

**Weighting and variance estimation for the
2008 Living Standards Survey**

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Background

Colmar Brunton conducted the 2008 Living Standards Survey (LSS) for the Ministry of Social Development between June and October 2008. Similar surveys were conducted in 2000 and 2004.

The survey investigates the living standards of New Zealanders. Analyses for the survey will be based on Economic Family Units (EFUs) and on all the people living within them (regardless of age). A multistage sample design has been used to select respondents, following a different hierarchy: adults were selected within dwellings, which were selected from randomly chosen meshblocks.

This paper describes the calculation of weights for the survey data, after reviewing relevant aspects of the sample design. The survey weights were calculated in two stages: first, base weights that adjust for the sample design were developed, then these were calibrated to match known population profiles. Jackknife replicate weights have also been produced. These enable estimation of sampling variances for the weighted survey results.

Sample design

A complex sample design like that used in the LSS induces varying selection probabilities, which would skew the survey's results if no weights were applied. Base weights adjust for this. This section briefly summarises relevant features of the sample design; further details are given in the reports by Ford (2009) and by Rout and Binnie (2009).

The first stage of the LSS sample design involved choosing meshblocks where interviewing was to be conducted. New Zealand was divided into 53 strata, defined in terms of regions and urban areas. The number of meshblocks to be selected in each stratum, $n_h^{clusters}$, was proportional (subject to rounding) to the number of people aged 18 years or more usually resident in that stratum according to the 2006 Census. In total, 715 meshblocks were selected systematically with replacement, and with probability proportional to the number of occupied private dwellings in each meshblock. (Although this differs from the procedure used in the 2004 survey, as described by Gray (2004), the base weights account for this.) Six meshblocks were selected more than once; these were split into two areas, with separate maps produced for field use.

In the second stage, interviewers selected a systematic sample of dwellings along a fixed route from a randomly selected start point within the selected meshblock. They continued selecting new dwellings until a cluster of seven interviews had been conducted in that area.¹ Non-responding dwellings were thus effectively replaced by other dwellings in the same area. This can be viewed as a form of adjustment for non-response, and assumes responding dwellings are on average similar to non-responding dwellings in their area.

Sometimes the interviewer went outside the designated meshblock to achieve enough interviews, using the map for an adjoining meshblock. Two or more maps were used for 43% of the selected areas. This will have affected dwelling selection probabilities, but it is difficult to quantify exactly how the selection probability for each dwelling will have changed. The selection probabilities for dwellings in smaller meshblocks seem likely to have been reduced, and this is borne out in the data. Averaging across interviews conducted outside the designated meshblock, the designated meshblock contained 47.8 occupied private dwellings on average; this was 13% smaller than the average of 55.0 dwellings within the designated meshblock calculated when averaging across all interviews conducted inside their designated meshblock. Only a small proportion (6%) of interviews were conducted outside the designated meshblock, however, so it is believed that any effect on the results will be negligible.

In the third and final stage, the adult with the next birthday was selected from those who live in each dwelling. An adult here is someone aged 18 years or more.

In total, 5,008 interviews were completed. While a response rate of 70% was achieved, non-response may still have skewed the sample. The data has been calibrated against population figures to reduce the potential bias, as described later in this report.

¹ Twenty-one clusters had a different number of interviews, due to uncertainty arising from appointments. The minimum was 5, the maximum 10.

Survey weights

Survey weights provide a relatively simple and effective way to account for the survey design and sample skews when analysing survey data. Most analyses for the Living Standards Survey will be based either on EFUs or on people living within these EFUs. An integrated person-EFU weight has been developed that can be used for both types of analysis. EFU members inherit their weight from the EFU they live in, and everyone in the same EFU has the same weight.

Calculation of the weights has been carried out in two stages. First, base weights are calculated that account for the sample design. Base weights are sometimes called design weights, because of this role, or inverse probability weights, reflecting their calculation as the reciprocal of the selection probabilities. These base weights are then calibrated against known population figures to eliminate deviations from these controls. This can enhance the reliability of the survey estimates and reduce bias. Integrated weighting was used to simultaneously control for EFU characteristics (at the EFU level) and personal characteristics (at the person level).

Base weights for adults

Two sets of base weights have been developed, one for adults and one for EFUs. Base weights for adults, while not directly needed for most intended analyses, are a useful intermediate step in creating the EFU weights. The formula for these adult weights is:

$$wb_j^{adult} = \frac{N_h^{opd} N_j^{opd\ adults}}{n_h^{clusters} n_i^{opd}}$$

The notation here is a simplified version of the notation developed in Ford (2009), and is laid out in Appendix A. The adult base weights, also known as respondent weights, are stored in the `wb_resp` variable.

This weight is derived as the product of the reciprocals of the selection probabilities at each stage, conditional on the earlier stages. In the first stage, $n_h^{clusters}$ meshblocks were selected in each stratum h with probability proportional to the number of occupied private dwellings they contained during the 2006 Census, i.e. with probability N_i^{opd} / N_h^{opd} for each selection. Meshblocks were selected with replacement, so each meshblock's overall selection probability was $n_h^{clusters} N_i^{opd} / N_h^{opd}$, accounting for the possible multiplicity.

Each dwelling in the selected meshblocks had an equal chance of being selected, namely n_i^{opd} / N_i^{opd} . This assumes that the number of occupied private dwellings within each meshblock during the fieldwork period was the same as enumerated in the 2006 Census. It also assumes that meshblocks selected more than once are split even-handedly, that dwelling non-response is stochastic, and that non-responding dwellings are similar on average to their replacements. Non-response bias may affect the results if the last two assumptions fail, although calibration against population targets should have reduced any such bias.

This formula does not account for some dwellings having an altered selection probability due to interviewing being conducted outside the designated meshblock. This effectively assumes that dwellings with a reduced selection probability were similar on average to those whose selection

probability was increased. As explained earlier, this last assumption is not seen as critical due to the small proportion of dwellings affected.

Finally, each person aged 18 years or more within a selected dwelling had a selection probability of $1/N_j^{opd\ adults}$, assuming that the last birthday method was an effective randomisation device.

Summary statistics for the adult base weights follow below.

```

wc_resp: adult base weight
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 207.7  338.7   579.0   580.3  633.8 2012.0

```

Base weights for EFUs

An EFU is selected if any of the adults in it are selected as the respondent. In a dwelling with a given number of adults, an EFU containing two adults thus has twice the chance of being selected of an EFU containing only one adult. EFU base weights were therefore calculated by dividing the adult base weight by $N_j^{EFU\ adults}$, as follows, to reflect an EFU's greater chance of selection when it contains two adults.

$$wb_j^{EFU} = \frac{wb_j^{adult}}{N_j^{EFU\ adults}} = \frac{N_h^{opd} N_j^{opd\ adults}}{n_h^{clusters} n_i^{opd} N_j^{EFU\ adults}}$$

These EFU base weights are stored in the `wb_efgu` variable. Summary statistics for these weights follow below.

```

wb_efgu: EFU base weight
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 207.7  284.4   300.0   380.5  339.1 1932.0

```

Calibration

The next step in the weighting process was to calibrate the base weights against population figures. To help develop a calibration scheme, the sample was profiled by a number of potential calibration variables, weighted using the above base weights, and compared against population figures. Because LSS analyses will rely primarily upon the EFU weight, the emphasis here was on EFU characteristics and variables about people that are available for all members of the respondent's EFU. The main person characteristics available across all members are age, gender and ethnicity.

