

Appendix C. Estimates of Sampling Errors

The sample of respondents selected in the Yemen Multiple Indicator Cluster Survey is only one of the samples that could have been selected from the same population, using the same design and size. Each of these samples would yield results that differ somewhat from the results of the actual sample selected. Sampling errors are a measure of the variability between all possible samples. The extent of variability is not known exactly, but can be estimated statistically from the survey results.

The following sampling error measures are presented in this appendix for each of the selected indicators:

- Standard error (*se*): Sampling errors are usually measured in terms of standard errors for particular indicators (means, proportions etc). Standard error is the square root of the variance. The Taylor linearization method is used for the estimation of standard errors.
- Coefficient of variation (se/r) is the ratio of the standard error to the value of the indicator
- Design effect (*deff*) is the ratio of the actual variance of an indicator, under the sampling method used in the survey, to the variance calculated under the assumption of simple random sampling. The square root of the design effect (*deft*) is used to show the efficiency of the sample design. A *deft* value of 1.0 indicates that the sample design is as efficient as a simple random sample, while a *deft* value above 1.0 indicates the increase in the standard error due to the use of a more complex sample design.
- Confidence limits are calculated to show the interval within which the true value for the population can be reasonably assumed to fall. For any given statistic calculated from the survey, the value of that statistics will fall within a range of plus or minus two times the standard error ($p + 2.se$ or $p - 2.se$) of the statistic in 95 percent of all possible samples of identical size and design.

For the calculation of sampling errors from MICS data, SPSS Version 14 Complex Samples module has been used. The results are shown in the tables that follow. In addition to the sampling error measures described above, the tables also include weighted and unweighted counts of denominators for each indicator.

Sampling errors are calculated for indicators of primary interest, for the national total, for the regions, and for urban and rural areas. Three of the selected indicators are based on households, 8 are based on household members, 13 are based on women, and 15 are based on children under 5. All indicators presented here are in the form of proportions. Table SE.1 shows the list of indicators for which sampling errors are calculated, including the base population (denominator) for each indicator. Tables SE.2 to SE.9 show the calculated sampling errors.

Table SE.1: Indicators selected for sampling error calculations

List of indicators selected for sampling error calculations, and base populations (denominators) for each indicator, Country, Year

MICS Indicator	Base Population
HOUSEHOLDS	
74 Child discipline	Children aged 2-14 years selected
HOUSEHOLD MEMBERS	
11 Use of improved drinking water sources	All household members
12 Use of improved sanitation facilities	All household members
55 Net primary school attendance rate	Children of primary school age
56 Net secondary school attendance rate	Children of secondary school age
59 Primary completion rate	Children of primary school completion age
71 Child labour	Children aged 5-14 years
75 Prevalence of orphans	Children aged under 18
WOMEN	
4 Skilled attendant at delivery	Ever-married women aged 15-49 years with a live birth in the last 2 years
20 Antenatal care	Ever-married women aged 15-49 years with a live birth in the last 2 years
21 Contraceptive prevalence	Women aged 15-49 currently married/in union
60 Adult literacy	Ever-married Women aged 15-24 years
67 Marriage before age 18	Women aged 20-49 years
86 Attitude towards people with HIV/AIDS	Women aged 15-49 years
88 Women who have been tested for HIV	Women aged 15-49 years
89 Knowledge of mother- to-child transmission of HIV	Women aged 15-49 years
UNDER-5s	
25 Tuberculosis immunization coverage	Children aged 12-23 months
26 Polio immunization coverage	Children aged 12-23 months
27 Immunization coverage for DPT	Children aged 12-23 months
28 Measles immunization coverage	Children aged 12-23 months
31 Fully immunized children	Children aged 12-23 months
- Acute respiratory infection in last two weeks	Children under age 5
22 Antibiotic treatment of suspected pneumonia	Children under age 5 with suspected pneumonia in the last 2 weeks
- Diarrhoea in last two weeks	Children under age 5
35 Received ORT or increased fluids and continued feeding	Children under age 5 with diarrhoea in the last 2 weeks
- Fever in last two weeks	Children under age 5
46 Support for learning	Children under age 5
62 Birth registration	Children under age 5

Table SE.2: Sampling errors: Total sample

Standard errors, coefficients of variation, design effects (deff), square root of design effects (deft) and confidence intervals for selected indicators, Yemen, 2006

