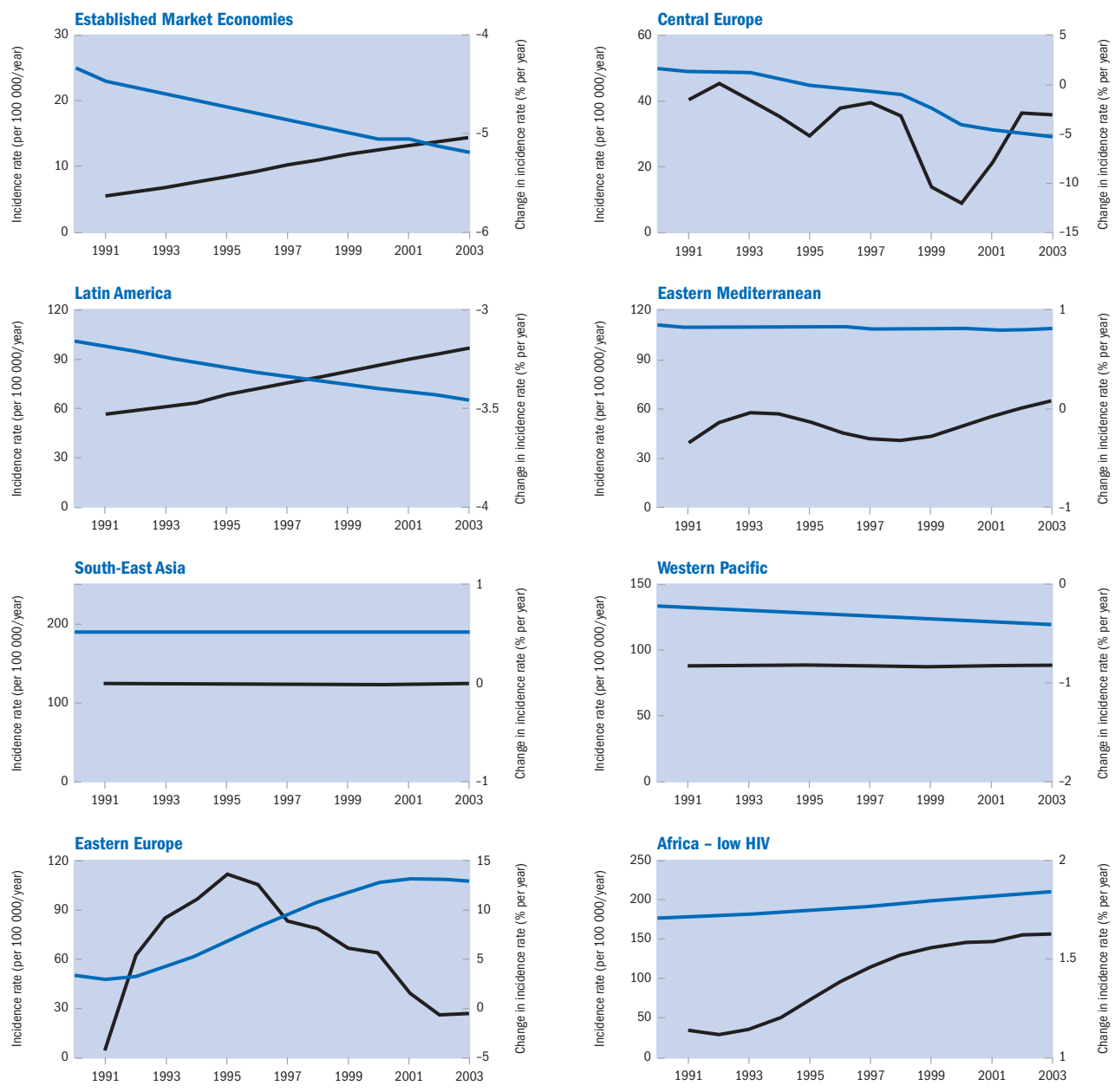


FIGURE 6

Trends in estimated TB incidence rates (all forms; blue lines), and the annual change in incidence rates (black lines), for nine groups of countries, 1990–2003



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. **Central Europe:** Albania, Bosnia & Herzegovina, Croatia, Cyprus, Hungary, Poland, Serbia & Montenegro, Slovakia, Slovenia, TFYR Macedonia, Turkey. **Latin America:** Anguilla, Antigua & Barbuda, Argentina, Bahamas, Barbados, Belize, Bermuda, Bolivia, Brazil, British Virgin Is., Cayman Is., Chile, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, 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. **Eastern Mediterranean:** Afghanistan, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Syrian Arab Rep., Tunisia, United Arab Emirates, West Bank & Gaza Strip, Yemen. **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. **Eastern Europe:** Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Rep. Moldova, Romania, Russian Federation, Tajikistan, Turkmenistan,

Ukraine, Uzbekistan. **Africa - low HIV:** Algeria, Angola, Benin, Burkina Faso, Cape Verde, Chad, Comoros, Djibouti, Equatorial Guinea, Eritrea, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, Togo. **Africa - high HIV:** Botswana, Burundi, Cameroon, Central African Rep., Congo, Côte d'Ivoire, DR Congo, Ethiopia, Gabon, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, UR Tanzania, Zambia, Zimbabwe.

the estimated rates of case detection, we have estimated the trends in TB incidence rate (all forms) for nine epidemiologically distinct regions of the world (Figure 6). In six of these regions, the trend in the incidence rate has been downward.

