

APPENDIX A

ESTIMATES OF SAMPLING ERRORS

Two types of errors affect the estimates from a sample survey: (1) nonsampling errors and (2) sampling errors. Nonsampling errors are the result of errors committed during data collection and data processing, such as failure to locate and interview the correct household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts were made during the implementation of NFHS-2 to minimize nonsampling errors, they are impossible to avoid and difficult to evaluate statistically.

Sampling errors, on the other hand, can be evaluated statistically. The sample of women selected in NFHS-2 is only one of many samples that could have been selected from the same population, using the same design and expected sample size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. The sampling error is a measure of the variability among all possible samples. Although the degree of variability is not known exactly, it can be estimated from the survey results.

The sampling error is usually measured by the *standard error* for a particular statistic (for example, a mean or percentage), which is the square root of the variance. The standard error can be used to calculate confidence intervals within which the true value for the population can reasonably be assumed to fall. For example, for any given statistic calculated from a sample survey, the value of that statistic will fall within a range, calculated as the value of the statistic plus or minus two times the standard error of that statistic, in 95 percent of all possible samples of identical size and design.

If the sample of women had been selected as a simple random sample, it would have been possible, for many statistics, to use straightforward formulas for calculating sampling errors. However, the NFHS-2 sample is the result of a multi-stage stratified sample design, and it is therefore necessary to use more complex formulas. The computer software used to calculate sampling errors for NFHS-2 is ISSA (the Integrated System for Survey Analysis). The linear Taylor series approximation method for variance estimation is used for estimates of means, proportions, and ratios. The JACKKNIFE repeated replication method is used with ISSA for variance estimation for more complex statistics such as fertility and mortality rates.

The ISSA package treats any percentage or average as a ratio estimate, $r = y/x$, where y represents the sample value for variable y , and x represents the number of cases in the group or subgroup under consideration. The variance of r is computed using the formula given below, with the standard error being the square root of the variance:

$$var(r) = \frac{1 - f}{x^2} \sum_{h=1}^H \left[\frac{m_h}{m_h - 1} \left(\sum_{i=1}^{m_h} z_{hi}^2 - \frac{z_h^2}{m_h} \right) \right]$$

in which

$$z_{hi} = y_{hi} - rx_{hi}$$

$$z_h = y_h - rx_h$$

where

- h = the stratum that varies from 1 to H,
- m_h = the total number of PSUs selected in the h^{th} stratum,
- y_{hi} = the sum of the values of variable y in PSU i in the h^{th} stratum,
- x_{hi} = the sum of the number of cases in PSU i in the h^{th} stratum,
- f = the overall sampling fraction, which is so small that the program ignores it.

In addition to the standard error, ISSA computes the relative standard error, confidence limits for the estimates, and the design effect (DEFT) for each estimate. The design effect is defined as the ratio of the standard error using the given sample design to the standard error that would result if a simple random sample had been used. A DEFT value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a value greater than 1.0 indicates the increase in the sampling error due to the use of a more complex and less statistically efficient design.

Sampling errors for NFHS-2 are calculated for selected variables considered to be of primary interest. The results in this appendix are presented for the state as a whole and for urban and rural areas separately, except for the variable on salt iodization for which the results are shown separately for large cities, small cities, towns, and rural areas. For each variable, the type of statistic (mean, proportion, ratio, or rate) and the base population are given in Table A.1. Table A.2 presents the value of the statistic (R), its standard error (SE), the relative standard error (SE/R), and the 95 percent confidence limits ($R \pm 2SE$) for each variable. In addition, for all variables except the fertility and mortality rates, the table shows the unweighted number of cases (N), the weighted number of cases (WN), the standard error assuming a simple random sample (SER), and the design effect (DEFT).

Table A.1 List of selected variables for sampling errors, Maharashtra, 1999

| Variable | Estimate | Base population |
|---|------------|--|
| Sex ratio | Ratio | <i>De facto</i> household population |
| Illiterate | Proportion | <i>De facto</i> household population age 6 and above |
| Have tuberculosis | Rate | 1,000 <i>de jure</i> Household population |
| Salt iodized at 15 ppm or more | Proportion | Households |
| Illiterate | Proportion | Ever-married women age 15–49 |
| High school complete and above | Proportion | Ever-married women age 15–49 |
| Currently married | Proportion | Ever-married women age 15–49 |
| Number of children ever born | Mean | Currently married women age 15–49 |
| Number of living children | Mean | Currently married women age 15–49 |
| Have ever used any method | Proportion | Currently married women age 15–49 |
| Currently using any method | Proportion | Currently married women age 15–49 |
| Currently using any modern method | Proportion | Currently married women age 15–49 |
| Currently using pills | Proportion | Currently married women age 15–49 |
| Currently using IUD | Proportion | Currently married women age 15–49 |
| Currently using condoms | Proportion | Currently married women age 15–49 |
| Currently using female sterilization | Proportion | Currently married women age 15–49 |
| Currently using male sterilization | Proportion | Currently married women age 15–49 |
| Currently using rhythm/safe period | Proportion | Currently married women age 15–49 |
| Using public source for modern method | Proportion | Current users of modern methods |
| Do not want any more children | Proportion | Currently married women age 15–49 |
| Want to delay birth at least 2 years | Proportion | Currently married women age 15–49 |
| Ideal number of children | Mean | Ever-married women age 15–49 |
| Ideal number of sons | Mean | Ever-married women age 15–49 |
| Ideal number of daughters | Mean | Ever-married women age 15–49 |
| Visited by health/family planning worker | Proportion | Ever-married women age 15–49 |
| Received no antenatal check-up | Proportion | Births in the past 3 years |
| Received iron and folic acid tablets or syrup | Proportion | Births in the past 3 years |
| Received medical assistance during delivery | Proportion | Births in the past 3 years |
| Received postpartum check-up | Proportion | Noninstitutional births in the past 3 years |
| Had diarrhoea in the past 2 weeks | Proportion | Children under 3 years |
| Treated with ORS packets | Proportion | Children under 3 with diarrhoea in past 2 weeks |
| Taken to a health facility/provider for diarrhoea | Proportion | Children under 3 with diarrhoea in past 2 weeks |
| Showing a vaccination card | Proportion | Children age 12–23 months |
| Received BCG vaccination | Proportion | Children age 12–23 months |
| Received DPT vaccination (3 doses) | Proportion | Children age 12–23 months |
| Received polio vaccination (3 doses) | Proportion | Children age 12–23 months |
| Received measles vaccination | Proportion | Children age 12–23 months |
| Fully vaccinated | Proportion | Children age 12–23 months |
| Received vitamin A | Proportion | Children age 12–35 months |
| Had reproductive health problem | Proportion | Currently married women age 15–49 |
| Not involved in any decisionmaking | Proportion | Ever-married women age 15–49 |
| Ever beaten or physically mistreated since age 15 | Proportion | Ever-married women age 15–49 |
| Not worked in past 12 months | Proportion | Ever-married women age 15–49 |
| Anaemic women | Proportion | Ever-married women age 15–49 |
| Anaemic children | Proportion | Children age 6–35 months |
| Fertility rates | Rate | All women, population |
| Mortality rates | Rate | Births, population |