Calibration variables and groups

A series of calibration variables and groups were selected, based in part on the comparisons described above. They were:

- Twelve EFU types, based on whether the respondent had a partner, whether they had any dependent children, whether the adults in the EFU were aged 65 or more, and whether there were any other EFUs in the household
- Age by gender (using five year age groups except for 0-9, 10-17, 18-24, 65-75, and 75 or more)
- Māori by age by gender (with age grouped as 0-17, 18-39, 40-64, and 65 or more)
- Pacific people by age by gender (with age grouped as 0-17, 18-39, and 40 or more)
- Asian people by age by gender (with age grouped as 0-17, 18-39, and 40 or more)
- Location (Auckland, Wellington, Christchurch, Other main urban areas, Secondary urban areas, Minor urban areas, Rural)

These follow similar themes to the calibration variables used for the 2004 LSS, albeit with more EFU and ethnicity detail, and with no breakdowns within location.

Calibration targets

Population figures for calibration, also known as weighting targets, have been derived from official population figures. Estimated resident population figures have been published for gender by age (with 5 year age breaks) as at 30 September 2008 (Statistics New Zealand, 2008), but not for regional or ethnic breakdowns. Population figures for these variables (by gender and age, for ethnicity) were calculated by taking the relevant figures from the 2006 Census and scaling these up by the percentage growth in the population (overall, or by the corresponding age/gender group where possible). This is expected to have underestimated the totals for fast growing groups such as Asian people.

EFU population figures from the 2006 Census were increased in proportion to the growth in the population aged 18 years or more. This assumes that the growth in each of the calibration categories was the same as this population. While this assumption is not expected to hold precisely, the adjustments are fairly small, so any resulting bias is likely to be minor.

This growth, which averaged around 7%, ranged from 3% to 11% depending on the group. Although the majority of the increase reflects population increase over time, it also includes a factor averaging around 2.6% that projects from the Census usually resident population to the estimated resident population. The bulk of this latter projection factor is to correct for Census undercount.

Further details of how the population figures were scaled up are given in Appendix B.

EFU types

For the 2004 LSS, eleven EFU categories were controlled during calibration. These are shown in Table 1 below.

Table 1: Profile of EFU categories used for calibration in the 2004 LSS (from Gray 2004, Table 11)

EFU type	Number	Percentage
single person < 65, single efu	163774	8.3%
couple only, respondent < 65, single efu	242153	12.2%
couple with children, respondent < 65, single efu	262112	13.2%
single person < 65 with children, single efu	74007	3.7%
single person < 65, multiple efu	641331	32.4%
couple only, respondent < 65, multiple efu	113182	5.7%
couple with children, respondent < 65, multiple efu	85837	4.3%
single person < 65 with children, multiple efu	68591	3.5%
couple both >= 65	114178	5.8%
couple respondent >= 65	11019	0.6%
single >= 65	203053	10.3%
Total	1979237	100.0%

A somewhat similar grouping of EFUs into ten types, shown in Table 2, was considered for calibrating the 2008 LSS. Perhaps the biggest difference from the 2004 approach was that couples were placed in the older group if either partner was aged 65 or more, as opposed to depending solely on the respondent's age. One reason for considering the age of both partners is that only using the respondent's age requires an extra assumption – that there is no association between a partner being the respondent and their age, after allowing for the sample design.

Table 2: Profile of 10 EFU categories considered for calibration of the 2008 LSS

EFU type	2008 population estimate	Percentage
Couple without kids, both under 65, single EFU household	254598	12.2%
Two parents with kids, single EFU household	302685	14.5%
Single without kids, under 65, single EFU household	204533	9.8%
Sole parent with kids, single EFU household	88893	4.3%
Couple without kids, both under 65, multiple EFU household	120816	5.8%
Two parents with kids, multiple EFU household	94964	4.6%
Single without kids, under 65, multiple EFU household	595898	28.6%
Sole parent with kids, multiple EFU household	66637	3.2%
Single without kids, aged 65+	194923	9.3%
Couple without kids, at least one aged 65+	161912	7.8%
Total	2085859	100.0%

This 10-way classification controls fully for presence of children and the number of adults in an EFU, but not for age or household composition – i.e. whether it was a single or multiple EFU household. Although this resulted in little imbalance on the age dimension, the proportion of multiple EFU households fell short by about 2%. This was felt to be too large a discrepancy, and the EFU classification was expanded by splitting the older groups by household composition. This resulted in the twelve groups shown in Table 3.

Table 3: Profile of the 12 EFU categories used for calibration of the 2008 LSS

EFU type	2008 population estimate	Percentage
Couple without kids, both under 65, single EFU household	254598	12.2%
Two parents with kids, single EFU household	302685	14.5%
Single without kids, under 65, single EFU household	204533	9.8%
Sole parent with kids, single EFU household	88893	4.3%
Couple without kids, both under 65, multi EFU household	120816	5.8%
Two parents with kids, multi EFU household	94964	4.6%
Single without kids, under 65, multi EFU household	595898	28.6%
Sole parent with kids, multi EFU household	66637	3.2%
Single without kids, aged 65+, single EFU household	147508	7.1%
Couple without kids, at least one aged 65+, single EFU household	137938	6.6%
Single without kids, aged 65+, multi EFU household	47415	2.3%
Couple without kids, at least one aged 65+, multi EFU household	23974	1.1%
Total	2085859	100.0%

This 12-way classification does contain some moderately small groups, with the smallest containing just 39 respondents. This would be expected to make the weights more variable and the survey results potentially less reliable. The coefficient of variation of the weights did increase from 0.78 under the 10-way classification to 0.79 under the 12-way classification, but this change is small enough to be of little concern. A third approach was also considered, of retaining the 10-way classification and adding an overall household composition variable. This can be seen as intermediate between the 10- and 12-way approaches. The 12-way classification was preferred as this was not excessively detailed and was simpler to explain and implement.

It is not possible to compare the population profiles directly across the full EFU classifications used in the 2004 and 2008 surveys, due to the difference how couples were classified by age. Collapsing across this dimension yields the figures shown in Tables 4 and 5. These show that the population profiles were generally similar, with the main exception being a smaller proportion of single person EFUs in the 2006 Census figures.

