Methods and procedures for the
2017 International Social Survey Programme (ISSP) for New Zealand

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The aim of the ISSP 2017 sampling was to achieve a final sample of n = 1,250 (in line with requirements of the ISSP Secretariat), and for the final sample to be representative across key variables – age, gender, Māori descent, region, deprivation, occupation and urbanicity. To this end, groups of individuals hypothesised to respond at lower rates were oversampled and groups of individuals hypothesised to respond at higher rates were undersampled.

The procedure was as follows. Names and addresses were obtained for all those on the electoral roll (aged 18 years and older). N = 15,000 were randomly selected from this list in order to (i) define strata which differ on likely response rates; and to (ii) assess the representativeness of the final set of respondents. N = 15,000 was chosen to ensure (i) there were enough numbers in each strata to achieve a representative number of respondents from each strata, given low response rates in some strata – note that n = 15,000 allows for response rates as low as 8% in strata (i.e. 1,200/15,000); and (ii) the numbers were not so great that the task of coding factors to test representativeness was not too onerous (two factors needed to be coded: deprivation, coded from electoral roll address and occupational categories, coded from electoral roll occupation free-text). N = 232 were removed from the analysis sample because they had overseas addresses, leaving a final analytic sample of n = 14,768.

Strata were based on the response rate patterns of the 2016 ISSP survey, where predictors of response were determined using a tree regression with the following seven factors as predictors: gender, age, Māori descent, region, rurality, New Zealand Deprivation Index quintiles and occupation. Combinations of four of these seven factors – age, Māori descent, occupation, and region – showed distinct patterns of response rates, producing twelve strata, as shown in **Figure 1**.
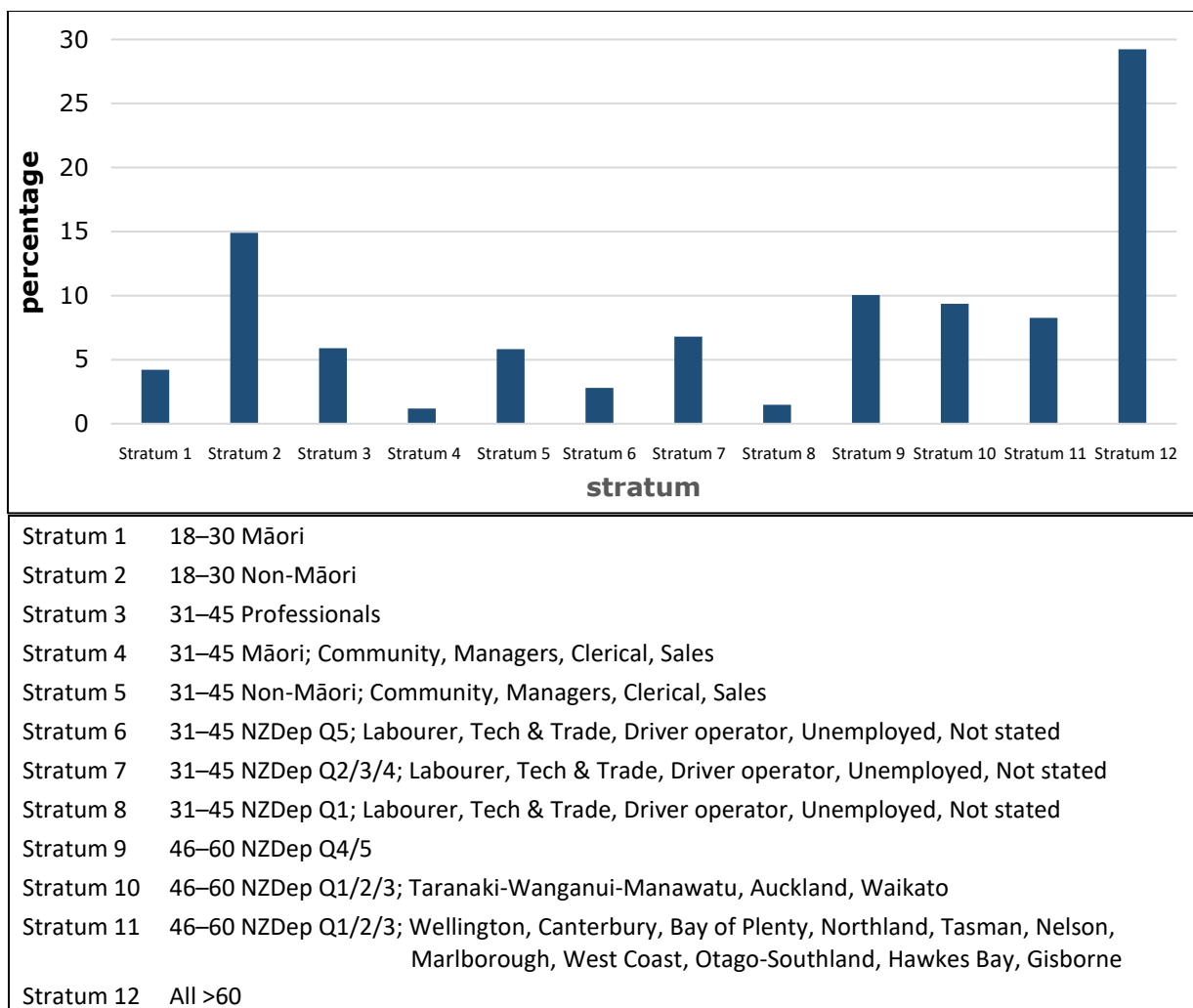
Stratum 1	18–30 Māori
Stratum 2	18–30 Non-Māori
Stratum 3	31–45 Professionals
Stratum 4	31–45 Māori; Community, Managers, Clerical, Sales
Stratum 5	31–45 Non-Māori; Community, Managers, Clerical, Sales
Stratum 6	31–45 NZDep Q5; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated
Stratum 7	31–45 NZDep Q2/3/4; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated
Stratum 8	31–45 NZDep Q1; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated
Stratum 9	46–60 NZDep Q4/5
Stratum 10	46–60 NZDep Q1/2/3; Taranaki-Wanganui-Manawatu, Auckland, Waikato
Stratum 11	46–60 NZDep Q1/2/3; Wellington, Canterbury, Bay of Plenty, Northland, Tasman, Nelson, Marlborough, West Coast, Otago-Southland, Hawkes Bay, Gisborne
Stratum 12	All >60

