

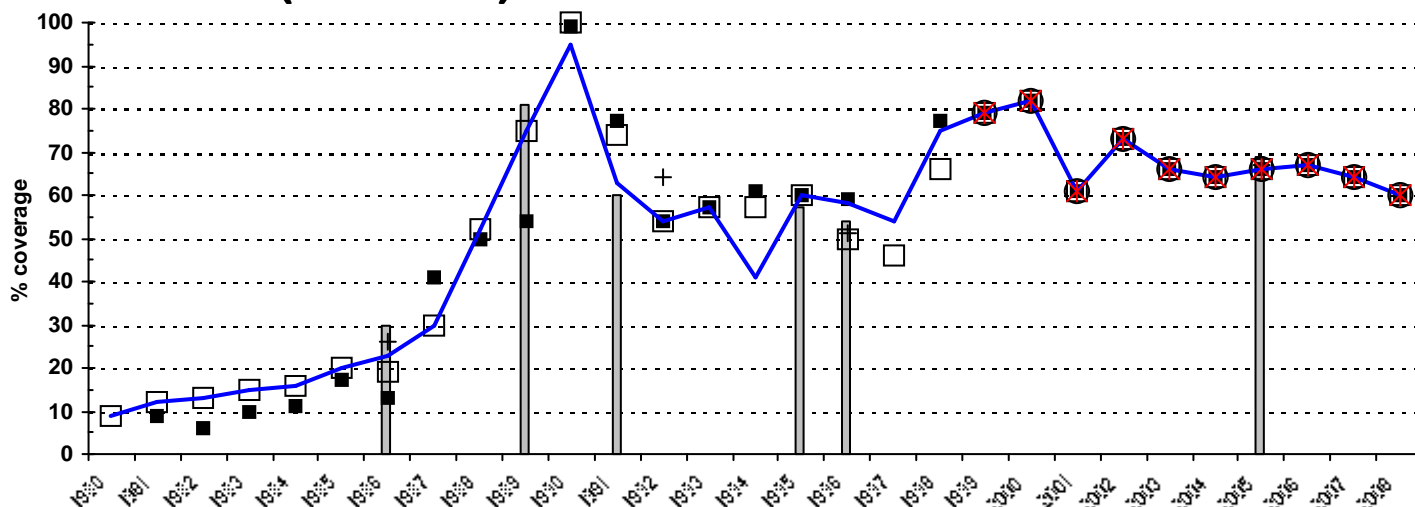
**WHO/UNICEF
Review of National Immunization Coverage
1980-2008**

Yemen

July, 2009

Yemen

BCG (1980-2008)



Description of trend

Survey data in 1986 and 1989 are not considered because only part of the country is covered (before unification). Coverage peaks in 1990, however 99% rate is slightly overestimated (miscalculation of population possible because north and south were united). The withdrawal of donor support after 1990 results in a drop in coverage, confirmed by survey data (DHS 1992). A further drop occurs in 1994 due to civil unrest in the country. Reported coverage for 1994 is an overestimate, possibly covering only part of the country. Estimates from 1994 are based on reported data calibrated to survey levels.

Data presented in chart

Year	WHO/ UNICEF estimate (%) —	Reported to:*		Government official estimate (%) ○	Reported doses administered (%)** ✖	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months 	Survey <12 months +
1980	9	9					
1981	12	12	9				
1982	13	13	6				
1983	15	15	10				
1984	16	16	11				
1985	20	20	17				
1986	23	19	13			30	26
1987	30	30	41				
1988	52	52	50				
1989	75	75	54			81	
1990	95	100	99				
1991	63	74	77			60	
1992	54	54	54				64
1993	57	57	57				
1994	41	57	61				
1995	60	60	60			57	
1996	58	50	59			54	51
1997	54	46					
1998	75	66	77				
1999	79	79	79	79	79		
2000	82	82	82	82	82		
2001	61	61	61	61	61		
2002	73	73	73	73	73		
2003	66	66	66	66	66		
2004	64	64	64	64	64		
2005	66	66	66	66	66	69	67
2006	67	67	67	67	67		
2007	64	64	64	64	64		
2008	60	60	60	60	60		

