Annex 1

Malnutrition prevalences by country and year, from survey data and interpolated for reference years (1990, 1995, 2000)

The tables in this Annex are constructed to list the available country data for the seven malnutrition indicators (xerophthalmia and vitamin A deficiency, anemia among nonpregnant and pregnant women and children, goiter, and underweight children). This aims to facilitate inspection of likely trends by country, and comparisons across countries. It also shows the availability (or scarcity) of survey data. The estimated prevalences for 1990, 1995 (1994 for iodine), and 2000 derived from the models described in the Methods section are inserted here. This allows a view of the agreement or deviation of each estimate from recent or historical data for each country. These results were then further evaluated to give the "best guess" estimates (Annex 2), applying rules described in the Methods section.

The tables are set up with similar principles, but there are some differences. Each table contains different amounts of data, with some differing levels of complexity. For example, the iodine tables are complicated in comparison with the xerophthalmia table, due to the amount of data exhibited and the detail included. Other differences include the characteristics of the observed data. For instance, the observed values in the anemia tables as well as in the vitamin A deficiency table consisted of national and subnational surveys, whereas the observed values in the underweight and xerophthalmia table consisted only of surveys considered to be nationally representative. This was done to look into filling in gaps where data were particularly scarce (discussed in the Methods), and the data used are recorded, but distinguished between national and subnational and those datapoints used and not used. The years covered in each matrix also vary somewhat, depending on availability and the utility of going farther back in time (e.g., to estimate endemic or pre-iodization goiter prevalences). The anemia tables cover 1974–2001, the vitamin A, xerophthalmia, and underweight tables cover 1980–2001, and the iodine tables cover 1946–2001.

The underweight table contains the most observed survey data, due primarily to the fact that Demographic and Health Survey (DHS) and UNICEF Multiple Indicator Cluster Surveys (MICS) surveys have been including anthropometry for some time. The xerophthalmia and vitamin A deficiency tables, on the other hand, contained the fewest observed survey data points because of the difficulty in measuring vitamin A deficiency and the rarity of clinical symptoms. The anemia tables contain more survey data than the xerophthalmia and vitamin A deficiency tables, because anemia is more often measured and is more common than xerophthalmia. The iodine tables include not only the goiter rates but also salt-iodization programs, the year they were established, and even the level of coverage.

TABLE A1.1. Prevalences of xerophthalmia (night-blindness + Bitot's spots, XN+X1B) in children 0–72 months old, 1980–2001

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Angola											*2.1*						*1.6*						*1.6*		
1	Benin											*2.0*						*1.5*						*1.5*		
1	Botswana											*0.9*						*0.9*						*0.5*		
1	Burkina Faso											*2.5*						*2.1*						*2.1*		
1	Burundi											*1.4*						*2.0*						*1.3*		
1	Cameroon											*1.9*						*1.6*						*1.1*		
1	Central African Republic											*2.4*						*1.6*						*2.0*		
1	Chad							2.7				*2.6*						*2.2*						*2.0*		
1	Congo											*1.5*						*1.5*						*2.1*		
1	Congo, Democratic Republic of the											*1.7*						*1.5*						*2.1*		
1	Côte d'Ivoire											*1.8*						*1.6*						*1.5*		
1	Eritrea											*1.8*						*1.9*						*0.9*		
1	Ethiopia	2.0										*2.3*						*1.9*		1.5				*2.3*		
1	Gabon											*1.2*						*1.8*						*1.3*		
1	Gambia, The											*1.7*						*1.3*						*1.2*		
1	Ghana											*1.7*						*1.5*						*1.0*		
1	Guinea											*2.5*						*2.0*						*1.9*		
1	Guinea-Bissau											*2.0*						*1.6*						*1.7*		
1	Kenya											*1.3*						*1.5*						*0.7*		
1	Lesotho											*1.4*						*0.8*						*0.4*		
1	Liberia											*1.9*						*2.1*						*1.6*		
1	Madagascar											*1.3*						*1.5*						*1.6*		
1	Malawi											*1.4*						*1.0*						*1.0*		
1	Mali											*2.2*						*2.3*						*1.7*		
1	Mauritania											*2.4*						*1.9*						*1.7*		
1	Mauritius											*1.2*						*0.9*						*0.6*		
1	Mozambique											*2.1*						*1.7*						*1.8*		

1	Namibia											*1.5*						*1.0*						*0.8*		
1	Niger									3.0		*2.6*			3.7			*2.1*						*2.5*		
1	Nigeria											*1.8*					1.2	*1.7*						*1.6*		
1	Rwanda											*1.3*						*1.1*						*0.7*		
1	Senegal											*2.1*						*1.8*						*1.7*		
1	Sierra Leone											*2.2*						*1.5*						*1.8*		
1	Somalia											*2.5*						*2.4*						*2.0*		
1	South Africa											*1.6*						*0.6*						*0.5*		
1	Sudan							2.4				*2.1*						*1.4*						*1.6*		
1	Swaziland											*1.8*						*1.0*						*0.6*		
1	Tanzania											*0.5*						*0.9*						*0.9*		
1	Togo											*1.9*						*2.0*						*1.8*		
1	Uganda											*1.5*						*1.3*						*1.4*		
1	Zambia											*0.9*						*0.5*						*0.5*		
1	Zimbabwe											*0.9*						*0.6*					0.2	*0.4*		
	Weighted regional average											*1.7*						*1.5*						*1.5*		
2	Afghanistan											*2.5*						*2.3*						*2.2*		
2	Bangladesh				4.5							*2.0*						*1.8*		1.2	0.9		0.5	*1.5*		
2	Bhutan											*1.5*						*1.3*					0.0	*1.4*		
2	Nepal		1.3									*2.0*				3.0		*2.2*		1.5		0.3		*1.6*		
2	Pakistan											*1.7*						*1.5*						*1.8*		
2	Sri Lanka											*0.6*						*0.4*						*0.2*		
	Weighted regional average											*1.8*						*1.6*						*1.7*		
3	India									1.4		*1.3*						*1.2*						*1.7*	1.2	1.7
4	Algeria											*1.1*						*1.3*						*1.0*		
4	Egypt											*1.2*						*1.0*	0.2					*0.9*		
4	Iran											*1.2*						*0.6*						*0.4*		

continued

TABLE A1.1. Prevalences of xerophthalmia (night-blindness + Bitot's spots, XN+X1B) in children 0–72 months old, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
4	Iraq											*1.3*						*0.8*						*1.4*		
4	Jordan											*0.7*						*0.3*						*0.3*		
4	Kuwait											*0.6*						*0.3*						*0.3*		
4	Lebanon											*1.1*						*0.3*						*0.4*		
4	Libya											*1.4*						*0.6*						*0.5*		
4	Morocco											*1.3*						*1.1*						*1.1*		
4	Saudi Arabia											*1.0*						*0.8*						*0.5*		
4	Syrian Arab Republic											*1.0*						*0.7*						*0.6*		
4	Tunisia											*1.0*						*0.9*						*0.8*		
4	United Arab Emirates											*1.3*						*0.4*						*0.1*		
4	Yemen											*2.1*						*1.9*						*1.5*		
	Weighted regional average											*1.2*						*0.9*						*0.8*		
5	Cambodia											*2.3*				6.2		*1.1*						*1.4*		
5	Indonesia											*0.9*						*0.4*	0.3					*0.7*		
5	Lao People's Democratic Republic											*1.7*						*1.3*	1.1					*1.1*		4.65 0.1
5	Malaysia											*0.8*						*0.6*						*0.4*		
5	Mongolia											*0.7*						*0.5*				0.2	0.8	*0.1*		
5	Myanmar											*1.0*		1.2			0.8	*0.5*						*0.5*		
5	Papua New Guinea											*1.7*						*1.5*						*1.2*		
5	Philippines			2.1					0.9			*0.3*				0.4		*0.5*						*0.4*		
5	Thailand											*0.4*						*0.3*						*0.1*		
5	Vietnam											*0.4*					0.1	*0.1*				0.3		*0.2*		
	Weighted regional average											*0.7*						*0.4*						*0.5*		

6	Belize											*0.8*						*0.7*						*0.5*		
6	Costa Rica											*0.2*						*0.2*						*0.2*		
6	Cuba											*0.0*						*0.1*						*0.1*		
6	Dominican Republic											*0.7*						*0.6*						*0.2*		
6	El Salvador											*1.2*						*0.4*						*0.3*		
6	Guatemala											*1.6*						*1.3*						*0.8*		
6	Haiti											*1.9*						*2.0*						*1.6*		
6	Honduras											*0.6*						*0.5*						*0.2*		
6	Jamaica											*0.4*						*0.1*						*0.1*		
6	Mexico											*0.5*						*0.6*						*0.2*		
6	Nicaragua											*1.0*						*0.8*						*0.5*		
6	Panama											*0.4*						*0.2*						*0.2*		
6	Trinidad and Tobago											*0.6*						*0.2*						*0.1*		
	Weighted regional average											*0.7*						*0.7*						*0.3*		
7	Bolivia		1.7									*0.8*						*0.5*						*0.6*		
7	Brazil											*0.5*						*0.6*						*0.2*		
7	Chile											*0.1*						*0.1*						*0.1*		
7	Colombia											*0.4*						*0.1*						*0.5*		
7	Ecuador											*0.9*						*0.5*						*0.1*		
7	Guyana											*0.6*						*0.1*						*0.2*		
7	Paraguay											*0.5*						*0.4*						*0.2*		
7	Peru											*0.9*						*0.7*						*0.3*		
7	Uruguay											*0.3*						*0.2*						*0.1*		
7	Venezuela											*0.7*						*0.7*						*0.3*		
	Weighted regional average											*0.6*						*0.5*						*0.3*		

continued

TABLE A1.1. Prevalences of xerophthalmia (night-blindness + Bitot's spots, XN+X1B) in children 0–72 months old, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
8	China											*0.7*						*0.4*						*0.4*		
9	Armenia																	*0.1*						*0.1*		
9	Azerbaijan																	*0.0*						*0.0*		
9	Georgia																	*0.6*						*0.3*		
9	Kazakhstan																	*0.0*						*0.0*		
9	Kyrgyzstan																	*0.4*						*0.0*		
9	Slovakia																	*0.0*						*0.0*		
9	Tajikistan																	*0.3*						*0.3*		
9	Turkey											*0.9*						*0.6*						*0.6*		
9	Turkmenistan																	*0.6*						*0.0*		
9	Uzbekistan																	*0.3*						*0.0*		
	Weighted regional average											*0.9*						*0.4*						*0.4*		

Observed prevalences (in regular font), prevalence predicted from regression model (in italics); observed consist of national surveys only. Columns 1990 I, 1995 I, and 2000 I are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values. Prevalences wherever possible refer to 0-72 months. Also included, unadjusted, may be other age bands within this range.

TABLE A1.2. Prevalences of vitamin A deficiency (serum retinol < 0.7 μmol/L) in children 0–72 months, 1980–2001

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Angola											*58.7*						*58.1*				64.3		*55.4*		
1	Benin											*42.3*						*40.2*					**[70.2]**	*43.3*		
1	Botswana											*29.7*					32.5	*25.6*						*29.8*		
1	Burkina Faso							[70.5]				*53.0*						*42.9*						*46.4*		
1	Burundi											*44.6*						*45.1*						*44.2*		
1	Cameroon											*38.7*			17.9			*32.2*						*36.0*		
1	Central African Republic											*43.5*						*40.9*					68.2	*45.3*		
1	Chad											*50.4*						*40.8*						*45.1*		
1	Congo									26.0		*34.0*						*33.3*						*32.2*		
1	Congo, Democratic Republic of the											*39.6*						*40.6*						*42.1*		
1	Côte d'Ivoire											*42.8*					46.6	*43.9*		33.2				*34.0*		
1	Eritrea											*48.4*						*46.6*			13.4			*46.0*		
1	Ethiopia	59.6										*39.8*						*37.0*		38.9				*29.5*		
1	Gabon											*42.8*						*39.2*						*41.1*		
1	Gambia, The											*36.7*						*35.1*					**64.0**	*29.2*		
1	Ghana											*53.9*	[73.4]					*50.0*			[75.8]			*45.8*		
1	Guinea											*53.6*						*48.2*						*51.0*		
1	Guinea-Bissau											*31.6*						*28.5*						*31.1*		
1	Kenya											*40.8*					33.0	*39.2*					**[84.4]**	*31.7*		
1	Lesotho											*50.3*						*53.5*						*54.1*		
1	Liberia											*39.7*						*42.5*					52.9	*37.7*		
1	Madagascar											*51.4*						*49.2*						*44.0*		
1	Malawi											*57.5*						*47.5*						*51.4*		
1	Mali											*48.9*						*46.0*						*47.3*		
1	Mauritania											*25.1*						*18.1*						*17.4*		
1	Mauritius											*59.9*						*56.4*	**9.3**					*48.7*		

continued

TABLE A1.2. Prevalences of vitamin A deficiency (serum retinol < 0.7 μmol/L) in children 0–72 months, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Mozambique											*42.3*						*27.9*						*25.8*		
1	Namibia											*51.2*			20.4			*65.8*						*58.8*		
1	Niger											*41.5*						*43.3*						*41.1*		
1	Nigeria											*45.4*						*35.2*				28.0		*38.2*		
1	Rwanda											*40.1*						*37.4*						*38.8*		
1	Senegal											*56.2*						*58.4*						*61.1*		
1	Sierra Leone											*51.0*						*50.6*						*46.9*		
1	Somalia											*34.8*						*24.6*						*25.1*		
1	South Africa											*46.3*		49.0			30.0	*35.4*						*33.1*		
1	Sudan											*42.8*						*36.1*						*35.8*		
1	Swaziland											*34.7*					**53.0**	*38.8*						*38.2*		
1	Tanzania					45.3						*40.5*						*37.5*			24.2			*36.6*		
1	Togo											*41.9*						*42.2*						*34.7*		
1	Uganda											*33.7*						*41.3*						*45.3*	27.9	
1	Zambia									16.5		*32.5*						*39.8*					**65.7**	*39.4*		
1	Zimbabwe											*30.0*						*24.7*					**35.8**	*28.2*		
	Weighted regional average											*42.3*						*41.4*						*40.8*		
2	Afghanistan											*54.8*						*54.2*						*53.3*		
2	Bangladesh											*42.2*						*35.3*			22.0			*28.2*		
2	Bhutan											*43.7*						*43.0*						*32.4*		
2	Nepal											*45.4*						*36.2*				32.3		*32.8*		
2	Pakistan									50.0		*40.2*						*37.8*						*35.0*		
2	Sri Lanka											*14.1*						*11.2*	**33.0**	**35.5** 28				*11.4*		
	Weighted regional average											*41.2*						*37.1*						*33.0*		