Table	Value (<i>r</i>)	Standard error (<i>se</i>)	Coefficient of variation (<i>se/r</i>)	Design effect (<i>deff</i>)	Square root of design effect (<i>deft</i>)	Weighted count	Unweighted count	Confidence limits		
								<i>r</i> - 2 <i>se</i>	<i>r</i> + 2 <i>se</i>	
HOUSEHOLDS										
Child discipline	CP.4	0.940	0.005	0.005	1.217	1.103	2878	2872	0.931	0.950
HOUSEHOLD MEMBERS										
Use of improved drinking water sources	EN.1	0.589	0.026	0.045	10.296	3.209	26088	3586	0.536	0.641
Use of improved sanitation facilities	EN.5	0.517	0.022	0.042	6.711	2.591	26088	3586	0.474	0.560
Net primary school attendance rate (ISCED)	ED.3	0.697	0.015	0.021	4.776	2.185	4673	4693	0.667	0.726
Net secondary school attendance rate (ISCED)	ED.4	0.379	0.014	0.037	3.651	1.911	4235	4271	0.350	0.407
Primary completion rate (ISCED)	ED.6	0.302	0.022	0.074	1.924	1.387	795	814	0.258	0.347
Net primary school attendance rate (Basic Ed.)	ED.3A	0.685	0.013	0.020	5.775	2.403	6816	6845	0.658	0.712
Net secondary school attendance rate (Basic Ed.)	ED.4A	0.239	0.012	0.051	1.757	1.326	2092	2119	0.214	0.263
Primary completion rate (Basic Ed.)	ED.6A	0.184	0.019	0.101	1.751	1.323	763	766	0.147	0.221
Child labour	CP.2	0.227	0.010	0.046	4.698	2.168	7618	7656	0.207	0.248
Prevalence of orphans	HA.10	0.052	0.004	0.069	3.567	1.889	13627	13637	0.044	0.059
WOMEN										
Skilled attendant at delivery	RH.5	0.357	0.017	0.048	1.989	1.410	1610	1585	0.323	0.391
Antenatal care	RH.3	0.470	0.018	0.038	2.033	1.426	1610	1585	0.434	0.506
Contraceptive prevalence	RH.1	0.277	0.011	0.040	2.119	1.456	3514	3519	0.255	0.298
Adult literacy	ED.8	0.352	0.020	0.057	1.782	1.335	1014	997	0.311	0.392
Marriage before age 18	CP.5	0.641	0.011	0.017	1.865	1.366	3427	3439	0.618	0.663
Attitude towards people with HIV/AIDS	HA.5	0.052	0.005	0.098	1.196	1.094	2268	2265	0.042	0.063
Women who have been tested for HIV	HA.6	0.019	0.003	0.140	1.430	1.196	3742	3742	0.014	0.025
Knowledge of mother-to-child transmission of HIV	HA.4	0.324	0.013	0.039	2.710	1.646	3742	3742	0.299	0.349
UNDER-5s										
Tuberculosis immunization coverage	CH.2	0.690	0.023	0.033	1.710	1.308	715	709	0.644	0.735
Polio immunization coverage	CH.2	0.630	0.022	0.035	1.497	1.223	714	707	0.586	0.675
Immunization coverage for DPT	CH.2	0.610	0.027	0.045	2.155	1.468	698	691	0.555	0.664
Measles immunization coverage	CH.2	0.651	0.023	0.035	1.656	1.287	712	706	0.605	0.697
Fully immunized children	CH.2	0.375	0.024	0.065	1.768	1.330	708	702	0.326	0.424
Acute respiratory infection in last two weeks	CH.6	0.129	0.007	0.055	1.694	1.302	3783	3783	0.115	0.143
Antibiotic treatment of suspected pneumonia	CH.6	0.379	0.026	0.068	1.382	1.176	488	497	0.327	0.430
Diarrhoea in last two weeks	CH.4	0.335	0.010	0.029	1.607	1.268	3783	3783	0.316	0.355
Received ORT or increased fluids and continued feeding	CH.5	0.476	0.015	0.032	1.239	1.113	1269	1301	0.445	0.507
Support for learning	CD.1	0.255	0.013	0.053	3.570	1.890	3783	3783	0.228	0.282
Birth registration	CP.1	0.223	0.017	0.074	5.993	2.448	3783	3783	0.190	0.256

Table SE.2: Sampling errors: Urban sample

Standard errors, coefficients of variation, design effects (deff), square root of design effects (deft) and confidence intervals for selected indicators, Yemen, 2006

Table	Value (<i>r</i>)	Standard error (<i>se</i>)	Coefficient of variation (<i>se/r</i>)	Design effect (<i>deff</i>)	Square root of design effect (<i>deft</i>)	Weighted count	Unweighted count	Confidence limits		
								<i>r</i> - 2 <i>se</i>	<i>r</i> + 2 <i>se</i>	
HOUSEHOLDS										
Child discipline	CP.4	0.951	0.007	0.007	0.872	0.934	893	828	0.938	0.965
HOUSEHOLD MEMBERS										
Use of improved drinking water sources	EN.1	0.738	0.033	0.044	5.789	2.406	8022	1055	0.673	0.803
Use of improved sanitation facilities	EN.5	0.923	0.026	0.028	9.917	3.149	8022	1055	0.871	0.975
Net primary school attendance rate (ISCED)	ED.3	0.833	0.017	0.021	2.614	1.617	1316	1209	0.798	0.867
Net secondary school attendance rate (ISCED)	ED.4	0.557	0.024	0.044	2.921	1.709	1318	1215	0.508	0.605
Primary completion rate (ISCED)	ED.6	0.425	0.037	0.086	1.123	1.060	224	205	0.351	0.498
Net primary school attendance rate (Basic Ed.)	ED.3A	0.828	0.016	0.020	3.303	1.817	1947	1792	0.796	0.860
Net secondary school attendance rate (Basic Ed.)	ED.4A	0.376	0.025	0.068	1.736	1.318	688	632	0.325	0.427
Primary completion rate (Basic Ed.)	ED.6A	0.316	0.037	0.118	1.269	1.127	214	200	0.241	0.390
Child labour	CP.2	0.081	0.008	0.098	1.677	1.295	2169	1995	0.065	0.097
Prevalence of orphans	HA.10	0.051	0.007	0.137	3.563	1.888	3863	3560	0.037	0.065
WOMEN										
Skilled attendant at delivery	RH.5	0.617	0.021	0.034	0.742	0.862	429	397	0.575	0.659
Antenatal care	RH.3	0.682	0.025	0.037	1.169	1.081	429	397	0.631	0.732
Contraceptive prevalence	RH.1	0.423	0.019	0.044	1.430	1.196	1088	1019	0.386	0.460
Adult literacy	ED.8	0.590	0.036	0.060	1.363	1.167	275	260	0.519	0.662
Marriage before age 18	CP.5	0.602	0.017	0.028	1.189	1.091	1090	1021	0.568	0.635
Attitude towards people with HIV/AIDS	HA.5	0.057	0.008	0.134	1.011	1.006	989	927	0.042	0.073
Women who have been tested for HIV	HA.6	0.034	0.006	0.163	1.026	1.013	1170	1095	0.023	0.045
Knowledge of mother- to-child transmission of HIV	HA.4	0.454	0.018	0.039	1.377	1.173	1170	1095	0.419	0.489
UNDER-5s										
Tuberculosis immunization coverage	CH.2	0.896	0.016	0.018	0.546	0.739	208	191	0.864	0.929
Polio immunization coverage	CH.2	0.729	0.031	0.042	0.893	0.945	206	190	0.667	0.790
Immunization coverage for DPT	CH.2	0.795	0.032	0.041	1.199	1.095	206	189	0.731	0.860
Measles immunization coverage	CH.2	0.803	0.026	0.033	0.845	0.919	209	192	0.751	0.856
Fully immunized children	CH.2	0.577	0.038	0.065	1.087	1.043	205	188	0.502	0.652
Acute respiratory infection in last two weeks	CH.6	0.116	0.014	0.123	1.881	1.372	1021	956	0.087	0.144
Antibiotic treatment of suspected pneumonia	CH.6	0.486	0.050	0.103	1.109	1.053	118	111	0.386	0.587
Diarrhoea in last two weeks	CH.4	0.292	0.016	0.056	1.215	1.102	1021	956	0.259	0.324
Received ORT or increased fluids and continued feeding	CH.5	0.499	0.029	0.058	0.924	0.961	298	280	0.441	0.556
Support for learning	CD.1	0.385	0.029	0.077	3.498	1.870	1021	956	0.326	0.444
Birth registration	CP.1	0.382	0.023	0.061	2.213	1.488	1021	956	0.335	0.429