Table A.2 Sampling errors, Maharashtra, 1999

| Variable/ residence | Value (R) | Standard error (SE) | Number of cases | | Standard error assuming SRS (SER) | Design effect (DEFT) | Relative standard error (SE/R) | Confidence limits | |
|--|--------------|---------------------------|-------------------|------------------|---|----------------------------|---|-------------------|-------|
| | | | Unweighted (N) | Weighted (WN) | | | | R-2SE | R+2SE |
| Sex ratio (<i>De facto</i> Household population) | | | | | | | | | |
| Urban | 898 | 20.381 | 9471 | 6673 | 10.618 | 1.919 | 0.023 | 857 | 939 |
| Rural | 985 | 14.361 | 5670 | 8618 | 13.980 | 1.027 | 0.015 | 957 | 1014 |
| Total | 947 | 12.231 | 15141 | 15290 | 8.487 | 1.441 | 0.013 | 923 | 972 |
| Illiterate (<i>De facto</i> Household population age 6 and above) | | | | | | | | | |
| Urban | 0.173 | 0.015 | 15762 | 11156 | 0.004 | 3.749 | 0.085 | 0.144 | 0.203 |
| Rural | 0.355 | 0.016 | 9729 | 14789 | 0.006 | 2.457 | 0.044 | 0.323 | 0.386 |
| Total | 0.277 | 0.013 | 25491 | 25945 | 0.004 | 3.339 | 0.045 | 0.252 | 0.302 |
| Have tuberculosis (1,000 <i>de jure</i> household population) | | | | | | | | | |
| Urban | 3.422 | 0.604 | 18335 | 12839 | 0.498 | 1.213 | 0.176 | 2.215 | 4.630 |
| Rural | 2.359 | 0.818 | 11233 | 17078 | 0.793 | 1.031 | 0.347 | 0.723 | 3.996 |
| Total | 2.816 | 0.531 | 29568 | 29917 | 0.448 | 1.185 | 0.189 | 1.754 | 3.877 |
| Salt iodized at 15 ppm or more (Households) | | | | | | | | | |
| Large city | 0.679 | 0.029 | 2675 | 1184 | 0.009 | 3.183 | 0.042 | 0.622 | 0.737 |
| Small city | 0.733 | 0.057 | 612 | 838 | 0.018 | 3.193 | 0.078 | 0.618 | 0.847 |
| Town | 0.730 | 0.104 | 375 | 510 | 0.023 | 4.534 | 0.143 | 0.522 | 0.938 |
| Rural | 0.519 | 0.031 | 2168 | 3298 | 0.011 | 2.880 | 0.060 | 0.457 | 0.580 |
| Total | 0.601 | 0.023 | 5830 | 5830 | 0.006 | 3.556 | 0.038 | 0.555 | 0.646 |
| Illiterate (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.290 | 0.025 | 3191 | 2229 | 0.008 | 3.170 | 0.088 | 0.239 | 0.341 |
| Rural | 0.556 | 0.024 | 2200 | 3162 | 0.011 | 2.297 | 0.044 | 0.507 | 0.605 |
| Total | 0.446 | 0.020 | 5391 | 5391 | 0.007 | 3.010 | 0.046 | 0.405 | 0.487 |
| High school complete and above (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.303 | 0.027 | 3191 | 2229 | 0.008 | 3.357 | 0.090 | 0.248 | 0.357 |
| Rural | 0.089 | 0.011 | 2200 | 3162 | 0.006 | 1.800 | 0.123 | 0.067 | 0.111 |
| Total | 0.177 | 0.015 | 5391 | 5391 | 0.005 | 2.868 | 0.084 | 0.148 | 0.207 |
| Currently married women (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.917 | 0.007 | 3191 | 2229 | 0.005 | 1.409 | 0.007 | 0.903 | 0.931 |
| Rural | 0.923 | 0.007 | 2200 | 3162 | 0.006 | 1.212 | 0.007 | 0.909 | 0.937 |
| Total | 0.921 | 0.005 | 5391 | 5391 | 0.004 | 1.345 | 0.005 | 0.911 | 0.931 |
| Number of children ever born (Currently married women age 15–49) | | | | | | | | | |
| Urban | 2.554 | 0.062 | 2951 | 2044 | 0.032 | 1.954 | 0.024 | 2.430 | 2.679 |
| Rural | 2.955 | 0.049 | 2031 | 2919 | 0.039 | 1.236 | 0.016 | 2.858 | 3.052 |
| Total | 2.790 | 0.040 | 4982 | 4963 | 0.025 | 1.595 | 0.014 | 2.710 | 2.870 |
| Number of living children (Currently married women age 15–49) | | | | | | | | | |
| Urban | 2.369 | 0.053 | 2951 | 2044 | 0.028 | 1.875 | 0.022 | 2.263 | 2.476 |
| Rural | 2.606 | 0.039 | 2031 | 2919 | 0.033 | 1.184 | 0.015 | 2.528 | 2.685 |
| Total | 2.509 | 0.032 | 4982 | 4963 | 0.022 | 1.497 | 0.013 | 2.444 | 2.573 |
| Have ever used any method (Currently married women age 15–49) | | | | | | | | | |
| Urban | 0.670 | 0.016 | 2951 | 2044 | 0.009 | 1.801 | 0.023 | 0.639 | 0.701 |
| Rural | 0.659 | 0.014 | 2031 | 2919 | 0.011 | 1.321 | 0.021 | 0.631 | 0.687 |
| Total | 0.664 | 0.010 | 4982 | 4963 | 0.007 | 1.546 | 0.016 | 0.643 | 0.684 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Number of cases | | Standard error assuming SRS (SER) | Design effect (DEFT) | Relative standard error (SE/R) | Confidence limits | |
|--|--------------|---------------------------|-------------------|------------------|---|----------------------------|---|-------------------|-------|
| | | | Unweighted (N) | Weighted (WN) | | | | R-2SE | R+2SE |
| Currently using any method (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.585 | 0.017 | 2951 | 2044 | 0.009 | 1.859 | 0.029 | 0.551 | 0.618 |
| Rural | 0.627 | 0.014 | 2031 | 2919 | 0.011 | 1.308 | 0.022 | 0.599 | 0.655 |
| Total | 0.609 | 0.011 | 4982 | 4963 | 0.007 | 1.570 | 0.018 | 0.588 | 0.631 |
| Currently using any modern method (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.567 | 0.017 | 2951 | 2044 | 0.009 | 1.844 | 0.030 | 0.533 | 0.600 |
| Rural | 0.621 | 0.014 | 2031 | 2919 | 0.011 | 1.316 | 0.023 | 0.593 | 0.650 |
| Total | 0.599 | 0.011 | 4982 | 4963 | 0.007 | 1.576 | 0.018 | 0.577 | 0.621 |
| Currently using pills (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.025 | 0.004 | 2951 | 2044 | 0.003 | 1.383 | 0.160 | 0.017 | 0.033 |
| Rural | 0.012 | 0.003 | 2031 | 2919 | 0.002 | 1.022 | 0.202 | 0.007 | 0.017 |
| Total | 0.017 | 0.002 | 4982 | 4963 | 0.002 | 1.214 | 0.129 | 0.013 | 0.022 |
| Currently using IUD (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.035 | 0.006 | 2951 | 2044 | 0.003 | 1.694 | 0.164 | 0.023 | 0.046 |
| Rural | 0.008 | 0.003 | 2031 | 2919 | 0.002 | 1.239 | 0.299 | 0.003 | 0.013 |
| Total | 0.019 | 0.003 | 4982 | 4963 | 0.002 | 1.468 | 0.148 | 0.014 | 0.025 |
| Currently using condoms (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.056 | 0.007 | 2951 | 2044 | 0.004 | 1.634 | 0.123 | 0.042 | 0.070 |
| Rural | 0.029 | 0.004 | 2031 | 2919 | 0.004 | 1.174 | 0.151 | 0.020 | 0.038 |
| Total | 0.040 | 0.004 | 4982 | 4963 | 0.003 | 1.406 | 0.097 | 0.032 | 0.048 |
| Currently using female sterilization (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.436 | 0.017 | 2951 | 2044 | 0.009 | 1.871 | 0.039 | 0.402 | 0.470 |
| Rural | 0.519 | 0.017 | 2031 | 2919 | 0.011 | 1.536 | 0.033 | 0.485 | 0.553 |
| Total | 0.485 | 0.012 | 4982 | 4963 | 0.007 | 1.754 | 0.026 | 0.460 | 0.509 |
| Currently using male sterilization (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.015 | 0.003 | 2951 | 2044 | 0.002 | 1.504 | 0.222 | 0.009 | 0.022 |
| Rural | 0.053 | 0.009 | 2031 | 2919 | 0.005 | 1.755 | 0.165 | 0.035 | 0.070 |
| Total | 0.037 | 0.006 | 4982 | 4963 | 0.003 | 2.059 | 0.148 | 0.026 | 0.048 |
| Currently using rhythm/safe period (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.014 | 0.003 | 2951 | 2044 | 0.002 | 1.354 | 0.209 | 0.008 | 0.020 |
| Rural | 0.002 | 0.001 | 2031 | 2919 | 0.001 | 0.977 | 0.435 | 0.000 | 0.005 |
| Total | 0.007 | 0.001 | 4982 | 4963 | 0.001 | 1.147 | 0.191 | 0.004 | 0.010 |
| Using public source for modern method (Current users of modern methods) | | | | | | | | | |
| Urban | 0.591 | 0.032 | 1630 | 1159 | 0.012 | 2.651 | 0.055 | 0.526 | 0.655 |
| Rural | 0.855 | 0.015 | 1262 | 1814 | 0.010 | 1.564 | 0.018 | 0.824 | 0.886 |
| Total | 0.752 | 0.018 | 2892 | 2972 | 0.008 | 2.299 | 0.025 | 0.715 | 0.789 |
| Do not want any more children (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.256 | 0.013 | 2951 | 2044 | 0.008 | 1.660 | 0.052 | 0.229 | 0.283 |
| Rural | 0.158 | 0.010 | 2031 | 2919 | 0.008 | 1.213 | 0.062 | 0.138 | 0.177 |
| Total | 0.198 | 0.009 | 4982 | 4963 | 0.006 | 1.526 | 0.043 | 0.181 | 0.215 |
| Want to delay birth at least two years (Currently married women age 15-49) | | | | | | | | | |
| Urban | 0.112 | 0.009 | 2951 | 2044 | 0.006 | 1.563 | 0.081 | 0.094 | 0.130 |
| Rural | 0.082 | 0.007 | 2031 | 2919 | 0.006 | 1.193 | 0.088 | 0.068 | 0.097 |
| Total | 0.095 | 0.006 | 4982 | 4963 | 0.004 | 1.411 | 0.062 | 0.083 | 0.106 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Number of cases | | Standard error assuming SRS (SER) | Design effect (DEFT) | Relative standard error (SE/R) | Confidence limits | |
|---|--------------|---------------------------|-------------------|------------------|---|----------------------------|---|-------------------|-------|
| | | | Unweighted (N) | Weighted (WN) | | | | R-2SE | R+2SE |
| Ideal number of children (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 2.198 | 0.044 | 3112 | 2170 | 0.013 | 3.401 | 0.020 | 2.110 | 2.287 |
| Rural | 2.388 | 0.028 | 2079 | 2987 | 0.016 | 1.735 | 0.012 | 2.332 | 2.443 |
| Total | 2.308 | 0.025 | 5191 | 5157 | 0.010 | 2.424 | 0.011 | 2.259 | 2.357 |
| Ideal number of sons (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.998 | 0.036 | 3112 | 2170 | 0.013 | 2.899 | 0.036 | 0.926 | 1.071 |
| Rural | 1.274 | 0.025 | 2079 | 2987 | 0.015 | 1.707 | 0.019 | 1.224 | 1.323 |
| Total | 1.158 | 0.023 | 5191 | 5157 | 0.010 | 2.363 | 0.020 | 1.113 | 1.203 |
| Ideal number of daughters (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.803 | 0.029 | 3112 | 2170 | 0.010 | 2.932 | 0.036 | 0.745 | 0.861 |
| Rural | 0.909 | 0.016 | 2079 | 2987 | 0.011 | 1.446 | 0.017 | 0.878 | 0.940 |
| Total | 0.864 | 0.015 | 5191 | 5157 | 0.007 | 2.106 | 0.018 | 0.834 | 0.895 |
| Visited by health/family planning worker (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.174 | 0.019 | 3191 | 2229 | 0.007 | 2.825 | 0.109 | 0.136 | 0.212 |
| Rural | 0.277 | 0.020 | 2200 | 3162 | 0.010 | 2.120 | 0.073 | 0.237 | 0.318 |
| Total | 0.234 | 0.015 | 5391 | 5391 | 0.006 | 2.549 | 0.063 | 0.205 | 0.264 |
| Received no antenatal check-up (Births in the past 3 years) | | | | | | | | | |
| Urban | 0.052 | 0.011 | 993 | 707 | 0.007 | 1.530 | 0.218 | 0.029 | 0.074 |
| Rural | 0.125 | 0.020 | 768 | 1103 | 0.013 | 1.548 | 0.160 | 0.085 | 0.165 |
| Total | 0.096 | 0.013 | 1761 | 1810 | 0.007 | 1.775 | 0.138 | 0.070 | 0.123 |
| Received iron and folic acid tablets or syrup (Births in the past 3 years) | | | | | | | | | |
| Urban | 0.886 | 0.014 | 993 | 707 | 0.010 | 1.426 | 0.016 | 0.858 | 0.915 |
| Rural | 0.823 | 0.021 | 768 | 1103 | 0.014 | 1.516 | 0.025 | 0.782 | 0.865 |
| Total | 0.848 | 0.014 | 1761 | 1810 | 0.009 | 1.654 | 0.017 | 0.820 | 0.876 |
| Received medical assistance during delivery (Births in the past 3 years) | | | | | | | | | |
| Urban | 0.841 | 0.022 | 993 | 707 | 0.012 | 1.794 | 0.026 | 0.797 | 0.885 |
| Rural | 0.436 | 0.032 | 768 | 1103 | 0.019 | 1.635 | 0.073 | 0.372 | 0.500 |
| Total | 0.594 | 0.028 | 1761 | 1810 | 0.013 | 2.228 | 0.047 | 0.539 | 0.650 |
| Received postpartum check-up (Noninstitutional births in the past 3 years) | | | | | | | | | |
| Urban | 0.393 | 0.044 | 167 | 135 | 0.038 | 1.171 | 0.113 | 0.304 | 0.482 |
| Rural | 0.280 | 0.026 | 503 | 723 | 0.020 | 1.317 | 0.094 | 0.227 | 0.333 |
| Total | 0.298 | 0.024 | 670 | 858 | 0.018 | 1.349 | 0.080 | 0.250 | 0.345 |
| Had diarrhoea in the past 2 weeks (Children under 3 years) | | | | | | | | | |
| Urban | 0.291 | 0.030 | 949 | 673 | 0.015 | 2.004 | 0.102 | 0.232 | 0.350 |
| Rural | 0.229 | 0.019 | 717 | 1030 | 0.016 | 1.209 | 0.083 | 0.191 | 0.267 |
| Total | 0.254 | 0.017 | 1666 | 1704 | 0.011 | 1.582 | 0.067 | 0.220 | 0.287 |
| Treated with ORS packets (Children under 3 with diarrhoea in past 2 weeks) | | | | | | | | | |
| Urban | 0.305 | 0.046 | 240 | 196 | 0.028 | 1.629 | 0.150 | 0.214 | 0.397 |
| Rural | 0.354 | 0.047 | 164 | 236 | 0.039 | 1.211 | 0.132 | 0.261 | 0.448 |
| Total | 0.332 | 0.033 | 404 | 432 | 0.023 | 1.404 | 0.099 | 0.267 | 0.397 |
| Taken to a health facility/provider for diarrhoea (Children under 3 with diarrhoea in past 2 weeks) | | | | | | | | | |
| Urban | 0.850 | 0.023 | 240 | 196 | 0.022 | 1.024 | 0.027 | 0.804 | 0.895 |
| Rural | 0.708 | 0.041 | 164 | 236 | 0.036 | 1.151 | 0.059 | 0.625 | 0.791 |
| Total | 0.772 | 0.025 | 404 | 432 | 0.021 | 1.210 | 0.032 | 0.722 | 0.822 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Number of cases | | Standard error assuming SRS (SER) | Design effect (DEFT) | Relative standard error (SE/R) | Confidence limits | |
|--|--------------|---------------------------|-------------------|------------------|---|----------------------------|---|-------------------|-------|
| | | | Unweighted (N) | Weighted (WN) | | | | R-2SE | R+2SE |
| Showing a vaccination card (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.536 | 0.034 | 311 | 229 | 0.028 | 1.224 | 0.063 | 0.468 | 0.603 |
| Rural | 0.459 | 0.036 | 252 | 362 | 0.032 | 1.136 | 0.078 | 0.387 | 0.531 |
| Total | 0.489 | 0.026 | 563 | 591 | 0.021 | 1.248 | 0.053 | 0.437 | 0.540 |
| Received BCG vaccination (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.983 | 0.009 | 311 | 229 | 0.007 | 1.268 | 0.009 | 0.965 | 1.000 |
| Rural | 0.908 | 0.027 | 252 | 362 | 0.018 | 1.474 | 0.030 | 0.854 | 0.961 |
| Total | 0.937 | 0.017 | 563 | 591 | 0.010 | 1.747 | 0.019 | 0.902 | 0.972 |
| Received DPT vaccination (3 doses) (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.922 | 0.019 | 311 | 229 | 0.015 | 1.260 | 0.020 | 0.885 | 0.959 |
| Rural | 0.877 | 0.034 | 252 | 362 | 0.021 | 1.647 | 0.039 | 0.809 | 0.945 |
| Total | 0.894 | 0.022 | 563 | 591 | 0.013 | 1.756 | 0.025 | 0.850 | 0.939 |
| Received polio vaccination (3 doses) (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.937 | 0.017 | 311 | 229 | 0.013 | 1.278 | 0.018 | 0.902 | 0.971 |
| Rural | 0.889 | 0.032 | 252 | 362 | 0.020 | 1.607 | 0.036 | 0.826 | 0.953 |
| Total | 0.908 | 0.021 | 563 | 591 | 0.012 | 1.738 | 0.023 | 0.866 | 0.949 |
| Received measles vaccination (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.843 | 0.028 | 311 | 229 | 0.020 | 1.391 | 0.033 | 0.787 | 0.898 |
| Rural | 0.843 | 0.033 | 252 | 362 | 0.023 | 1.423 | 0.039 | 0.778 | 0.909 |
| Total | 0.843 | 0.023 | 563 | 591 | 0.015 | 1.510 | 0.027 | 0.798 | 0.888 |
| Fully vaccinated (Children age 12–23 months) | | | | | | | | | |
| Urban | 0.809 | 0.033 | 311 | 229 | 0.022 | 1.543 | 0.041 | 0.742 | 0.876 |
| Rural | 0.768 | 0.040 | 252 | 362 | 0.027 | 1.487 | 0.052 | 0.689 | 0.847 |
| Total | 0.784 | 0.027 | 563 | 591 | 0.017 | 1.615 | 0.035 | 0.729 | 0.839 |
| Received vitamin A (Children age 12–35 months) | | | | | | | | | |
| Urban | 0.600 | 0.036 | 638 | 449 | 0.020 | 1.812 | 0.060 | 0.528 | 0.672 |
| Rural | 0.677 | 0.037 | 480 | 691 | 0.022 | 1.716 | 0.055 | 0.603 | 0.751 |
| Total | 0.647 | 0.027 | 1118 | 1140 | 0.014 | 1.846 | 0.041 | 0.593 | 0.700 |
| Had reproductive health problem (Currently married women age 15–49) | | | | | | | | | |
| Urban | 0.457 | 0.025 | 2951 | 2044 | 0.009 | 2.725 | 0.055 | 0.407 | 0.507 |
| Rural | 0.360 | 0.020 | 2031 | 2919 | 0.011 | 1.865 | 0.055 | 0.320 | 0.400 |
| Total | 0.400 | 0.016 | 4982 | 4963 | 0.007 | 2.246 | 0.039 | 0.369 | 0.431 |
| Not involved in any decisionmaking (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.063 | 0.006 | 3191 | 2229 | 0.004 | 1.466 | 0.100 | 0.050 | 0.075 |
| Rural | 0.078 | 0.008 | 2200 | 3162 | 0.006 | 1.417 | 0.104 | 0.061 | 0.094 |
| Total | 0.072 | 0.005 | 5391 | 5391 | 0.004 | 1.537 | 0.075 | 0.061 | 0.082 |
| Ever beaten or physically mistreated since age 15 (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.169 | 0.015 | 3191 | 2229 | 0.007 | 2.289 | 0.090 | 0.139 | 0.200 |
| Rural | 0.189 | 0.011 | 2200 | 3162 | 0.008 | 1.305 | 0.058 | 0.168 | 0.211 |
| Total | 0.181 | 0.009 | 5391 | 5391 | 0.005 | 1.687 | 0.049 | 0.163 | 0.199 |
| Not worked in past 12 months (Ever-married women age 15–49) | | | | | | | | | |
| Urban | 0.690 | 0.019 | 3191 | 2229 | 0.008 | 2.262 | 0.027 | 0.653 | 0.727 |
| Rural | 0.269 | 0.021 | 2200 | 3162 | 0.009 | 2.198 | 0.077 | 0.227 | 0.311 |
| Total | 0.443 | 0.021 | 5391 | 5391 | 0.007 | 3.155 | 0.048 | 0.400 | 0.486 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Number of cases | | Standard error assuming SRS (SER) | Design effect (DEFT) | Relative standard error (SE/R) | Confidence limits | |
|--|--------------|---------------------------|-------------------|------------------|---|----------------------------|---|-------------------|-------|
| | | | Unweighted (N) | Weighted (WN) | | | | R-2SE | R+2SE |
| Anaemic women (Ever-married women age 15-49) | | | | | | | | | |
| Urban | 0.448 | 0.015 | 2925 | 2074 | 0.009 | 1.600 | 0.033 | 0.418 | 0.477 |
| Rural | 0.512 | 0.019 | 2091 | 2942 | 0.011 | 1.745 | 0.037 | 0.474 | 0.550 |
| Total | 0.485 | 0.013 | 5016 | 5016 | 0.007 | 1.821 | 0.026 | 0.460 | 0.511 |
| Anaemic children (Children age 6-35 months) | | | | | | | | | |
| Urban | 0.728 | 0.020 | 687 | 489 | 0.017 | 1.185 | 0.028 | 0.688 | 0.768 |
| Rural | 0.780 | 0.021 | 546 | 769 | 0.018 | 1.171 | 0.027 | 0.738 | 0.821 |
| Total | 0.760 | 0.015 | 1233 | 1258 | 0.012 | 1.242 | 0.020 | 0.729 | 0.790 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Relative standard error (SE/R) | Confidence limits | |
|---|--------------|---------------------------|---|-------------------|-------|
| | | | | R-2SE | R+2SE |
| Total fertility rate (Women age 15–49) | | | | | |
| Urban | 2.243 | 0.114 | 0.051 | 2.015 | 2.472 |
| Rural | 2.740 | 0.098 | 0.036 | 2.545 | 2.936 |
| Total | 2.519 | 0.073 | 0.029 | 2.372 | 2.665 |
| Age-specific fertility rate (Women age 15–19) | | | | | |
| Urban | 0.938 | 0.009 | 0.095 | 0.076 | 0.112 |
| Rural | 0.156 | 0.010 | 0.064 | 0.136 | 0.176 |
| Total | 0.129 | 0.007 | 0.053 | 0.115 | 0.142 |
| Age-specific fertility rate (Women age 20–24) | | | | | |
| Urban | 0.185 | 0.009 | 0.050 | 0.166 | 0.203 |
| Rural | 0.254 | 0.012 | 0.048 | 0.229 | 0.278 |
| Total | 0.223 | 0.008 | 0.035 | 0.207 | 0.238 |
| Age-specific fertility rate (Women age 25–29) | | | | | |
| Urban | 0.111 | 0.009 | 0.082 | 0.092 | 0.129 |
| Rural | 0.101 | 0.010 | 0.094 | 0.082 | 0.120 |
| Total | 0.106 | 0.007 | 0.063 | 0.092 | 0.119 |
| Age-specific fertility rate (Women age 30–34) | | | | | |
| Urban | 0.045 | 0.007 | 0.145 | 0.032 | 0.058 |
| Rural | 0.026 | 0.006 | 0.213 | 0.015 | 0.038 |
| Total | 0.034 | 0.004 | 0.124 | 0.026 | 0.043 |
| Age-specific fertility rate (Women age 35–39) | | | | | |
| Urban | 0.014 | 0.004 | 0.261 | 0.007 | 0.022 |
| Rural | 0.010 | 0.003 | 0.320 | 0.004 | 0.017 |
| Total | 0.012 | 0.002 | 0.201 | 0.007 | 0.017 |

Table A.2 Sampling errors, Maharashtra, 1999 (contd.)

| Variable/ residence | Value (R) | Standard error (SE) | Relative standard error (SE/R) | Confidence limits | |
|---|--------------|---------------------------|---|-------------------|--------|
| | | | | R-2SE | R+2SE |
| Neonatal mortality (5-year period preceding survey) | | | | | |
| Urban | 24.728 | 5.618 | 0.227 | 13.491 | 35.965 |
| Rural | 36.684 | 6.064 | 0.165 | 24.556 | 48.813 |
| Total | 31.998 | 4.249 | 0.133 | 23.499 | 40.497 |
| Infant mortality ${}_1q_0$ (5-year period preceding survey) | | | | | |
| Urban | 32.974 | 5.563 | 0.169 | 21.847 | 44.101 |
| Rural | 50.632 | 6.629 | 0.131 | 37.374 | 63.890 |
| Total | 43.722 | 4.566 | 0.104 | 34.591 | 52.853 |
| Child mortality ${}_4q_1$ (5-year period preceding survey) | | | | | |
| Urban | 10.151 | 3.121 | 0.307 | 3.909 | 16.394 |
| Rural | 18.045 | 3.063 | 0.170 | 11.920 | 24.170 |
| Total | 14.985 | 2.227 | 0.149 | 10.531 | 19.439 |
| Under-five mortality ${}_5q_0$ (5-year period preceding survey) | | | | | |
| Urban | 42.791 | 6.854 | 0.160 | 29.083 | 56.499 |
| Rural | 67.763 | 6.640 | 0.098 | 54.483 | 81.043 |
| Total | 58.052 | 4.842 | 0.083 | 48.369 | 67.735 |
| Crude death rate (Based on Household Questionnaire) | | | | | |
| Urban | 7.891 | 0.743 | 0.094 | 6.404 | 9.378 |
| Rural | 9.950 | 0.766 | 0.077 | 8.418 | 11.483 |
| Total | 9.067 | 0.559 | 0.062 | 7.948 | 10.185 |
| Crude birth rate (Based on women's birth history) | | | | | |
| Urban | 21.623 | 1.179 | 0.055 | 19.264 | 23.982 |
| Rural | 23.819 | 1.002 | 0.042 | 21.815 | 25.823 |
| Total | 22.998 | 0.772 | 0.034 | 21.454 | 24.541 |
| SRS: Simple random sample | | | | | |

APPENDIX B

DATA QUALITY TABLES

The purpose of this appendix is to provide the data user with an overview of the general quality of the NFHS-2 data. Whereas Appendix A is concerned with sampling errors and their effects on the survey results, the tables in this appendix refer to possible *nonsampling* errors: for example, rounding or heaping on certain ages or dates; omission of events occurring further in the past; deliberate distortion of information by some interviewers in an attempt to lighten their workload; noncooperation of the respondent in providing information; or refusal to have children measured for height and weight or tested for anaemia. A description of the likely magnitude of such nonsampling errors is provided in this appendix.

The distribution of the *de facto* household population by single years of age and sex is presented in Table B.1. In many (but not all) cases, the respondent was the head of the household. It is well documented that ages are poorly reported in most parts of India. Ages are of little relevance to much of the rural population in particular, and no amount of probing will ensure that ages are properly recorded. In interviewer training for NFHS-2, a great deal of emphasis was placed on obtaining as accurate information as possible on ages and dates of events. Nevertheless, it is clear that age reporting in NFHS-2 shares the same problems inherent in all Indian censuses and surveys. Heaping on ages ending in 0, 2, 5, and 8 is considerable and is particularly severe in the older age groups. Another measure of the quality of the NFHS-2 age data is the percentage of persons whose ages were recorded as not known or missing. In Maharashtra, information on age was missing for only 4 persons out of 29,774 persons who stayed in the sample households the night before the interview.

Table B.2 examines the possibility that some eligible women (that is, ever-married women age 15–49) were not properly identified in NFHS-2. In some surveys, interviewers may try to reduce their workload by pushing women out of the eligible age range or recording ever-married women as never married so that they will not have to be interviewed. If such practices were being followed to a noticeable extent, Table B.2 would normally show (1) a shortage of ever-married women in the 45–49 age group and an excess in the 50–54 age group or (2) an unusually low proportion of ever-married women by age. Neither of these patterns is evident in the NFHS-2 data. It can, therefore, be concluded that there was no concerted effort to misidentify eligible women in NFHS-2 in Maharashtra.

One traditional measure of the quality of data is the extent to which information is missing on key variables. Although completeness of responses does not necessarily indicate that the results are accurate, the existence of missing information for a large number of cases would suggest that data collection was not carried out with sufficient care. In NFHS-2 in Maharashtra, for age at first marriage, woman's education, and prevalence of diarrhoea in the two weeks preceding the survey, almost complete information is available (Table B.3). Missing information is slightly higher for the age at death of children who died (2 percent), and is still higher for the month of birth of children born in the past 15 years (6 percent). It is important to note, however, that the year of birth is recorded in almost every case in which the month is missing. Data on height and weight of children are available for about 95 percent of living children age 0–35 months, which is acceptable. Some children could not be measured because they were not at

Table B.1 Household age distribution

Single-year age distribution of *de facto* household population by sex (weighted), Maharashtra, 1999

| Age | Male | | Female | | Age | Male | | Female | |
|-----|--------|---------|--------|---------|------------------------|--------|---------|--------|---------|
| | Number | Percent | Number | Percent | | Number | Percent | Number | Percent |
| < 1 | 353 | 2.3 | 307 | 2.1 | 38 | 158 | 1.0 | 191 | 1.3 |
| 1 | 278 | 1.8 | 313 | 2.2 | 39 | 110 | 0.7 | 119 | 0.8 |
| 2 | 363 | 2.4 | 303 | 2.1 | 40 | 409 | 2.7 | 265 | 1.8 |
| 3 | 279 | 1.8 | 280 | 1.9 | 41 | 81 | 0.5 | 90 | 0.6 |
| 4 | 358 | 2.3 | 309 | 2.1 | 42 | 187 | 1.2 | 168 | 1.2 |
| 5 | 344 | 2.3 | 341 | 2.4 | 43 | 74 | 0.5 | 88 | 0.6 |
| 6 | 341 | 2.2 | 299 | 2.1 | 44 | 93 | 0.6 | 97 | 0.7 |
| 7 | 297 | 1.9 | 338 | 2.3 | 45 | 280 | 1.8 | 244 | 1.7 |
| 8 | 370 | 2.4 | 334 | 2.3 | 46 | 97 | 0.6 | 107 | 0.7 |
| 9 | 331 | 2.2 | 295 | 2.0 | 47 | 94 | 0.6 | 89 | 0.6 |
| 10 | 460 | 3.0 | 372 | 2.6 | 48 | 108 | 0.7 | 121 | 0.8 |
| 11 | 338 | 2.2 | 282 | 1.9 | 49 | 96 | 0.6 | 21 | 0.1 |
| 12 | 435 | 2.8 | 370 | 2.6 | 50 | 245 | 1.6 | 118 | 0.8 |
| 13 | 324 | 2.1 | 329 | 2.3 | 51 | 76 | 0.5 | 74 | 0.5 |
| 14 | 341 | 2.2 | 303 | 2.1 | 52 | 98 | 0.6 | 118 | 0.8 |
| 15 | 353 | 2.3 | 296 | 2.0 | 53 | 52 | 0.3 | 99 | 0.7 |
| 16 | 338 | 2.2 | 337 | 2.3 | 54 | 64 | 0.4 | 77 | 0.5 |
| 17 | 315 | 2.1 | 265 | 1.8 | 55 | 155 | 1.0 | 197 | 1.4 |
| 18 | 351 | 2.3 | 371 | 2.6 | 56 | 54 | 0.4 | 85 | 0.6 |
| 19 | 241 | 1.6 | 247 | 1.7 | 57 | 55 | 0.4 | 50 | 0.3 |
| 20 | 345 | 2.3 | 343 | 2.4 | 58 | 86 | 0.6 | 73 | 0.5 |
| 21 | 240 | 1.6 | 202 | 1.4 | 59 | 43 | 0.3 | 35 | 0.2 |
| 22 | 353 | 2.3 | 340 | 2.4 | 60 | 214 | 1.4 | 259 | 1.8 |
| 23 | 230 | 1.5 | 235 | 1.6 | 61 | 29 | 0.2 | 32 | 0.2 |
| 24 | 246 | 1.6 | 247 | 1.7 | 62 | 84 | 0.5 | 111 | 0.8 |
| 25 | 377 | 2.5 | 382 | 2.6 | 63 | 22 | 0.1 | 37 | 0.3 |
| 26 | 248 | 1.6 | 251 | 1.7 | 64 | 42 | 0.3 | 47 | 0.3 |
| 27 | 235 | 1.5 | 214 | 1.5 | 65 | 194 | 1.3 | 251 | 1.7 |
| 28 | 255 | 1.7 | 259 | 1.8 | 66 | 42 | 0.3 | 40 | 0.3 |
| 29 | 147 | 1.0 | 178 | 1.2 | 67 | 33 | 0.2 | 27 | 0.2 |
| 30 | 450 | 2.9 | 420 | 2.9 | 68 | 41 | 0.3 | 25 | 0.2 |
| 31 | 124 | 0.8 | 152 | 1.0 | 69 | 44 | 0.3 | 22 | 0.2 |
| 32 | 264 | 1.7 | 230 | 1.6 | 70+ | 465 | 3.0 | 415 | 2.9 |
| 33 | 110 | 0.7 | 116 | 0.8 | Don't know/ missing | | | | |
| 34 | 186 | 1.2 | 167 | 1.1 | | 3 | 0.0 | 1 | 0.0 |
| 35 | 477 | 3.1 | 375 | 2.6 | | | | | |
| 36 | 167 | 1.1 | 173 | 1.2 | Total | 15,290 | 100.0 | 14,484 | 100.0 |
| 37 | 99 | 0.6 | 110 | 0.8 | | | | | |

Note: The *de facto* population includes both usual residents and visitors who stayed in the household the night before the interview.

home or they were ill at the time of the survey. In some cases when the child was at home, either the child refused to be measured or the mother refused to allow the child to be measured. Data on the level of women's haemoglobin are available for 94 percent of respondents and data on the level of children's haemoglobin are available for 87 percent of children. Before undertaking haemoglobin measurements, a separate 'informed consent' statement was read to the respondent explaining that participation in the haemoglobin testing was completely voluntary. At this point, some women declined to take part in the anaemia testing and/or to have their children participate. Nevertheless, the response rate for anaemia testing both for women and children is acceptable.

Another measure of data quality is the completeness and accuracy of information on births. Table B.4 examines the distribution of births by calendar year to identify any unusual patterns that may indicate that births have been omitted or that the ages of children have been displaced. Overall, 93 percent of living children listed in the birth history had complete birth dates recorded, as did 74 percent of children who had died. The completeness of data on birth

| Table B.2 Age distribution of eligible and interviewed women | | | | | |
|---|-----------|--------------------|-------------------|---------|---------------------|
| Age distribution of the <i>de facto</i> household population of women age 10–54 and of interviewed women age 15–49, and percentage of eligible women who were interviewed (weighted), Maharashtra, 1999 | | | | | |
| Age | All women | Ever-married women | Interviewed women | | Percent interviewed |
| | | | Number | Percent | |
| 10–14 | 1,656 | 21 | NA | NA | NA |
| 15–19 | 1,517 | 437 | 398 | 7.0 | 91.0 |
| 20–24 | 1,368 | 1,062 | 1,008 | 17.8 | 94.9 |
| 25–29 | 1,284 | 1,207 | 1,152 | 20.3 | 95.4 |
| 30–34 | 1,084 | 1,064 | 1,012 | 17.9 | 95.1 |
| 35–39 | 968 | 957 | 914 | 16.1 | 95.5 |
| 40–44 | 708 | 702 | 660 | 11.6 | 94.0 |
| 45–49 | 582 | 576 | 520 | 9.2 | 90.4 |
| 50–54 | 486 | 483 | NA | NA | NA |
| 15–49 | 7,512 | 6,005 | 5,665 | 100.0 | 94.3 |

Note: The *de facto* population includes both usual residents and visitors who stayed in the household the night before the interview. For all columns, the age distribution is taken from ages reported in the Household Questionnaire. The total number of interviewed women in this table differs from the total number in earlier tables because this table uses household weights rather than women's weights for the calculations.
NA: Not applicable

| Table B.3 Completeness of reporting | | | |
|--|-----------------------------------|--------------------------------|-----------------|
| Percentage of observations with missing information for selected demographic and health indicators (weighted), Maharashtra, 1999 | | | |
| Indicator | Reference group | Percentage missing information | Number of cases |
| Birth date | Births in past 15 years | | |
| Month only | | 6.27 | 9,366 |
| Month and year | | 0.79 | 9,366 |
| Age at death | Deaths to births in past 15 years | 1.87 | 676 |
| Age at first marriage | Ever-married women age 15–49 | 0.05 | 5,391 |
| Woman's education | Ever-married women age 15–49 | 0.00 | 5,391 |
| Anthropometry | Living children age 0–35 months | | |
| Height | | 5.41 | 1,736 |
| Weight | | 5.74 | 1,736 |
| Height or weight | | 5.74 | 1,736 |
| Woman's haemoglobin level | Ever-married women age 15–49 | 6.07 | 5,391 |
| Child's haemoglobin level | Living children age 6–35 months | 13.17 | 1,462 |
| Diarrhoea in past 2 weeks | Living children age 1–35 months | 0.37 | 1,704 |

Table B.4 Births by calendar year

Number of births, percent with complete birth date, sex ratio at birth, and calendar year ratio for children still alive at the time of the survey (L), children who died by the time of the survey (D), and total children (T), by calendar year (weighted), Maharashtra, 1999

| Calendar year | Number of births | | | Percent with complete birth date ¹ | | | Sex ratio at birth ² | | | Calendar year ratio ³ | | |
|-----------------|------------------|-------|--------|---|-------|-------|---------------------------------|-------|-------|----------------------------------|-------|-------|
| | L | D | T | L | D | T | L | D | T | L | D | T |
| 1999 | 201 | 6 | 207 | 100.0 | 100.0 | 100.0 | 983 | 804 | 977 | NA | NA | NA |
| 1998 | 575 | 32 | 607 | 99.7 | 93.4 | 99.4 | 920 | 812 | 914 | NC | NC | NC |
| 1997 | 590 | 23 | 613 | 99.2 | 87.8 | 98.8 | 1,074 | 618 | 1,052 | 107.0 | 81.6 | 105.8 |
| 1996 | 527 | 25 | 553 | 98.6 | 87.8 | 98.1 | 739 | 1,103 | 753 | 90.5 | 79.5 | 90.0 |
| 1995 | 575 | 40 | 615 | 96.6 | 88.5 | 96.1 | 915 | 1,404 | 940 | 102.0 | 108.8 | 102.4 |
| 1994 | 600 | 48 | 648 | 94.3 | 75.3 | 92.9 | 876 | 1,069 | 889 | 103.1 | 124.1 | 104.4 |
| 1993 | 589 | 38 | 626 | 94.3 | 80.5 | 93.4 | 1,036 | 610 | 1,005 | 99.6 | 76.9 | 97.9 |
| 1992 | 582 | 50 | 631 | 93.7 | 88.9 | 93.3 | 1,050 | 684 | 1,016 | 103.2 | 106.8 | 103.4 |
| 1991 | 539 | 55 | 594 | 93.2 | 78.7 | 91.8 | 935 | 1,039 | 944 | 91.8 | 108.7 | 93.2 |
| 1990 | 592 | 52 | 644 | 92.3 | 72.0 | 90.6 | 965 | 1,574 | 1,004 | 102.8 | 97.6 | 102.3 |
| 1989 | 613 | 52 | 665 | 94.5 | 72.7 | 92.8 | 903 | 1,103 | 917 | 102.2 | 108.0 | 102.7 |
| 1988 | 607 | 44 | 651 | 91.9 | 75.8 | 90.8 | 905 | 863 | 902 | 100.0 | 78.2 | 98.2 |
| 1993-97 | 2,881 | 174 | 3,055 | 96.5 | 82.9 | 95.8 | 925 | 943 | 926 | NA | NA | NA |
| 1988-92 | 2,931 | 253 | 3,185 | 93.1 | 77.6 | 91.9 | 949 | 1,022 | 955 | NA | NA | NA |
| 1983-87 | 2,790 | 289 | 3,079 | 92.0 | 74.7 | 90.4 | 889 | 809 | 881 | NA | NA | NA |
| 1978-82 | 2,164 | 318 | 2,483 | 91.1 | 74.4 | 89.0 | 907 | 843 | 899 | NA | NA | NA |
| 1977 or earlier | 1,800 | 460 | 2,260 | 88.9 | 66.6 | 84.4 | 945 | 1,133 | 981 | NA | NA | NA |
| All | 13,342 | 1,533 | 14,876 | 93.1 | 74.1 | 91.2 | 923 | 955 | 926 | NA | NA | NA |

NA: Not applicable

NC: Not calculated because full-year data were not collected for 1999

¹Both year and month of birth given

² $(B_f/B_m) \times 1000$, where B_f and B_m are the numbers of female and male births, respectively

³ $[2B_x / (B_{x-1} + B_{x+1})] \times 100$, where B_x is the number of births in calendar year x

dates for surviving children is good overall and is excellent in recent years. The completeness of data on birth dates for nonsurviving children is less satisfactory overall, but is again better in recent years. Annual data on the number of births can be examined to see if there is an abnormally large decline in the number of births after January 1996, the cutoff point for the health questions and measurements made on young children in the survey. It is typical for the annual number of births to fluctuate somewhat, so small annual fluctuations are to be expected. However, the sharp drop in the annual number of births in the year 1996 (for both surviving and nonsurviving children) suggests that there has been some omission of recent births or displacement of birth dates that could result in an underestimate of both fertility and infant mortality rates for recent years.

Many surveys that include both demographic information and health information for children below a specified age have been subject to a substantial amount of age displacement. In particular, there is often a tendency for interviewers to ‘age’ children out of the eligible period for asking health questions. This problem was well known before NFHS-2 began; therefore,

| Table B.5 Reporting of age at death in days | | | | |
|--|------------------------|------|-------|------|
| Distribution of reported deaths under 1 month of age by age at death in days and percentage of neonatal deaths reported to occur at age 0–6 days, for births occurring during five-year periods preceding the survey (weighted), Maharashtra, 1999 | | | | |
| Age at death (days) | Years preceding survey | | | |
| | 0–4 | 5–9 | 10–14 | 0–14 |
| < 1 | 14 | 38 | 28 | 81 |
| 1 | 25 | 30 | 19 | 75 |
| 2 | 8 | 16 | 10 | 34 |
| 3 | 8 | 10 | 9 | 27 |
| 4 | 5 | 6 | 4 | 15 |
| 5 | 10 | 7 | 4 | 21 |
| 6 | 4 | 2 | 3 | 9 |
| 7 | 3 | 3 | 5 | 10 |
| 8 | 1 | 6 | 3 | 10 |
| 9 | 1 | 0 | 0 | 1 |
| 10 | 2 | 3 | 3 | 7 |
| 11 | 0 | 1 | 1 | 2 |
| 12 | 0 | 1 | 6 | 8 |
| 13 | 1 | 1 | 0 | 3 |
| 14 | 2 | 0 | 0 | 2 |
| 15 | 6 | 9 | 16 | 30 |
| 16 | 0 | 0 | 3 | 3 |
| 17 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 |
| 20 | 3 | 3 | 0 | 5 |
| 21 | 0 | 4 | 0 | 5 |
| 22 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 |
| 24 | 0 | 2 | 0 | 2 |
| 25 | 0 | 0 | 0 | 1 |
| 26 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 |
| 0–30 | 94 | 141 | 116 | 351 |
| Percent early neonatal ¹ | 79.2 | 76.4 | 68.2 | 74.4 |

¹Deaths during the first 6 days divided by deaths during the first 30 days

interviewer training stressed this issue to try to reduce the extent of biases due to age displacement. Apparently the training was not entirely successful in avoiding this type of problem, however.

Table B.5 presents information on the reporting of age at death in days. Results from the table suggest that early infant deaths have not been seriously underreported in Maharashtra, because the ratios of deaths under seven days to all neonatal deaths are consistently high (a value of less than 25 percent is often used as a guideline to indicate underreporting of early neonatal deaths). The estimates are 79 percent for 0–4 years, 76 percent for 5–9 years, and 68 percent for 10–14 years preceding the survey. Although there was no severe underreporting of early neonatal deaths in NFHS-2, there was some misreporting of age at death due to a preference for reporting the age at death at 5, 10, 12, 15, 20, and 21 days (Table B.5).

Table B.6 shows the percentage of infant deaths that occurred during the neonatal period. These percentages are also quite high, suggesting that there is no major omission of early deaths. One problem that is inherent in most retrospective surveys is heaping of the age at death on certain digits, e.g., 6, 12, and 18 months. Misreporting of age at death will bias estimates of the age pattern of mortality if the net result of misreporting is the transference of deaths between age

| Table B.6 Reporting of age at death in months | | | | |
|---|------------------------|------|-------|------|
| Distribution of reported deaths under two years of age by age at death in months and percentage of infant deaths reported to occur at age under one month, for births occurring during five-year periods preceding the survey (weighted), Maharashtra, 1999 | | | | |
| Age at death (months) | Years preceding survey | | | |
| | 0–4 | 5–9 | 10–14 | 0–14 |
| < 1 | 94 | 141 | 116 | 351 |
| 1 | 4 | 14 | 14 | 32 |
| 2 | 3 | 8 | 13 | 24 |
| 3 | 6 | 4 | 5 | 14 |
| 4 | 6 | 3 | 1 | 10 |
| 5 | 2 | 6 | 6 | 14 |
| 6 | 1 | 7 | 2 | 11 |
| 7 | 5 | 4 | 3 | 12 |
| 8 | 1 | 3 | 0 | 4 |
| 9 | 0 | 5 | 7 | 12 |
| 10 | 0 | 1 | 3 | 5 |
| 11 | 1 | 4 | 2 | 7 |
| 12 | 3 | 3 | 8 | 15 |
| 13 | 0 | 0 | 2 | 2 |
| 14 | 0 | 1 | 0 | 1 |
| 15 | 0 | 1 | 0 | 2 |
| 16 | 0 | 0 | 0 | 0 |
| 17 | 1 | 0 | 0 | 1 |
| 18 | 1 | 6 | 4 | 12 |
| 19 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 |
| 1 year | 3 | 8 | 13 | 24 |
| 0–11 months | 125 | 200 | 172 | 497 |
| Percent neonatal ¹ | 75.3 | 70.6 | 67.6 | 70.7 |

¹Deaths during the first month divided by deaths during the first year

segments for which the rates are calculated. For example, an overestimate of child mortality relative to infant mortality may result if children dying during the first year of life are reported as having died at age one year or older. Thus, heaping at 12 months can bias the mortality estimates because a certain fraction of these deaths, which are reported to have occurred after infancy may have actually occurred during infancy (that is, at ages 0–11 months). In this case, heaping would bias the infant mortality rate downward and the child mortality rate upward.

Examination of the distribution of deaths under age two years during the 15 years before the survey by month of death (Table B.6) indicates that there is substantial heaping of deaths at 5, 9, 12, and 18 months of age. The heaping in the past five years is less evident. The degree of digit preference in Maharashtra is not serious enough to alter substantially the estimated mortality rates, probably due to the strong emphasis on this potential problem during training of the interviewers.