3	India											*63.4*						*58.9*						*56.8*		52.3 63.8
4	Algeria											*33.5*						*29.4*						*28.9*		
4	Egypt											*33.8*						*34.8*	**11.3**					*27.1*		
4	Iran											*29.2*						*24.5*						*23.1*		
4	Iraq											*32.0*						*31.3*						*41.7*		
4	Jordan											*24.0*						*18.5*			4.0			*19.3*		
4	Kuwait											*19.4*						*17.2*						*15.8*		
4	Lebanon											*24.4*						*19.5*						*19.9*		
4	Libya											*34.5*						*27.6*						*19.3*		
4	Morocco											*36.2*						*34.2*						*29.2*		
4	Saudi Arabia											*32.6*						*24.5*						*20.9*		
4	Syrian Arab Republic											*27.6*						*23.9*						*22.0*		
4	Tunisia											*27.7*						*24.0*						*21.5*		
4	United Arab Emirates											*25.2*						*17.3*						*13.7*		
4	Yemen											*46.4*			62.4			*38.2*						*40.3*		
	Weighted regional average											*32.6*						*29.0*						*28.0*		
5	Cambodia											*53.6*						*46.3*						*42.3*		
5	Indonesia											*36.5*		57.5				*29.6*						*25.8*		
5	Lao People's Democratic Republic											*43.1*						*43.5*						*42.4*	**44.7**	
5	Malaysia					12.0						*24.8*						*21.2*						*19.7*		
5	Mongolia											*34.4*						*31.3*					**19.8**	*29.1*		
5	Myanmar								32.4			*33.8*						*41.5*						*35.2*		
5	Papua New Guinea											*36.8*						*35.5*						*37.4*		
5	Philippines											*26.4*				35.5		*25.1*				38.0		*22.8*		

continued

TABLE A1.2. Prevalences of vitamin A deficiency (serum retinol < 0.7 μmol/L) in children 0–72 months, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
5	Thailand											*22.7*	20.0					*22.6*						*21.9*		
5	Vietnam											*28.5*						*24.3*						*23.4*	**12.4**	
	Weighted regional average											*32.0*						*29.1*						*26.2*		
6	Belize										**24.0**	*18.5*						*17.0*						*16.4*		
6	Costa Rica		1.8									*11.0*						*9.8*		8.7				*8.8*		
6	Cuba											*9.5*						*8.8*						*8.2*		
6	Dominican Republic											*21.9*		19.6				*16.7*						*17.5*		
6	El Salvador									36.0		*23.2*						*17.8*						*17.0*		
6	Guatemala									21.6		*25.5*						*24.2*	**15.8**					*21.3*		
6	Haiti											*33.7*						*29.9*						*31.5*		
6	Honduras								20.0			*24.0*						*16.7*		13.0				*15.2*		
6	Jamaica											*9.7*						*10.1*			[58.8]			*11.1*		
6	Mexico											*16.9*	32.0					*13.8*						*13.1*		
6	Nicaragua											*21.5*				31.0		*20.9*						*19.4*	**8.8**	
6	Panama											*12.6*			6.0			*11.4*					**9.4**	*11.7*		
6	Trinidad and Tobago											*12.6*						*10.0*						*10.1*		
	Weighted regional average											*18.8*						*15.9*						*15.3*		
7	Bolivia											*32.4*		11.3				*25.4*						*22.6*		
7	Brazil										[54.7]	*22.0*			16.0	19.3		*19.6*				32.1		*15.2*		
7	Chile											*11.4*						*9.6*						*8.8*		
7	Colombia											*16.6*						*13.9*	13.0					*12.7*		
7	Ecuador							15.7				*21.4*				16.3		*14.5*						*13.0*		
7	Guyana											*19.3*						*13.7*			10.6			*18.3*		
7	Paraguay											*16.7*						*13.5*						*12.9*		

7	Peru											*26.9*			22.0			*17.4*		13.0			**10.9**	*16.9*		
7	Uruguay											*11.4*						*10.5*						*9.6*		
7	Venezuela											*15.1*						*11.9*						*11.4*		
	Weighted regional average											*20.9*						*17.3*						*15.0*		
8	China			18.5								*18.2*						*18.3*						*16.4*	11.7	
9	Armenia																	*11.8*						*11.6*		
9	Azerbaijan																	*13.6*						*22.7*		
9	Georgia																	*11.0*						*11.4*		
9	Kazakhstan																	*14.9*						*19.3*		
9	Kyrgyzstan																	*16.5*						*18.3*		
9	Slovakia																	*9.5*						*7.8*		
9	Tajikstan																	*19.3*						*17.9*		
9	Turkey											*25.3*						*19.7*						*17.7*		
9	Turkmenistan																	*21.4*						*17.9*		
9	Uzbekistan															48.9		*39.4*						*39.7*		
	Weighted regional average											*25.3*						*22.0*						*22.0*		

Observed values consist of national (in bold) and subnational (not in bold, regular font) surveys. Prevalence predicted from regression model (in italics). Brackets indicate values not used in the regression model. Columns 1990 I, 1995 I, and 2000 I are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values. Prevalences wherever possible refer to 0-72 months. Also included, unadjusted, may be other age bands within this range.

TABLE A1.3. Prevalences of anemia in nonpregnant women aged 15–49 years, 1974–2000

Region	Country	1974–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Angola										*51.6*						*55.4*						*58.7*		
1	Benin			50.5	41.0	24.3				23.6	*37.9*						*43.4*						*45.1*		[64.6]
1	Botswana										*25.3*					33.0	*28.7*						*31.1*		
1	Burkina Faso							35.4			*48.6*						*50.1*						*48.4*		
1	Burundi			64.4							*53.6*						*56.7*						*60.2*		
1	Cameroon										*37.0*						*39.2*						*39.7* *44.6*	23.7	
1	Central African Republic										*40.3*						*48.0*					49.8	*48.9*		
1	Chad										*53.0*						*54.1*						*55.7*		
1	Congo										*42.8*						*45.4*						*48.3*		
1	Congo, Democratic Republic of the			33.7							*46.9*						*49.1*						*54.1*		
1	Côte d'Ivoire	44.2									*39.3*						*41.1*	[42]					*45.7*		
1	Eritrea										*45.8*						*52.8*						*53.3*		
1	Ethiopia								[8]		*55.8*		36.9				*58.4*						*58.2*		
1	Gabon										*27.1*						*26.9*						*32.1*		
1	Gambia, The							41.0			*46.1*						*50.8*						*52.7*		56.0
1	Ghana										*48.3*						*36.8* *53.9*						*39.7*		
1	Guinea										*48.4* *14.3*						*44.0*						*43.3* *52.3*	50.3	
1	Guinea-Bissau										*47.0*						*50.2*						*53.3*		
1	Kenya	33.0		68.0			34.5				*37.4*						*42.9*					49.2	*42.5*		
1	Lesotho										*38.6*					15.1	*39.0*						*42.7*		
1	Liberia		63.0					64.3			*42.3*						*41.7*					50.0	*43.9*		
1	Madagascar										*38.8*						*37.4*		42.4				*44.8*		
1	Malawi									42.0	*43.6*						*51.1*						*54.5*		
1	Mali										*59.1* *33.2*						*45.4*						*47.4*		

1	Mauritania										*35.9*						*39.4*						*42.0*		
1	Mauritius										*25.2*						*26.8*						*27.7*		
1	Mozambique			48.5							*48.1*						*59.0*						*53.8*		
1	Namibia										*32.3*						*34.7* *36.6*						*34.7*		
1	Niger	36.0									*44.3*						*46.5*						*47.4*		
1	Nigeria	18.0	46.0	39.8		26.5	33.7				*46.9*						*49.0*						*47.1*		
1	Rwanda										*41.1*						*45.0*						*43.4*		
1	Senegal	50.0 56.0									*37.5*						*35.5*						*42.5*		
1	Sierra Leone										*59.4* *39.1*						*59.1*						*68.3*		
1	Somalia						49.7				*48.9*						*52.3*						*53.7*		
1	South Africa	46.0 23.2	62.3		32.3						*24.1*						*24.0*						*26.3*		
1	Sudan					32.6					*40.2*						*42.7*						*44.3*		
1	Swaziland										*31.1*						*30.6*						*32.2*		
1	Tanzania										*43.2*				55.0		*47.1*						*44.7*		
1	Togo										*43.3*						*47.0*						*45.4*		
1	Uganda										*39.2*						*43.3*						*44.4* *36.4*	30.3	
1	Zambia	16.7									*36.1*						*43.8*				41.0		*45.7*		
1	Zimbabwe										*37.6*						*40.8*					34.3	*43.5*		
	Weighted regional average										*43.6*						*45.6*						*46.5*		
2	Afghanistan										*55.4*						*58.4*						*60.9*		
2	Bangladesh	70.0 70.0 74.0									*76.0*						*75.5*			[38.9]			*63.9*		[34]
2	Bhutan					50.0					*65.2*						*54.2*						*55.2*		
2	Nepal										*69.6*						*60.5*				65.0		*62.1*		
2	Pakistan	47.8	47.8		53.6	28.3	23.9	18.0			*57.4*						*58.3*						*58.5*		

continued

TABLE A1.3. Prevalences of anemia in nonpregnant women aged 15–49 years, 1974–2000 *(continued)*

Region	Country	1974–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
2	Sri Lanka								59.8		*53.6*					45.1	*53.7*						*50.5*		
	Weighted regional average										*65.6*						*65.3*						*60.6*		
3	India	52.8 55.3 59.8 54.7	56.7	57.0	69.3	88.4	75.0		62.5		*70.6*						*72.5*				51.9		*70.6*		
4	Algeria										*27.2*						*30.7*						*31.3*		
4	Bahrain	49.6 49.0															*36.2*								
4	Egypt	28.6 63.7		25.9							*34.3*						*33.4*						*32.7* *39.9*	28.0	
4	Iran	17.3									*25.8* *13.8*					[14.5]	*30.3*						*29.1*		
4	Iraq										*28.9*						*36.4*						*40.1*		
4	Jordan							23.0			*24.6* *39.8*		23.5				*25.7*		28.0				*29.3*		
4	Kuwait										*11.5*						*11.0*						*12.3*		
4	Lebanon										*24.8*						*25.7*						*24.1*		
4	Libya										*19.4*						*21.6*						*23.5*		
4	Morocco										*31.6*					30.8	*32.4*						*34.0*		
4	Saudi Arabia									29.7	*17.2*						*18.7*						*18.6*		
4	Syrian Arab Republic										*30.0*						*28.8*						*30.1*		
4	Tunisia					36.2					*26.7*						*27.9*						*27.0*		
4	United Arab Emirates										*7.1*						*8.9*						*10.5*		
4	Yemen										*39.6*						*45.2*						*49.4*		
	Weighted regional average										*28.8*						*31.2*						*31.5*		

5	Cambodia										*34.2*						*39.4*						*40.7* *54.3*	58.0	
5	Indonesia	33.0 57.2	55.0				60.1				*38.9*		42.8				*35.5* *43.4*	39.5					*39.6*		
5	Korea, Democratic People's Republic of																				31.7				
5	Korea, Republic of	25.0																							
5	Lao People's Democratic Republic										*46.1*						*45.5*						*48.0*	[31.4]	
5	Malaysia										*21.5*						*18.2*						*22.1*		
5	Mongolia								21.0		*12.5*						*19.9*						*17.7*	16.9	
5	Myanmar	59.1, 48.5									*44.0*				48.6		*47.7* *48.5*	42.0					*44.8*		
5	Papua New Guinea		48.0		90.0						*43.5*						*38.0*						*42.5*		
5	Philippines	50.5 45.4	27.3				41.3				*31.8*				43.6		*29.9*					32.5, 43.2	*35.3*		
5	Samoa	30.9 47.2																							
5	Thailand	35.0 48.0 39.8	41.3							28.0	*28.6*				33.2		*22.8*	18.0					*27.1*		
5	Vanuatu							10.1																	
5	Vietnam							40.0			*37.3*						*38.7* *44.4*	41.2					*32.5* *29.9*	24.3	
	Weighted regional average										*36.0*						*34.0*						*36.1*		
6	Antigua and Barbuda	17.8																							
6	Barbados	[19]																							
6	Belize				42.2						*20.2*						*20.3*		44.0				*23.8*		
6	Costa Rica									22.0	*22.7,* *24.6*	13.5			26.4		*24.1*		26.8				*24.0*		
6	Cuba	22.0				16.7	4.0				*23.2*			47.8			*27.7*						*28.1*		
6	Dominica		30.0			26.8																			

continued

TABLE A1.3. Prevalences of anemia in nonpregnant women aged 15–49 years, 1974–2000 *(continued)*

Region	Country	1974–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
6	Dominican Republic										*33.6*						*31.1*						*31.3*		
6	El Salvador	15.9							35.5		*31.8*						*32.3*						*33.9*		
6	Grenada	43.5		48.9	59.7	47.0	52.1																		
6	Guatemala	8.0									*34.4*						*35.0* *35.5*	35.0					*34.0*		
6	Haiti										*40.0*						*43.4*						*50.9* *52.4*	54.4	
6	Honduras				15.0						*32.7*					26.0	*33.9* *30.0*	25.8					*31.4*		[14.7]
6	Jamaica	45.6				42.6		25.0			*25.9*						*27.7*			43.7			*26.5*		
6	Mexico	14.0 46.2		76.0		74.0			15.4	31.9	*24.4* *18.9*	14.0			33.3		*21.0*						*20.6*		
6	Nicaragua										*35.1*				36.3		*36.4*						*39.6* *30.4*	[24]	
6	Panama										*25.2*			34.7			*23.8*					40.7	*24.8*		
6	Trinidad and Tobago				21.0						*23.5*						*25.0*						*25.3*		
	Weighted regional average										*28.1*						*25.3*						*25.5*		
7	Bolivia		18.3			24.7					*33.7*					43.5	*32.1*				27.1		*30.3*		
7	Brazil	31.7 24	23.0			21.0	31.2				*23.3*						*19.7*						*20.8*		
7	Chile	8.0	21.8	5.0							*20.1*						*15.1*						*15.4*		
7	Colombia	16.8									*26.8*						*25.3*	22.5					*26.5*		
7	Ecuador				7.0	18.9					*30.1*						*30.6*			35.5			*34.2*		
7	Guyana	59.7			41.0	53.6	52.1				*32.9*						*36.1*						*34.9*		
7	Paraguay										*24.7*						*20.1*						*25.2*		
7	Peru										*32.4*						*31.1*		35.7				*32.4* *34.5*	[31.6]	
7	Uruguay										*12.0*						*6.2*						*9.6*		

7	Venezuela		16.0	16.7							*24.1*			43.0			*25.1*						*23.9*		
	Weighted regional average										*24.8*						*22.2*						*23.3*		
8	China	16, 50	38.0	11.0	31.9	21.0		31.9	34.0		*27.8*			21.5			*24.2*						*20.6*		
9	Armenia																*28.8*						*33.7* *15.3*	[12.4]	
9	Azerbaijan																*31.6*						*34.8*		
9	Georgia																*31.0*						*30.6*		
9	Kazakhstan																*20.6* *47.5*	48.5				[35.6]	*25.7*		
9	Kyrgyzstan																*25.5*			38.0			*31.4*		
9	Slovakia																*18.3*						*20.1*		
9	Tajikistan																*37.3*						*42.1*		
9	Turkey	60.1									*27.2*						*27.2*						*32.7*		
9	Turkmenistan																*25.9*						*28.0* *36.7*	[47.5]	
9	Uzbekistan																*25.4*		60.0				*29.5*		
	Weighted regional average																*26.5*						*31.1*		

Observed prevalence (regular font), predicted from prevalence in pregnant women (underlined), and predicted from regression model (in italics); brackets indicate values not used in the regression model. Shaded cells are the observed values that were used in the formulation of the regression model. Observed values consist of both national and subnational surveys. Columns 1990 I, 1995 I, and 2000 I are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values.