Table 4: 2004 profile of EFUs by number of adults, presence of children, and single/multiple EFU dwellings (derived from Gray 2004, Table 11)

	Single EFU in dwelling	Multiple EFUs in dwelling	Total
Couple without children	18.6%	5.7%	24.3%
Couple with children	13.2%	4.3%	17.6%
Single without children	18.5%	32.4%	50.9%
Single with children	3.7%	3.5%	7.2%
Total	54.1%	45.9%	100.0%

Table 5: Profile of EFUs from the 2006 Census

	Single EFU in dwelling	Multiple EFUs in dwelling	Total
Couple without children	18.8%	6.9%	25.8%
Couple with children	14.5%	4.6%	19.1%
Single without children	16.9%	30.8%	47.7%
Single with children	4.3%	3.2%	7.5%
Total	54.5%	45.5%	100.0%

It is unclear why the proportion of single person EFUs has changed. This may reflect real change in the population, or simply differences in the derivation of the figures. The 2006 figures are based solely on Census data, while the 2004 figures combine 2001 Census data with administrative data on EFUs containing people aged 65 years or more. (Full details of the 2006 Census EFU population figures are presented in Appendix D.)

Data collected in the 2006 Census was insufficient to determine the EFU membership for 7% of people aged over 15, who were therefore omitted from the 2006 EFU figures. This may have contributed to the differences in EFU profiles, although it is hard to be sure as the extent of missing data in 2001 was not documented. Very similar questions were asked about the relationships between residents within private dwellings in both censuses (Statistics New Zealand, 2006).

Like the Census differences described above, the composition of the LSS sample (after applying base weights) was generally consistent between the 2004 and 2008 surveys. The biggest differences are again seen among single person EFUs, although here the 2004 figures were lower.

Table 6: Profile of EFUs from the 2004 LSS sample (from Gray 2004, Table 5)

	Single EFU in dwelling	Multiple EFUs in dwelling	Total
Couple without children	20.1%	11.2%	31.3%
Couple with children	17.5%	6.6%	24.1%
Single without children	14.1%	20.6%	34.7%
Single with children	5.3%	4.2%	9.5%
Total	57.0%	42.6%	99.6%

Table 7: Profile of EFUs from the 2008 LSS sample

	Single EFU in dwelling	Multiple EFUs in dwelling	Total
Couple without children	21.6%	7.3%	28.9%
Couple with children	17.8%	5.8%	23.6%
Single without children	15.5%	23.0%	38.4%
Single with children	4.4%	4.7%	9.1%
Total	59.3%	40.8%	100.0%

Calibration and integrated weighting

Calibration alters the base weights to align their totals with external population figures. If the weights after calibration w_j are expressed as $w_j = g_j d_j$ where d_j are the base or design weights and g_j are adjustment factors, then the g_j are chosen to minimise their total distance from 1, weighted by the base weights, under some distance function. Possible distance functions include $\sum d_j (g_j - 1)^2 / 2$, which produces linear weights, and $\sum d_j (g_j \log g_j - g_j + 1)$, giving multiplicative weights.² The computations are simplest under linear weighting. Other distance functions allow some restrictions on the range of weights produced, although this is limited by the nature of the data.

Because the EFU weights can be applied not just to EFUs but also to each of their members, it is desirable to calibrate them to match population figures for both people and EFUs. Integrated weighting (Lemaitre and Dufour, 1987) provides a method for accommodating different weighting units. It is possible in theory to calibrate all at once, for instance by dividing the EFU type indicator variables by the number of members in each EFU. However this produced zero or negative weights, or failed to converge, depending on the distance function used. Such weights are often seen as counterintuitive or inefficient, and are not supported by all analysis software, so they are usually best avoided.

² For more details about calibration, see Deville and Särndal (1992), Deville, Särndal, and Sautory (1993), and Lundström and Särndal (1999).

An iterative algorithm was used instead, in which the EFU controls were applied first, and the resulting weights were then calibrated to the people targets. The EFU calibration was then rerun using these weights as input, followed by calibration of people, and so on. Doing this using linear weighting produced negative weights, and multiplicative weighting has been used instead. This guarantees non-negative weights but puts no other restrictions on their range. Adequate convergence was achieved after 200 iterations were completed.

Another set of weights was produced that can be applied to respondents only to estimate characteristics of the population aged 18 or more. Initial adult weights were derived from the resulting EFU weights by dividing them by the number of adults in the EFU. However these exhibited a moderately large gender imbalance, except among older people and Asian people, so further calibration was conducted to align the respondent weights with population figures.

Calibration results

The resulting calibrated adult and EFU weights, stored in the `wb_resp` and `wb_efgu` variables respectively, were aligned well with the people targets; the largest difference was 2.5 people, or less than 0.002%. The EFU weights summed to values between 5.6% and 5.7% higher than the EFU targets. This was primarily due to a proportion of EFUs being excluded from the Census figures due to insufficient data. (See Appendix D for details.) Tables comparing the weights against population figures, before and after calibration, can be found in Appendix C.

Summary statistics for the calibrated weights follow below. Both are somewhat more variable than the corresponding base weights, but not excessively so.

```
wc_efgu: calibrated EFU weight
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  22.49  279.90  333.90  440.00  429.40 3709.00
wc_resp: calibrated adult weight
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  44.45  411.50  568.20  636.90  724.90 3929.00
```

Sampling errors

Measures of sampling reliability such as confidence intervals and significance tests are vital for interpreting the survey results. However, estimating sampling errors for a complex survey like the LSS is not entirely straightforward. In particular, analytic formulae for sampling errors are not available for the iterative calibration algorithm used here. A resampling method can accommodate this, and support a wide range of estimates. Gray's (2004) choice of the delete-a-group jackknife technique has been followed here, and adapted to fit the 2008 sample design.

Resampling methods estimate sampling variation by repeatedly analysing subsamples of the data, and summarising the variation in the results. The traditional jackknife method involves dropping one observation from the dataset at a time. As the name suggests, the delete-a-group jackknife extends this to the deletion of groups of observations, which reduces the amount of computation needed. These groups need to be chosen to reflect important features of the sample design, as discussed by Wolter (1985).

A set of replicate weights can be calculated for each subsample (or replicate), as described in earlier sections. Observations that are omitted from that replicate are assigned a weight of zero. In particular, each set of base replicate weights are calibrated in the same way as the main survey weights, using the same calibration targets; this accounts for this aspect of the estimation process. Including these calibrated jackknife weights in the dataset provides analysts with a relatively easy way to calculate sampling errors, as they do not need to be aware of details of the calibration process.

While the jackknife technique handles a wide variety of estimates well, including linear and smooth non-linear estimators, it can exhibit problems with other measures such as the median and other quantiles (Wolter, 1985, p. 163).

Jackknife weights

This section describes how the jackknife weights were derived, and how they are used.