Figure 1 Response rates for ISSP 2017 across 12 different strata.

Each of the n = 14,768 was then categorised into one of the twelve strata, and a random sample from each strata was selected to be mailed a survey. The number selected to be mailed from each strata was <u>inversely proportional</u> to the predicted response rates for each strata (taken from Figure 1). That is, groups suspected to have low response rates were mailed in greater numbers and groups suspected to have high response rates were mailed in lower numbers.

The number mailed in each strata is detailed in **Table 1** below. The number (%) in each strata (column 1) determines the desired number returned for each strata, given n = 1,250 are required in total (column 2). The expected response rate from ISSP 2016 (column 3) is used to determine

the number required to mail to achieve the desired number of responses (column 4). This in turn determines a selection probability for individuals each strata (column 5) which, when applied stochastically, selects the individuals to mail (the actual number selected to mail is shown in column 6).

The n = 3,876 selected individuals were sent the International Social Survey Programme (ISSP) questionnaire, cover sheet and a pen. The cover sheet invited participants to take part, and also: (i) described the survey and explained that participation was optional, confidentiality of participants was guaranteed, and that the survey was approved by the University of Auckland Human Participants Ethics Committee (reference number 018740); (ii) explained that all respondents go into a draw to win one of two $100 gift cards ('Prezzy' Cards) and a further draw to win one of two $100 gift cards if complete survey online; (iii) explained how the participants were selected and how their names and addresses were obtained; (iv) explained that the survey was being managed at the University of Auckland by the Centre of Methods and Policy Application in the Social Sciences (COMPASS), with collaborators from the University of Auckland School of Population Health; (v) explained that funding was received from the Jeannette Crossley Foundation; and (vi) explained that after the data have been analysed, an anonymised data set will be permanently stored in both New Zealand and international data archives, as a historical record of the 2017 ISSP.