TABLE A1.4. Prevalences of anemia in pregnant women, 1974–2001

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Angola										*42.9*						*45.6*						*45.7*		
1	Benin			55.2	47.6	34.3				23.5	*49.0*						*49.0*						*48.6*		[72.7]
1	Botswana										*34.4*					41.2	*30.7*						*26.5*		
1	Burkina Faso							43.1			*49.2*						*50.7*						*50.1*		
1	Burundi			80.0							*52.1*						*53.1*						*54.1*		
1	Cameroon										*41.5*						*44.8*						*45.4* *33.8*	[52.6]	
1	Central African Republic										*42.9*						*42.5*					54.8	*42.0*		
1	Chad										*46.9*						*48.9*						*49.2*		
1	Congo										*41.2*						*43.7*						*45.5*		
1	Congo, Democratic Republic of the			37.5							*51.3*						*52.4*								
1	Côte d'Ivoire	52.0									*44.4*						*45.9* *48.4*						*45.9*		
1	Eritrea																*51.5*						*50.1*		
1	Ethiopia								6.0		*50.0*		41.9				*50.2*						*51.3*		
1	Gabon										*30.8*						*36.5*						*31.9*		
1	Gambia, The							60.0			*46.7*						*51.0*						*51.3*		73.0
1	Ghana										*48.7*						*49.7*	65.4					*50.6*		
1	Guinea										*49.5*	10.7					*48.5*						*49.6* *55.0*	63.2	
1	Guinea-Bissau										*46.9*						*46.7*						*46.7*		
1	Kenya	57.0		85.0			42.4				*45.6*						*47.7*					54.1	*46.7*		
1	Lesotho										*45.8*					7.1	*43.2*						*46.2*		
1	Liberia		78.0					79.8			*48.2*						*47.5*					62.1	*47.9*		
1	Madagascar										*44.4*						*44.2*		45.3				*45.0*		
1	Malawi									49.0	*52.4*						*52.9*						*53.1*		
1	Mali										*47.9*	36.8					*48.1*						*48.4*		

1	Mauritania										*43.2*						*45.7*						*46.2*		
1	Mauritius										*30.0*						*21.5*						*20.5*		
1	Mozambique			58.0							*53.1*						*53.7*						*52.3*		
1	Namibia										*39.8*						*30.1*	41.5					*31.5*		
1	Niger	43.6									*49.3*						*50.3*						*50.9*		
1	Nigeria	43.4 29. 9 29.3	51.6	46.0		27.5	37.5				*51.2*						*51.7*						*51.7*		
1	Rwanda										*51.6*						*53.4*						*52.8*		
1	Senegal	54.8 59.5									*44.1*						*44.9*						*45.7*		
1	Sierra Leone										*52.3*	45.0					*53.5*						*54.1*		
1	Somalia						65.0				*41.1*						*40.2*						*40.0*		
1	South Africa	35.1 23.0	28.5		35.5						*37.4*						*34.2*						*34.0*		
1	Sudan					36.0					*45.3*						*45.6*						*45.0*		
1	Swaziland										*42.6*						*39.0*						*38.3*		
1	Tanzania	67.0									*51.3*				58.7		*50.4*						*49.5*		
1	Togo										*49.2*						*50.9*						*50.8*		
1	Uganda										*48.7*						*48.7*						*48.2* *39.1*	41.2	
1	Zambia	32, 14									*47.7*						*48.0*						*49.1*		
1	Zimbabwe										*45.0*						*46.9*					18.8	*46.5*		
	Weighted regional average										*47.9*						*48.2*						*48.2*		
2	Afghanistan										*43.9*						*44.1*						*45.4*		
2	Bangladesh	53.0									*53.9*						*53.2*			49.2			*51.2*		51.0
2	Bhutan					60.0																			
2	Nepal										*52.5*						*51.8*				[68.9]		*51.8*		
2	Pakistan	57.0	[57]		65.0	30.0	24.0	29.3			*48.6*						*47.0*						*47.7*		
2	Sri Lanka								62.6		*50.0*					39.0	*46.3*						*43.9*		

continued

TABLE A1.4. Prevalences of anemia in pregnant women, 1974–2001 *(continued)*

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
	Weighted regional average										*50.5*						*49.2*						*48.7*		
3	India	69.5 71.1 66.5	73.7	60.3	76.8	88.0	65.5		90.0		*73.3*						*73.5*				49.7		*71.7*		
4	Algeria										*29.7*						*34.8*						*35.2*		
4	Bahrain	54.4 54.0																[41]							
4	Egypt	30.5 79.0		35.6							*46.1*						*43.7*						*35.9* *37.2*	46.1	
4	Iran	14.8									*27.0*	10.0				26.5	*40.6*						*34.9*		
4	Iraq										*27.7*						*41.3*						*26.2*		
4	Jordan							46.0			*38.6*	46.0	23.4				*37.0*		35.0				*35.7*		
4	Kuwait										*35.6*						*39.6*						*35.1*		
4	Lebanon										*31.9*						*28.9*						*22.3*		
4	Libya										*9.9*						*5.4*						*5.5*		
4	Morocco										*41.8*					45.4	*40.0*						*39.3*		
4	Oman	38.8																							
4	Saudi Arabia									31.9	*20.2*						*23.4*						*23.1*		
4	Syrian Arab Republic										*40.8*						*39.7*						*40.7*		
4	Tunisia					41.0					*36.7*						*32.5*						*30.5*		
4	United Arab Emirates										*35.6*						*39.6*						*35.1*		
4	Yemen										*44.5*						*49.5*						*47.5*		
	Weighted regional average										*35.6*						*39.6*						*35.1*		
5	Cambodia										*41.7*						*45.3*						*44.8* *61.1*	[66]	

5	Indonesia	37 70	68.0				74.0				*46.9*		50.1				*41.8* *46.4*	50.9					*47.4*		
5	Korea, Democratic People's Republic of																				34.7				
5	Korea, Republic of	34.9																							
5	Lao People's Democratic Republic										*48.6*						*45.7*						*46.3* *40.0*		
5	Malaysia										*37.1*						*43.4*						*39.2*		
5	Maldives		19.8																						
5	Mongolia								20.0		*23.0*						*9.6*						*6.2* *28.4*		
5	Myanmar	72.7 58									*52.2*				58.1		*52.0* *48.4*	58.0					*51.2*		
5	Papua New Guinea		53.2		86.6						*39.7*						*38.7*						*40.4*		
5	Philippines	53.0 53.7	33.8				48.0				*41.4*				43.6		*39.4*				50.7		*39.0*		
5	Samoa	56.2																							
5	Thailand	59.1 53.2 46.0	48.0				20.5			37.2	*37.6*		25.0		36.9		*32.6*	22.3	19.1				*34.1*		
5	Vietnam							46.5			*44.1*						*42.9* *47.8*	52.3					*40.4* *34.3*	32.2	
	Weighted regional average										*44.4*						*41.5*						*43.2*		
6	Bahamas			[12]																					
6	Barbados	[29]																							
6	Belize				49.3						*38.8*						*36.8*		51.7				*30.5*		
6	Costa Rica									28.0	*34.0,* *25.7*	24.9			27.4		*29.2*		27.9				*19.7*		
6	Cuba	32.5				14.0	18.1				*38.9*			57.0			*39.1*						*39.0*		
6	Dominica		38.8			28.0																			
6	Dominican Republic										*40.9*						*37.8*						*36.0*		

continued

TABLE A1.4. Prevalences of anemia in pregnant women, 1974–2001 *(continued)*

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
6	El Salvador	12.9							40.0		*40.3*						*34.2*						*30.1*		
6	Grenada	51.0		58.5	73.5	52.4	62.9																		
6	Guatemala	21.3									*42.6*						*37.5* *42.8*	40.0					*34.5*		
6	Haiti										*48.5*						*49.2*						*45.5* *58.3*	63.4	
6	Honduras				26.9						*45.2*					26.0	*44.2* *35.5*	32.4					*41.6*		26.7
6	Jamaica	52.6				48.9		52.0			*37.7*						*37.5*			51.3			*37.0*		
6	Mexico	54.8		41.0		73.9			18.2	35.0	*31.9* *26.1*	17.0			37.0		*32.0*						*36.0*		
6	Nicaragua										*43.6*				43.9		*48.6*						*47.3* *34.1*	32.9	
6	Panama										*35.6*			38.9			*34.7*					36.3	*37.7*		
6	Trinidad and Tobago				[53]						*24.5*						*21.5*						*16.3*		
	Weighted regional average										*35.6*						*35.0*						*36.4*		
7	Bolivia		16.2			25.0					*37.4*					51.0	*37.7*				27.9		*37.7*		
7	Brazil	34.7 34.1	33.3			31.7	34.0				*36.4*						*43.5*						*48.0*		
7	Chile	21.3	21.0	15.0							*39.3*						*53.0*						*59.3*		
7	Colombia	30.3									*38.6*						*36.6* *32.9*						*34.9*		
7	Ecuador				20.5	17.0					*40.7*						*37.8*			40.0			*38.8*		
7	Guyana	73.7			71.0	65.0	63.0				*33.7*						*43.5*						*41.4*		
7	Paraguay										*38.3*						*41.5*						*39.9*		
7	Peru										*39.4*						*28.7*		35.1				*30.8* *40.1*	38.6	
7	Uruguay										*59.9*						*127.7*						*125.4*		

7	Venezuela		27.7	14.0							*30.2*			49.2			*28.1*						*25.1*		
	Weighted regional average										*37.1*						*41.2*						*43.6*		
8	China	13.0 54.8	43.5	23.7	35.0	20.0		35.0	42.0		*31.3*			35.0			*27.8*						*27.3*		
9	Armenia																*40.2*						*42.3* *24.8*	12.0	
9	Azerbaijan																*45.5*						*44.1*		
9	Georgia																*44.1*						*41.8*		
9	Kazakhstan																*38.8* *53.6*	56.6				32.9	*38.8*		
9	Kyrgyzstan																*36.7*			38.3			*41.3*		
9	Slovakia																*41.7*						*37.2*		
9	Tajikistan																*47.5*						*49.0*		
9	Turkey	[74]									*34.3*						*21.3*						*17.9*		
9	Turkmenistan																*39.3*						*40.2* *52.8*	41.6	
9	Uzbekistan																*39.5*		50.8				*40.6*		
	Weighted regional average										*34.3*						*32.2*						*30.5*		

Observed prevalence (in regular font), predicted prevalence based on nonpregnant women (underlined), and predicted prevalence from regression model (in italics); brackets indicate values not used in the regression model; shaded cells are the observed values that were used in the formulation of the regression model; observed values consist of both national and subnational surveys. Columns 1990 I, 1995 I, and 2000 I, are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values.