The first issue to resolve is how many groups are appropriate. A total of 715 primary sampling units (PSUs) were selected for the 2008 LSS. It is desirable that the number of groups be a factor of 715, to avoid additional variation from varying replicate sample sizes. Since $715 = 5 \cdot 11 \cdot 13$, the options are 5, 11, 13, 55, 65, 143 and 715. Using too few groups will produce biased and unreliable variance estimates. However, the larger the number of groups that are used, the more computational effort will be required. Using only thirteen groups would give poor results, so 55 groups have been used.

Groups of PSUs have been selected by ordering PSUs randomly within strata, then taking 55 systematic samples of 13 PSUs from this list. (The group number is stored in the `jkgrp` variable.) The jackknife replicate samples were then taken as the respondents in the complement of each of these 55 groups of PSUs.

Base weights have been calculated for each replicate sample using the same formula as before, with $n_h^{clusters}$ updated as needed. Calibration was then conducted, as described earlier for the full sample, on each set of replicate weights. These calibrated jackknife replicate weights are stored in the `wc_resp_1-wc_resp_55` and `wc_efgu_1-wc_efgu_55` variables.

To estimate the variance of some result $\hat{\theta}$ from the 2008 LSS, recalculate the result using each set of jackknife weights. The values obtained are called pseudovalues, denoted here as $\hat{\theta}_{[-k]}$, where $k = 1, \dots, 55$ indexes the jackknife replicates; their mean is denoted $\bar{\theta}_{[.]}$. Then the jackknife variance estimate is

$$\frac{54}{55} \sum_{k=1}^{55} (\hat{\theta}_{[-k]} - \bar{\theta}_{[.]})^2,$$

and its square root is the standard error of $\hat{\theta}$ (Efron and Tibshirani, 1993). This formula is slightly different from the formula used in the 2004 LSS, which may be conservative (i.e. overestimate the standard error) in some cases.

Jackknife sampling errors have been calculated for ELSI scores across a range of population subgroups. These are shown in Appendix E. Precise comparisons with the 2004 results are hindered by the altered definition used for the ELSI scores, but the 2008 sampling errors generally seem comparable with those from the 2004 LSS.

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Appendix A: Notation for base weights

The notation used in the base weights section of this report is a simplified version of the notation from Ford (2009). In general, only the latest stage will be indicated by subscripts and superscripts. For instance, instead of $n_{hi}^{opd-cluster}$ we now have n_i^{opd} . The indices for selected dwellings, EFUs and respondents (j , j and k) have been collapsed into a single index j .

Symbol	Meaning
j	Index for the current selected dwelling, EFU, or respondent
wb_j^{adult}	Base weight for adults
wb_j^{EFU}	Base weight for EFUs
wb_j^{people}	Base weight for all people
h	Index for the current stratum
$n_h^{clusters}$	Number of clusters selected in stratum h
N_h^{opd}	Number of occupied private dwellings in stratum h , from the 2006 census
i	Index for the current selected cluster or meshblock
N_i^{opd}	Number of occupied private dwellings in meshblock i , from the 2006 census
n_i^{opd}	Number of dwellings with interviews conducted in cluster i
$N_j^{opd\ adults}$	Number of adults (people aged 18 years or more) living in dwelling j
$N_j^{EFU\ adults}$	Number of adults (people aged 18 years or more) living in EFU j
$N_j^{EFU\ people}$	Number of people living in EFU j , regardless of age

Appendix B: Derivation of population benchmarks

Benchmark population figures for calibration, also known as weighting targets, have been derived from official population figures. Provisional estimated resident population figures have been published for gender by age (with 5 year age breaks)³ as at 30 September 2008 (Statistics New Zealand, 2008), but not for regional or ethnic breakdowns.

Table B1: Population estimates as at 30 September 2008, by age group and gender

Age group	Males	Females	Total
0-9	301950	287540	589490
10-17 ⁴	256516	244437	500953
18-24 ⁴	213844	207633	421477
25-29	134950	139650	274600
30-34	129220	140750	269970
35-39	148010	163480	311490
40-44	150950	162300	313250
45-49	155640	165220	320860
50-54	136700	141850	278550
55-59	120530	124020	244550
60-64	105210	108710	213920
65-74	142450	151990	294440
75 or more	101990	144460	246450
Total	2097960	2182040	4280000

Population figures by gender and age were calculated for Maori, Pacific and Asian ethnic groups by taking the relevant figures from the 2006 Census and scaling these up by the percentage growth in the population (overall, or by the corresponding age/gender group where possible). This growth, which averaged around 7%, ranged from 3% to 11% depending on the group. Each of the ethnic groups has been growing faster than the population as a whole, so these rates are likely to underestimate the growth in these populations, especially for Asian people (the fastest growing group).

Although the majority of the increase reflects population increase over time, it also includes a factor averaging around 2.6% that projects from the Census usually resident population to the estimated resident population. The bulk of this latter projection factor is to correct for net Census undercount. As this is a figure for the overall population, it is also likely to be an underestimate for these ethnic groups, since they have exhibited higher net undercount than the population as a whole (Statistics New Zealand, 2007).

³ Estimates for the population aged 18 years or more were not published. These have been derived by assuming that 18-19 year olds comprise two fifths of the population aged 15-19 years. (This was done separately for males and females.)

Table B2: Maori population estimates as at 30 September 2008, by age group and gender

Ethnic group by gender by age group	2006 Census	September 2008 estimate	Relevant gender by age group	2006 Census	September 2008 estimate	Increase (%)
Maori Males 0-17	121368	125857	Males 0-17	538548	558466	3.7%
Maori Males 18-39	84111	90148	Males 18-39	584100	626024	7.2%
Maori Males 40-64	58911	63383	Males 40-64	621822	669030	7.6%
Maori Males 65+	10476	11580	Males 65+	221145	244440	10.5%
Maori Females 0-17	115983	119778	Females 0-17	515121	531977	3.3%
Maori Females 18-39	95925	100551	Females 18-39	621537	651513	4.8%
Maori Females 40-64	65904	71054	Females 40-64	651213	702100	7.8%
Maori Females 65+	12651	13665	Females 65+	274461	296450	8.0%
Total	565329	596016		4027947	4280000	6.3%

Table B3: Pacific population estimates as at 30 September 2008, by age group and gender

Ethnic group by gender by age group	2006 Census	September 2008 estimate	Relevant gender by age group	2006 Census	September 2008 estimate	Increase (%)
Pacific Males 0-17	60411	62645	Males 0-17	538548	558466	3.7%
Pacific Males 18-39	40959	43899	Males 18-39	584100	626024	7.2%
Pacific Males 40+	29640	32119	Males 40+	842967	913470	8.4%
Pacific Females 0-17	57918	59813	Females 0-17	515121	531977	3.3%
Pacific Females 18-39	44586	46736	Females 18-39	621537	651513	4.8%
Pacific Females 40+	32457	35012	Females 40+	925674	998550	7.9%
Total	265971	280225		4027947	4280000	6.3%

