Estimation for a Population Proportion from Stratified Random Sampling

The formulas for estimating a population proportion \( p \) and its bound from StRS are:

\[
\hat{p}_{st} = \frac{1}{N} \sum_{i=1}^{L} N_i \hat{p}_i = \sum_{i=1}^{L} \left( \frac{N_i}{N} \right) \hat{p}_i, \quad \text{and}
\]

\[
\hat{V}(\hat{p}_{st}) = \frac{1}{N^2} \sum_{i=1}^{L} N_i^2 \left( \frac{\hat{p}_i \hat{q}_i}{n_i - 1} \right) \left( \frac{N_i - n_i}{N_i} \right).
\]

Sample size calculation for estimation of proportions from StRS

The same approach to calculation of sample size as used for means and totals gives:

\( n_i \) is proportional to \( N_i \sqrt{p_i q_i / c_i} \) with

\[
n = \frac{\sum_{i=1}^{L} N_i^2 p_i q_i / a_i}{N^2 D + \sum_{i=1}^{L} N_i p_i q_i},
\]

where \( D = B^2/4 \).