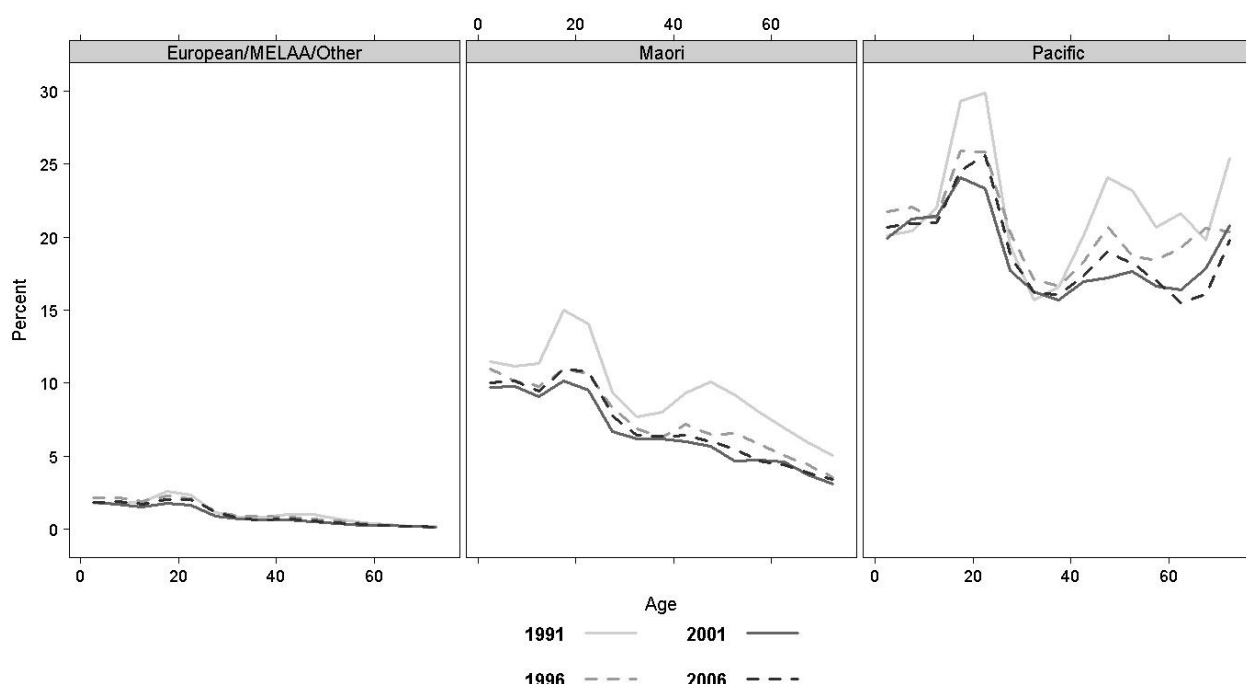


Figure 28. Prevalence of exposure to household crowding (2+ bedroom deficit), by age and ethnic group and census year, 1991-2006.



Crowding levels have generally declined in NZ over these four census periods. But inequalities across ethnic groups have persisted. For Māori in total, the relative risk of exposure to severe household crowding (2+ bedroom deficit), compared with European/Other, was 9.0 (95%CI 8.9-9.1) in 1991 and 8.6 (95%CI 8.5-8.7) in 2006 (Table A 24). For Pacific peoples in total, the relative risk of exposure to severe household crowding compared with European/Other was 18.2 (95%CI 17.9-18.5) in 1991, and 20.9 (95%CI 20.6-21.2) in 2006.

For children aged under 15 years (Table A 25) and under 5 years (Table A 26), inequalities have also persisted over this period. For Māori children less than 15 years, the relative risk of exposure to severe household crowding (2+ bedroom deficit), compared with European/Other, was 6.3 (95% CI 6.1 - 6.4) in 1991 and 5.5 (95% CI 5.3 - 5.6) in 2006. For Pacific children less than 15 years, the relative risk of exposure to severe household crowding compared with European/Other was 11.5 (95% CI 11.2 - 11.8) in 1991, and 11.6 (95% CI 11.3 - 11.9) in 2006. For Māori children less than 5 years, the relative risk of exposure to severe household crowding (2+ bedroom deficit), compared with European/Other, was 6.3 (95% CI 6.1-6.6) in 1991 and 5.4 (95% CI 5.2-5.7) in 2006. For Pacific children less than 5 years, the relative risk of exposure to severe household crowding compared with European/Other was 11.2 (95% CI 10.7-11.6) in 1991, and 11.1 (95% CI 10.6-11.5) in 2006.

5. Discussion and conclusions

5.1. Key findings

Household crowding can be derived from Census data on the household composition (number of people and their ages and couple status) and the number of rooms in a house. The Canadian National Occupancy Standard (CNOS) is widely used in NZ and produces broadly similar results to other crowding measures based on the number of bedrooms in the house (though somewhat higher estimates than the American Crowding Index which is based on total rooms).¹³ From a health perspective, it is important to report the proportion of people exposed to household crowding rather than reporting the proportion of households which are crowded. The latter is the more common way for such data to be presented but inevitably understates the proportion of peoples exposed.

After declining for many decades, exposure to household crowding (1+ bedroom deficit) appears to have levelled out in NZ and may now be increasing. The 2006 Census identified 10.4% of the population as being exposed to household crowding, a slight increase from 10.1% exposed in 2001 though less than the 11.9% in 1991. The proportion exposed to more severe household crowding (2+ bedroom deficit) was 3.5% in 2006, which was the same level as in 1991. Long-term trends in exposure to household crowding in NZ have been reviewed elsewhere.²⁰ Historically, levels of household crowding were much higher than they are today. Using a definition equivalent to severe household crowding (more than 1.5 people per room) in 1921 about 9% of private dwellings were crowded and 15% of the population lived in these dwellings.²⁰ This 1921 Census did not include Māori.

The distribution of exposure to household crowding is very unequal with much higher levels for children relative to adults, and for Pacific and Māori relative to European/Other.²¹ In 2006, the proportion of people exposed to household crowding (1+ bedroom deficit) were 42.6% for Pacific peoples, 22.8% for Māori, and 4.7% for European/Other. Within the Pacific population, levels of exposure to household crowding also varied considerably across the largest ethnic groups, ranging from 39.7% for Cook Islanders, 42.2% for Samoans, and 51.8% for Tongans. Other reports have documented important variations in living conditions and health outcomes for these Pacific peoples living in NZ.²² It would be useful to investigate the basis for these differences.

In 2006, 27.6% of Māori children under five years, and 45.4% of Pacific children under five years were exposed to household crowding, compared with 8.2% for European/Other. Exposure to extreme crowding (2+ bedroom deficit) was 10.1% for Māori and 20.6% for Pacific children under five years compared with 1.9% for European/Other. The proportion of total children under five year exposed to extreme crowding increased from 5.3% to 6.0% over the 1991 to 2006 period.

The distribution of exposure to household crowding has shown persistent ethnic inequalities across the 1991 to 2006 period. For Māori children (<5 years), the relative risk of exposure to severe household crowding, compared with European/Other, was 6.3 (95% CI 6.1-6.6) in 1991, and 5.4 (95% CI 5.2-5.7) in 2006. For Pacific children, the relative risk of exposure to severe household crowding, compared with European/Other, was 11.2 (95% CI 10.7-11.6) in 1991, and 11.1 (95% CI 10.6-11.5) in 2006.

Other ethnic groups in NZ, notably Asian (including South East Asian, Chinese and Indian), Latin American, African and Middle Eastern have not been a major focus of this report. These populations are all exposed to relatively high levels of household crowding compared with NZ Europeans (Figure 8). Characteristics of household crowding in these populations have been described in other published reports from Statistics NZ.²¹

Exposure to household crowding is strongly associated with household composition, particularly the proportion of dependent children. Very few households with no dependent children are crowded (less than 2%), whereas more than 80% of households with 7 or more dependent children are classified as crowded.¹⁶ Not surprisingly, crowded households also tended to be larger, with an average of 5 occupants, compared with 2.7 for the total NZ population.¹⁶

Exposure to household crowding is also associated with a range of measures of socio-economic deprivation, notably living in rental housing (particularly social housing), low equivalised household income, being unemployed, and lack of educational qualifications.

There is a pattern for social housing tenants to experience high and increasing levels of crowding over time. The level of household crowding in HNZN properties is strongly influenced by the composition of this population, which includes a high proportion of those groups which are known to have high levels of household crowding (low income households, families with young children, Māori and Pacific peoples).¹⁴ The increase in crowding in HNZN properties over this period is likely to have been partly driven by a shift in composition of the tenant population towards ethnic groups associated with high levels of household crowding (notably the marked rise in the proportion of Pacific peoples living in HNZN properties which would mean an increase in crowding as there was no apparent change in the size of houses over time, as shown in Table A 17). This trend has continued over the 2004-10 period.²³ Another factor may be an increasing concentration of high-needs tenants in HNZN properties, particularly following the move back from 'market rents' (introduced in 1992) to income-related rents in 2001.²⁴ Since then, the proportion of more affluent tenants paying market rents has been declining, and has been replaced by tenants selected because of their high level of housing need.

Exposure to household crowding also concentrates other housing risks, notably the potential for exposure to passive smoking. Passive smoking is an important health risk, particularly for children.²⁵⁻²⁷ In 2006 the proportion of active smokers in the most crowded households (2+ bedroom deficit) was 35.8%, which is almost double the proportion in households which are not crowded (18.8%). Consequently, the potential for passive smoke exposure was more than doubled for those living in such households (66.6% for 2+ bedroom deficit households vs. 30.4% for those living in households not classified as crowded).

Levels of exposure to household crowding are somewhat higher in NZ than in Australia, England, or Canada, though lower than in the US.²⁸ Compared with Australia, a higher proportion of NZ households are classified as crowded (5.1% in NZ compared with 4.4% in Australia in 2001). A consistent pattern across all reported data is that the distribution of household crowding is very unequal. Exposure to household crowding appears to be invariably higher for indigenous peoples (13.5% in NZ compared with 12.7% for indigenous people in Australia, in 2001).²⁸

5.2. Implications

Exposure to household crowding is an important risk factor for transmission of infectious diseases. In NZ this exposure is associated with an increased risk of meningococcal disease,⁶ tuberculosis⁷ rheumatic fever⁸ and pneumonia.⁴ Furthermore, crowding in a small, poorly ventilated house contributes to high relative humidity and condensation, leading to dampness and mould, which can cause respiratory illness and mental health problems.^{29,30,31} Also, as demonstrated here, the risk of passive smoke exposure is increased in such households.

It is therefore of particular concern that a high proportion of Pacific and Māori children are exposed to household crowding in NZ. These populations experience the highest rates of hospitalisation for infectious diseases, with rates that are typically two times higher than those recorded for

Europeans/Others.¹ Additionally, hospitalisation rates for Māori and Pacific peoples are rising more rapidly than for other ethnic groups resulting in increasing health inequalities.¹

The findings in this report add further support for interventions aimed at reducing household crowding for Māori and Pacific households, particularly those containing children. The HNZN Healthy Housing Programme, before it was largely disestablished in 2011, focused on such populations in Auckland, Northland and Wellington. It included a set of interventions to reduce household crowding, improve housing conditions, and link households to health services.³² Evaluations of the Healthy Housing Programme show that it was highly successful in lowering hospitalisation rates for children.^{33,34}

5.3. Strengths and limitations

This analysis is one of the few we are aware of that has explicitly looked at household crowding from the health perspective. Consequently, it has focussed on reporting the level of exposure to household crowding experienced by housing occupants.