Table B4: Asian population estimates as at 30 September 2008, by age group and gender

Ethnic group by gender by age group	2006 Census	September 2008 estimate	Relevant gender by age group	2006 Census	September 2008 estimate	Increase (%)
Asian Males 0-17	49314	51138	Males 0-17	538548	558466	3.7%
Asian Males 18-39	69096	74055	Males 18-39	584100	626024	7.2%
Asian Males 40+	50964	55226	Males 40+	842967	913470	8.4%
Asian Females 0-17	46713	48242	Females 0-17	515121	531977	3.3%
Asian Females 18-39	78798	82598	Females 18-39	621537	651513	4.8%
Asian Females 40+	59667	64364	Females 40+	925674	998550	7.9%
Total	354552	375624		4027947	4280000	6.3%

Urbanisation benchmarks for the total population were calculated by scaling up the 2006 Census usually resident population figures for all people to reflect the difference between the 2006 Census usually resident population (4,027,947) and the estimated resident population as at 30 September 2008 (4,280,000). In other words, the benchmarks were obtained by increasing the Census figures by 6.26%.

Table B5: Urbanisation population benchmarks for integrated calibration

Urbanisation	2006 Census	September 2008	Change (%)
Auckland	884478	948500	6.3%
Wellington	270477	290055	6.3%
Christchurch	277197	297262	6.3%
Other main urban areas	714315	766020	6.3%
Secondary urban areas	179928	192952	6.3%
Minor urban areas	242508	260062	6.3%
Rural (incl. Waters)	405363	434705	6.3%
Total	4027947	4280000	6.3%

Similarly, urbanisation figures were calculated for the population aged 18 or more by scaling up the 2006 Census usually resident population figures for people aged 18 or more to reflect the difference between the 2006 Census usually resident population aged 18 years or more (2,974,266) and the estimated resident population aged 18 years or more as at 30 September 2008 (3,189,557). In other words, the benchmarks were obtained by increasing the Census figures by 7.24%.

Table B6: Urbanisation population benchmarks for calibration of adult weights

Urbanisation	2006 Census	September 2008	Change (%)
Auckland	884478	948500	7.2%
Wellington	270477	290055	7.2%
Christchurch	277197	297262	7.2%
Other main urban areas	714315	766020	7.2%
Secondary urban areas	179928	192952	7.2%
Minor urban areas	242508	260062	7.2%
Rural (incl. Waters)	405363	434705	7.2%
Total	2974266	3189557	7.2%

EFU calibration targets were derived from the 2006 Census figures shown in Appendix D, by scaling them up in the same way as for the urbanisation figures for adults. This assumes that the growth in each of the calibration categories was the same as over the entire population aged 18 or more. While this assumption is not expected to hold precisely, the adjustments are fairly small, so any resulting bias is likely to be relatively minor.

Single person EFUs in households of unidentifiable composition were split pro rata between single and multiple EFU households.

Table B7: EFU population figures

EFUs in household	Family type	2006 Census	2008 population estimate
Single EFU	Couple without children, both under 65	237414	254598
Single EFU	Couple with children	282255	302685
Single EFU	Single person under 65, without children	190710	204533
Single EFU	One parent with children	82893	88894
Multiple EFUs	Couple without children, both under 65	112662	120816
Multiple EFUs	Couple with children	88554	94964
Multiple EFUs	Single person under 65, without children	555627	595898
Multiple EFUs	One parent with children	62139	66637
Single EFU	Single person aged 65 or more, without children	137541	147508
Single EFU	Couple without children, at least one aged 65 or more	128628	137938
Multiple EFUs	Single person aged 65 or more, without children	44211	47415
Multiple EFUs	Couple without children, at least one aged 65 or more	22356	23974
Unknown	Single person without children	84	-
Total	Total	1945074	2085859

Appendix C: Comparisons of weighted LSS data and population figures

Comparing the weighted data against population figures illustrates the necessity and effectiveness of the calibration process. The following tables compare totals of the base EFU weights and calibrated EFU weights (applied to EFUs or EFU members) against the relevant population estimates used for calibration.

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Males 0-9	346089	14.6%	301949	0.00%	301950
Males 10-17	263351	2.7%	256516	0.00%	256516
Males 18-24	161274	-24.6%	213843	0.00%	213844
Males 25-29	89835	-33.4%	134950	0.00%	134950
Males 30-34	115527	-10.6%	129220	0.00%	129220
Males 35-39	151641	2.5%	148010	0.00%	148010
Males 40-44	146184	-3.2%	150950	0.00%	150950
Males 45-49	142809	-8.2%	155640	0.00%	155640
Males 50-54	114834	-16.0%	136700	0.00%	136700
Males 55-59	111011	-7.9%	120530	0.00%	120530
Males 60-64	89512	-14.9%	105210	0.00%	105210
Males 65-74	142388	0.0%	142452	0.00%	142450
Males 75+	90452	-11.3%	101992	0.00%	101990
Females 0-9	345198	20.1%	287539	0.00%	287540
Females 10-17	244253	-0.1%	244436	0.00%	244437
Females 18-24	174015	-16.2%	207633	0.00%	207633
Females 25-29	131775	-5.6%	139650	0.00%	139650
Females 30-34	138093	-1.9%	140750	0.00%	140750
Females 35-39	170575	4.3%	163480	0.00%	163480
Females 40-44	157241	-3.1%	162300	0.00%	162300
Females 45-49	150654	-8.8%	165220	0.00%	165220
Females 50-54	131870	-7.0%	141850	0.00%	141850
Females 55-59	118141	-4.7%	124020	0.00%	124020
Females 60-64	99168	-8.8%	108710	0.00%	108710
Females 65-74	156497	3.0%	151993	0.00%	151990
Females 75+	120531	-16.6%	144462	0.00%	144460
Total	4102918	-4.3%	4280000	0.00%	4280000

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Maori males 0-17	153383	21.9%	125857	0.00%	125857
Maori males 18-39	70072	-22.3%	90148	0.00%	90148
Maori males 40-64	51290	-19.1%	63383	0.00%	63383
Maori males 65+	12477	7.8%	11580	0.00%	11580
Maori females 0-17	135389	13.0%	119778	0.00%	119778
Maori females 18-39	103580	3.0%	100551	0.00%	100551
Maori females 40-64	73689	3.7%	71054	0.00%	71054
Maori females 65+	11787	-13.7%	13665	0.00%	13665
Non-Maori	3491251	-5.2%	3683985	0.00%	3683984
Total	4102918	-4.3%	4280000	0.00%	4280000