TABLE A1.5. Prevalences of anemia in children 0–59 months old, 1974–2001

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
1	Angola										*69.0*						*72.8*						*71.6*		
1	Benin										*78.0*						*74.7*						*75.1*		[81.9]
1	Botswana										*46.4*					38.0	*44.1*						*37.3*		
1	Burkina Faso										*80.9*						*84.4*						*83.2*		
1	Burundi										*76.0*						*83.8*						*82.0*		
1	Cameroon										*60.6*						*61.5*						*57.7*	57.0	
1	Central African Republic										*74.5*						*67.8*					84.2 46.2	*74.4*		
1	Chad										*83.6*						*79.0*						*76.2*		
1	Congo										*59.6*						*56.5*						*55.2*		
1	Congo, Democratic Republic of										*68.9*						*73.1*						*79.1*		
1	Côte d'Ivoire										*63.9*						*67.9*	[49]					*65.5*		
1	Eritrea										*66.7*						*82.4*						*75.0*		
1	Ethiopia										*82.7*						*87.8*						*85.4*		
1	Gabon										*46.5*						*44.8*						*43.0*		
1	Gambia, The										*66.7*						*76.4*						*74.6*		76 59.4
1	Ghana										*66.7*						*67.9*	83.5					*64.8*		
1	Guinea										*76.1* *14.3*						*72.1*						*72.5*	79.0	
1	Guinnea-Bisseau										*82.3*						*73.5*						*83.2*		
1	Kenya										*64.9*						*64.3*						*60.0*		
1	Lesotho										*69.4*						*56.8*						*50.7*		
1	Liberia										*71.9*						*73.2*					86.7 51.5	*68.7*		
1	Madagascar										*65.3*						*77.6*		[66.8] 39.3				*72.8*		

1	Malawi										*77.7*						*77.5*						*76.0*		
1	Mali										*78.4* *33.2*						*79.4*						*76.8*		
1	Mauritania										*73.3*						*72.6*						*73.8*		
1	Mauritius										*54.1*						*37.3*						*35.6*		
1	Mozambique										*91.1*						*90.5*						*79.6*		
1	Namibia										*61.8*						*43.9*						*41.6*		
1	Niger										*79.1*						*85.5*						*87.1*		
1	Nigeria										*73.6*						*71.9*						*69.2*		
1	Rwanda										*73.2*						*74.0*						*68.9*		
1	Senegal										*68.7*						*70.9*						*71.2*		
1	Sierra Leone	[50]									*83.4* *39.1*						*84.1*						*85.8*		
1	Somalia										*87.1*						*90.1*						*78.4*		
1	South Africa										*53.0*					21.4	*37.1*						*36.9*		
1	Sudan										*77.7*						*73.8*						*70.2*		
1	Swaziland										*66.7*						*48.6*						*46.7*		
1	Tanzania										*67.1*						*76.4*						*65.2*		
1	Togo										*72.2*						*73.2*						*71.7*		
1	Uganda										*77.1*						*71.8*						*67.2*	64.1	
1	Zambia										*61.8*						*60.5*				[65]		*63.3*		
1	Zimbabwe										*59.2*						*54.9*					19.3 20.2	*53.1*		
	Weighted regional average										*72.1*						*72.5*					70.5			
2	Afghanistan										*65.5*						*66.3*						*64.5*		
2	Bangladesh										*66.4*						*63.4*			52.7 42.2			*58.1*		48 43.5
2	Bhutan					58.0 50.0					*66.0*						*57.4*						*53.0*		

continued

TABLE A1.5. Prevalences of anemia in children 0–59 months old, 1974–2001 *(continued)*

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
2	Nepal										*70.7*						*68.8*				74.9 56.4		*64.9*		
2	Pakistan					65.0 28.3	23.9				*60.5*						*57.7*						*56.3*		
2	Sri Lanka										*39.6*						*34.8*						*32.1*		
	Weighted regional average										*62.9*						*60.3*						*57.4*		
3	India										*79.7*						*78.8*				74.3		*74.6*		
4	Algeria										*36.5*						*38.1*						*37.6*		
4	Bahrain																								
4	Egypt										*52.1*						*48.0*						*40.3,* *39.9*	30.5	
4	Iran										*35.7,* *13.8*						*39.4*						*31.6*		
4	Iraq										*34.4*						*43.5*						*36.3*		
4	Jordan										*34.3,* *39.8*		[1.0], 23.5				*29.7*						*27.2*		
4	Kuwait										*10.2*						*7.1*						*4.7*		
4	Lebanon										*28.0*						*20.9*						*20.5*		
4	Libya										*26.1*						*21.8*						*20.3*		
4	Morocco										*46.5*					35.4, 39.4	*47.0*						*45.0*		
4	Oman													60.0											
4	Saudi Arabia										*24.0*						*23.4*						*18.5*		
4	Syrian Arab Republic										*42.2*						*39.5*						*39.5*		
4	Tunisia	29.9									*37.2*						*35.1*						*32.2*		
4	United Arab Emirates										*16.9*						*5.6*						*1.4*		
4	Yemen										*53.7*						*62.7*						*59.3*		

	Weighted regional average										*40.3*						*41.2*						*37.2*		
5	Cambodia										*52.7*						*54.2*						*53.1* *54.3*	63.0	
5	Indonesia										*44.3*						*34.2*	40.5					*38.3*		
5	Lao People's Democratic Republic										*53.3*						*54.4*						*54.4*	48.2	
5	Malaysia										*28.1*						*20.8*						*20.4*		
5	Micronesia									[70]															
5	Mongolia										*40.0*						*45.7*						*36.9*	30.3	
5	Myanmar										*50.5*						*48.7*	30.4					*47.8*		
5	Papua New Guinea										*47.4*						*37.0*						*39.7*		
5	Philippines										*33.5*				27.0		*28.7*				29.6		*28.5*		
5	Samoa				[63]																				
5	Thailand						40.6				*27.0*						*20.0*	25.7	25.2				*22.4*		
5	Vietnam										*46.1*						*44.0*	45.3					*39.3* *29.9*	34.5	
	Weighted regional average										*41.4*						*35.7*						*36.0*		
6	Barbados	11.5 27.6																							
6	Belize										*30.8*						*27.0*		19.0 44.0				*22.9*		
6	Costa Rica										*23.2* *24.6*						*19.6*		26.0 26.8				*15.2*		
6	Cuba										*28.0*						*27.4*						*27.1*		
6	Dominica																								
6	Dominican Republic										*34.7*						*29.1*						*25.0*		

continued

TABLE A1.5. Prevalences of anemia in children 0–59 months old, 1974–2001 *(continued)*

Region	Country	1971–1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	2001
6	El Salvador								23.0 35.5		*35.5*						*31.8*						*27.9*		
6	Grenada													55.7											
6	Guatemala										*44.3*						*39.8* *35.5*	26.0					*34.0*		
6	Haiti										*53.0*						*58.3*						*50.1* *52.4*	[65.8]	
6	Honduras										*41.2*						*40.5* *30.0*	30.0					*33.5*		[29.9]
6	Jamaica							[78.0] 44.2			*23.7*						*26.7*			48.2 43.7			*21.4*		
6	Mexico										*23.0* *18.9*						*19.6*						*14.9*		
6	Nicaragua										*36.0*						*46.7*						*46.6* *30.4*	[33.5]	
6	Panama										*25.1*			18.0 34.7			*20.6*					36.0 32.8	*18.6*		
6	St Vincent and the Grenadines								[68]																
6	Trinidad and Tobago										*22.0*						*15.4*						*12.4*		
	Weighted regional average										*28.9*						*27.0*						*22.6*		
7	Bolivia										*66.4*						*62.4*				66.8 26.8		*59.4*		
7	Brazil										*49.5*						*45.6*						*45.2*		
7	Chile										*48.7*						*40.7*						*39.4*		
7	Colombia										*55.2*						*49.5*	23.3					*48.3*		
7	Ecuador										*58.3*						*53.5*			72.0 35.5			*54.2*		

7	Guyana										*52.6*						*58.8*			47.9			*56.2*		
7	Paraguay										*55.6*						*50.7*						*51.9*		
7	Peru										*57.9*						*50.0*		56.8 32				*50.3,* *34.5*	49.6	
7	Uruguay										*45.1*						*37.7*						*36.1*		
7	Venezuela										*46.9*						*45.3*						*40.9*		
	Weighted regional average										*51.7*						*47.2*						*48.4*		
8	China										*20.8*			16.7 31.9			*12.5*						*8.4*		
9	Armenia																*30.8*						*34.1,* *15.3*	23.9	
9	Azerbaijan																*34.9*						*33.4*		
9	Georgia																*35.7*						*32.9*		
9	Kazakhstan																*24.9*	69.9				36.3 30.4	*26.3*		
9	Kyrgyzstan																*32.4*			49.8 32.5			*41.7*		
9	Tajikistan																*37.9*						*45.0*		
9	Turkey										*31.3*						*25.8*						*23.3*		
9	Turkmenistan																*29.1*						*30.4,* *36.7*	35.9	
9	Uzbekistan																*27.7*		[61], 43.3				*32.5*		
	Weighted regional average																*27.8*						*28.2*		

Observed prevalence (in regular font), prevalence predicted from the regression model (in italics); brackets indicate values not used in the regression model. Shaded cells are the observed values that were used in the formulation of the regression model. Observed values consist of both national and subnational surveys. Columns 1990 I, 1995 I, and 2000 I are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values.

Table A1.6A. Iodine deficiency and salt iodization programs in Sub-Saharan Africa, Middle East and North Africa, and Central Asia and

Country	1945–1969	1970–1979	1980	1981	1982	1983	1984	1985 O.	1986	1987	1988	1989	1990 O.	1991	1992
Angola															
Benin						23.7									
Botswana												8.0			
Burkina Faso										16.2					
Burundi													42.4		
Cameroon							70							26.3	
Cape Verde						2.0									
Central African Republic														62.5	
Chad															
Comoros															
Congo															
Congo, Democratic Republic of															
Côte d'Ivoire															
Equatorial Guinea															
Eritrea															
Ethiopia						28.5									
Gabon												34.4			
Gambia															
Ghana															
Guinea													22.6		
Guinnea-Bisseau													19		
Kenya							(20)								
Lesotho											16.2				
Liberia								(13.9)							
Madagascar													24.1		
Malawi												12.7			
Mali															
Mauritania															
Mauritius															
Mozam-bique															76
Namibia													34.5		

Eastern Europe, 1945–2001

1993	1994	1995 O.	TGR source	1996	1997	1998	1999	2000 O.	2001	2002	1997 (1992–1996)	2000 (1995–2000)	2002 (1997–2000)	TGR 2000 P	TGR source
				Legislation							*0*	*10*	*10x*	33.4	
	19.1		2,1	*79*				**1.1,** *98*			*35*	*79*	*79x*	12.7	3
			2					*66*			*97*	*27*	*66*	17.4	
			2	Legislation, *22*							*22*	*23*	*23x*	29.1	
			2					*68*			*80*	*80*	*68*	17.6	
			2						*>90*		*86*	*82*	*84*	11.7	
			2									*99*	0x		
			5	Legislation				*87*			*28*	*65*	*87*	11.2	
				63							*31*	*55*	*58*	24.0	4
				Legislation									*83*		
											45			36.2	
								96	**5.7**		*19*	*90*	*90*	16.9	3
				75, Legislation							*0*		*31*	18.4	5
												20	*20x*		
	22		1			**36.6**	*97*				*80*	*80*	*97*	10.0	5
			5					*28*			*0*	*0*	*28*	23.1	
									17.1, *36*				*15*	27.3	3
							16.3				*0*	*0*	*8*	19.6	5
16.8			1			*28*						*10*	*28*	18.1	
			1	Legislation	*		*12*					*37*	*12*	22.9	
			2				*12*				*0*		*2*	16.9	
	16.3		2,3					*90*			*89*	*100*	*91*	10.1	
			2					*69*				*73*	*69*	19.4	
			2					*84*						17.6	
			2	*				*76*	**(3.5)**		*1*	*73*	*76*	11.7	5
			2	**27**					*82*		*58*	*58*	*48*	21.8	3
				8					**42.8**		*20*	*9*	*9x*	42.4	5
				30.9, Legislation				*3*			*3*	*3*	*3*	20.5	3
								0			*0*	*0*	*0x*	27.6	
			3			**19.2**		*62*			*62*	*62*	*62x*	17.4	3
	Legislation		2				*>90*	*63*			*80*	*59*	*63*	18.4	

continued

Table A1.6A. Iodine deficiency and salt iodization programs in Sub-Saharan Africa, Middle East and North Africa, and Central Asia and

Country	1945–1969	1970–1979	1980	1981	1982	1983	1984	1985 O.	1986	1987	1988	1989	1990 O.	1991	1992
Niger															
Nigeria															Legislation
Rwanda													**49.6**	Legislation	
Senegal															44.3
Sierra Leone															
Somalia															
South Africa	*	Legislation													
Sudan															
Swaziland															
Tanzania		Legislation				42.5									
Togo									22.1						
Uganda															
Zambia		**50.5** Legislation													
Zimbabwe												42.3			
Algeria	Legislation									8.5					
Egypt														5.2	
Iran											**30**	Legislation			
Iraq													Legislation		42.9
Jordan															
Kuwait															
Lebanon	Legislation (1964)														*
Libya															

Eastern Europe, 1945–2001 *(continued)*

1993	1994	1995 O.	TGR source	1996	1997	1998	1999	2000 O.	2001	2002	1997 (1992–1996)	2000 (1995–2000)	2002 (1997–2000)	TGR 2000 P	TGR source
	35.8		3	Legislation		**20.4**		*44*			*0*	*64*	*44*	28.3	5
20			3					*97*			*83*	*98*	*98*	7.7	
			2		**25.9**			*76*			90	95	76	12.8	3
	Legislation		9					*31*			*10*	*9*	*31*	23.3	
											75	*75*	*23*	16.4	
														12.6	
	1		7			*62*					*40*	*40*	*62*	35.1	
	Legislation			*10*	**22**			** 10*				*0*	*96*	11.5	5
		26						*76*				*26*	*26x*	16.3	
		*	2				**(23.0)**		**(12.3, 32.2)=17**	*83*	*74*	*74*	*67*	13.5	5,5
			2					*98*	**7.2**		*0*	*73*	*73*	8.6	3
15.7	(44) Legislation		3					*64*			*50*	*69*	*69x*	16.9	
32			2,1					*37*			*90*	*90*	*54*	25.4	
	Legislation		2				**14.8***(93)*				*94*	*80*	*93*	8.6	6
8			2,3				*92*	*68*			*92*	*92*	*69*	16.7	
			2	Legislation?				*60*			*90*	*0*	*56*	11.9	
			2	Recent iodized salt				*94(yr?)*			*82*	*94*	*94*	9.1	
			3				*92*				*50*	*10*	*40*	24.6	
37.7, Legislation			3	*				33.5 *86(yr?)*			*75*	*95*	*88*	10.8	5
				Agreement to iodize salt							92	92	87		
25.7			1	*91*				*87*			*90*	*90*	*90x*	11.0	
						Legislation		*90(yr?)*						10.1	

continued

Table A1.6A. Iodine deficiency and salt iodization programs in Sub-Saharan Africa, Middle East and North Africa, and Central Asia and

Country	1945–1969	1970–1979	1980	1981	1982	1983	1984	1985 O.	1986	1987	1988	1989	1990 O.	1991	1992
Morocco															
Oman															
Palestine															
Saudi Arabia				Iodized salt											
Syrian Arab Republic															**73**
Tunisia		Legislation (1970)		4.3											
United Arab Emirates															
Yemen														32	
Armenia															
Azerbaijan															
Georgia															
Kazakhstan															
Kyrgyzstan															
Slovakia															
Tajikistan															
Turkey	Legislation (1968)													30.3	
Turkmenistan															
Uzbekistan												**15**			

Bolded values are total goiter rate (TGR) prevalence; iodized salt coverage is in italics; * indicates the year that large-scale iodization of salt started; ( ) indicates subnational data; X indicates household iodized salt consumption not between 1997 and 2000. Shaded cells show where coverage of iodized salt is thought to be > 25%. Estimates for all countries are given for 2000 only. 2000 P represents the predicted values. 1985 O, 1990 O, 1995 O, 2000 O are the observed survey values. See page 159, this issue, for sources.