A major strength of this project is that it has been done in collaboration with Statistics NZ so has been able to use total NZ population data rather than a sample. Because the data analysis was largely conducted by a Statistics NZ staff member (RG), it has used individual records rather than aggregated data, so the estimates are precise.

Important limitations include the following:

- There is no standard international method for measuring levels of household crowding, as is reflected in the range of crowding definitions in use.
- There is similarly no international agreement on thresholds for defining overcrowding. Consequently, it is probably more correct to refer to levels of household crowding than levels of overcrowding.
- This analysis excludes people living in non-private dwellings, such as boarding houses and night shelters, because household and room data are not collected for these dwellings. The calculation of crowding also excludes visitors to the household.¹⁶ For these reasons, the crowding levels reported here are probably conservative.
- The Census can only record some dimensions of household crowding so there is potential for ‘functional crowding’ to be even greater than that estimated here (for example in situations where families may sleep in a single room to keep warm over winter). A small study of hospitalised children in Wellington found that 12.3% (13/106) reported that they had always or often “...needed to sleep in same room as other family members just to keep warm in the house.”³⁵
- Census variables inevitably contain some errors and missing values. At the broadest level, we are unable to assign a level of household crowding to about 10% of the NZ population because of insufficient Census data (Table A 1). Missing data limit our analysis of social economic status for people in crowded households. Non-response for some socio-economic variables, particularly income and highest qualification, is very high and precludes any further breakdowns by severity of crowding. Household variables such as tenure and sector of landlord also have some non-response limitations.
- This analysis is entirely dependent on the use of Census data, so is only able to provide updates every 5 years. The delay in the 2011 Census until 2013 means that the next data point in this sequence will be 7 years after the previous one. At the time of writing (2012), this report cannot provide a particularly accurate measure of ‘current’ crowding levels in NZ. However, the

patterns in the distribution of household crowding are very well established, so are unlikely to have changed much from what is presented here. Given the impact of the Canterbury earthquakes, record low building consents,³⁶ and reports of extreme housing shortages in Auckland,³⁷ it would be important to consider other ways of tracking levels of household crowding in NZ.

- Ultimately, this analysis is confined to information collected by the Census. This constraint inevitably limits the amount of information collected about other important aspects of housing that might be associated with household crowding, notably housing conditions. NZ is unusual among OECD countries in not having a regular national housing survey.

5.4. Further research needs

NZ has several sources of data on household crowding that could provide additional information on the distribution of this exposure and its health effects:

- NZ Health survey includes specific questions to measure household crowding.
- NZ General Social Survey also includes specific questions on crowding levels.
- The Census itself provides additional data to that presented in this report. Multivariate analysis would be useful to analyse the independent relationships described here.

A number of important questions about household crowding and its health consequences would benefit from further research:

- We need to better understand what household crowding means in practice, for example, how people in crowded households perceive crowding, how they use rooms within households, and how they adapt to higher levels of household crowding.
- It would be valuable to relate findings on the distribution of household crowding, and how this distribution has changed over time, to the incidence and distribution of infectious diseases in the New Zealand population. A related report provides an estimate of the size of this disease burden (see: Baker MG, McDonald A, Zhang J, Howden-Chapman P. *Infectious diseases attributable to household crowding in New Zealand: A systematic review and burden of disease estimate*. Wellington: He Kainga Oranga/ Housing and Health Research Programme, University of Otago, 2013).
- It would also be important to assess the impact of household crowding on wellbeing more generally, and on the health and social functioning of individuals and families.
- It would be useful to more fully evaluate interventions in NZ that have sought to lower levels of household crowding and use this knowledge to implement, refine and improve further interventions in this area. NZ is well placed to conduct high-quality evaluations of such interventions and add to the small evidence base on the health impacts of housing improvements.

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7. Appendices

7.1. Data fields used in this analysis:

Bedrooms

A bedroom is defined as a room in a dwelling which is used or intended for sleeping in. Statistics NZ applies the following rules:

- A room is considered to be a bedroom if it is furnished as a bedroom even if it is not being used at the time of the data collection. A room furnished as a bedroom should include a sleeping facility such as a bed or mattress, and could include items such as a dresser and chest of drawers.
- Room equivalents should not be counted for one roomed dwellings (i.e. bed-sitting room). A one-roomed dwelling should be counted as having one bedroom and therefore one total room.
- A sleepout adjacent to a private dwelling should be counted as a bedroom if it is used and/or furnished as a bedroom and is occupied by members of the same household as occupy the dwelling.
- A caravan adjacent to a private dwelling should be counted as a bedroom only if it is used as a bedroom and is occupied by members of the same household as occupy the dwelling.
- A room (such as a living room) that is used as a bedroom at night, either short-term or long-term, should not be counted as a bedroom unless the only bedroom facilities in the dwelling are in that room. If the only bedroom facilities in a dwelling are in a room that is also used for another purpose, i.e. in a living room, this room should be counted as a bedroom.

Canadian National Occupancy Standard

The Canadian National Occupancy Standard (CNOS) was developed by the Canada Mortgage and Housing Corporation. A household is said to be crowded if the dwelling requires extra bedrooms in order to meet the following criteria:

- There should be no more than two people per bedroom; parents or couples share a bedroom.
- Children aged less than five years, either of same or opposite sex, may reasonably share a bedroom.
- Children aged less than 18 years of the same sex may reasonably share a bedroom.
- A child aged five to 17 years should not share a bedroom with one aged under five of the opposite sex; single adults aged 18 years and over and any unpaired children require a separate bedroom.

Cigarette smoking

Cigarette smoking behaviour refers to the active smoking of one or more manufactured or hand-rolled tobacco cigarettes, from purchased or home-grown tobacco, per day, by people aged 15 years and over. Cigarette smoking does not include: the smoking of cigars, pipes and cigarillos; the smoking of any other substances, herbal cigarettes or marijuana for example; the consumption of tobacco products by other means, such as chewing or passive smoking. The 2006 Census non-

response rate was 5.2%. In 1996 the non-response rate was 7.2%. Cigarette smoking behaviour is a supplementary variable.

Ethnicity

Ethnicity is the ethnic group or groups that people identify with or feel they belong to. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality or citizenship. Ethnicity is self-perceived and people can belong to more than one ethnic group.

Comparability with previous census data: There are issues affecting the comparability of the 2006 data with the 1991, 1996 and 2001 Census data.

Changes in the 2006 Census: Although the 2006 question was consistent with those used in 1991 and 2001, the output is not consistent, due to the revised classification used for the 2006 Census. For full details of the Statistical Standard for Ethnicity 2005 go to: <http://www.stats.govt.nz/analytical-reports/review-measurement-ethnicity/default.htm>

Classification changes for 2006 were: For 2006, the 'Other' category has been split into two groups: 'Middle Eastern/Latin American/African' (MELAA); and 'Other Ethnicity', making six output groups instead of five. The 'Other Ethnicity' category includes groups previously classified as 'Other Other', as well as a separate category for 'New Zealander'. In 1991, 1996 and 2001, 'New Zealander' responses were included in the 'NZ European' category.

In 2006 and 2001, up to six ethnic responses were classified, compared with three in 1991 and 1996.

Public discussion about the term 'New Zealander' occurred during the months leading up to the 2006 Census. This may have had an impact on the 2006 ethnicity data. In 2006, 11.1% of respondents gave New Zealander as one of the responses to the ethnicity question, compared with 2.4% in 2001.

Changes in the 1991, 1996 and 2001 Censuses: The concept that the ethnicity question is designed to measure is cultural affiliation. Statistics NZ research has shown that there was a shift in response patterns between 1991 and 1996. While some changes in response in 1996 could be attributed to the question wording rather than population changes, in general 1996 is more closely comparable with 2001 and 2006 data than with the 1991 data. The key change between the 1991 and 1996 Censuses was an increase in people identifying more than one ethnicity, a consequent reduction in single responses, and the possibility that a larger proportion of respondents may have answered the 1996 question on the basis of their ancestry (descent) rather than their ethnicities (cultural affiliations). The main effect of the 1996 question on the data was a large increase in 'Other European' responses associated with the tick boxes provided, and corresponding decreases for these ethnicities in 2001. The apparently large increase in responses of 'Māori' between 1991 and 1996 may reflect more on the 1991 data and the social changes that occurred in this period. Changes were made in 1996 to the question wording, the instructions and the available tick boxes. The questions used in the 2001 and 2006 Censuses were consistent with the 1991 question, but the 1991 Census used the descriptor 'New Zealand Māori' rather than 'Māori'.

There has been a key change in the wording of the ethnicity question in the 1996 Census. This change affected the type of responses given and the comparability of the data over time. The 2001 and 2006 questions were almost the same as for 1991, but differ from the question used in 1996. For more information, go to:

<http://www.stats.govt.nz/census/2001-census-data/change-in-ethnicity-question.htm>

An individual can be counted in more than one ethnic group. However, if two or more of their ethnic groups fall into the same broad ethnic group category, then they are counted only once in that category in tables providing ethnicity data at that level.

There has been an increase in the proportion of people stating multiple ethnicities. In 2001, 9.0% of respondents to the ethnicity question stated that they had more than one ethnicity. In 2006 this percentage rose to 10.4%.

A technical resource page for ethnicity, which is regularly updated with references and is aimed at those working with ethnicity data, contains further information: <http://www.stats.govt.nz/analytical-reports/review-measurement-ethnicity/papers.htm>

Highest qualification

This is derived for people aged 15 years and over, and combines highest secondary school qualification and post-school qualification to derive a single highest qualification. The non-response rate for highest qualification was 6.0% in 2006 and 6.5% in 2001. Highest Qualification is a defining variable. There are issues affecting the comparability of this data with 1996 and 2001 Census data; the classifications have been changed to include National Certificate of Educational Achievement (NCEA) qualifications.

For the 2006 Census, new qualifications classifications were adopted based on the NZ Register of Quality Assured Qualifications. This register was introduced in 2003 as part of changes to NZ's qualifications system.

Household

A household, as defined in the Census, is either one person who usually lives alone, or two or more people who usually live together and share facilities (e.g. cooking facilities, bathroom facilities, a living area) in a private dwelling. It may include other people in addition to a family, or two or more families living together.

Household composition

This is a derived variable that classifies households according to the relationships between usually resident people. Households are classified according to the presence, number and type of family nuclei, and the presence of related and unrelated people. In 2006, 1.9% of households were classified as 'household composition unidentifiable'. In 2001, 2.1% of households were classified as 'household composition unidentifiable'. Household composition is a defining variable.

Comparability with 1996 and 2001 Census data: There are issues affecting the comparability of this data with 1996 and 2001 Census data.

Certain aspects of the household composition data are not comparable over time, because of classification changes. This affects analysis at the more detailed levels of the classification, but not at the least detailed level.

The 2001 and 2006 data for multi-family households are not comparable with 1996 data because in 2001 and 2006 two-family households in which one or both of the families were 'couple only' were classified in the 'other two-family household' category. In 1996 the classification did not have this category, and two-family households containing couple-only families were included in the 'two two-parent families' and 'one two-parent family and a one-parent family' categories.

In 1996 there were categories indicating whether or not 'other multi-person households' contained siblings, but the 2001 and 2006 classifications do not have these subcategories, so this information is not available for 2001 and 2006.