**Table SE.2: Sampling errors:
Rural sample**

Standard errors, coefficients of variation, design effects (deff), square root of design effects (deft) and confidence intervals for selected indicators, Yemen, 2006

Table	Value (r)	Standard error (se)	Coefficient of variation (se/r)	Design effect (deff)	Square root of design effect (deft)	Weighted count	Unweighted count	Confidence limits		
								r - 2se	r + 2se	
HOUSEHOLDS										
Child discipline	CP.4	0.936	0.006	0.007	1.344	1.159	1984	2044	0.923	0.948
HOUSEHOLD MEMBERS										
Use of improved drinking water sources	EN.1	0.522	0.035	0.067	12.335	3.512	18066	2531	0.452	0.592
Use of improved sanitation facilities	EN.5	0.336	0.026	0.077	7.522	2.743	18066	2531	0.285	0.388
Net primary school attendance rate (ISCED)	ED.3	0.643	0.019	0.029	5.448	2.334	3357	3484	0.605	0.681
Net secondary school attendance rate (ISCED)	ED.4	0.298	0.016	0.055	3.969	1.992	2917	3056	0.265	0.331
Primary completion rate (ISCED)	ED.6	0.254	0.027	0.107	2.395	1.548	571	609	0.200	0.309
Net primary school attendance rate (Basic Ed.)	ED.3A	0.628	0.017	0.027	6.413	2.532	4869	5053	0.594	0.662
Net secondary school attendance rate (Basic Ed.)	ED.4A	0.171	0.013	0.077	1.805	1.344	1405	1487	0.145	0.198
Primary completion rate (Basic Ed.)	ED.6A	0.133	0.021	0.155	2.091	1.446	550	566	0.092	0.174
Child labour	CP.2	0.286	0.013	0.047	4.957	2.227	5449	5661	0.259	0.313
Prevalence of orphans	HA.10	0.052	0.004	0.080	3.543	1.882	9764	10077	0.043	0.060
WOMEN										
Skilled attendant at delivery	RH.5	0.263	0.020	0.077	2.538	1.593	1181	1188	0.222	0.304
Antenatal care	RH.3	0.393	0.022	0.056	2.446	1.564	1181	1188	0.349	0.438
Adult literacy	ED.8	0.211	0.013	0.060	2.391	1.546	2426	2500	0.186	0.236
Marriage before age 18	CP.5	0.263	0.023	0.088	2.025	1.423	739	737	0.217	0.309
Comprehensive knowledge about HIV prevention among young people	HA.3	0.659	0.014	0.021	2.112	1.453	2337	2418	0.631	0.687
Attitude towards people with HIV/AIDS	HA.5	0.049	0.007	0.139	1.324	1.151	1279	1338	0.035	0.062
Women who have been tested for HIV	HA.6	0.013	0.003	0.226	1.714	1.309	2572	2647	0.007	0.018
Knowledge of mother-to-child transmission of HIV	HA.4	0.265	0.016	0.059	3.337	1.827	2572	2647	0.234	0.296
UNDER-5s										
Tuberculosis immunization coverage	CH.2	0.605	0.032	0.052	2.169	1.473	508	518	0.542	0.669
Polio immunization coverage	CH.2	0.591	0.029	0.049	1.758	1.326	507	517	0.533	0.648
Immunization coverage for DPT	CH.2	0.532	0.037	0.069	2.733	1.653	492	502	0.458	0.606
Measles immunization coverage	CH.2	0.588	0.031	0.052	1.982	1.408	503	514	0.527	0.649
Fully immunized children	CH.2	0.293	0.030	0.102	2.216	1.489	503	514	0.233	0.353
Acute respiratory infection in last two weeks	CH.6	0.134	0.008	0.061	1.653	1.286	2762	2827	0.118	0.151
Antibiotic treatment of suspected pneumonia	CH.6	0.344	0.029	0.084	1.412	1.188	370	386	0.287	0.402
Diarrhoea in last two weeks	CH.4	0.352	0.012	0.034	1.767	1.329	2762	2827	0.328	0.375
Received ORT or increased fluids and continued feeding	CH.5	0.469	0.018	0.039	1.340	1.158	971	1021	0.433	0.505
Support for learning	CD.1	0.207	0.015	0.074	4.021	2.005	2762	2827	0.177	0.238
Birth registration	CP.1	0.164	0.022	0.133	9.767	3.125	2762	2827	0.120	0.208