

WEIGHTING TELEPHONE INTERVIEW DATA FOR 15+ YEAR OLDS FOR NSW, VIC, QLD, SA, WA, TAS

Notation

h = stratum = state by met/xmet

p = postcode

j = household

i = person

z = post stratification cell = state by met/ex-met by age by sex cell

$N_{h,p}$ = total number of households (records on frame) in postcode p, stratum h

N_h = total number of households (records on frame) in stratum h

d_h = number of postcodes selected in stratum h

$n_{h,p}$ = number of households selected in postcode p, stratum h

$n^{\#}_{h,p}$ = number of households undertaking telephone interview in postcode p, stratum h

$m_{h,p,j}$ = number of persons aged 15+ in household j, postcode p, stratum h

$k_{h,p,j}$ = number of persons aged 5-14 years in household j, postcode p, stratum h

First stage of selection – Postcodes selected PPS

Postcodes were selected proportional to the number of households (records on frame) in postcode p, therefore

$$P(\text{selecting postcode } p \text{ in stratum } h) = \frac{N_{h,p}}{N_h} * d_h \quad \text{where } N_h = \sum_p N_{h,p}$$

Second stage of selection – Fixed number of households selected per postcode

Cluster size for Metropolitan strata was 30 households selected per postcode.

Cluster size for Non-metropolitan strata was 40 households selected per postcode.

$$P(\text{household } j \text{ selected / postcode } p \text{ selected in stratum } h) = \frac{n_{h,p}}{N_{h,p}}$$

However, as each postcode has a certain % of households (records on frame) that are out-of-scope (i.e. disconnected, businesses, etc) the probability of a household being selected is determined by the number of records on the frame in a particular postcode that are in-scope and therefore we need to adjust $N_{h,p}$ to reflect this.

$$P(\text{household } j \text{ selected / postcode } p \text{ selected in stratum } h) = \frac{n_{h,p}}{N^{\#}_{h,p}}$$

where
$$N_{h,p}^{\#} = N_{h,p} - \frac{f_{out\ of\ scope}}{f_{rang}} * N_{h,p} = N_{h,p} \left(1 - \frac{f_{out\ of\ scope}}{f_{rang}}\right)$$

As some postcodes have higher response rates than other postcodes need to adjust for this, therefore

$$P(\text{household } j \text{ selected} / \text{postcode } p \text{ selected in stratum } h) = \frac{n_{h,p}^{\#}}{N_{h,p}^{\#}}$$

Third stage of selection – One 15+ year old randomly selected per household

$$P(\text{person } i \text{ selected} / \text{household } j, \text{ postcode } p, \text{ stratum } h) = \frac{1}{m_{h,p,j}}$$

Overall probability of selection

$$P(\text{person } i \text{ in household } j, \text{ postcode } p, \text{ stratum } h) = \left(\frac{N_{h,p}}{N_h} * d_h\right) * \left(\frac{n_{h,p}^{\#}}{N_{h,p}^{\#}}\right) * \left(\frac{1}{m_{h,p,j}}\right)$$

Calculating initial weight

The initial weight, which equals the inverse of the probability of selection is

$$\text{Initial weight} = w_{h,p,j,i} = \left(\frac{N_h}{N_{h,p} * d_h}\right) * \left(\frac{N_{h,p}^{\#}}{n_{h,p}^{\#}}\right) * (m_{h,p,j})$$

Adjusting for non-response at age-sex level

Need to adjust for different response rates at age, sex level and force weights to add to ERP state by met/non-met by age by sex benchmarks (N_z)

$$\text{i.e. want } X_z = \sum_{i \in z} w_{h,p,j,i} * x_{h,p,j,i} = N_z \quad \text{where } x_{h,p,j,i} = \begin{cases} 1 & \text{if } i \in z \\ 0 & \text{otherwise} \end{cases}$$