Eastern Europe, 1945–2001 *(continued)*

1993	1994	1995 O.	TGR source	1996	1997	1998	1999	2000 O.	2001	2002	1997 (1992–1996)	2000 (1995–2000)	2002 (1997–2000)	TGR 2000 P	TGR source
22	Legislation	*	3	Iodized salt started				*30(yr?)*				*65*	61		
10		Legislation	3					*87(yr?)*							
											21	*40*	*40*		
Legislation		*	2					*40(yr?)*				*98*	*97*	27.1	
			2					*97*						9.1	
											21	*39*	*39*		
			2	Legislation		**16.8**							*70*	16.1	3
													41	11.6	
													8	14.6	
											14	*53*	*20*	20.5	
												27	*27*	21.4	
								< 17(yr?)						20.9	
											20	*20*	*20*		
											31	*18*	*18x*	28.1	
			3								*0*	*0*	*90*	22.6	
											0	*0*	*19*	10.6	
			11											24.3	

TABLE A1.6B. Iodine deficiency and salt iodization programs in South Asia, Southeast Asia, and Latin America, 1945–2001

Country	Pre-iod TGR	1945–1969	1970–1979	1980	1981	1982	1983	1984	1985 O.	1986	1987	1988	1989	1990 0.	TGR source*
Afghanistan															
Bangladesh	20–30%												Legisla-tion		
Bhutan	>30%					**65.4**, *0*									10
India	<20%						(15)			*					
Nepal	>30%	**55** (1960)	*,**57.6**							44.2-					10,2,2
Pakistan										(10–80)					
Sri Lanka	<20%	(**22.5 wet-zone, 6.1dry), (12-54)**								14.4			16.6		2,2
Maldives															
Cambodia	>30%														
China			(70)			(50)				**9.2**	*(87)*				2
Indonesia	>30%			32		(37)			*			27.7			7,2,2
Korea, Democratic People's Republic of															
Lao People's Democratic Republic	20-30%											25			2
Malaysia															
Mongolia	20-30%														
Myanmar	20-30%													**18**	2
Papua New Guinea															
Philippines	<20%										14.7				2
Thailand	<20%	*0*								17		*			
Vietnam															
Belize															
Costa Rica	<20%	Legisla-tion (1941), **18** (1966)	**5.3** (1979)											**3**	10,10,2
Cuba			(**30**) (1974)												10
Dominican Republic	<20%														
El Salvador		**48** (1966)	*56*		17									**24.6**	10,2
Guatemala	20–40%	*93*	*15*				15.5								

1991	1992	1993	1994	1995 O.	1996	1997	1998	1999	2000 O.	2001	2002	**1997** (1992-1996)	**2000** (1995-2000)	**2002** (1997-2000)		TGR source
															47.7	
		47.1		*, 53					70.1	55		44	*78*	*70*	16.7	1
	25		96		82							*96*	*82*	*82X*	13.8	2
							49.4				*67*	*70*	*52*	26.2		
	(32)						**40,** *55.2*		62.6			*68*	*93*	*24.3*	24.3	5
				19	50							*19*	*19*	*38.3*	38.3	
				*					87, **21**			*7*	*47*	*10.8*	10.8	8
				23.6												3
			62			17			13.8	13		*0*	*7*	*14*	18.0	2,5
			*	**20.4**		10.8		**8,** *91.2*				51	83	91		3,3,5
					9.8		65.2	63.6	64.5			*50*	*62*	*64*	12.3	8
							*					5	5			
			*		(72)				*75.8,* **9**				*93*	*76*	13.7	7
		28					*67.7*	**21.4**					*68*	*68*	14.9	3,5
25.1			*14*	*18*	** 41*	*50,* **25.1**	*60*	*80,* **12.2**	*45.6*			*14*	*65*	*46*	17.4	3,7
(61)		**6.7**	*				21	22.4				*40*	*15*	*22*	14.9	5
16.3		**11**	*50*		5.9			*74.1,* **2.7**				*50*	*50*	*74*	13.0	1,1,1,7
		34.9, *	*42*	**27.1**	*85.3*	*89*	**14.9**		**10.1,** *77.6 or 39.5*			42	65	40	14.6	1,5,7,7
			5.5, *90*	*97.5*									*90*	*90X*	10.5	5
			(81.6 - 92.3)		97							91	89	*97X*	9.9	
												0	*45*	*0*	8.5	
		5.3	*						18.1			40	13	18	11.4	3
				91.1								*91*	*91*	*91X*	10.6	
				20.4, *38*				49.3				93	64	49	16.0	3

continued

TABLE A1.6B. Iodine deficiency and salt iodization programs in South Asia, Southeast Asia, and Latin America, 1945–2001 *(continued)*

Country	Pre-iod TGR	1945–1969	1970–1979	1980	1981	1982	1983	1984	1985 O.	1986	1987	1988	1989	1990 0.	TGR source
Haiti															2
Honduras	<20%	**17** (1969)	*(1971)								8.8				10,2
Jamaica		*(1962)													
Mexico		**28.8** (1932), **28.8, (54.6)**													
Nicaragua	>30%		*(1978), **33**		20									**4.3**	10,10,2
Panama	<20%	**16.5,** *0*	*(1970), **6**												10,10
Trinidad and Tobago															
Argentina		**49.8,** *(1968)											8.3		10,2
Bolivia			**(77)** , *(1970)		60.8								20.9		10,2
Brazil		**(27.2)**	*(1974), **14.7**												10,2
Chile			(24.8)			9									10,2
Colombia	>30%	**52.6,** *(1950), **33.9**													10
Ecuador	<20%		17.4					*							2
Guyana															
Paraguay	>30%						33.4							**48.7**	2
Peru	20-30%	**22**	**28.9,** *(1970), *86*												2
Uruguay														**1**	2
Venezuela	<20%				17.2									**10.7, 6.67**	2,3,5

Bolded values are total goiter rate (TGR) prevalence; iodized salt coverage is in italics (nonbold); * indicates the year that large-scale iodization of salt started; ( ) indicates subnational data; X indicates household iodized salt consumption not between 1997 and 2000. 1985 O, 1990 O, 1995 O, 2000 O are the observed survey values. Shaded cells show where coverage of iodized salt is thought to be > 25%. See page 159, this issue, for sources.

1991	1992	1993	1994	1995 O.	1996	1997	1998	1999	2000 O.	2001	2002	**1997** (1992-1996)	**2000** (1995-2000)	**2002** (1997-2000)	TGR 2000 P	TGR source
	10								10.8			*10*	*10*	*11*	11.5	3
			85		**4.9,** *86*		80	3.5				*85*	*85*	*80*	12.0	3,5
								100	100			*100*	*100*	*100*	10.8	
					3				90			*87*	*99*	*90*	10.4	3
		(**33.7**)	*79*				86.1		2.5			79	86	86	11.0	5
13.2			92				*94.6*	**10.2**				*92*	*92*	*95*	10.2	2,5
									1.2					1	11.6	
					90							90	90	90X		
			(4.5)		92			90	62.5			*92*	*90*	*63*	20.2	3
					95.2				(**1.4**), *87*			*79*	*95*	*95X*	8.0	5
11.4								100				*90*	*97*	*100*	8.8	2
	*		6.5			92						*90*	*92*	*92*	9.9	8
								99				*90*	*97*	*99*	8.4	
			(40.0)				83.2					*64*	*79*	*83*	12.7	3
			90		(**10.8**)	*93*	(**1**)					*90*	*93*	*93*	9.6	3,5
	(8-9.1)															
			*		14		90			(**2.2**) *90.9*		*65*	*65*	*90*	10.4	3,3

TABLE A1.7. Prevalence of underweight children 0–59 months of age, 1980–2001

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	Source *
1	Angola											*29.5*						*26.4*		41.6				*28.0*		1
1	Benin											*25.6*						*23.0*		22.5				*21.5*		2
1	Botswana					27.0						*18.3*						*13.9*						*10.9*	12.5	1
1	Burkina Faso											*33.5*			32.7	29.5		*27.2*				34.3		*29.7*		3
1	Burundi								37.7			*34.1*						*33.6*						*35.3*	45.1	1
1	Cameroon											*22.4*		15.1				*20.1*			17.0			*22.5*		3
1	Central African Rep.											*25.3*				21.0		*26.7*						*27.3*	24.3	1
1	Chad											*32.1*						*32.2*		38.8				*32.4*	27.6	1
1	Congo								23.5			*22.2*						*19.8*				13.9		*15.8*		3
1	Congo, Democratic Republic of the											*26.9*						*32.8*	34.4					*34.3*		3
1	Côte d'Ivoire							12.4				*22.6*					18.3	*21.6*				21.2		*21.7*		3
1	Eritrea											*27.7*						*31.6*	33.6					*27.4*		3
1	Ethiopia				37.3							*32.9*			47.7, 46.9			*34.7*						*31.8*	47.1	3
1	Gabon											*20.6*						*18.4*						*14.4*	11.9	3
1	Gambia, The											*26.4*						*26.8*						*25.1*	17.0	1
1	Ghana									30.3		*19.4*				21.0		*20.0*				24.9		*19.2*		3
1	Guinea	23.4										*31.8*						*30.0*					23.2	*28.7*		3
1	Guinnea-Bisseau											*33.4*						*36.4*						*36.9*	23.1	3
1	Kenya			22.0					18.0			*24.1*				22.3	22.5	*23.3*				17.0		*22.3*	22.7	1
1	Lesotho		13.3									*23.4*			15.8		21.4	*19.9*		16.0				*18.6*		1
1	Liberia											*24.4*						*25.5*						*27.4*	26.4	3
1	Madagascar					33.0						*28.0*			39.0		32.1	*27.0*			30.8			*27.1*	33.1	1
1	Malawi		24.0									*35.5*			27.0			*34.5*	29.9					*29.8*	25.4	3
1	Mali								30.7 25.1			*33.3*						*32.3*	30.8					*33.4*		3

1	Mauritania		31.0									*23.4*		47.6				*22.1*		23.0				*22.2*		1
1	Mauritius						23.9					*13.7*						*11.9*	14.9					*11.3*		3
1	Mozambique											*36.7*						*34.1*	27.0		20.1			*29.9*		3
1	Namibia											*22.2*			26.2			*11.9*						*12.6*		-
1	Niger											*32.0*			42.6			*33.9*				38.2		*33.5*	39.6	1
1	Nigeria											*30.1*	35.7			39.1		*27.4*					21.0	*26.3*		3
1	Rwanda						27.5					*29.5*			29.4			*30.4*						*29.0*	29.0	1
1	Senegal							21.9				*24.1*			20.1	22.2		*23.1*		22.3				*23.0*	18.4	1
1	Sierra Leone											*25.3*	28.7					*29.5*						*30.2*	27.2	1
1	Somalia											*34.0*						*33.4*					25.8	*36.6*		1
1	South Africa											*18.3*					9.2	*9.8*						*9.7*		-
1	Sudan											*26.8*			34.0			*24.3*	16.7					*23.4*		1
1	Swaziland					9.7						*26.5*						*19.6*						*18.1*		-
1	Tanzania								33.0			*31.6*			28.9			*32.6*		30.6			29.4	*30.2*		3
1	Togo									24.4		*26.0*						*24.9*		25.1		19.3		*24.3*		3
1	Uganda										23.3	*32.2*						*32.8*	19.7					*30.0*	22.5	3
1	Zambia						20.5			25.8		*23.5*			25.1			*22.3*		23.5			25.0	*22.9*		3
1	Zimbabwe					14.0				11.4		*17.4*					11.9	*17.3*					13.0	*16.9*		3
	Weighted regional average											*28.3*						*27.5*						*27.0*		
2	Afghanistan											*65.5*						*63.8*			36.9			*63.9*		3
2	Bangladesh		70.1				71.5					*63.5*	66.5					*60.9*		56.4			47.6	*53.2*		2
2	Bhutan											*69.4*						*61.1*					18.7	*54.2*		3
2	Nepal											*65.3*					48.7	*60.0*		47.8		47.1		*57.6*	48.4 (01)	3
2	Pakistan							48.8				*58.4*	40.4					*55.0*	38.2					*53.3*		1
2	Sri Lanka	47.5							36.6			*35.8*				37.6		*31.1*						*29.0*	33.0	3
	Weighted regional average											*60.4*						*57.2*						*53.6*		
2	India									63.0		*54.7*				54.5		*52.9*				50.1		*48.6*		3

continued

TABLE A1.7. Prevalence of underweight children 0–59 months of age, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	Source *
3	Algeria								8.6			*11.7*	9.2		9.2			*10.7*	12.8					*9.3*	6.0	3
3	Egypt									13.3		*11.9*	10.4		9.9			*12.2*			11.7			*10.5*	4.0	3
3	Iran											*10.6*					15.7	*9.7*				10.9		*8.5*		3
3	Iraq											*11.7*						*12.2*						*12.5*	15.9	1
3	Jordan											*8.3*	6.4	9.7				*9.2*			5.1			*8.8*		1
3	Kuwait											*4.7*						*6.0*						*5.4*		-
3	Lebanon											*8.8*						*6.5*		3.0				*6.8*		3
3	Libya											*10.0*						*5.6*	4.7					*5.1*		3
3	Morocco								14.8			*15.8*			9.5			*14.7*						*13.3*		-
3	Saudi Arabia											*10.2*					8.7	*8.5*						*7.4*		-
3	Syrian Arab Republic											*14.0*				12.0		*13.8*	12.9					*13.5*		1
3	Tunisia									10.3		*12.9*						*10.1*						*8.5*	4.0	1
3	United Arab Emirates											*6.4*						*4.4*						*5.0*		3
3	Yemen											*23.3*			30.0			*20.9*			46.1			*21.2*		3
	Weighted regional average											*12.5*						*11.7*						*11.2*		
4	Cambodia											*46.5*					39.8	*46.8*						*47.0*	45.0	3
4	Indonesia								41.4		38.7	*37.7*						*34.9*	34.0				26.4	*33.7*		3
4	Lao People's Democratic Republic					36.5						*47.2*					40.0	*44.3*						*43.9*	40.0	1
4	Malaysia				28.2			23.3				*28.8*				23.3		*20.0*	20.1				18.3	*19.1*		3
4	Mongolia											*21.3*			12.3		10.2	*27.7*						*28.4*	12.7	1
4	Myanmar					44.1						*42.7*	38.4	36.7			42.9	*44.6*	30.8					*43.9*	36.0	3
4	Papua New Guinea				29.9	34.7						*42.4*						*41.1*						*41.9*		-
4	Philippines			33.2					32.9			*24.8*	33.5		33.0	29.6		*25.1*		28.2		32.0		*21.4*		3