The 1996 classification included a 'visitor-only household' category, but the 2001 and 2006 classifications did not include this category. In 2001 and 2006 this information was available from the 'visitor-only private dwelling' category of the 'visitor-only private dwelling indicator' variable.

There was a change in the classification of young people not living with their parents. In 1996, everyone under 18 years old who was not employed full time, did not have a child and/or partner, and did not report living with parents was coded as a child in a family nucleus and given a child dependency status of 'dependent child'. For 2001 and 2006, the age criterion was changed to people under 15 years old. This change affected how the household was classified, but has not had a major impact on the comparability of the data over time.

Sector of landlord

This is the institutional unit to which the owners of rented or leased private dwellings belong. Landlord refers to the type of organisation or person from whom households rent or lease private occupied dwellings. The 2006 Census non-response rate was 1.1%, however 4.5% answered 'don't know' to this question. In 2001 the non-response rate was 1.8% and 4.1% answered 'don't know'.

There are issues affecting the comparability of this data with 1996 and 2001 Census data. There has been a change in the questionnaire and classification – 'private person, trust or business' is now one category. In 2001, these were three separate categories. Aggregating the three categories used in 2001 allows comparison with 2006 data.

Significant issues: There is an undercount of households renting from HNZC and other agencies. Comparing census data with HNZC data indicates that there was an undercount of approximately 25% in 2006, and approximately 15% in 2001. It is not possible to give exact figures, as the HNZC data relates to a different time period and could include dwellings that were unoccupied at the time of the Census. The undercount is largely due to respondent error in filling out the tenure related questions and a high non-response rate for these households. Only households that responded 'yes' to question 11 'does this household pay rent' and gave valid responses for both sections of question 12 'how much rent does this household pay' can be included in the subject population.

Tenure of household

This refers to the nature of the occupancy of a household in a private dwelling (i.e. whether they own the dwelling or not and whether they have a mortgage or pay rent), at the time of the survey. It does not refer to the tenure (or ownership) of the land on which the dwelling is situated. The 2006 Census non-response rate was 4.7%. The 2001 non-response rate was 3.7%. Tenure of household is a defining variable.

Comparability with 1996 and 2001 Census data: There are significant issues affecting the comparability of the 2006 data with the 1996 and 2001 Census data because of the explicit identification of home ownership through family trusts in 2006. The 2006 dwelling form included two new questions: Question 7 – dwelling held in family trust; Question 8 – mortgage payments made by family trust. The way in which tenure of household is derived has changed. In 2001 four questions were used to derive tenure of household, whereas in 2006 six questions (incorporating the new family trust questions) were used to derive this variable.

Dwellings in a family trust were treated as not owned in 2001. The 2001 help notes instructed respondents to mark 'no' to the ownership of dwelling question if their dwelling was in a family trust. However, respondents who did not read the help notes may have answered 'yes' to the ownership of dwelling question. So it is likely that for 2001 some households whose dwelling was in a family trust were included in the 'dwelling owned or partly owned...' categories rather than the 'dwelling not owned...' categories.

Comparisons of 2006 Census data on home ownership with previous census data could be made by aggregating the three 'dwelling owned or partly owned by usual residents...' categories together with the three 'dwelling held in a family trust by usual residents...' categories for the 2006 data. However, this will still not provide an exact time series comparison, because of the different treatment of dwellings held in a family trust in the 2001 Census.

Income

Total personal income represents the before-tax income of the respondent in the 12 months ending on census day. It is collected as an income range rather than an actual dollar income.

'Total household income' is derived by aggregating the total personal income of all members of the household who are aged 15 years and over. As total personal income is collected in income ranges (e.g. \$25,001–\$30,000), and not as an actual dollar income (e.g. \$29,500), in order for total household income to be calculated, a representative income is determined for each total personal income range. Total household income is derived by adding together the median total personal incomes of each member of the household who is aged 15 years and over. The non-response rates for total household income were 16.2% in 2006 and 18.5% in 2001.

Significant issues: Total household income data are affected by absentees and other people who did not answer the income question. The total personal income of an absentee cannot be included in the calculation of these variables. Where there was one or more absentee aged 15 years or over, the income for the family, extended family or household was set to 'not stated' unless the accumulated income was already '\$100,001 or more'. Likewise, if someone had not stated their income, the income for the household was set to 'not stated' unless the '\$100,001 or more' threshold had already been reached. This has affected the quality of these variables and care should be taken when using them. The effect becomes more marked as the number of people in the family, extended family or household increases. This makes household income data for crowded households unreliable and all figures should be treated with caution.

This analysis uses Jensen equivalised household income, which adjusts income based on the number and age of people in the household.

Usual residence

This is the meshblock of the dwelling where a person considers himself or herself to usually reside, except in the following cases:

- People who board at another residence to attend primary or secondary school, and return to the home of their parent(s) or guardian(s) for the holidays, usually reside at the address of their parent(s) or guardian(s). Post-secondary students usually reside at the address where they live while studying.
- Children in joint custody usually reside at the place where they spend more nights, or if they spend equal amounts of time at each residence, they usually reside at the place where they are at the time of the census.

- People who are in rest homes, hospitals, prisons or other institutions usually reside where they consider themselves to live, and this may include the institution.
- A person whose home is on any ship, boat or vessel permanently located in any harbour shall be deemed to usually reside at the wharf or landing place (or main wharf or landing place) of the harbour.
- A person from another country who has lived, or intends to live, in NZ for 12 months or more usually resides at his or her address in NZ (for consistency with other population statistics, for example external migration).
- People who spend equal amounts of time residing at different addresses, and cannot decide which address is their usual residence, usually reside at the address they are at on census night.

If none of the above guidelines apply, the person usually resides at the address he or she is surveyed at. The definition of usual residence does not include a time criterion and instead uses the approach of self-definition. This is because a time criterion can lead to households and families being classified on an arbitrary basis. Furthermore, most people know where they usually live (reside) and as such this involves feelings of belonging, association and participation in and with a household.

Work and labour force status

This classifies people aged 15 years and over according to their inclusion or exclusion from the labour force. For people who are employed, it distinguishes whether they are employed full time (30 hours or more per week) or part time (fewer than 30 hours per week). For people who are not employed, it classifies them as either 'unemployed' or 'not in the labour force'. There is no non-response category for work and labour force status, as a person's work and labour force status is imputed if they did not respond to the questions from which it is derived. This includes situations in which an entire individual form for a person within a household was not answered, and situations in which an entire household did not respond. In 2006, work and labour force status was imputed for 6.7% of the usually resident population aged 15 years and over. In 2001, work and labour force status was imputed for 7.9% of the usually resident population aged 15 years and over.

7.2. Tabulated data used in figures contained in report

Table A 1. Prevalence of exposure to household crowding and degree of crowding by census year, 1991-2006 (see Figure 1).

Crowding level	1991		1996		2001		2006	
	Pop	%	Pop	%	Pop	%	Pop	%
Unspecified population*	27,600	0.9	116,400	3.3	143,100	4.0	158,000	4.1
Total population (specified)	3,210,300	100	3,383,500	100	3,451,400	100	3,736,900	100
Not crowded	2,829,800	88.2	3,013,900	89.1	3,103,000	89.9	3,347,200	89.6
1 bedroom deficit	267,300	8.3	253,500	7.5	239,500	6.9	258,500	6.9
2 bedroom deficit	74,300	2.3	76,000	2.2	70,400	2.0	83,300	2.2
3+ bedroom deficit	39,000	1.2	40,100	1.2	38,500	1.1	47,800	1.3
Total crowded	380,612	11.8	369,600	10.9	348,400	10.1	389,600	10.4

*Unspecified population = difference between usually resident population and those with sufficient details to calculate a household crowding level

Table A 2. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by age group and census year, 1991-2006 (see Figure 3).

Age group (years)	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
0-4	267,700	46,500	17.4%	271,100	49,200	18.1%	259,000	44,400	17.1%	261,900	44,300	16.9%
5-9	245,300	43,800	17.9%	275,500	50,000	18.1%	275,900	47,300	17.1%	274,800	48,000	17.5%
10-14	249,400	42,100	16.9%	251,000	38,600	15.4%	276,500	40,900	14.8%	289,200	44,300	15.3%
15-19	267,600	53,200	19.9%	243,000	41,500	17.1%	241,600	37,900	15.7%	275,100	45,800	16.6%
20-24	254,400	46,700	18.4%	254,200	40,400	15.9%	217,600	34,100	15.7%	247,900	43,200	17.4%
25-29	258,200	30,900	12.0%	255,700	30,300	11.8%	226,800	25,100	11.1%	224,300	28,400	12.7%
30-34	260,600	26,800	10.3%	274,900	28,800	10.5%	257,300	24,900	9.7%	257,600	25,000	9.7%
35-39	238,800	23,900	10.0%	268,800	25,500	9.5%	276,700	25,100	9.1%	282,000	25,700	9.1%
40-44	231,200	22,100	9.6%	242,700	20,800	8.6%	267,600	21,200	7.9%	294,700	25,200	8.6%
45-49	181,800	15,800	8.7%	230,200	15,700	6.8%	236,500	15,600	6.6%	276,100	19,900	7.2%
50-54	154,500	10,500	6.8%	176,900	9,600	5.4%	221,300	10,500	4.7%	237,800	13,800	5.8%
55-59	132,100	6,500	4.9%	148,700	6,900	4.6%	169,300	6,800	4.0%	218,800	9,000	4.1%
60-64	132,700	4,600	3.5%	125,000	4,600	3.7%	142,100	5,400	3.8%	166,900	6,200	3.7%
65-69	118,300	2,900	2.5%	121,200	3,400	2.8%	116,000	3,700	3.2%	136,300	4,600	3.4%
70 and over	217,700	4,100	1.9%	244,700	4,500	1.8%	267,300	5,300	2.0%	293,300	6,300	2.1%
Total NZ (specified)	3,210,300	380,500	11.9%	3,383,500	369,700	10.9%	3,451,400	348,400	10.1%	3,736,900	389,600	10.4%

Age group (years)	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
0-4	267,700	14,300	5.3%	271,100	16,100	5.9%	259,000	14,700	5.7%	261,900	15,600	6.0%
5-9	245,300	12,200	5.0%	275,500	15,100	5.5%	275,900	14,700	5.3%	274,800	16,000	5.8%
10-14	249,400	12,300	4.9%	251,000	12,200	4.9%	276,500	13,000	4.7%	289,200	15,100	5.2%
15-19	267,600	16,800	6.3%	243,000	13,900	5.7%	241,600	12,600	5.2%	275,100	16,500	6.0%
20-24	254,400	15,400	6.1%	254,200	13,600	5.4%	217,600	11,300	5.2%	247,900	15,700	6.3%
25-29	258,200	9,400	3.6%	255,700	9,800	3.8%	226,800	7,700	3.4%	224,300	9,800	4.4%
30-34	260,600	6,800	2.6%	274,900	8,100	2.9%	257,300	7,100	2.8%	257,600	7,700	3.0%
35-39	238,800	5,900	2.5%	268,800	6,700	2.5%	276,700	6,800	2.5%	282,000	7,500	2.7%
40-44	231,200	5,900	2.6%	242,700	5,900	2.4%	267,600	5,800	2.2%	294,700	7,500	2.5%
45-49	181,800	4,700	2.6%	230,200	4,800	2.1%	236,500	4,500	1.9%	276,100	6,300	2.3%
50-54	154,500	3,500	2.3%	176,900	3,200	1.8%	221,300	3,300	1.5%	237,800	4,600	1.9%
55-59	132,100	2,100	1.6%	148,700	2,400	1.6%	169,300	2,200	1.3%	218,800	3,100	1.4%
60-64	132,700	1,600	1.2%	125,000	1,600	1.3%	142,100	1,900	1.3%	166,900	2,000	1.2%
65-69	118,300	1,000	0.8%	121,200	1,300	1.1%	116,000	1,300	1.1%	136,300	1,600	1.2%
70 and over	217,700	1,400	0.6%	244,700	1,600	0.7%	267,300	1,800	0.7%	293,300	2,300	0.8%
Total NZ (specified)	3,210,300	113,300	3.5%	3,383,500	116,100	3.4%	3,451,400	108,900	3.2%	3,736,900	131,100	3.5%

Table A 3. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by major ethnic group and census year, 1991-2006 (see Figure 6, Figure 7).