Table 1 *process for selecting number to mail in each strata.*

Stratum Definition	N (%) of 15,000 sample	Desired number returned	ISSP 2016 response rate (%)	Number to mail to achieve desired number returned	Proportion of strata to mail	Actual number selected to mail
1: 18–30 Māori	625 (3.9)	49	11.9	414	0.662 (414/625)	416
2: 18–30 Non-Māori	2,296 (15.1)	188	23.3	809	0.352 (809/2,296)	814
3: 31–45 Professionals	922 (5.7)	71	40.4	175	0.190 (175/922)	171
4: 31–45 Māori; Community, Managers, Clerical, Sales	152 (0.9)	11	22.1	51	0.336 (51/152)	52
5: 31–45 Non-Māori; Community, Managers, Clerical, Sales	933 (6.2)	78	35.3	220	0.236 (220/933)	218
6: 31–45 NZDep Q5; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated	460 (2.0)	26	12.8	200	0.435 (200/460)	199
7: 31–45 NZDep Q2/3/4; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated	988 (5.8)	73	21.6	336	0.340 (336/988)	335
8: 31–45 NZDep Q1; Labourer, Tech & Trade, Driver operator, Unemployed, Not stated	268 (2.0)	25	33.3	74	0.276 (74/268)	74
9: 46–60 NZDep Q4/5	1,461 (8.9)	112	29.7	375	0.257 (375/1,461)	374
10: 46–60 NZDep Q1/2/3; Taranaki-Wanganui-Manawatu, Auckland, Waikato	1,329 (8.7)	109	37.3	293	0.220 (293/1,329)	290
11: 46–60 NZDep Q1/2/3; Wellington, Canterbury, Bay of Plenty, Northland, Tasman, Nelson, Marlborough, West Coast, Otago, Southland, Hawkes Bay, Gisborne	1,357 (9.7)	121	58.6	206	0.152 (206/1,357)	206
12: All >60	4,209 (31.1)	388	53.8	722	0.172 (722/4,209)	727
Total	**15,000**	**1,250**		**3,875**		**3,876**

The mailout took place on April 12 2017. Participants could complete the survey either on the questionnaire provided or online via Qualtrics. For those yet to complete the survey, a reminder postcard was sent on May 15 2017, and a second questionnaire was sent on June 8 2017.

A total of n = 1,358 participants returned surveys between April 17 2017 and August 22 2017, giving a raw response rate of 35.0% (1,358/3,876), and a standardised response rate of 41.2% (i.e. the response rate that would have been achieved had each stratum been mailed surveys proportional to their share of the population). As shown in **Figure 2**, there were spikes in returns following the first and second mail-outs, with a smaller spike following the reminder postcard. Most returns were through the post; n = 211 (15.5%) completed the survey online.
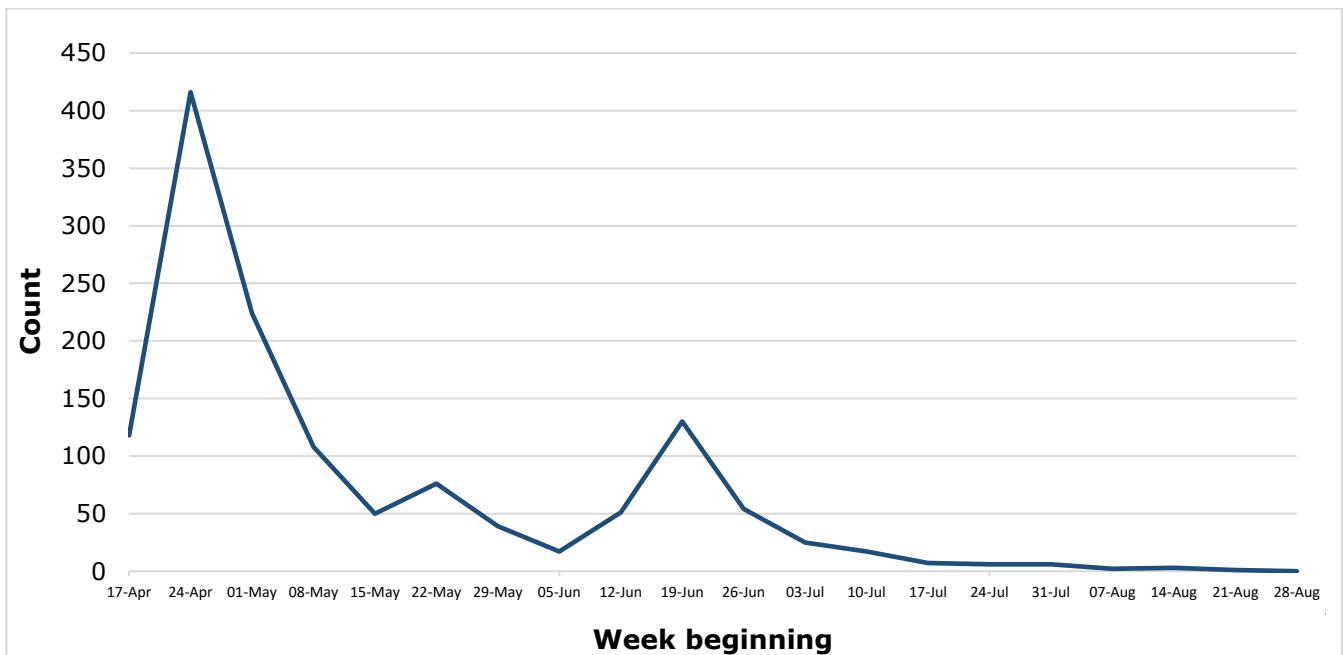

Figure 2 Questionnaires returned by date.