4	Thailand			36.0					25.4			*34.6*	13.0			18.6		*30.7*						*32.3*		3
4	Vietnam							51.5				*38.8*	41.9				44.9	*38.0*				39.8		*37.0*	33.1	3
	Weighted regional average											*35.9*						*34.4*						*32.9*		
5	Belize											*14.2*			6.2			*12.7*						*11.9*		-
5	Costa Rica			6.0								*13.3*			2.3			*10.2*		5.1				*10.4*		3
5	Cuba											*6.9*						*7.9*						*7.5*	4.1	1
5	Dominican Republic							12.5				*15.1*		10.4				*13.3*		5.9				*12.2*	4.6	1
5	El Salvador									15.5		*18.5*				11.2		*17.2*				11.8		*10.8*		3
5	Guatemala	43.6							33.2			*20.8*						*17.6*	26.6			24.2		*17.4*		3
5	Haiti											*24.7*	35.2				27.5	*22.8*						*20.9*	17.0	3
5	Honduras								20.6			*17.5*			19.3			*16.0*		25.4				*14.9*		3
5	Jamaica						14.9				7.2	*12.1*				10.2		*11.4*					3.9	*11.3*		3
5	Mexico									14.2		*13.4*						*10.7*				7.5		*9.1*		3
5	Nicaragua			10.5								*15.1*				11.9		*14.1*				12.2		*13.7*		3
5	Panama	16.0										*9.8*			6.1			*9.1*			6.8			*9.1*		3
5	Trinidad and Tobago								6.7			*8.1*						*7.9*						*8.3*		-
	Weighted regional average											*14.7*						*12.6*						*11.3*		
6	Bolivia		14.5								13.2	*23.1*					11.5	*16.0*				7.6		*13.8*		2
6	Brazil							12.4			7.1	*8.6*						*7.6*		5.7				*5.9*		3
6	Chile			1.1				2.5				*6.0*					0.9	*3.9*				0.8		*2.9*		3
6	Colombia	16.7						12.0			10.1	*10.4*						*6.9*	8.4					*5.0*	6.7	3
6	Ecuador								16.5			*10.8*						*9.3*					14.8	*8.7*		3
6	Guyana		22.1									*11.6*		26.6		18.3		*8.2*			11.8			*12.7*		3
6	Paraguay											*16.5*	3.7					*9.8*				5.0		*9.2*		3
6	Peru					13.4						*11.1*			10.8			*7.2*		7.8				*6.0*	7.1	3
6	Uruguay								7.4			*5.1*			4.4		4.5	*3.1*						*2.6*		3

continued

TABLE A1.7. Prevalence of underweight children 0–59 months of age, 1980–2001 *(continued)*

Region	Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 I.	1990 O.	1991	1992	1993	1994	1995 I.	1995 O.	1996	1997	1998	1999	2000 I.	2000 O.	Source *
6	Venezuela			10.2					5.9			*4.9*						*5.3*			5.1		4.7	*4.5*		3
	Weighted regional average											9.8						7.5						5.7		
7	China								21.7			*23.6*	17.5		17.7		15.8	*20.7*				9.6		*17.8*	10.0	3
8	Armenia																	*8.1*						*7.2*	2.6	2
8	Azerbaijan																	*9.6*		10.1				*10.1*	16.8	1
8	Georgia																	*9.9*					3.1	*9.0*		1
8	Kazakhstan																	*8.3*	6.4				4.2	*8.3*		2
8	Kyrgyzstan																	*10.4*			8.5			*10.9*		2
8	Slovakia																	*7.4*						*4.9*		-
8	Tajikistan																	*13.3*						*13.4*		-
8	Turkey											*11.6*				10.4		*8.8*				8.3		*8.6*		3
8	Turkmenistan																	*10.5*						*9.6*	12.0	3
8	Uzbekistan																	*10.2*		14.5				*9.5*		3
	Weighted regional average											11.6						9.4						9.2		

Observed prevalence (in regular font), prevalence predicted from regression model (in italics); observed values consist of national data only. Columns 1990 I, 1995 I, and 2000 I are the interpolated values by regression, as described in the Methods section. Columns 1990 O, 1995 O, and 2000 O are the observed survey values.

* Sources: given for most recent survey, for surveys after 1995 (earlier surveys are listed in Administrative Committee on Coordination/Sub-committee on Nutrition. Fourth report on the world nutrition situation. Geneva: World Health Organization, 2000, pp 94–96; Mason JB, Lotfi M, Dalmiya N, Sethuraman K, Deitchler M, with Geibel S, Gillenwater K, Gilman A, Mason K, Mock N. Micronutrient Initiative/UNICEF/Tulane University. The micronutrient report: current progress in the control of vitamin A, iodine, and iron deficiencies. Ottawa, Canada: International Development Research Centre, 2001, pp 86–87).

Key to sources: 1 = UNICEF/MICS; 2 = DHS; 3 = nationally implemented survey, listed in WHO database: www.who.int/nutgrowthdb, and/or Administrative Committee on Coordination/Sub-committee on Nutrition. Fifth report on the world nutrition situation. Geneva: World Health Organization, 2004, pp 76–79.

Sources for xerophthalmia

Country	Survey year	Reported prevalence (%)	Source
Bangladesh	1983	4.5	1
	1997	0.9	2
	1999	0.5	3
Bhutan	1999	0.0	4
Bolivia	1981	1.7	5
Chad	1986	2.7	6
China	2000[a]	0.2	7
Egypt	1995	0.2	8
Ethiopia	1980	2.0[b]	6
	1996	1.5	8
India	1979	3.6	7
	1988	1.4	6
	2000	0.9	4
	2001	1.7	7
Indonesia	1978	2.0	6
	1995	0.3	7
Lao People's Democratic Republic	1995	1.1	7
	2000	4.7/1.1	7
Madagascar	2000	2.2	4
Mongolia	1998	0.2	4
	1999	0.8	4
Myanmar	1991	1.2	7
	1994	0.8	7
Nepal	1981	1.0	6
	1993	3.0	8
	1996	1.5	8
	1998	0.6	4
Niger	1988	3.0	9
	1992	3.7	8
Nigeria	1994	1.2	6
Philippines	1982	3.2	7
	1987	0.9	7
	1993	0.4	6
Sri Lanka	1995	1.6	7
Sudan	1986	2.4	8
Vietnam	1994	0.1	4
	1998	0.3	7
Zimbabwe	1999	0.2	4

a. Survey of 14 provinces, treated as national.
b. National Bitot's spots (X1B) prevalence, 1.0%.

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Sources for vitamin A deficiency

Country	Survey year	Reported prevalence (%) of serum retinol <0.7µmol/L	Source
Angola	1998	64.30	1
Antigua	1996	11.70	2
Argentina	1998	5.30*	3
	1999	6.30*	3
Bangladesh	1997	22.00	4
Belize	1989	24.00	3
Bolivia	1991	11.30*	5
Botswana	1994	32.50*	6
Brazil	1992	16.00*	3
	1997	19.30*	3
	1998	32.10*	3
Cameroon	1992	17.90*	5
Cape Verde	1996	2.00	3
Central African Republic	1999	68.20	3
China	1982	18.50*	5
	2000	11.70*	3
Colombia	1977	24.10*	5
	1995	13.00*	6
Congo	1988	26.00*	5
Costa Rica	1979	2.30	5
	1981	1.80	5
	1996	8.70	6
Côte d'Ivoire	1994	46.60*	5
	1996	33.19	3
Dominica	1996	10.70	2
Dominican Repub.	1991	19.60*	5
Ecuador	1986	15.70	2
	1993	16.30*	5
Egypt	1995	11.30	6
El Salvador	1976	33.30*	5
	1988	36.00*	5
Eritrea	1997	13.40	7
Ethiopia	1980	59.60	5
	1996	38.90	6
Gambia	1999	64.00	1
Guatemala	1970	26.20	5
	1988	21.60*	5
	1995	15.80	2
Guyana	1997	10.60	3
Honduras	1987	20.00	5
	1996	13.00	3
India- AP	2001	52.30*	3
India- Orissa	2001	63.80*	3
Indonesia	1991	57.50*	6
Jordan	1997	4.04*	3
Kenya	1994	33.00*	6
Lao P.D.R.	2000	44.70	4
Liberia	1999	52.90	7
Malaysia	1984	12.00*	5
Mauritius	1995	9.30	6
Mexico	1990	32.00*	5
Micronesia	1989	64.00	5
Mongolia	1999	19.80	3
Myanmar	1987	32.40*	5
Namibia	1992	20.40	5
Nepal	1998	32.30	3
Nicaragua	1993	31.00*	2
	2000	8.80	3
Nigeria	1998	28.00	7
Oman	1995	20.80	5
Pakistan	1988	50.00*	5
Panama	1992	6.00	6
	1999	9.40	3
Papua New Guinea	1993	58.10*	6
Peru	1992	22.00*	5
	1996	13.00*	6
	1999	10.90	3
Philippines	1993	10.10*	4
	1998	38.00	4
South Africa	1991	49.00*	5
	1994	30.00*	5
Sri Lanka	1995	33.00	4
	1996	35.50	6
	1996	28.00*	8
St. Vincent/Gren.	1997	6.20	3
Swaziland	1994	53.00	7
Tanzania	1984	45.30*	5
	1997	24.20*	3
Thailand	1990	20.00*	5
Uganda	2000	27.90	3
Uzbekistan	1993	48.90*	6

continued

Sources for vitamin A deficiency *(continued)*

Country	Survey year	Reported prevalence (%) of serum retinol <0.7µmol/L	Source
Vietnam	2000	12.40	3
Yemen	1992	62.40*	5
Zambia	1988	16.50*	6
	1999	65.70	3
Zimbabwe	1999	35.80	3

* Subnational data.

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Sources for anemia in nonpregnant women

Country	Survey year	Source
Armenia	2000	1
Bangladesh	2001	2
	1997	3
Benin	2001	4
Bolivia	1998	5
Cambodia	2000	6
Cameroon	2000	6
Central African Rep.	1999	6
Chile	1983	6
China	1992	6
Côte d'Ivoire	1995	6
Egypt	2000	7
Gambia	2001	6
Grenada	1992	6
Guinea	2000	6
Haiti	2000	8
Honduras	2001	6
India	1998	9
Indonesia	1995	3
Iran	1999	6
Jordan	1996	6
Kazakhstan	1999	10
Kenya	1999	6
Kyrgyzstan	1997	11
Lao P.D.R.	2000	3
Liberia	1999	6
Mali	2000	6
Mongolia	2000	6
Nepal	1998	6
Nicaragua	2000	6
Niger	2000	6
Panama	1999	6
Peru	2000	6
Philippines	1993	12
	1998	12
Thailand	1995	13
Turkmenistan	2000	14
Uganda	2000	6
Uzbekistan	1996	15
Viet Nam	2000	6
Zambia	1998	16
Zimbabwe	1999	6

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Sources for anemia in pregnant women

Country	Survey year	Source
Armenia	2000	1
Bangladesh	2001	2
	1997	3
Benin	2001	4
Bhutan	1985	5
Bolivia	1998	6
Cambodia	2000	5
Cameroon	2000	5
Central African Rep.	1999	5
Chile	1983	5
China	1992	3
Dominica	1997	5
Egypt	2000	7
Gambia	2001	5
Ghana	1995	5
Grenada	1992	5
Guinea	2000	5
Guyana	1997	5
Haiti	2000	8
India	1998	9
Indonesia	1995	3
Jamaica	1997	5
Jordan	1996	5
Kazakhstan	1999	10
Kenya	1999	5
Korea D.P.R.	1998	5
Kyrgyzstan	1997	11
Liberia	1999	5
Nepal	1998	5
Nicaragua	2000	5
Panama	1999	5
Peru	2000	5
Philippines	1993	12
	1998	12
Thailand	1986	3
	1995	13
Turkmenistan	2000	14
Uganda	2000	5
Uzbekistan	1996	15
Viet Nam	2000	5
Zimbabwe	1999	5

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Sources for anemia in preschool-age children

Country	Survey year	Source
Argentina	1998	1
	1999	1
Armenia	2000	2
Bangladesh	2001	3
	1997	4
Benin	2001	5
Bhutan	1985	1
Bolivia	1998	6
Cambodia	2000	1
Cameroon	2000	1
Cape Verde	1996	1
Central African Rep.	1999	1
China	1992	1
Côte d'Ivoire	1995	1
Dominica	1997	1
Egypt	2000	7
Gambia	2001	1
Ghana	1995	1
Grenada	1992	1
Guinea	2000	1
Guyana	1997	1
Haiti	2000	8
Honduras	2001	1
India	1998	9
Indonesia	1995	4
Iran	1999	1
Jamaica	1997	1
Kazakhstan	1999	10
Kenya	1999	11
Korea D.P.R.	1998	1
Kyrgyzstan	1997	12
Lao P.D.R.	2000	4
Liberia	1999	1
Mongolia	2000	1
Nepal	1998	1
Nicaragua	2000	1
Panama	1999	1
Peru	2000	1
Philippines	1998	13
	1993	14
South Africa	1994	1
Thailand	1995	15
	1986	4
Turkmenistan	2000	16
Uganda	2000	1
Uzbekistan	1996	17
Vietnam	2000	1
Zambia	1998	1
Zimbabwe	1999	1

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Annex 2

Estimates of prevalences of deficiencies and underweight for each country for 2000 ("best guesses")