1+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
European/Other	2,594,500	178,800	6.9%	2,706,200	162,900	6.0%	2,674,700	128,600	4.8%	2,864,000	133,800	4.7%
Māori	391,400	116,300	29.7%	481,100	121,500	25.3%	472,700	110,400	23.4%	513,700	117,000	22.8%
Pacific	153,400	72,000	46.9%	188,500	84,900	45.0%	207,600	88,800	42.8%	243,100	103,600	42.6%
Total NZ (specified)	3,210,300	380,500	11.9%	3,383,500	369,700	10.9%	3,451,400	348,400	10.1%	3,736,900	389,600	10.4%

2+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
European/Other	2,594,500	31,200	1.2%	2,706,200	31,500	1.2%	2,674,700	23,400	0.9%	2,864,000	27,500	1.0%
Māori	391,400	42,300	10.8%	481,100	42,500	8.8%	472,700	37,200	7.9%	513,700	42,400	8.3%
Pacific	153,400	33,600	21.9%	188,500	40,000	21.2%	207,600	40,800	19.7%	243,100	48,800	20.1%
Total NZ (specified)	3,210,300	113,300	3.5%	3,383,500	116,100	3.4%	3,451,400	108,900	3.2%	3,736,900	131,100	3.5%

Table A 4. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by level two ethnic group, 2006 Census (see Figure 8).

Level 2 ethnic group	Pop	1 bed-room deficit No.	%	2+ bed-room deficit No.	%
01 European nfd	20,380	1,010	5.0%	190	0.9%
02 NZ European	2,213,080	102,790	4.6%	20,800	0.9%
03 Other Europe	223,070	12,690	5.7%	2,610	1.2%
04 Māori	513,670	117,010	22.8%	42,410	8.3%
05 Pacific nfd	700	110	15.7%	30	4.3%
06 Samoan	119,940	50,670	42.2%	23,330	19.5%
07 Cook Island	53,000	21,030	39.7%	9,880	18.6%
08 Tongan	46,230	23,960	51.8%	12,000	26.0%
09 Niuean	20,580	8,200	39.8%	3,700	18.0%
10 Tokelauan	6,190	2,700	43.6%	1,320	21.3%
11 Fijian	9,080	2,350	25.9%	830	9.1%
12 Other Pacific	7,340	3,010	41.0%	1,520	20.7%
13 Asian nfd	2,010	390	19.4%	80	4.0%
14 SE Asian	40,820	10,280	25.2%	3,610	8.8%
15 Chinese	137,970	26,580	19.3%	7,750	5.6%
16 Indian	98,640	20,450	20.7%	4,870	4.9%
17 Other Asian	55,620	7,940	14.3%	1,880	3.4%
18 Middle Eastern	16,340	3,550	21.7%	1,010	6.2%
19 Latin American	6,080	770	12.7%	220	3.6%
20 African	9,580	3,070	32.0%	1,220	12.7%
21 Other	1,380	180	13.0%	20	1.4%
22 NZer	405,210	12,560	3.1%	2,120	0.5%
Total NZ (specified)	3,736,900	389,600	10.4%	131,100	3.5%

nfd= not further defined

Table A 5. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by Pacific ethnic group and census year, 1991-2006 (see Figure 9)

1+bedroom deficit

Pacific ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Samoa	79,500	39,000	49.1%	95,300	44,600	46.8%	103,200	44,400	43.0%	119,900	50,700	42.3%
Cook Island	34,500	14,300	41.4%	43,700	17,500	40.0%	47,200	18,200	38.6%	53,000	21,000	39.6%
Tongan	21,000	11,300	53.8%	29,300	15,200	51.9%	36,300	18,300	50.4%	46,200	24,000	51.9%
Niuean	13,200	6,000	45.5%	17,200	7,700	44.8%	18,200	7,400	40.7%	20,600	8,200	39.8%
Tokelauan	3,800	2,200	57.9%	4,600	2,700	58.7%	5,600	2,600	46.4%	6,200	2,700	43.5%
Fijian	4,600	1,200	26.1%	7,100	1,900	26.8%	6,400	1,700	26.6%	9,100	2,400	26.4%
Other Pacific	2,000	600	30.0%	4,300	1,400	32.6%	5,800	2,200	37.9%	7,300	3,000	41.1%
Total Pacific	153,400	72,000	46.9%	188,500	84,900	45.0%	207,600	88,800	42.8%	243,100	103,600	42.6%

2+bedroom deficit

Pacific ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
Samoa	79,500	18,400	23.1%	95,300	21,500	22.6%	103,200	20,300	19.7%	119,900	23,300	19.4%
Cook Island	34,500	6,200	18.0%	43,700	7,700	17.6%	47,200	8,300	17.6%	53,000	9,900	18.7%
Tongan	21,000	5,600	26.7%	29,300	7,500	25.6%	36,300	9,000	24.8%	46,200	12,000	26.0%
Niuean	13,200	2,800	21.2%	17,200	3,500	20.3%	18,200	3,000	16.5%	20,600	3,700	18.0%
Tokelauan	3,800	1,200	31.6%	4,600	1,400	30.4%	5,600	1,200	21.4%	6,200	1,300	21.0%
Fijian	4,600	300	6.5%	7,100	600	8.5%	6,400	500	7.8%	9,100	800	8.8%
Other Pacific	2,000	200	10.0%	4,300	600	14.0%	5,800	1,100	19.0%	7,300	1,500	20.5%
Total Pacific	153,400	33,600	21.9%	188,500	40,000	21.2%	207,600	40,800	19.7%	243,100	48,800	20.1%

Table A 6. Prevalence of exposure to household crowding by (1 and 2+ bedroom deficit) by major ethnic group and age group, 2006 census year (see Figure 10, Figure 11, Figure 12, Figure 13).

Age Group (years)	Ethnicity and Crowding Level									
	European/Other *					Māori				
	Total pop	1 bdrm deficit		2+ bdrm deficit		Total pop	1 bdrm deficit		2+ bdrm deficit	
		No.	%	No.	%		No.	%	No.	%
0-4	194,000	12,300	6.3%	3,580	1.8%	63,830	10,940	17.1%	6,250	9.8%
5-9	200,800	14,300	7.1%	3,800	1.9%	64,690	11,840	18.3%	6,410	9.9%
10-14	204,300	12,120	5.9%	3,420	1.7%	62,550	10,710	17.1%	5,770	9.2%
15-19	190,400	12,740	6.7%	3,890	2.0%	52,720	8,980	17.0%	5,620	10.7%
20-24	163,600	11,480	7.0%	3,290	2.0%	38,830	5,990	15.4%	4,050	10.4%
25-29	155,500	7,040	4.5%	1,830	1.2%	35,190	4,630	13.2%	2,650	7.5%
30-34	193,000	6,740	3.5%	1,370	0.7%	36,690	4,620	12.6%	2,300	6.3%
35-39	214,300	7,160	3.3%	1,370	0.6%	35,940	4,440	12.4%	2,230	6.2%
40-44	225,200	7,170	3.2%	1,500	0.7%	34,910	4,260	12.2%	2,190	6.3%
45-49	216,800	5,870	2.7%	1,280	0.6%	29,720	2,990	10.1%	1,730	5.8%
50-54	191,900	3,710	1.9%	830	0.4%	22,640	1,970	8.7%	1,200	5.3%
55-59	184,100	2,180	1.2%	520	0.3%	17,440	1,250	7.2%	790	4.5%
60-64	143,400	1,310	0.9%	320	0.2%	12,020	800	6.7%	510	4.2%
65-69	117,900	860	0.7%	210	0.2%	9,470	540	5.7%	350	3.7%
Over 70	268,800	1,330	0.5%	290	0.1%	11,690	640	5.5%	370	3.2%
Total	2,864,000	106,300	3.7%	27,520	1.0%	528,310	74,600	14.1%	42,410	8.0%

Age Group (years)	Ethnicity and Crowding Level									
	Pacific					Asian				
	Total pop	1 bdrm deficit		2+ bdrm deficit		Total pop	1 bdrm deficit		2+ bdrm deficit	
		No.	%	No.	%		No.	%	No.	%
0-4	33,740	8,100	24.0%	6,740	20.0%	23,000	4,100	17.8%	1,400	6.1%
5-9	32,680	8,330	25.5%	6,590	20.2%	24,100	4,100	17.0%	1,400	5.8%
10-14	30,500	7,310	24.0%	6,140	20.1%	26,000	3,800	14.6%	1,400	5.4%
15-19	25,880	6,050	23.4%	6,080	23.5%	29,300	4,400	15.0%	1,800	6.1%
20-24	19,280	4,030	20.9%	4,720	24.5%	40,800	7,100	17.4%	3,500	8.6%
25-29	17,760	3,480	19.6%	3,220	18.1%	29,600	4,100	13.9%	1,900	6.4%
30-34	17,180	3,340	19.4%	2,680	15.6%	26,100	3,500	13.4%	1,200	4.6%
35-39	17,140	3,550	20.7%	2,640	15.4%	27,700	3,900	14.1%	1,200	4.3%
40-44	15,330	3,130	20.4%	2,540	16.6%	29,400	3,600	12.2%	1,100	3.7%
45-49	12,130	2,250	18.5%	2,210	18.2%	23,800	2,600	10.9%	900	3.8%
50-54	9,640	1,720	17.8%	1,680	17.4%	17,300	1,800	10.4%	700	4.0%
55-59	7,310	1,160	15.9%	1,190	16.3%	12,000	1,100	9.2%	500	4.2%
60-64	5,320	860	16.2%	790	14.8%	7,900	1,000	12.7%	400	5.1%
65-69	4,060	640	15.8%	620	15.3%	6,600	900	13.6%	300	4.5%
Over 70	5,260	790	15.0%	990	18.8%	8,300	1,000	12.0%	400	4.8%
Total	253,200	54,740	21.6%	48,820	19.3%	331,800	47,000	14.2%	18,000	5.4%

* European/Other includes MELAA which was identified as a separate level 1 category in 2006

Table A 7. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by major ethnic group, for children <15 years, 1991-2006 (see Figure 14, Figure 15).

