Methods and procedures for
International Social Survey Programme
(ISSP)
2020
Environment III
New Zealand

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Background

In New Zealand, survey response rates tend to be lower among some demographic groups (e.g. male gender, younger age brackets, Māori ethnicity, lower socioeconomic status) – introducing the possibility of non-response bias (see, for examples, Fink, et al. 2011; 't Mannetje, et al. 2011; Meiklejohn, et al. 2012). Oversampling is commonly used to overcome this challenge and achieve a more representative sample.

This report summarises the sampling procedures, including oversampling, for an annual survey carried out by the Centre of Methods and Policy Application in the Social Sciences (COMPASS Research Centre, http://www.compass.auckland.ac.nz) at the University of Auckland, as New Zealand's contribution to the International Social Survey Programme (ISSP).

The ISSP is a cross-national collaboration on surveys covering a different social science topic each year. The topic for 2020, Environment, consisting of a range of measures (including environmental risk perceptions, values, behaviours, and self-efficacy), was previously fielded in the years 1993, 2000, and 2010. Due to COVID-19 lockdowns and other administrative challenges, our implementation of the 2020 survey was delayed to the first half of 2021.

Methods

Given the response patterns for our previous ISSP surveys (https://tinyurl.com/compass-issp), we replicated the stratified random sampling method for age group, gender, and ethnicity that we have used for the last three years. This involved dividing a randomly selected sample of 160,000 individuals from the New Zealand Electoral Rolls into 40 strata: 4 'ethnic' (Māori descent, high Pacific geographical meshblocks, high Asian geographical meshblocks, remainder) × 2 gender (male, female) × 5 age group (18–30, 31–45, 46–60, 61–75, 76+).

Sampling from the electoral rolls provides an indicator for Māori descent, but not for other ethnicities. To define our other 'ethnic' strata, we used published ethnicity counts for each geographical meshblock in the country – the smallest unit for which statistical data is collected by Statistics NZ – based on the boundaries as at the 2018 New Zealand Census of Population and Dwellings.

We defined "High Pacific" and "High Asian" meshblocks as those where the respective ethnicities made up at least 50% of the population. These proportions were made slightly higher than in our previous surveys to be more certain of reaching people of these ethnic groups.

The electoral rolls provided names and titles (but not genders), and addresses, for 3,528,000 voting age New Zealanders, i.e. Citizens or Permanent Residents aged 18 or over. The address information enabled the removal of 75,439 people reporting an overseas mailing address. From those remaining (with domestic addresses), a random sample of 160,000, ~5%, was taken, to:

   (i)   secure sufficient responses from all 40 strata, assuming a low response rate of 10%; and
   (ii) make the task of coding and adding variables less onerous. Gender needed to be imputed where there was no title, and free-text occupation data needed to be coded to the local standard – Australian and New Zealand Standard Classification of Occupations v1.3 (ANZSCO). We also added the NZDep2018 socioeconomic deprivation quintile for survey weighting.

Each person sampled was categorised into the appropriate stratum, and a random sample from each stratum was selected to be mailed a questionnaire. Figure 1 illustrates the distribution of these strata and Table 1 provides the number selected from each stratum. Note, the final sample target was n = 1,200, so we chose the number selected from each stratum to be the same as for the ISSP survey in 2019, when we received n = 1,210 responses. Note also that we used stratified random sampling to increase representativeness (Stephan, 1941; Sharma, 2017), and oversampled groups typically underrepresented in New Zealand surveys, specifically Pacific and Asian ethnic groups.
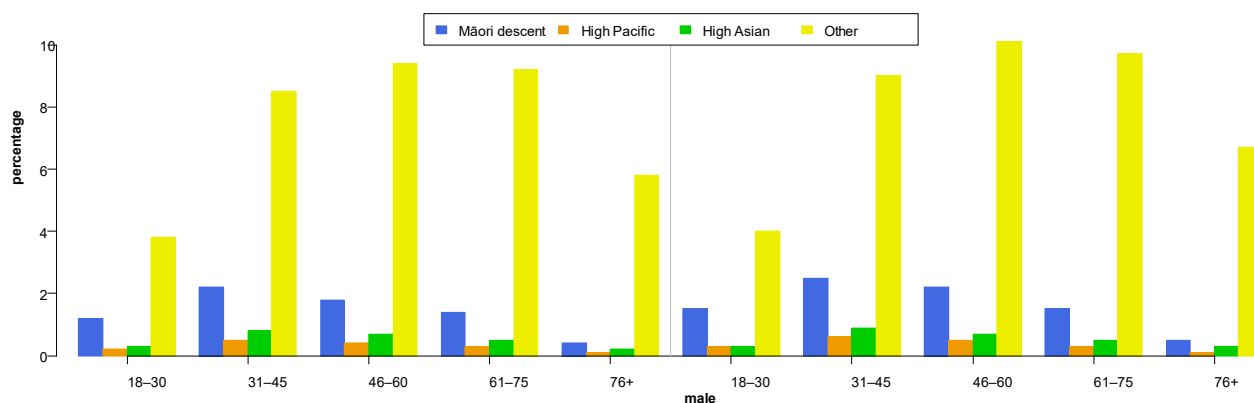
Figure 1: Demographic distributions in our sampling strata, from the random sample of 160,000 from the electoral roll

We then used a weighting procedure, described below, to produce results that were representative across key demographics:

- Age
- Gender
- Māori descent
- Region
- Deprivation
- Occupation
- Urbanicity.