Country	Underweight[a]	Vitamin A deficiency		Anemia[d]			Iodine-deficiency disorders
		Xeroph-thalmia[b]	Serum retinol < 0.7 µmol/L[c]	Preschool children	Nonpregnant women	Pregnant women	
Angola	41.6*	1.6	64.3	71.6	58.7	45.7	33.4
Benin	21.6	1.5	43.3	81.9	64.6	72.7	12.7
Botswana	12.5	0.5	29.8	37.3	31.1	26.5	17.4
Burkina Faso	29.7	2.1	46.4	83.2	48.4	50.1	29.1
Burundi	45.1	1.3	44.2	82	60.2	54.1	17.6
Cameroon	22.5	1.1	36.0	57.7	31.7*	45.4	11.7
Central African Rep.	24.3	2.0	46.8*	74.4	49.8	48.4*	11.2
Chad	27.6	2.0	45.1	76.2	55.7	49.2	24.0
Congo	15.8	1.7	32.2	55.2	48.3	45.5	36.2
Congo, D.R.	34.3	2.1	42.1	79.1	54.1		16.9
Côte d'Ivoire	21.7	1.5	34.0	65.5	45.7	45.9	18.4
Eritrea	30.2	0.9	29.7*	75.0	53.3	50.1	10.0
Ethiopia	47.1	2.3	38.9	85.4	58.2	51.3	23.1
Gabon	11.9	1.3	42.8	43.0	32.1	31.9	27.3
Gambia, The	17.0	1.2	46.6*	74.6	52.7	62.0	19.6
Ghana	24.3	1.0	45.8	64.8	39.7	50.6	18.1
Guinea	28.7	1.9	51.0	72.5	43.3	56.4*	22.9
Guinea Bissau	23.1	1.7	31.1	83.2	53.3	46.7	16.9
Kenya	22.7	0.7	31.7	60.0	42.5	46.7	10.1
Lesotho	22.7	0.4	54.1	50.7	42.7	46.2	19.4
Liberia	27.4	1.6	37.7	68.7	43.9	55.0*	17.6
Madagascar	33.1	2.2	44.0	72.8	44.8	45.0	11.7
Malawi	25.4	1.0	51.4	76	54.5	53.1	21.8
Mali	33.4	1.7	47.3	76.8	47.4	60.9*	42.4
Mauritania	23.1	1.7	17.4	73.8	42.0	46.2	20.5
Mauritius	11.4	0.6	48.7	35.6	27.7	20.5	27.6
Mozambique	17.6	1.8	25.8	79.6	53.8	52.3	17.4
Namibia	12.6	0.8	58.8	41.6	34.7	31.5	18.4
Niger	39.6	2.5	41.1	87.1	47.4	50.9	28.3
Nigeria	21.0	1.6	38.2	69.2	47.1	51.7	7.7
Rwanda	29.0	0.7	38.8	68.9	43.4	52.8	12.8
Senegal	18.4	1.7	61.1	71.2	42.5	45.7	23.3
Sierra Leone	27.2	1.8	46.9	85.8	68.3	54.1	16.4
Somalia	36.6*	2.0	25.1	78.4	53.7	40.0	12.6
South Africa	9.7	0.5	33.1	36.9	26.3	34.0	16.1
Sudan	15.9	1.6	35.8	70.2	44.3	45.0	35.1
Swaziland	18.1	0.6	38.2	46.7	32.2	38.3	11.5
Tanzania	29.4	0.9	36.6	65.2	44.7	49.5	16.3
Togo	18.8	1.8	34.7	71.7	45.4	50.8	13.5

continued

Country	Underweight[a]	Vitamin A deficiency		Anemia[d]			Iodine-deficiency disorders
		Xeroph-thalmia[b]	Serum retinol < 0.7 µmol/L[c]	Preschool children	Nonpregnant women	Pregnant women	
Uganda	22.5	1.4	36.6*	64.1	30.3	41.2	8.6
Zambia	22.9	0.5	52.6*	63.3	45.7	49.1	25.4
Zimbabwe	13.0	0.2*	35.8	53.1	43.5	32.7*	8.6
Afghanistan	63.9*	2.2	53.3	64.5	60.9	45.4	47.7
Bangladesh	47.6	[0.5]	28.2	51.0	63.9	51.2	16.7
Bhutan	54.3*	0.0*	32.4	53.0	55.2		13.8
India	48.6	1.7	56.8	74.6	61.3*	49.0	26.2
Nepal	48.1	[0.3]	32.8	64.9	62.1	51.8	24.3
Pakistan	48.0*	1.8	35.0	56.3	58.5	47.7	38.3
Sri Lanka	33.0	0.2	23.5*	32.1	50.5	43.9	10.8
Algeria	9.3	1.0	28.9	37.6	31.3	35.2	16.7
Egypt	4.0	0.9	27.1	30.5	28	41.0*	11.9
Iran	8.6	0.4	23.1	31.6	29.1	34.9	9.1
Iraq	15.9	1.4	41.7	36.3	40.1	26.2	24.6
Jordan	4.8	0.3	19.3	27.2	29.3	35.7	10.8
Kuwait	5.4	0.3	15.8	4.7	12.3	(34.4)	
Lebanon	3.2	0.4	19.9	20.5	24.1	22.3	11.0
Libya	5.1	0.5	19.3	20.3	23.5	5.5	10.1
Morocco	13.3	1.1	29.2	45.0	34.0	39.3	
Saudi Arabia	7.4	0.5	20.9	18.5	18.6	23.1	
Syrian Arab Republic	12.7	0.6	22.0	39.5	30.1	40.7	27.1
Tunisia	4.0	0.8	21.5	32.2	27.0	30.5	9.1
United Arab Emirates	5.0	0.1	13.7	1.4	10.5	(34.4)	
Yemen	21.2	1.5	40.3	59.3	49.4	47.5	16.1
Cambodia	45.0	1.4	42.3	63.0	49.4*	66.0	18.0
Indonesia	33.7	0.7	25.8	38.3	39.6	47.4	12.3
Lao P.D.R.	40.0	[1.1]	44.7	54.4	48.0	46.3	13.7
Malaysia	19.1	0.4	19.7	20.4	22.1	39.2	
Mongolia	12.7*	[0.5]	29.1	36.9	17.7	6.2	14.9
Myanmar	43.9	0.5	35.2	47.8	44.8	51.2	17.4
Papua New Guinea	41.9	1.2	37.4	39.7	42.5	40.4	
Philippines	21.4	0.4	22.8	28.5	35.3	44.9*	14.9
Thailand	16.0	0.1	21.9	22.4	27.1	26.6*	13.0
Vietnam	36.7	0.2	17.9*	39.3	32.5	32.2	14.6
Belize	11.9	0.5	16.4	22.9	23.8	51.7	10.5
Costa Rica	10.4	0.2	8.8	26.0	24.0	27.9	9.9
Cuba	4.1	0.1	8.2	27.1	28.1	39.0	8.5
Dominican Republic	4.6	0.2	17.5	25.0	31.3	36.0	11.4
El Salvador	10.8	0.3	17.0	27.9	33.9	30.1	10.6
Guatemala	24.1	0.8	21.3	34.0	34.0	34.5	16.0
Haiti	17.0	1.6	31.5	65.8	54.4	63.4	11.5
Honduras	14.9	0.2	15.2	33.5	31.4	41.6	12.0
Jamaica	11.3	0.1	11.1	48.0	26.5	51.3	10.8

continued

Country	Underweight[a]	Vitamin A deficiency		Anemia[d]			Iodine-deficiency disorders
		Xeroph-thalmia[b]	Serum retinol < 0.7 μmol/L[c]	Preschool children	Nonpregnant women	Pregnant women	
Mexico	9.1	0.2	13.1	14.9	20.6	36.0	10.4
Nicaragua	12.0	0.5	14.1*	46.6	39.6	40.1	11.0
Panama	9.1	0.2	11.7	36.0	32.8*	37.7	10.2
Trinidad and Tobago	8.3	0.1	10.1	12.4	25.3	16.3	11.6
Bolivia	6.7	0.6	22.6	59.4	30.3	37.7	20.2
Brazil	4.4	0.2	15.2	45.2	20.8	48.0	8.0
Chile	2.9	0.1	8.8	39.4	15.4	59.3	8.8
Colombia	6.7	0.5	12.7	48.3	26.5	34.9	9.9
Ecuador	8.7	0.1	13.0	54.2	34.2	38.8	8.4
Guyana	12.8	0.2	18.3	56.2	34.9	41.4	
Paraguay	9.2	0.2	12.9	51.9	25.2	39.9	12.7
Peru	7.1	0.3	16.9	50.3	32.4	30.8	9.6
Uruguay	2.6	0.1	9.6	36.1	9.6	(42.2)	
Venezuela	4.5	0.3	11.4	40.9	23.9	25.1	10.4
China	8.4	[0.2]	11.7	8.4	20.6	27.3	10.0
Armenia	2.6	0.1	11.6	23.9	12.4	12.0	11.6
Azerbaijan	16.8	0	22.7	33.4	34.8	44.1	14.6
Georgia	3.1	0.3	11.4	32.9	30.6	41.8	20.5
Kazakhstan	4.2	0	19.3	36.3	35.6	32.9	21.4
Kyrgyzstan	10.0	0	18.3	41.7	31.4	41.3	20.9
Slovakia	4.9	0	7.8	0	20.1	37.2	
Tajikstan	13.4	0.3	17.9	45.0	42.1	49.0	28.1
Turkey	8.6	0.6	17.7	23.3	32.7	17.9	22.6
Turkmenistan	9.7	0	17.9	35.9	47.5	41.6	10.6
Uzbekistan	9.5	0	39.7	32.5	29.5	40.6	24.3

a. Values with asterisk in the Underweight column: Angola, 2000 estimate 28.0%, 1996 survey 41.6% – survey value used (Angola likely to be higher than predicted due to conflict). Somalia, 36.6% predicted vs 25.8 survey: 36.6% taken as higher value likely due to conflict. Afghanistan predicted 63.9%, survey 36.9%: predicted higher value taken as survey value likely not to be representative. Bhutan, 54.2% vs 18.7%, higher value was taken for similar reasons. Pakistan, 57.6% predicted vs 47.1 survey: survey result was taken. Mongolia, 28.4% predicted vs 12.7% survey, survey result was taken.

b. Values in square brackets in Xerophthalmia column are more uncertain.

c. Values with asterisk in the Serum retinol column: predicted and recent survey values averaged (see data in **table A1.2**).

d. Values with asterisk in the in Anemia columns: predicted and recent survey values averaged (see data in **tables A1.3–4**). Values in parentheses indicate missing values set to the mean for the region.

Book reviews

Demography and nutrition: Evidence from historical and contemporary populations. Susan Scott and Christopher J. Duncan. Blackwell, Oxford, UK, 2002. (ISBN 0-632-05983-4) 369 pages, hardcover, includes illustrations. US$139.99.

The concepts in this book should be part of the training and understanding of all workers concerned with nutrition. The introduction emphasizes that the diet to which modern humans are adapted is very different from the one for which they are genetically programmed. The discrepancy between genotype and diet began with the beginnings of agriculture. While recognizing the demographic effect of famines in every century, the main thesis of this book is that it is chronic malnutrition, usually subliminal and undetected, that had the greater effect in preindustrial England and continues to do so in today's developing countries. The authors use demographic data from 16th to 19th century England to support this concept.

The book points out that today the inappropriateness of our diet and lifestyle has resulted in a dramatic shift in predominant human disease patterns in the more industrialized countries from infection to chronic degenerative diseases. Separate chapters deal with the basis for changes in fertility, the role of nutrition in pregnancy, iodine deficiency and endogenous mortality, malnutrition in infancy, and the role of infant mortality. There is much to be learned from the chapters on the seasonality of mortality and on childhood mortality and infectious disease. The data on population dynamics, disease, and malnutrition in 16th-century England include smallpox, scarlet fever, diphtheria, measles, and whooping cough. A final chapter deals with evidence for human longevity and diet. Throughout, complex data are effectively presented in figures and tables.

The concluding chapter reviews the diet to which we are adapted and the demographic importance of nutrition in pregnancy. It then summarizes the interactions of nutrition and human demography. Written entirely by the two authors, the book is well organized. The single reference list at the end is excellent and the index is adequate. This book is recommended background reading for professionals and students concerned with the role of nutrition in the demography of contemporary populations as well as throughout history.

Diet, life expectancy, and chronic disease: Studies of Seventh-Day Adventists and other vegetarians. Gary E. Fraser. Oxford University Press, New York, 2003. (ISBN 0-19-511324-1) 300 pages, hardcover, includes illustrations, US$59.95.

The Seventh-Day Adventists are a large, conservative religious group most of whose members follow a well-chosen lacto-ovo vegetarian diet, although with many variations. For many years they have been the subject of studies that collectively have shown distinct health advantages for their diet and lifestyle. This book analyzes the results of such studies, focusing on heart disease, cancer, and life expectancy. The relative risk of these is consistently lower among the Adventist vegetarians. In the case of lung cancer, there is a further benefit from not smoking.

In judging the impact of Adventist dietary practices on heart disease, it is noted that the average middle-aged Adventist male exercises more and has a somewhat larger social support network than his non-Adventist counterparts. Consequently, analyses of the effect of vegetarian status are adjusted for the effect of other factors. Such analyses indicate that the current lifestyle recommended by the American Heart Association and government agencies to prevent heart disease can be effective. Similarly, Adventists have lower rates for many cancers than seen in the general population, again probably due to a number of factors in addition to diet. A chapter deals with the effects of social support, religious practice, and other psychological factors on health. The effects of Adventist diet and lifestyle in the United States are compared with those in Norwegian, British, German, and Indian vegetarians.

Useful chapters deal with Adventist experience with

changing a population's diet. The extensive reference list at the end will be useful to researchers, and a glossary makes the book more accessible to a wider audience. It provides a scholarly evaluation of what has been learned from comparative epidemiological studies of this special population.

Food and health in Europe: A new basis for action. Edited by A. Robertson, C. Tirado, T. Lobstein, M. Jermini, C. Knai, J.H. Jensen, A. Ferro-Luzzi, and W.P.T. James. European Series No. 96. WHO Regional Office for Europe, Geneva, 2004. (ISBN 92-890-1363-X) 500 pages, softcover, includes illustrations, US$90.00.