1+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
European/Other	570,300	58,800	10.3%	600,000	61,500	10.3%	592,900	50,900	8.6%	599,100	49,500	8.3%
Māori	150,600	49,900	33.1%	184,000	55,800	30.3%	181,800	51,900	28.5%	186,600	51,900	27.8%
Pacific	60,500	29,400	48.6%	74,900	36,100	48.2%	82,500	38,600	46.8%	93,300	43,200	46.3%
Total NZ (specified)	762,400	132,400	17.4%	797,600	137,800	17.3%	811,400	132,600	16.3%	825,900	136,600	16.5%

2+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
European/Other	570,300	10,300	1.8%	600,000	12,300	2.1%	592,900	9,900	1.7%	599,100	10,800	1.8%
Māori	150,600	17,100	11.4%	184,000	19,000	10.3%	181,800	17,300	9.5%	186,600	18,400	9.9%
Pacific	60,500	12,600	20.8%	74,900	16,300	21.8%	82,500	17,200	20.8%	93,300	19,500	20.9%
Total NZ (specified)	762,400	38,800	5.1%	797,600	43,400	5.4%	811,400	42,400	5.2%	825,900	46,700	5.7%

Table A 8. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by major ethnic group, for children <5 years, 1991-2006 (see Figure 16, Figure 17).

1+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	1+ bed- room deficit	%	Pop	1+ bed- room deficit	%	Pop	1+ bed- room deficit	%	Pop	1+ bed- room deficit	%
European/Other	199,900	19,700	9.9%	203,500	21,000	10.3%	189,800	16,800	8.9%	194,000	15,900	8.2%
Māori	57,000	18,700	32.8%	67,300	20,700	30.8%	62,800	18,000	28.7%	62,400	17,200	27.6%
Pacific	23,900	11,100	46.4%	29,000	13,900	47.9%	30,100	13,500	44.9%	32,600	14,800	45.4%
Total NZ (specified)	267,700	46,500	17.4%	271,100	49,200	18.1%	259,000	44,400	17.1%	261,900	44,300	16.9%

2+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	2+ bed- room deficit	%	Pop	2+ bed- room deficit	%	Pop	2+ bed- room deficit	%	Pop	2+ bed- room deficit	%
European/Other	199,900	3,600	1.8%	203,500	4,400	2.2%	189,800	3,500	1.8%	194,000	3,600	1.9%
Māori	57,000	6,500	11.4%	67,300	7,400	11.0%	62,800	6,100	9.7%	62,400	6,300	10.1%
Pacific	23,900	4,800	20.1%	29,000	6,300	21.7%	30,100	6,000	19.9%	32,600	6,700	20.6%
Total NZ (specified)	267,700	14,300	5.3%	271,100	16,100	5.9%	259,000	14,700	5.7%	261,900	15,600	6.0%

Table A 9. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit), by household type and census year, 1991-2006 (see Figure 18).

1+bedroom deficit

Household type	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Couple with children	387,300	23,800	6.1%	376,600	20,400	5.4%	355,500	16,000	4.5%	388,900	18,400	4.7%
One parent family	107,100	10,000	9.3%	113,400	9,900	8.7%	124,100	9,100	7.3%	131,500	10,500	8.0%
Couple and others	15,800	600	3.8%	23,300	800	3.4%	26,300	800	3.0%	28,800	1,200	4.2%
Couple with children and others	24,000	8,500	35.4%	27,300	8,500	31.1%	31,000	8,600	27.7%	30,600	9,000	29.4%
One parent family and others	25,300	11,300	44.7%	27,200	10,500	38.6%	34,000	12,100	35.6%	31,400	11,600	36.9%
Multi-family households	19,700	8,100	41.1%	31,700	14,500	45.7%	27,700	11,600	41.9%	38,700	15,300	39.5%
Non family households	66,400	6,900	10.4%	65,400	5,200	8.0%	68,500	5,100	7.4%	70,300	5,900	8.4%
Total household composition stated	1,154,700	69,100	6.0%	1,223,400	69,700	5.7%	1,281,200	63,300	4.9%	1,390,400	71,900	5.2%

2+bedroom deficit

Major ethnic group Total ethnicity	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
Couple with children	387,300	2,700	0.7%	376,600	2,800	0.7%	355,500	2,200	0.6%	388,900	2,700	0.7%
One parent family	107,100	1,100	1.0%	113,400	1,100	1.0%	124,100	1,100	0.9%	131,500	1,400	1.1%
Couple and others	15,800	100	0.6%	23,300	100	0.4%	26,300	100	0.4%	28,800	200	0.7%
Couple with children and others	24,000	2,100	8.8%	27,300	2,500	9.2%	31,000	2,400	7.7%	30,600	2,800	9.2%
One parent family and others	25,300	2,600	10.3%	27,200	2,700	9.9%	34,000	2,900	8.5%	31,400	3,300	10.5%
Multi-family households	19,700	3,000	15.2%	31,700	6,900	21.8%	27,700	5,300	19.1%	38,700	7,200	18.6%
Non family households	66,400	700	1.1%	65,400	700	1.1%	68,500	700	1.0%	70,300	900	1.3%
Total household composition stated	1,154,700	12,100	1.0%	1,223,400	16,800	1.4%	1,281,200	14,600	1.1%	1,390,400	18,500	1.3%

Table A 10. Prevalence of exposure to household crowding (1+ bedroom deficit) by DHB and census year, 1991-2006.

1+bedroom deficit

DHB	1991			1996			Pop	2001			Pop	2006		
	Pop	1+bdrm deficit	%	Pop	1+bdrm deficit	%		1+bdrm deficit	%			1+bdrm deficit	%	
Auckland	287,600	48,900	17.0%	314,700	55,600	17.7%	332,400	54,500	16.4%		370,000	61,100	16.5%	
Bay of Plenty	138,500	17,300	12.5%	153,800	17,400	11.3%	164,200	15,700	9.6%		180,400	17,200	9.5%	
Canterbury	364,300	29,200	8.0%	390,100	26,000	6.7%	400,200	21,200	5.3%		441,200	26,000	5.9%	
Capital and Coast	212,600	24,200	11.4%	220,300	22,900	10.4%	229,200	21,700	9.5%		248,900	22,400	9.0%	
Counties Manukau	291,900	61,700	21.1%	320,900	68,500	21.3%	345,500	73,100	21.2%		400,400	87,500	21.9%	
Hawke's Bay	132,500	16,500	12.5%	133,700	14,500	10.8%	131,900	13,900	10.5%		137,100	14,400	10.5%	
Hutt	126,700	15,100	11.9%	125,800	13,500	10.7%	124,500	12,600	10.1%		129,200	13,600	10.5%	
Lakes	84,400	12,000	14.2%	88,500	12,000	13.6%	86,000	9,900	11.5%		89,600	10,500	11.7%	
Midcentral	145,100	13,800	9.5%	147,400	11,500	7.8%	143,500	9,500	6.6%		147,700	9,700	6.6%	
Nelson Marlborough	99,900	7,800	7.8%	108,800	6,700	6.2%	112,800	6,200	5.5%		120,400	6,200	5.1%	
Northland	119,900	17,400	14.5%	125,100	16,500	13.2%	124,900	14,500	11.6%		131,400	15,700	11.9%	
Otago	163,000	11,200	6.9%	164,300	8,500	5.2%	157,800	6,300	4.0%		165,100	6,900	4.2%	
South Canterbury	51,400	3,000	5.8%	51,500	2,000	3.9%	49,300	1,400	2.8%		50,900	1,500	2.9%	
Southland	102,600	8,600	8.4%	101,800	5,900	5.8%	95,900	4,200	4.4%		98,900	4,400	4.4%	
Tairāwhiti	41,500	7,000	16.9%	41,900	6,600	15.8%	40,200	5,900	14.7%		40,100	6,100	15.2%	
Taranaki	102,700	9,000	8.8%	99,900	6,900	6.9%	95,400	5,600	5.9%		96,600	5,900	6.1%	
Waikato	283,400	33,200	11.7%	293,200	30,500	10.4%	294,600	28,000	9.5%		314,000	30,500	9.7%	
Wairarapa	37,000	3,100	8.4%	36,400	2,500	6.9%	35,800	2,100	5.9%		36,000	1,900	5.3%	
Waitemata	332,500	32,100	9.7%	373,100	34,900	9.4%	402,100	36,600	9.1%		453,500	42,700	9.4%	
West Coast	29,600	2,200	7.4%	29,900	1,800	6.0%	27,000	1,100	4.1%		28,100	1,200	4.3%	
Whanganui	63,300	6,400	10.1%	62,100	5,000	8.1%	58,000	4,400	7.6%		57,100	4,400	7.7%	
Total	3,210,300	379,900	11.8%	3,383,500	369,700	10.9%	3,451,400	348,400	10.1%		3,736,900	389,600	10.4%	

Table A 11. Prevalence of exposure to household crowding (2+ bedroom deficit) by DHB and census year, 1991-2006.

2+bedroom deficit

DHB	1991			1996			2001			2006		
	Pop	2+bdrm deficit	%	Pop	2+bdrm deficit	%	Pop	2+bdrm deficit	%	Pop	2+bdrm deficit	%
Auckland	287,600	16,900	5.9%	314,700	19,900	6.3%	332,400	18,600	5.6%	370,000	21,700	5.9%
Bay of Plenty	138,500	5,600	4.0%	153,800	5,400	3.5%	164,200	4,900	3.0%	180,400	5,900	3.3%
Canterbury	364,300	5,600	1.5%	390,100	5,400	1.4%	400,200	4,000	1.0%	441,200	6,100	1.4%
Capital and Coast	212,600	6,800	3.2%	220,300	7,000	3.2%	229,200	5,800	2.5%	248,900	6,400	2.6%
Counties Manukau	291,900	26,400	9.0%	320,900	29,800	9.3%	345,500	31,400	9.1%	400,400	38,500	9.6%
Hawke's Bay	132,500	4,800	3.6%	133,700	4,400	3.3%	131,900	4,300	3.3%	137,100	4,800	3.5%
Hutt	126,700	4,000	3.2%	125,800	3,600	2.9%	124,500	3,800	3.1%	129,200	4,000	3.1%
Lakes	84,400	3,500	4.1%	88,500	3,700	4.2%	86,000	3,000	3.5%	89,600	3,600	4.0%
Midcentral	145,100	3,200	2.2%	147,400	2,500	1.7%	143,500	2,200	1.5%	147,700	2,400	1.6%
Nelson Marlborough	99,900	1,300	1.3%	108,800	1,300	1.2%	112,800	1,200	1.1%	120,400	1,400	1.2%
Northland	119,900	5,700	4.8%	125,100	5,400	4.3%	124,900	4,600	3.7%	131,400	5,500	4.2%
Otago	163,000	1,900	1.2%	164,300	1,500	0.9%	157,800	1,000	0.6%	165,100	1,100	0.7%
South Canterbury	51,400	500	1.0%	51,500	300	0.6%	49,300	200	0.4%	50,900	200	0.4%
Southland	102,600	1,600	1.6%	101,800	1,000	1.0%	95,900	700	0.7%	98,900	1,000	1.0%
Tairāwhiti	41,500	2,500	6.0%	41,900	2,500	6.0%	40,200	1,800	4.5%	40,100	2,100	5.2%
Taranaki	102,700	1,900	1.9%	99,900	1,400	1.4%	95,400	1,100	1.2%	96,600	1,300	1.3%
Waikato	283,400	9,000	3.2%	293,200	9,000	3.1%	294,600	8,100	2.7%	314,000	9,800	3.1%
Wairarapa	37,000	600	1.6%	36,400	500	1.4%	35,800	400	1.1%	36,000	400	1.1%
Waitemata	332,500	8,900	2.7%	373,100	10,000	2.7%	402,100	10,500	2.6%	453,500	13,300	2.9%
West Coast	29,600	400	1.4%	29,900	400	1.3%	27,000	200	0.7%	28,100	200	0.7%
Whanganui	63,300	1,600	2.5%	62,100	1,300	2.1%	58,000	1,000	1.7%	57,100	1,300	2.3%
Total	3,210,300	112,800	3.5%	3,383,500	116,100	3.4%	3,451,400	108,900	3.2%	3,736,900	131,100	3.5%

Table A 12. Prevalence of exposure to household crowding (1+ bedroom deficit) among European/Other, by DHB and census year, 1991-2006.

1+bedroom deficit

DHB	1991			1996			2001			2006		
	Pop	Number	%	Pop	Number	%	Pop	Number	%	Pop	Number	%
Auckland	208,400	15,800	7.6	211,600	16,000	7.6	210,200	16,800	8.0	224,800	13,100	5.8
Bay of Plenty	110,100	7,600	6.9	122,000	7,800	6.4	127,500	5,800	4.5	142,900	6,000	4.2
Canterbury	338,000	23,000	6.8	348,200	18,500	5.3	350,900	15,200	4.3	387,700	15,300	3.9
Capital and Coast	168,900	10,200	6.0	174,000	10,100	5.8	176,600	10,600	6.0	195,200	9,100	4.7
Counties Manukau	194,600	16,700	8.6	200,900	17,000	8.5	196,300	16,600	8.5	213,600	15,500	7.3
Hawke's Bay	106,200	7,900	7.4	105,800	6,500	6.1	101,700	5,600	5.5	108,300	5,700	5.3
Hutt	103,600	7,500	7.2	100,300	6,000	6.0	96,100	5,700	5.9	99,500	5,200	5.2
Lakes	60,900	4,600	7.6	64,000	4,600	7.2	60,900	3,600	5.9	64,600	3,500	5.4
Midcentral	126,000	8,600	6.8	125,400	6,800	5.4	119,500	5,800	4.9	124,500	4,900	3.9
Nelson Marlborough	94,500	6,700	7.1	99,700	5,300	5.3	102,000	4,600	4.5	111,400	4,300	3.9
Northland	90,400	7,200	8.0	95,100	7,400	7.8	91,500	5,800	6.3	98,700	5,900	6.0
Otago	153,100	9,000	5.9	149,400	6,400	4.3	142,500	5,100	3.6	150,400	4,900	3.3
South Canterbury	49,200	2,600	5.3	48,100	1,700	3.5	45,900	1,200	2.6	48,100	1,200	2.5
Southland	93,800	6,600	7.0	91,800	4,300	4.7	86,100	3,000	3.5	89,600	3,000	3.3
Tairāwhiti	26,300	2,000	7.6	26,900	2,100	7.8	24,100	1,600	6.6	24,100	1,600	6.6
Taranaki	91,900	6,300	6.9	88,300	4,900	5.5	82,400	3,500	4.2	84,500	3,300	3.9
Waikato	234,600	17,000	7.2	236,200	14,200	6.0	231,500	12,600	5.4	249,600	12,300	4.9
Wairarapa	32,300	2,000	6.2	33,900	2,000	5.9	31,100	1,200	3.9	32,000	1,100	3.4
Waitemata	287,500	17,800	6.2	303,400	16,700	5.5	309,700	18,000	5.8	341,200	14,700	4.3
West Coast	34,200	3,200	9.4	27,400	1,500	5.5	24,800	1,000	4.0	26,100	900	3.4
Whanganui	52,000	3,400	6.5	65,900	6,300	9.6	46,300	2,200	4.8	46,400	2,100	4.5
Total	2,645,100	183,600	6.9	2,690,900	159,200	5.9	2,657,700	145,600	5.5	2,863,200	133,700	4.7

NB. European/Other includes MELAA which was identified as a separate level 1 category in 2006

Table A 13. Prevalence of exposure to household crowding (1+ bedroom deficit) among Māori, by DHB and census year, 1991-2006.

1+bedroom deficit

DHB	1991			1996			Pop	2001		Pop	2006	
	Pop	Number	%	Pop	Number	%		Number	%		Number	%
Auckland	26,200	8400	32.2	28,600	8500	29.6	25,700	6800	26.4	26700	6500	24.1
Bay of Plenty	32,900	10500	32.0	38,300	11000	28.6	38,400	10000	26	41500	10600	25.6
Canterbury	20,300	4100	20.2	25,800	4300	16.7	26,100	3500	13.6	30800	4500	14.5
Capital and Coast	20,200	5100	25.3	21,900	4600	21	22,000	4200	18.9	24200	4400	18
Counties Manukau	49,600	19100	38.6	55,200	19700	35.6	55,600	18900	34	61900	20700	33.5
Hawke's Bay	27,400	8500	31.1	29,300	8000	27.4	28,700	7500	26.1	30400	8000	26.2
Hutt	15,400	4100	26.5	17,300	4200	24.1	17,900	4200	23.7	19700	4600	23.2
Lakes	26,200	7500	28.8	28,600	7900	27.5	27,000	6600	24.5	28500	7000	24.6
Midcentral	18,800	4700	24.7	21,200	4100	19.2	21,200	3700	17.3	24200	4100	16.8
Nelson Marlborough	6,300	1300	20.4	8,800	1400	16.5	8,800	1500	16.5	10000	1400	14.1
Northland	34,100	11100	32.5	38,100	10600	27.8	36,400	9400	25.8	38900	9900	25.5
Otago	7,400	1200	16.3	9,500	1000	10.9	8,800	900	10.5	10300	1100	10.3
South Canterbury	2,100	400	17.7	2,800	300	9.1	2,600	200	9.3	2900	300	9.2
Southland	9,400	1900	20.6	10,500	1500	14.2	9,700	1100	11.3	10300	1100	10.9
Tairāwhiti	16,800	5300	31.4	17,800	5000	27.8	17,200	4300	25.2	17600	4500	25.7
Taranaki	12,600	3000	24.2	13,900	2700	19.5	13,100	2200	17	14500	2500	17.4
Waikato	50,600	15600	30.8	57,300	15400	26.8	57,600	14600	25.4	61300	15300	24.9
Wairarapa	5,100	1200	22.9	5,400	1000	18.2	4,900	900	18.4	5000	800	15.9
Waitemata	27,800	6900	24.8	35,300	7500	21.3	36,300	7100	19.6	39600	7200	18.3
West Coast	2,000	400	18.4	2,600	400	13.7	2,300	200	8.7	2600	300	10.7
Whanganui	12,600	3100	25	13,000	5800	20.3	12,400	2500	20.2	12800	2500	19.4
Total	423,700	123500	29.1	481,100	136800	25.2	472,700	110400	23.4	513700	117000	22.8

Table A 14. Prevalence of exposure to household crowding (1+ bedroom deficit) among Pacific people, by DHB and census year, 1991-2006.

1+bedroom deficit

DHB	1991			1996			2001			2006		
	Pop	Number	%	Pop	Number	%	Pop	Number	%	Pop	Number	%
Auckland	39,800	20,200	50.7	42,200	22,000	52.1	42,300	20,700	49.0	45,900	22,800	49.6
Bay of Plenty	1,500	500	29.9	2,500	800	32.6	2,700	700	25.9	3,300	900	28.3
Canterbury	5,500	1,900	34.5	6,900	2,300	32.7	7,300	2,000	28.1	9,600	3,100	32.5
Capital and Coast	17,500	7,300	41.7	17,900	7,100	39.8	19,100	7,100	37.2	20,100	7,100	35.3
Counties Manukau	49,500	27,000	54.5	58,300	31,400	53.8	68,900	35,600	51.6	85,100	43,000	50.5
Hawke's Bay	2,500	900	36.1	3,400	1,200	35.3	4,100	1,400	35.1	4,600	1,700	36.9
Hutt	7,400	3,200	43.6	8,400	3,500	41.0	9,200	3,400	37.1	10,800	4,000	37.4
Lakes	2,400	900	36.9	3,100	1,100	34.9	2,900	900	32.0	3,300	1,100	32.1
Midcentral	2,400	700	31.8	3,200	1,000	31.2	3,500	1,000	27.2	4,100	1,200	30.0
Nelson Marlborough	600	100	23.2	900	200	20.4	1,000	200	22.3	1,500	400	28.6
Northland	1,700	500	28.8	2,600	800	29.7	2,600	700	27.0	3,300	1,000	30.8
Otago	2,200	700	31.6	2,300	600	25.3	2,300	500	20.7	2,700	500	18.7
South Canterbury	200	0	12.5	300	100	21.0	300	100	16.8	400	100	15.9
Southland	1,600	500	28.1	1,400	400	25.6	1,200	200	19.6	1,400	200	17.3
Tairāwhiti	500	200	31.5	900	300	32.8	1,000	300	27.2	1,200	300	29.7
Taranaki	700	200	27.6	900	200	19.0	900	200	24.7	1,200	300	23.5
Waikato	6,200	2,100	34.1	7,800	2,400	31.0	8,500	2,500	29.4	9,800	2,900	29.3
Wairarapa	600	200	27.2	800	200	28.1	700	200	21.8	800	200	22.8
Waitemata	18,500	7,400	40.3	23,200	9,200	39.7	27,700	10,800	39.0	32,600	12,400	38.1
West Coast	200	0	11.5	200	0	13.6	200	0	15.4	200	0	19.5
Whanganui	900	200	27.4	1,100	200	19.3	1,000	200	20.6	1,200	300	21.4
Total	162,200	74,700	46.0	188,500	84,900	45.0	207,600	88,800	42.8	243,100	103,600	42.6

Table A 15. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by home ownership status and census year, 1991-2006 (Figure 19).

1+bedroom deficit

Home ownership status	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Not owned (total)	788,400	160,600	20.4	972,600	194,700	20.0	1,106,800	207,500	18.7	1,225,100	235,900	19.3
Private rental	403,000	67,600	16.8	532,100	79,300	14.9	719,800	109,100	15.2	823,000	124,500	15.1
HNZC	200,600	67,500	33.7	174,400	66,700	38.3	171,300	71,000	41.4	165,300	71,600	43.4
Council	23,500	2,600	10.9	21,500	2,600	12.1	18,400	2,100	11.4	15,100	2,000	13.0
Owned	2,397,900	215,500	9.0	2,381,300	171,900	7.2	2,308,200	137,600	6.0	2,430,000	139,200	5.7

2+bedroom deficit

Home ownership status	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
Not owned (total)	788,400	48,600	6.2	972,600	64,800	6.7	1,106,800	68,300	6.2	1,225,100	81,300	6.6
Private rental	403,000	16,300	4.0	532,100	18,500	3.5	719,800	28,100	3.9	823,000	34,000	4.1
HNZC	200,600	24,300	12.1	174,400	27,900	16.0	171,300	30,800	18.0	165,300	32,100	17.4
Council	23,500	800	3.4	21,500	700	3.3	18,400	700	3.8	15,100	600	4.0
Owned	2,397,900	62,700	2.6	2,381,300	50,100	2.1	2,308,200	39,400	1.7	2,430,000	43,800	1.8

Table A 16. Prevalence of exposure to household crowding (1+bedroom deficit), by housing tenure/landlord sector, major ethnic group, and census year, 1991-2006 (see Figure 20)