Possibly due to the impacts of COVID-19 and lockdowns that occurred during our fieldwork (e.g. there may have been difficulties accessing post boxes during lockdowns), we saw a lower response rate this year than in previous surveys, with 996 total responses. This was just short of the 1,000 minimum set by the ISSP Secretariat, and the suggested ISSP target of 1,400. In addition, two further responses were removed for submission to the ISSP based on their case completion requirements, so our final dataset included n=994 responses. This is at least in part an example of the impact of COVID-19 on survey research (Sakshaug, et al. 2020).

Table 1: Number selected to be mailed from each stratum

	Māori descent	High Pacific	High Asian	Other	Total
Male					*2,700*
18–30 years	160	180	160	210	**710**
31–45 years	160	180	160	210	**710**
46–60 years	120	120	120	200	**560**
61–75 years	80	60	80	140	**360**
76+ years	80	60	80	140	**360**
Female					*2,700*
18–30 years	170	180	150	260	**760**
31–45 years	130	120	150	220	**620**
46–60 years	120	120	100	160	**500**
61–75 years	90	90	100	130	**410**
76+ years	90	90	100	130	**410**
Total	**1,200**	**1,200**	**1,200**	**1,800**	**5,400**

Of the 5,400 randomly selected individuals, 12 were deemed by New Zealand Post to have insufficient or incorrect address information. The remaining 5,388 were mailed the ISSP questionnaire, along with a cover letter and a separate participant information sheet.

The documents explained:
  (i)   what the survey was about and that it was approved by the University of Auckland Human Participants Ethics Committee (ref. UAHPEC3136);
  (ii)   how we obtained their names and addresses, and how we selected participants;
  (iii) that their participation was voluntary;
  (iv)   the steps we take to ensure their confidentiality;
  (v)   that they could complete the survey either on the paper questionnaire they had received, or online via Qualtrics, and that either would put them in a draw for one of four $100 gift cards.
  (vi)   that the survey was being managed at the University of Auckland by COMPASS Research Centre; and
  (vii) that an anonymised data set would be permanently stored in both New Zealand and international data archives, as a historical record of the 2020 ISSP.

We sent the first mailout of 5,388 on Monday 22 February 2021. It was intended to be one week earlier, but Auckland (where the researchers were based) went into a one-week COVID-19 lockdown at that time. We sent a reminder postcard to the 4,667 people we still had not heard from on Friday 26 March. A follow-up survey invitation (cover letter, participant information sheet, and questionnaire) was sent out on Friday 23 April to 4,475 non-respondents. By the end of June 2021, we had received a total of n = 994 responses – a raw response rate of 18.45% and a standardised response rate of 25.8% (the response rate that would have been achieved had each stratum been sent questionnaires proportional to their actual share of the population).

Figure 2 shows the timing of the returned responses. Recording of dates early on was affected by another COVID-19 lockdown in Auckland from Sunday 27 February to 7 March 2021. Mail was then saved up and delivered to the home address of one of the researchers, twice a week only for the subsequent two weeks.
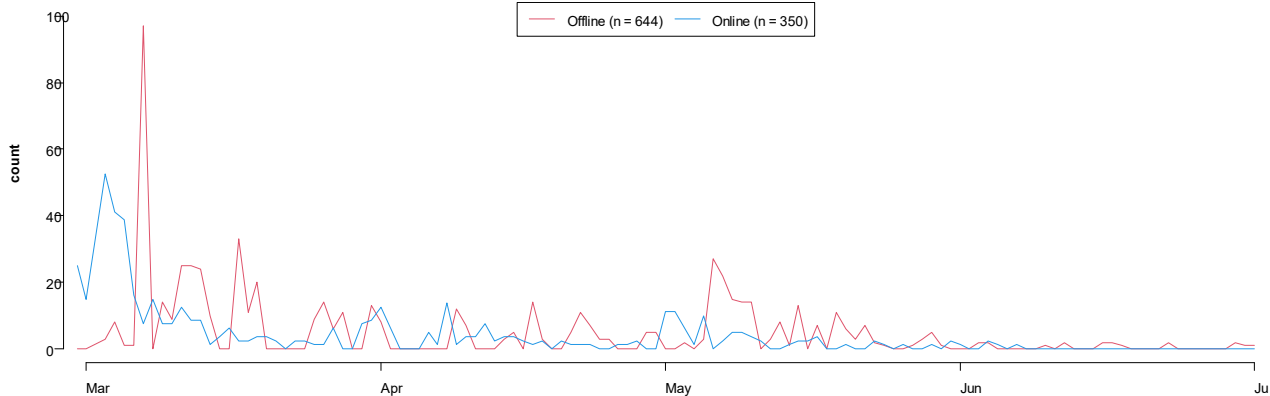

Figure 2: Questionnaires returned by date

Table 2 shows the number of people that responded from each stratum, the percentages based on invitation numbers for each stratum, and, in the shaded row and column, the total percentages of responses they made up. As expected, the younger Māori descent and "High Pacific" strata had the lowest response rates.

The raw numbers returned indicate we successfully reached people of Pacific and Asian ethnic groups with our strategy of selecting meshblocks containing high proportions of these groups. Response rates were down across the board compared to our last ISSP survey, but the 46–60 age group saw by far the largest decline. In the ISSP 2019 survey on the topic of social inequality, males in that age group responded at 22% overall, and females at 31%.

