

# **Sample and attrition weights in the Health, Work and Retirement survey cohorts 2006-2012**

**Brief Technical Report**

**HWR weights '06-'12**

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## **Overview of the Health, Work and Retirement (HWR) survey cohorts**

The Health, Work and Retirement (HWR) longitudinal study includes a biennial survey of older persons in the New Zealand population. To date, there have been several cohorts recruited to the Health, Work and Retirement study. The initial HWR cohort was recruited in 2006 (Andy Towers, 2008), with additional cohorts also recruited from a new sample drawn in 2009 under the auspices of the New Zealand Longitudinal Study of Ageing (NZSLA: A Towers & Stevenson, 2014), the Retirement Planning Study (RP: Noone, Stephens, & Alpass, 2010) and The Family Centre Social Policy Research Unit Study. All samples were randomly selected from the electoral roll, with the HWR 2006 cohort and the 2010 Family Centre cohort over-sampling from persons indicated as being of Maori descent on the electoral roll.

### **HWR 2006**

The HWR 2006 longitudinal cohort is comprised of persons aged 55-70 recruited from the New Zealand electoral roll. An over-sample of persons indicated on the roll as being of Maori-descent was undertaken to ensure adequate representation of the important sub-group in the survey. Further information on the sampling method and characteristics of respondents are detailed elsewhere (Andy Towers, 2008).

### **RP/NZSLA/FC 2009-2010**

In 2009 a new aged 50-84 sample was drawn from the electoral roll for the purposes of the Retirement Planning (RP) study, New Zealand Longitudinal Study of Ageing (NZSLA), and Family Centre (FC) studies. The Retirement Planning study included an off-wave survey in 2009 with this cohort then included in subsequent on-wave Health, Work and Retirement surveys in 2010 and 2012. The NZSLA sample were approached for participation in 2010 and re-surveyed in 2012. The Family Centre (FC) cohort were also approached for participation in 2010 and also over-sampled for Māori, as per the HWR 2006 protocol. As the RP/NZSLA/FC cohorts were drawn from the same sample, the weights for these cohorts are calculated simultaneously in reference to the sample drawn from the electoral roll, with the 2009 response sample N reflecting responses of the Retirement Planning survey in 2009 as well as the NZSLA and FC cohorts in 2010. The 2010 response N reflects the attrition 2009-2010 in the RP cohort, by including the N responses from this cohort to the 2010 survey, as well as the N responses from the NZSLA and FC cohorts in 2010.

### **Weights 2006-2012**

Sample weights (2006-2012) in the Health, Work and Retirement study are calculated to account for response biases associated with participant age (four 10-year age brackets), gender (male vs. female), Maori descent (Maori descent vs. non-Maori descent) and area-level socio-economic deprivation (high vs. low NZ Deprivation index), relative to the random-sample drawn from the electoral roll. A weighing factor adjusting for the over-sampling of persons of Maori descent from the electoral roll, relative to the general New Zealand population, is also added.

### **Weighting for demographic group**

The weighting for a given demographic group (Maori descent, gender, age bracket, and area deprivation category) and was defined as the ratio of the number of persons from the demographic group drawn from the electoral roll ( $N_{DE}$ ), relative to the responding number ( $N_{DR}$ ).

## Weighting for oversampling of persons of Maori descent

Of the N = 609,720 persons aged 55-74 on the electoral roll in 2006, N = 47,436 (7.8%) were indicated as being of Maori descent and N = 562,284 (92.2%) were indicated as being of non-Maori descent. The weighting factor for persons of Maori/non-Maori descent sampled in the HWR 2006 cohort and for the RP/NZSLA/FC 2009-2010 cohort was calculated as the proportion of persons aged 55-74 of with the relevant Maori/non-Maori descent indicator on the electoral roll, divided by the proportion of persons of that descent indicator in the sample drawn from the electoral roll.

### HWR 2006 sample:

Of the N = 13,044 persons aged 55-74 drawn from the electoral roll, N = 8,275 (63.4%) were indicated as being of Maori descent and N = 4,769 (36.6%) were indicated as being of non-Maori descent.