1+bedroom deficit

Sector of landlord and tenure Major ethnic group ¹	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Not owned total												
European/Other	532,500	62,900	11.8	665,500	75,900	11.4	728,200	67,500	9.3	789,500	74,300	9.4
Māori	165,100	53,500	32.4	227,500	68,500	30.1	248,200	70,000	28.2	274,100	77,300	28.2
Pacific	76,700	37,100	48.4	103,500	51,500	49.7	126,700	61,400	48.4	147,400	70,100	47.6
Private rental²												
European/Other	307,700	35,500	11.5	409,300	42,200	10.3	510,900	45,500	8.9	580,100	49,700	8.6
Māori	59,600	16,100	27.0	104,400	24,500	23.5	158,100	37,800	23.9	174,000	40,400	23.2
Pacific	19,200	8,500	44.1	26,300	9,300	35.4	49,900	18,200	36.4	72,100	26,200	36.3
HNZC^{2,3}												
European/Other	88,400	16,900	19.1	77,400	17,400	22.5	62,500	13,700	21.9	59,200	14,500	24.4
Māori	71,500	27,700	38.8	65,300	27,000	41.4	56,100	24,000	42.8	57,800	25,600	44.4
Pacific	48,700	24,900	51.2	50,100	28,300	56.4	62,000	36,600	58.9	67,900	40,400	59.6
Council²												
European/Other	18,500	1,000	5.2	16,600	1,000	6.3	13,700	800	5.5	11,200	700	6.2
Māori	3,700	1,000	27.8	3,300	700	22.4	2,600	500	18.8	2,200	500	23.7
Pacific	1,100	500	44.8	1,700	800	43.6	1,500	600	41.4	1,500	700	45.6
Owned												
European/Other	2,044,300	114,600	5.6	2,019,500	86,100	4.3	1,922,500	60,300	3.1	2,025,700	56,000	2.8
Māori	223,100	61,600	27.6	250,300	52,100	20.8	220,800	39,500	17.9	228,700	36,000	15.9
Pacific	75,100	34,000	45.3	83,100	32,500	39.1	79,000	26,600	33.7	85,700	28,400	33.1
Total												
European/Other	2,594,500	178,800	6.9	2,706,200	162,900	6.0	2,674,700	128,600	4.8	2,864,000	133,800	4.7
Māori	391,400	116,300	29.8	481,100	121,500	25.3	472,700	110,400	23.4	513,700	117,000	22.8
Pacific	153,400	72,000	46.9	188,500	84,900	45.0	207,600	88,800	42.8	243,100	103,600	42.6

1 Population excludes people where ethnicity, crowding, tenure and landlord information is missing. Because people may specify more than one ethnicity, percentages and numbers will add up to more than the total.

2 Population for these variables is: people in households that make rental payments and have specified a landlord.

3 There was a very large undercount of HNZC properties (around 25% in 2006 and 15% in 2001). This reduces the reliability of the information and care should be taken in interpreting change over time.

Note: All figures have been randomly rounded and then further rounded to the nearest 100.

Table A 17. Size of houses (mean number of bedrooms) by sector of landlord and census year, 1996-2006 (see Figure 21)

Year	Private Person or Business ²	Local Authority or City Council	HNZC	Other State Landlord ³	Not Elsewhere Included ⁴	Total
1996	2.6	1.4	2.6	3.0	2.5	2.5
2001	2.7	1.2	2.6	3.0	2.4	2.6
2006	2.7	1.3	2.6	2.9	2.5	2.6

1 Means calculated on rounded data.

2 Includes 'Private Person (rented or leased)', 1991 and 1996; 'Real Estate Agency (rented or leased)', 1996; 'Private Person', 'Private Trust', 'Business or Other Organisation', 2001.

3 Includes 'Other Government Departments (rented or leased)', 1991; 'Other Central Government Agency', 1996; 'Other State-Owned Corporation or State-Owned Enterprise or Government Department or Ministry', 2001.

4 'Not Elsewhere Included' includes 'Landlord not Specified (rented or leased)', 1991 and 1996; 'Don't Know', 'Not Stated', 2001.

All cells in this table have been randomly rounded to base 3 prior to calculations.

Source: Statistics NZ, Census of Population and Dwellings

Table A 18. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by equivalised income quintile and census year, 1991-2006 (see Figure 23).

1+bedroom deficit

Equivalised income quintile	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
1	525900	82400	15.7	543400	79300	14.6	544500	66200	12.2	613900	75100	12.2
2	520200	55200	10.6	542100	60100	11.1	550700	52500	9.5	616400	58000	9.4
3	527600	56200	10.7	565400	32800	5.8	480600	32000	6.7	552300	43600	7.9
4	539200	22300	4.1	555500	32000	5.8	625600	23900	3.8	692300	46000	6.6
5	540600	27800	5.1	558100	15000	2.7	555900	16500	3.0	623500	7000	1.1

Numbers exclude people for whom crowding and household income information is missing.

2+bedroom deficit

Data not included due to a relatively large proportion of non-responses to income question among those living in crowded households.

Table A 19. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by employment status and census year, 1991-2006 (see Figure 25).

1+bedroom deficit

Work and Labour force Status	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Employed Full Time	1,085,100	87,900	8.1	1,179,100	80,400	6.8	1,234,100	74,800	6.1	1,438,800	96,600	6.7
Employed Part Time	238,800	17,900	7.5	357,800	27,100	7.6	374,500	25,500	6.8	428,900	31,400	7.3
Unemployed	148,900	30,800	20.7	125,300	26,900	21.5	124,600	24,300	19.5	96,300	19,600	20.4
Not in Labour Force	896,900	98,000	10.9	830,200	81,300	9.8	811,100	76,000	9.4	845,700	86,500	10.2

2+bedroom deficit

Work and Labour force Status	1991			1996			2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
Employed Full Time	1,085,100	21,700	2.0	1,179,100	21,800	1.8	1,234,100	20,300	1.6	1,438,800	28,900	2.0
Employed Part Time	238,800	4,000	1.7	357,800	7,200	2.0	374,500	6,700	1.8	428,900	9,000	2.1
Unemployed	148,900	10,000	6.7	125,300	9,600	7.7	124,600	8,500	6.8	96,300	7,400	7.7
Not in Labour Force	896,900	34,000	3.8	830,200	27,900	3.4	811,100	25,400	3.1	845,700	31,300	3.7

Table A 20. Prevalence of exposure to household crowding (1+ and 2+ bedroom deficit) by highest qualification gained and census year, 2001 and 2006.

1+bedroom deficit

Highest qualification gained	2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
No qualifications	624,000	63,300	10.1	649,400	71,300	11.0
School qualification	913,300	70,300	7.7	919,700	79,800	8.7
Post school qualification	473,500	23,300	4.9	641,300	36,000	5.6
University qualification	273,300	12,100	4.4	422,500	20,200	4.8

2+bedroom deficit

Highest qualification gained	2001			2006		
	Pop	2+ bed-room deficit	%	Pop	2+ bed-room deficit	%
No qualifications	624,000	21,500	3.4	649,400	26,800	4.1
School qualification	913,300	19,800	2.2	919,700	24,600	2.7
Post school qualification	473,500	5,600	1.2	641,300	10,000	1.6
University qualification	273,300	2,000	0.7	422,500	4,000	0.9

Table A 21. Prevalence of exposure to household crowding (1+bedroom deficit) by equivalised household income quintile, major ethnic group, and census year, 1991-2006 (see Figure 24).

1+bedroom deficit

Equivalised income & Major ethnic group	1991			1996			2001			2006		
	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%	Pop	1+ bed-room deficit	%
Quintile 1												
European/Other	528,500	82,700	15.6	402,300	34,900	8.7	396,700	25,100	6.3	440,100	27,500	6.2
Māori	118,800	32,600	27.4	119,600	32,000	26.7	106,200	25,100	23.6	110,800	25,800	23.3
Pacific	42,800	17,300	40.4	40,400	17,200	42.6	37,600	14,500	38.6	43,500	16,900	38.9
Quintile 2												
European/Other	522,300	55,300	10.6	451,500	31,800	7.0	447,000	23,700	5.3	494,200	24,400	4.9
Māori	59,600	18,600	31.2	83,900	20,800	24.8	82,600	18,400	22.3	92,900	18,400	19.8
Pacific	20,900	10,100	48.3	28,700	11,300	39.5	30,100	11,600	38.5	37,400	13,800	36.9
Quintile 3												
European/Other	529,900	56,300	10.6	499,000	19,300	3.9	401,900	15,500	3.9	453,800	17,800	3.9
Māori	57,800	14,700	25.4	64,100	9,300	14.5	60,400	9,500	15.7	72,800	11,900	16.3
Pacific	20,300	7,900	38.9	20,800	6,200	29.6	23,700	7,100	30.0	33,400	12,500	37.4
Quintile 4												
European/Other	542,100	22,400	4.1	494,100	19,300	3.9	553,300	11,400	2.1	589,100	20,600	3.5
Māori	38,500	4,900	12.7	57,400	7,600	13.3	60,300	6,100	10.1	72,300	11,600	16.0
Pacific	11,800	3,500	29.7	20,900	6,700	32	24,000	6,500	27.1	33,800	12,000	35.5
Quintile 5												
European/Other	549,900	28,000	5.1	516,300	10,700	2.1	499,500	10,100	2.0	568,200	4,700	0.8
Māori	26,100	4,100	15.7	34,800	2,400	7.0	34,300	3,300	9.6	41,700	1,300	3.1
Pacific	7,400	1,900	25.7	9,400	1,800	18.9	11,800	2,500	21.2	12,100	600	5.0

Numbers exclude people for whom crowding and household income information is missing.
 EIQ distribution not provided for 2+ bedroom deficit due to high incidence of missing data.

Table A 22. Percentage of people living in crowded accommodation (1+ bedroom deficit), by age and ethnic group and census year, 1991-2006 (see Figure 27).

1+bedroom deficit

Age group (years)	European/Other				Māori				Pacific			
	1991	1996	2001	2006	1991	1996	2001	2006	1991	1996	2001	2006
0-4	9.8	10.3	8.9	8.2	31.0	30.8	28.6	27.6	43.8	48.0	44.9	45.5
5-9	10.9	11.2	9.2	9.0	30.8	31.2	29.9	28.9	46.1	49.0	48.6	47.3
10-14	10.2	9.1	7.7	7.6	30.0	28.5	27.1	27.0	47.3	47.3	47.0	46.0
15-19	13.2	10.5	8.4	8.7	34.3	30.1	28.2	28.5	52.9	51.5	49.1	49.0
20-24	12.1	9.9	8.6	9.0	33.1	27.4	25.6	26.7	53.2	48.7	46.0	47.4
25-29	6.7	6.4	5.3	5.7	27.1	23.3	21.0	21.3	42.2	41.5	37.5	39.2
30-34	5.9	5.6	4.4	4.2	25.6	22.1	20.4	19.3	39.8	38.9	37.1	36.4
35-39	6.0	5.5	4.3	4.0	25.4	20.7	20.2	19.0	42.1	39.9	37.5	37.7
40-44	6.1	4.9	3.9	3.9	24.4	20.1	18.9	19.0	44.7	41.4	39.1	38.6
45-49	5.5	3.7	3.1	3.3	21.4	17.5	16.1	16.4	44.5	41.4	38.4	38.4
50-54	3.8	2.7	2.1	2.4	18.3	16.0	13.0	14.4	39.3	37.7	35.6	36.9
55-59	2.4	2.0	1.5	1.5	14.5	14.8	13.0	12.1	37.7	36.9	33.8	33.6
60-64	1.5	1.5	1.1	1.1	11.9	12.9	11.4	11.3	41.2	36.9	33.0	32.5
65-69	1.0	1.0	0.9	0.9	10.1	11.1	10.4	9.8	41.4	36.9	35.2	32.6
Over 70	0.9	0.7	0.6	0.6	11.0	9.4	9.2	9.1	47.1	39.9	39.6	35.8
Total	6.9	6.0	4.8	4.7	29.1	25.2	23.4	22.8	46.0	45.0	42.8	42.6

NB. European/Other includes MELAA which was identified as a separate level 1 category in 2006

Table A 23. Percentage of people living in crowded accommodation (2+ bedroom deficit), by age and ethnic group and census year, 1991-2006 (see Figure 28).