Table 2. Number of respondents (response rate, %) within each stratum.
Percentages in shaded cells show the row and column percentages of responses out of the total responses (n = 994)

Age	Māori descent	High Pacific	High Asian	Other	Total	% of responses
Male					*481 (17.87%)*	*48.39%*
18–30 years	12 (7.5%)	7 (3.9%)	18 (11.3%)	30 (14.3%)	**67 (9.4%)**	**6.74%**
31–45 years	10 (6.3%)	21 (11.7%)	16 (10.0%)	38 (18.2%)	**85 (12.0%)**	**8.55%**
46–60 years	21 (17.5%)	13 (10.8%)	19 (16.0%)	45 (22.5%)	**98 (17.5%)**	**9.86%**
61–75 years	15 (19.2%)	11 (18.3%)	18 (22.5%)	53 (37.9%)	**97 (27.1%)**	**9.76%**
76+ years	36 (45.0%)	16 (26.7%)	22 (27.5%)	60 (43.2%)	**134 (37.3%)**	**13.48%**
Female					*513 (19.00%)*	*51.61%*
18–30 years	12 (7.1%)	20 (11.1%)	17 (11.3%)	39 (15.0%)	**88 (11.6%)**	**8.85%**
31–45 years	20 (15.5%)	15 (12.5%)	26 (17.3%)	46 (20.9%)	**107 (17.3%)**	**10.76%**
46–60 years	16 (13.4%)	13 (10.8%)	18 (18.0%)	50 (31.3%)	**97 (19.4%)**	**9.76%**
61–75 years	25 (28.4%)	12 (13.3%)	30 (30.0%)	52 (40.0%)	**119 (29.0%)**	**11.97%**
76+ years	22 (24.4%)	14 (15.6%)	19 (19.0%)	47 (36.2%)	**102 (24.9%)**	**10.26%**
Total	**189 (15.9%)**	**142 (11.8%)**	**203 (16.9%)**	**460 (25.6%)**	**994 (18.4%)**	
% of responses	**19.01%**	**14.29%**	**20.42%**	**46.28%**		**994 (100%)**

Representativeness

1. Was the oversampling of Māori, Pacific, and Asian groups successful?

Figure 3 shows the percentage for each stratum in the electoral roll and ISSP samples. A comparison of stratum percentages shows that the sampling strategy did result in higher representation of: males and females of Māori descent in the older age groups; all High Pacific groups; and all High Asian groups. However, all 'Other' strata ended up under-represented, except for the oldest males, an exception that was also observed in our ISSP survey for 2019.
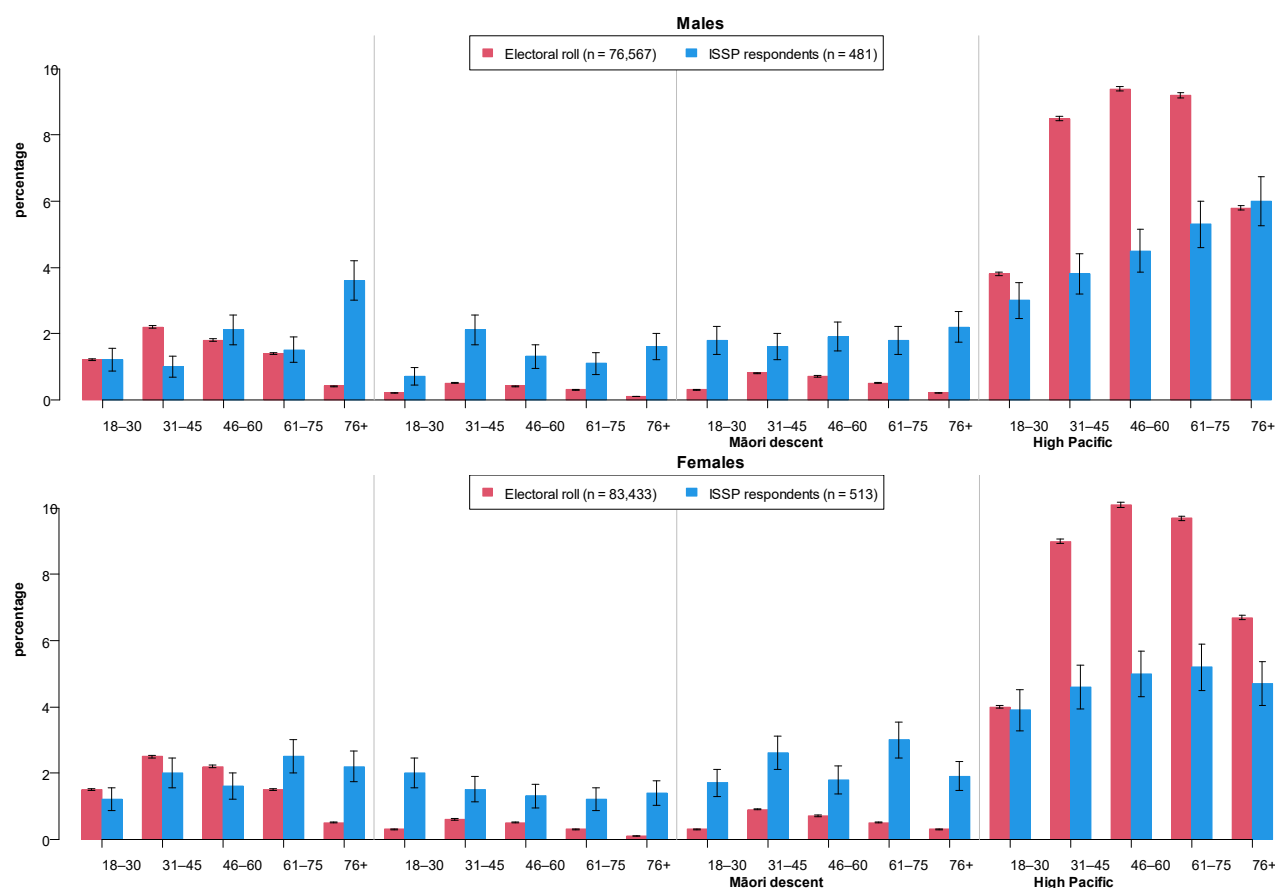