<u>Representativeness</u>

1. Did the sampling strategy produce the correct distribution across strata?

Figure 3 shows the distribution of the strata in the electoral roll and in ISSP respondents. In most cases, the proportion of respondents in strata was very similar to that of the electoral roll. The main differences were that greater numbers of people aged 46–60 in deprivation quintile 4 or 5 responded than was expected (Strata 9: 10.0% in ISSP vs. 8.9% in electoral roll); fewer people aged 46–60 in deprivation quintile 1, 2, or 3, who lived in Wellington, Canterbury, Bay of Plenty, Northland, Tasman/Nelson/Marlborough/West Coast, Otago-Southland or Hawkes Bay/Gisborne responded than was expected (Strata 11: 8.3% in ISSP vs. 9.7% in electoral roll).
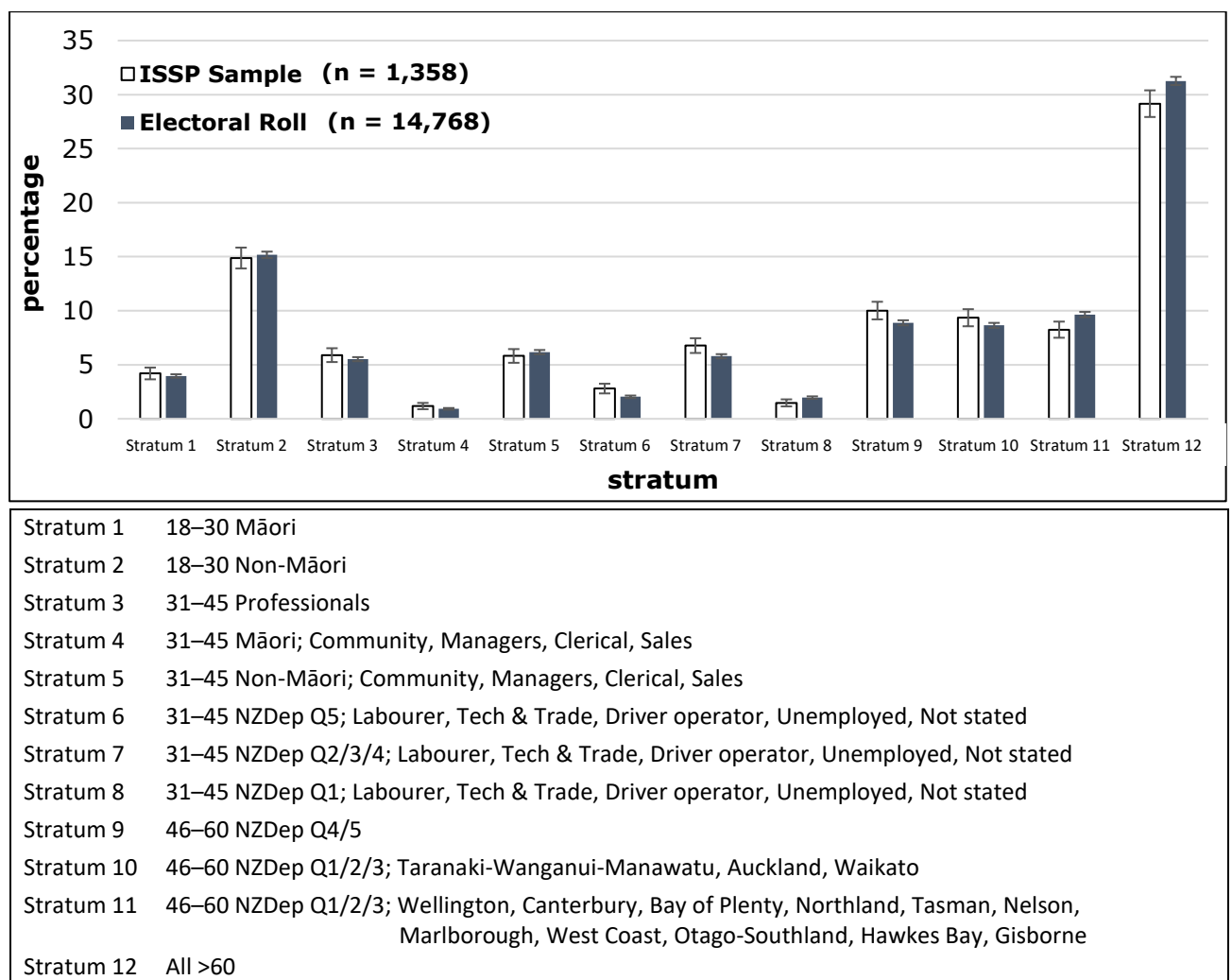

