Appendix III

ESTIMATION PROCEDURE

Notations

x_{ijk} and y_{ijk} respectively denote the enumerated and omitted population of the k^{th} sex (k =1,2) for the j^{th} block of the i^{th} stratum (for rural and urban in each state). N_h denotes the total number of enumeration blocks, n_h the number of blocks in the sample in the h^{th} stratum and w_i the weight for the i^{th} stratum, where $w_i = \frac{N_i}{n_i}$ rounded off to the nearest integer.

Formulae

The total number of enumerated persons of sex k in the i^{th} stratum is estimated as

$$\hat{X}_{i.k} = w_i \sum_{j=i}^{n_h} x_{ijk}$$

Similarly the number of omitted persons of sex k in the i^{th} stratum is estimated as

$$\hat{Y}_{i.k} = w_i \sum_{j-1}^{n_h} y_{ijk}$$

The omission rates have been worked out as the ratio of the number of omitted persons to the number of enumerated persons i.e., $\hat{r}_{ik} = \frac{Y_{i.k}}{X_{i.k}}$

The variance of the estimated omission rate has been obtained as

$$V(r_{ik}) = \frac{n_{ik}(1-f_i)}{X_{ik}^2} \sum_{j=1}^{n_h} \left(y_{ijk} - r_{ik} x_{ijk}\right)^2$$

In case of the omission rates for persons (males + females), the number of enumerated/omitted persons was first calculated at block level and the same formulae as above have been used without the suffix k for the sex.

For the combined estimates of the strata (i.e. rural + urban or zones), the summations extended over the variable i in the above formulae. In this case, weights were also used as the sampling fractions, were not same in all states. Thus the formula for the variance of the omission rate for the k^{th} sex will be given by

$$V(r_k) = \sum_i w_i \frac{n_{ik}(1-f_i)}{X_{ik}^2} \sum_{j=1}^{n_h} \left(y_{ijk} - r_{ik} x_{ijk}\right)^2$$

To estimate the error rates/variances of Type 1, Type II or Total errors, the variable y has been taken as representing the figures of Type 1, Type II or Total error.

The Percent Relative Standard Errors have been estimated using the above estimates of variance.