In reality $X_z = N_z$ and not N_z so to force estimate to add to benchmark must adjust Initial

$$\text{Weight by factor } \frac{N_z}{N_z} \quad \text{where } N_z = \sum_{i \in z} w_{h,p,j,i} = \sum_{i \in z} \left(\frac{N_h}{N_{h,p} * d_h}\right) * \left(\frac{N_{h,p}^{\#}}{n_{h,p}^{\#}}\right) * (m_{h,p,j})$$

Calculating final weight

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_z}{N_z} * \text{InitialWeight} = \frac{N_z}{N_z} * w_{h,p,j,i}$$

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_z}{\sum_{i \in z} \left(\frac{N_h}{N_{h,p} * d_h} \right) * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (m_{h,p,j})} * \left(\frac{N_h}{N_{h,p} * d_h} \right) * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (m_{h,p,j})$$

WEIGHTING TELEPHONE INTERVIEW DATA FOR 4-15 YEAR OLDS FOR NSW, VIC, QLD, SA, WA, TAS

After the adult interview is completed every second household is asked whether there are any children aged 5-14 years living in the household. If there are, a child is randomly selected from the children in this age range.

$$P(\text{child } i \text{ selected/ household } j, \text{ postcode } p, \text{ stratum } h) = \frac{1}{k_{h,p,j}} \text{ therefore}$$

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_z}{\sum_{i \in z} \left(\frac{N_h}{N_{h,p} * d_h} \right) * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (k_{h,p,j})} * \left(\frac{N_h}{N_{h,p} * d_h} \right) * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (k_{h,p,j})$$

WEIGHTING TELEPHONE INTERVIEW DATA FOR 15+ YEAR OLDS FOR NT AND ACT

For NT and ACT all postcodes were selected so P (selecting postcode p in stratum) = 1, therefore

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_z}{\sum_{i \in z} \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (m_{h,p,j})} * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (m_{h,p,j})$$

WEIGHTING TELEPHONE INTERVIEW DATA FOR 4-15 YEAR OLDS FOR NT AND ACT

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_z}{\sum_{i \in z} \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (k_{h,p,j})} * \left(\frac{N_{h,p}^\#}{n_{h,p}^\#} \right) * (k_{h,p,j})$$

The second phase of this survey involved undertaking dental examinations for telephone interview respondents who reported they were dentate (ie. had some natural teeth), were aged 15 years and over and willing to participate. The response rates for the 'Examination phase' are lower than those for the telephone interview phase.

WEIGHTING EXAMINATION DATA FOR 15+ YEAR OLDS FOR NSW, VIC, QLD, SA, WA, TAS

The weighting formulae is similar to the telephone interview formulae, however the formulae needs to be changed to reflect the different response rates for the examination phase and use benchmarks that reflect the number of dentate people in a state by met/xmet by age by sex cell rather than the ERP benchmarks. Dentate benchmarks can be estimated by adjusting the ABS ERP state by met/xmet by age by sex benchmarks by the % of dentate persons in a state by met/xmet by age by sex cell, which would be estimated from the telephone interview survey.

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_{z,dentate}}{\sum_{i \in z} \left(\frac{N_h}{N_{h,p}} * d_h \right) * \left(\frac{N_{h,p}^\#}{e_{h,p}^\#} \right) * (m_{h,p,j})} * \left(\frac{N_h}{N_{h,p}} * d_h \right) * \left(\frac{N_{h,p}^\#}{e_{h,p}^\#} \right) * (m_{h,p,j})$$

$N_{z,dentate}$ = estimate of dentate population in state by met/xmet by age by sex cell

$e_{h,p}^\#$ = number of households undertaking dental examination in postcode p, stratum h

WEIGHTING EXAMINATION DATA FOR 15+ YEAR OLDS FOR NT AND ACT

$$\text{Final Weight } w_{h,p,j,i}^* = \frac{N_{z,dentate}}{\sum_{i \in z} \left(\frac{N_{h,p}^\#}{e_{h,p}^\#} \right) * (m_{h,p,j})} * \left(\frac{N_{h,p}^\#}{e_{h,p}^\#} \right) * (m_{h,p,j})$$