**Thus:**

$$\text{Weighting factor for Maori } (M_{H1}) = 0.0778/0.6344 = 0.1226$$

$$\text{Weighting factors for Non-Maori } (M_{H0}) = 0.9222/0.3656 = 2.5224$$

### RP/NZSLA/FC 2009-2010 sample:

Of the N = 8,004 persons aged 50-74 drawn from the electoral roll, N = 2,589 (32.4%) were indicated as being of Maori descent and N = 5,415 (67.6%) were indicated as being of non-Maori descent.

**Thus:**

$$\text{Weighting factor for Maori } (M_{N1}) = 0.0778/0.3235 = 0.2405$$

$$\text{Weighting factor for non-Maori } (M_{N0}) = 0.9222/0.6765 = 2.5224$$

## Weighting for attrition

For phases in which the same cohort were approached for re-participation over time, an attrition factor was also calculated using a fair-shares methodology. Using this method, participants responding at a follow-up phase are weighted upwards to compensate for those participants who did not respond from within in the same demographic group.

## Weighting for mortality

Where persons were known to have died since their last participation, the removal of these persons from the potential population was also accounted for in the calculation of attrition. This was done by removing the same proportion of responding participants who were deceased in a given year from the total number drawn in the demographic category, the assumption being that the mortality rate in the responding demographic group is similar to the mortality in the initially sampled demographic group. Thus, the population weight decreases in line with increasing age and increasing mortality (i.e., so that their corresponding weight for deceased persons was not spread amongst remaining members of that demographic group). In this way as the numbers of participants in a given demographic group reduce over time due to mortality, the size of the corresponding population (demographic group initially sampled) to which participants are weighted to represent, also decreases in size – both reaching zero at the same time. A longitudinal weight of zero was assigned to any participants who did not respond or were known to be deceased.

## Formula for longitudinal population weights:

Dataset variable: PopulationWeightYYYY

The weighting equation for each cohort at each phase is expressed as:

$$W = N_{\text{DRY}}/N_{\text{DE}} * M_X$$

Where

$N_{\text{DE}}$  = Number in demographic group drawn from the electoral roll

$N_{\text{DRY}}$  = Number in demographic group who responded to the survey in a given year

$M_X$  = weighting for over-sample of persons of Maori descent in a given cohort

## Formula for longitudinal scaled population weights (SW):

Dataset variable: PopulationWeightScaledYYYY

To reduce the weighted sample N to reflect the observed sample size at each survey phase, the sample weight was reduced using an index of the N responding in the cohort at a given phase, divided by the sum of all longitudinal population weights assigned to respondents in the cohort at a given phase. As such, the initial sum of the population weights for a cohort is equal to the population N, which reduces over time as the population N is reduced due to mortality.

The scaled weighting equation for each cohort at each phase is expressed as:

$$SW_{YY} = W * (N_R / \Sigma W_o)$$

Where

$SW_{YY}$  = the sample weight for each cohort by phase

$W$  = longitudinal population weight for each cohort by year

$N_R$  = Overall number of respondents for each phase

$\Sigma W_o$  = the sum of the longitudinal population weights for all respondents observed at a given phase

Values of  $N_R / \Sigma W_o$  2006-2012:

$SW_{06}$ :  $W_{06} * 0.51369$

NZSLA/RP/FC  $SW_{10}$ :  $W_{10} * 0.16791$

$SW_{08}$ :  $W_{08} * 0.19380$

HWR 2006  $SW_{12}$ :  $W_{12} * 0.15153$

$SW_{09}$ :  $W_{09} * 0.24958$

NZSLA/RP/FC  $SW_{12}$ :  $W_{12} * 0.14259$

HWR 2006  $SW_{10}$ :  $W_{10} * 0.15773$

## References

- Noone, J. H., Stephens, C., & Alpass, F. (2010). The Process of Retirement Planning Scale (PRePS): development and validation. *Psychological assessment*, 22(3), 520.
- Towers, A. (2008). Health, Work and Retirement Survey: Summary report for the 2006 data wave: Methodology. Retrieved from: [http://hwr.massey.ac.nz/resources/methodology\\_towers.pdf](http://hwr.massey.ac.nz/resources/methodology_towers.pdf)
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