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Pacific males 0-17	86215	37.6%	62645	0.00%	62645
Pacific males 18-39	42096	-4.1%	43899	0.00%	43899
Pacific males 40+	32756	2.0%	32119	0.00%	32119
Pacific females 0-17	82252	37.5%	59813	0.00%	59813
Pacific females 18-39	48547	3.9%	46736	0.00%	46736
Pacific females 40+	40203	14.8%	35012	0.00%	35012
Non-Pacific	3770848	-5.7%	3999776	0.00%	3999775
Total	4102918	-4.3%	4280000	0.00%	4280000

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Asian males 0-17	57114	11.7%	51138	0.00%	51138
Asian males 18-39	78936	6.6%	74055	0.00%	74055
Asian males 40+	50531	-8.5%	55226	0.00%	55226
Asian females 0-17	57695	19.6%	48241	0.00%	48242
Asian females 18-39	84338	2.1%	82598	0.00%	82598
Asian females 40+	52324	-18.7%	64364	0.00%	64364
Non-Asian	3721979	-4.7%	3904377	0.00%	3904376
Total	4102918	-4.3%	4280000	0.00%	4280000

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Auckland	1261003	-1.8%	1283691	0.00%	1283692
Wellington	398326	3.9%	383190	0.00%	383190
Christchurch	354697	-7.5%	383340	0.00%	383340
Other main urban areas	959339	-6.3%	1023631	0.00%	1023631
Secondary urban areas	252860	-2.1%	258296	0.00%	258295
Minor urban areas	315141	-9.4%	347750	0.00%	347749
Rural	561552	-6.4%	600103	0.00%	600103
Total	4102918	-4.3%	4280000	0.00%	4280000

Weighting group	Base EFU weight	Difference from population (%)	Calibrated EFU weight	Difference from population (%)	Population estimate
Couple without kids, both under 65, single EFU household	243306	-4.4%	268946	5.64%	254598
Two parents with kids, single EFU household	338260	11.8%	319741	5.63%	302685
Single without kids, under 65, single EFU household	153007	-25.2%	216059	5.64%	204533
Sole parent with kids, single EFU household	83317	-6.3%	93902	5.63%	88893
Couple without kids, both under 65, multi EFU household	120735	-0.1%	127625	5.64%	120816
Two parents with kids, multi EFU household	110679	16.5%	100315	5.63%	94964
Single without kids, under 65, multi EFU household	399141	-33.0%	629480	5.64%	595898
Sole parent with kids, multi EFU household	89495	34.3%	70391	5.63%	66637
Single without kids, aged 65+, single EFU household	141692	-3.9%	155878	5.67%	147508
Couple without kids, at least one aged 65+, single EFU household	168944	22.5%	145762	5.67%	137938
Single without kids, aged 65+, multi EFU household	38773	-18.2%	50105	5.67%	47415
Couple without kids, at least one aged 65+, multi EFU household	18328	-23.6%	25334	5.67%	23974
Total	1905678	-9.5%	2203538	5.64%	2085859

The following tables compare totals of the base adult weights, adult weights derived directly from the EFU weights, and calibrated adult weights against the relevant population estimates used for calibration.

Weighting group	Base adult weight	Difference from population (%)	Adult weight derived from EFU weight	Difference from population (%)	Calibrated adult weight	Difference from population (%)	Population estimate
Males 18-24	155046	-27.5%	208185	-2.6%	213844	0.00%	213844
Males 25-29	82555	-38.8%	127406	-5.6%	134950	0.00%	134950
Males 30-34	98765	-23.6%	114433	-11.4%	129220	0.00%	129220
Males 35-39	133556	-9.8%	133165	-10.0%	148010	0.00%	148010
Males 40-44	132779	-12.0%	139454	-7.6%	150950	0.00%	150950
Males 45-49	127741	-17.9%	138837	-10.8%	155640	0.00%	155640
Males 50-54	100149	-26.7%	119775	-12.4%	136700	0.00%	136700
Males 55-59	97549	-19.1%	105947	-12.1%	120530	0.00%	120530
Males 60-64	84963	-19.2%	99384	-5.5%	105210	0.00%	105210
Males 65-74	150073	5.4%	147331	3.4%	142450	0.00%	142450
Males 75+	91269	-10.5%	102643	0.6%	101990	0.00%	101990
Females 18-24	185107	-10.8%	219517	5.7%	207633	0.00%	207633
Females 25-29	143988	3.1%	149554	7.1%	139650	0.00%	139650
Females 30-34	147230	4.6%	149084	5.9%	140750	0.00%	140750
Females 35-39	197645	20.9%	189705	16.0%	163480	0.00%	163480
Females 40-44	170264	4.9%	174486	7.5%	162300	0.00%	162300
Females 45-49	170494	3.2%	186461	12.9%	165220	0.00%	165220
Females 50-54	131780	-7.1%	143000	0.8%	141850	0.00%	141850
Females 55-59	129368	4.3%	135293	9.1%	124020	0.00%	124020
Females 60-64	101765	-6.4%	115529	6.3%	108710	0.00%	108710
Females 65-74	153929	1.3%	149303	-1.8%	151990	0.00%	151990
Females 75+	119919	-17.0%	142766	-1.2%	144460	0.00%	144460
Total	2905930	-8.9%	3191261	0.1%	3189557	0.00%	3189557

Weighting group	Base adult weight	Difference from population (%)	Adult weight derived from EFU weight	Difference from population (%)	Calibrated adult weight	Difference from population (%)	Population estimate
Maori males 18-39	56578	-37.2%	77626	-13.9%	90148	0.00%	90148
Maori males 40-64	38397	-39.4%	49827	-21.4%	63383	0.00%	63383
Maori males 65+	11839	2.2%	11279	-2.6%	11580	0.00%	11580
Maori females 18-39	120268	19.6%	116201	15.6%	100551	0.00%	100551
Maori females 40-64	84551	19.0%	81788	15.1%	71054	0.00%	71054
Maori females 65+	13061	-4.4%	14736	7.8%	13665	0.00%	13665
Non-Maori	2581237	-9.1%	2839805	0.0%	2839176	0.00%	2839176
Total	2905930	-8.9%	3191261	0.1%	3189557	0.00%	3189557

Weighting group	Base adult weight	Difference from population (%)	Adult weight derived from EFU weight	Difference from population (%)	Calibrated adult weight	Difference from population (%)	Population estimate
Pacific males 18-39	34015	-22.5%	36526	-16.8%	43899	0.00%	43899
Pacific males 40+	29159	-9.2%	29004	-9.7%	32119	0.00%	32119
Pacific females 18-39	54415	16.4%	52548	12.4%	46736	0.00%	46736
Pacific females 40+	41669	19.0%	36585	4.5%	35012	0.00%	35012
Non-Pacific	2746672	-9.4%	3036597	0.2%	3031790	0.00%	3031790
Total	2905930	-8.9%	3191261	0.1%	3189557	0.00%	3189557

