$\hat{Var}\left(\hat{Y}_{st}\right)=\frac{1}{4}\left(\hat{Y}_{st1}-\hat{Y}_{st2}\right)^2$, where $\hat{Y}_{st1}$ and $\hat{Y}_{st2}$ are the estimates for sub-sample 1 and sub-sample 2 respectively for stratum 's' and sub-stratum 't'.

(ii) forsub-stratum with 3 sub-samples:

$$\hat{Var}\left(\hat{Y}_{st}\right)=\frac{1}{6}\sum_{m=1}^{3}\left(\hat{Y}_{stm}-\frac{\hat{Y}_{st1}+\hat{Y}_{st2}+\hat{Y}_{st3}}{3}\right)^2$$, where $\hat{Y}_{stm}$ is the estimate for sub-sample 'm' for stratum 's' and sub-stratum 't'.

A.12 **For ratio** $\hat{R}$:

$\hat{MSE}(\hat{R})=\sum_{s}\sum_{t}\hat{MSE}_{st}(\hat{R})$ where $\hat{MSE}_{st}(\hat{R})$ is given by

(i) for sub-stratum with 2 sub-samples:

$$\hat{MSE}_{st}(\hat{R})=\frac{1}{4\hat{X}^2}\left[\left(\hat{Y}_{st1}-\hat{Y}_{st2}\right)^2+\hat{R}^2\left(\hat{X}_{st1}-\hat{X}_{st2}\right)^2-2\hat{R}\left(\hat{Y}_{st1}-\hat{Y}_{st2}\right)\left(\hat{X}_{st1}-\hat{X}_{st2}\right)\right]$$

(ii) for sub-stratum with 3 sub-samples:

$$\hat{MSE}_{st}(\hat{R})=\frac{1}{6\hat{X}^2}\sum_{m=1}^{3}\left[\left(\hat{Y}_{stm}-\frac{\sum_{m=1}^{3}\hat{Y}_{stm}}{3}\right)^2+\hat{R}^2\left(\hat{X}_{stm}-\frac{\sum_{m=1}^{3}\hat{X}_{stm}}{3}\right)^2\right.$$

$$\left.-2\hat{R}\left(\hat{Y}_{stm}-\frac{\sum_{m=1}^{3}\hat{Y}_{stm}}{3}\right)\left(\hat{X}_{stm}-\frac{\sum_{m=1}^{3}\hat{X}_{stm}}{3}\right)\right]$$

A.13 **Estimates of Relative Standard Error (RSE)**:

$$\hat{RSE}\left(\hat{Y}\right)=\frac{\sqrt{\hat{Var}\left(\hat{Y}\right)}}{\hat{Y}}\times 100$$

$$\hat{RSE}\left(\hat{R}\right)=\frac{\sqrt{\hat{MSE}\left(\hat{R}\right)}}{\hat{R}}\times 100$$

A.14 **Multipliers**:

The formulae for multipliers at stratum/sub-stratum/second-stage stratum/ slum level for a sub-sample and schedule type are given below: