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 for variables with a sufficient number of cases. 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±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, Delhi, 1999

Variable	Estimate	Base population
Sex ratio	Ratio	*De facto* household population
Illiterate	Proportion	*De facto* household population age 6 and above
Have tuberculosis	Rate	1,000 *de jure* 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 past 3 years
Received iron and folic acid tablets or syrup	Proportion	Births in past 3 years
Received medical assistance during delivery	Proportion	Births in past 3 years
Received postpartum check-up	Proportion	Noninstitutional births in past 3 years
Had diarrhoea in 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, Delhi, 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 (*De facto* household population)									
Urban	896	13.837	7113	7068	11.454	1.208	0.015	869	924
Rural	842	39.543	596	636	37.965	1.042	0.047	763	921
Total	892	13.086	7709	7704	10.962	1.194	0.015	866	918
Illiterate (*De facto* household population age 6 and above)									
Urban	0.142	0.010	11883	11811	0.004	2.455	0.073	0.122	0.163
Rural	0.215	0.020	937	1000	0.017	1.181	0.092	0.176	0.255
Total	0.148	0.010	12820	12811	0.004	2.370	0.066	0.128	0.167
Have tuberculosis (1,000 *de jure* household population)									
Urban	5.484	0.970	13666	13579	0.851	1.139	0.177	3.544	7.425
Rural	0.919	0.922	1120	1196	0.905	1.019	1.003	0.000	2.763
Total	5.115	0.903	14786	14775	0.788	1.145	0.176	3.309	6.920
Salt iodized at 15 ppm or more (Households)									
Urban	0.898	0.015	2564	2550	0.006	2.577	0.017	0.867	0.929
Rural	0.823	0.032	199	213	0.027	1.186	0.039	0.759	0.888
Total	0.892	0.015	2763	2763	0.006	2.465	0.016	0.863	0.921
Illiterate (Ever-married women age 15–49)									
Urban	0.277	0.025	2287	2282	0.009	2.708	0.092	0.226	0.328
Rural	0.458	0.050	190	195	0.036	1.379	0.109	0.358	0.558
Total	0.291	0.024	2477	2477	0.009	2.613	0.082	0.243	0.339
High school complete and above (Ever-married women age 15-49)									
Urban	0.462	0.033	2287	2282	0.010	3.129	0.071	0.397	0.527
Rural	0.200	0.033	190	195	0.029	1.129	0.164	0.134	0.266
Total	0.441	0.031	2477	2477	0.010	3.075	0.070	0.380	0.503
Currently married (Ever-married women age 15–49)									
Urban	0.955	0.005	2287	2282	0.004	1.141	0.005	0.945	0.965
Rural	0.995	0.005	190	195	0.005	0.987	0.005	0.985	1.000
Total	0.958	0.005	2477	2477	0.004	1.145	0.005	0.948	0.967
Number of children ever born (Currently married women age 15–49)									
Urban	2.709	0.075	2183	2178	0.038	1.979	0.028	2.559	2.859
Rural	2.927	0.161	189	194	0.145	1.115	0.055	2.605	3.250
Total	2.727	0.070	2372	2372	0.037	1.907	0.026	2.587	2.867
Number of living children (Currently married women age 15–49)									
Urban	2.502	0.059	2183	2178	0.033	1.792	0.024	2.383	2.620
Rural	2.715	0.165	189	194	0.131	1.255	0.061	2.385	3.045
Total	2.519	0.056	2372	2372	0.032	1.741	0.022	2.407	2.631
Have ever used any method (Currently married women age 15–49)									
Total	0.745	0.012	2372	2372	0.009	1.309	0.016	0.721	0.768

Table A.2 Sampling errors, Delhi, 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	0.640	0.013	2183	2178	0.010	1.290	0.021	0.614	0.667
Rural	0.608	0.038	189	194	0.036	1.080	0.063	0.531	0.685
Total	0.638	0.013	2372	2372	0.010	1.272	0.020	0.613	0.663
Currently using any modern method (Currently married women age 15–49)									
Urban	0.564	0.012	2183	2178	0.011	1.135	0.021	0.540	0.588
Rural	0.555	0.046	189	194	0.036	1.265	0.083	0.464	0.647
Total	0.563	0.012	2372	2372	0.010	1.141	0.021	0.540	0.587
Currently using pills (Currently married women age 15–49)									
Urban	0.040	0.005	2183	2178	0.004	1.084	0.114	0.031	0.049
Rural	0.048	0.014	189	194	0.016	0.874	0.284	0.021	0.075
Total	0.040	0.004	2372	2372	0.004	1.060	0.106	0.032	0.049
Currently using IUD (Currently married women age 15–49)									
Urban	0.062	0.006	2183	2178	0.005	1.206	0.100	0.050	0.075
Rural	0.058	0.024	189	194	0.017	1.409	0.413	0.010	0.107
Total	0.062	0.006	2372	2372	0.005	1.218	0.097	0.050	0.074
Currently using condoms (Currently married women age 15–49)									
Urban	0.182	0.011	2183	2178	0.008	1.301	0.059	0.160	0.203
Rural	0.096	0.031	189	194	0.021	1.456	0.326	0.033	0.158
Total	0.175	0.010	2372	2372	0.008	1.326	0.059	0.154	0.195
Currently using female sterilization (Currently married women age 15–49)									
Urban	0.257	0.011	2183	2178	0.009	1.133	0.041	0.236	0.279
Rural	0.327	0.045	189	194	0.034	1.308	0.137	0.238	0.417
Total	0.263	0.010	2372	2372	0.009	1.154	0.040	0.242	0.284
Currently using male sterilization (Currently married women age 15–49)									
Urban	0.023	0.003	2183	2178	0.003	1.008	0.140	0.017	0.030
Rural	0.026	0.013	189	194	0.012	1.145	0.511	0.000	0.053
Total	0.023	0.003	2372	2372	0.003	1.015	0.134	0.017	0.030
Currently using rhythm/safe period (Currently married women age 15–49)									
Urban	0.048	0.005	2183	2178	0.005	1.168	0.111	0.037	0.059
Rural	0.016	0.016	189	194	0.009	1.734	1.004	0.000	0.047
Total	0.045	0.005	2372	2372	0.004	1.194	0.113	0.035	0.055
Using public source for modern method (Current users of modern methods)									
Total	0.519	0.020	1333	1337	0.014	1.481	0.039	0.478	0.559
Do not want any more children (Currently married women age 15–49)									
Total	0.456	0.014	2372	2372	0.010	1.390	0.031	0.427	0.484
Want to delay birth at least two years (Currently married women age 15–49)									
Total	0.102	0.006	2372	2372	0.006	0.940	0.057	0.091	0.114

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

Variable/ residence	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Standard error assuming SRS (SER)	Design effect (DEFT)	Relative standard error (SE/R)	Confidence limits: R-2SE	Confidence limits: R+2SE
Ideal number of children (Ever-married women age 15–49)									
Urban	2.359	0.037	2217	2212	0.018	2.082	0.016	2.285	2.432
Rural	2.426	0.056	183	188	0.054	1.024	0.023	2.314	2.537
Total	2.364	0.034	2400	2400	0.017	2.026	0.014	2.296	2.432
Ideal number of sons (Ever-married women age 15–49)									
Urban	1.152	0.031	2215	2210	0.015	2.068	0.027	1.089	1.215
Rural	1.214	0.052	182	187	0.051	1.010	0.043	1.111	1.318
Total	1.157	0.029	2397	2397	0.015	2.005	0.025	1.099	1.215
Ideal number of daughters (Ever-married women age 15–49)									
Urban	0.916	0.022	2215	2210	0.012	1.942	0.024	0.871	0.960
Rural	0.911	0.064	182	187	0.040	1.609	0.071	0.783	1.040
Total	0.915	0.021	2397	2397	0.011	1.910	0.023	0.873	0.958
Visited by health/family planning worker (Ever-married women age 15–49)									
Urban	0.012	0.003	2287	2282	0.002	1.249	0.237	0.006	0.018
Rural	0.016	0.008	190	195	0.009	0.859	0.492	0.000	0.032
Total	0.012	0.003	2477	2477	0.002	1.213	0.219	0.007	0.018
Received no antenatal check-up (Births in past 3 years)									
Urban	0.127	0.020	742	738	0.013	1.581	0.162	0.086	0.168
Rural	0.292	0.095	79	81	0.057	1.652	0.324	0.103	0.481
Total	0.143	0.020	821	820	0.013	1.554	0.142	0.102	0.184
Received iron and folic acid tablets or syrup (Births in past 3 years)									
Urban	0.796	0.027	742	738	0.015	1.806	0.034	0.742	0.849
Rural	0.619	0.093	79	81	0.055	1.692	0.150	0.433	0.805
Total	0.778	0.026	821	820	0.015	1.768	0.033	0.727	0.829
Received medical assistance during delivery (Births in past 3 years)									
Urban	0.682	0.035	742	738	0.019	1.875	0.051	0.612	0.751
Rural	0.455	0.059	79	81	0.061	0.972	0.129	0.337	0.573
Total	0.659	0.032	821	820	0.018	1.775	0.048	0.596	0.723
Received postpartum check-up (Noninstitutional births in past 3 years)									
Total	0.195	0.021	326	325	0.022	0.964	0.109	0.153	0.237
Had diarrhoea in past 2 weeks (Children under 3 years)									
Urban	0.299	0.027	703	700	0.017	1.580	0.091	0.244	0.353
Rural	0.321	0.050	72	74	0.055	0.903	0.156	0.221	0.421
Total	0.301	0.025	775	774	0.016	1.514	0.083	0.251	0.351
Treated with ORS packets (Children under 3 with diarrhoea in past 2 weeks)									
Total	0.391	0.039	234	233	0.033	1.183	0.100	0.313	0.469
Taken to a health facility/provider for diarrhoea (Children under 3 with diarrhoea in past 2 weeks)									
Total	0.801	0.031	234	233	0.027	1.172	0.039	0.738	0.864

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

Variable/ residence	Value (R)	Standard error (SE)	Number of cases: Unweighted (N)	Number of cases: Weighted (WN)	Standard error assuming SRS (SER)	Design effect (DEFT)	Relative standard error (SE/R)	Confidence limits: R-2SE	Confidence limits: R+2SE
Showing a vaccination card (Children age 12–23 months)									
Urban	0.443	0.035	249	248	0.032	1.125	0.080	0.372	0.514
Rural	0.384	0.122	26	27	0.095	1.275	0.317	0.140	0.627
Total	0.437	0.034	275	275	0.030	1.123	0.077	0.370	0.504
Received BCG vaccination (Children age 12–23 months)									
Urban	0.920	0.023	249	248	0.017	1.340	0.025	0.874	0.966
Rural	0.922	0.059	26	27	0.053	1.127	0.064	0.803	1.000
Total	0.920	0.021	275	275	0.016	1.309	0.023	0.877	0.963
Received DPT vaccination (3 doses) (Children age 12–23 months)									
Urban	0.793	0.030	249	248	0.026	1.154	0.037	0.734	0.853
Rural	0.847	0.072	26	27	0.071	1.021	0.085	0.702	0.991
Total	0.799	0.028	275	275	0.024	1.140	0.035	0.743	0.854
Received polio vaccination (3 doses) (Children age 12–23 months)									
Urban	0.811	0.029	249	248	0.025	1.185	0.036	0.752	0.869
Rural	0.809	0.096	26	27	0.077	1.250	0.119	0.616	1.000
Total	0.810	0.028	275	275	0.024	1.173	0.034	0.755	0.866
Received measles vaccination (Children age 12–23 months)									
Urban	0.767	0.036	249	248	0.027	1.355	0.047	0.694	0.840
Rural	0.847	0.072	26	27	0.071	1.021	0.085	0.702	0.991
Total	0.775	0.034	275	275	0.025	1.335	0.043	0.707	0.842
Fully vaccinated (Children age 12–23 months)									
Urban	0.686	0.038	249	248	0.029	1.296	0.056	0.610	0.763
Rural	0.809	0.096	26	27	0.077	1.250	0.119	0.616	1.000
Total	0.698	0.036	275	275	0.028	1.299	0.051	0.626	0.770
Received vitamin A (Children age 12–35 months)									
Urban	0.321	0.027	488	486	0.022	1.225	0.083	0.268	0.374
Rural	0.382	0.147	50	52	0.073	2.028	0.385	0.088	0.677
Total	0.327	0.027	538	537	0.021	1.302	0.083	0.273	0.381
Had reproductive health problem (Currently married women age 15–49)									
Urban	0.362	0.021	2183	2178	0.010	2.057	0.058	0.320	0.405
Rural	0.391	0.056	189	194	0.036	1.562	0.142	0.280	0.502
Total	0.365	0.020	2372	2372	0.010	2.011	0.055	0.325	0.404
Not involved in any decisionmaking (Ever-married women age 15–49)									
Urban	0.054	0.006	2287	2282	0.005	1.274	0.112	0.042	0.066
Rural	0.042	0.016	190	195	0.015	1.093	0.380	0.010	0.074
Total	0.053	0.006	2477	2477	0.004	1.259	0.107	0.042	0.064
Ever beaten or physically mistreated since age 15 (Ever-married women age 15–49)									
Urban	0.141	0.012	2287	2282	0.007	1.619	0.084	0.117	0.164
Rural	0.147	0.025	190	195	0.026	0.957	0.168	0.097	0.196
Total	0.141	0.011	2477	2477	0.007	1.570	0.078	0.119	0.163
Not worked in past 12 months (Ever-married women age 15–49)									
Urban	0.788	0.016	2287	2282	0.009	1.887	0.020	0.756	0.821
Rural	0.827	0.063	190	195	0.027	2.301	0.076	0.701	0.954
Total	0.791	0.016	2477	2477	0.008	1.911	0.020	0.760	0.823

Table A.2 Sampling errors, Delhi, 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	0.405	0.014	2022	2024	0.011	1.320	0.036	0.376	0.434
Rural	0.398	0.063	175	173	0.037	1.693	0.158	0.272	0.523
Total	0.405	0.014	2197	2197	0.010	1.347	0.035	0.376	0.433
Anaemic children (Children age 6–35 months)									
Urban	0.691	0.028	504	503	0.021	1.356	0.040	0.636	0.747
Rural	0.680	0.074	56	56	0.063	1.170	0.108	0.533	0.827
Total	0.690	0.026	560	559	0.020	1.334	0.038	0.638	0.742

Table A.2 Sampling errors, Delhi, 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	2.374	0.088	0.037	2.198	2.549
Rural	2.554	0.345	0.135	1.864	3.244
Total	2.397	0.086	0.036	2.226	2.569
Age-specific fertility rate (Women age 15–19)					
Total	0.036	0.007	0.187	0.022	0.049
Age-specific fertility rate (Women age 20–24)					
Total	0.191	0.009	0.045	0.174	0.208
Age-specific fertility rate (Women age 25–29)					
Total	0.174	0.009	0.051	0.156	0.191
Age-specific fertility rate (Women age 30–34)					
Total	0.059	0.006	0.105	0.046	0.071
Age-specific fertility rate (Women age 35–39)					
Total	0.017	0.004	0.250	0.009	0.026
Age-specific fertility rate (Women age 40–44)					
Total	0.003	0.002	0.565	0.000	0.007
Neonatal mortality (5-year period preceding survey)					
Total	29.453	5.555	0.189	18.343	40.562
Infant mortality ${}_1q_0$ (5-year period preceding survey)					
Total	46.845	7.192	0.154	32.461	61.229
Child mortality ${}_4q_1$ (5-year period preceding survey)					
Total	8.959	2.366	0.264	4.227	13.690
Under-five mortality ${}_5q_0$ (5-year period preceding survey)					
Total	55.384	7.876	0.142	39.631	71.136
Crude death rate (Based on Household Questionnaire)					
Total	8.012	0.709	0.088	6.594	9.430
Crude birth rate (Based on women's birth history)					
Total	21.265	0.792	0.037	19.681	22.849

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 Delhi, information on age was missing for only 1 person out of 14,574 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 Delhi.

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 Delhi, the extent of missing information is negligible (less than 1 percent) for age at death, age at first marriage, women's education, and prevalence of diarrhoea in the two weeks preceding the survey (Table B.3). Month of birth was missing for 11 percent of children; however, the year is reported in almost every case in which the month is missing. Data on height and weight of children are available for 86 percent of the members of the respective reference groups. Missing information is highest (17 percent) for children's haemoglobin level. The response rates are acceptable for the height and weight and child's haemoglobin level since in any survey many

Table B.1 Household age distribution

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

	Male		Female			Male		Female	
Age	Number	Percent	Number	Percent	Age	Number	Percent	Number	Percent
< 1	158	2.1	115	1.7	38	107	1.4	103	1.5
1	163	2.1	120	1.7	39	39	0.5	66	1.0
2	171	2.2	123	1.8	40	257	3.3	141	2.0
3	138	1.8	140	2.0	41	36	0.5	35	0.5
4	154	2.0	144	2.1	42	103	1.3	87	1.3
5	185	2.4	150	2.2	43	43	0.6	57	0.8
6	195	2.5	149	2.2	44	44	0.6	46	0.7
7	160	2.1	148	2.1	45	177	2.3	118	1.7
8	160	2.1	192	2.8	46	41	0.5	54	0.8
9	168	2.2	138	2.0	47	48	0.6	26	0.4
10	194	2.5	167	2.4	48	89	1.2	47	0.7
11	158	2.1	128	1.9	49	26	0.3	32	0.5
12	192	2.5	199	2.9	50	117	1.5	90	1.3
13	147	1.9	143	2.1	51	16	0.2	29	0.4
14	178	2.3	173	2.5	52	62	0.8	65	0.9
15	180	2.3	149	2.2	53	26	0.3	30	0.4
16	192	2.5	157	2.3	54	20	0.3	27	0.4
17	142	1.8	137	2.0	55	90	1.2	132	1.9
18	219	2.8	166	2.4	56	25	0.3	23	0.3
19	121	1.6	94	1.4	57	18	0.2	16	0.2
20	188	2.4	182	2.7	58	34	0.4	37	0.5
21	121	1.6	119	1.7	59	13	0.2	9	0.1
22	163	2.1	182	2.7	60	130	1.7	127	1.8
23	114	1.5	103	1.5	61	14	0.2	6	0.1
24	157	2.0	135	2.0	62	22	0.3	13	0.2
25	184	2.4	145	2.1	63	16	0.2	8	0.1
26	139	1.8	152	2.2	64	8	0.1	9	0.1
27	114	1.5	104	1.5	65	83	1.1	99	1.4
28	159	2.1	144	2.1	66	12	0.2	8	0.1
29	69	0.9	59	0.9	67	13	0.2	4	0.1
30	241	3.1	179	2.6	68	17	0.2	9	0.1
31	57	0.7	80	1.2	69	2	0.0	2	0.0
32	153	2.0	125	1.8	70+	204	2.6	166	2.4
33	57	0.7	74	1.1	Don't				
34	58	0.7	88	1.3	know/				
35	240	3.1	180	2.6	missing	0	0.0	1	0.0
36	111	1.4	100	1.5					
37	51	0.7	67	1.0	Total	7,704	100.0	6,870	100.0

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

children cannot be measured because they were not at 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 woman's haemoglobin level are available for 89 percent of respondents. 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.

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, 90 percent of living children listed in the birth history had complete birth dates recorded, as did 67 percent of children who had died. The completeness of data on birth dates for living children is acceptable overall. The completeness for nonsurviving children is less

Table B.2 Age distribution of eligible and interviewed women

Age distribution of the *de facto* household population of women age 10–54 and of interviewed women age 15–49, and percentage of eligible women who were interviewed (weighted), Delhi, 1999

Age	All women	Ever-married women	Interviewed women		Percent interviewed
			Number	Percent	
10–14	810	1	NA	NA	NA
15–19	703	64	61	2.5	95.2
20–24	722	421	381	15.4	90.6
25–29	604	560	512	20.7	91.5
30–34	546	536	490	19.8	91.4
35–39	515	509	464	18.7	91.0
40–44	366	363	330	13.3	91.0
45–49	277	274	238	9.6	86.8
50–54	241	240	NA	NA	NA
15–49	3,733	2,727	2,476	100.0	90.8

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), Delhi, 1999

Indicator	Reference group	Percentage missing information	Number of cases
Birth date	Births in last 15 years		
Month only		10.50	4,566
Month and year		0.14	4,566
Age at death	Deaths to births in last 15 years	0.73	283
Age at first marriage	Ever-married women age 15–49	0.32	2,477
Woman's education	Ever-married women age 15–49	0.20	2,477
Anthropometry	Living children age 0–35 months		
Height		14.00	784
Weight		13.85	784
Height or weight		14.25	784
Woman's haemoglobin level	Ever-married women age 15–49	11.38	2,477
Child's haemoglobin level	Living children age 6–35 months	17.37	676
Diarrhoea in past 2 weeks	Living children age 1–35 months	0.51	774

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), Delhi, 1999

	Number of births			Percent with complete birth date[1]			Sex ratio at birth[2]			Calendar year ratio[3]		
Calendar year	L	D	T	L	D	T	L	D	T	L	D	T
1999	47	4	51	100.0	73.4	97.9	613	990	637	NA	NA	NA
1998	277	14	291	97.8	79.0	96.9	766	757	765	NC	NC	NC
1997	257	12	269	98.4	82.5	97.7	713	976	723	94.5	90.7	94.4
1996	267	12	279	94.8	82.8	94.3	846	956	851	106.7	81.4	105.3
1995	243	17	261	91.8	69.7	90.3	1,084	891	1,070	88.1	133.0	90.1
1994	285	14	299	91.5	85.8	91.2	883	408	853	105.8	80.8	104.3
1993	296	18	314	89.5	60.3	87.9	834	279	790	97.4	116.2	98.3
1992	322	17	339	85.3	46.9	83.4	874	877	874	114.8	110.8	114.6
1991	265	12	277	93.6	66.5	92.4	904	482	880	82.8	63.1	81.7
1990	318	22	340	89.2	68.1	87.9	1,086	705	1,057	115.1	119.6	115.4
1989	288	24	312	90.3	58.0	87.8	829	997	841	93.3	109.4	94.4
1988	300	22	322	86.1	63.3	84.5	937	837	929	107.3	109.1	107.4
1993–97	1,349	73	1,422	93.1	74.7	92.1	862	614	847	NA	NA	NA
1988–92	1,493	96	1,590	88.7	60.6	87.0	924	795	916	NA	NA	NA
1983–87	1,434	124	1,558	89.1	70.3	87.6	931	959	933	NA	NA	NA
1978–82	1,009	112	1,121	87.7	68.1	85.7	895	948	901	NA	NA	NA
1977 or earlier	691	104	794	84.2	59.6	81.0	817	657	795	NA	NA	NA
All	6,300	528	6,827	89.6	66.8	87.8	885	804	879	NA	NA	NA

NA: Not applicable
NC: Not calculated because full-year data were not collected for 1999
[1] Both year and month of birth given
[2] $(B_f/B_m)x1000$, where B_f and B_m are the numbers of female and male births, respectively
[3] $[2B_x/(B_{x-1}+B_{x+1})]x100$, where B_x is the number of births in calendar year x

satisfactory. The 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. As shown in Table B.4, in Delhi there is no evidence that births are shifted to 1995, the year before the January 1996 cutoff (in fact the opposite pattern is observed).

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, interviewer training stressed this issue to try to reduce the extent of biases due to age displacement. Apparently, the training was successful in avoiding this type of problem in Delhi.

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 Delhi, because the

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), Delhi, 1999

	Years preceding survey			
Age at death (days)	0–4	5–9	10–14	0–14
< 1	10	11	9	29
1	11	12	19	42
2	2	3	4	9
3	2	0	6	8
4	4	1	4	9
5	4	1	1	6
6	3	2	1	6
7	1	2	1	4
8	0	2	1	3
9	0	2	3	5
10	0	0	1	1
11	1	0	0	1
12	0	0	0	0
13	0	0	1	1
14	0	1	0	1
15	1	2	2	5
16	0	0	0	0
17	0	0	0	0
18	1	1	1	3
19	0	0	0	0
20	0	0	3	3
21	0	1	1	2
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	1	0	0	1
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
0–30	41	40	58	139
Percent early neonatal[1]	87.5	72.8	76.9	78.8

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

ratios of deaths under seven days to all neonatal deaths are consistently high (a ratio of less than 25 percent is often used as a guideline to indicate underreporting of early neonatal deaths). The ratios are 88 for 0–4 years, 73 for 5–9 years, and 77 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 9, 15, 18, and 20 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, and nearly constant over time, suggesting that there is no major omission of neonatal deaths. A problem 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 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 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 (that is, at ages 12–23 months), may have actually occurred during infancy

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), Delhi, 1999

	Years preceding survey			
Age at death (months)	0–4	5–9	10–14	0–14
< 1	41	40	58	139
1	6	5	4	15
2	4	1	5	10
3	4	8	10	22
4	1	2	4	7
5	2	0	4	6
6	3	4	7	14
7	0	2	2	4
8	1	2	1	4
9	2	1	0	3
10	0	3	0	3
11	0	1	1	2
12	1	1	0	2
13	0	0	0	0
14	0	0	0	0
15	0	1	0	1
16	0	0	0	0
17	0	0	0	0
18	0	1	0	1
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	7	8	18
0–11 months	64	70	96	229
Percent neonatal[1]	64.1	57.9	60.3	60.7

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

(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 there is some heaping of deaths at 3 months and 6 months of age. There is no heaping at age 12 months and only a few cases reported as having died at "one year", so the effect of these problems on the infant mortality rate is minimal.