Weighting group	Base adult weight	Difference from population (%)	Adult weight derived from EFU weight	Difference from population (%)	Calibrated adult weight	Difference from population (%)	Population estimate
Asian males 18-39	75217	1.6%	71456	-3.5%	74055	0.00%	74055
Asian males 40+	49389	-10.6%	52758	-4.5%	55226	0.00%	55226
Asian females 18-39	84974	2.9%	82482	-0.1%	82598	0.00%	82598
Asian females 40+	52586	-18.3%	65749	2.2%	64364	0.00%	64364
Non-Asian	2643764	-9.3%	2918815	0.2%	2913312	0.00%	2913312
Total	2905930	-8.9%	3191261	0.1%	3189557	0.00%	3189557

Weighting group	Base adult weight	Difference from population (%)	Adult weight derived from EFU weight	Difference from population (%)	Calibrated adult weight	Difference from population (%)	Population estimate
Auckland	871253	-8.1%	949146	0.1%	948500	0.00%	948500
Wellington	274422	-5.4%	281396	-3.0%	290055	0.00%	290055
Christchurch	269842	-9.2%	301022	1.3%	297262	0.00%	297262
Other main urban areas	685816	-10.5%	768681	0.3%	766020	0.00%	766020
Secondary urban areas	184366	-4.4%	195864	1.5%	192952	0.00%	192952
Minor urban areas	221626	-14.8%	256067	-1.5%	260062	0.00%	260062
Rural	398605	-8.3%	439084	1.0%	434705	0.00%	434705
Total	2905930	-8.9%	3191261	0.1%	3189557	0.00%	3189557

The following table compares the occupation profiles of the Census and the 2008 LSS. (The occupation variable was not used for calibration.) Census figures are for the usually resident population aged 15 or more, while the LSS figures are for adults (almost all aged 18 or more). Due to the larger proportions of unidentifiable responses in the Census, percentages based on identifiable occupations should provide a more useful basis for comparison than the overall percentage. Many of the differences here are moderate, but a few are more substantial; the largest difference is five percentage points, for professionals.

Occupation	2006 Census	Overall percentage	Percentage of identifiable occupations	2008 LSS	Overall percentage	Percentage of identifiable occupations
Managers	340530	10.8%	18.2%	324780	10.2%	15.3%
Professionals	374328	11.8%	20.0%	536342	16.8%	25.2%
Technicians and Trades Workers	241857	7.7%	12.9%	312452	9.8%	14.7%
Community and Personal Service Workers	156468	5.0%	8.4%	197242	6.2%	9.3%
Clerical and Administrative Workers	240813	7.6%	12.9%	252038	7.9%	11.8%
Sales Workers	186060	5.9%	9.9%	152761	4.8%	7.2%
Machinery Operators and Drivers	114324	3.6%	6.1%	122955	3.9%	5.8%
Labourers	218991	6.9%	11.7%	229875	7.2%	10.8%
Not Elsewhere Included	112404	3.6%		5870	0.2%	
Not employed	1068285	33.8%		1053926	33.0%	
Work and Labour Force Status Unidentifiable	106308	3.4%		3020	0.1%	
Total	3160374	100.0%	100.0%	3191261	100.0%	100.0%

Appendix D: Details of 2006 Census figures for EFUs

This appendix gives details of the EFU figures from the 2006 Census, received from Statistics New Zealand in response to the following request:

“The following table showing numbers of Economic Family Units (EFUs).

An EFU is defined here as an adult, together with their partner or spouse (if they have one), and any dependent children aged under 18 living in their household. Children under 18 who living with their partner or spouse form a separate EFU, as do people under 18 with a child of their own. People aged 16 or 17 who are working full-time are also considered independent and thus a separate EFU. EFUs in non-private dwellings should be excluded if they contain people aged 65 or more. [The preceding sentence, about non-private dwellings, was withdrawn after Statistics New Zealand explained that information on relationships within the dwelling was only collected from private dwellings.]

11. EFU type by whether the dwelling contains a single EFU or multiple EFUs

Here EFU type splits the population into the following groups:

- Single person aged 65+
- Couple with at least one aged 65+
- Sole parent aged 65+
- Two parents with at least one aged 65+
- Single aged under 65
- Couple both aged under 65
- Sole parent aged under 65
- Two parents both aged under 65”

The EFU figures received are shown on the next page, along with Statistics New Zealand's notes describing their derivation. Table 5 on page 9 was obtained by summing these over age and expressing the results as percentages of the total, and Tables 2 and 3 were derived by summing the figures over various EFU groups. Confidentialised cells have been assumed to be zero. The table classifies 1,945,074 EFUs, of which 1,059,441 were the only EFU in their household, and 885,549 were part of a multiple EFU household. (This distinction could not be drawn for another 84 EFUs.)

EFU calibration targets were derived from these figures, after they were scaled up to reflect the difference between the 2006 Census usually resident population aged 18 years or more and the corresponding estimated resident population as at 30 September 2008. When calculating EFU targets for single adults without children, households of unknown composition were split pro rata across single and multiple EFU dwellings.

The information about relationships needed to ascertain EFU membership was not specified for 219,078 people aged over 15 (i.e. 7% of the usually resident population aged over 15). These people were omitted from the table, along with 3,180 families that may or may not have contained dependent children. No direct adjustment was made for this missing data, but it may explain much of the almost 6% difference between the EFU benchmarks and the sums of the integrated weights.

2006 Census of Population and Dwellings
 Prepared for James Reilly, Statistical Insights
 Reference Number: TRM25243

*Person and Family EFUs by Household Composition
 for the Census Usually Resident Population Count Aged 15 Years and Over and Couples With or Without Children in Household*

Person and Family EFUs	Household Composition (1)	Household Composition (2)	Household Composition Unidentifiable	Total
Counts People				
Sole parent aged 65+ (3)	690	774	..C	1,461
Sole parent aged under 65 (3)	82,203	61,365	..C	143,568
Single person aged under 65 (4)	190,710	555,627	69	746,406
Single person aged 65+ (4)	137,541	44,211	15	181,767
Counts Families				
Couple with at least one aged 65 years and over (5)	22,652	22,356	..C	150,987
Couples both aged under 65 years (5)	237,414	112,662	..C	350,076
Two parents with at least one aged 65+ (6)	1,929	1,308	..C	3,240
Two Parents both aged under 65 (6)	280,326	87,246	..C	367,569

- (1) HH Composition includes Couple Only, Couple and dependent children only, One parent with dependent children only and Multi EFU
- (2) Multi EFU includes Household Composition of Couple Only with Other People, Couple with Dependent Children Adult Children and Other People, One Parent with Dependent Children Adult Children and Children with Dependency Unknown Couple or Three Family Households and Other Multi Person Households
- (3) Sole parents with dependent children, with or without adult children
- (4) Single people are people in adult child roles in families, people who are not partnered and people living alone, and sole parents
- (5) Couples with no children, they may have adult children but they do not have dependent children
- (6) Two Parents with dependent children, with or without adult children

Note: Families with number of unknown dependent children and persons whose individual role in the family is unknown, have been suppressed

Confidentiality rules have been applied to all cells in this table, including randomly rounding to base 3. Individual figures may not add to totals and values for the same data may vary in different tables.