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Figure 3 Distribution of the strata in the electoral roll sample and the ISSP sample respondents.
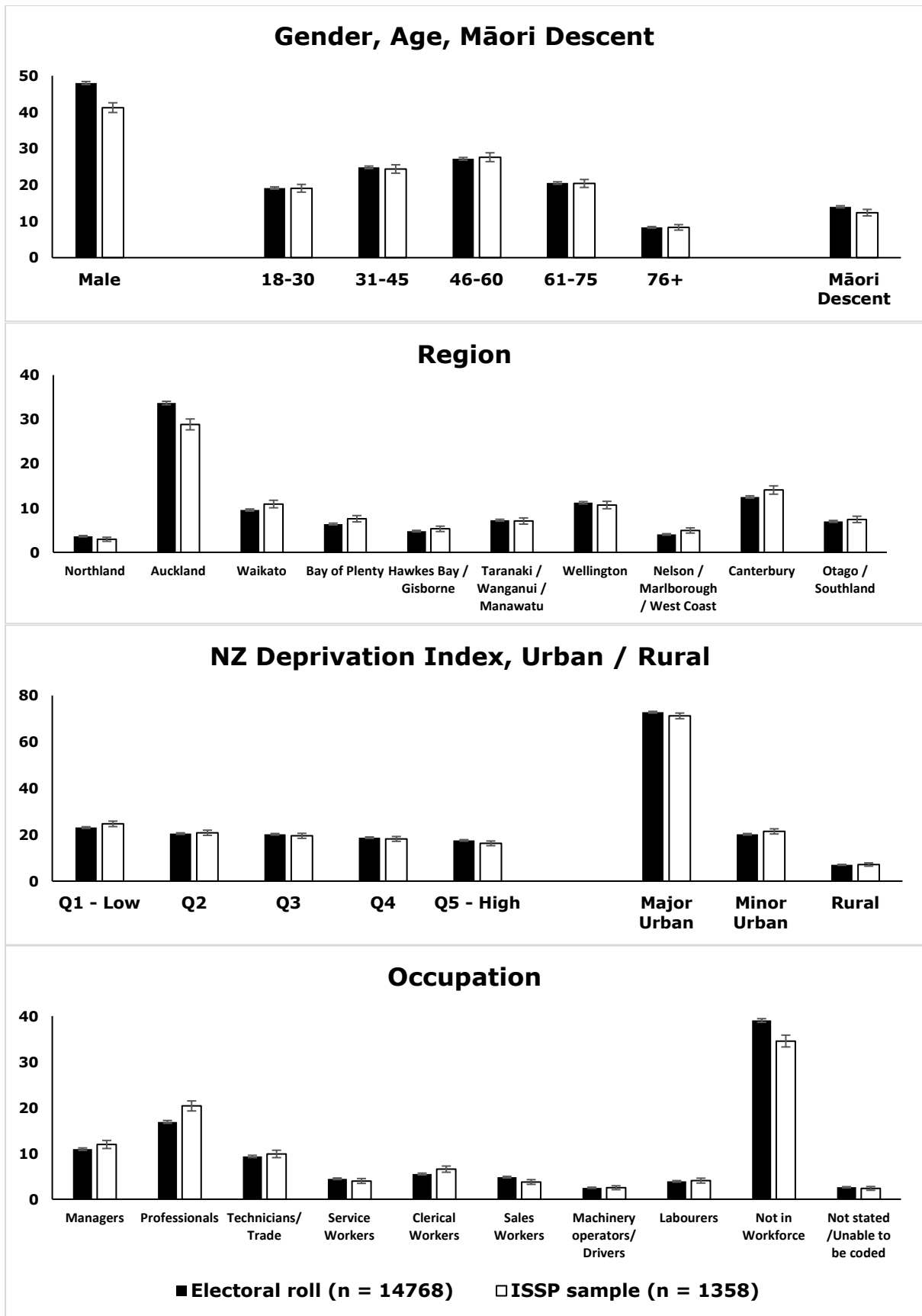
Figure 4 Comparison between Electoral Roll sample (n = 14,768) and ISSP Sample Respondents (n = 1,358) on demographic and geographic data available through the electoral roll.