This book was commissioned by the World Health Organization (WHO) Regional Committees for Europe to help fulfill WHO's role in implementing its first food and nutrition action plan for the WHO European Region. It provides a comprehensive, in-depth analysis of the data on nutritional health, food-borne disease, food safety, and public health concerns about the supply and security of food in Europe. It presents policy options and solutions, along with dietary guidelines and case studies from different countries of the region.

This book recognizes that many sectors besides the health sector, including agriculture, education, and the food industry, influence human nutritional health. Specifically, it reviews the evidence on food, diet and disease, food safety and health, food security, and sustainable development and suggests policies and strategies to protect the food supply and improve the nutritional status of the European populations. The discussion of these issues is also applicable to the role of poverty in some of the newer countries of Europe, developing countries in transition, and, to some extent, all developing countries, as part of the population in these countries becomes more affluent. It is unfortunate that a WHO softcover publication is priced too high for most developing-country health professionals who would find it useful.

Gut flora, nutrition, immunity and health. Edited by Roy Fuller and Gabriela Perdigón. Blackwell, Oxford, UK, 2003. (ISBN 1-4051-0000-1) 296 pages, hardcover, includes illustrations and index, US$134.99.

The 11 chapters in this book are well written and authoritative but have some overlap. The first chapter reviews the complex taxonomy of identified gut flora that is similar in all healthy humans. The second reviews the impact of food on the flora of the large intestine and their breakdown of complex carbohydrates and proteins, and of (occasionally) toxic metabolites. The next chapter discusses the health benefits of probiotics and prebiotics and wisely emphasizes the need for good clinical trials and more knowledge of the mechanisms.

Other chapters deal with the metabolic activity of intestinal microflora, the role of the immune system and the way it is affected in eating disorders, the mucosal immune system, food hypersensitivity, and allergic diseases. One explores the nutritional and intestinal modulation of carcinogenesis, and another the role of nutrition in immunity of the aged. The extensive references with each chapter are useful, but the index is inadequate. This book lives up to its title, with good, up-to-date, and reasonably comprehensive information on the subject.

Nutritional concerns of women. 2nd ed. Edited by Dorothy Klimis-Zacas and Ira Wolinsky. CRC Series in Modern Nutrition. CRC Press, Boca Raton, Fla., USA, 2004. (ISBN 0-8493-1337-6) 536 pages, hardcover, includes illustrations, US$69.95.

This is the second edition of a book that fills a unique niche. It covers the nutrition of women in adolescence, pregnancy, lactation, menopause, and old age, and related topics such as premenstrual syndrome and major nutritional risk factors. The chapters on diseases that are frequent in women include those on anemia, diabetes, osteoporosis, some cancers, and such chronic conditions as cardiovascular disease, diabetes, thyroid disorders, and arthritis and rheumatic disease. It is written for nutrition scientists but has been used as a text in university courses focusing on women's nutrition.

Unique chapters deal with women in recreational athletics, women in the military, hormonal contraceptives, and eating disorders. While focused mainly on the nutritional problems of women in the United States and other industrialized countries, a chapter titled "Gender, Culture and Nutrition" focuses on the nutritional problem of women in other societies. The chapters are relatively short and often lack depth, and make very limited use of tables and figures, but they are well referenced. However, it is still convenient to have women's issues specifically identified and dealt with in a single volume.

The world food problem: Tackling the causes of undernutrition in the third world. 3rd ed. Howard D. Leathers and Phillips Foster. Lynne Rienner, Boulder, Colo., USA, 2004 (ISBN 1-58826-275-8) 447 pages, softcover, includes illustrations, US$26.50.

This is the third edition of a text designed for courses in international nutrition. It provides evidence "that under-nutrition remains a problem for hundreds of

millions of people in developing countries" and that poverty, income inequalities, population growth, and illness are the major causes. It emphasizes increasing agricultural production as an integral part of any strategy to reduce world hunger.

The five chapters of Part 1 document the elements of global malnutrition, and the next nine chapters deal with its causes, with heavy emphasis on food supply and agriculture. The final nine chapters deal with policy approaches to undernutrition including health improvement, income generation, demographic measures, food production, and price policies.

Unfortunately, the book does not deal with infection other than diarrhea and makes no mention of the developing country problems of HIV/AIDS, malaria, and drug-resistant tuberculosis. Nor does it deal with the dual problem of undernutrition and overnutrition and the resulting increase in chronic diseases due to the latter. With supplemental readings, it could be used in an undergraduate course, but it is not an adequate text for advanced graduate study.

—Nevin S. Scrimshaw

News and notes

Food and Agriculture Organization

Human Energy Requirements: Report of a Joint FAO/WHO/UNU Expert Consultation

New scientific knowledge generated in the 20 years since the last joint (Food and Agriculture Organization, World Health Organization, and United Nations University) consultation on human energy (and protein) requirements was held in 1981 prompted the convening of a new Expert Consultation in 2001. The FAO/WHO/UNU Expert Consultation on Human Energy Requirements was called to make recommendations for energy requirements of populations throughout the life cycle. The report of this Expert Consultation, which took place in October 2001 at FAO headquarters in Rome, was released in November 2004.

The report is intended not only to describe the energy requirements of population groups of different ages and for different physiological states, such as during growth, pregnancy, and lactation, but also to be prescriptive in supporting and maintaining health and good nutrition, defining human energy requirements, and proposing dietary energy recommendations for populations. The new concepts and recommendations set forth in the report include calculation of energy requirements for all ages; modification of the requirements and dietary energy recommendations for infants, older children, and adolescents; proposals for different requirements for populations with lifestyles that involve different levels of habitual physical activity; reassessment of energy requirements for adults, based on energy expenditure estimates expressed as multiples of basal metabolic rates; classification and recommendations of physical activity levels; an experimental approach for factorial estimates of the energy needs of pregnancy and lactation; and recommendations for additional dietary energy needs in the last two trimesters of pregnancy.

The principal objectives of expert consultations on human energy requirements are to provide international agencies and their member countries with the necessary tools for addressing practical questions, such as the assessment of the adequacy of food supplies and the people who do not attain energy adequacy, to draw up targets for food production, and to inform national food and nutrition policy makers. The recommendations and guidelines that result from these consultations will serve to enable governments and organizations to better plan, monitor, and evaluate nutrition programs and policies. In turn, these may aid member nations in developing estimates of requirements appropriate for local conditions and for direct application in their countries. The report is accompanied by a CD-ROM software program and instruction manual on calculating population energy requirements and food needs. This software package is being issued along with the expert report to ensure that those interested in the recommendations of the report have the means to investigate and ensure the recommendations' practical applicability as well as to appreciate that these two outputs are complementary. The user's manual and the software application, "Calculating Population Energy Requirements and Food Needs," thus represent a further milestone in FAO's continued involvement in both the theoretical and the practical issues related to human energy requirements.

For more information regarding this publication and the accompanying software application, please contact us at:

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In memoriam

Professor Kamaluddin Ahmad (1921–2004)

Professor Kamaluddin Ahmad, retired Professor of Biochemistry, former Director of the Institute of Nutrition and Food Science at the University of Dhaka, former Vice Chancellor of the Bangladesh Agriculture University and a past President of the Bangladesh Academy of Sciences—pioneer of the study of biochemistry, pharmacy, and nutrition in Bangladesh and an internationally noted scientist, died on 4 July 2004. He was 82 years old.

A brilliant scientist and scholar of indomitable energy and wide interests, Professor Ahmad combined an uncanny intuition in scientific research with building institutions of scientific learning in the country.

Early Life and Career

Professor Ahmad was born in Gohira, Chittagong on December 21, 1921. His father, a great believer in education, instilled the love of learning. He was only 17 when his father died, the eldest son in the family, with no obvious guardian or much by way of property or money. Through brilliance, hard work and a series of merit scholarships, he pursued his education, often sending some small savings from his scholarship money to his widowed mother still in the village. He graduated with a First Class First in Chemistry from the University of Dhaka and then earned a Masters in Chemistry, again earning a First Class First and a Gold Medal for extraordinary scores.

As the Second World War drew to a close, he sailed on a war ship then converted to civilian use from Bombay to San Francisco en route to Madison, Wisconsin. There he easily earned a Ph.D. in Biochemistry at the University of Wisconsin in less than three years, having published his work on Antimycin-A in the American Journal of Chemical Society. He discovered a new—and perhaps the most elegant—method for synthesis of unsaturated fatty acids like vaccenic acid. He also contributed to the finding of the structure of colchicines and the synthesis of sphingosine. He was elected to the Sigma Xi honor society. In 1968, his Ph.D. supervisor and co-author of the landmark Antimycin-A article, Professor Frank Strong, gave a public lecture at Dhaka University. He described Professor Ahmad as "my best student." Throughout his life, Dr. Ahmad was grateful for the many opportunities he had to study and interact with the great luminaries of science. In Wisconsin, he had the opportunity to study with Harry Steenbock, Conrad Elvehjem and Karl Park Link. As a Nuffield Fellow at the University of Glasgow, he worked with Sir James Cook. He also studied at the Isotope School in Harwell, England. He loved to travel—and traveled extensively across Africa, Asia, Europe and North and South America.

Although he had many opportunities to build a scholarly career in the West, he felt it his calling to return home at the end of British rule to contribute to a new nation. He is best known for having founded and developed to their pinnacle the Departments of Biochemistry and Pharmacy and the Institute of Nutrition and Food Science at the University of Dhaka. The Department of Biochemistry that he established in 1957 was the first such department in Pakistan, and possibly in the Indian subcontinent. He served Dhaka University as its Dean of the Faculty of Science from 1966–1969 before assuming leadership of the East Pakistan Agricultural University.

Early in his career (1955), he discovered Ramnacin, an antibiotic in local soils and he began to study how hair and nails acted as a sponge in the body for the lethal arsenic. Just prior to his death he had initiated field trials of a promising new therapy derived from hair extracts for mitigating chronic arsenic poisoning—a work that sadly remains unfinished.

Tireless Health Advocate for the Poor

Kamaluddin Ahmad's advocacy for solving the nutritional problems of the country began with the conclusion of the East Pakistan Nutrition Survey in 1963–64.

He ably led the survey and, for the first time, demonstrated the scope and depth of nutritional problems in Bangladesh (then East Pakistan).

Unsatisfied as a researcher bound to his laboratory, Professor Ahmad became a tenacious public advocate for addressing the nutritional problems that the survey had revealed. He began campaigning as early as the 1960s for distribution of high potency vitamin A capsules to prevent blindness and for mandating iodization of edible salt. He was a constant promoter of dark green leafy vegetables as an inexpensive source of essential vitamins. Supported by UNICEF and other international agencies, Professor Ahmad extended his laboratory to the whole country and his students became his partners. It was in his laboratory at the Biochemistry Department that the first grain of salt was iodized with makeshift equipment. With the delay in the progress of salt iodization nationally, the impatient professor personally led iodine injection campaigns in the most severely iodine-deficient villages in Bangladesh. He advocated the use of alum as an inexpensive method for purifying drinking water and thereby helping in the control of diarrheal diseases. On a request from UNICEF, he and his wife jointly produced a general reader on nutrition in Bangla entitled Pushti Bidda.

His many awards include Gold Medal from the Pakistan Academy of Sciences; Gold Medal from the Bangladesh Academy of Sciences for achievement in Biological Sciences; MA Khan Memorial Gold Medal; and the Bangladesh Prime Minister's Award.

Institution Builder and Professional Leader

Beyond his founding the Departments of Biochemistry and Pharmacy and the Institute of Nutrition and Food Sciences at Dhaka University, Professor Ahmad was a leader of the scientific community at large. He served as the first General President of the Bangladesh Association for Advancement of Science, as well as President of the Bangladesh Academy of Sciences. For years he led the Bangladesh Biochemical Society as well as the Nutrition Society. He served as a member of Syndicate of the Bangladesh Agriculture University, Dhaka University, Rajshahi University and Chittagong University. In the case of Chittagong University, he played an important behind-the-scene role regarding its establishment. He was a trustee of the Independent University in Dhaka. He was a Fellow of Bangla Academy, the Bangladesh Institute of Development Studies, the Asiatic Society of Bangladesh and the American Institute of Nutrition.

Professor Ahmad has been associated with the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B) from its inception up to his death. He has served at various times on its Research Review Committee, Ethical Review Committee and Program Coordination Committee. In December 2003, the 10th Asian Conference on Diarrhoeal Disease and Nutrition (ASCODD) gave him a lifetime achievement award presented by the President of Bangladesh.

Upon retirement from the University of Dhaka, he founded and served as Research Director of the Bangladesh Institute of Herbal Medicine. He worked relentlessly in developing drugs derived from plants, for he argued that scientifically developed natural drugs could be hugely effective in the treatment of illnesses at a price the poor could afford. The University of Dhaka also established a Centre for Biomedical Research to enable Professor Ahmad to pursue his research interests in the field. His intellectual interests often extended well beyond biochemistry and nutrition. He played an important role in the creation of the first Anthropology Unit at the University of Dhaka and served it as an honorary advisor.

Internationally, Dr. Ahmad played a leadership role in his profession and frequently presented his views in regional and international conferences. He was elected a Fellow of the Third World Academy of Sciences in Trieste, Italy, the apex body of scientists from developing countries. The Academy described his death as a "loss of such a profound person and great scientist" and noted that "he has contributed very much to what the Academy is today."

He chaired the Commission on Nutritional Surveillance of the International Union of Nutritional Sciences; he was a founder of the Federation of Asian Nutrition Societies. The Institute of Nutrition and Food Sciences at Dhaka University was recognized during his tenure as a collaborative center of the UN University system.

The remarkable life of Professor Kamaluddin Ahmad is an example of a man who took his life seriously, applied his enormous intellectual talent and fertile imagination and a mind so versatile to make a contribution. His was a life devoted wholeheartedly to the service of mankind. His legacy will be carried on by the many he inspired and taught.

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7. WHO HIV infections page. WHO web site. Available at: http://www.who.int/topics/hiv_infections/en/. Accessed 12 October 2004.
8. Nielsen J, Palle V-B, Martins C, Cabral F, Aaby P. Malnourished children and supplementary feeding during the war emergency in Guinea-Bissau in 1998–1999. [serial online]. Am J Clin Nutr; 2004; 80:1036-42. Available at: http://www.ajcn.org/cgi/content/full/80/4/1036. Accessed 12 October 2004.

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