..C indicates cells have been suppressed for confidentiality reasons

Source: Statistics New Zealand

Appendix E: Examples of sampling errors for ELSI means

Mean ELSI scores and their sampling errors have been calculated for a range of groups, selected from Appendix C in the New Zealand Living Standards 2004 report (Jensen *et al*, 2004). ELSI scores were calculated as described in Appendix A of that report, except that three components that were no longer gathered were omitted, and 18 was subtracted from the sum of the component scores to compensate (instead of 22). Missing values are not included in these analyses.

The results are shown on the following pages. The sampling errors have been calculated using the mean squared error formula shown on page 13, and were generally similar to those from the 2004 LSS.

Figure (2004 report)	Category	Sub-population	Mean	LCL	UCL	Standard error	Effective sample size
3.1	Total		40.5	40.0	41.0	0.2	3075
3.2	Age	Children	36.5	35.7	37.3	0.4	1154
3.2	Age	18–24 years	40.7	39.5	42.0	0.6	315
3.2	Age	25–44 years	39.5	38.8	40.2	0.4	1263
3.2	Age	45–64 years	42.2	41.5	42.9	0.4	1165
3.2	Age	65 years or more	47.1	46.6	47.6	0.3	1428
3.3	Sole	Female	27.5	25.7	29.3	0.9	232
3.3	Sole	Male	29.3	27.3	31.4	1.0	194
3.4	Gender	Female	40.2	39.8	40.7	0.2	2961
3.4	Gender	Male	40.8	40.2	41.3	0.3	1945
3.6	EFU	Single with children	28.2	26.6	29.8	0.8	292
3.6	EFU	Couple with children	39.8	39.1	40.6	0.4	983
3.6	EFU	Single without children	41.1	40.2	42.0	0.5	715
3.6	EFU	Couple without children	45.5	44.9	46.2	0.3	1013
3.7	Region	Auckland	39.8	38.8	40.8	0.5	779
3.7	Region	Wellington	41.5	39.7	43.3	0.9	202
3.7	Region	Other major urban areas	40.0	39.1	40.8	0.4	851
3.7	Region	Secondary and minor urban areas	41.4	40.0	42.8	0.7	301
3.7	Region	Rural New Zealand	41.6	40.3	43.0	0.7	299
3.8	Housing	Rented – Housing New Zealand	23.8	21.3	26.2	1.2	112
3.8	Housing	Rented – private landlord	35.2	34.3	36.1	0.5	846
3.8	Housing	Local	36.5	31.4	41.6	2.6	23
3.8	Housing	Owned mortgage	48.0	47.5	48.6	0.3	919
3.8	Housing	Owned free	41.1	40.3	41.9	0.4	711
3.8	Housing	Family	40.4	38.7	42.1	0.9	209
3.9	Qualifications	No qualification	36.3	34.9	37.7	0.7	417
3.9	Qualifications	School qualification	40.9	40.4	41.5	0.3	1908
3.9	Qualifications	Occupational certificate or diploma	41.1	40.5	41.8	0.3	1240
3.9	Qualifications	Bachelors degree or higher qualification	44.9	44.2	45.5	0.3	926
3.10	Occupation	Elementary occupations	35.2	33.4	37.0	0.9	209
3.10	Occupation	Trades, plant and machinery	39.6	38.4	40.7	0.6	428
3.10	Occupation	Clerks, service and sales	41.7	41.0	42.4	0.3	1066
3.10	Occupation	Professionals	45.4	44.6	46.1	0.4	739
3.10	Occupation	Legislators, administrators and managers	45.3	44.5	46.2	0.4	570

Figure (2004 report)	Category	Sub-population	Mean	LCL	UCL	Standard error	Effective sample size
4.1	No children		42.7	42.0	43.3	0.3	1244
4.1	With children		37.1	36.3	37.8	0.4	1331
4.3	Families with children	Sole	28.8	27.3	30.4	0.8	325
4.3	Families with children	Two	40.3	39.5	41.0	0.4	999
4.5	Age of mother	18–24 years	33.3	30.7	35.9	1.3	72
4.5	Age of mother	25–34 years	35.2	33.9	36.6	0.7	352
4.5	Age of mother	35–44 years	38.3	37.2	39.4	0.6	494
4.5	Age of mother	45 years or more	38.6	37.2	40.1	0.7	429
4.7	Number of children	One child	37.0	35.7	38.3	0.6	420
4.7	Number of children	Two children	38.4	37.3	39.5	0.6	548
4.7	Number of children	Three or more children	34.7	33.2	36.2	0.8	326
4.8	Age of youngest child	0–4 years	37.0	35.9	38.1	0.5	588
4.8	Age of youngest child	5–9 years	36.7	35.6	37.9	0.6	464
4.8	Age of youngest child	10–14 years	36.3	34.9	37.7	0.7	379
4.8	Age of youngest child	15–17 years	39.3	36.6	42.0	1.4	108
4.9	Housing	Rented – Housing New Zealand	21.2	18.4	24.1	1.5	77
4.9	Housing	Rented – private landlord	31.8	30.3	33.2	0.7	324
4.9	Housing	Owned	41.4	40.5	42.4	0.5	518
4.10	Qualifications	No qualification	28.9	26.6	31.2	1.2	146
4.10	Qualifications	School qualification	35.7	34.3	37.0	0.7	359
4.10	Qualifications	Occupational certificate or diploma	36.7	35.6	37.8	0.6	497
4.10	Qualifications	Bachelors degree or higher qualification	42.8	41.8	43.8	0.5	461

Figure (2004 report)	Category	Sub-population	Mean	LCL	UCL	Standard error	Effective sample size
5.1	Older people		47.1	46.6	47.6	0.3	1428
5.1	Working-age		40.8	40.3	41.3	0.3	2369
5.2	Age	65–74 years	45.8	45.0	46.6	0.4	589
5.2	Age	75 years or more	48.6	47.8	49.5	0.4	345
5.3	Single without children	Female	45.8	44.7	47.0	0.6	338
5.3	Single without children	Male	46.8	45.4	48.2	0.7	194
5.4	Older people	Female	46.9	46.3	47.5	0.3	1030
5.4	Older	Male	47.3	46.6	48.0	0.4	643
5.5	EFU	Single person	46.2	45.3	47.0	0.5	536
5.5	EFU	Couple only	48.2	47.6	48.9	0.3	657
5.6	Housing	Rented – Housing New Zealand	31.4	25.0	37.8	3.3	19
5.6	Housing	Rented – private landlord	40.5	36.9	44.2	1.9	47
5.6	Housing	Owned	48.0	47.4	48.5	0.3	849