2. Did the sampling strategy produce a sample representative across key demographic variables?

Variables available on the electoral roll that allowed us to compare whether the ISSP respondents were representative included gender, age, Māori descent, region, rurality, New Zealand Deprivation Index quintiles and occupation. Comparisons are shown in **Figure 4.** These revealed that – despite the sampling strategy of oversampling groups less likely to respond – three out of seven sample characteristics differed slightly from the electoral roll. Specifically, the sample underrepresented males and individuals living in Auckland, overrepresented those from professional occupations and under-represented those not in the workforce.

Weighting

To account for this pattern of differences, weights were computed based on the inverse probability of responding. This was achieved by conducting a logistic regression with responded (yes/no) as the outcome, and gender, region and occupation as predictors. Gender was included in the model to ensure that the weights did not inadvertently over-weight one gender relative to the other, and also to allow for the possibility of gender interactions. Māori-descent, age, deprivation and urbanicity were excluded because the proportion of respondents fall into each subgroup is not significantly different from that of the electoral roll (as indicated by Chi-Square test), see also **Figure 4**. A main effects model was computed and then three two-way interactions were tested in separate models. One interaction was found to be significant: gender × occupation. This interaction and all the main effects were included in the final model, as shown in **Table 3**.

From the model in **Table 3**, a predicted probability of response was generated for each respondent based on their covariates. This probability was then inverted and standardised to have mean = 1 to form a response weight, which ranged 0.49–2.80 across the n = 1,358

respondents. **Figure 5** shows the effect of weighting by this variable on the comparison variables from the electoral roll. This reveals that all variables are now similar between the weighted ISSP sample and the electoral roll, suggesting that the weighted ISSP sample is representative of the electoral roll, at least for the variables tested.

Table 2 Logistic regression model predicting response for those who responded to the ISSP survey (n = 1,358), of individuals from electoral roll (n = 14,768).