Figure 3: Percentage of each stratum in the electoral roll sample and among ISSP respondents

2. What were the response rates by gender, age group, and ethnicity?

As Figure 4 illustrates, response rates were higher for females and the 'Other' ethnic grouping. Responses generally increased by age, and high Pacific and the younger age groups saw the lowest response rates among our stratification variables. These differences are also reflected in the stratum response rates presented in Figure 5. Males aged 18–30 years from High Pacific meshblocks had the lowest response rate (3.9%) while males aged 76+ years of Māori descent had the highest (45.0%).
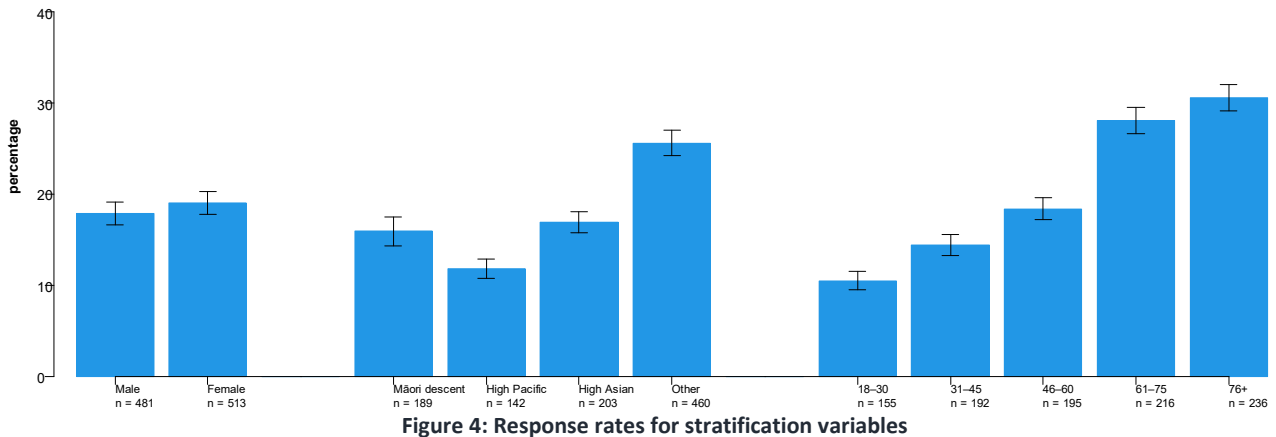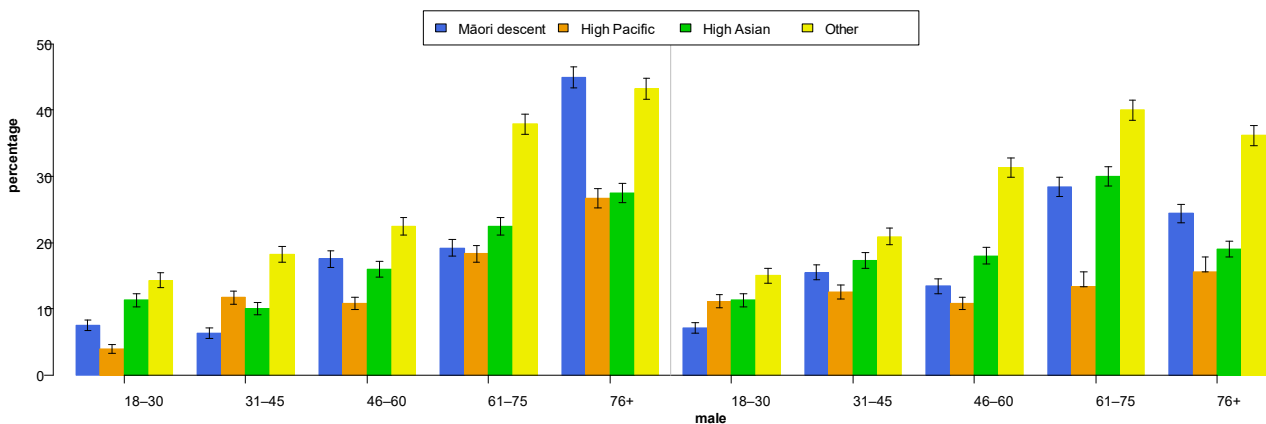

Figure 4: Response rates for stratification variables

Figure 5: Response rates for all sampling strata

3. What was the distribution of responses like relative to the electoral roll?

The comparisons in Figure 6 show that the percentage distribution of all variables except for gender differed slightly – and with non-overlapping confidence intervals – from those in the electoral roll:

- The youngest and oldest age groups were both overrepresented, while the rest were underrepresented;
- People of Māori descent were overrepresented, as were those from Auckland and other major urban areas;
- Among occupation categories coded to the 1-digit level of ANZSCO, Professionals were overrepresented while Managers and Technicians / Trades Workers were underrepresented. Retirees were overrepresented to a large extent, which is common in survey research (Gigliotti & Dietsch 2014).
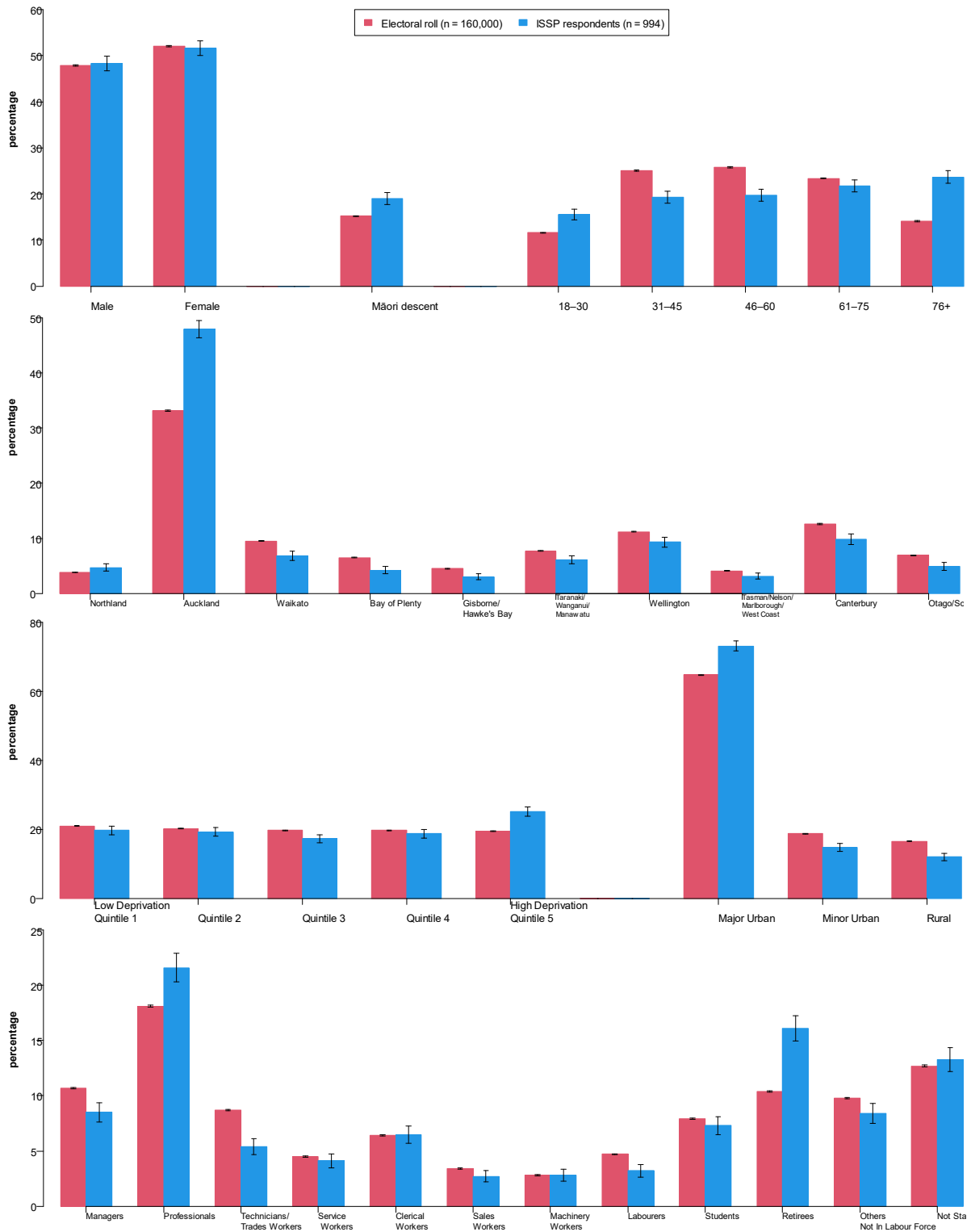
Figure 6: Percentages of demographic variables in the electoral roll sample and in our ISSP data set

Weighting

To account for the above differences, we constructed weights based on the inverse probability of responding. We conducted a logistic regression with responded (Yes/No) as the outcome, and age group, Māori descent, region, occupation, NZDep quintile, and urbanicity as predictors. Gender was not included, based on its non-significant chi-square test result. A main effects model was computed and then all two-way interactions were tested in separate models.

Seven of these were found to be significant:

- Age group × Māori descent
- Māori descent × NZDep quintile
- Māori descent × occupation
- Region × urbanicity.
- Māori descent × region
- Māori descent × urbanicity
- Region × NZDep quintile

