Results

Monitoring progress in TB control

Countries reporting to WHO

By the end of 2006, 199 of 212 countries and territories reported case notifications for 2005 and/or treatment outcomes for patients registered in 2004 (Annex 2). These countries include 99.9% of the world's population. Reports were submitted by all 22 HBCs. The countries that did not report included 10 Caribbean islands, Equatorial Guinea, Monaco and San Marino.

Case notifications and incidence estimates

The 199 countries reporting to WHO notified 5.1 million new and relapse cases, of which 2.4 million (47%) were new smear-positive cases (Table 8; Figure 1). Of these notifications, 4.9 million were from DOTS areas, including 2.3 million new smear-positive cases. A total of 26.5 million new and relapse cases, and 13.0 million new smear-positive cases, were notified by DOTS programmes between 1995 and 2005. Based on surveillance and survey data, we estimate that there were 8.8 million new cases of TB in 2004 (136 per 100 000), including 3.9 million (60 per 100 000) new smear-positive cases (Table 9; Figures 2, 3).

Comparing different parts of the world, the African Region (23%), South-East Asia Region (35%) and Western Pacific Region (25%) together accounted for 83% of all notified new and relapse cases and similar proportions of new smear-positive cases in 2005. Because DOTS has emphasized diagnosis by sputum smear microscopy, 48% of all new and relapse cases were new smear-positive (approximately 45% expected) in DOTS areas, compared with 36% elsewhere. Among new pulmonary cases reported by DOTS programmes, 59% were new smear-positive (a minimum of 65% expected), compared with 46% elsewhere (Table 8). The proportion of smear-positive cases among pulmonary cases reported under DOTS conforms with expectations and so, therefore, does the proportion of smear-negative cases.

In ranking countries by the estimated number of incident cases, 22 countries have been given special attention (Table 8). The magnitude of the TB burden within countries can also be expressed as the incidence rate per 100 000 population. Among the 15 countries with the highest estimated TB incidence rates, 12 are in Africa (Figure 4). The high incidence rates estimated for the African countries in this list are partly explained by the relatively high rates of HIV coinfection. Where HIV infection rates are higher in adult populations, they are also estimated to be higher among new TB patients. Figure 5 maps the distribution of HIV among TB patients,

FIGURE 1

Tuberculosis notification rates, 2005

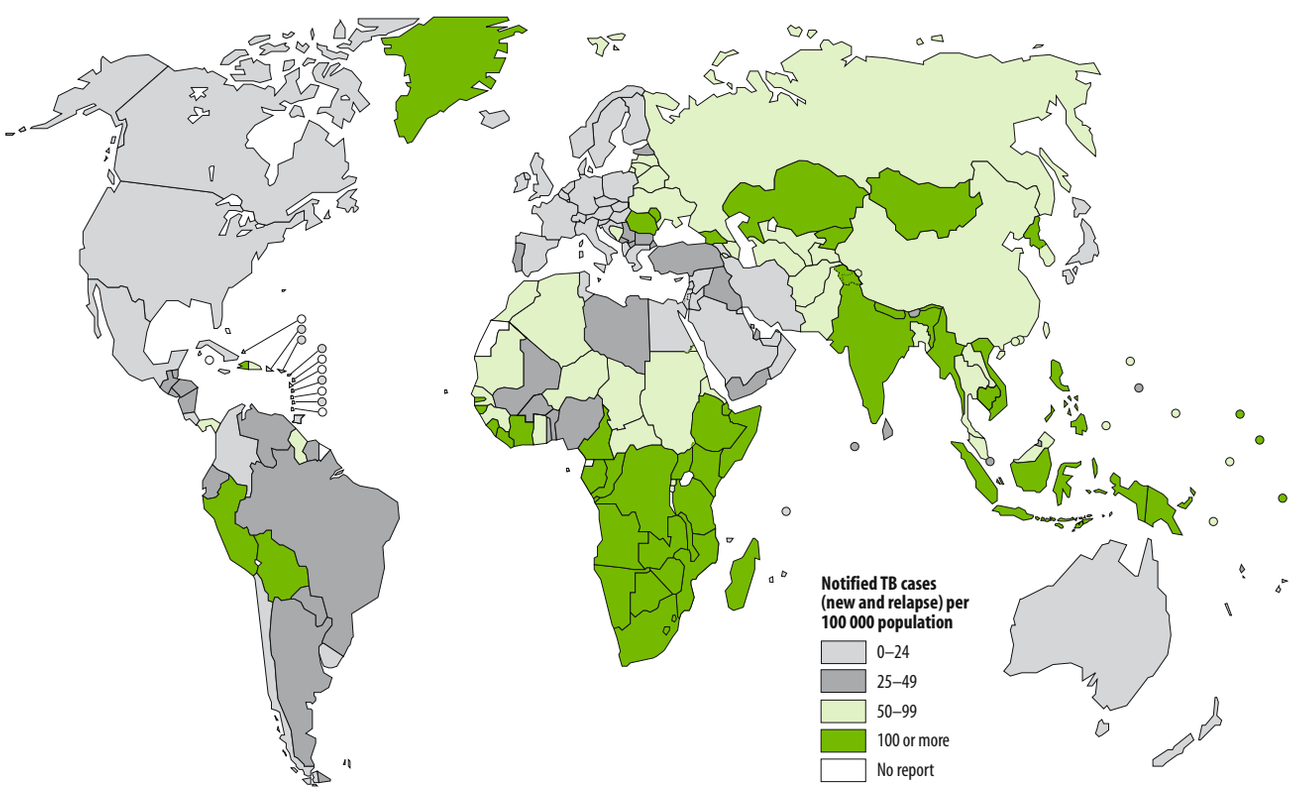


TABLE 8

Case notifications, 2005

		NEW AND RELAPSE CASES		NEW CASES						RE-TREATMENT CASES EXCLUDING RELAPSE		OTHER[a]		% OF NEW PULMONARY CASES SMEAR-POSITIVE[b]	
				SMEAR-POSITIVE		SMEAR-NEGATIVE/ UNKNOWN		EXTRAPULMONARY							
		DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY
1	India	1 146 599	1 156 248	506 852	508 890	392 390	399 066	170 948	171 838	148 495	148 580	–	–	56	56
2	China	894 428	–	472 719	–	329 157	–	42 845	–	90 780	–	5 301	–	59	–
3	Indonesia	254 601	–	158 640	–	85 373	–	6 142	–	4 446	–	–	–	65	–
4	Nigeria	62 598	–	35 048	–	22 705	–	2 836	–	2 858	–	1 392	–	61	–
5	Bangladesh	123 118	–	84 848	–	23 076	–	11 318	–	–	–	–	–	79	–
6	Pakistan	137 574	–	47 154	–	65 392	–	22 411	–	2 640	–	–	–	42	–
7	South Africa	260 162	270 178	119 906	125 460	73 551	76 680	38 786	39 739	31 559	32 289	–	–	62	62
8	Ethiopia	124 262	–	38 525	–	39 816	–	43 675	–	873	–	–	–	49	–
9	Philippines	137 100	–	81 647	–	50 347	–	1 149	–	–	–	–	–	62	–
10	Kenya	102 680	–	40 389	–	43 772	–	15 265	–	5 721	–	–	–	48	–
11	DR Congo	97 075	–	65 040	–	9 959	–	18 494	–	1 909	–	574	–	87	–
12	Russian Federation	82 643	127 930	22 690	32 605	47 151	74 301	6 776	12 320	6 433	28 617	–	–	32	30
13	Viet Nam	94 994	–	55 570	–	16 429	–	16 670	–	976	–	–	–	77	–
14	UR Tanzania	61 022	–	25 264	–	20 810	–	13 094	–	3 178	–	–	–	55	–
15	Brazil	51 452	80 209	26 224	42 093	15 898	23 990	7 229	11 037	3 159	6 548	–	466	62	64
16	Uganda	41 040	–	20 559	–	15 040	–	3 780	–	769	–	–	–	58	–
17	Thailand	57 895	–	29 762	–	18 837	–	7 501	–	–	–	–	–	61	–
18	Mozambique	33 231	–	17 877	–	9 184	–	4 771	–	487	–	–	–	66	–
19	Myanmar	107 009	–	36 541	–	35 601	–	30 252	–	982	–	–	–	51	–
20	Zimbabwe	50 454	–	13 155	–	29 074	–	6 721	–	4 437	–	–	–	31	–
21	Cambodia	35 535	–	21 001	–	7 057	–	6 759	–	588	–	–	–	75	–
22	Afghanistan	21 844	–	9 949	–	6 085	–	4 954	–	–	–	–	–	62	–
High-burden countries		**3 977 316**	**4 071 025**	**1 929 360**	**1 962 736**	**1 356 704**	**1 401 751**	**482 376**	**493 571**	**310 290**	**336 678**	**7 267**	**7 733**	**59**	**58**
	AFR	1 168 502	1 186 800	538 816	550 001	359 987	364 789	207 438	208 979	64 805	65 883	–	2 649	60	60
	AMR	187 380	227 616	101 786	124 788	45 154	55 740	28 083	33 298	8 725	12 442	1 640	2 106	69	69
	EMR	276 707	282 945	112 617	112 804	97 664	99 392	62 974	63 282	5 252	–	–	53	54	
	EUR	270 290	365 346	70 229	96 101	111 802	157 334	29 792	49 831	33 935	60 719	194	413	39	38
	SEAR	1 779 496	1 789 186	855 306	857 371	587 502	594 185	241 438	242 332	162 573	162 661	189	202	59	59
	WPR	1 238 180	1 274 266	661 390	671 719	431 865	447 749	80 958	87 584	95 742	99 053	6 511	10 125	60	60
Global		**4 923 555**	**5 126 159**	**2 340 214**	**2 412 784**	**1 633 974**	**1 719 189**	**650 683**	**686 306**	**371 032**	**406 010**	**11 183**	**15 495**	**59**	**58**

– Indicates all cases notified as DOTS, no additional cases notified as non-DOTS.

[a] Cases not included elsewhere in table.

[b] Expected percentage of new pulmonary cases that are smear-positive is 65–80%.

FIGURE 2

Estimated numbers of new TB cases, 2005

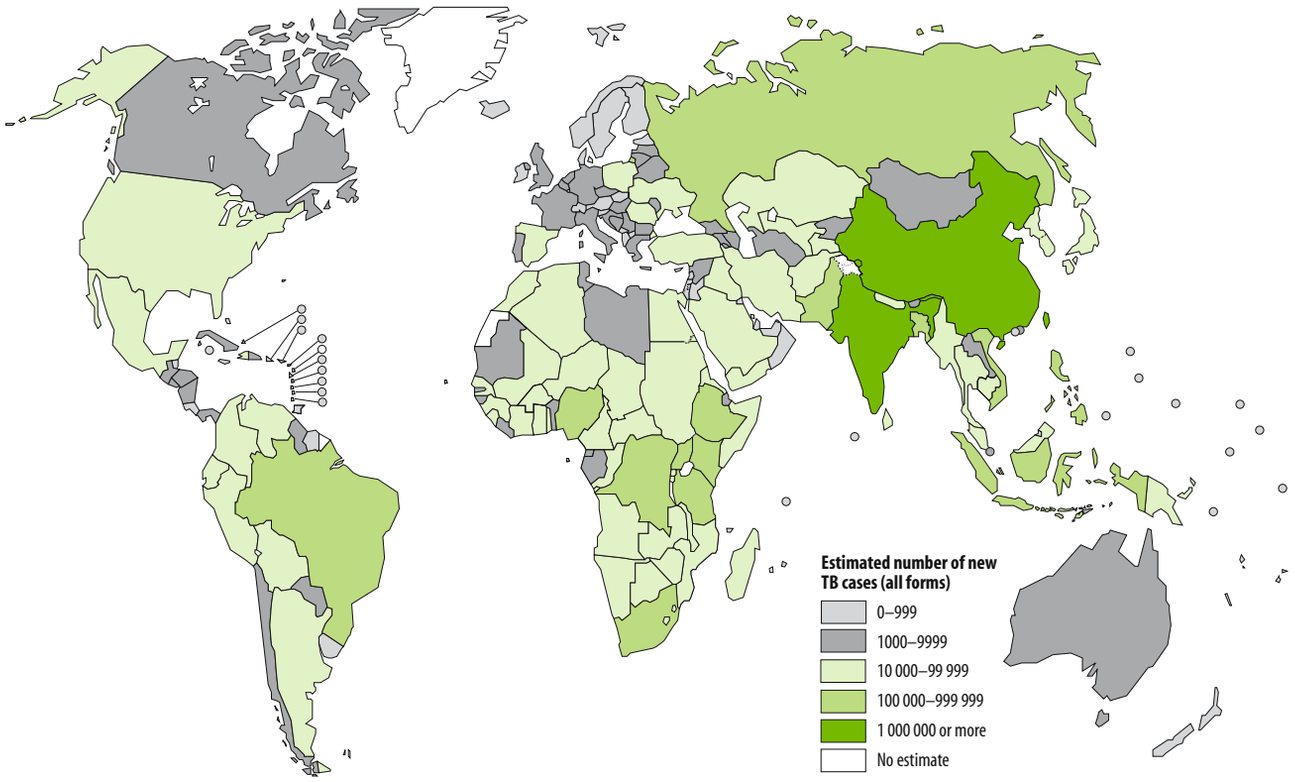


FIGURE 3

Estimated TB incidence rates, 2005

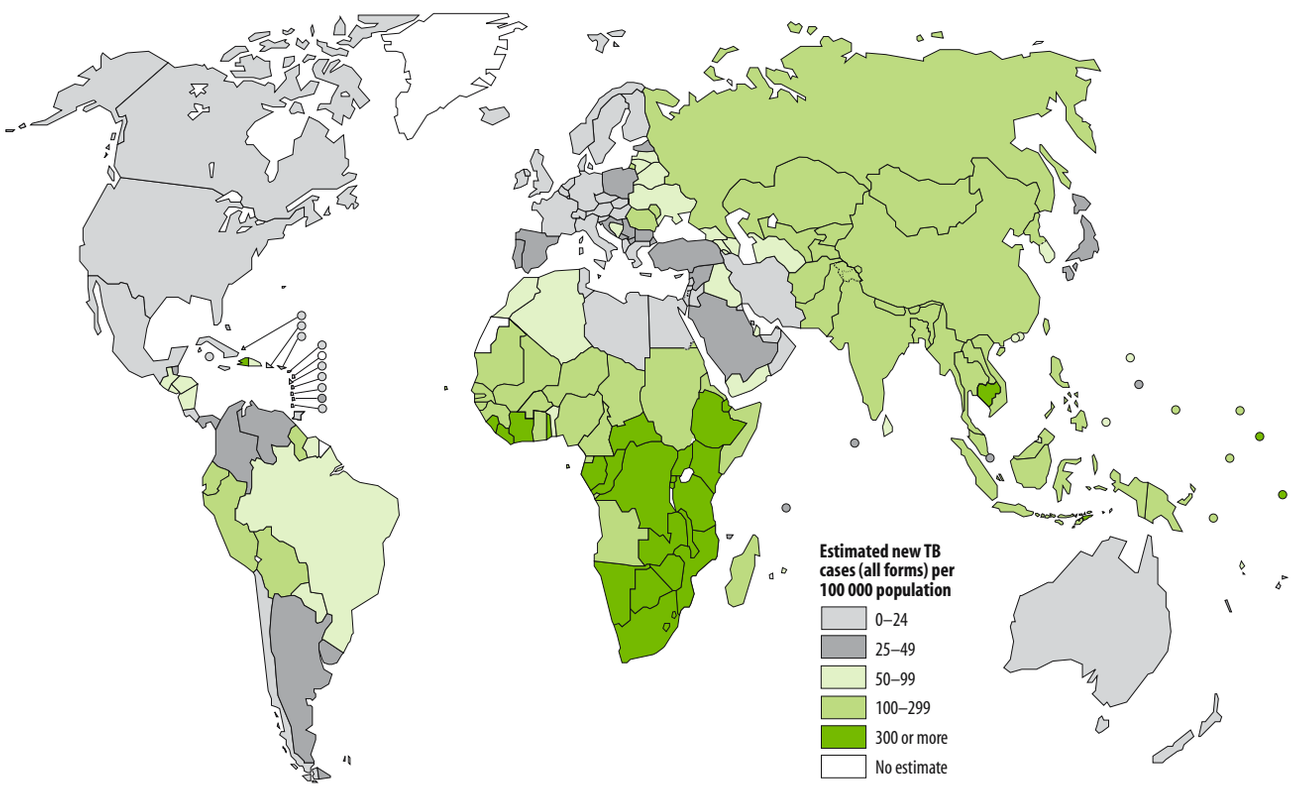


TABLE 9

Estimated TB burden, 2005

			INCIDENCE[a]				PREVALENCE		MORTALITY		HIV PREV. IN INCIDENT TB CASES[b]
			ALL FORMS		SMEAR-POSITIVE		ALL FORMS		ALL FORMS		
		POPULATION 1000s	NUMBER 1000s	PER 100 000 POP PER YEAR	NUMBER 1000s	PER 100 000 POP PER YEAR	NUMBER 1000s	PER 100 000 POP	NUMBER 1000s	PER 100 000 POP PER YEAR	%
1	India	1 103 371	1 852	168	827	75	3 299	299	322	29	5.2
2	China	1 315 844	1 319	100	593	45	2 737	208	205	16	0.5
3	Indonesia	222 781	533	239	240	108	584	262	92	41	0.8
4	Nigeria	131 530	372	283	162	123	704	536	100	76	19
5	Bangladesh	141 822	322	227	145	102	575	406	66	47	0.1
6	Pakistan	157 935	286	181	129	82	468	297	59	37	0.6
7	South Africa	47 432	285	600	116	245	242	511	34	71	58
8	Ethiopia	77 431	266	344	118	152	423	546	56	73	11
9	Philippines	83 054	242	291	109	131	374	450	39	47	0.1
10	Kenya	34 256	220	641	94	276	321	936	48	140	28
11	DR Congo	57 549	205	356	90	156	311	541	42	73	17
12	Russian Federation	143 202	170	119	76	53	214	150	28	20	6.2
13	Viet Nam	84 238	148	175	66	79	198	235	19	23	3.0
14	UR Tanzania	38 329	131	342	56	147	190	496	29	75	29
15	Brazil	186 405	111	60	49	26	142	76	15	7.5	14
16	Uganda	28 816	106	369	46	158	161	559	26	91	30
17	Thailand	64 233	91	142	41	63	131	204	12	19	7.6
18	Mozambique	19 792	89	447	37	185	118	597	24	124	50
19	Myanmar	50 519	86	171	38	76	86	170	8	15	7.1
20	Zimbabwe	13 010	78	601	32	245	82	631	17	130	60
21	Cambodia	14 071	71	506	32	226	99	703	12	87	6.0
22	Afghanistan	29 863	50	168	23	76	86	288	10	35	0.0
High-burden countries		**4 045 482**	**7 033**	**174**	**3 117**	**77**	**11 546**	**285**	**1 265**	**31**	**10**
	AFR	738 083	2 529	343	1 088	147	3 773	511	544	74	28
	AMR	890 757	352	39	157	18	448	50	49	5.5	7.9
	EMR	541 704	565	104	253	47	881	163	112	21	2.1
	EUR	882 395	445	50	199	23	525	60	66	7.4	4.6
	SEAR	1 656 529	2 993	181	1 339	81	4 809	290	512	31	3.9
	WPR	1 752 283	1 927	110	866	49	3 616	206	295	17	1.0
Global		**6 461 751**	**8 811**	**136**	**3 902**	**60**	**14 052**	**217**	**1 577**	**24**	**11**

[a] All estimates include TB in people with HIV.
[b] Prevalence of HIV in incident TB cases in adults aged 15–49 years.

FIGURE 4

Fifteen countries with the highest estimated TB incidence rates per capita (all ages, all forms; grey bars) and corresponding incidence rates of HIV-infected TB in adults aged 15–49 years (green bars), 2005

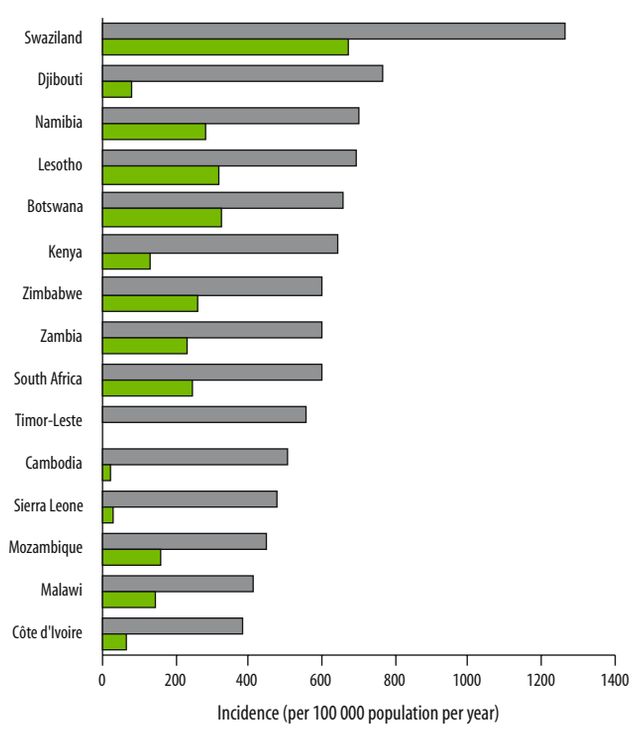
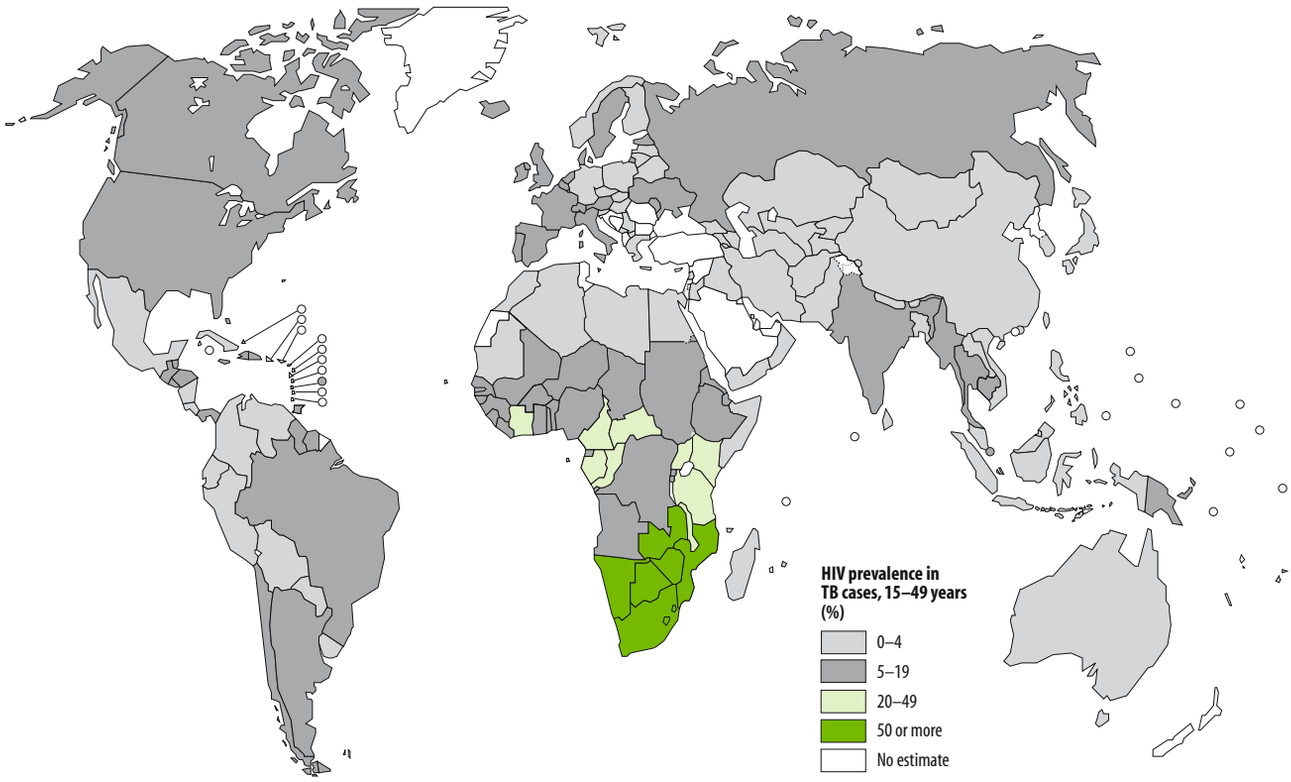


FIGURE 5

Estimated HIV prevalence in new adult TB cases, 2005



showing the relatively high rates in countries of eastern and southern Africa (subregion African – high HIV). Some countries have small populations but high rates of HIV infection; in Swaziland, for example, 75% of TB patients were estimated to be HIV-positive in 2005. Figure 6 shows how the number of HIV-infected TB patients varies among countries and regions. South Africa, with 0.7% of the world's population, had 19% of all cases of TB in adult HIV-positive people in 2005, while 10% of cases lived in India. The rest of the African Region accounted for a further 61% of HIV-infected TB cases in 2005.

Using the time series of notifications of all TB cases from countries thought to have reliable data, and scaling by the estimated rates of case detection, we have estimated the trends in TB incidence (all forms of TB) for nine epidemiologically different subregions of the world (subdivisions of the six WHO regions) for the period 1990 to 2005 (Figure 7). In six of the nine subregions the incidence rate was stable or falling for most of this period. In subregions Africa – high HIV and Eastern Europe, incidence rates increased for most of the period since 1990 but now appear to have stabilized or begun to fall.

In subregion Africa – high HIV, the annual change in TB incidence runs almost parallel to the change in HIV prevalence. Since 1990, both HIV prevalence and TB incidence have been increasing more slowly each year and, by 2005, both indicators were falling (rates of change negative; Figure 8). The time series of estimates for some

FIGURE 6

Geographical distribution of HIV-positive TB cases, 2005.
For each country or region, the number of incident TB cases arising in people with HIV is shown as a percentage of the global total of such cases. AFR* is all countries in the WHO African Region except those shown separately; AMR* excludes Brazil; EUR* excludes the Russian Federation; SEAR* excludes India.

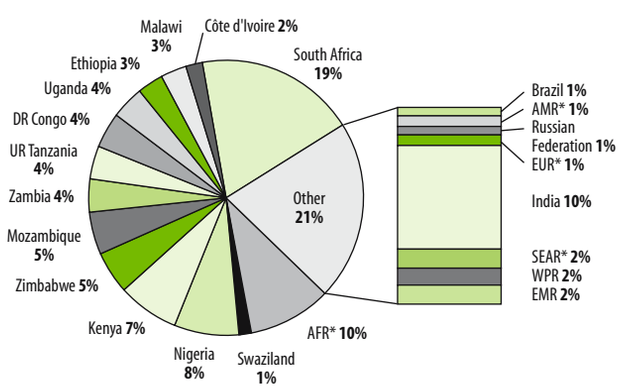


FIGURE 7

Trends in estimated TB incidence rates (per 100 000 per year, all forms, black lines), and the estimated annual change in incidence rates (green lines), for nine subregions and the world, 1990–2005. For each subregion, series are constructed with data from countries (shown in bold, facing page) whose surveillance systems are reliable enough to determine the national and sub-regional trends in incidence.

FIGURE 7

AFRICA – COUNTRIES WITH HIGH HIV PREVALENCE: **Botswana**, **Burkina Faso**, **Burundi**, **Cameroon**, Central African Rep, Chad, Congo, Côte d'Ivoire, DR Congo, Equatorial Guinea, Ethiopia, **Gabon**, **Kenya**, **Lesotho**, Liberia, **Malawi**, Mozambique, Namibia, Nigeria, Rwanda, South Africa, **Swaziland**, **Uganda**, **UR Tanzania**, **Zambia**, **Zimbabwe**.

AFRICA – COUNTRIES WITH LOW HIV PREVALENCE: Algeria, Angola, Benin, Cape Verde, Comoros, Eritrea, Gambia, Ghana, Guinea, Guinea-Bissau, **Madagascar**, **Mali**, Mauritania, Mauritius, Niger, Sao Tome & Principe, Senegal, Seychelles, **Sierra Leone**, **Togo**.

CENTRAL EUROPE: **Albania**, Bosnia & Herzegovina, Croatia, Cyprus, **Hungary**, Montenegro, **Poland**, Serbia, **Slovakia**, **Slovenia**, TFYR Macedonia, **Turkey**.

EASTERN EUROPE: **Armenia**, Azerbaijan, **Belarus**, **Bulgaria**, **Estonia**, Georgia, **Kazakhstan**, **Kyrgyzstan**, **Latvia**, **Lithuania**, Rep Moldova, **Romania**, **Russian Federation**, **Tajikistan**, **Turkmenistan**, **Ukraine**, **Uzbekistan**.

EASTERN MEDITERRANEAN: Afghanistan, Bahrain, Djibouti, Egypt, **Iran (Islamic Republic of)**, Iraq, **Jordan**, Kuwait, **Lebanon**, Libyan Arab Jamahiriya, **Morocco**, **Oman**, Pakistan, **Qatar**, **Saudi Arabia**, Somalia, Sudan, **Syrian Arab Rep**, **Tunisia**, United Arab Emirates, West Bank & Gaza Strip, Yemen.

ESTABLISHED MARKET ECONOMIES: Andorra, **Australia**, Austria, **Belgium**, Canada, **Czech Rep**, Denmark, **Finland**, France, **Germany**, Greece, **Iceland**, **Ireland**, Israel, Italy, Japan, Luxembourg, Malta, Monaco, Netherlands, **New Zealand**, Norway, **Portugal**, San Marino, **Singapore**, Spain, **Sweden**, **Switzerland**, **United Kingdom**, **United States**.

LATIN AMERICA: Anguilla, **Antigua & Barbuda**, **Argentina**, Bahamas, Barbados, Belize, **Bermuda**, **Bolivia**, Brazil, British Virgin Is, Cayman Is, **Chile**, **Colombia**, Costa Rica, **Cuba**, **Dominica**, Dominican Republic, Ecuador, **El Salvador**, **Grenada**, **Guatemala**, Guyana, Haiti, **Honduras**, **Jamaica**, **Mexico**, Montserrat, Netherlands Antilles, **Nicaragua**, Panama, **Paraguay**, **Peru**, **Puerto Rico**, **St Kitts & Nevis**, **St Lucia**, **St Vincent & the Grenadines**, Suriname, Trinidad & Tobago, Turks & Caicos Is, **Uruguay**, US Virgin Is, **Venezuela**.

SOUTH-EAST ASIA: Bangladesh, **Bhutan**, DPR Korea, **India**, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste.

WESTERN PACIFIC: American Samoa, Brunei Darussalam, Cambodia, **China**, **China Hong Kong SAR**, China Macao SAR, Cook Is, Fiji, French Polynesia, Guam, Kiribati, Lao PDR, **Malaysia**, Marshall Is, Micronesia, Mongolia, Nauru, New Caledonia, Niue, N Mariana Is, Palau, Papua New Guinea, Philippines, **Rep Korea**, Samoa, Solomon Is, Tokelau, Tonga, Vanuatu, Viet Nam, Wallis & Futuna Is.

FIGURE 8

Annual changes (%) in estimated HIV prevalence rate (15–49 years old, green line) and the TB case notification rate (black line, see figure 7) for sub-region Africa high-HIV.
Changes are to the year marked from the preceding year, 1990–1 et seq. Estimates of HIV prevalence are from UNAIDS (personal communication).

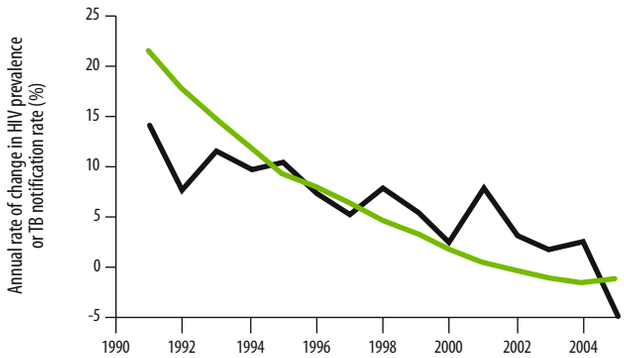
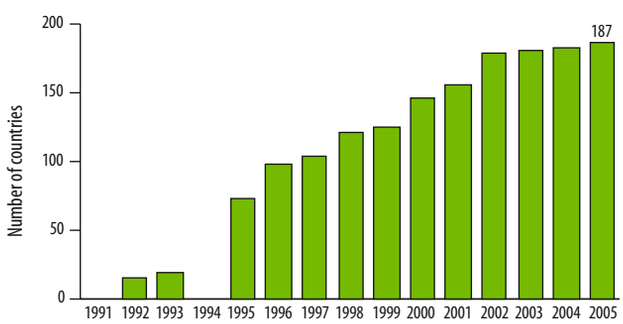


FIGURE 9

Number of countries implementing DOTS (out of a total of 212 countries), 1991–2005



African countries show the expected lag between peak HIV prevalence and peak TB incidence rate. In Zimbabwe, for example, estimated HIV prevalence reached a maximum in 1997, while the TB case notification rate was highest in 2002.

In subregion Africa – low HIV, the TB incidence rate was evidently still increasing in 2005. In eastern Europe, the annual increase in the incidence rate reached nearly 20% in 1995 but had stabilized by year 2000.

The global incidence rate of TB peaked around 2002 and appears now to have stabilized or begun to decline (Figure 7). The incidence rate is now stable or falling in all six WHO regions. However, the slow decline in incidence rates per capita is offset by population growth. Consequently, the number of new cases arising each year is still increasing globally and in the WHO regions of Africa, the Eastern Mediterranean and South-East Asia.

DOTS coverage

The total number of countries implementing DOTS increased steadily from 1995 but had stabilized at about 180 by 2002, rising a little closer to the maximum in 2005 (187 out of 212; Figure 9). All 22 HBCs have had DOTS programmes since 2000; many of which have been established for much longer. DOTS coverage within countries has steadily increased since 1995 (Figure 10; Table 10). By the end of 2005, 89% of the world's population lived in counties, districts, oblasts and provinces of countries that had adopted DOTS. Geographical coverage was reported to be more than 80% in all regions except Europe (Figure 11).

All but four HBCs had at least 90% of the population living in areas where DOTS has been implemented. Population coverage in the remaining four – Afghanistan, Brazil, Nigeria, and the Russian Federation – was 81%, 68%, 65%, and 83% respectively.

Case notification and case detection

A total of 4.8 million new cases of TB were notified from all sources in 2005. This represents 55% of the 8.8 million estimated new cases; the 2.4 million new smear-positive cases notified account for 62% of the 3.9 million estimated (Tables 8, 9; Annex 2).

The detection rate of new smear-positive cases from all

FIGURE 10

DOTS coverage, 1995–2005

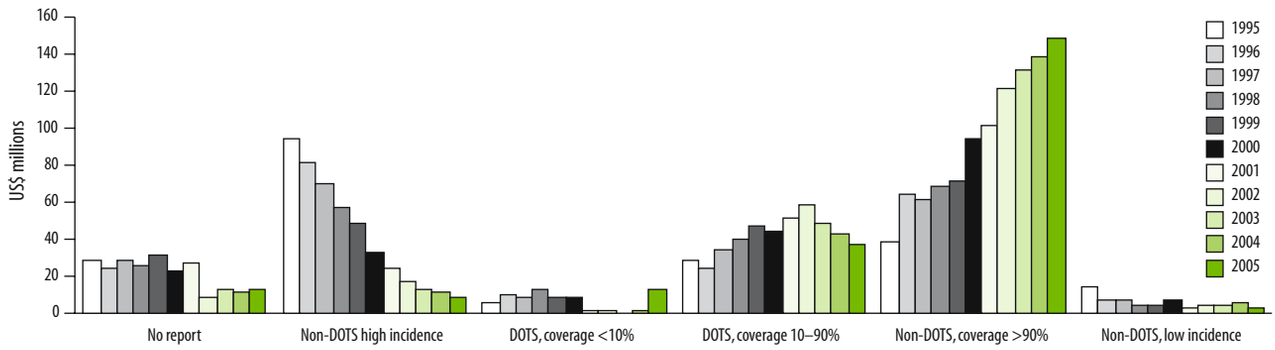


TABLE 10

Progress in DOTS implementation, 1995–2005

		PERCENT OF POPULATION COVERED BY DOTS										
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1	India	1.5	2	2.3	9	13.5	30	45	51.6	67.2	84.0	91.0
2	China	49	60.4	64.2	63.9	64	68	68	77.6	91	96	100
3	Indonesia	6	13.7	28.3	80	90	98	98	98	98	98	98
4	Nigeria	47	30	40	45	45	47	55	55	60	65	65
5	Bangladesh	40.5	65	80	90	90	92	95	95	99	99	99
6	Pakistan	2.0	8	–	8	8	9	24	45	63	79	100
7	South Africa	–	0	13	22	66	77	77	98	99.5	93	94
8	Ethiopia	39	39	48	64.4	63	85	70	95	95	70	90
9	Philippines	4.3	2	15	16.9	43	89.6	95	98	100	100	100
10	Kenya	15	100	100	100	100	100	100	100	100	100	100
11	DR Congo	47	51.4	60	60	62	70	70	70	75	75	100
12	Russian Federation	–	2.3	2.3	5	5	12	16	25	25	45	83
13	Viet Nam	50	95	93	96	98.5	99.8	99.8	99.9	100	100	99.9
14	UR Tanzania	98	100	100	100	100	100	100	100	100	100	100
15	Brazil	–	0	0	3	7	7	32	25	33.6	52	68
16	Uganda	–	0	100	100	100	100	100	100	100	100	100
17	Thailand	–	1.1	4	32	59	70	82	100	100	100	100
18	Mozambique	97	100	84	95	–	100	100	100	100	100	100
19	Myanmar	–	59	60	60.3	64	77	84	88.3	95	95	95
20	Zimbabwe	–	0	0	100	11.6	100	100	100	100	100	100
21	Cambodia	60	80	88	100	100	99	100	100	100	100	100
22	Afghanistan	–	–	12	11	13.5	15	12	38	53	68	81
High-burden countries		**24**	**32**	**36**	**43**	**46**	**55**	**61**	**68**	**79**	**87**	**94**
	AFR	43	46	56	61	56	71	69	81	85	84	89
	AMR	12	48	50	55	65	68	73	73	78	83	88
	EMR	16	12	18	33	51	65	71	78	86	90	97
	EUR	5.4	8.2	17	22	23	26	32	40	42	47	60
	SEAR	6.6	12	16	29	36	49	60	66	77	89	93
	WPR	43	55	57	58	57	67	68	77	90	94	98
Global		**22**	**32**	**37**	**43**	**47**	**57**	**62**	**69**	**77**	**83**	**89**

Zero indicates that a report was received, but the country had not implemented DOTS. – indicates that no report was received.

FIGURE 11

DOTS coverage by WHO region, 2005. The shaded portion of each bar shows the DOTS coverage as a percent of the population. The numbers in each bar show the population (in millions) within (green portion) or outside (grey portion) DOTS areas.

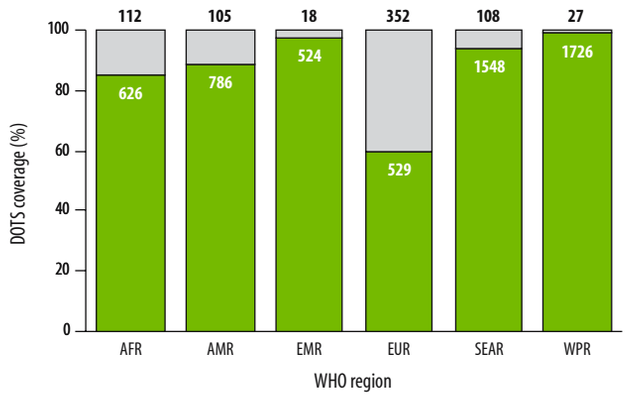
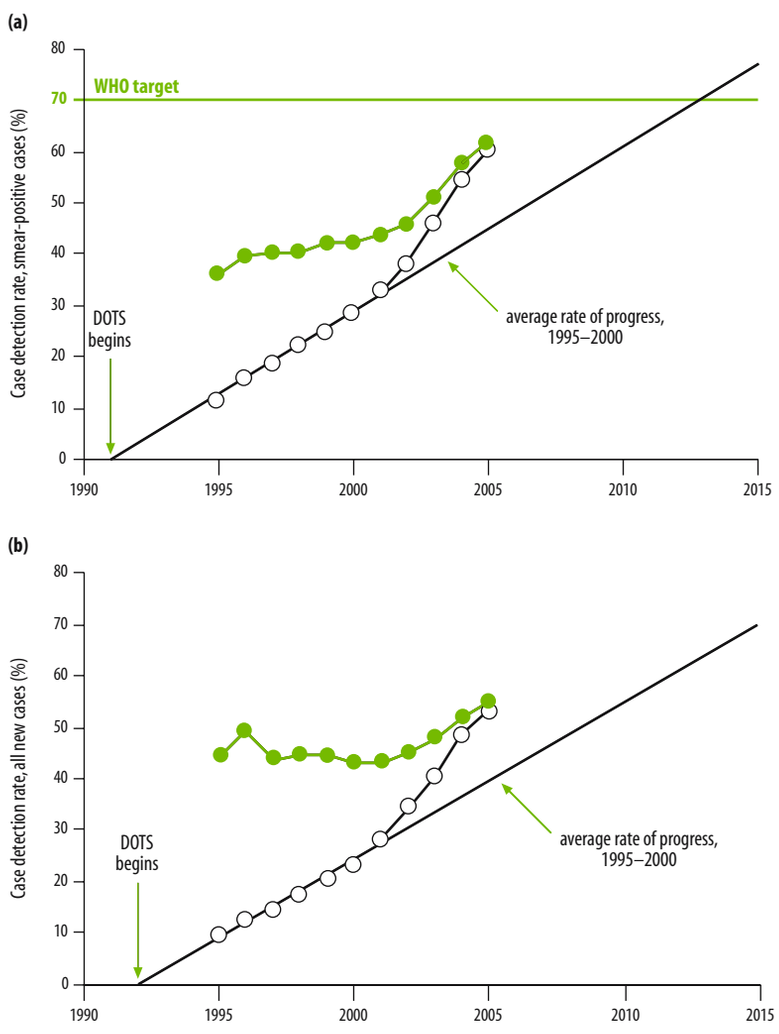


FIGURE 12

Progress towards the 70% case detection target. (a) Open circles mark the number of new smear-positive cases notified under DOTS 1995–2004, expressed as a percentage of estimated new cases in each year. The solid line through these points indicates the average annual increment from 1995 to 2000 of about 134 000 new cases, compared to the increment from 2004 to 2005 of about 242 000 cases. Closed circles show the total number of smear-positive cases notified (DOTS and non-DOTS) as a percentage of estimated cases. (b) As (a), but for all new cases (excluding relapses).



sources increased slowly and linearly from 1995 to 2001 and then more quickly from 2002 to 2005 (Figure 12a). The increase from 2002 to 2005 is attributable mostly to increases in the numbers of new smear-positive cases reported in the South-East Asia and Western Pacific regions. The detection rate of all new TB cases, from DOTS and non-DOTS programmes, remained approximately stable from 1995 to 2001 but increased between 2002 and 2005 (Figure 12b).

DOTS programmes detected an estimated 53% of all new cases and 60% of new smear-positive cases in 2005. The detection rate achieved by DOTS programmes, of both smear-positive and all new TB cases, has accelerated sharply since 2000, rising more quickly than the overall (DOTS and non-DOTS) case detection rate (Figure 12). However, the increase in the smear-positive case detection rate under DOTS is slowing: the increment between 2004 (54%) and 2005 (60%) was 6%, which is less than in the two preceding yearly intervals (Table 11, Figure 12).

The point estimate of 60% smear-positive case detection rate by DOTS programmes in 2005 is below the 70% target. There is, however, much uncertainty surrounding this estimate: 95% confidence limits range from 52% to 69%, with a small chance (0.7%) of the true estimate lying at ≥70%.

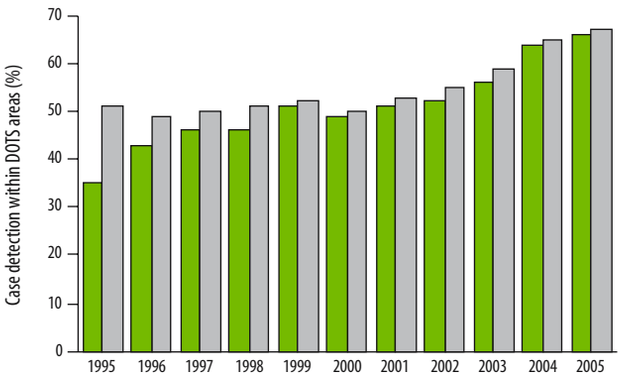
Since case detection under DOTS has increased faster than the overall rate of case detection, the proportion of all notified new smear-positive cases that were notified by DOTS programmes has increased, reaching 97% in 2005. Almost all TB cases (96%) reported to WHO in 2005 were reported by DOTS programmes (Table 8).

The case detection rate within DOTS areas (measured by the ratio of case detection to population coverage) changed little between 1995 and 2001, averaging 51% worldwide, but had increased to 67% by 2005 (Figure 13). Data from the 22 HBCs show the same pattern of change, where recent increases since 2000 have been driven mainly, but not exclusively, by improvements in Asia: Bangladesh, China, India, Indonesia, Myanmar and the Philippines (Tables 10, 11; Figure 13; Annex 1).

Comparing the WHO regions, new smear-positive case detection rates by DOTS programmes in 2005 were lowest in the European (35%) and Eastern Mediterranean regions (44%) and highest in the Region of the Americas (65%), the South-East Asia Region (64%) and the Western Pacific Region (76%; Table 11, Figure 14). Only the Western Pacific Region met the 2005 target.

FIGURE 13

Smear-positive case detection rate within DOTS areas[a] for high-burden countries (green) and the world (grey), 1995–2005



[a] Calculated as DOTS case detection rate of new smear-positive cases divided by DOTS coverage

FIGURE 14

Smear-positive case detection rate by DOTS programmes, by WHO region, 1995–2005. Heavy line shows global DOTS case detection rate.

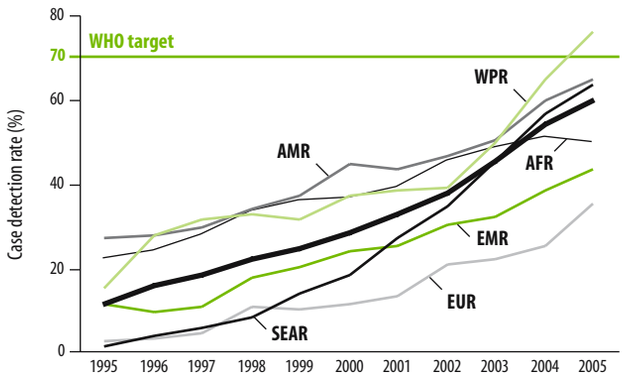


TABLE 11

Case detection rate of new smear-positive cases (%), 1995–2005

		DOTS PROGRAMMES											WHOLE COUNTRY										
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1	India	0.3	0.9	1.1	1.7	7.0	12	24	31	45	57	61	38	41	38	38	46	46	49	50	54	60	62
2	China	15	28	32	32	29	31	31	30	43	63	80	22	34	39	33	33	34	34	32	45	65	80
3	Indonesia	1.3	4.4	7.4	12	19	20	22	31	38	53	66	12	4.4	7.4	12	19	21	*	31	*	53	66
4	Nigeria	11	11	11	12	13	13	14	13	18	21	22	*	11	*	*	13	13	17	15	*	21	22
5	Bangladesh	7.0	15	19	24	25	26	28	32	38	44	59	16	22	25	28	28	28	29	33	38	44	*
6	Pakistan	1.0	1.8	–	3.7	2.0	2.8	5.3	13	17	27	37	2.5	*	–	13	5.5	*	9.2	13	*	*	*
7	South Africa	–	–	5.0	18	57	62	67	88	101	104	103	33	55	65	74	76	75	79	89	101	109	108
8	Ethiopia	15	20	22	24	25	33	33	34	35	36	33	*	*	*	*	*	*	*	34	35	36	33
9	Philippines	0.4	0.5	3.2	10	20	48	56	61	68	72	75	96	87	80	68	71	64	56	61	68	72	75
10	Kenya	55	57	53	56	55	46	49	48	48	47	43	55	57	53	*	*	50	*	*	*	*	*
11	DR Congo	41	47	44	55	54	52	56	55	63	71	72	46	*	44	55	*	*	56	*	*	*	*
12	Russian Federation	–	0.4	0.9	0.9	1.6	4.4	5.0	6.6	8.3	13	30	68	66	60	56	27	33	32	35	38	41	43
13	Viet Nam	30	59	78	83	83	82	83	87	85	89	84	59	77	*	85	83	*	*	87	*	*	84
14	UR Tanzania	56	55	52	53	51	47	46	43	45	46	45	*	55	*	53	*	*	46	43	*	*	*
15	Brazil	–	–	–	4.1	3.9	7.5	7.8	9.4	18	45	53	80	79	79	80	77	78	74	81	79	86	86
16	Uganda	–	–	58	58	57	49	45	45	45	46	45	49	54	*	*	57	*	*	*	*	*	45
17	Thailand	–	0.3	5.0	21	39	46	72	65	71	70	73	55	46	35	*	*	*	*	*	*	70	73
18	Mozambique	52	47	46	47	46	44	44	45	46	47	49	*	*	46	47	46	*	44	*	46	47	*
19	Myanmar	–	26	26	29	32	48	56	65	73	83	95	26	28	28	*	*	*	58	*	73	83	95
20	Zimbabwe	–	–	–	50	47	44	44	45	41	43	41	48	52	55	50	*	44	44	*	41	*	*
21	Cambodia	40	34	44	47	53	49	47	56	61	60	66	*	42	*	47	*	49	*	56	61	*	*
22	Afghanistan	–	–	2.7	8.2	7.5	13	21	29	28	36	44	–	–	*	*	7.5	*	*	*	28	*	*
High-burden countries		**8.4**	**14**	**17**	**20**	**23**	**27**	**31**	**36**	**44**	**55**	**62**	**32**	**36**	**37**	**37**	**39**	**39**	**41**	**43**	**49**	**58**	**63**
	AFR	22	24	28	33	36	37	39	45	49	51	50	36	41	39	43	43	41	43	46	49	52	51
	AMR	27	28	30	34	37	45	44	47	51	60	65	71	72	77	77	76	76	76	77	77	79	80
	EMR	11	9.6	11	18	20	24	26	30	32	39	44	21	26	25	32	29	25	28	31	33	39	45
	EUR	2.5	3.3	4.4	11	10	11	14	21	22	25	35	61	61	56	56	43	45	41	41	50	46	48
	SEAR	1.5	4.1	5.6	8.2	14	19	27	34	45	57	64	29	30	30	30	38	40	43	47	51	59	64
	WPR	15	28	31	33	31	37	38	39	50	65	76	36	45	48	44	44	43	43	43	52	67	78
Global		**11**	**16**	**18**	**22**	**25**	**28**	**33**	**38**	**45**	**54**	**60**	**36**	**40**	**40**	**40**	**42**	**42**	**44**	**46**	**51**	**58**	**62**

– Indicates not available.

* No additional data beyond DOTS report, either because country is 100% DOTS, or because no non-DOTS report was received.

FIGURE 15

Proportion of estimated new smear-positive (a) and of all new cases (b) notified under DOTS (grey portion of bars) and non-DOTS (green portion of bars), 2005. Figures indicate the number of cases (in thousands) represented by each portion of each bar.

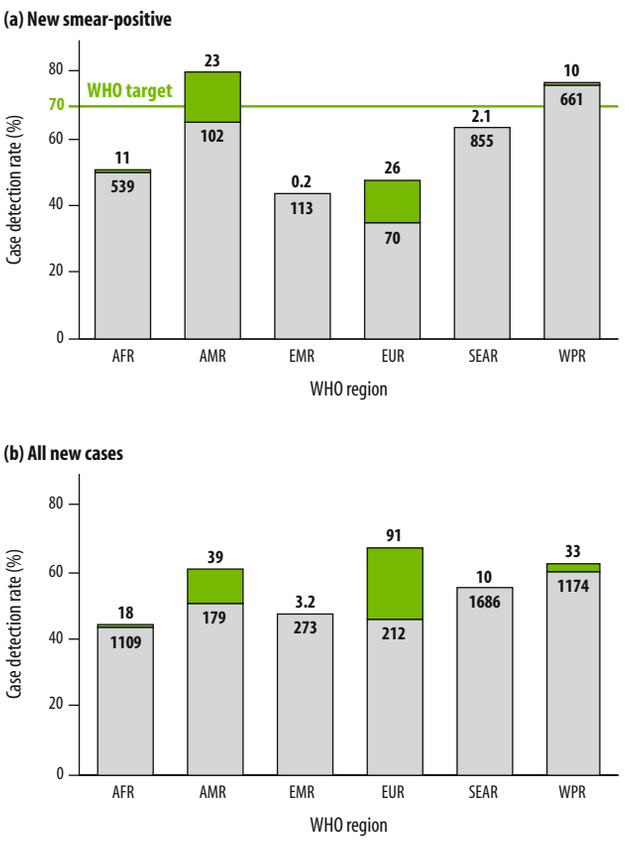
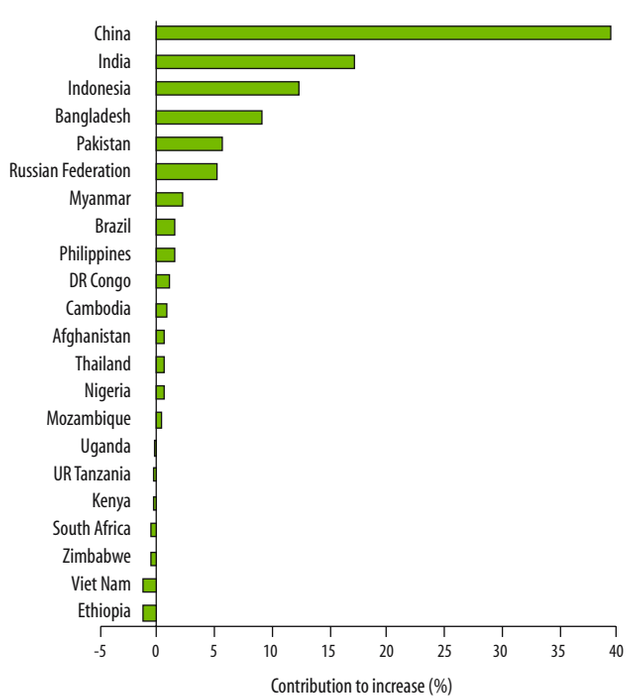


FIGURE 16

Contributions to the global increase in the number of new smear-positive cases notified under DOTS made by high-burden countries, 2004–2005



In the three regions with the highest rates of case detection – South-East Asia, the Americas and the Western Pacific – the increment between 2004 and 2005 was smaller than in the preceding year. Among the HBCs, the deceleration in case detection was most conspicuous in India.

The Region of the Americas and the European Region reported the largest numbers of cases from outside DOTS programmes. Counting all smear-positive cases, the case detection rate in the Region of the Americas exceeded 70% (Table 11, Figure 15a). Counting all new cases, the overall case detection rate in Europe was 68% (Figure 15b).

Estimates of the case detection rates for individual countries suggest that 67 countries met the 70% target by the end of 2005. Of the additional new smear-positive cases reported by DOTS programmes in 2005 (compared with 2004), 39% were in China and 17% were in India (Figure 16). China and India have made big improvements in case detection in recent years, but these two countries still accounted for an estimated 28% of all undetected new smear-positive cases in 2005. However, in 2005, Nigeria had succeeded China as the second largest reservoir of undetected cases. These three countries are among eight that together accounted for 59% of all cases not detected by DOTS programmes in 2005 (Figure 17).

Outcomes of treatment

More than two million new smear-positive cases were registered for treatment in DOTS programmes in 2004, approximately the same number that were notified that year (Table 12). Discrepancies between the numbers of cases notified and registered for treatment were small globally, by region and for most HBCs. The largest proportional difference between notified and registered cases was reported by the Russian Federation.

The cure rate among cases registered under DOTS worldwide was 77%, and a further 7% completed treatment (no laboratory confirmation of cure), giving a reported, overall treatment success rate of 84%, i.e. 1% below the 85% target set for the 2004 cohort (evaluated by

FIGURE 17

Smear-positive TB cases undetected by DOTS programmes in eight high-burden countries, 2005. Numbers above the bars indicate the proportion of all missed cases which were missed by each country.

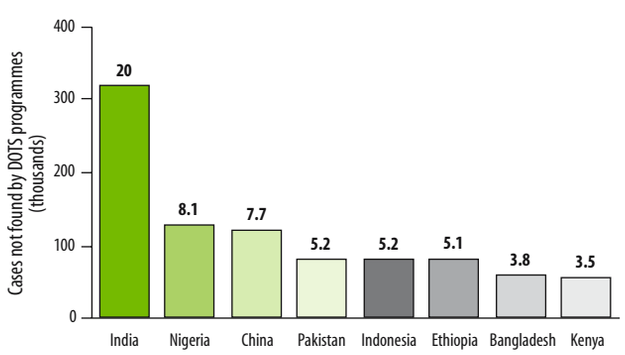


TABLE 12

Treatment outcomes for new smear-positive cases, DOTS strategy, 2004 cohort

	NOTIFIED	REGISTERED[a]	REGST'D (%)	TREATMENT OUTCOMES (%)[a] CURED	COMPLETED TREATMENT[a]	DIED	FAILED	DEFAULTED	TRANS-FERRED	NOT EVAL'D	TREATMENT SUCCESS (%)	% EST[a] CASES SUCCESSFULLY TREATED UNDER DOTS
1 India	465 518	465 518	100	84	2.3	4.4	2.4	6.6	0.4	0.0	86†	49
2 China	377 546	377 546	100	91	2.5	1.7	1.0	1.0	0.9	1.6	94†	59
3 Indonesia	128 981	128 981	100	81	8.2	2.5	1.1	5.0	1.7	0.0	90†	48
4 Nigeria	33 755	33 755	100	62	12	6.3	2.4	12	1.9	4.3	73	16
5 Bangladesh	62 694	62 694	100	88	1.2	3.8	0.7	2.8	2.4	0.6	90†	39
6 Pakistan	33 746	33 152	98	70	12	2.8	0.8	11	3.8	0.2	82	22
7 South Africa	120 977	120 977	100	54	15	7.4	1.5	11	6.2	4.5	70	73
8 Ethiopia	41 430	41 430	100	64	15	6.2	0.7	4.7	5.0	4.0	79	29
9 Philippines	78 163	78 163	100	79	7.7	2.3	1.0	4.7	2.5	2.8	87†	63
10 Kenya	41 167	41 167	100	69	11	5.0	0.2	7.0	5.1	2.3	80	38
11 DR Congo	62 192	62 192	100	79	5.5	5.9	1.1	4.8	2.9	0.5	85	60
12 Russian Federation	9 926	7 108	72	55	3.7	14	14	9.8	4.4	0.0	59	5.5
13 Viet Nam	58 394	58 370	100	91	2.1	3.3	0.9	1.4	1.7	0.0	93†	82
14 UR Tanzania	25 823	25 823	100	78	3.1	10	0.3	3.6	4.7	0.1	81	37
15 Brazil	22 532	22 532	100	46	35	5.4	0.6	7.9	4.6	0.5	81	37
16 Uganda	20 986	20 986	100	31	39	6.6	0.5	17	5.5	0.3	70	33
17 Thailand	28 421	28 421	100	70	3.9	8.6	1.7	6.1	3.8	5.4	74	52
18 Mozambique	17 058	17 058	100	75	1.3	13	1.1	7.2	2.3	0.1	77	36
19 Myanmar	31 408	31 413	100	75	8.3	5.5	2.2	6.2	2.5	0.0	84	69
20 Zimbabwe	14 581	14 581	100	50	4.6	12	1.7	7.6	9.4	15	54	24
21 Cambodia	18 978	18 978	100	89	2.6	4.0	0.2	2.3	2.0	0.0	91†	55
22 Afghanistan	8 273	9 976	121	79	10	3.0	1.8	2.7	3.4	0.0	89†	39
High-burden countries	**1 702 549**	**1 700 821**	**100**	**80**	**6.1**	**4.2**	**1.5**	**5.3**	**2.1**	**1.3**	**86†**	**47**
AFR	537 591	538 641	100	62	12	7.0	1.3	9.4	4.9	3.1	74	38
AMR	99 991	96 613	97	60	19	5.0	1.1	6.1	3.2	5.0	80	48
EMR	96 769	98 426	102	72	11	2.9	1.2	7.7	2.7	2.8	83	32
EUR	52 286	48 471	93	59	14	6.8	6.7	6.5	2.9	3.4	74	18
SEAR	755 479	755 489	100	83	3.6	4.2	2.0	5.9	1.1	0.3	87†	49
WPR	564 871	566 238	100	87	3.9	2.3	1.0	1.7	1.4	2.5	91†	59
Global	**2 106 987**	**2 103 878**	**100**	**77**	**7.3**	**4.4**	**1.6**	**5.8**	**2.4**	**2.0**	**84**	**46**

Values over 10 shown as whole numbers.

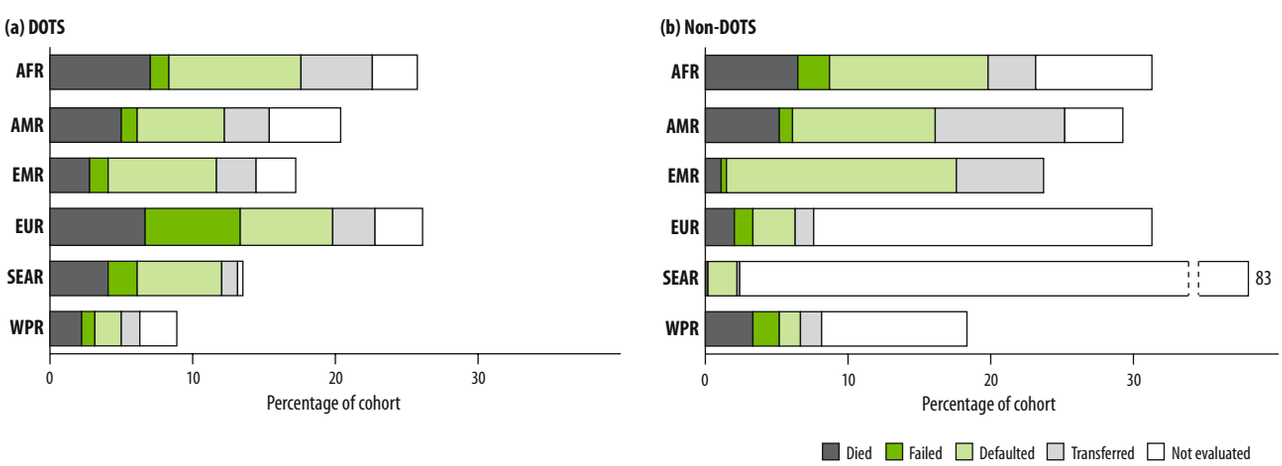
a Cohort: cases diagnosed during 2004 and treated/followed-up through 2005. See Table 5 and accompanying text for definitions of treatment outcomes. If the number registered was provided, this (or the sum of the outcomes, if greater) was used as the denominator for calculating treatment outcomes. If the number registered was missing, then the number notified (or the sum of the outcomes, if greater) was used as the denominator. Est: estimated cases for 2004 (as opposed to notified or registered).

† Treatment success ≥ 85% (treatment success for DR Congo 84.8%).

Laboratory-confirmed notifications from Israel and USA included here under smear-positive notifications.

FIGURE 18

Outcomes for those patients not successfully treated in (a) DOTS and (b) non-DOTS areas, by WHO region, 2004 cohort



the end of 2005; Table 12). An estimated 46% of all smear-positive cases arising in 2004 were treated successfully by DOTS programmes. Of all patients treated under DOTS, 10% had no reported outcome (defaulted, transferred, not evaluated). Treatment results for 11 consecutive cohorts (1994–2004) of new smear-positive patients show that the success rates have been 80% or more in DOTS areas since 1998, even though the number of patients has increased from 240 000 in 1994 to over 2 million in 2004 (Tables 12, 13).

The differences in treatment outcomes among WHO regions were similar to those reported in previous years. Documented treatment success rates by DOTS programmes varied from 74% in Europe and Africa, to 87% in South-East Asia and 91% in the Western Pacific, the latter two regions having exceeded the 85% target (Table 12, Figure 18). Death during treatment was most common in the African Region (7%), where a higher fraction of cases are HIV-positive, and in the European Region (7%), where a higher fraction of cases are drug resistant (eastern Europe) or occur among the elderly (western and central Europe). Treatment interruption (default) was most frequent in the African Region (9%) and the Eastern Mediterranean Region (8%). Transfer without follow-up was also especially high in the African Region (5%). Treatment failure was conspicuously high in the European Region (7%), mainly because failure rates were high in eastern Europe.

DOTS treatment success reached or exceeded 85% in eight HBCs (Table 12), and in 57 countries in total. It was under 60% in Zimbabwe and the Russian Federation, and 90% or more in Cambodia, China, and Viet Nam. Treatment results for individual African countries once again point to the effects of HIV and inadequate patient support: cohort death rates were more than 7% in Mozambique, South Africa, UR Tanzania and Zimbabwe. HIV may also have contributed to the high death rate in Thailand (7%) although, among Asian countries, Thailand has a relatively high proportion of elderly patients (Annex 1).

Treatment outcomes are also poor in some African

TABLE 13

Treatment success for new smear-positive cases (%), 1994–2004 cohorts[a]

	DOTS PROGRAMMES										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1 India	83	79	79	82	84	82	84	85	87	86	86
2 China	94	96	96	96	97	96	95	96	93	94	94
3 Indonesia	94	91	81	54	58	50	87	86	86	87	90
4 Nigeria	65	49	32	73	73	75	79	79	79	78	73
5 Bangladesh	73	71	72	78	80	81	83	84	84	85	90
6 Pakistan	74	70	–	67	66	70	74	77	77	75	82
7 South Africa	–	–	69	73	74	60	66	65	68	67	70
8 Ethiopia	74	61	73	72	74	76	80	76	76	70	79
9 Philippines	80	–	82	83	84	87	88	88	88	88	87
10 Kenya	73	75	77	65	77	78	80	80	79	80	80
11 DR Congo	71	80	48	64	70	69	78	77	78	83	85
12 Russian Federation	–	65	62	67	68	65	68	67	67	61	59
13 Viet Nam	91	91	90	85	93	92	92	93	92	92	93
14 UR Tanzania	80	73	76	77	76	78	78	81	80	81	81
15 Brazil	–	–	–	–	91	89	73	67	75	83	81
16 Uganda	–	–	33	40	62	61	63	56	60	68	70
17 Thailand	–	–	78	62	68	77	69	75	74	73	74
18 Mozambique	67	39	54	67	–	71	75	78	78	76	77
19 Myanmar	–	66	79	82	82	81	82	81	81	81	84
20 Zimbabwe	–	–	–	–	70	73	69	71	67	66	54
21 Cambodia	84	91	94	91	95	93	91	92	92	93	91
22 Afghanistan	–	–	–	45	33	87	86	84	87	86	89
High-burden countries	**87**	**83**	**78**	**81**	**83**	**81**	**84**	**84**	**83**	**84**	**86**
AFR	59	62	57	63	70	69	72	71	73	73	74
AMR	77	77	83	82	81	83	81	82	83	83	80
EMR	82	87	86	79	77	83	83	83	83	82	83
EUR	68	69	72	72	76	77	77	75	76	75	74
SEAR	80	74	77	72	72	73	83	84	85	85	87
WPR	90	91	93	93	95	94	92	93	90	91	91
Global	**77**	**79**	**77**	**79**	**81**	**80**	**82**	**82**	**82**	**83**	**84**

– Indicates not available.

[a] See notes for Table 12.

TABLE 14

Re-treatment outcomes for smear-positive cases, DOTS strategy, 2004 cohort[a]

			TREATMENT OUTCOMES (%)							
		REGISTERED	CURED	COMPLETED TREATMENT	DIED	FAILED	DEFAULTED	TRANS-FERRED	NOT EVAL'D	TREATMENT SUCCESS (%)
1	India	196 726	50	23	6.9	4.5	15	0.7	0.1	73
2	China	106 741	84	5.5	2.6	2.7	1.6	1.1	2.9	89†
3	Indonesia	4 429	62	20	4.4	3.2	6.6	4.1	0.0	82
4	Nigeria	3 421	62	11	8.8	4.7	12	1.6	0.1	73
5	Bangladesh	4 305	76	5.1	4.0	2.8	5.9	4.2	1.9	81
6	Pakistan	5 079	63	14	3.8	2.2	12	4.6	0.0	78
7	South Africa	53 511	27	29	12	2.4	17	6.8	6.2	56
8	Ethiopia	3 197	38	16	8.8	2.2	4.6	3.3	27	54
9	Philippines	3 498	41	12	3.8	5.3	5.7	4.2	28	53
10	Kenya	3 646	66	10	11	0.7	6.6	5.4	0.0	76
11	DR Congo	5 463	67	4.4	8.9	4.6	5.3	4.6	5.6	71
12	Russian Federation	3 011	35	3.6	15	26	15	5.4	0.0	39
13	Viet Nam	7 438	80	4.3	5.7	4.8	3.0	2.4	0.0	84
14	UR Tanzania	4 953	36	40	14	0.5	4.0	4.7	1.0	76
15	Brazil	5 029	25	27	7.2	1.2	16	9.2	15	51
16	Uganda	1 592	30	38	7.7	0.8	12	4.8	6.7	68
17	Thailand	2 240	51	5.3	10	6.0	6.6	4.4	17	56
18	Mozambique	–	–	–	–	–	–	–	–	–
19	Myanmar	6 012	60	14	9.0	5.2	7.9	4.1	0.0	74
20	Zimbabwe	6 931	28	25	11	3.5	5.6	4.6	22	53
21	Cambodia	912	71	15	5.8	1.2	3.7	3.6	0.0	86†
22	Afghanistan	–	–	–	–	–	–	–	–	–
High-burden countries		**428 134**	**56**	**18**	**6.6**	**3.7**	**11**	**2.2**	**2.7**	**74**
	AFR	96 827	36	24	11	2.6	13	5.8	8.0	60
	AMR	11 640	41	18	6.4	2.9	14	6.2	12	59
	EMR	10 654	58	16	4.5	3.3	10	3.8	4.1	74
	EUR	25 159	33	20	10	11	12	3.9	10	52
	SEAR	226 364	52	22	6.7	4.8	14	1.1	0.3	73
	WPR	126 075	80	6.1	3.0	2.9	2.0	1.7	4.5	86†
Global		**496 719**	**55**	**18**	**6.8**	**4.1**	**10**	**2.5**	**3.7**	**73**

– Indicates not available.
† Treatment success ≥ 85%
[a] See notes for Table 12.

countries because many patients are lost to follow-up: more than 10% of patients had no recorded outcome in Ethiopia, Kenya, Nigeria, South Africa, Uganda and Zimbabwe (Table 12). The same was true of Brazil, Pakistan, the Philippines and the Russian Federation. Large numbers of patients completed treatment without confirming cure (a final, negative sputum smear) in Brazil (35%) and Uganda (39%).

A total of 496 719 patients were reported to have been re-treated under DOTS in 2004 (Table 14). While some patients remained on treatment (included with those not evaluated), the re-treatment success rate by the end of 2005 was 73%.

When the three registration categories (re-treatment after relapse (post cure), failure and default) are distinguished and compared with new TB patients, three patterns appear. First, the treatment success was lower on average for re-treatment (73%) than for new cases (84%) (Tables 12, 14). In the 2004 cohort of re-treated patients, re-treatment success was higher post-relapse than post-default in eight out of eight HBCs that provided data, and higher post-default than post-failure in four out of seven HBCs (Annex 2). Second, patients who defaulted from their first course of treatment tended to default when treated again. In all eight HBCs that submitted data, patients who were re-treated after default did not complete the subsequent course of treatment more often than patients who were re-treated after relapse or failure. Third, the regional distribution of adverse re-treatment outcomes resembled the pattern observed for new cases. For example, countries in the African Region reported high death rates (11%; Table 14). Countries in the European Region reported high rates of death (10%) and treatment failure (11%). Re-treatment success was much lower than 85% in all regions except the Western Pacific.

For non-DOTS areas, only five of the 12 HBCs that do not have full DOTS coverage provided treatment results for new smear-positive patients in the 2004 cohort. In

India, 93% of 23 677 patients were not evaluated. In China, 91% of 7340 patients were treated successfully. Brazil, the Russian Federation and South Africa reported treatment success rates of 70% (of 20 349 patients), 61% (of 18 570) and 55% (of 5921), respectively.

Meeting targets for case detection and cure – results by country, region and worldwide

The data and estimates in this report suggest that the world as a whole narrowly failed to meet the targets for case detection (60%/70%) and treatment success (84%/85%). Both targets were reached in the Western Pacific Region, and the South-East Asia Region achieved more than 85% treatment success. All other WHO regions missed both targets. The European Region performed worst on both indicators.

Data on both treatment success and case detection were provided by 187 DOTS countries. Case detection exceeded 50%, and treatment success exceeded 70%, in 85 countries (Figure 19). Of these countries, 26 appear to have reached both WHO targets. They include the HBCs China, the Philippines and Viet Nam (Figure 19, 20). Of 164 countries that provided data for both the 2003 and the 2004 cohorts, 87 (53%) showed higher treatment success rates for the 2004 cohort, and 59 of 177 (33%) improved case detection by more than 5% between 2004 and 2005.

The country profiles in Annex 1 give more details of progress in each of the 22 HBCs. Annex 2 tabulates case detection and treatment success rates by country over the 11 years for which data are available.

FIGURE 19

DOTS status in 2005, countries close to targets. 85 countries reported treatment success rates 70% or over and DOTS detection rates 50% or over. 26 countries (including 1 country out of range of graph) have reached both targets; 1 in the African Region, 4 in the Region of the Americas, 5 in the Eastern Mediterranean Region, 5 in the European Region, 3 in the South-East Asia Region and 8 in the Western Pacific Region.

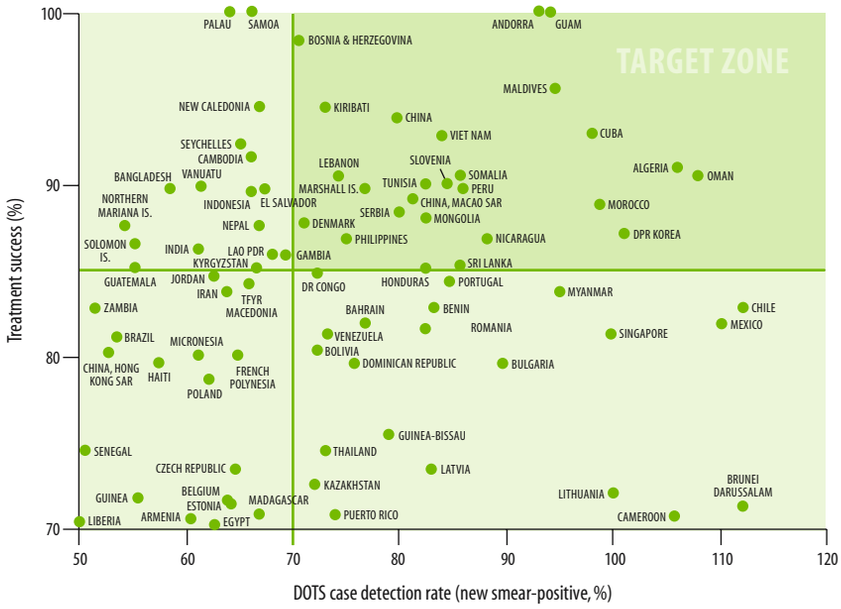
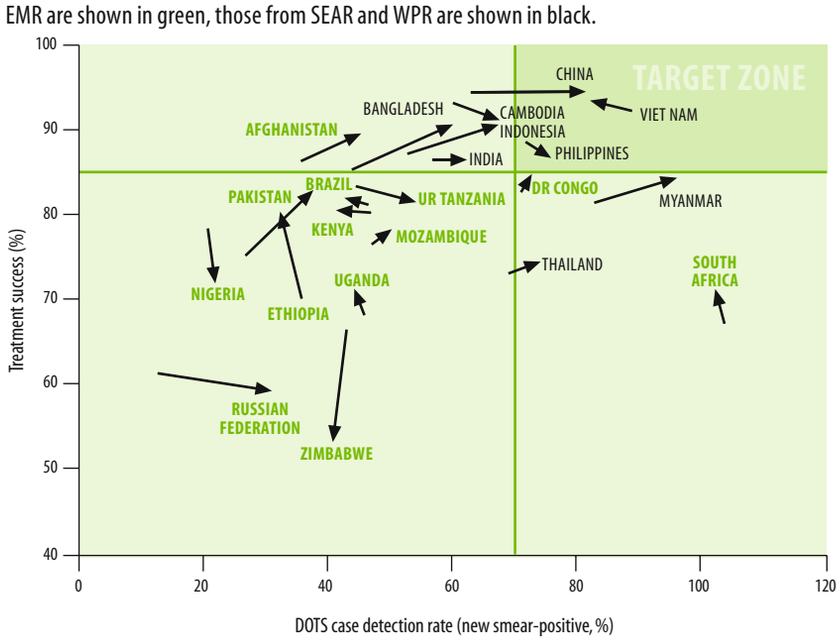


FIGURE 20

DOTS progress in high-burden countries, 2004–2005. Treatment success refers to cohorts of patients registered in 2003 or 2004, and evaluated, respectively, by the end of 2004 or 2005. Arrows mark progress in treatment success and DOTS case detection rate. Countries should enter the graph at top left, and proceed rightwards to the target zone. Countries from AFR, AMR and EMR are shown in green, those from SEAR and WPR are shown in black.



Progress towards the Millennium Development Goals

Trends in incidence, prevalence and mortality

With the 8.8 million new incident TB cases in 2005, there were 14.1 million prevalent cases (217/100 000) on average (Table 9). An estimated 1.6 million people (24/100 000) died from TB in 2005, including those coinfected with HIV (195 000). The sequence of annual estimates suggests that all three major indicators – incidence, prevalence and mortality rates – are now falling globally. Prevalence was already in decline by 1990, mortality peaked before the year 2000, and incidence has begun to fall since 2003 (Figure 21). TB prevalence continued to fall globally between 1990 and 2005 because, in Africa, HIV caused a smaller increase in prevalence than in incidence or mortality. In addition,

FIGURE 21

Estimated global prevalence, mortality and incidence rates, 1990–2005. Note the different scales on y-axes.

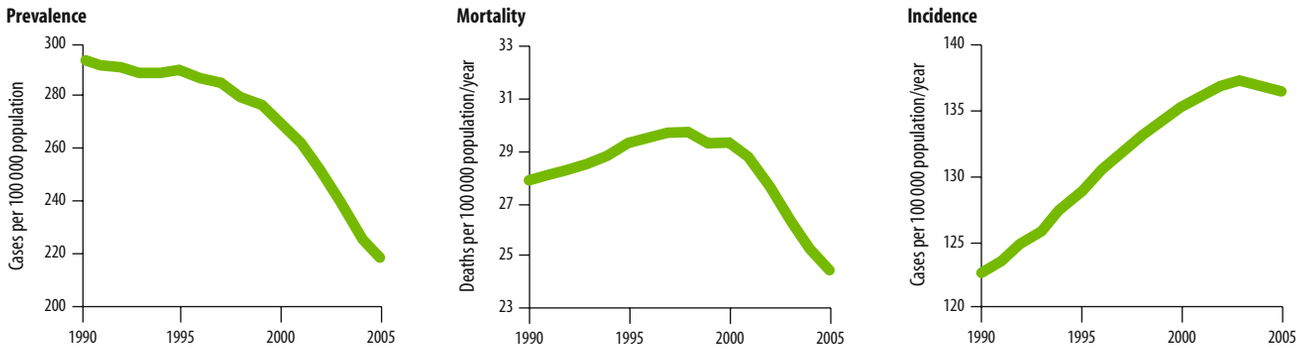
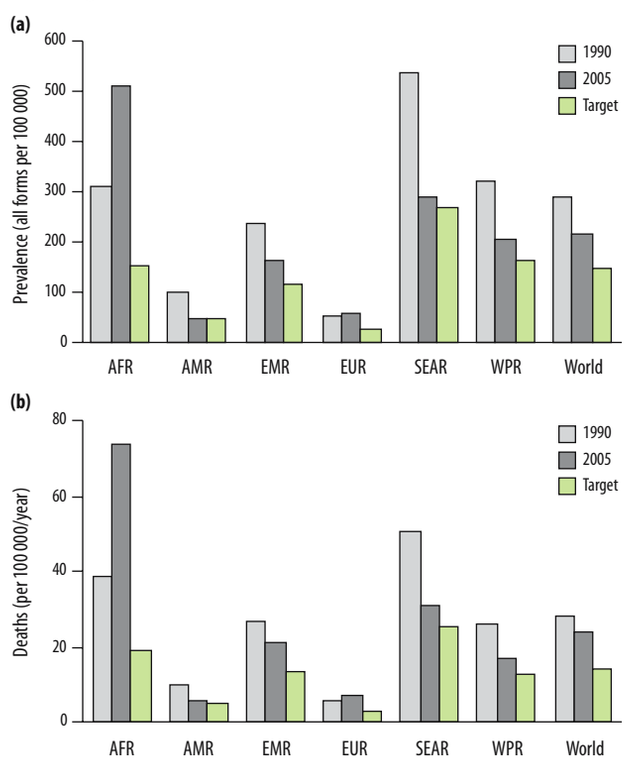


FIGURE 22

Estimated TB prevalence (a) and death rates (b), by WHO region, for the MDG baseline year 1990, for 2005, and compared with the MDG target for 2015



in Asia, our calculations suggest that DOTS has reduced prevalence more than incidence or mortality.

The fall in the global incidence rate, if confirmed by further monitoring, satisfies MDG 6, target 8. The targets set by the Stop TB Partnership – to halve prevalence and death rates by 2015 (compared with levels in 1990) – are more demanding but have, perhaps, almost been reached in the Region of the Americas (Figure 22).[1] Prevalence and death rates have fallen in South-East Asia and the Western Pacific Region at rates that will, if maintained, reach the targets by 2015. In the Eastern Mediterranean Region, both indicators are falling, but too slowly to meet the 2015 targets.

In line with the trends in incidence (Figure 7), prevalence and death rates increased in the African and European regions between 1990 and 2005, but most dramatically in the former. Estimates for these two regions in 2005 are very much larger than the 2015 target values. The combined data from all regions suggest that the world as a whole will not meet the 2015 targets at the current rate of progress.

Epidemic trends and the age distribution of TB cases

The specific effects on TB epidemiology of HIV infection, drug resistance, the impact of DOTS and other phenomena cannot easily be disentangled in routinely collected data. One of several reasons is that the time series of case notifications do not always reflect underlying trends in incidence. The true incidence and its trend may be obscured by the variable effort given to case-finding, by changing diagnostic procedures and by fluctuations in the consistency of reporting. However, the age distribution of notified cases is less susceptible to the vagaries of reporting, and trends in the age of TB cases are more likely to reflect underlying epidemiological processes.

Case reports from Viet Nam show no decline in the overall notification rate, even though the NTP has met the WHO targets for case detection and cure for more

[1] See also: *Health situation in the Americas – basic indicators*. Washington D.C., Pan American Health Organization, 2006 (PAHO/HDM/HA/06.01).

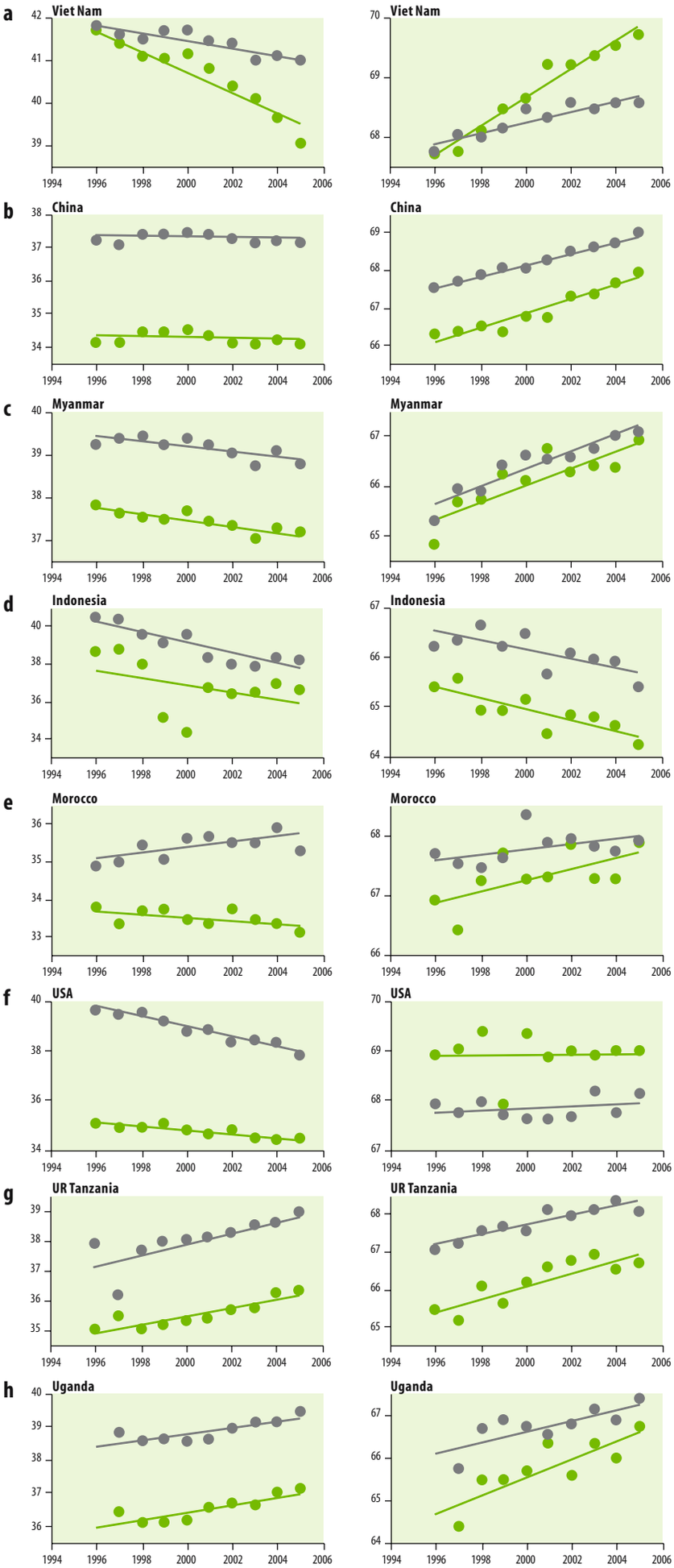


FIGURE 23

Average age of men (grey circles) and women (green circles) aged 15–54 years (left) and ≥55 years (right) with sputum smear-positive TB, notified under DOTS, 1996–2005. The effects of demographic change have been removed by calculating averages from the case notification rates per capita within each age class.

than a decade (Annex 2). Figure 23a reveals that, while the average age of older men and women with TB (≥55 years) has been rising, as expected when transmission is in decline, the average age of TB patients aged 15–54 years has been falling (left). The same is true in Myanmar (Figure 23b), and in Bangladesh, Sri Lanka and Thailand (not shown). Data from China show that new TB patients aged 55 years and over are getting older on average each year, but this is not true for younger patients (Figure 23c). In Viet Nam, the changes have been faster for women than men, opening up an age gap between male and female patients that already existed during the 1990s in Myanmar, and which has persisted until 2005.

The spread of HIV infection is one possible reason for the shift towards younger adults in these Asian countries. Another is that transmission is continuing among younger adults but not among the elderly. In Viet Nam, the shift is due to an increase in case notification rates among 15–24 years-olds (especially men), coupled with a fall in notifications among people aged 25–54 years (especially women). In Indonesia, the average age of men and women with TB has been falling in both younger and older age classes (Figure 22d). This suggests an explanation other than HIV, at least for people aged 55 years and over. In Morocco, the average age of men with TB aged 15–54 years is increasing, while for women it is decreasing (Figure 23e).

The average age of TB patients is also falling among people aged 15–54 years in the United States of America (Figure 23f). The most likely explanation is the growing proportion of cases among immigrants, although it may be reinforced by the age shift in some high-burden countries. During the period 2001–2005, Viet Nam (Figure 23a) was ranked third (behind Mexico and the Philippines) as a source of TB patients born outside the USA.[1]

In UR Tanzania and Uganda (Figure 23g, h), by contrast, the average TB patient is getting older in both age classes. This finding for younger men and women is consistent with, but not proof of, the view that the HIV epidemics are in decline in these countries[2] and that, as a consequence, TB incidence was stable or falling by 2005.

Stop TB Strategy: implementation and planning (2005–2007)

For the first time in 2006, countries were asked specific questions related to the six components of the WHO Stop TB Strategy, which was formally launched early in the year (Table 2). All HBCs have embraced the strategy to some degree and have been implementing diverse activities to achieve full DOTS expansion, to consolidate the gains made in previous years and to begin addressing the remaining challenges. The progress made by countries, and especially by the 22 HBCs, in implementing the Stop TB Strategy was evident from their responses to the questionnaire. These are presented in detail in Annex 2, and summarized below under the various components and subcomponents of the Strategy. Component 1e, concerned with monitoring and evaluation, is covered under **Monitoring progress in TB control**.

1. Pursue high-quality DOTS expansion and enhancement

a. Political commitment

The development of NTP strategic plans in line with *The Global Plan to Stop TB, 2006–2015* is one indicator of sustained political commitment. A total of 18 HBCs reported having such plans, mostly covering the period 2006–2010, with the exception of Brazil (2004–2007), India (2006–2011), Pakistan (2005–2010), the Russian Federation (2007–2011) and Thailand (2006–2015). While Ethiopia's plan was still under development, South Africa, UR Tanzania and Zimbabwe did not have country plans in line with the Global Plan at the time of reporting. A more rigorous assessment of the extent to which country plans are in line with the Global Plan is provided under **Financing TB control** and in Annex 1.

Human resource development

HRD for comprehensive TB control was included in regional strategic plans for TB control 2006–2010 in the African, Americas, South-East Asia and Western Pacific regions, although the level of detail varies considerably. At the end of 2006, the plan for the European Region was under preparation. In the Eastern Mediterranean Region, HRD was included in the TB/HIV strategic plan for 2006–2010, with details for other components not yet finalized.

A total of 15 HBCs reported having a comprehensive HRD plan for TB control (Annex 2). Of the 7 HBCs with no plan, both China and Mozambique had plans under development. In the Russian Federation, HRD has been described briefly in both the World Bank loan and the GFATM grant, but has not been fully developed. Kenya had not developed an HRD plan by the end of 2006. In Uganda, HRD was not directly under the control of the NTP. In UR Tanzania and Zimbabwe, TB control has been integrated with the delivery of other health services and there was no separate HRD plan for TB. Twelve countries reported that their HRD plans were linked and coordinated with national human resources for health plans.

In the 15 HBCs with HRD plans, all have included training and staffing needs for DOTS enhancement and sustainability, together with collaborative TB/HIV activities. Ten have incorporated training and staffing needs for MDR-TB, and 13 included training and staffing needs for PPM.

A total of 17 countries had a staff member at the central level specifically for HRD work, and in 9 countries this

[1] *Reported tuberculosis in the United States, 2005*. Atlanta GA, Centers for Disease Control and Prevention, 2005.

[2] *AIDS epidemic update: December 2006*. Geneva, UNAIDS/WHO, 2006.

person worked on HRD full-time (Bangladesh, Brazil, Ethiopia, India, Indonesia, Nigeria, Pakistan, South Africa, Viet Nam). Some 19 HBCs had job descriptions for HRD positions, which were distributed and known to all staff.

Seven HBCs reported that all peripheral-level health care units had at least one health-care professional trained on TB; 10 countries reported that some units did not have a trained professional. Training on TB control, following NTP guidelines, was included in the basic training of doctors in 19 of the 22 HBCs (all but Ethiopia, Pakistan and Uganda) and was a part of the nursing curricula in 17 HBCs.

b. Case detection through quality-assured bacteriology

Table 15 summarizes information on laboratory services in HBCs. Although there has been improvement in the geographical coverage of laboratory services, these services need to be strengthened in several countries. For example, six HBCs reported not having a fully functional national reference laboratory (Table 15).

In terms of coverage, there has also been an improvement in EQA for smear microscopy in recent years. However, these efforts still need to be intensified, especially in the Region of the Americas, and in the Eastern Mediterranean and European regions. The data reported to WHO were incomplete but, in each of these regions, less than half of the smear microscopy centres appear to have been included in the EQA programme. Only nine HBCs reported EQA coverage exceeding 50% of designated laboratories. Similarly, while all 22 HBCs had plans for laboratory supervision, only half of them implemented these plans during 2006. Laboratory supervision was uneven in the remaining half.

Regarding culture facilities, there were also large gaps in the information reported to WHO. Brazil, Cambodia, China, South Africa, Thailand and Viet Nam were exceptional in reporting good coverage of culture facilities, i.e. exceeding the minimum of one culture facility per five million population. However, over half of the populations in the African, South-East Asia and Western Pacific regions had limited coverage of culture services. India had only five laboratories linked to the NTP that provided a culture service, and only these five were able to do DST. Most countries had neither national policies to expand culture and DST services nor the technical capacity to implement and support such services.

Lack of staff, problems of transportation and inadequate funding, including that for technical assistance, were reported to be the major barriers for HBCs to operate or strengthen quality-assured laboratory services.

TABLE 15

Coverage of laboratory services, high-burden countries, 2005

				ACCESS TO DIAGNOSTIC SERVICES						LABORATORIES INCLUDED IN EXTERNAL QUALITY ASSURANCE (EQA) FOR SPUTUM SMEAR MICROSCOPY	
				SPUTUM SMEAR		CULTURE		DST			
COUNTRY	POPULATION THOUSANDS	NATIONAL REFERENCE LABORATORY (NRL)		NUMBER OF LABS	PER 100 000 POP	NUMBER OF LABS	PER 5 MILLION POP[a]	NUMBER OF LABS	PER 10 MILLION POP[a]	NUMBER	%
1 India	1 103 371	Y		11 813	1.1	5	0.02	5	0.05	11 813	100
2 China	1 315 844	Y		3 240	0.2	327	1.2	187	2.5	2 904	90
3 Indonesia	222 781	N (one acting)		3 320	1.5	41	0.9	22	1.8	3 294	99
4 Nigeria	131 530	Y		598	0.5	3	0.1	3	0.2	209	35
5 Bangladesh	141 822	Y		635	0.4	2	0.1	0	0.1	26	4.1
6 Pakistan	157 935	Y (weak)		982	0.6	3	0.1	0	0.2	312	32
7 South Africa	47 432	N		143	0.3	18	1.9	18	3.8	0	0
8 Ethiopia	77 431	Y		607	0.8	1	0.1	1	0.1	1 778	limited
9 Philippines	83 054	Y		1 858	2.2	3	0.2	3	0.4	491	26
10 Kenya	34 256	Y (weak)		619	1.8	3	0.4	3	0.9	90	15
11 DR Congo	57 549	Y		1 041	1.8	1	0.1	1	0.2	1 041	100
12 Russian Federation	143 202	Y		4 953	3.5	–	–	–	–	–	limited
13 Viet Nam	84 238	Y		875	1.0	30	1.8	2	3.6	756	86
14 UR Tanzania	38 329	Y		690	1.8	3	0.4	1	0.8	690	100
15 Brazil	186 405	Y		4 000	2.1	187	5.0	33	10	1 800	45
16 Uganda	28 816	Y (weak)		465	1.6	2	0.3	2	0.7	203	44
17 Thailand	64 233	Y		846	1.3	40	3.1	8	6.2	846	100
18 Mozambique	19 792	Y		252	1.3	1	0.3	1	0.5	252	100
19 Myanmar	50 519	Y		310	0.6	2	0.2	1	0.4	14	4.5
20 Zimbabwe	13 010	Y		167	1.3	1	0.4	1	0.8	10	6.0
21 Cambodia	14 071	Y		186	1.3	3	1.1	1	2.1	186	100
22 Afghanistan	29 863	N		435	1.5	0	0	0	0	0	0

– indicates not available; labs, laboratories; pop, population.

[a] To provide culture for diagnosis of paediatric, extrapulmonary and ss-/HIV+ TB, as well as DST for re-treatment and failure cases, most countries will need one culture facility per 5 million population and one DST facility per 10 million population. However, for countries with large populations (numbers shown it italics), one laboratory for culture and DST in each major administrative area (e.g. province) may be sufficient. See also footnote g in country profiles (Annex 1).

c. Standardized treatment, with supervision and patient support

All 22 HBCs, and 171 of 176 responding countries, used standardized, short-course chemotherapy in DOTS units; 149 of 178 responding countries routinely used directly observed therapy (DOT) during the initial phase of treatment. In the Russian Federation, South Africa, Thailand, Uganda and Zimbabwe, some DOTS units were not using DOT during the initial phase of treatment.

A total of 159 countries, and all HBCs provided anti-TB drugs free of charge to all patients treated with Category I regimens under DOTS; 129 countries responding to the questionnaire, and all HBCs except Brazil and Zimbabwe, reported that they used the WHO-recommended Category I regimen. Only 20 out of 37 responding NTPs in the European region said that they used the recommended Category I regimen.

Treatment with Category I regimen for six months was reportedly used in 91 countries worldwide; 31 reported that they used an eight-month regimen; 21 of the countries that used an eight-month Category I regimen, notably those in the African Region, said that they had plans to change to the six-month regimen.

d. An effective drug supply and management system

Uninterrupted provision of quality-assured anti-TB drugs is central to effective TB control. All WHO regions reportedly had at least one country (16 countries in Africa) facing a stock-out of first line drugs at the central or peripheral levels (basic TB management units). Africa reported that 22% of countries suffered a peripheral-level anti-TB drug stock-out during 2005. Fourteen countries in Africa had a stock-out of first-line drugs at the central level (Annex 2). HBCs reporting a stock-out of any first-line drug at the peripheral level were China, DR Congo, India, Mozambique, Thailand, Uganda and Zimbabwe (Annex 2).

The Stop TB Strategy recommends the use of drugs in fixed-dose combinations (FDCs) in the treatment of TB. During 2006, only 44 countries were using four-drug FDCs in the initial phase and two-drug FDCs in the continuation phase of treatment. The South-East Asia Region had the highest proportion of countries (5/11) using FDCs (Annex 1). Nine HBCs (41%) were using patient kits for drugs, including seven with FDCs: Afghanistan, Brazil, Indonesia, Kenya, Nigeria, the Philippines and Viet Nam. A total of 17 HBCs had in place mechanisms for the quality control of anti-TB drugs.

2. Address TB/HIV, MDR-TB and other challenges

Implement collaborative TB/HIV activities

The association between HIV and TB has been known almost since the start of the HIV-epidemic, but programmes to implement collaborative TB/HIV activities have been developed only in the past five years. Now, with the increasing availability of antiretroviral drugs, and the support of international donors and technical agencies, the number of countries that have policies to implement collaborative TB/HIV activities is increasing rapidly, especially in the African Region (Figure 24).

Of the 63 TB/HIV focus countries, 60 provided data to WHO in 2005. Figure 24 shows that, of those that provided data, between 58% and 71% had appointed a TB/HIV focal point in the NTP, had developed a national plan for implementing collaborative TB/HIV activities, had a national policy of HIV counselling and testing for all TB

FIGURE 24

Development of policies for TB/HIV collaboration; for diagnosing and treating HIV in TB patients; and for diagnosing, treating and preventing TB in people infected with HIV, 2002–2005. Data for those countries that were sent detailed questionnaires about collaborative TB/HIV activities (35 countries in 2002, 36 in 2003, 41 in 2004, and 63 in 2006). Dark portion of each bar shows the number of countries with each type of policy among those 32 countries that provided data for all 4 years. Shown are the numbers of countries with a nominated person in the NTP responsible for collaborative TB/HIV activities (focal person), a national body responsible for coordinating TB/HIV activities (coordination), a national plan for such activities (plan), a national surveillance system to measure the prevalence of HIV in TB patients (surveillance), a policy to offer HIV counselling and testing to TB patients, a policy to offer CPT to HIV-infected TB patients (CPT), a policy to offer ART to HIV-infected TB patients (ART), a policy of intensified case-finding by screening people with HIV for TB annually (ICF), a policy to offer IPT to people with HIV, and a policy for controlling the spread of TB in congregate settings (infection control).

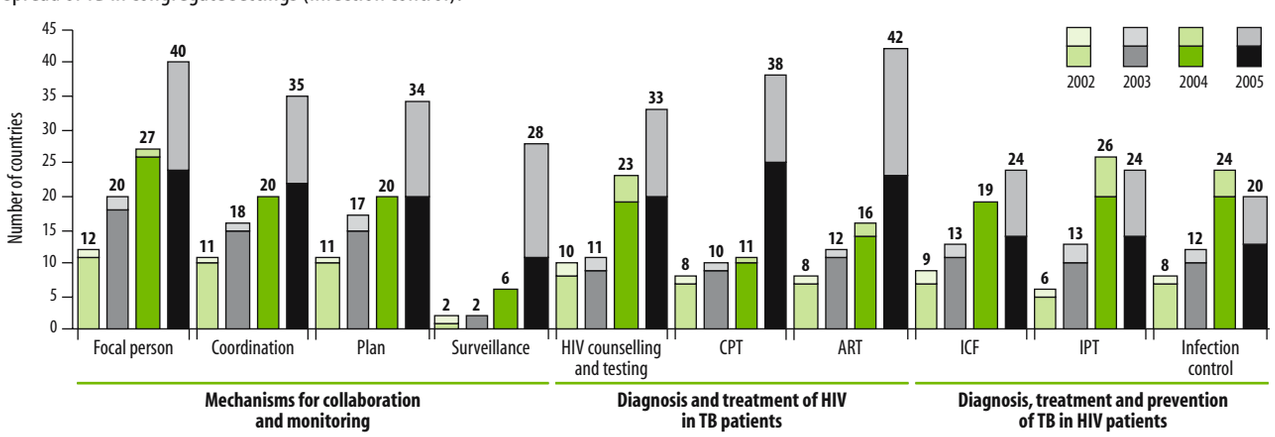
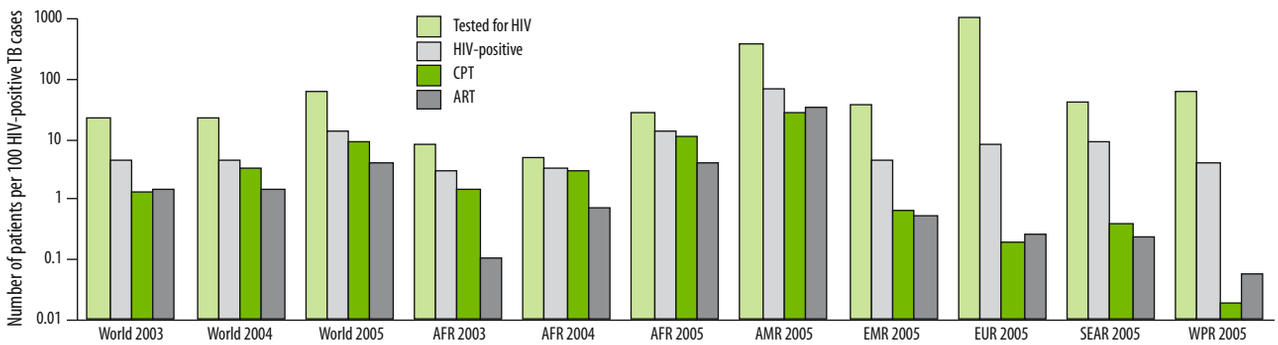


FIGURE 25

Diagnosis and treatment of HIV in TB patients, globally and in the African Region, 2003–2005, and in other WHO regions, 2005.
TB patients tested for HIV, that were found to be HIV-positive, that were given CPT, and that started ART, for every 100 estimated HIV-positive TB cases.



patients, and had a national policy to provide CPT and ART to HIV-positive TB patients. However, fewer countries had policies and procedures for diagnosing (through screening, ICF), treating and preventing TB (IPT) in people infected with HIV. Only 34–41% had policies on intensified TB case-finding among HIV-positive people, to provide IPT to people who are HIV-positive but who do not have active TB, and on infection control to minimize the spread of TB among HIV-positive people. Figure 24 also shows that only 47% had a system for HIV surveillance among TB patients.

Table 16, and Figure 26, show the number of TB patients tested for HIV, and the numbers testing HIV-positive, started on CPT, ART and IPT, how the numbers varied among regions, and how they changed between 2003 and 2005. For every 100 adult (15–49 years) HIV-positive TB cases in the world, estimated as described in the **Methods**, 59 TB patients were tested for HIV in 2005 (Figure 25; this index is expected to be greater than 100). The highest testing rates were in the European Region, which has the lowest incidence rate of HIV-positive TB cases; the lowest testing rates were in the African Region, where the incidence rate is highest. The Eastern Mediterranean, South-East Asia and Western Pacific regions had the lowest rates of HIV testing among notified TB patients in 2005 (*T/N* in Table 16). The European and Western Pacific regions had the lowest prevalence of HIV among those tested (*P/T*). In the African Region, where all TB patients should be tested for HIV, about 10% of notified TB cases were tested.

A better measure of the coverage of HIV testing is the number of TB cases that were found to be HIV-positive, expressed as a percentage of the expected number of incident HIV-positive TB cases (Figure 25; *P/E* in Table 16). In the Region of the Americas in 2005, 66% were detected. In the African Region 13% were detected, while only 4% were found in the Western Pacific Region. Globally, only 14% of all estimated HIV-positive TB cases were identified by testing in 2005 (Figure 25, Table 16). Among all TB patients tested, the proportion positive (*P/T*) remained fairly constant between 2003 and 2005 at about 51% in African Region, and about 23% worldwide (Table 16).

Table 16 also shows that the African Region led the

TABLE 16

Detection and treatment of HIV-positive TB patients, by WHO region, 2005. T is the number of TB patients that were tested for HIV, N the number of notified TB patients, P the number of TB patients that were found to be HIV-positive, E the estimated number of HIV-positive TB cases, C the number of HIV-positive TB patients that were treated with CPT, and A the number of HIV-positive TB patients that were started on ART. Ranges express uncertainty within each region by including in the denominator all countries that were asked for data on A, C and P (lower limit, assuming C = A = 0 for countries that reported on P but not C or A), or only those countries that reported all these data (upper limit). *C/P and A/P could not be meaningfully calculated for the European Region: 1064 HIV-positive TB patients were reported from 16 countries; information about CPT was provided only by Armenia, Georgia, Iceland and Serbia (26 patients in total), and information about ART was provided by these countries and by Slovakia and TFYR Macedonia (36 patients in total). The final column gives the percentage of total estimated HIV-positive TB cases in each region.

	TESTED FOR HIV/ NOTIFIED	HIV-POSITIVE/ TESTED FOR HIV	HIV-POSITIVE/ ESTIMATED HIV-POSITIVE TB CASES	STARTED CPT/ TESTED HIV-POSITIVE	STARTED ART/ TESTED HIV-POSITIVE	REGIONAL DISTRIBUTION OF ESTIMATED HIV-POSITIVE TB CASES
	T/N (%)	P/T (%)	P/E (%)	C/P (%)	A/P (%)	
AFR	10	51	13	82–92	29–33	80
AMR	26	17	66	41–85	52–89	2.7
EMR	1.0	11.6	4.4	14.8–15.4	12–14	1.2
EUR	32	0.6	7.8	*	*	2.2
SEAR	1.6	22	8.9	4–50	3–31	13
WPR	0.5	1.8	4.0	0.5–18	1–55	1.8
Global	**6.7**	**23**	**14**	**68–91**	**30–38**	**100**

FIGURE 26

Collaborative TB/HIV activities, 2002–2005. Bars show the numbers (in thousands) of TB patients that were tested for HIV, found to be HIV-positive, given CPT, started on ART; and for HIV-positive people, the number (in thousands) that were screened for TB, diagnosed with active TB, or given IPT after screening. The numbers of countries reporting data in each year are given above the bars.

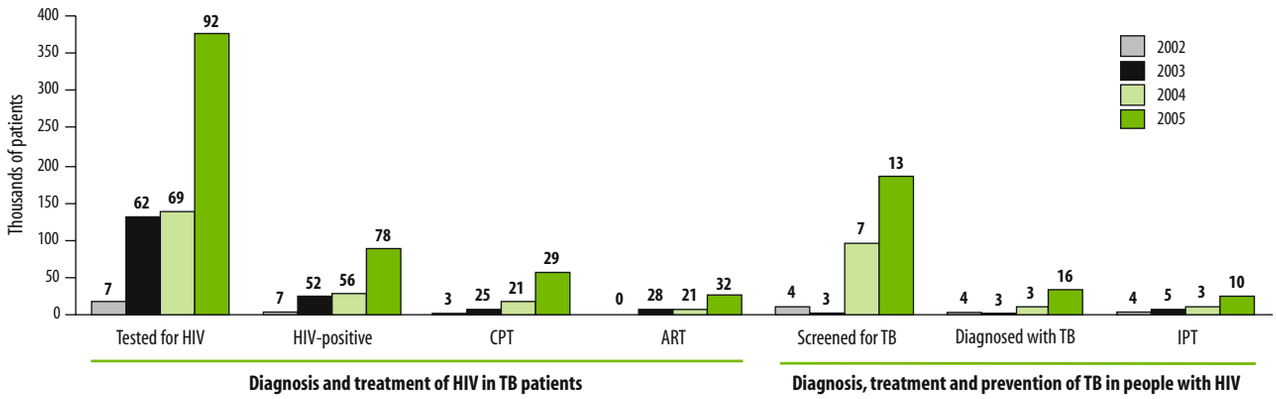


TABLE 17

Country reports for 2005 compared with expectations for 2006 given in *The Global Plan to Stop TB, 2006–2015*

	COUNTRY REPORTS, 2005[a]	GLOBAL PLAN, 2006
	(MILLIONS OR PERCENTAGES)	
DOTS EXPANSION		
Number of new smear-positive cases notified under DOTS	2.3	2.1
Estimated number of new smear-positive cases	3.8	3.3
New smear-positive case detection rate under DOTS	60%	65%
Number of new smear-positive cases successfully treated under DOTS	1.7	1.8
Number of new smear-positive cases registered for treatment under DOTS	2.1	2.1
New smear-positive treatment success rate, 2004	84%	83%
Number of new smear-negative and extrapulmonary cases notified under DOTS	2.2	3.0
Estimated number of new smear-negative and extrapulmonary cases	4.8	4.5
New smear-negative and extra-pulmonary case detection rate under DOTS	46%	66%
MDR-TB		
Number of laboratory-confirmed MDR-TB cases treated by GLC-approved programmes or equivalent	0.005	0.02
Number of laboratory-confirmed MDR-TB cases treated by all programmes	0.02	0.12
Proportion of laboratory-confirmed MDR-TB cases treated by GLC-approved programmes or equivalent	27%	17%
TB/HIV		
Number of HIV-positive people attending HIV services screened for TB	0.18	11
Number of HIV-positive people attending HIV services	4.0	18
Proportion of HIV-positive people attending HIV services that were screened for TB	8.8%[b]	61%
Number of eligible HIV-positive people offered IPT	0.026[c]	1.2
Estimated number of HIV-positive people	29	30
Proportion of HIV-positive people and eligible for IPT that received IPT	0.27%[d]	4%
Number of TB patients tested for HIV	0.22[e,f]	1.6[f]
Total number of notified TB cases including new, re-treatment and other cases	3.3[e,f]	3.4[f]
Proportion of all notified TB cases that were tested for HIV	6.6%[g]	47%
Number of HIV-positive TB cases enrolled on ART	0.025[e]	0.22
Number of TB cases found to be HIV-positive	0.083[e]	0.50
Proportion of all HIV-positive TB patients that enrolled on ART	38%[h]	44%

GLC indicates Green Light Committee.

[a] Includes only those countries in the Global Plan, i.e countries in sub-regions Central Europe and Established Market Economies (see legend of Figure 7) are excluded here.

[b] Only the 9 countries which provided both numerator and denominator are included in this percentage.

[c] While the Global Plan includes only people newly diagnosed with HIV in this indicator, country reports include all HIV-positive people eligible for IPT, regardless of year of diagnosis.

[d] Only the 4 countries which provided both numerator and denominator are included in this percentage.

[e] Includes patients reported from DOTS and non-DOTS areas.

[f] The numbers of notified TB cases, and the numbers tested for HIV, are weighted according to the population coverage of collaborative TB/HIV activities anticipated by the Global Plan.

[g] Only the 91 countries which provided both numerator and denominator are included in this percentage.

[h] Only the 31 countries which provided both numerator and denominator are included in this percentage.

world in the provision of CPT, at least in relation to TB patients who tested HIV-positive (*C/P*), while the Eastern Mediterranean Region lagged behind in the provision of ART (*A/P*). The uncertainties in the estimated proportion of HIV-positive TB patients that are given CPT or that start ART (ranges in Table 16) reflect fundamental problems in patient management as well as in reporting.

The Global Plan laid out objectives for TB/HIV control in 2006 (Table 17). It proposed that 1.6 million TB patients would be tested for HIV in 2006. It also suggested that 220 000 patients should be started on ART, as compared with a total of 80 000 in country plans for 2006. In 2005, 14% and 11% of the expected numbers for 2006 were reported to have been tested for HIV and started on ART, respectively. In the African Region in 2005, where the burden of HIV-related TB is highest, 17% of 737 000, suggested in the Global Plan for 2006, were tested for HIV and 10% of the 197 000, suggested in the Global Plan for 2006, were started on ART. Furthermore, the number of HIV-positive people screened for TB in 2005 was only 1.7% of the 11 million targeted for 2006; the number started on IPT in 2005 was 2.2% of the 1.2 million targeted for 2006.

The proportion of all (estimated) adult (15–49) HIV-positive TB patients put on ART was only 4% in 2005 (Annex 2). Although screening is an efficient way of finding TB patients, just 0.2% of the estimated 24 million HIV-positive people in the African Region were screened in 2005, and approximately 0.1% of the estimated 21 million HIV-positive people without active TB were started on IPT.[1]

In sum, many more HIV-positive TB patients need to be diagnosed and treated in order to satisfy expectations of the Global Plan from 2006 onwards.

The time trends in these indicators are more encouraging because they do show rapid expansion of diagnosis and treatment, albeit from low levels (Figures 25 and 26). The numbers of TB patients tested for HIV, and found to be HIV-positive, increased more then 15-fold between 2002 and 2005 (Figure 26). The provision of CPT and ART to TB patients has also expanded globally (Figure 26), in the African Region (especially ART, Figure 25), and in some countries (Box) Screening for TB among HIV-positive cases, followed by the provision of IPT, also increased quickly between 2002 and 2005 (Figure 26).

Recording and reporting of HIV testing in TB patients is improving but still weak. Of the 63 TB/HIV focus countries, 6 that account for 2.7% of all HIV-positive TB patients had modified their TB registers to capture HIV data routinely (Belize, Brazil, Estonia, Jamaica, the Russian Federation and Trinidad and Tobago), 19 that account for 57% of HIV-positive TB patients were planning to do so, and 32 that account for 37% of HIV-positive TB patients did not have plans to do so. Only 21 out of 37 focus countries in the African Region reported the number of TB cases tested for HIV.

Prevent and control MDR-TB

MDR-TB surveillance and control in high-burden countries

Among the 22 HBCs, 11 had carried out nationwide drug resistance surveys by 2006, including Ethiopia and the Philippines, with UR Tanzania finalizing its first nationwide survey. A further 6 HBCs are expanding regional coverage of DRS, among which China, India and the Russian Federation have all made substantial progress. Additionally, China is planning to undertake a nationwide survey in 2007. Indonesia has its first DRS under way. Afghanistan, Bangladesh, Nigeria and Pakistan have never reported drug resistance data, but all except Afghanistan have plans to carry out surveys.

A total of 13 NTPs have staff responsible at central level for drug-resistant TB, 9 of which have national guidelines on the programmatic management of MDR-TB. In seven HBCs (Brazil, DR Congo, Mozambique, Philippines, the Russian Federation, South Africa and Thailand), MDR-TB is managed by the NTP.

Prior to 2006, the NTPs of Kenya, the Philippines and the Russian Federation were approved by the GLC for management of MDR-TB. In addition, India was approved by the GLC in 2005 for a project in New Delhi. In Kenya, the MDR-TB management project has not yet been launched because of lack of human and financial resources. In 2006, three additional HBCs were approved by the GLC: Bangladesh and DR Congo as part of the NTP, and Cambodia for an operational research project. A major geographical expansion of GLC-approved MDR-TB management occurred in 2006 in the Russian Federation, with eight additional regions approved and two regions under review. Before 2006, only four regions were approved. In 2006, China and India submitted applications from the NTPs, which are currently under review. In addition, Uganda has a GLC application under review submitted by a national university working with an international NGO. The NTPs in Myanmar and Viet Nam have started preparing applications to the GLC, which should be submitted at the beginning of 2007 (Table 18).

TABLE 18

GLC collaboration, high-burden countries, end 2006

GLC-APPROVED		UNDER GLC REVIEW		PREPARATION OF GLC APPLICATION
NTP	NON-NTP[a]	NTP	NON-NTP[a]	NTP
Bangladesh DR Congo Kenya Philippines Russian Federation	Cambodia India	China India	Uganda	Ethiopia Myanmar Viet Nam

[1] 2006 Report on the Global AIDS Epidemic (UNAIDS/WHO) May 2006.

[a] e.g. projects proposed and implemented by private health-care providers, NGOs, universities

BOX

Scaling up HIV testing among TB patients: three case studies

In many countries, HIV testing is the major bottleneck in the provision of CPT and ART for HIV-positive patients. In several African countries, HIV testing for TB patients has increased dramatically over the past two years. Where there has been good collaboration between the HIV/AIDS and TB control programmes, provider-initiated testing has led to substantial increases in the number of TB/HIV patients starting CPT and ART. This is illustrated with data from Kenya, Rwanda and Zambia. Similar results have been reported from Malawi.[1]

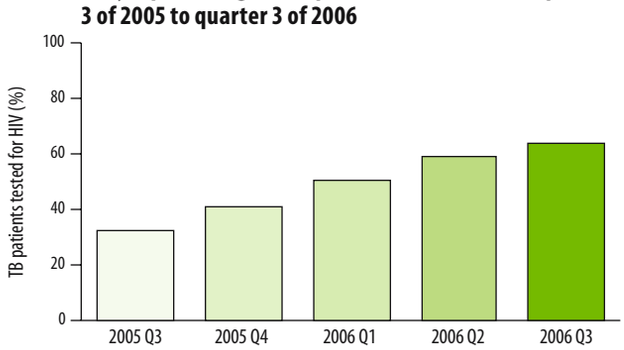
Kenya

Population: 34.3 million
Tuberculosis cases notified in 2005: 108 401
Estimated proportion of TB patients infected with HIV in 2005: 52%

Before 2005, few TB patients in Kenya knew their HIV status, even though about half of them were infected with HIV. Collaborative TB/HIV activities, guided by a national steering committee, led to the development of a provider-initiated programme of rapid HIV testing for TB patients. Starting in March 2005, district and health-centre staff treating TB patients throughout Kenya were trained to do HIV-testing. TB patients are offered HIV testing at TB clinics, and those who are infected with HIV are given CPT at the same clinic. Patients are referred to ART centres, usually in the district hospital. TB recording and reporting forms, adapted to capture TB/HIV data, have been introduced throughout the country. Routine testing began in 2005. In the third quarter of 2005, 32% of TB patients in Kenya were tested for HIV, and this had increased to 64% by the third quarter of 2006 (Figure B1). Of those found to be HIV-positive from the third quarter of 2005 to the third quarter of 2006, 80% were given CPT and 30% started ART.

FIGURE B1

Kenya: percentage of TB patients tested for HIV, quarter 3 of 2005 to quarter 3 of 2006



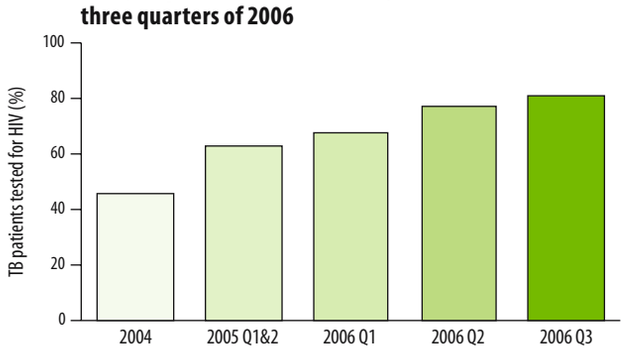
Rwanda

Population: 9.0 million
Tuberculosis cases notified in 2005: 7220
Estimated proportion of TB patients infected with HIV in 2005: 38%

In 2004, a programme of TB/HIV collaborative activities was established and a national programme was developed to train health workers who diagnose TB to test patients for HIV. During 2005, health workers throughout the country were trained in HIV counselling and testing. TB monitoring and recording forms, revised to include TB/HIV data, were introduced in late 2005 and were made available in all health centres by the beginning of 2006. In 2004, 46% of TB patients were tested for HIV; by the third quarter of 2006, this had increased to 81% (Figure B3). HIV-positive TB patients are given CPT by health workers who treat TB patients and then referred to the district ART services. In the first two quarters of 2006, 43% of TB patients were given CPT and 31% started ART.

FIGURE B3

Rwanda: percentage of TB patients tested for HIV in 2004, in quarters 1 and 2 of 2005, and in each of the first three quarters of 2006



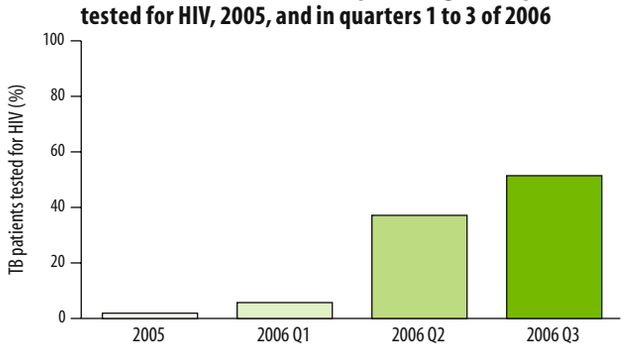
Zambia

Population: 11.7 million
Tuberculosis cases notified in 2005: 49 567
Estimated proportion of TB patients infected with HIV in 2005: 56%

The national TB/HIV coordinating committee met quarterly during 2005 and 2006. Counselling and testing guidelines have been developed; during 2006, all district and clinic staff were trained to use them. Revised monitoring and recording forms to capture TB/HIV data were introduced at the beginning of 2006. CPT is given at ART clinics from where patients are referred to ART centres, which are usually in the district hospital. Data are available from Southern Province, where the percentage of TB patients tested for HIV increased from 2% in 2005 to 52% in the third quarter of 2006 (Figure B2). Of those found to be HIV-positive from the first quarter of 2006 to the third quarter of 2006, 29% were given CPT and 33% started ART.

FIGURE B2

Zambia (Southern Province): percentage of TB patients tested for HIV, 2005, and in quarters 1 to 3 of 2006



[1] *Global tuberculosis control: surveillance, planning, financing. WHO report 2006.* Geneva, World Health Organization, 2006 (WHO/HTM/TB/2006.362).

The GFATM has approved funding (up to round 5) for both DRS and MDR-TB control in seven HBCs (Bangladesh, China, DR Congo, India, Indonesia, Mozambique and the Russian Federation). In addition, Cambodia, Nigeria and Zimbabwe have been approved for DRS and Kenya and the Philippines for MDR-TB management.

MDR-TB surveillance and control globally

Out of 182 countries that filled in the standard data collection form, 125 (69%) reported that management of MDR-TB patients was an activity of the NTP (Figure 27); a further 31 stated that they planned to treat MDR-TB in the next two years. Globally in 2005, 98 728 drug susceptibility tests were done at the start of treatment, of which 39% were reported from the European Region (38 818); 104 countries reported 18 422 laboratory-confirmed MDR-TB cases (16 countries in the African Region, 20 in the Region of the Americas, 14 in the Eastern Mediterranean Region, 38 in the European Region, 3 in the South-East Asia Region and 13 in the Western Pacific Region). Out of all MDR-TB cases, 10 828 (59%) were reported from the European Region (Figure 28). The total number of laboratory-confirmed MDR-TB patients reported in 2005, and the number known to be treated by WHO-recommended procedures, are far lower than the numbers anticipated by the Global Plan for 2006 (Table 17).

Up to December 2006, the Global DRS Project had collected data from areas representing more than 40% of global smear-positive TB cases. The GLC had approved 53 projects for more than 25 000 MDR-TB patients in 42 countries.[1] This is almost a doubling of MDR-TB patients since December 2005, by which time about 13 000 MDR-TB patients had been approved for treatment. The countries approved in 2006 were: Armenia, Bangladesh, Belize, Burkina Faso, Cambodia, DR Congo, Ecuador, Guinea, Kazakhstan, Paraguay and Rwanda. Most GLC-approved countries are in the European Region and the Region of the Americas (12 countries each), followed by the African Region (6 countries), the Eastern Mediterranean Region (5 countries), the South-East Asia Region (4 countries) and the Western Pacific Region (3 countries).

From the data provided in the standard data collection form, GLC-approved projects globally were reporting slightly better outcomes at the end of treatment than non-GLC approved projects, with cure rates of 57% (variation among WHO regions 50–80%) and 50% (range 48–79%), respectively (Figure 28). Countries reported that they were expecting to treat 16 990 MDR-TB cases in 2006 (6345

[1] Armenia, Azerbaijan, Bangladesh, Belize, Bolivia, Burkina Faso, Cambodia, Costa Rica, DR Congo, Dominican Republic, Ecuador, El Salvador, Egypt, Estonia, Georgia, Guinea, Haiti, Honduras, India, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Latvia, Lebanon, Lithuania, Malawi, Mexico, Mongolia, Nepal, Nicaragua, Paraguay, Peru, Philippines, Republic of Moldova, Romania, Russian Federation, Rwanda, Syrian Arab Republic, Timor-Leste, Tunisia and Uzbekistan.

FIGURE 27

Percentage of NTPs that manage MDR-TB patients as part of their routine activities, by WHO region, 2005

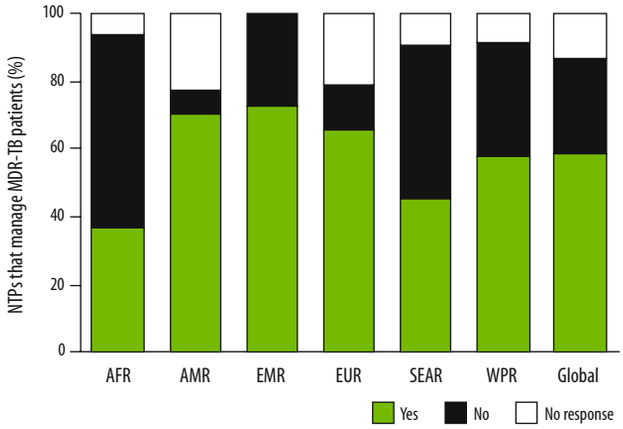


FIGURE 28

Numbers of patients for whom DST was carried out at the start of treatment, and the number of patients with confirmed MDR-TB, by WHO region, 2005. Note that some countries reported the number of confirmed cases of MDR-TB without providing the number tested. Furthermore, confirmed MDR-TB cases may have been tested at any time during treatment.

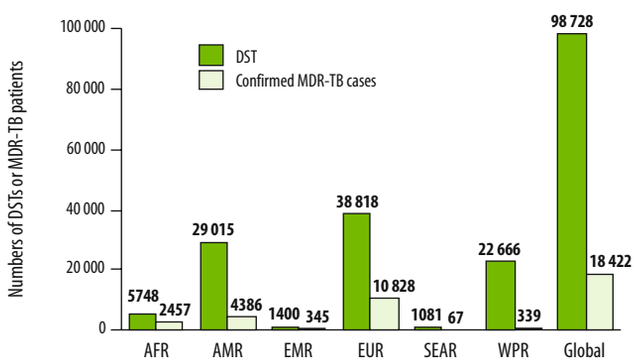
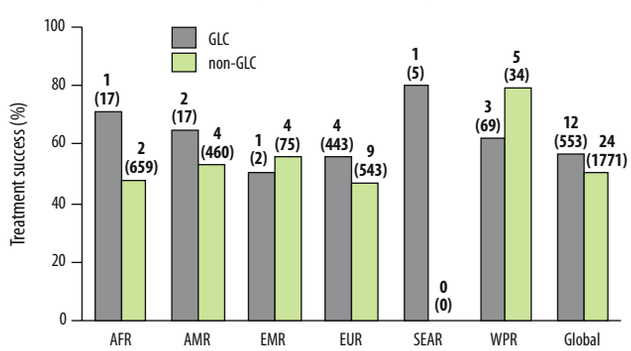


FIGURE 29

Treatment success among MDR-TB cases, by WHO region, 2002 cohort. The number of countries providing outcomes is shown above each bar; the total number of patients is shown in parentheses.



under the GLC and 10 645 outside of GLC programmes; cf 20 000 in the Global Plan, Table 17), and 16 714 MDR-TB cases in 2007 (7096 under the GLC and 9618 outside GLC programmes).

Address prisoners, refugees, other high-risk groups and special situations

Prison inmates are among the high-risk groups that have received most attention in HBCs. Some 20 HBCs had a plan of action for TB control in prisons. Other high-risk groups for which HBCs had specific action plans included refugees (11 countries), ethnic minorities (9 countries) and other marginalized groups (6 countries).

While Afghanistan, DR Congo and Nigeria have been addressing TB control among refugees following political unrest, India, Indonesia and Pakistan were attempting to manage TB among people forced to move by natural disasters. Efforts to improve TB control in Afghanistan, DR Congo and Uganda have been hampered by outbreaks of war.

FIGURE 30

Level of the health-care system with staff fully dedicated to TB, high-burden countries, 2005

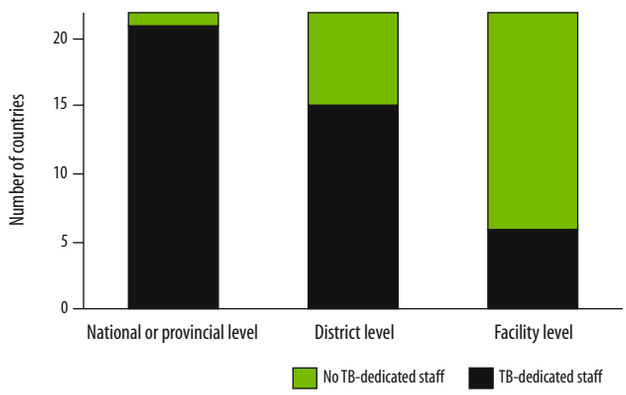
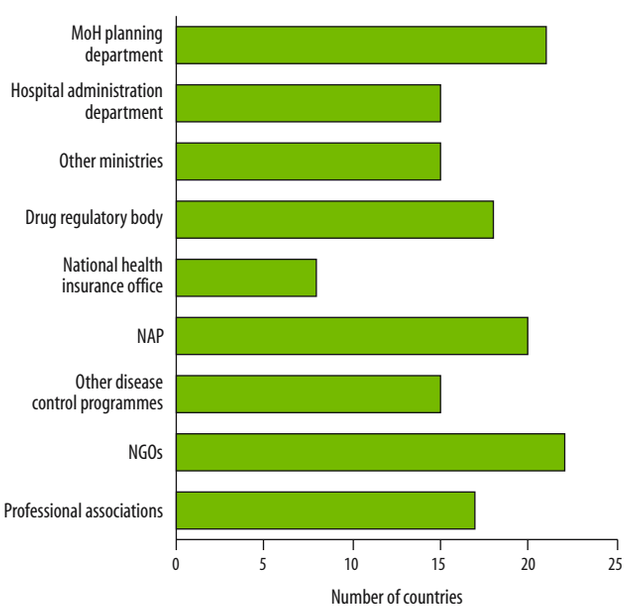


FIGURE 31

Partners involved in the development of national TB control plans, high-burden countries, 2005



3. Contribute to health system strengthening

The diagnosis and treatment of TB are fully integrated into the public health systems of most countries. Although HBCs normally have staff fully dedicated to TB control in central and provincial planning and supervision units, as well as dedicated TB control supervisors at the district level, a few also have dedicated staff at facility level (Figure 30). Some TB control functions were typically managed by NTPs, such as quality control of sputum smear microscopy and monitoring and evaluation. By contrast, anti-TB drug management was fully integrated into general drug management systems in nine HBCs. It was partly integrated in a further nine HBCs, while four managed the supply of anti-TB drugs separately.

Because TB services are normally delivered in general health facilities by multi-purpose staff, NTPs rely on a well-functioning health-care infrastructure, including committed and well-trained general health staff. Any challenge to the general health system is thus a challenge for TB control. Optimal planning of TB control therefore requires collaboration with relevant stakeholders involved in general health-care planning. It also requires coordination among the various health development frameworks at central, provincial and district levels, such as poverty reduction strategy papers (PRSP), sector-wide approaches (SWAPs) and medium-term expenditure frameworks (MTEF).

The extent to which this was being done in 2005 varied among HBCs. Most of the HBCs had developed their TB control plans with the involvement of a broad range of stakeholders (Figure 31). Eighteen had aligned their plans for TB control with a national health development plan. With respect to HRD, only 13 had coordinated the plan for TB with a national plan.[1] Of the 19 HBCs with a PRSP, 14 had aligned their TB control plans accordingly. The TB control plans of nine HBCs were aligned with SWAPs.

Practical Approach to Lung Health

Worldwide, 70 countries reported that the Practical Approach to Lung Health (PAL) was a part of the national plan for TB control (including 10 HBCs). In 2005, PAL was operational in some form in 20 countries. Among them, Chile, El Salvador, Kyrgyzstan, Morocco and South Africa have been scaling up PAL activities, while Algeria, Bolivia, Guinea, Jordan, the Syrian Arab Republic and Tunisia have developed and tested their PAL guidelines and have begun the process of implementation. The remaining nine countries were at a preliminary phase

[1] It is not known how many of the HBCs have formal sector-wide human resource development plans in the health sector, so further integration may be hindered by the lack of such a plan.

of PAL development. Among the 22 HBCs, Uganda had adapted and was field-testing PAL guidelines. South Africa had progressed further in PAL development and implementation, with guidelines and training materials developed for primary health-care workers, emphasizing HIV-infected TB patients. Five additional Latin American countries, including Brazil, were planning to begin implemention of PAL early in 2007.

4. Engage all care providers

Public–Public and Public–Private mix approaches

By September 2006, 11 HBCs (Bangladesh, China, DR Congo, India, Indonesia, Kenya, Mozambique, Myanmar, Philippines, UR Tanzania and Viet Nam) had started scaling up public–private mix for TB care and control (PPM), 5 were preparing to scale up and had developed PPM guidelines (Cambodia, Nigeria, Pakistan, Thailand and Zimbabwe), while the remaining had either initiated or prepared for PPM pilot projects. Specific training for non-NTP providers was organized in 18 HBCs, and 16 HBCs were providing anti-TB drugs free of charge to such providers. A focal person for PPM in the central NTP office was appointed in 14 HBCs, of which 4 were working full-time and 10 part-time.

Several HBCs had involved all health institutions belonging to public sector health-care networks, such as public hospitals, medical college hospitals, army health facilities and prison health facilities (Figures 32 and 33). However, many such providers continued to operate without formal links to the NTP and did not follow NTP or ISTC guidelines. Facilities governed by health insurance agencies were partly or fully engaged with the NTP in 8 of the 16 countries where such agencies were of relevance for TB control.

All but one HBC (Russian Federation) had begun to involve at least some private practitioners, private hospitals and NGO health facilities in referral to the NTP (Figure 32), in diagnosis following programme guidelines and/or in treatment with recommended drugs (Figure 33). However, in most HBCs, only a small fraction of all eligible private providers have so far been involved.

International Standards for Tuberculosis Care

The International Standards for Tuberculosis Care were familiar to 17 HBCs, of which 11 had developed plans for their wide dissemination and use as an advocacy and training tool so as to engage all health-care providers. Among HBCs, Indonesia, India, Kenya and UR Tanzania are pilot sites for implementing ISTC, and have adopted diverse approaches to make best use of the published standards. The ISTC have been particularly useful in engaging the national professional societies and academic institutions in TB control.

FIGURE 32

Engagement of different types of providers in referral of TB suspects, high-burden countries, 2005

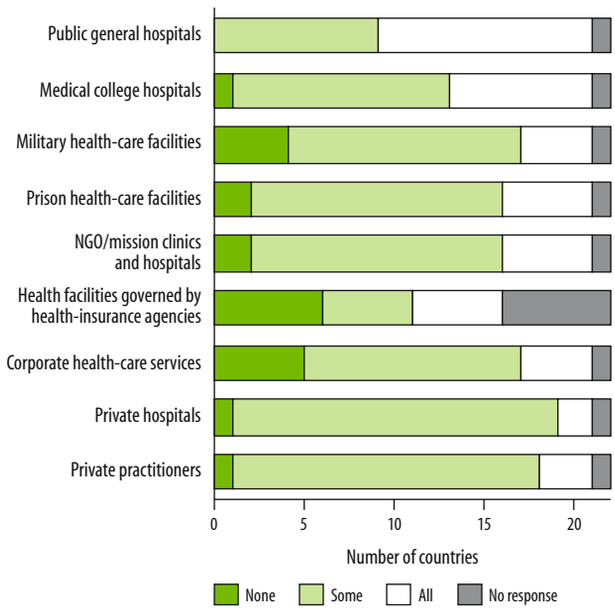
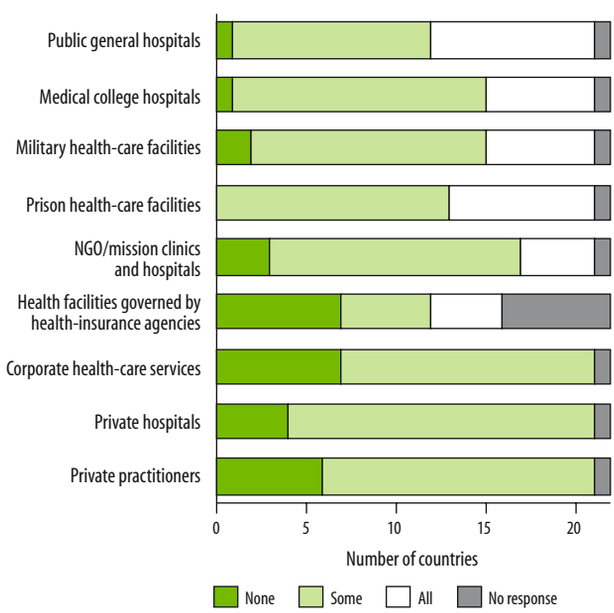


FIGURE 33

Engagement of different types of providers in free-of-charge TB treatment with recommended drugs, high-burden countries, 2005



5. Empower people with TB, and communities

Advocacy, communication and social mobilization

The implementation of advocacy, communication and social mobilization (ACSM) at country level has been uneven. Some countries already have extensive experience carrying out communication programmes aimed at increasing case detection rates while, for other countries, ACSM is an entirely new field. The quality of ACSM depended largely on resources available. Some large programmes made liberal use of partners including NGOs, media and advertising agencies, multi-disease ACSM resources in governments, community groups, and others, who helped to develop materials and to disseminate key messages from national level down to community level.

The two major barriers reportedly faced by HBCs to implement successful ACSM plans were limited resources and staff capacity. With the GFATM (round 5) approving substantial grants for ACSM for 18 countries (US$ 36 million over 5 years), a lack of skilled staff at the central and peripheral levels, rather than the availability of money, is likely to be the main problem.

Monitoring and evaluation of ACSM is a major challenge for all HBCs: only seven HBCs currently claim to have data sources in place to measure and assess ACSM results. The Stop TB Partnership is in the process of developing guidelines on ACSM indicators to help countries develop a robust monitoring and evaluation system, and to develop strategies through identification of the most important gaps in knowledge and attitudes among their key target groups.

Community participation in TB care

Community-based approaches to TB control were implemented in all regions. All (except for one) countries in the South-East Asia Region reported interventions for community involvement in TB control to a varying extent. About half of the countries in Africa, the Americas and in the Eastern Mediterranean and Western Pacific regions (65 countries), and only a quarter of countries in Europe (10 countries), reportedly engaged communities in TB care and prevention (Annex 1).

Most HBCs have been engaging communities in activities other than treatment support, with the exception of Afghanistan, India and Thailand. Other areas of involvement included case detection, defaulter tracing and raising awareness about TB. Future plans to involve communities included expansion of ongoing activities and new ACSM activities related mostly to raising awareness.

More than half of the HBCs have GFATM funding for community involvement (14 and 20 countries had grants approved in rounds 5 and 6, respectively). Among GFATM TB grants approved in round 6, 20 countries (including two HBCs, India and UR Tanzania) included community involvement as a part of their application, worth a total of US$ 25.7 million for up to 5 years (6.4% of overall budgets).

Patients' Charter for Tuberculosis Care

The Patients' Charter for Tuberculosis Care was being promoted in all regions, although few countries reported any specific promotional activities. In the Indian state of Kerala, the state health minister launched the charter, presenting it to a TB patient and distributing copies translated into the local language. The minister also launched the ISTC, directed at health-care providers in the state.

6. Enable and promote research

Globally, no specific mechanism yet exists to promote or oversee TB research activities. Few, if any, NTPs monitor the TB research under way in their countries. NTPs were therefore expected to report mainly on research with which they were associated in 2005.

All HBCs did report having operational research (OR) in their respective NTP strategic plans, but only India and Pakistan provided details. TB/HIV and prevalence surveys were the most common OR activities undertaken across the HBCs. Mozambique and Zimbabwe reported only drug resistance surveys under OR. Kenya, Mozambique and Thailand reported no OR activities for 2005.

Financing TB control

Data received

Financial data were received from 156 out of 212 (74%) countries (Table 19), continuing the year-on-year increase in reporting since the start of data collection in 2002 (the total in *Global tuberculosis control 2006* was 140 countries).[1] Complete budget data for 2006 were provided by 98 countries (up from 87 in last year's report), 87 countries provided complete budget data for 2007, and 83 provided complete expenditure data for 2005 (compared with 73 that provided complete expenditure data for 2004). The countries that provided financial reports accounted for 96–100% of the regional burden of TB in four WHO regions, with lower figures of 85% and 81% for the Region of the Americas and the European Region, respectively. Overall, countries that reported financial data accounted for 98% of the global burden of TB.

Data were received from all 22 HBCs, including South Africa for the first time (Table 20). Complete budget data for 2006 were provided by 21 countries (the exception was Thailand), and complete budget data for 2007 were provided by 19 countries (the exceptions were Thailand, UR Tanzania[2] and Zimbabwe). Complete expenditure data for 2005 were provided for 19 countries, with data missing for Thailand, Uganda and Zimbabwe. A total of 21 countries provided data on the utilization of health

[1] *Global tuberculosis control: surveillance, planning and financing.* Geneva, World Health Organization, 2006 (WHO/HTM/TB/2006.362).

[2] As in previous years, the planning cycle in UR Tanzania means that we did not expect budget data for 2007 to be reported.

TABLE 19

Budget, expenditure and utilization data received, all countries, 2007

	NUMBER OF COUNTRIES	FINANCIAL REPORTS RECEIVED	BUDGET 2006			BUDGET 2007			EXPENDITURE 2005			UTILIZATION OF HEALTH SERVICES	PROP. OF ESTIMATED REGIONAL TB INCIDENCE ACCOUNTED FOR BY COUNTRIES THAT REPORTED FINANCIAL DATA (%)
			COMPLETE	PARTIAL	NONE	COMPLETE	PARTIAL	NONE	COMPLETE	PARTIAL	NONE		
AFR	46	43	31	7	5	25	5	13	23	1	19	22	99
AMR	44	26	16	6	4	15	7	4	15	3	8	21	85
EMR	22	18	13	1	4	13	1	4	11	1	6	14	96
EUR	53	29	16	8	5	17	6	6	16	3	10	22	81
SEAR	11	9	6	3	0	5	3	1	5	1	3	8	99
WPR	36	31	16	8	7	12	7	12	13	4	14	26	100
Global	**212**	**156**	**98**	**33**	**25**	**87**	**29**	**40**	**83**	**13**	**60**	**113**	**98**

TABLE 20

Budget, expenditure and utilization data received, high-burden countries, 2007

	NUMBER OF COUNTRIES	FINANCIAL REPORTS RECEIVED	BUDGET 2006			BUDGET 2007			EXPENDITURE 2005		UTILIZATION OF HEALTH SERVICES
			COMPLETE	PARTIAL	NONE	COMPLETE	PARTIAL	NONE	COMPLETE	NONE	
AFR	9	9	9	0	0	7	0	2[a]	7	2[b]	9
AMR	1	1	1	0	0	1	0	0	1	0	1
EMR	2	2	2	0	0	2	0	0	2	0	2
EUR	1	1	1	0	0	1	0	0	1	0	1
SEAR	5	5	4	1[c]	0	4	1[c]	0	4	1[c]	4[c]
WPR	4	4	4	0	0	4	0	0	4	0	4
Global	**22**	**22**	**21**	**1**	**0**	**19**	**1**	**2**	**19**	**3**	**21**

[a] UR Tanzania and Zimbabwe.
[b] Uganda and Zimbabwe.
[c] Thailand did not report data.

services and made projections of the number of cases they would treat in 2006 and 2007. While considerable clarification and verification of data by WHO are still required, the quality of the data when first submitted is improving: Bangladesh, Brazil, China, India, Indonesia, South Africa and UR Tanzania provided timely and exemplary data that required almost no follow-up.

NTP budgets and funding

High-burden countries, 2002–2007

NTP budgets in 21 of the 22 HBCs have increased during the period 2002–2007, sometimes by substantial amounts (Figures 34–35; Table 21). There are insufficient data to make an assessment for Thailand. The total combined budget for the 22 HBCs in 2007 is US$ 1.25 billion, 2.5 times the US$ 509 million budgeted in 2002. The Russian Federation has by far the largest budget (US$ 513 million), followed by China (US$ 200 million), South Africa (US$ 95 million), India (US$ 75 million) and Indonesia (US$ 59 million), making a combined total that is 75% of the NTP budgets reported by HBCs. There are three countries with budgets in the range US$ 30–50 million and four with budgets in the range US$ 20–30 million; the rest (10 countries, half of which are in Africa) have budgets of under US$ 20 million.

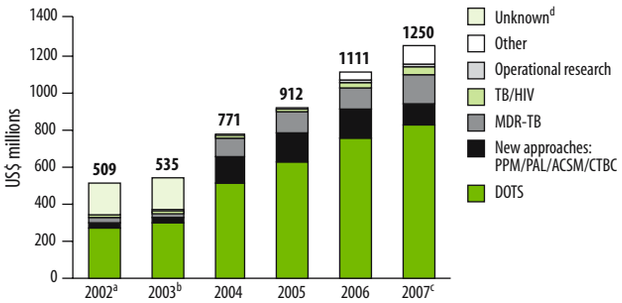
In absolute terms, the budgetary increase in the Russian Federation dwarfs that in any other HBC, at US$ 351 million since 2002; the second largest increase (in China) was US$ 103 million. In relative terms, the increases in nine countries (Afghanistan, Brazil, DR Congo, Kenya, Myanmar, Nigeria, Pakistan, the Russian Federation and Zimbabwe) stand out, with three- to eight-fold increases over six years (Table 21). Countries with relatively small increases are Ethiopia, the Philippines, UR Tanzania and Viet Nam. Across all 22 HBCs, DOTS has consistently accounted for the largest share of NTP budgets,[1] but since 2004 an increasing share of these budgets has been accounted for by MDR-TB treatment and new approaches such as PPM, community TB care, ACSM and PAL (Figure 34). NTP budgets for collaborative TB/HIV activities remain small, although Kenya is an exception (see Annex 1).

These large budget increases have been accompanied by big improvements in available funding (Figures 35–36; Table 21). For all HBCs, funding for NTP budgets has increased by US$ 592 million since 2002, reaching US$ 1 billion of the US$ 1.25 billion needed in 2007. Kenya and Viet Nam are the only countries where projected funding for 2007 is less than in 2002, although in the case of Kenya this is because the NTP is unsure about whether funding theoretically available in GFATM grants will be approved for disbursement and because multi-

[1] See **Methods** for definition of the budgetary line items included in the category DOTS.

FIGURE 34

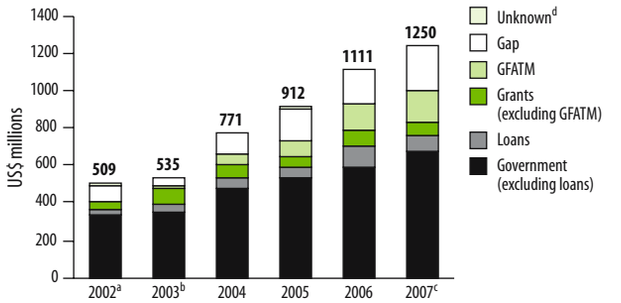
Total NTP budgets by line item, high-burden countries, 2002–2007



[a] Estimates assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).
[b] Estimates assume budget 2003 equal to expenditure 2003 (Russian Federation and Zimbabwe) or budget 2004 (Thailand).
[c] Estimates assume budget 2007 equal to budget 2006 (UR Tanzania and Zimbabwe).
[d] "Unknown" applies to Afghanistan 2002–2004, Russian Federation 2002–2003 and Mozambique 2002–2003, as breakdown by line item not available.

FIGURE 35

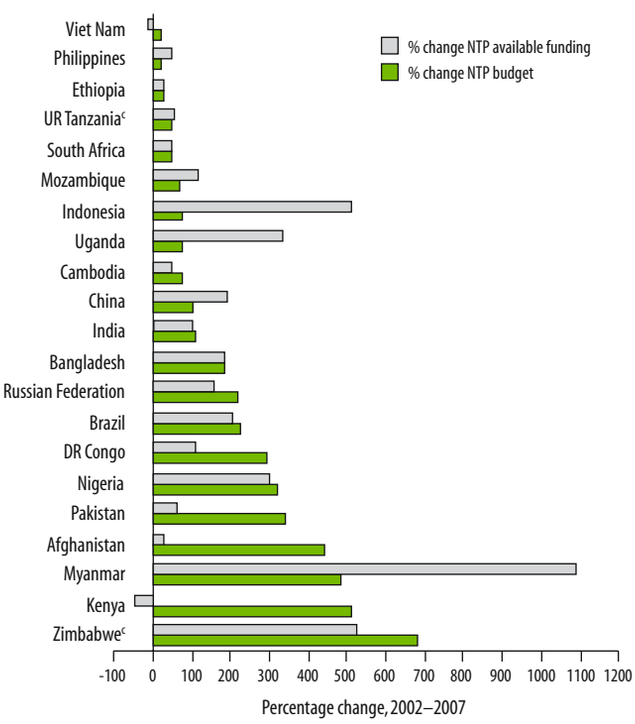
Total NTP budgets by source of funding, high-burden countries, 2002–2007



[a] Estimates assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).
[b] Estimates assume budget 2003 equal to expenditure 2003 (Russian Federation and Zimbabwe) or budget 2004 (Thailand).
[c] Estimates assume budget 2007 equal to budget 2006 for UR Tanzania and Zimbabwe.
[d] "Unknown" applies to Afghanistan 2004, DR Congo 2002 and Nigeria 2002 as breakdown by funding source not available.

FIGURE 36

Changes in NTP budget and available funding, 21 high-burden countries,[a,b] 2002–2007



[a] Complete data not available for Thailand.
[b] Countries ranked by percentage change in NTP budget.
[c] Comparison is 2002–2006 for UR Tanzania and Zimbabwe.

year grants with bilateral donors need to be renegotiated during 2007.[1] While most of the extra US$ 592 million has come from HBC governments (US$ 404 million including loans), this overall statistic conceals the fact that most of the additional domestic funding comes from three countries only: China, the Russian Federation and South Africa (an extra US$ 340 million including loans since 2002). Although most other HBC governments have also increased their domestic funding (the six exceptions are Afghanistan, Cambodia, Ethiopia, Kenya, the Philippines and Viet Nam), the remaining increase in funding is largely due to the GFATM. Funding from the GFATM in 2007 amounts to US$ 168 million compared with zero in 2002, and all HBCs have now secured GFATM grants (although Myanmar's grant has been terminated and funding ended in 2006). The largest grants are held by Bangladesh, China, India, Indonesia, Nigeria and the Russian Federation (worth US$ 10–30 million in 2007); in other HBCs, grants are worth in the range US$ 1–8 million in 2007. In relative terms, the most impressive improvements in funding overall (from all sources) have occurred in Indonesia, Myanmar and Zimbabwe (Figure 36), mainly due to GFATM funding in Indonesia and Zimbabwe and GDF funding in Myanmar.

Among all HBCs, national governments will provide US$ 758 million (61%) of the funding required by NTPs in 2007 and US$ 241 million (19%) will be funded by donor agencies (Table 21). This leaves a reported funding gap of US$ 251 million (20%). In absolute terms, the largest funding gaps (as in 2006) are those reported by China, Kenya, Pakistan and the Russian Federation (US$ 186 million, or 74% of the total gap). Proportionally,

[1] If multi-year grants are successfully renegotiated and GFATM grants are disbursed on schedule, then the funding available in 2007 will be higher than in 2002.

TABLE 21

NTP budgets and available funding, high-burden countries, 2007

	TOTAL NTP BUDGET (US$ MILLIONS)	CHANGE SINCE 2002[a] (US$ MILLIONS)	CHANGE SINCE 2002 (%)	AVAILABLE FUNDING (US$ MILLIONS)				FUNDING GAP	CHANGE IN AVAILABLE FUNDING SINCE 2002[b] (US$ MILLIONS)				CHANGE IN FUNDING GAP SINCE 2002 (US$ MILLIONS)
				GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	(US$ MILLIONS)	GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	
1 India	75	39	109	9.2	37	10	14	3.4	2.9	13	5.0	14	3.4
2 China	200	103	105	120	11	2.7	26	41	68	11	0.2	26	-2.5
3 Indonesia	59	25	73	25	0	11	23	0	18	0	8.0	23	-25
4 Nigeria	36	28	323	17	0	4.2	13	2.3	15	0	0	13	-4.3
5 Bangladesh	20	13	184	2.9	0.9	2.5	14	0	-0.5	0.8	-0.9	14	0
6 Pakistan	23	18	341	3.4	0	2.0	0.6	17	0.4	0	1.3	0.6	16
7 South Africa	95	32	50	88	0	2.5	4.0	0	30	0	0.9	4.0	0
8 Ethiopia	6.3	1.5	30	0.2	0	1.5	4.5	0	-0.9	0	-2.2	4.5	0
9 Philippines	20	3.8	23	10	0	1.5	6.4	2.1	-1.8	0	1.5	6.4	-2.3
10 Kenya	32	26	508	1.0	0	0.2	1.0	29	-0.5	0	-2.4	1.0	28
11 DR Congo	26	19	292	1.4	0.8	5.0	6.7	12	0.4	0.8	-0.7	6.7	8.1
12 Russian Federation	513	351	216	360	25	2.2	27	99	206	25	-5.4	27	99
13 Viet Nam	14	2.2	19	6.6	0	1.9	1.9	3.4	-2.1	-1.8	0.9	1.9	3.4
14 UR Tanzania[c]	8.1	2.6	47	2.1	0	5.7	0	0.4	1.9	0	0.9	0	-0.2
15 Brazil	44	30	225	29	0.5	2.8	8.1	3.0	16	0.5	2.8	8.1	3.0
16 Uganda	9.2	3.9	75	1.7	0	0.5	6.2	0.8	1.6	-1.2	-0.1	6.2	-2.5
17 Thailand[c]	2.0	–	–	–	–	–	2.0	–	–	–	–	2.0	–
18 Mozambique	14	5.7	72	0.8	0	3.9	1.2	7.8	0.5	0	1.5	1.2	2.5
19 Myanmar	16	14	484	0.5	0	6.6	0	9.2	0.1	0	6.4	0	7.0
20 Zimbabwe[c]	13	12	679	2.3	0	3.2	5.1	2.6	2.2	0	1.6	5.1	2.6
21 Cambodia	7.6	3.3	77	0.6	0	1.8	2.1	3.1	-0.7	-0.7	0.7	2.1	1.9
22 Afghanistan	17	14	445	0.1	0	0.7	1.3	15	-0.2	0	-0.6	1.3	13
High-burden countries	**1 250**	**746**	**109[d]**	**683**	**76**	**73**	**168**	**251**	**356**	**48**	**19**	**168**	**152**

– Indicates not available.

[a] Figures assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).

[b] Total of changes in available funding and funding gap does not equal the total in column 3 because comparisons by source of funding are with 2003 for DR Congo and Nigeria.

[c] Data for UR Tanzania and Zimbabwe are for 2006. Data for Thailand are partial.

[d] Median value.

the largest gaps are in Afghanistan, Cambodia, DR Congo, Kenya, Mozambique, Myanmar and Pakistan (with gaps representing 40–93% of the required budget).

Further details, including charts showing trends in NTP budgets by funding source and line item for each HBC during the period 2002–2007, are provided in Annex 1.

All countries by region, 2007

The Global Financial Monitoring Project started to collect data from all countries (rather than focusing only on the 22 HBCs) in 2003 and to report on these data in 2004. Since there is variation in the set of countries that report complete data each year, presentation of needs for all countries over time is difficult. For this reason, Figure 37 presents NTP budgets by source of funding for 2007 only. In 2007, 90 countries (22 HBCs and 68 other countries) that collectively account for 90% of the global burden of TB submitted complete data.[1] These countries accounted for almost all of the regional burden of TB in the Eastern Mediterranean, South-East Asia and Western Pacific regions, for 87% of the regional burden in the African Region, 57% of the burden in the Region of the Americas, and 65% of the regional burden in the European Region. These figures mean that the reporting of complete financial data to WHO has been maintained (compared with 2006) in the South-East Asia and Western Pacific regions, and improved in all regions except the Region of the Americas.[2]

NTP budgets in 2007 in these 90 countries total US$ 1.6 billion, with a funding gap of US$ 307 million (both figures higher than for 2006). Budgetary funding gaps as a proportion of the total budget are higher in HBCs compared with other countries, except in the African Region and the Region of the Americas. Overall, NTP budgets per TB case (estimated annual incidence) were lower for HBCs compared with non-HBCs in four regions; in the African Region, budgets were very similar (US$ 138 per case and US$ 135 per case for HBCs and non-HBCs respectively), and in the European Region the budget for the Russian Federation was higher than the average for the other 16 countries that reported data.

[1] Data in 2007 assumed to be as for 2006 in Thailand, UR Tanzania and Zimbabwe.

[2] This is because Peru reported data in the 2005 round of data collection, but not the 2006 round of data collection used for this report.

FIGURE 37

Regional distribution of NTP budgets by source of funding, 22 high-burden countries and 68 non high-burden countries, 2007.
Numbers in parentheses above bars show the percentage of all estimated TB cases in the region accounted for by the countries included in the bar.
Numbers in parentheses in the x-axis show the number of countries contributing to each bar.

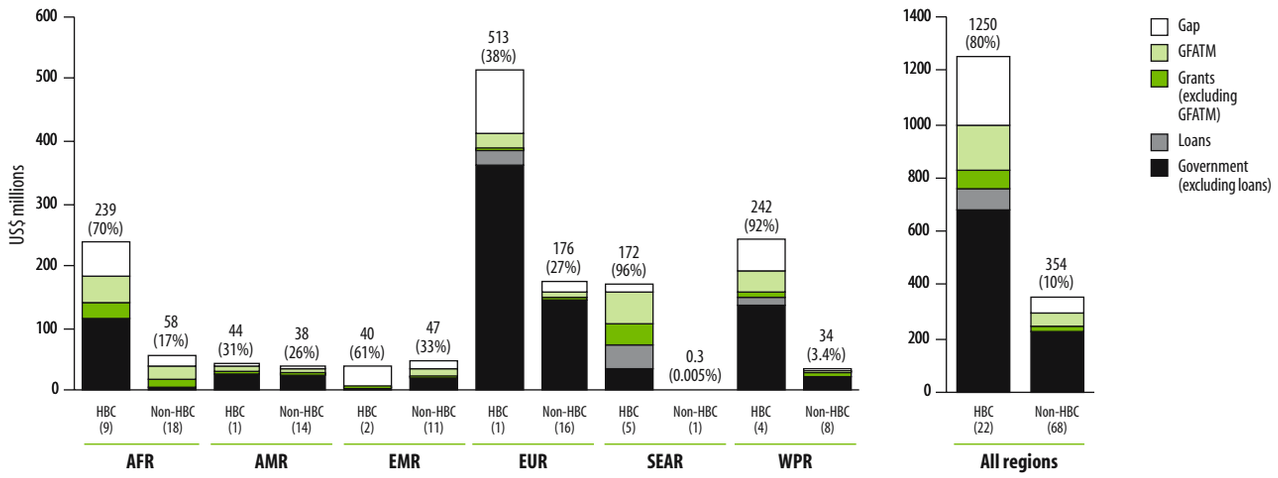
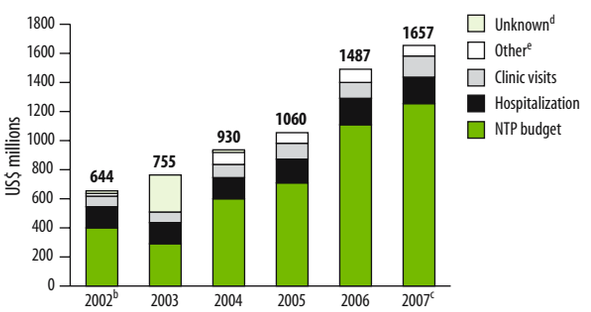


FIGURE 38

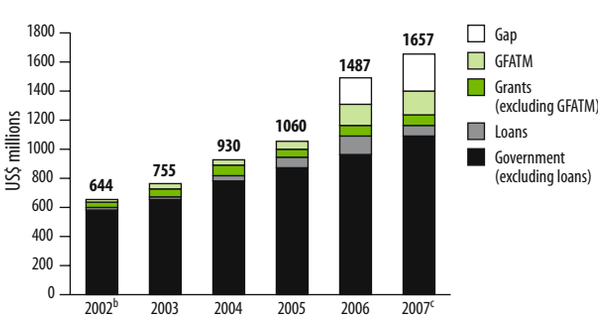
Total TB control costs by line item, high-burden countries,[a] 2002–2007



[a] Total TB control costs for 2002–2005 are based on expenditure data, whereas those for 2006–2007 are based on budget data.
[b] Estimates assume costs 2002 equal to costs 2003 for Afghanistan, Bangladesh, Mozambique, Nigeria, Uganda and Zimbabwe.
[c] Estimates assume costs 2007 equal to costs 2006 for UR Tanzania and Zimbabwe.
[d] "Unknown" applies to Russian Federation 2003 and Thailand 2002–2004.
[e] "Other" includes costs for hospitalization and fluorography in the Russian Federation not reflected in NTP budget or NTP expenditure data.

FIGURE 39

Total TB control costs by source of funding, high-burden countries,[a] 2002–2007



[a] Total TB control costs for 2002–2005 are based on expenditure data, whereas those for 2006–2007 are based on budget data.
[b] Estimates assume costs 2002 equal to costs 2003 for Afghanistan, Bangladesh, Mozambique, Nigeria, Uganda and Zimbabwe.
[c] Estimates assume costs 2007 equal to costs 2006 for UR Tanzania and Zimbabwe.

Total costs of TB control

High-burden countries, 2002–2007

NTP budgets include only part of the resources needed for TB control. In particular, they do not include the costs associated with general health-service staff and infrastructure, which are used when TB patients are hospitalized or make outpatient clinic visits for DOT and monitoring. For the 22 HBCs combined, the total cost of TB control is projected to be almost US$ 1.7 billion in 2007, compared with US$ 644 million in 2002 (Figures 38–40; Table 22). The figures for total costs 2002–2006 are lower than those reported in *Global tuberculosis control 2006*, due to downward revisions of the costs estimated for South Africa following the reporting of financial data and related estimates of health services utilization (hospitalization and clinic visits) to WHO for the first time in 2006. Notably, the financial report for South Africa included lower estimates of the frequency and duration of hospitalization compared with the costing studies conducted in the mid-late 1990s that were used to produce cost estimates for previous reports in this series.

Increases in projected costs during the period 2002–2007 arise because of the large increases in NTP budgets (described above) and because of the higher costs of clinic visits and hospitalization that are associated with treating more patients. As in previous years, the largest costs in 2007 are for the Russian Federation and South Africa, which together account for US$ 829 million, or almost exactly half of the total cost of US$ 1.7 billion (Figure 40; Table 22). South Africa is a middle-income country, and the high costs are mainly explained by the higher prices for items such as hospitalization and outpatient visits, compared with those typical in low-income countries, as well as a relatively large budget for treatment of MDR-TB (US$ 43 million for about 6000 patients). The high costs in the Russian Federation reflect continued staffing and maintenance of an extensive network of TB hospitals and

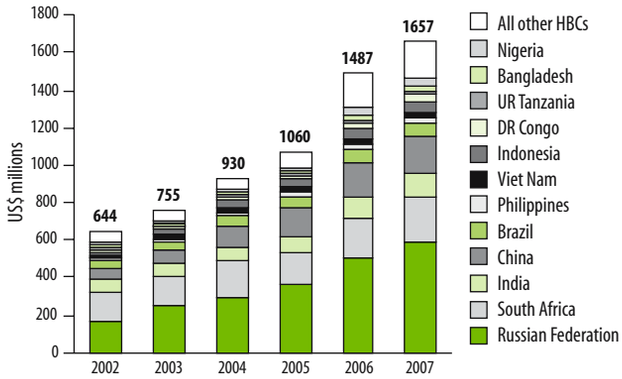
sanatoria, a large budget for second-line anti-TB drugs to treat many MDR-TB patients (US$ 91 million, with an estimated total of about 34 000 cases) and continued use of fluorography for mass population screening. China (US$ 200 million), India (US$ 119 million), Brazil (US$ 74 million) and Indonesia (US$ 64 million) rank third to sixth. These six countries account for 78% of the total cost of TB control in the 22 HBCs. An additional nine countries have total costs in the range US$ 23–52 million in 2007, and the remaining seven have costs of US$ 19 million or less.

The countries with by far the largest projected absolute increases in annual costs between 2002 and 2007 are the Russian Federation and China (US$ 423 million and US$ 139 million respectively). They are followed by increases in the range US$ 36–81 million in Brazil, India, Indonesia, Nigeria and South Africa. The smallest absolute changes are projected for Cambodia, Ethiopia, Uganda, UR Tanzania, and Viet Nam. The biggest proportional increases are for Afghanistan, Kenya, Myanmar, Nigeria and Pakistan.

Funding for the general health-service staff and infrastructure used by TB patients during clinic visits and hospitalization is assumed to be provided by governments.

FIGURE 40

Total TB control costs by country, high-burden countries,[a] 2002–2007



[a] Total TB control costs for 2002–2005 are based on expenditure data, whereas those for 2006–2007 are based on budget data.

TABLE 22

Total TB control costs and available funding, high-burden countries, 2007

	TOTAL COSTS (US$ MILLIONS)	CHANGE SINCE 2002[a] (US$ MILLIONS)	CHANGE SINCE 2002 (%)	AVAILABLE FUNDING (US$ MILLIONS)				FUNDING GAP (US$ MILLIONS)	CHANGE IN AVAILABLE FUNDING SINCE 2002 (US$ MILLIONS)				CHANGE IN FUNDING GAP SINCE 2002 (US$ MILLIONS)
				GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM		GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	
1 India	119	56	90	53	37	10	14	3.4	13	20	5.6	14	3.4
2 China	200	139	229	120	11	2.7	26	41	63	9.8	-0.6	26	41
3 Indonesia	64	43	209	29	0	11	23	0	10	0	9.4	23	0
4 Nigeria	52	43	435	33	0	4.2	13	2.3	27	0	0.4	13	2.3
5 Bangladesh	27	17	160	10	0.9	2.5	14	0	3.2	0.8	-0.9	14	0
6 Pakistan	27	22	444	7.0	0	2.0	0.6	17	3.2	0	0.8	0.6	17
7 South Africa	235	81	53	228	0	2.5	4.0	0	80	0	0.9	4.0	0
8 Ethiopia	14	7.0	99	8.0	0	1.5	4.5	0	4.7	0	-2.2	4.5	0
9 Philippines	31	8.9	40	21	0	1.5	6.4	2.1	1.5	-2.2	1.0	6.4	2.1
10 Kenya	34	28	533	3.1	0	0.2	1.0	29	0.3	0	-2.4	1.0	29
11 DR Congo	35	23	196	11	0.8	5.0	6.7	12	4.9	0.8	-1.1	6.7	12
12 Russian Federation	594	423	247	442	25	2.2	27	99	271	25	2.2	27	99
13 Viet Nam	23	2.2	10	16	0	1.9	1.9	3.4	-2.7	-1.8	1.4	1.9	3.4
14 UR Tanzania[b]	15	3.7	33	8.7	0	5.7	0	0.4	2.4	0	0.9	0	0.4
15 Brazil	74	36	93	60	0.5	2.8	8.1	3.0	21	0.5	2.8	8.1	3.0
16 Uganda	10	6.9	245	2.2	0	0.5	6.2	0.8	1.2	-1.2	-0.1	6.2	0.8
17 Thailand[b]	4.0	–	–	2.0	–	–	2.0	–	–	–	–	2.0	–
18 Mozambique	24	20	518	11	0	3.9	1.2	7.8	8.5	-0.8	3.6	1.2	7.8
19 Myanmar	19	16	531	3.4	0	6.6	0	9.2	1.2	0	5.7	0	9.2
20 Zimbabwe[b]	18	12	201	7.0	0	3.2	5.1	2.6	2.6	0	1.6	5.1	2.6
21 Cambodia	10	5.1	104	3.0	0	1.8	2.1	3.1	0.2	-0.7	0.4	2.1	3.1
22 Afghanistan	27	23	542	10	0	0.7	1.3	15	10	0	-3.3	1.3	15
High-burden countries	**1 657**	**1 017**	**201[c]**	**1 089**	**76**	**73**	**168**	**251**	**527**	**50**	**26**	**168**	**251**

– Indicates not available.

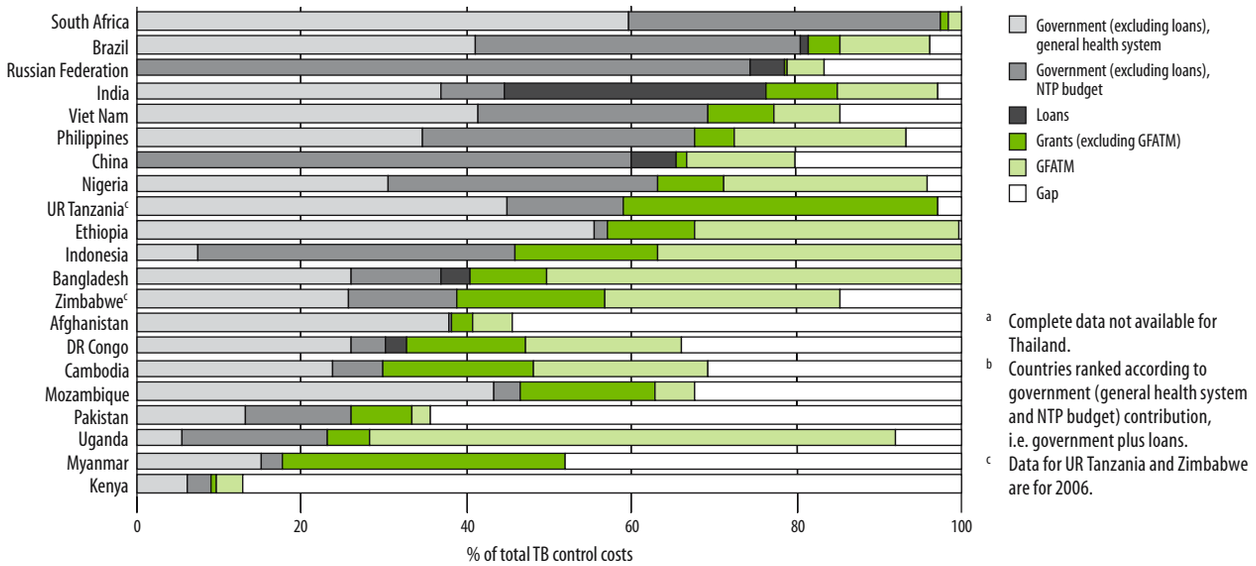
[a] TB control costs for 2006–2007 were estimated using budget data, whereas those for 2002–2005 were estimated using expenditure rather than budget data wherever possible. Estimates assume expenditure 2002 equal to available funding 2002 (Kenya and UR Tanzania), to expenditure 2003 (Afghanistan, Bangladesh, Mozambique, Nigeria and Zimbabwe) or to available funding 2003 (Uganda).

[b] Data for UR Tanzania and Zimbabwe are for 2006. Data for Thailand are partial.

[c] Median value.

FIGURE 41

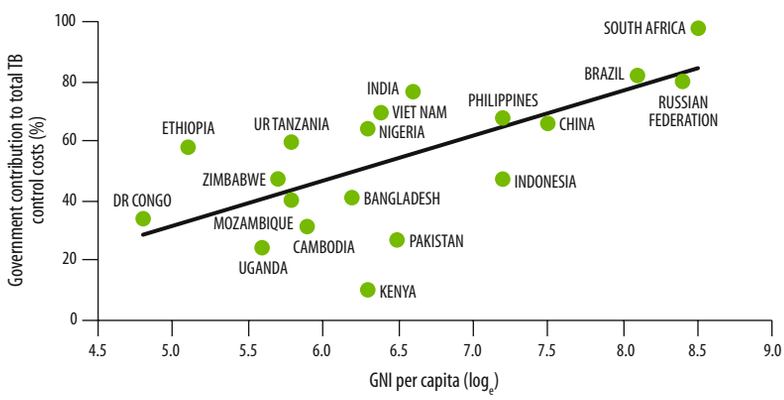
Sources of funding for total TB control costs, 21 high-burden countries,[a,b] 2007



[a] Complete data not available for Thailand.
[b] Countries ranked according to government (general health system and NTP budget) contribution, i.e. government plus loans.
[c] Data for UR Tanzania and Zimbabwe are for 2006.

FIGURE 42

Government contribution (including loans) to total TB control costs by gross national income (GNI) per capita, 19 high-burden countries,[a] 2007



[a] Data on GNI per capita not available for Myanmar and Afghanistan. Complete data for Thailand not available.

This assumption, together with the implicit assumption that health systems have sufficient capacity to support the treatment of growing numbers of patients in 2007,[1] means that the resources available for TB control are estimated to have increased from almost US$ 644 million in 2002 to US$ 1.4 billion in 2007 (Figure 39; Table 22). The contribution by HBC governments to the total cost of TB control in 2007 is 70% on average, which is larger than their contribution to NTP budgets. However, this high average figure conceals important variations among countries. There are 10 HBCs that are dependent on grants to cover more than one-third of the total costs of TB control (Bangladesh, Cambodia, DR Congo, Ethiopia, Indonesia, Myanmar, Nigeria, Uganda, UR Tanzania and Zimbabwe), and a further four (Afghanistan, Kenya, Mozambique and Pakistan) that are likely to rely on grant funding to a similar or greater extent to fill reported funding gaps (Figure 41). The share of the total costs provided by HBC governments is closely related to average income levels (Figure 42), although the government contribution relative to income levels is comparatively high in Ethiopia, India, South Africa, UR Tanzania and Viet Nam, and comparatively low in Indonesia, Kenya, and Pakistan. For all HBCs, the estimated gap between the funding already available and the total cost of TB control is US$ 251 million in 2007, i.e. the NTP budget gap reported above.

Further details, including charts for each country that show trends in total TB control costs by line item for each year 2002–2007, are shown in Annex 1.

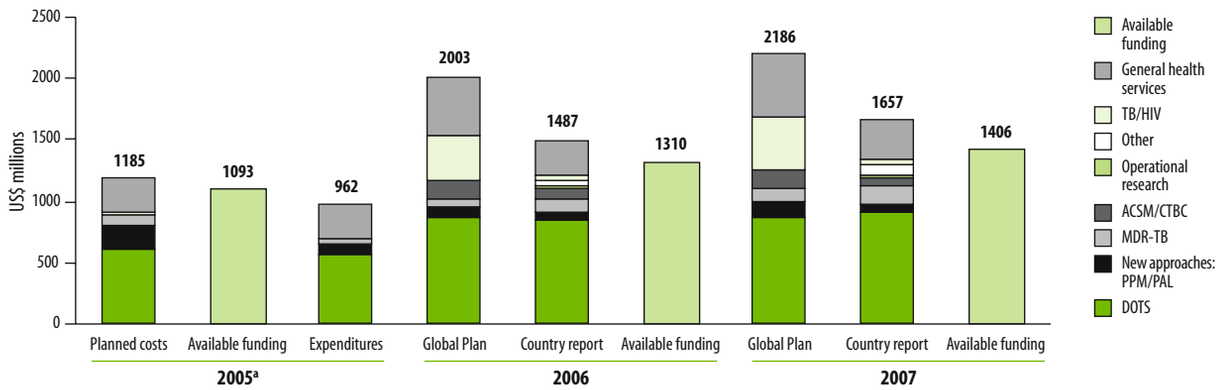
High-burden countries: country reports compared with the Global Plan

The Global Plan has set out what needs to be done between 2006 and 2015 to achieve the MDG and related Stop TB Partnership targets for TB control. For the Global Plan to be successfully implemented, country-level planning and budgeting for TB control needs to be in line with the seven regional plans and budgets that are described in the Global Plan; plans need to be fully funded; and planned interventions and activities need to be fully implemented. For the 22 HBCs as a whole, planned costs and available funding for 2006 and 2007 according to country reports

[1] Nonetheless, the capacity of health systems to manage an increasing number of TB patients warrants further analysis, particularly in countries where the number of patients will need to increase substantially to achieve the MDG and related Stop TB Partnership targets for TB control.

FIGURE 43

Global Plan compared to planned costs, available funding and expenditures, 22 high-burden countries, 2005–2007



[a] Planned costs are higher than actual costs shown in Figures 38–40 (actual costs are based on expenditures).

are compared with those derived from the Global Plan,[1] as well as with planned costs, available funding and actual expenditures in 2005, in Figure 43. This shows that while planned costs and available funding reported by countries are higher in 2006 and 2007 compared with 2005, they are much less than the funding requirements included in the Global Plan. For example, in 2007 the Global Plan indicates that US$ 2.2 billion is required in the 22 HBCs, while country reports indicate planned costs of US$ 1.7 billion, and available funding of US$ 1.4 billion. The discrepancy is mostly due to lower planned costs for collaborative TB/HIV activities (especially in the African region – see Annex 1) and ACSM. Exceptions where planned costs in country reports are either in line with or more ambitious than the Global Plan include Brazil, China, Kenya, the Philippines and Viet Nam (see Annex 1).

All countries: country reports compared to the Global Plan

The financial data submitted to WHO allow total TB control costs for 2007 to be estimated for 84 of the 172 countries that were included in the Global Plan (22 HBCs and 62 other countries).[2] These 84 countries account for 90% of all new cases arising each year, while the 172 countries included in the Global Plan account for 98% of such cases. A regional comparison of costs and available funding based on (a) country reports and (b) the Global Plan is shown for these 84 countries in Figure 44. Overall, country reports indicate planned costs of US$ 2.3 billion, compared with US$ 3.1 billion in the Global Plan. As for the 22 HBCs, the main discrepancy is the higher costs for collaborative TB/HIV activities and ACSM that are included in the Global Plan. However, Figure 44 also illustrates that this overall discrepancy is mostly accounted for by the African and (to a lesser extent) South-East Asia regions. In the Western Pacific Region, costs based on country reports are similar to those set out in the Global Plan. In the Region of the Americas and the Eastern Mediterranean Region, higher costs in the Global Plan reflect higher projections of the number of patients that need to be treated in DOTS programmes (both regions) and, in the Eastern Mediterranean region, an NTP budget that is not increasing in line with country projections of patients to be treated (notably in Pakistan). In the European Region, planned costs based on country reports are higher than those in the Global Plan. These differences mean that while the funding gap reported by countries amounts to US$ 307 million in 2007, the funding gap would be US$ 1.1 billion if the available funding of US$ 2.0 billion is compared with the funding requirements of US$ 3.1 billion set out in the Global Plan.

Budgets and costs per patient

Budgets and costs per patient in HBCs are shown in Table 23. The budget for first-line anti-TB drugs is lowest in Bangladesh (US$ 13) and highest in South Africa (US$ 61). In most countries, the budget is in the range US$ 16–35. The relatively high figure of US$ 51 for Kenya is due to the purchase of a one-year buffer stock; it is possible that the comparatively high figures for Mozambique and UR Tanzania have a similar explanation.

The budget per patient, including all line items, also varies. Three countries have budgets below US$ 100 per patient (Ethiopia, India and Pakistan). A total of eight countries have budgets in the range US$ 100–200 per patient, five are in the range US$ 200–300 and four are in the range US$ 300–550.[3] The Russian Federation is the only country with a budget above US$ 1000 per patient. The total cost per patient treated in 2007 is below US$ 100 in Ethiopia and India, in the range US$ 100–300 in 12 countries, and US$ 300–500 in three countries. There are four countries with much higher costs: Afghanistan, Brazil, the Russian Federation, and South Africa. Afghanistan's

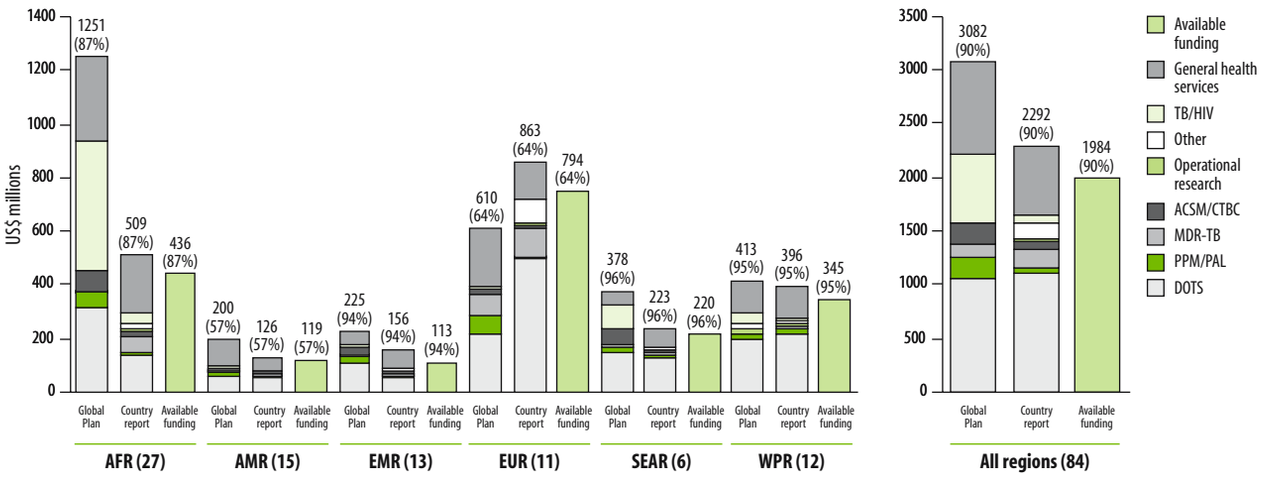
[1] See **Methods** for explanation of how costs for individual countries were derived from the Global Plan.

[2] Six of the 90 countries that reported complete data were not considered in the Global Plan cost estimates.

[3] Figures were not calculated for Thailand because the budget and health services utilization data reported to WHO were incomplete.

FIGURE 44

Total TB control costs in 2007 in 22 high-burden countries and 62[a] other countries by region: country reports compared with *The Global Plan to Stop TB, 2006–2015*. Numbers in parentheses above bars show the percentage of all estimated TB cases in the region accounted for by the countries included in the bar. Numbers in parentheses in the x-axis show the number of countries contributing to each bar.



[a] Iceland, the Netherlands, Serbia, Slovakia, Switzerland and TFYR Macedonia are excluded since they were not included in the Global Plan.

TABLE 23

Total TB control costs and NTP budgets per patient, high-burden countries, 2007

	2007 (US$)			CHANGES SINCE 2002, (FACTOR[a])		
	FIRST-LINE DRUGS BUDGET	NTP BUDGET	TOTAL COSTS	FIRST-LINE DRUGS BUDGET	NTP BUDGET	TOTAL COSTS
1 India	16	57	91	1.6	1.7	1.5
2 China	23	250	250	1.4	1.9	1.9
3 Indonesia	31	171	185	1.0	1.5	1.4
4 Nigeria	14	346	497	0.3	2.4	2.0
5 Bangladesh	13	101	136	0.6	1.2	1.1
6 Pakistan	19	97	112	0.3	2.1	1.2
7 South Africa	61	324	803	1.0	1.1	1.1
8 Ethiopia	26	39	88	1.0	0.9	1.4
9 Philippines	30	145	222	0.6	1.2	1.2
10 Kenya	51	263	280	1.4	5.1	4.2
11 DR Congo	19	228	309	0.5	2.5	1.8
12 Russian Federation	17	1 465	1 698	0.3	3.5	3.9
13 Viet Nam	35	166	283	1.0	1.9	1.3
14 UR Tanzania[b]	49	137	248	1.2	1.7	1.3
15 Brazil	67	516	864	1.5	3.1	1.7
16 Uganda	24	146	154	0.5	3.1	2.2
17 Thailand	–	–	–	–	–	–
18 Mozambique	51	297	522	2.2	3.8	3.4
19 Myanmar	21	117	138	1.2	5.6	2.6
20 Zimbabwe[b]	33	221	298	1.2	7.7	3.0
21 Cambodia	26	197	259	0.6	1.5	1.3
22 Afghanistan	20	545	598	0.7	2.4	5.2
High-burden countries (median value)	**26**	**197**	**259**	**1.0**	**1.9**	**1.8**

– Indicates not available.
[a] Calculated as 2007 value divided by 2002 value.
[b] Latest available data are for 2006.

relatively high costs reflect the need to rebuild the basic infrastructure required for TB control,[1] as well as a plan for 2006–2010 that incorporates all elements of the new Stop TB Strategy and follows the planning and costing framework used for the Global Plan. The other three countries are middle-income countries with generally higher prices for the inputs needed for TB control and in the Russian Federation, as noted above, a further explanation is the continued reliance on lengthy hospitalization of patients as well as mass population screening using fluorography. Among the low-income countries, there is no clear-cut relationship between the cost per patient treated and GNI per capita: for example, in India and Pakistan the cost per patient treated is low relative to income levels, while in DR Congo and Mozambique the cost per patient treated is relatively high compared with GNI per capita (data not shown). Overall, budgets and costs per patient are generally increasing, with a median increase of 90% per patient for budgets and of 80% for total costs (though the median for first-line drugs shows no change since 2002).

Further details, including charts that show five per patient indicators (costs, budgets, available funding, expenditures and budget for first-line anti-TB drugs) for each year 2002–2007 for each HBC, are provided in Annex 1. Data have also been compiled and analysed for all other countries that reported data, and are available upon request.

Expenditures compared with available funding and case detection

For countries that have received large increases in funding, there are two important challenges: to spend the extra money, and to translate extra spending into improved case detection and treatment success rates. To date, we have been able to conduct analyses for the HBCs only.

The ability to translate additional funding into spending can be assessed by comparing expenditures with available funding (Table 24; Figure 45). Complete sets of data on budgets, funds and expenditures for 2005 were available for 18 HBCs (the exceptions being South Africa, Thailand, Uganda and Zimbabwe). When budget and funding data were prospectively reported for 2005, five of these 18 HBCs had fully-funded budgets (Afghanistan, Brazil, India, Indonesia and Viet Nam). Among these five countries, Brazil, India, and Viet Nam spent all the available funds; in Brazil and India, expenditures included the spending of funds that were mobilized in excess of the original budget.[2]

China was also successful in mobilizing additional funding during 2005, and spent funds that were in excess of the original budget. Apart from these six countries,

TABLE 24

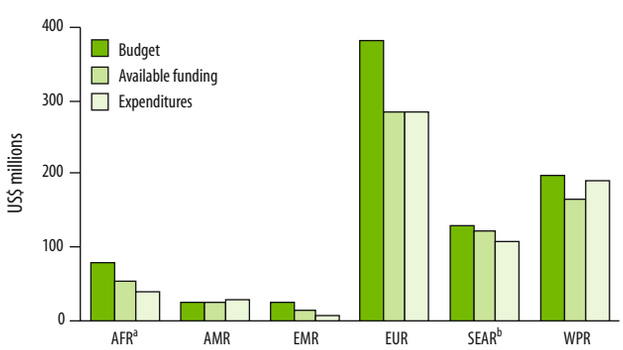
Budgets, available funding and expenditures (US$ millions), high-burden countries, 2005

		BUDGET	AVAILABLE FUNDING[a]	EXPENDITURE[b]	AVAILABLE FUNDING AS % OF NTP BUDGET	EXPENDITURE AS % OF AVAILABLE FUNDING[c]
1	India	47	47	51	100	108
2	China	155	127	157	82	123
3	Indonesia	53	53	40	100	76
4	Nigeria	14	8.6	8.5	63	100
5	Bangladesh	17	14	12	85	85
6	Pakistan	19	8.7	3.1	45	36
7	South Africa	–	41	41	–	99
8	Ethiopia	6.8	6.2	5.9	91	95
9	Philippines	20	17	13	86	78
10	Kenya	10	7.8	7.7	77	98
11	DR Congo	11	8.7	7.9	81	91
12	Russian Federation	382	284	284	74	100
13	Viet Nam	17	17	17	100	100
14	UR Tanzania[d]	7.6	6.5	5.1	86	78
15	Brazil	24	24	28	100	117
16	Uganda	6.0	3.6	–	60	–
17	Thailand[d]	4.7	4.7	–	100	–
18	Mozambique	7.7	7.3	4.8	95	66
19	Myanmar	5.8	2.1	2.6	36	122
20	Zimbabwe[d]	16	5	–	30	–
21	Cambodia	6.9	4.6	4.4	67	94
22	Afghanistan	4.0	4.0	1.8	100	44
High-burden countries		**833**	**702**	**694**	**79[e]**	**90[e]**

– Indicates not available.
[a] Based on budget data, reported prospectively in 2005.
[b] Based on actual expenditures reported in 2006.
[c] Figures can be above 100% when additional funds were mobilized after reporting data in 2005.
[d] Data for UR Tanzania and Zimbabwe are for 2006. Data for Thailand are partial.
[e] Average values.

FIGURE 45

Budget, available funding and expenditures by WHO region (US$ millions), high-burden countries, 2005

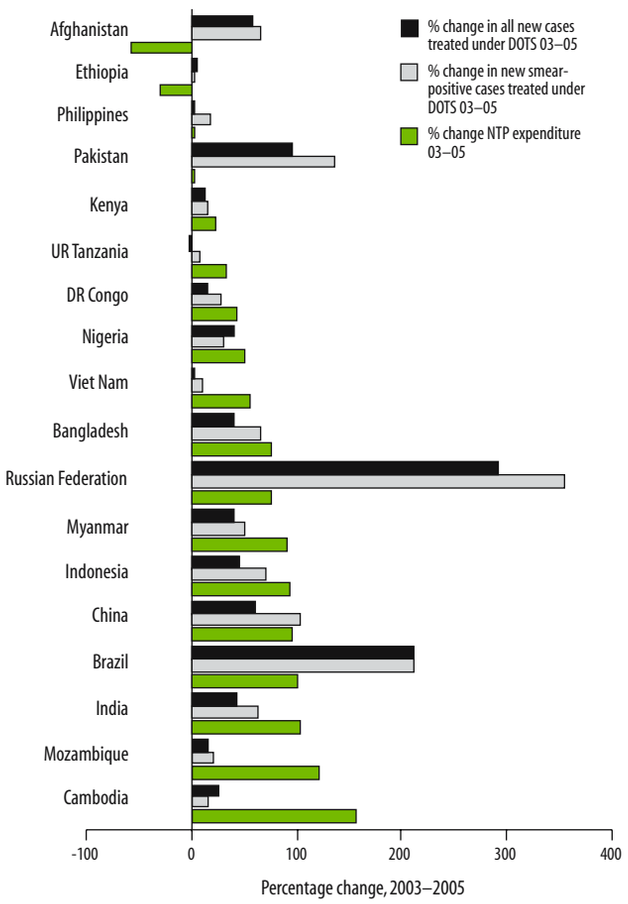


[a] Expenditure data not available for Uganda and Zimbabwe. Budget data not available for South Africa.
[b] Expenditure data not available for Thailand.

[1] While we have reported these costs as part of the NTP budget, they will help to strengthen the health system as a whole.
[2] This explains why the value of expenditures in 2005 as a percentage of the available funding prospectively reported in 2005 (final column of Table 24) is above 100.

FIGURE 46

Change in NTP expenditure and change in new smear-positive and all types of patients treated under DOTS, 18 high-burden countries,[a,b] 2003–2005



[a] Expenditure data for both years not available for South Africa, Thailand, Uganda and Zimbabwe. Comparison for Kenya is with expenditure 2004.

[b] Countries ranked by percentage change in NTP expenditure.

budgets were not fully funded and, except for Myanmar, Nigeria and the Russian Federation, expenditures were almost always less than available funding. Expenditures were particularly low in relation to available funding in Afghanistan and Pakistan. For three African countries highlighted as spending less than 50% of the funding available to them in 2004, there was an improvement in 2005. In 2005, Kenya, Mozambique and UR Tanzania spent 98%, 66% and 78% of available funding, respectively.

The ability to translate spending into improved case detection can be assessed by comparing changes in expenditures 2003–2005 with changes in the number of patients treated 2003–2005 (Figure 46; 2005 is the most recent year for which both case notification and expenditure data are available). Of the 18 countries for which data were available, all but one that increased spending between 2003 and 2005 also increased the number of cases (both new smear-positive and new cases as a whole) that were detected and treated in DOTS programmes (the exception was UR Tanzania). However, the relationship was variable. In Brazil and the Russian Federation, the increase in the number of patients treated under DOTS was far in excess of the increase in expenditures, probably because increasing the number of cases treated under DOTS requires a substitution of DOTS for non-DOTS treatment rather than an increase in total notifications. There was a close to one-to-one relationship between increased expenditures and increased notifications of new smear-positive cases under DOTS in China, while the percentage increase in notifications of new smear-positive cases under DOTS was 56–87% of the percentage increase in expenditures in Bangladesh, DR Congo, India, Indonesia, Kenya, Myanmar and Nigeria (with a range of 46–81% when all forms of new case are considered). There were four countries where the percentage increase in the number of cases treated in DOTS programmes was small compared with the increase in expenditures (Cambodia, Mozambique, UR Tanzania and Viet Nam). In three countries, reported expenditures fell while the number of cases treated increased (Afghanistan, Ethiopia and Pakistan). This fall in expenditures combined with an increase in the number of cases treated is plausible in Ethiopia, since large capital expenditures occurred in 2003, but the data for Afghanistan and Pakistan suggest that expenditures are being underreported. Finally, in the Philippines there were relatively small absolute changes in both expenditures and cases (all forms) treated (2% and 3% respectively).

GFATM contribution to TB control

High-burden countries

In HBCs, the GFATM is the single most important source of external financing, with nine countries (Bangladesh, Cambodia, DR Congo, Ethiopia, Indonesia, Nigeria, the Philippines, Uganda and Zimbabwe) relying on the GFATM to fund more than 25% of their NTP budgets. After six rounds of proposals, the total value of approved proposals in the HBCs is US$ 1.3 billion (Table 25). The amounts in the Phase 1 grant agreements (i.e. the grants that cover the first two years of the proposal) total US$ 519 million.

By the end of 2006, US$ 324 million had been disbursed. For each country, we can compare the actual and expected rates of disbursal, where the expected rate assumes that disbursements should be spread evenly over the two or five year period of the grant agreement following the programme start date (Table 25).[1] Across all grants and countries, the actual disbursement rate is similar to the expected rate. However, for half (19 out of 38) of the grants the actual disbursement rate is below the expected rate, and for half it is above the expected rate. Disbursements are particularly low in relation to the expected disbursement

[1] For other countries, a summary table with the same indicators as those shown for the HBCs is available upon request.

TABLE 25

The Global Fund to Fight Aids, Tuberculosis and Malaria financing for high-burden countries, as of end 2006

	ROUND	TOTAL BUDGET (YEARS 1–5)[a] US$ MILLIONS	GRANT AMOUNT PHASE 1 (YEARS 1–2)[b] US$ MILLIONS	GRANT AMOUNT PHASE 2 (YEARS 3–5) US$ MILLIONS	TOTAL DISBURSEMENT BY END 2006 (AS OF 23 DEC 2006) US$ MILLIONS	TOTAL DISBURSEMENT BY END 2006 AS % OF GRANT AGREEMENT ACTUAL (%)	TOTAL DISBURSEMENT BY END 2006 AS % OF GRANT AGREEMENT EXPECTED (%)[c]	DATE GRANT AGREEMENT SIGNATURE	PROGRAMME START DATE	DATE OF FIRST DISBURSEMENT	TIME BETWEEN BOARD APPROVAL AND SIGNATURE OF GRANT AGREEMENT[d] (MONTHS)	TIME BETWEEN SIGNATURE OF GRANT AGREEMENT AND FIRST DISBURSEMENT (MONTHS)
1 India	1[e]	8.7	5.7	3.0	7.2	84	75	Jan-03	Apr-03	Jul-03	9	6
	2	29	7.1	22	6.8	23	55	Feb-04	Apr-04	Mar-04	13	2
	3[f]	15	2.7	–	2.2	82	100	Oct-04	Nov-04	Jan-05	12	3
	4	27	6.8	–	4.0	59	86	Feb-05	Apr-05	Mar-05	7	1
	6	24	9.1	–	–	–	–	–	–	–	>2	–
2 China	1	48	25	23	36	74	75	Jan-03	Apr-03	Apr-03	9	3
	4	56	28	–	22	79	74	Jun-05	Jul-05	Jul-05	11	1
	5	53	18	–	3.9	22	7.2	Sep-06	Nov-06	Oct-06	12	0.5
3 Indonesia	1	69	22	47	38	56	68	Jan-03	Aug-03	Mar-03	9	2
	5	69	18	–	–	–	–	Sep-06	–	–	12	–
4 Nigeria	5	68	26	–	8.4	33	0	Sep-06	Jan-07	Dec-06	12	2
5 Bangladesh	3	42	11	16	15	57	48	Jul-04	Aug-04	Jul-04	9	1
			5.5	10	4.5	29	46	Aug-04	Sep-04	Oct-04	10	1
	5	46	3.9	–	1.5	39	32	May-06	May-06	Jun-06	7	1
			5.8	–	1.5	25	32	May-06	May-06	Aug-06	7	3
6 Pakistan	2	4.0	2.2	1.8	1.7	43	60	Aug-03	Jan-04	Jan-04	7	5
	3	9.9	5.6	–	3.7	67	99	Oct-04	Jan-05	Nov-04	12	2
7 South Africa	1[f]	20	2.4	–	2.4	100	100	Aug-03	Dec-03	Dec-03	16	5
			18	–	18	100	100	Aug-03	Aug-03	Dec-03	16	5
	1[f]	62	27	–	22	84	100	Aug-03	Jan-04	Dec-03	16	5
	2[f]	25	8.4	–	1.8	21	49	Nov-05	Jan-06	Dec-05	34	1
8 Ethiopia	1	27	11	16	15	57	68	Mar-03	Aug-03	Aug-03	11	5
	6	44	12	–	–	–	–	–	–	–	>2	–
9 Philippines	2	11	3.4	8.0	9.3	81	68	Jun-03	Aug-03	Jul-03	5	1
	5	50	15	–	4.6	30	11	Aug-06	Oct-06	Sep-06	>2	–
10 Kenya	2	8.8	4.9	3.8	2.5	28	63	Jun-03	Nov-03	Oct-03	5	4
	5	20	7.9	–	3.5	44	16	Jul-06	Sep-06	Aug-06	9	2
	6	9.2	4.2	–	–	–	–	–	–	–	>2	–
11 DR Congo	2[e]	7.6	6.4	1.2	7.6	100	68	Jun-03	Aug-03	Jul-03	5	1
	5	36	15	–	4.7	32	3.1	Oct-06	Dec-06	Nov-06	13	1
	6	12	8.5	–	–	–	–	–	–	–	>2	–
12 Russian Federation	4	88	49	–	18	36	53	Oct-05	Dec-05	Dec-05	15	3
Tomsk	3	11	6.3	4.5	6.5	61	41	Oct-04	Dec-04	Dec-04	12	2
13 Viet Nam	1	10	2.5	7.5	2.5	25	51	Oct-03	Jun-04	Apr-04	9	7
	6	11	1.6	–	–	–	–	–	–	–	>2	–
14 UR Tanzania	3[f]	83	24	–	20	85	100	Sep-04	Nov-04	Nov-04	11	2
	6	37	18	–	–	–	–	–	–	–	>2	–
Zanzibar	3	1.7	1.0	–	1.0	100	100	Sep-04	Dec-04	Nov-04	20	3
15 Brazil	5	27	2.8	–	–	–	–	Dec-06	–	–	15	–
			8.8	–	–	–	–	Dec-06	–	–	15	–
16 Uganda	2	5.7	4.7	–	4.6	98	100	Mar-04	Mar-04	Mar-04	14	0.4
	6	26	11	–	–	–	–	–	–	–	>2	–
17 Thailand	1	11	7.0	4.5	6.9	60	65	May-03	Oct-03	Jul-03	13	2
	6	20	7.7	–	–	–	–	–	–	–	>2	–
18 Mozambique	2	15	9.2	–	7.2	78	99	Apr-04	Jan-05	Dec-04	15	9
19 Myanmar[g]	2	17	2.7	–	2.7	100	99	Aug-04	Jan-05	Sep-04	19	1
20 Zimbabwe	5	12	9.2	–	–	–	–	Dec-06	–	–	15	–
21 Cambodia	2	6.2	2.5	3.7	4.0	64	60	Oct-03	Jan-04	Dec-03	9	2
	5	9.7	3.3	–	0.8	24	7.2	Sep-06	Nov-06	Nov-06	12	1
22 Afghanistan	4[e]	3.4	2.3	–	1.3	56	66	Jun-05	Sep-05	Aug-05	12	2
High-burden countries		**1 298**	**519**	**171**	**324**	**62[h]**	**65[h]**				**11[h]**	**2[h]**

– Indicates not available.

[a] Budgets are for 5 years, unless otherwise stated.

[b] Phase 1 amounts for round 6 grants are provisional because the grants have not yet been signed.

[c] Shows the percentage of the grant period that has elapsed since the programme start date.

[d] Board approval dates: 22 April 2002 for round 1, 13 January 2003 for round 2, 15 October 2003 for round 3, 28 June 2004 for round 4, 30 September 2005 for round 5 and 3 Novemeber 2006 for round 6.

[e] Budget is for three years.

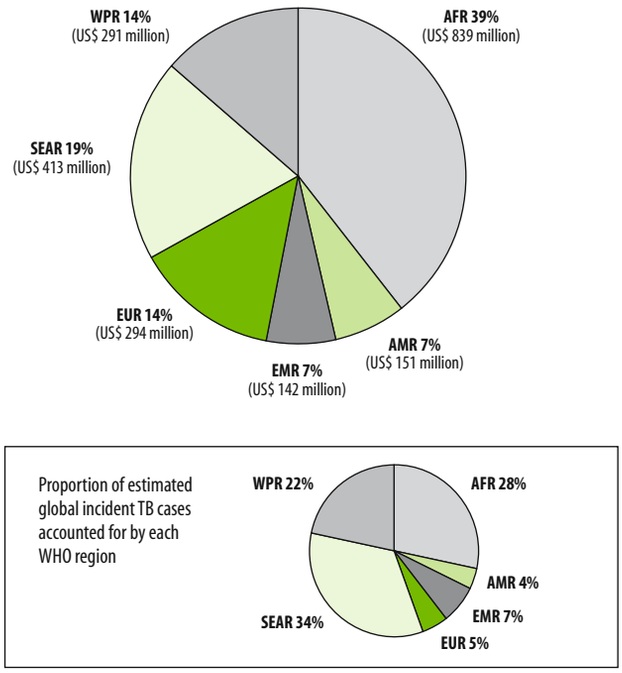
[f] TB/HIV grant.

[g] Grant has been terminated.

[h] Median values.

FIGURE 47

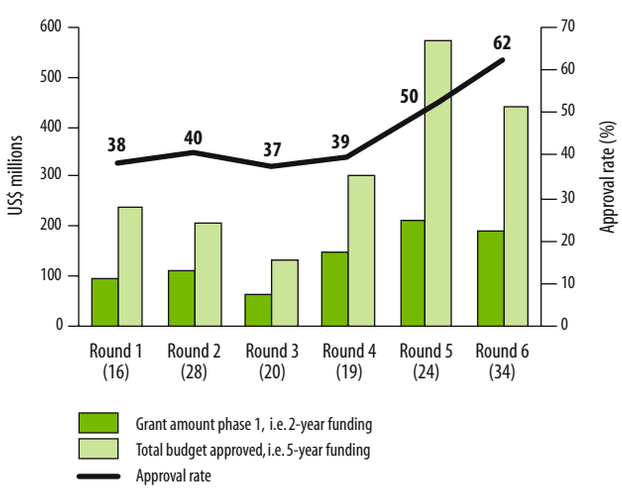
GFATM funding for TB control by WHO region, as of end 2006[a]



[a] Refers to the total budgets approved in rounds 1–6.

FIGURE 48

GFATM financing and proposal approval rate by round.
Numbers in the horizontal axis show the number of TB proposals approved in each round.



of funds in India (round 2 but not rounds 1, 3 and 4), Kenya (round 2 but not round 5), South Africa (rounds 1 and 2) and Viet Nam (round 1). The main delay in the initial flow of funds to countries is the time taken to sign the grant agreement after proposal approval; the median time is 11 months (range 2–34 months), which is in line with GFATM expectations that it takes about one year to prepare and finalize the Phase 1 grant agreement and related documentation. Once grant agreements are signed, disbursements are usually made within 2 months.

All countries

In six funding rounds between 2002 and 2006, the GFATM approved proposals worth a total of US$ 2.1 billion for control of TB and TB/HIV in 92 countries, including all 22 HBCs. The total for TB proposals was US$ 1.9 billion. The African Region has the single largest share, at 39% (Figure 47), which is higher than its share of the global burden of TB (28%). The South-East Asia and Western Pacific regions have the second and third highest funding in absolute terms, but less than might be expected given their share of the global burden of TB. The funding approved for the Eastern Mediterranean Region is in line with its share of the global burden of TB (7%), while the share of funding for the European Region and the Region of the Americas is higher than these regions' share of the global burden of TB.

The value of approved proposals for TB control was relatively high in rounds 5 and 6 compared with rounds 1–4, as was the proposal approval rate (Figure 48).[1] The approval rate for TB proposals submitted to the GFATM was 50% in round 5 and 62% in round 6, up from 37–40% in rounds 1–4.

[1] Calculated as the number of proposals approved divided by the number of proposals reviewed by the GFATM's Technical Review Panel.