2+bedroom deficit

Age group (years)	European/Other				Māori				Pacific			
	1991	1996	2001	2006	1991	1996	2001	2006	1991	1996	2001	2006
0-4	1.8	2.2	1.8	1.9	11.4	11.0	9.7	10.1	20.1	21.7	19.9	20.6
5-9	1.8	2.1	1.7	1.9	11.2	10.1	9.8	10.1	20.2	21.9	21.4	21.0
10-14	1.9	1.9	1.5	1.7	11.3	9.7	9.1	9.5	21.9	21.2	21.5	20.9
15-19	2.6	2.3	1.8	2.0	15.0	10.9	10.1	11.0	29.3	26.1	23.9	24.6
20-24	2.3	2.1	1.6	2.0	14.0	10.7	9.4	10.9	30.1	25.6	23.4	25.4
25-29	1.1	1.2	0.9	1.2	9.5	8.2	6.8	7.9	19.4	20.1	17.7	18.7
30-34	0.8	0.9	0.7	0.7	7.5	6.8	6.3	6.4	16.0	16.8	16.6	16.3
35-39	0.8	0.8	0.6	0.7	8.0	6.3	6.1	6.3	17.0	16.5	15.4	15.9
40-44	1.0	0.8	0.6	0.7	9.4	7.3	6.1	6.5	20.0	18.2	16.7	17.0
45-49	1.0	0.7	0.5	0.6	9.9	6.3	5.8	5.9	25.0	20.5	17.6	19.0
50-54	0.7	0.5	0.4	0.4	9.4	6.7	4.6	5.5	22.7	18.2	18.1	18.5
55-59	0.4	0.4	0.3	0.3	8.2	5.5	4.8	4.7	19.4	17.8	15.7	17.1
60-64	0.3	0.3	0.3	0.2	7.0	5.4	4.9	4.3	20.8	19.4	15.4	15.7
65-69	0.2	0.2	0.2	0.2	6.7	4.5	4.3	4.4	18.8	20.8	17.9	15.4
Over 70	0.1	0.1	0.1	0.1	5.9	4.0	3.7	3.6	23.5	20.7	21.1	20.0
Total	1.2	1.2	0.9	1.0	10.8	8.8	7.9	8.3	21.9	21.2	19.7	20.1

NB. European/Other includes MELAA which was identified as a separate level 1 category in 2006

Table A 24. Prevalence of exposure to household crowding by ethnic group and census year, by level of crowding, all ages, 1991-2006.

		European/ Other ^{1 2}			Māori ¹					Pacific peoples ¹				
Crowding level	Year	Total pop	No. Exp	% Exp	Total	No. Exp	% Exp	RR ³	95% CI ⁴	Total	No. Exp	% Exp	RR ³	95% CI ⁴
All ages														
0	1991	2,594,500	2,415,700	93.1%	391,400	275,100	70.3%	0.75	(0.75 - 0.76)	153,400	81,400	53.1%	0.57	(0.57 - 0.57)
	1996	2,706,200	2,543,300	94.0%	481,100	359,600	74.7%	0.80	(0.79 - 0.80)	188,500	103,600	55.0%	0.58	(0.58 - 0.59)
	2001	2,674,700	2,546,100	95.2%	472,700	362,300	76.6%	0.81	(0.8 - 0.81)	207,600	118,800	57.2%	0.60	(0.60 - 0.60)
	2006	2,864,000	2,730,200	95.3%	513,700	396,700	77.2%	0.81	(0.81 - 0.81)	243,100	139,500	57.4%	0.60	(0.60 - 0.61)
1+	1991	2,594,500	178,800	6.9%	391,400	116,300	29.7%	4.31	(4.28 - 4.34)	153,400	72,000	46.9%	6.81	(6.75 - 6.87)
	1996	2,706,200	162,900	6.0%	481,100	121,500	25.3%	4.20	(4.16 - 4.23)	188,500	84,900	45.0%	7.48	(7.42 - 7.54)
	2001	2,674,700	128,600	4.8%	472,700	110,400	23.4%	4.86	(4.82 - 4.9)	207,600	88,800	42.8%	8.90	(8.82 - 8.97)
	2006	2,864,000	133,800	4.7%	513,700	117,000	22.8%	4.88	(4.84 - 4.91)	243,100	103,600	42.6%	9.12	(9.05 - 9.20)
2+	1991	2,594,500	31,200	1.2%	391,400	42,300	10.8%	8.99	(8.86 - 9.12)	153,400	33,600	21.9%	18.21	(17.94 - 18.50)
	1996	2,706,200	31,500	1.2%	481,100	42,500	8.8%	7.59	(7.48 - 7.7)	188,500	40,000	21.2%	18.23	(17.96 - 18.50)
	2001	2,674,700	23,400	0.9%	472,700	37,200	7.9%	9.00	(8.85 - 9.14)	207,600	40,800	19.7%	22.46	(22.11 - 22.83)
	2006	2,864,000	27,500	1.0%	513,700	42,400	8.3%	8.60	(8.47 - 8.73)	243,100	48,800	20.1%	20.91	(20.60 - 21.22)

Notes:

1. Based on total ethnicity reporting

2. European/Other includes MELAA which was identified as a separate level 1 category in 2006

3. RR = Relative risk of exposure to household crowding, for Māori and Pacific peoples relative to European/Other as the reference population

4. 95% CI = 95% Confidence interval

Table A 25. Prevalence of exposure to household crowding by ethnic group and census year, level of crowding, <15 years, 1991-2006.

		European/ Other ^{1 2}			Māori ¹					Pacific peoples ¹				
Crowding level	Year	Total pop	No. Exp	% Exp	Total	No. Exp	% Exp	RR ³	95% CI ⁴	Total	No. Exp	% Exp	RR ³	95% CI ⁴
<15 years														
0	1991	570,300	511,500	89.7%	150,600	100,700	66.9%	0.75	(0.74 - 0.75)	60,500	31,100	51.4%	0.57	(0.57 - 0.58)
	1996	600,000	538,500	89.8%	184,000	128,200	69.7%	0.78	(0.77 - 0.78)	74,900	38,800	51.8%	0.58	(0.57 - 0.58)
	2001	592,900	542,000	91.4%	181,800	129,900	71.5%	0.78	(0.78 - 0.79)	82,500	43,900	53.2%	0.58	(0.58 - 0.59)
	2006	599,100	549,600	91.7%	186,600	134,700	72.2%	0.79	(0.78 - 0.79)	93,300	50,100	53.7%	0.59	(0.58 - 0.59)
1+	1991	570,300	58,800	10.3%	150,600	49,900	33.1%	3.21	(3.18 - 3.25)	60,500	29,400	48.6%	4.71	(4.65 - 4.78)
	1996	600,000	61,500	10.3%	184,000	55,800	30.3%	2.96	(2.92 - 2.99)	74,900	36,100	48.2%	4.70	(4.64 - 4.76)
	2001	592,900	50,900	8.6%	181,800	51,900	28.5%	3.33	(3.28 - 3.37)	82,500	38,600	46.8%	5.45	(5.38 - 5.52)
	2006	599,100	49,500	8.3%	186,600	51,900	27.8%	3.37	(3.33 - 3.41)	93,300	43,200	46.3%	5.60	(5.53 - 5.68)
2+	1991	570,300	10,300	1.8%	150,600	17,100	11.4%	6.29	(6.14 - 6.44)	60,500	12,600	20.8%	11.53	(11.24 - 11.84)
	1996	600,000	12,300	2.1%	184,000	19,000	10.3%	5.04	(4.92 - 5.15)	74,900	16,300	21.8%	10.62	(10.37 - 10.87)
	2001	592,900	9,900	1.7%	181,800	17,300	9.5%	5.70	(5.56 - 5.84)	82,500	17,200	20.8%	12.49	(12.18 - 12.8)
	2006	599,100	10,800	1.8%	186,600	18,400	9.9%	5.47	(5.34 - 5.60)	93,300	19,500	20.9%	11.59	(11.32 - 11.87)

Notes:

1. Based on total ethnicity reporting
2. European/Other includes MELAA which was identified as a separate level 1 category in 2006
3. RR = Relative risk of exposure to household crowding, for Māori and Pacific peoples relative to European/Other as the reference population
4. 95% CI = 95% Confidence interval

Table A 26. Prevalence of exposure to household crowding by ethnic group and census year, level of crowding, <5 years, 1991-2006.

		European/ Other ^{1 2}			Māori ¹					Pacific peoples ¹				
Crowding level	Year	Total pop	No. Exp	% Exp	Total	No. Exp	% Exp	RR ³	95% CI ⁴	Total	No. Exp	% Exp	RR ³	95% CI ⁴
<5 years														
0	1991	199,900	180,200	90.1%	57,000	38,300	67.2%	0.75	(0.74 - 0.75)	23,900	12,800	53.6%	0.59	(0.58 - 0.60)
	1996	203,500	182,500	89.7%	67,300	46,600	69.2%	0.77	(0.76 - 0.78)	29,000	15,100	52.1%	0.58	(0.57 - 0.59)
	2001	189,800	173,000	91.1%	62,800	44,800	71.3%	0.78	(0.77 - 0.79)	30,100	16,600	55.1%	0.61	(0.60 - 0.61)
	2006	194,000	178,100	91.8%	62,400	45,200	72.4%	0.79	(0.78 - 0.80)	32,600	17,800	54.6%	0.59	(0.59 - 0.60)
1+	1991	199,900	19,700	9.9%	57,000	18,700	32.8%	3.33	(3.26 - 3.40)	23,900	11,100	46.4%	4.71	(4.60 - 4.82)
	1996	203,500	21,000	10.3%	67,300	20,700	30.8%	2.98	(2.92 - 3.04)	29,000	13,900	47.9%	4.64	(4.55 - 4.75)
	2001	189,800	16,800	8.9%	62,800	18,000	28.7%	3.24	(3.17 - 3.31)	30,100	13,500	44.9%	5.07	(4.95 - 5.18)
	2006	194,000	15,900	8.2%	62,400	17,200	27.6%	3.36	(3.29 - 3.44)	32,600	14,800	45.4%	5.54	(5.42 - 5.66)
2+	1991	199,900	3,600	1.8%	57,000	6,500	11.4%	6.33	(6.08 - 6.60)	23,900	4,800	20.1%	11.15	(10.68 - 11.64)
	1996	203,500	4,400	2.2%	67,300	7,400	11.0%	5.09	(4.90 - 5.28)	29,000	6,300	21.7%	10.05	(9.67 - 10.44)
	2001	189,800	3,500	1.8%	62,800	6,100	9.7%	5.27	(5.05 - 5.49)	30,100	6,000	19.9%	10.81	(10.37 - 11.27)
	2006	194,000	3,600	1.9%	62,400	6,300	10.1%	5.44	(5.22 - 5.67)	32,600	6,700	20.6%	11.08	(10.64 - 11.53)

Notes:

1. Based on total ethnicity reporting
2. European/Other includes MELAA which was identified as a separate level 1 category in 2006
3. RR = Relative risk of exposure to household crowding, for Māori and Pacific peoples relative to European/Other as the reference population
4. 95% CI = 95% Confidence interval