These interactions and all of the main effects were included in the final model. The associated odds ratios are presented here in Appendix Table A1. The graphs in Figure 7 shows the same comparisons to the electoral roll sample as Figure 6, for our data set with weights applied.
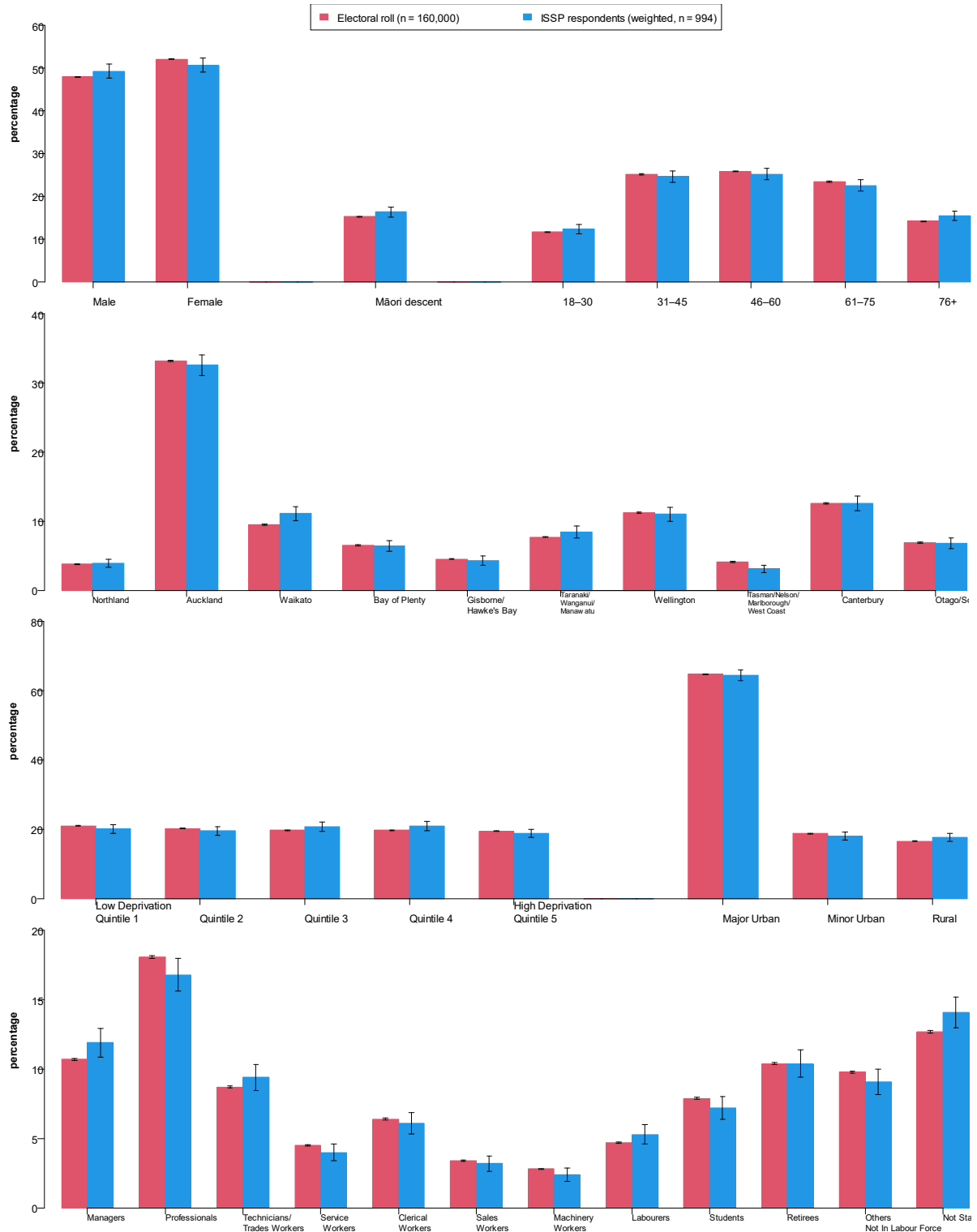

Figure 7: Percentages of demographic variables in the electoral roll sample and in our weighted ISSP data set

These show that almost all of the differences we observed earlier were removed by our weighting. The main exceptions to this are:

- Among regions we overrepresent people from the Waikato region (9.5% in the roll sample and 11.1% with our weights) and underrepresent people from Tasman, Nelson, Marlborough, and the West Coast of the South Island (4.1% in the roll sample and 3.1% with our weights);
- Among occupations we overcorrected for the percentages of both Managers (10.7% in the roll sample, 8.5% in our data, and 11.9% with our weights) and Professionals (18.1% in the roll sample, 21.6% in our data, and 16.8% with our weights). We also ended up overrepresenting those that did not give their occupation (12.7% in the roll sample, 13.3% in our data, and 14.1% with our weights).

All other comparisons show overlapping confidence intervals.

External validation

We compared two survey questions' responses to official figures:

- Which party did you give your party vote to at the 2020 General Election?;
- To which of the following ethnic groups do you belong? (multiple response).

Figure 8 compares our weighted party vote distribution to confirmed results from the 2020 General Election. This shows that we overrepresented Labour Party voters and underrepresented ACT voters, but were within confidence bounds for the other major parties.
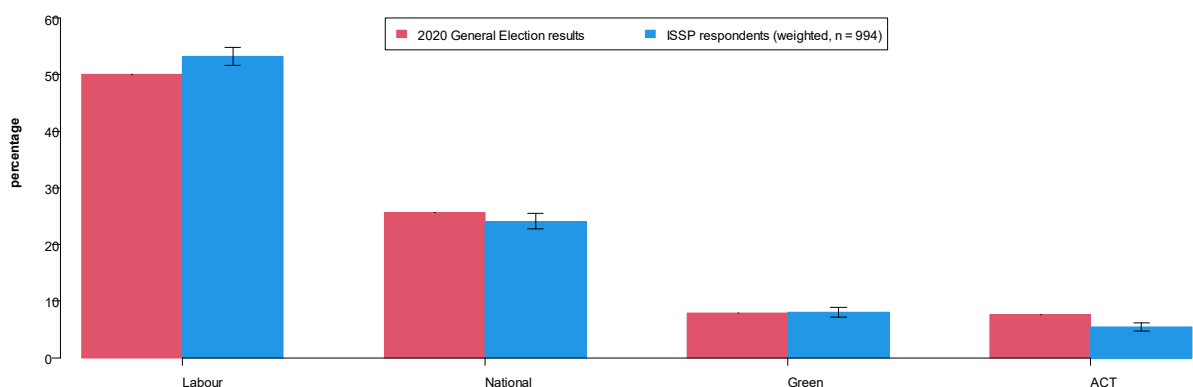
Figure 8: Percentages of main parties that people gave their party vote at the 2020 New Zealand General Election, official results compared to our weighted ISSP data set

Figure 9 compares our ethnic group distribution against the 2018 New Zealand Census of Population and Dwellings. It shows that we slightly overrepresented European and Māori groups, and underrepresented Pacific and Asian groups.