| Parameter	Odds Ratio (95% Confidence Interval)
Gender	
Female	Reference
Male	1.025 (0.478–2.197)
Occupation	
Not Stated / not codable	Reference
Managers	1.291 (0.661–2.522)
Professionals	1.797 (0.952–3.395)
Technicians / trades	1.789 (0.896–3.572)
Service workers	1.057 (0.524–2.132)
Clerical workers	1.381 (0.709–2.689)
Sales workers	1.212 (0.601–2.446)
Machinery operators / drivers	2.096 (0.838–5.239)
Labourers	1.834 (0.888–3.789)
Not in workforce	1.053 (0.562–1.973)
Region	
Northland	Reference
Auckland	1.049 (0.747–1.473)
Waikato	1.437 (0.997–2.072)
Bay of Plenty	1.519 (1.036–2.227)
Hawkes Bay / Gisborne	1.397 (0.931–2.095)
Taranaki / Wanganui / Manawatu	1.222 (0.831–1.797)
Wellington	1.159 (0.803–1.671)
Nelson / Marlborough / West Coast	1.553 (1.029–2.344)
Canterbury	1.385 (0.969–1.978)
Otago / Southland	1.319 (0.899–1.935)
Gender × Occupation interaction	
Female × Not Stated / not codable	Reference
Male × Managers	0.912 (0.397–2.096)
Male × Professionals	0.518 (0.231–1.162)
Male × Technicians/ Trades	0.553 (0.236–1.269)
Male × Service workers	0.792 (0.299–2.099)
Male × Clerical workers	0.945 (0.376–2.376)
Male × Sales workers	0.376 (0.138–1.023)
Male × Machinery operators / drivers	0.431 (0.143–1.297)
Male × Labourers	0.406 (0.157–1.046)
Male × Not in workforce	0.837 (0.381–1.840)
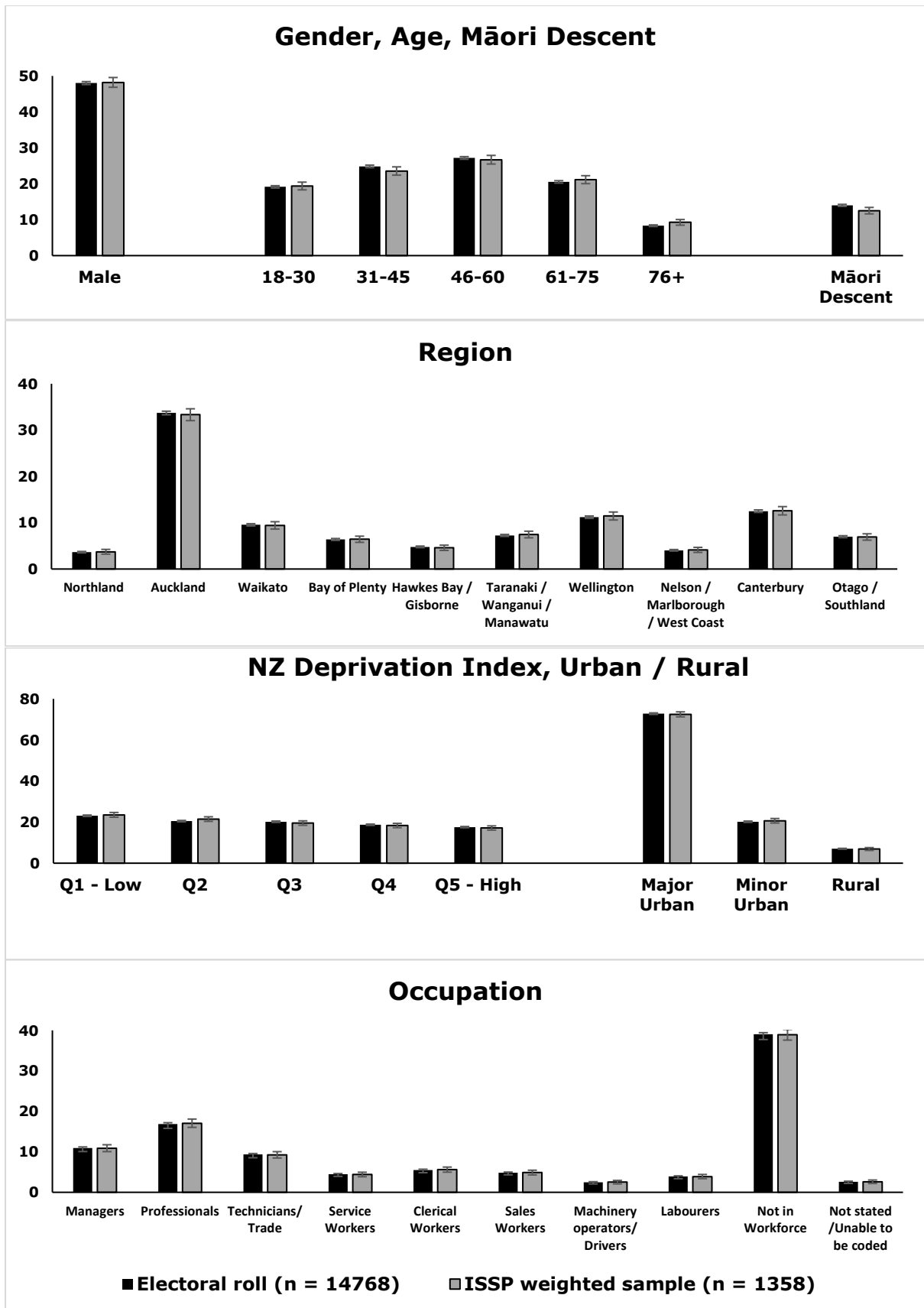
Figure 5 Comparison between Electoral Roll sample (n = 14,768) and ISSP Sample Respondents (n = 1,358), weighted for non-response, on demographic and geographic data available through the electoral roll.

