Video 13 of 21: Weighting Design/Base weights

Sampling
General steps used in weighting:
Design/Base weights

- Sample
  - Frame
    - Design/Base weights

- Sample
  - Known Eligibility
    - Eligible
      - Elig resp
    - Not Eligible
      - Elig nonresp

- Unknown Eligibility
  - Compensate for unequal selection probabilities

- Compensate for unknown eligibility by distributing base weights of unknown s over known Eligibility

- Compensate for nonresponse problem

Sample estimates and population parameters alignment

KN known Eligible
KNs known Eligible weights
UKN unknown Eligible
UKNs unknown Eligible weights
Es Eligible nonresp
IN not Eligible res
ER Eligible res
ENR not Eligible res

Design weights

• First step in the weighting adjustment process
• Adjusts unequal selection probabilities across sampled cases due to various reasons:
  – Disproportionate sample allocation
  – Over- or under-sampling of sub-populations
  – Multiplicity
  – Dual frame integration
  – Within-household selection
Design/Base weights: Unequal selection probabilities

- In probability samples, all population elements have a known non-zero selection probability
- If the sample design assigns unequal selection probabilities across the population elements, this should be addressed through design weights
  - Sometimes the task of computing these selection probabilities for every sampled element is non-trivial
- Assuming that the selection probability of the $i^{th}$ sampled element is $\pi_i$, the design (or base) weight is calculated as
  \[ d_{0i} = \frac{1}{\pi_i} \]
Design/Base weights: Example

- Assuming an RDD stratified random sample by region (i.e., phone numbers are selected with simple random sample within each region)

<table>
<thead>
<tr>
<th>Region</th>
<th>(N_h)</th>
<th>(n_h)</th>
<th>(\pi_h = n_h/N_h)</th>
<th>(d_{0h} = 1/\pi_h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>25,014,398</td>
<td>220</td>
<td>0.000008795</td>
<td>113,701.81</td>
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<tr>
<td>Midwest</td>
<td>28,082,527</td>
<td>214</td>
<td>0.000007620</td>
<td>131,226.76</td>
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<td>Northeast</td>
<td>25,014,398</td>
<td>228</td>
<td>0.000015351</td>
<td>65,141.66</td>
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<tr>
<td>South</td>
<td>41,882,543</td>
<td>1,046</td>
<td>0.000005444</td>
<td>183,695.36</td>
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</tbody>
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END OF VIDEO 13