Figure 9: Percentages of major ethnic groups reported (multiple response), 2018 New Zealand Census of Population and Dwellings compared to our weighted ISSP data set

Conclusion

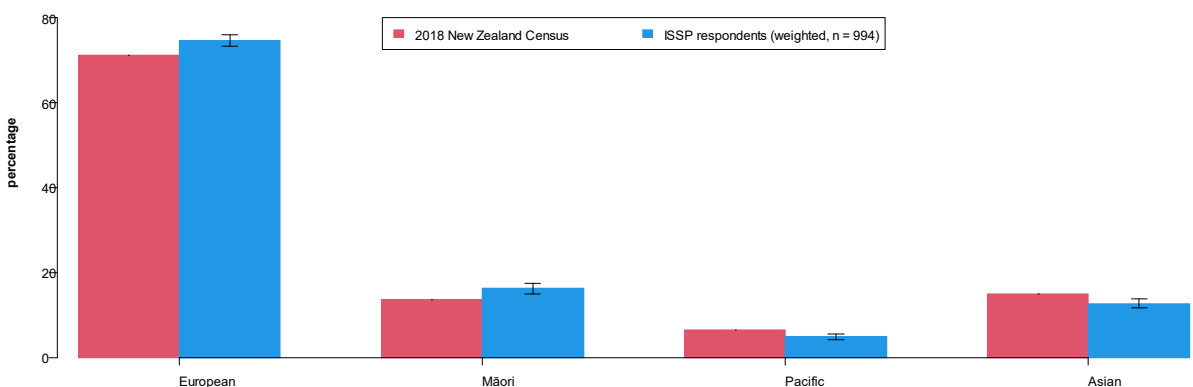Weighting our 2020 ISSP data set on characteristics that predict response enabled a representative sample across age, Māori descent, region, occupation, deprivation, and urbanicity. Responses were already representative by gender. With our sampling strategy, the weighting brought us closer to representativeness by ethnicity as confirmed through external validation.

Weighting allows respondents from underrepresented groups to act as 'spokespeople' for others like them in the population, e.g. the respondent with the lowest weight 'speaks' for 0.047 of a person who shares their demographic characteristics, while the one with the highest weight 'speaks' for 10.95 people who share theirs. We set the average weight at 1 so that the weighted sample size is the same as the unweighted.

We cannot know if our respondents' views are actually typical of people within their demographic groups in the population; nevertheless, our weights explain *some* of the variation in survey responses, based on the variables in our models. Weighted responses provide descriptive and analytic results that are *closer* to those that would be observed in the whole population.

References

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Appendix

Table A1. Logistic regression model predicting response for those who responded to the ISSP survey (n = 994 of n = 160,000 individuals sampled from the electoral roll)

Parameter	Odds Ratio (95% Confidence Interval)
Age group	
18–30 years	*Reference*
31–45 years	0.644 (0.368 – 1.127)
46–60 years	0.908 (0.519 – 1.589)
61–75 years	1.330 (0.761 – 2.326)
76+ years	5.808 (3.181–10.604)
Māori descent	
Yes	*Reference*
No	1.159 (0.418 – 3.211)
Region	
Northland	*Reference*
Auckland	1.807 (0.212–15.381)
Waikato	4.176 (0.441–39.502))
Bay of Plenty	1.256 (0.120–13.143)
Hawke's Bay / Gisborne	1.030 (0.085–12.465)
Taranaki / Wanganui / Manawatū	2.750 (0.287–26.351)
Wellington	2.787 (0.310–25.088)
Tasman / Nelson / Marlborough / West Coast	8.181 (0.777–86.091)
Canterbury	3.822 (0.422–34.616)
Otago / Southland	4.735 (0.486–46.093)
NZDep quintile	
Q1 – Low	*Reference*
Q2	3.782 (0.440–32.487)
Q3	6.718 (0.830–54.379)
Q4	2.896 (0.353–23.744)
Q5 – High	1.852 (0.233–14.706)
Urbanicity	
Major Urban	*Reference*
Minor Urban	1.726 (0.720 – 4.137)
Rural	1.307 (0.606 – 2.817)
Occupation	
Not Stated	*Reference*
Managers	1.037 (0.522 – 2.058)
Professionals	1.442 (0.819 – 2.541)
Technicians / Trades Workers	0.890 (0.442 – 1.791)
Service Workers	1.241 (0.626 – 2.462)
Clerical Workers	0.831 (0.369 – 1.868)
Sales Workers	1.858 (0.856 – 4.029)
Machinery Operators / Drivers	0.381 (0.114 – 1.279)
Labourers	0.798 (0.388 – 1.640)
Students	0.564 (0.240 – 1.321)
Retirees	1.192 (0.634 – 2.240)
Others Not In Labour Force	0.828 (0.455 – 1.506)
Age group × Māori descent	
18–30 years × Yes	*Reference*
31–45 years × No	0.679 (0.367 – 1.254)
46–60 years × No	0.452 (0.243 – 0.839)
61–75 years × No	0.398 (0.214 – 0.739)
76+ years × No	0.147 (0.075 – 0.289)