Further, there were external validation variables in the survey: (i) respondents were asked which party they voted for the 2014 General Election and (ii) ethnicity of respondents. The weighted responses for (i) was compared to the confirmed results from the 2014 General Election in **Figures 6** below. Figure 6 shows that party voting of the weighted ISSP sample over-estimated National and Green voters; under-estimated Labour and NZ First voters. However from the comparison of the weighted responses for (ii) against the 2013 Census shown in **Figure 7** below, there is still an overrepresentation of Europeans and underrepresentation of Pacific peoples and Asians in the weighted ISSP sample.
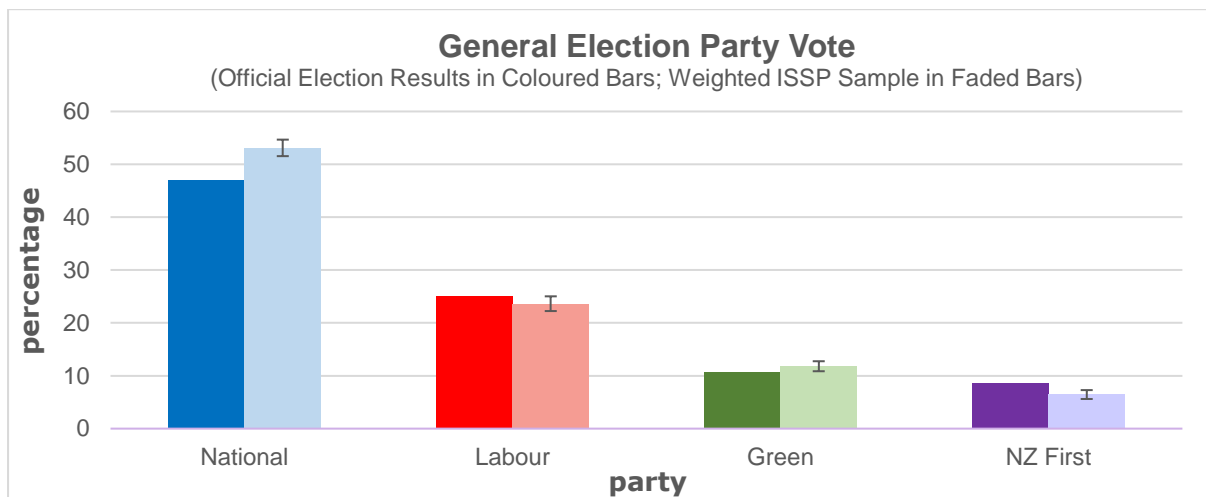

Figure 6 Comparison between 2014 General Election Party Vote Results and ISSP Sample Party Vote (n = 1,358), weighted for non-response.
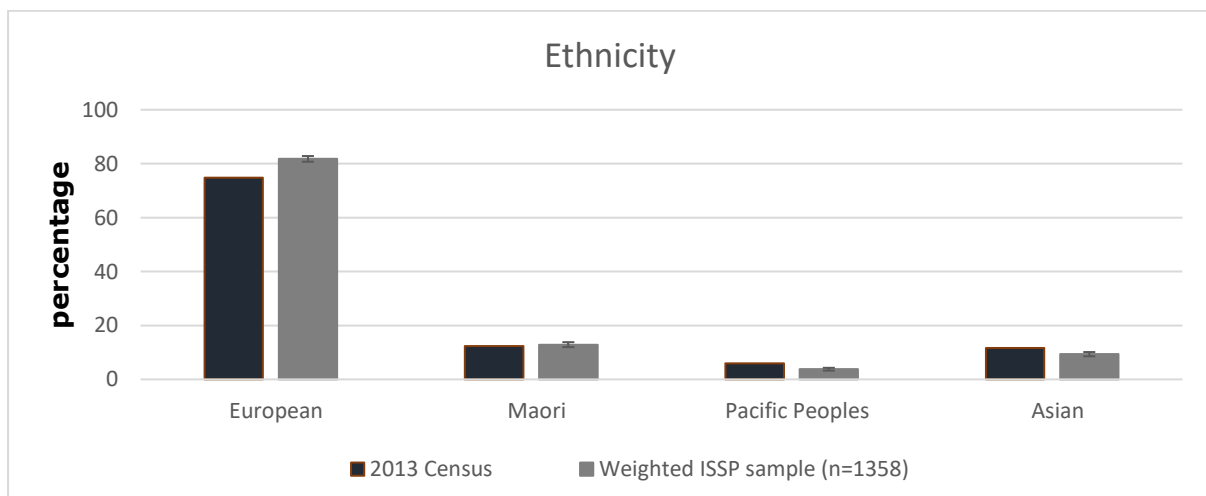

Figure 7 Comparison of ethnicity between 2013 Census and ISSP Sample (n = 1,358), weighted for non-response

Conclusions

Weighting the ISSP survey based on the characteristics that predict response was able to achieve a sample that is representative across a number of factors, including gender, age, Māori descent, region, urbanicity, deprivation and occupation. However, caution is advised, as external validation indicated that general election voting and ethnic identification may not be representative of the whole population. Also, the weighting essentially treats sample respondents from under-represented groups as 'spokespeople' for others like them for all responses in the survey (e.g. the respondent with the lowest weight 'speaks' for 0.49 people who share the same demographic characteristics as them, while the respondent with the highest weight 'speaks' for 2.80 people who share the same demographic characteristics as them). This may or may not be appropriate depending on how strongly sample responses in the population are determined by the demographic characteristics used to calculate weights, and this cannot be fully known. Nonetheless, insofar as the demographic characteristics used to calculate weights explain *some* variation in survey responses, weighted responses are likely to give descriptive and analytic results *closer to those* of the population.