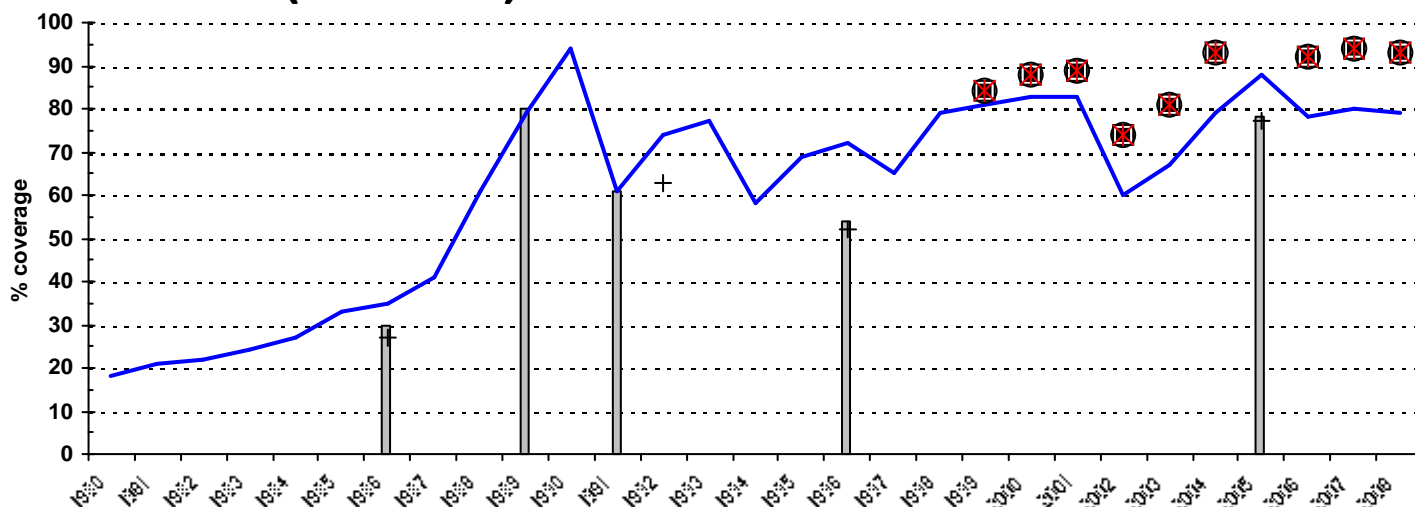
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

DTP1 (1980-2008)



Description of trend

WHO and UNICEF began requesting data on DTP1 coverage in 2001 and have received national reports reflecting DTP1 coverage from 2001 onward. Estimates from 1980-2003 are derived from the WHO/UNICEF estimates of DTP3 and the relationship between the levels of DTP3 coverage and the drop-out between DTP1 and DTP3. This relationship results from an analysis of 282 surveys conducted in 101 countries which were published between 1980 and 2004. The exception is 1991, where the estimate is based on survey data. A further drop occurs in 1994 due to civil unrest in the country. Reported coverage for 1994 is an overestimate, possibly covering only part of the country. Estimates from 2003 are based on reported data calibrated to survey levels.

Data presented in chart

Year	WHO/ UNICEF estimate (%)	Reported to:*		Government official estimate (%)	Reported doses administered (%)**	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months ▮	Survey <12 months +
1980	18						
1981	21						
1982	22						
1983	24						
1984	27						
1985	33						
1986	35					30	27
1987	41						
1988	61						
1989	79					80	
1990	94						
1991	61					61	
1992	74						63
1993	77						
1994	58						
1995	69						
1996	72					54	52
1997	65						
1998	79						
1999	81	84	84	84	84		
2000	83	88	88	88	88		
2001	83	89	89	89	89		
2002	60	74	74	74	74		
2003	67	81	81	81	81		
2004	79	93	93	93	93		
2005	88	102	102	102	102	78	77
2006	78	92	92	92	92		
2007	80	94	94	94	94		
2008	79	93	93	93	93		

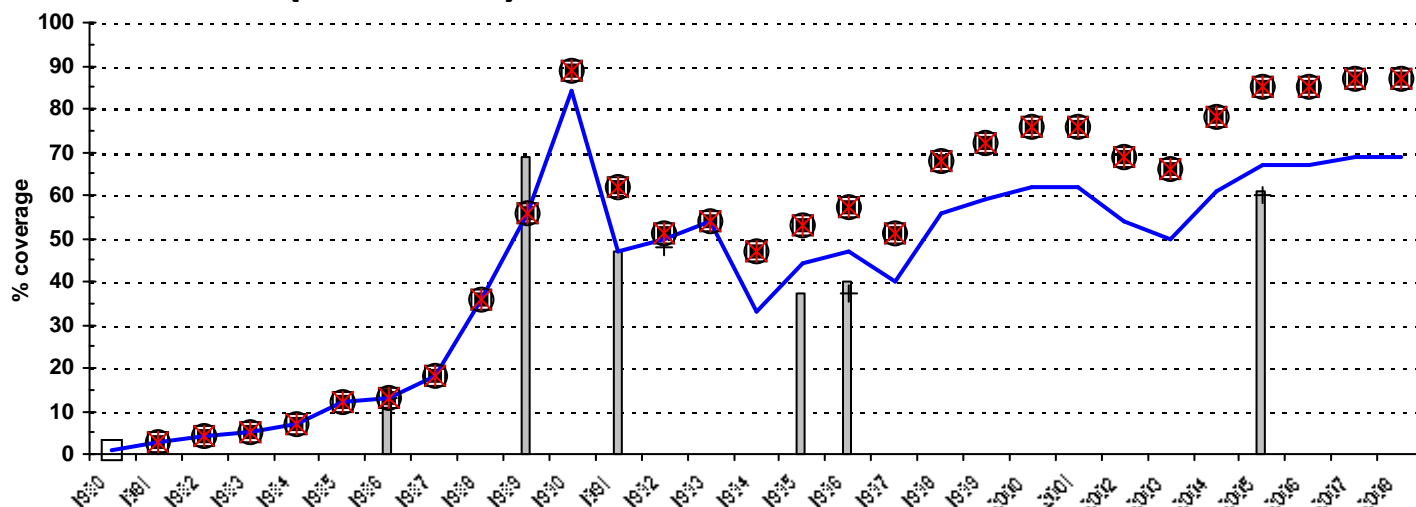
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

DTP3 (1980-2008)



Description of trend

Survey data in 1986 and 1989 are not considered (only part of the country covered). Coverage peaks in 1990, however 90% seems to be an overestimate (miscalculation of population possible because north and south were united). Withdrawal of donor support after 1990 results in drop in coverage, confirmed by a survey. A further drop occurs in 1994 due to civil unrest. Reported coverage for 1994 is an overestimate, possibly covering only part of the country. Officially reported data show higher coverage than survey data for 1995 and 1996 (MICS 1996, DHS 1997). Estimates from 1994 are based on reported data calibrated to survey levels adjusted for recall bias.

Data presented in chart

Year	WHO/ UNICEF estimate (%) —	Reported to:*		Government official estimate (%) ○	Reported doses administered (%)** ✳	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months ▮	Survey <12 months +
1980	1	1					
1981	3	3	3	3	3		
1982	4	4	4	4	4		
1983	5	5	5	5	5		
1984	7	7	7	7	7		
1985	12	12	12	12	12		
1986	13	13	13	13	13	15	13
1987	18	18	18	18	18		
1988	36	36	36	36	36		
1989	56	56	56	56	56	69	
1990	84	89	89	89	89		
1991	47	62	62	62	62	47	
1992	50	51	51	51	51		48
1993	54	54	54	54	54		
1994	33	47	47	47	47		
1995	44	53	53	53	53	37	
1996	47	57	57	57	57	40	37
1997	40	51	51	51	51		
1998	56	68	68	68	68		
1999	59	72	72	72	72		
2000	62	76	76	76	76		
2001	62	76	76	76	76		
2002	54	69	69	69	69		
2003	50	66	66	66	66		
2004	61	78	78	78	78		
2005	67	85	85	85	85	61	60
2006	67	85	85	85	85		
2007	69	87	87	87	87		
2008	69	87	87	87	87		

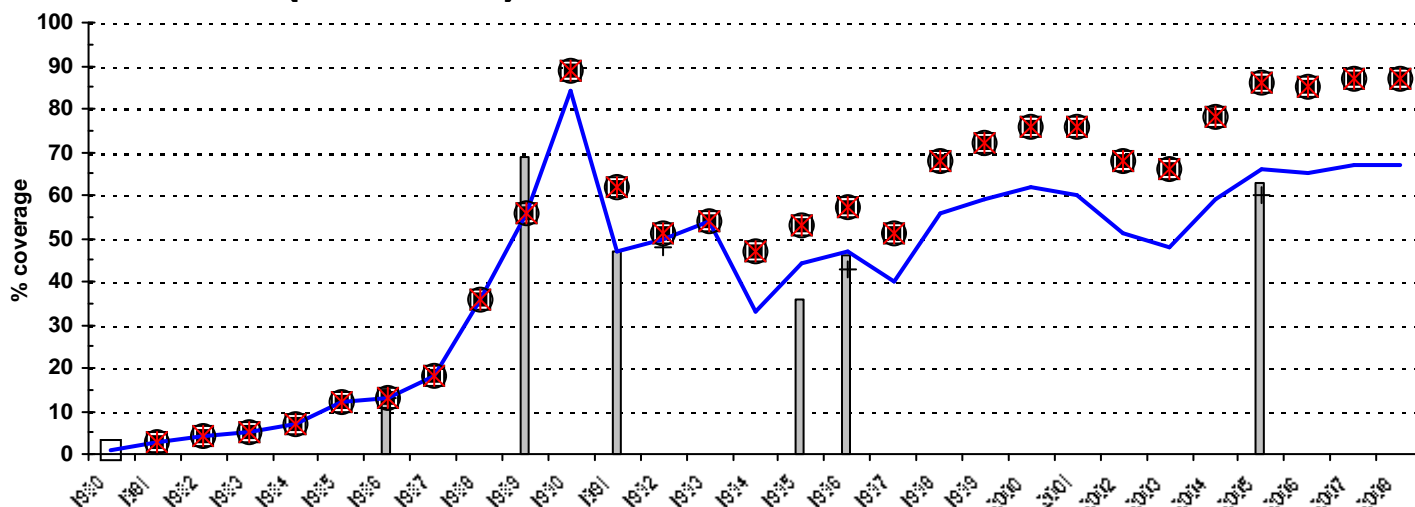
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

Pol3 (1980-2008)



Description of trend

Survey data in 1986 and 1989 are not considered (only part of the country covered). Coverage peaks in 1990, however 90% seems to be an overestimate (miscalculation of population possible because north and south were united). Withdrawal of donor support after 1990 results in a drop in coverage, confirmed by a survey. A further drop occurs in 1994 due to civil unrest. Reported coverage for 1994 is an overestimate, possibly covering only part of the country. Officially reported data show higher coverage than survey data for 1995 and 1996). Estimates from 1994 are based on reported data calibrated to survey levels adjusted for recall bias.

Data presented in chart

Year	WHO/ UNICEF estimate (%) —	Reported to:*		Government official estimate (%) ○	Reported doses administered (%)** ✕	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months 	Survey <12 months +
1980	1	1					
1981	3	3	3	3	3		
1982	4	4	4	4	4		
1983	5	5	5	5	5		
1984	7	7	7	7	7		
1985	12	12	12	12	12		
1986	13	13	13	13	13	15	13
1987	18	18	18	18	18		
1988	36	36	36	36	36		
1989	56	56	56	56	56	69	
1990	84	89	89	89	89		
1991	47	62	62	62	62	47	
1992	50	51	51	51	51		48
1993	54	54	54	54	54		
1994	33	47	47	47	47		
1995	44	53	53	53	53	36	
1996	47	57	57	57	57	46	43
1997	40	51	51	51	51		
1998	56	68	68	68	68		
1999	59	72	72	72	72		
2000	62	76	76	76	76		
2001	60	76	76	76	76		
2002	51	68	68	68	68		
2003	48	66	66	66	66		
2004	59	78	78	78	78		
2005	66	86	86	86	86	63	60
2006	65	85	85	85	85		
2007	67	87	87	87	87		
2008	67	87	87	87	87		

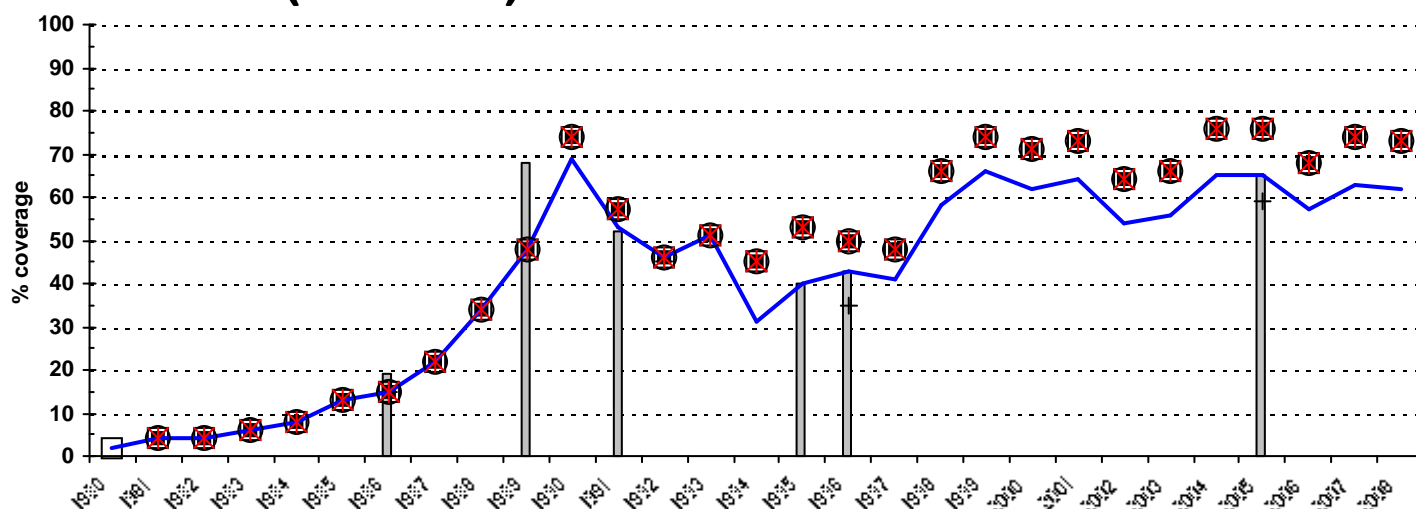
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

MCV (1980-2008)



Description of trend

Survey data in 1986 and 1989 are not considered (only part of the country covered). Coverage peaks in 1990, however 70% seems to be an overestimate (miscalculation of population possible because north and south were united). Withdrawal of donor support after 1990 resulted in drop in coverage, confirmed by a survey. A further drop occurs in 1994 due to civil unrest. The reported numbers for 1994 are overestimates, possibly covering only part of country. Officially reported data show higher coverage than survey data for 1995 and 1996 (MICS 1996, DHS 1996). Estimates from 1994 are based on reported data calibrated to survey levels.

Data presented in chart

Year	WHO/ UNICEF estimate (%)	Reported to:*		Government official estimate (%)	Reported doses administered (%)**	Survey data (%)***	
		WHO (%)	UNICEF (%)			Survey 12-23 months	Survey <12 months
1980	2	2					
1981	4	4	4	4	4		
1982	4	4	4	4	4		
1983	6	6	6	6	6		
1984	8	8	8	8	8		
1985	13	13	13	13	13		
1986	15	15	15	15	15	19	15
1987	22	22	22	22	22		
1988	34	34	34	34	34		
1989	48	48	48	48	48	68	
1990	69	74	74	74	74		
1991	53	57	57	57	57	52	
1992	46	46	46	46	46		45
1993	51	51	51	51	51		
1994	31	45	45	45	45		
1995	40	53	53	53	53	40	
1996	43	50	50	50	50	43	35
1997	41	48	48	48	48		
1998	58	66	66	66	66		
1999	66	74	74	74	74		
2000	62	71	71	71	71		
2001	64	73	73	73	73		
2002	54	64	64	64	64		
2003	56	66	66	66	66		
2004	65	76	76	76	76		
2005	65	76	76	76	76	65	59
2006	57	68	68	68	68		
2007	63	74	74	74	74		
2008	62	73	73	73	73		

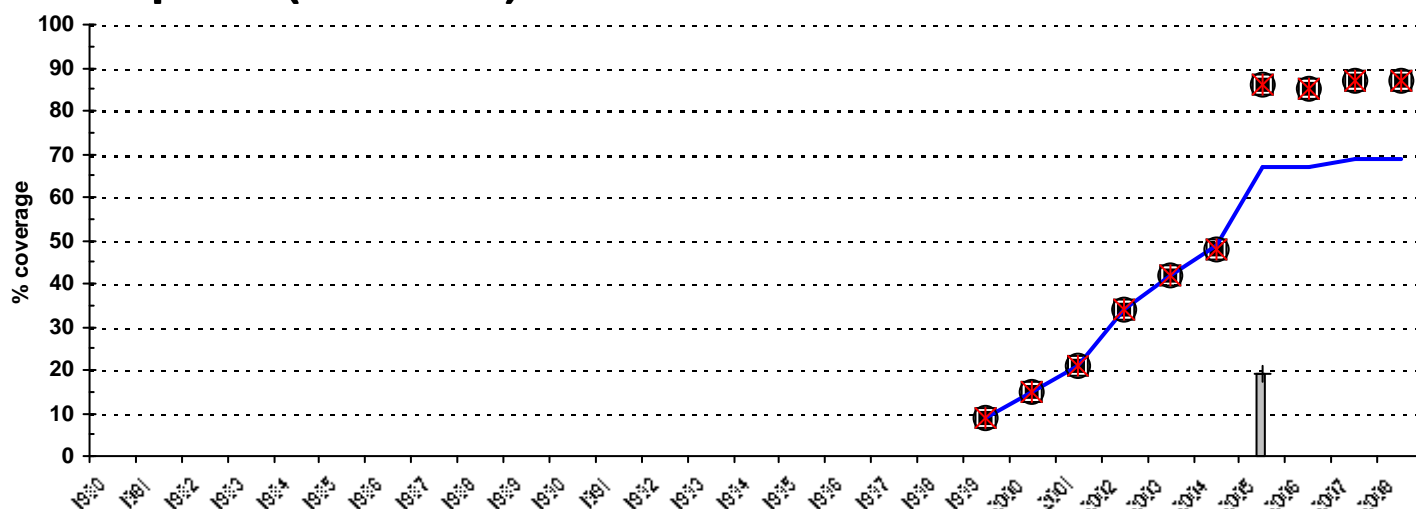
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

HepB3 (1980-2008)



Description of trend

Hepatitis B vaccine was introduced in April 1999 and DTP-HepB-Hib combination in last half of 2005. From 2005 estimates are based on estimates of DTP3 coverage.

Data presented in chart

Year	WHO/ UNICEF estimate (%) —	Reported to:*		Government official estimate (%) ○	Reported doses administered (%)** ✕	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months 	Survey <12 months +
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999	9	9	9	9	9		
2000	15	15	15	15	15		
2001	21	21	21	21	21		
2002	34	34	34	34	34		
2003	42	42	42	42	42		
2004	49	48	48	48	48		
2005	67	86	86	86	86	19	19
2006	67	85	85	85	85		
2007	69	87	87	87	87		
2008	69	87	87	87	87		

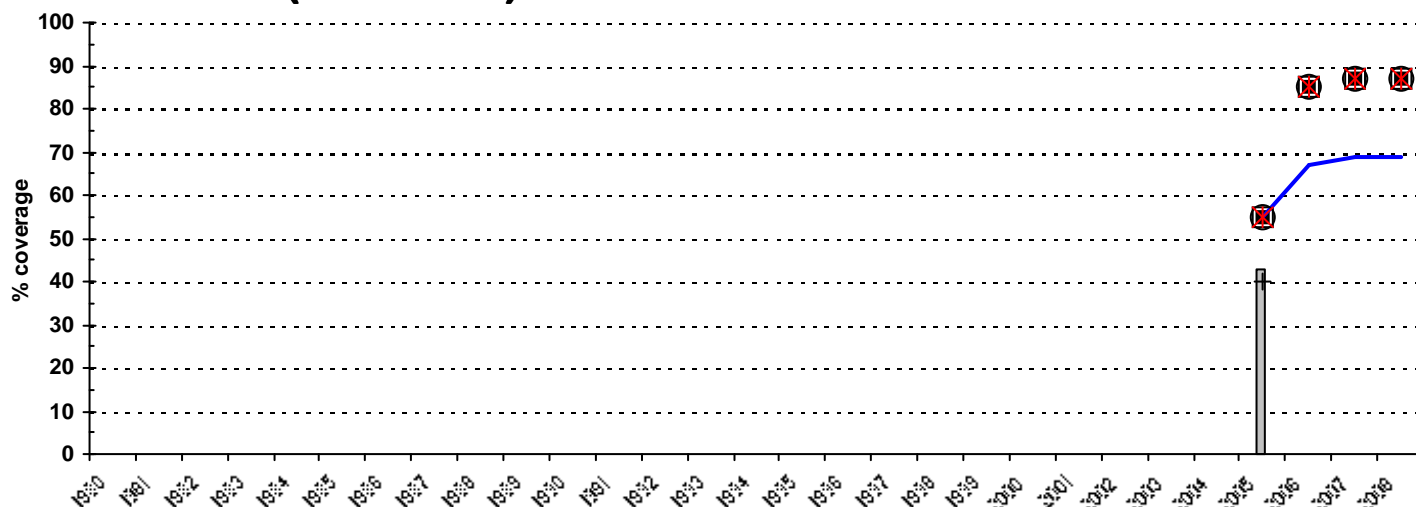
*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

Hib3 (1980-2008)



Description of trend

Hib vaccine introduced during last half of 2005 as part of DTP-HepB-Hib combination vaccine. Estimates follow officially reported data. From 2006 estimates are based on estimates of DTP3 coverage.

Data presented in chart

Year	WHO/ UNICEF estimate (%) —	Reported to:*		Government official estimate (%) ○	Reported doses administered (%)** ✕	Survey data (%)***	
		WHO (%) □	UNICEF (%) ■			Survey 12-23 months 	Survey <12 months +
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							
2004							
2005	55	55	55	55	55	43	40
2006	67	85	85	85	85		
2007	69	87	87	87	87		
2008	69	87	87	87	87		

*Prior to 1998 national reports to WHO/UNICEF did not specify whether information was derived from administrative records, surveys or other sources.

**Coverage based on registration of doses administered by health care providers.

***In case more than one survey was implemented in a certain year the highest value is presented. Details of all data are presented in the second section of this report.

Yemen

Details Survey Data

Year Source

Antigen	Confirmation method	% coverage	Compliance with schedule	Age group	Sample size	% cards seen	Survey year	Comments
2005 Yemen Multiple Indicator Cluster Survey 2006, Final Report								
BCG	Card or History	69		12-23 m	721	48.3	2006	
BCG	C or H <12 month	67.2		12-23 m	721	48.3	2006	
DTP1	Card or History	78.4		12-23 m	721	48.3	2006	
DTP1	C or H <12 month	76.9		12-23 m	721	48.3	2006	
DTP3	Card or History	61		12-23 m	721	48.3	2006	
DTP3	C or H <12 month	59.7		12-23 m	721	48.3	2006	
Pol3	Card or History	63		12-23 m	721	48.3	2006	
Pol3	C or H <12 month	60.2		12-23 m	721	48.3	2006	
MCV	Card or History	65.1		12-23 m	721	48.3	2006	
MCV	C or H <12 month	59.2		12-23 m	721	48.3	2006	
HepB	Card or History	19.4		12-23 m	721	48.3	2006	
HepB	C or H <12 month	18.6		12-23 m	721	48.3	2006	
Hib3	Card or History	42.6		12-23 m	721	48.3	2006	
Hib3	C or H <12 month	40		12-23 m	721	48.3	2006	
PAB	n.a.	30.8		CBAW	1610		2006	

1996 Yemen Demographic and Maternal and Child Health Survey 1997, 1998

BCG	Card or History	53.7		12-23 m	2188	30.8	1997	
BCG	C or H <12 month	51.2		12-23 m	2188	30.8	1997	
BCG	C or H <12 month	47		24-35 m	2323	27	1997	
BCG	C or H <12 month	44.1		36-47 m	2239	22.5	1997	
BCG	C or H <12 month	44.6		48-59 m	2306	20.7	1997	
DTP1	Card or History	53.9		12-23 m	2188	30.8	1997	
DTP1	C or H <12 month	52.3		12-23 m	2188	30.8	1997	
DTP1	C or H <12 month	47		24-35 m	2323	27	1997	
DTP1	C or H <12 month	42.4		36-47 m	2239	22.5	1997	
DTP1	C or H <12 month	40.6		48-59 m	2306	20.7	1997	
DTP3	Card or History	39.7		12-23 m	2188	30.8	1997	
DTP3	C or H <12 month	37.3		12-23 m	2188	30.8	1997	
DTP3	C or H <12 month	34.4		24-35 m	2323	27	1997	
DTP3	C or H <12 month	29.9		36-47 m	2239	22.5	1997	
DTP3	C or H <12 month	30.5		48-59 m	2306	20.7	1997	
Pol3	Card or History	45.8		12-23 m	2188	30.8	1997	
Pol3	C or H <12 month	42.8		12-23 m	2188	30.8	1997	
Pol3	C or H <12 month	38.8		24-35 m	2323	27	1997	
Pol3	C or H <12 month	34.9		36-47 m	2239	22.5	1997	
Pol3	C or H <12 month	35.3		48-59 m	2306	20.7	1997	
MCV	Card or History	42.8		12-23 m	2188	30.8	1997	
MCV	C or H <12 month	35.1		12-23 m	2188	30.8	1997	
MCV	C or H <12 month	33.1		24-35 m	2323	27	1997	
MCV	C or H <12 month	29.3		36-47 m	2239	22.5	1997	
MCV	C or H <12 month	29.5		48-59 m	2306	20.7	1997	

1995 Yemen MICS 1996

BCG	Card or History	57.1		12-23 m			1996	
DTP1	Card or History			12-23 m			1996	
DTP3	Card or History	37.1		12-23 m			1996	
Pol3	Card or History	36.4		12-23 m			1996	
MCV	Card or History	40		12-23 m			1996	

Yemen

Details Survey Data

Year Source

Antigen	Confirmation method	% coverage	Compliance with schedule	Age group	Sample size	% cards seen	Survey year	Comments
1992 National Immunization Programme Review								
BCG	C or H <12 month	64		12-23 m	209	36.8	1993	
DTP1	C or H <12 month	63		12-23 m	209	36.8	1993	
DTP3	C or H <12 month	48		12-23 m	209	36.8	1993	
Pol3	C or H <12 month	48		12-23 m	209	36.8	1993	
MCV	C or H <12 month	45		12-23 m	209	36.8	1993	
1991 Yemen Demographic and Maternal and Child Health Survey 1991/1992, 1994								
BCG	Card or History	60.4		12-23 m	1256	26.9	1991/92	Mother or respondent to Child's Questionnaire
DTP1	Card or History	61.3		12-23 m	1256	26.9	1991/92	Mother or respondent to Child's Questionnaire
DTP3	Card or History	47.3		12-23 m	1256	26.9	1991/92	Mother or respondent to Child's Questionnaire
Pol3	Card or History	47.3		12-23 m	1256	26.9	1991/92	Mother or respondent to Child's Questionnaire
MCV	Card or History	51.5		12-23 m	1256	26.9	1991/92	Mother or respondent to Child's Questionnaire
1989 Yemen, Immunization, Diarrhoeal Disease, Maternal and Child Mortality Survey 1990, Evaluation Series No. 5								
BCG	Card or History	81		12-23 m	634	62	1990	Weighted average (based on 30% rural, 70 % urban)
DTP1	Card or History	80		12-23 m	634	62	1990	Weighted average (based on 30% rural, 70 % urban)
DTP3	Card or History	69		12-23 m	634	62	1990	Weighted average (based on 30% rural, 70 % urban)
Pol3	Card or History	69		12-23 m	634	62	1990	Weighted average (based on 30% rural, 70 % urban)
MCV	Card or History	68		12-23 m	634	62	1990	Weighted average (based on 30% rural, 70 % urban)
1986 Report of Joint Government/WHO/Unicef EPI Coverage Review in the Yemen Arab Republic, 1987								
BCG	Card or History	30		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
BCG	C or H <12 month	26		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
DTP1	Card or History	30		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
DTP1	C or H <12 month	27		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
DTP3	Card or History	15		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
DTP3	C or H <12 month	13		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
Pol3	Card or History	15		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
Pol3	C or H <12 month	13		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
MCV	Card or History	19		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)
MCV	C or H <12 month	15		12-23 m		22	1987	W.a.(based on 7% urban, 93% rural)

Yemen

WHO/UNICEF Estimates of Protection at Birth (PAB) against tetanus

In countries where tetanus is recommended for girls and women coverage is usually reported as "TT2+", i.e. the proportion of (pregnant) women who have received their second or superior TT dose in a given year. TT2 + coverage, however, can under-represent the actual proportion of births that are protected against tetanus as it does not include women who have previously received protective doses, women who received one dose without documentation of previous doses, and women who received doses in TT (or Td) supplemental immunization activities (SIA). In addition, girls who have received DTP in their childhood and are entering childbearing age, may be protected with TT booster doses.

WHO and UNICEF have developed a model that takes into account the above scenarios, and calculates the proportion of births in a given year that can be considered as having been protected against tetanus - "Protection at Birth".

In this model, annual cohorts of women are followed from infancy through their life. A proportion receive DTP in infancy (estimated based on the WHO-UNICEF estimates of DTP3 coverage). In addition some of these women also receive TT through routine services when they are pregnant and may also receive TT during SIAs. The model also adjusts reported data, taking into account coverage patterns in other years, and/or results available through surveys. The duration of protection is then calculated, based on WHO estimates of the duration of protection by doses ever received. The proportion of births that are protected against tetanus as a result of maternal immunization reflects the tetanus immunization received by the mother throughout her life rather than simply the TT immunizations received during the current pregnancy.

¹ This model is described in: Griffiths U., Wolfson L., Quddus A., Younus M., Hafiz R.. Incremental cost-effectiveness of supplementary immunization activities to prevent neo-natal tetanus in Pakistan. Bulletin of the World Health Organization 2004; 82:643-651.

Yemen

Year	PAB coverage estimate (%)
1980	
1981	
1982	
1983	
1984	
1985	3
1986	3
1987	8
1988	4
1989	7
1990	17
1991	14
1992	15
1993	12
1994	17
1995	30
1996	33
1997	30
1998	39
1999	41
2000	54
2001	58
2002	68
2003	65
2004	69
2005	59
2006	56
2007	52
2008	63