Parameter	Odds Ratio (95% Confidence Interval)
Māori descent × Region	
Yes × Northland	*Reference*
No × Auckland	2.145 (1.026 – 4.485)
No × Waikato	0.585 (0.263 – 1.302)
No × Bay of Plenty	1.303 (0.520 – 3.264)
No × Hawke's Bay / Gisborne	1.644 (0.584 – 4.623)
No × Taranaki / Wanganui / Manawatū	0.891 (0.389 – 2.040)
No × Wellington	1.315 (0.542 – 3.192)
No × Tasman / Nelson / Marlborough / West Coast	0.734 (0.257 – 2.098)
No × Canterbury	1.082 (0.445 – 2.632)
No × Otago / Southland	0.516 (0.208 – 1.280)
Māori descent × NZDep quintile	
Yes × Q1 – Low	*Reference*
No × Q2	1.085 (0.577 – 2.040)
No × Q3	0.642 (0.348 – 1.186)
No × Q4	1.037 (0.572 – 1.881)
No × Q5 – High	1.702 (0.942 – 3.075)
Māori descent × Urbanicity	
Yes × Major Urban	*Reference*
No × Minor Urban	0.635 (0.397 – 1.016)
No × Rural	0.678 (0.402 – 1.143)
Māori descent × Occupation	
Yes × Not Stated	*Reference*
No × Managers	1.024 (0.481 – 2.182)
No × Professionals	1.068 (0.574 – 1.985)
No × Technicians / Trades Workers	0.831 (0.378 – 1.828)
No × Service Workers	0.791 (0.354 – 1.767)
No × Clerical Workers	1.645 (0.685 – 3.948)
No × Sales Workers	0.428 (0.170 – 1.079)
No × Machinery Operators / Drivers	3.575 (0.984–12.992)
No × Labourers	0.958 (0.404 – 2.271)
No × Students	1.320 (0.531 – 3.283)
No × Retirees	1.031 (0.507 – 2.098)
No × Others Not In Labour Force	1.081 (0.545 – 2.143)
Region × NZDep quintile	
Northland × Q1 – Low	*Reference*
Auckland × Q2	0.273 (0.032 – 2.300)
Auckland × Q3	0.298 (0.037 – 2.383)
Auckland × Q4	0.488 (0.060 – 3.971)
Auckland × Q5 – High	0.850 (0.108 – 6.695)
Waikato × Q2	0.305 (0.033 – 2.835)
Waikato × Q3	0.043 (0.004 – 0.447)
Waikato × Q4	0.191 (0.021 – 1.742)
Waikato × Q5 – High	0.296 (0.034 – 2.597)
Bay of Plenty × Q2	0.292 (0.028 – 3.081)
Bay of Plenty × Q3	0.260 (0.026 – 2.578)
Bay of Plenty × Q4	0.263 (0.025 – 2.798)
Bay of Plenty × Q5 – High	0.536 (0.055 – 5.242)
Hawke's Bay / Gisborne × Q2	0.385 (0.033 – 4.556)
Hawke's Bay / Gisborne × Q3	0.301 (0.027 – 3.418)
Hawke's Bay / Gisborne × Q4	0.479 (0.043 – 5.346)
Hawke's Bay / Gisborne × Q5 – High	0.336 (0.029 – 3.836)
Taranaki / Wanganui / Manawatū × Q2	0.240 (0.025 – 2.319)
Taranaki / Wanganui / Manawatū × Q3	0.067 (0.007 – 0.665)
Taranaki / Wanganui / Manawatū × Q4	0.242 (0.026 – 2.210)
Taranaki / Wanganui / Manawatū × Q5 – High	0.198 (0.022 – 1.799)

Parameter	Odds Ratio (95% Confidence Interval)
Wellington × Q2	0.180 (0.020 – 1.594)
Wellington × Q3	0.075 (0.008 – 0.677)
Wellington × Q4	0.235 (0.027 – 2.052)
Wellington × Q5 – High	0.427 (0.051 – 3.561)
Tasman / Nelson / Marlborough / West Coast × Q2	0.135 (0.013 – 1.362)
Tasman / Nelson / Marlborough / West Coast × Q3	0.051 (0.005 – 0.543)
Tasman / Nelson / Marlborough / West Coast × Q4	0.207 (0.022 – 1.964)
Tasman / Nelson / Marlborough / West Coast × Q5 – High	–
Canterbury × Q2	0.163 (0.018 – 1.438)
Canterbury × Q3	0.174 (0.021 – 1.459)
Canterbury × Q4	0.177 (0.020 – 1.536)
Canterbury × Q5	0.137 (0.015 – 1.262)
Otago / Southland × Q2	0.342 (0.035 – 3.305)
Otago / Southland × Q3	0.194 (0.020 – 1.854)
Otago / Southland × Q4	0.337 (0.036 – 3.178)
Otago / Southland × Q5 – High	0.353 (0.037 – 3.355)
Region × Urbanicity	
Northland × Major Urban	*Reference*
Auckland × Minor Urban	0.607 (0.227 – 1.623)
Auckland × Rural	0.516 (0.207 – 1.287)
Waikato × Minor Urban	0.792 (0.287 – 2.185)
Waikato × Rural	1.048 (0.406 – 2.706)
Bay of Plenty × Minor Urban	0.502 (0.138 – 1.826)
Bay of Plenty × Rural	1.801 (0.673 – 4.816)
Hawke's Bay / Gisborne × Minor Urban	1.101 (0.294 – 4.121)
Hawke's Bay / Gisborne × Rural	1.172 (0.375 – 3.665)
Taranaki / Wanganui / Manawatū × Minor Urban	1.521 (0.538 – 4.303)
Taranaki / Wanganui / Manawatū × Rural	1.694 (0.644 – 4.455)
Wellington × Minor Urban	0.706 (0.251 – 1.984)
Wellington × Rural	0.434 (0.089 – 2.118)
Tasman / Nelson / Marlborough / West Coast × Minor Urban	0.475 (0.144 – 1.570)
Tasman / Nelson / Marlborough / West Coast × Rural	0.723 (0.231 – 2.263)
Canterbury × Minor Urban	0.609 (0.230 – 1.613)
Canterbury × Rural	0.428 (0.151 – 1.202)
Otago / Southland × Minor Urban	0.608 (0.211 – 1.754)
Otago / Southland × Rural	0.336 (0.100 – 1.122)