Incidence rates have been increasing for most of the period since 1990 in African countries with low and high rates of HIV infection, and in eastern Europe, although the patterns of change in the three regions are quite different. In African countries with high HIV infection, incidence has been pushed upwards by the spread of HIV, but the rate of increase has fallen from a maximum exceeding 15% per year in the early 1990s (Figure 6). In African countries with lower rates of HIV infection, the rate of increase in TB has never been as high (2–3% per year), but neither are there signs that the increase is slowing. In eastern Europe, the rate of increase reached nearly 15% annually by 1995, but the increase now appears to have been halted, and incidence is once again in decline.

The global trend is obtained by summing the estimated numbers of TB cases across all nine regions (Figure 7). Worldwide, the incidence rate of TB was growing at a maximum of around 1.5% per year in 1995, but less than 1% per year by 2003.

TB and HIV

Some countries have carried out surveys of the prevalence of HIV in TB patients, either nationally or locally, and the results have been reported via the data collection form or the supplementary TB/HIV questionnaire. Although the accuracy of the data is not known because, for example, the design of the surveys has not been fully described, a growing number of countries are testing TB patients for HIV infection.

The prevalence of HIV infection in TB patients can be derived from the incidence rate ratio (IRR). IRR is estimated from the relationship between HIV prevalence in adult TB patients and HIV prevalence in the adult population, where both have been measured together (Figure 8). The IRR derived from the national surveys in this set of data is 8.3 (95% CI, 6.1–

FIGURE 7

Trends in the estimated global TB incidence rate (blue line), and the annual change in incidence rate (black line), 1990–2003

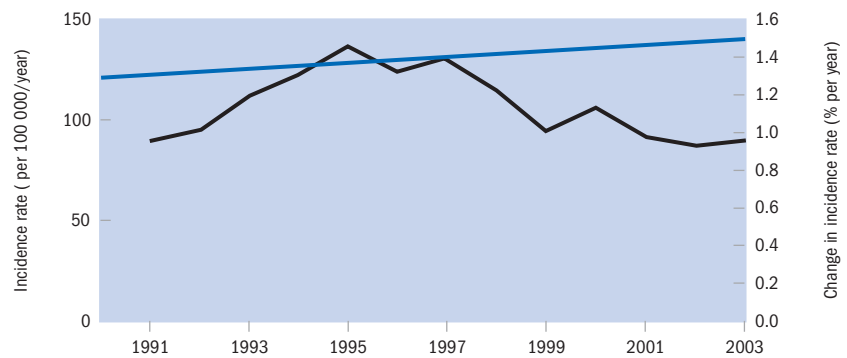


FIGURE 8

The prevalence of HIV in TB patients as measured in national surveys (blue dots) and subnational surveys (data reported to WHO; black dots), plotted against the prevalence of HIV in adults aged 15–49 years (data from UNAIDS). The incidence rate ratio is 8.3 (6.1–10.8; $P = 0.0036$) for the national survey data and 8.4 (7.9–10.0; $P = 0.0029$) for the subnational surveys. The countries are: BFA Burkina Faso; BOT Botswana; BUU Burundi; CAE Cameroon; CAF Central African Republic; CAM Cambodia; CNG Congo; COD DR Congo; DJI Djibouti; ETH Ethiopia; GHA Ghana; HAI Haiti; IVC Côte d'Ivoire; KEN Kenya; LES Lesotho; MAL Malawi; MOZ Mozambique; NIE Nigeria; RWA Rwanda; SOA South Africa; TAN UR Tanzania; ZIM Zimbabwe.

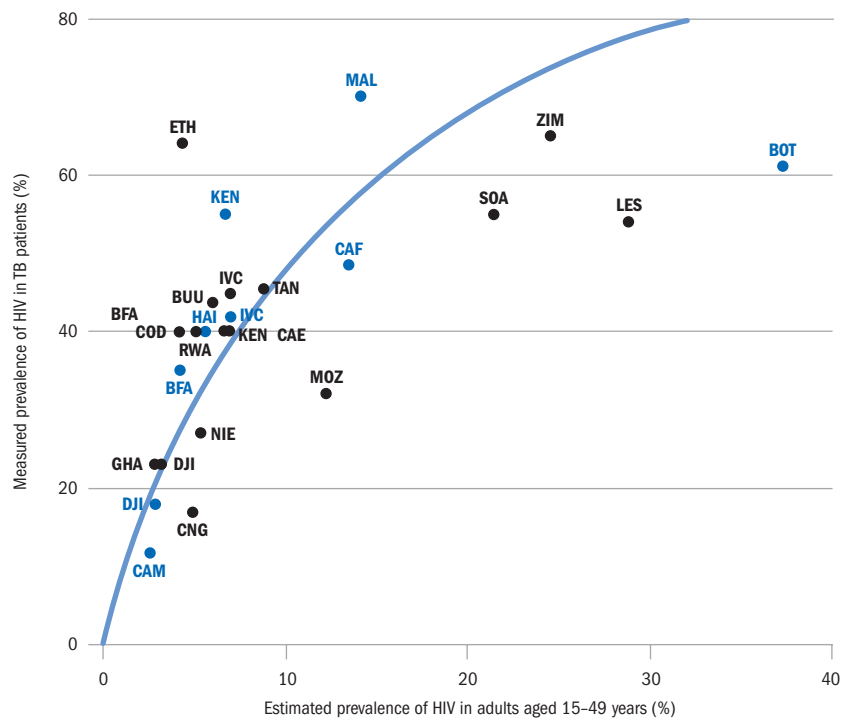


FIGURE 9
Estimated HIV prevalence in TB cases, 2003

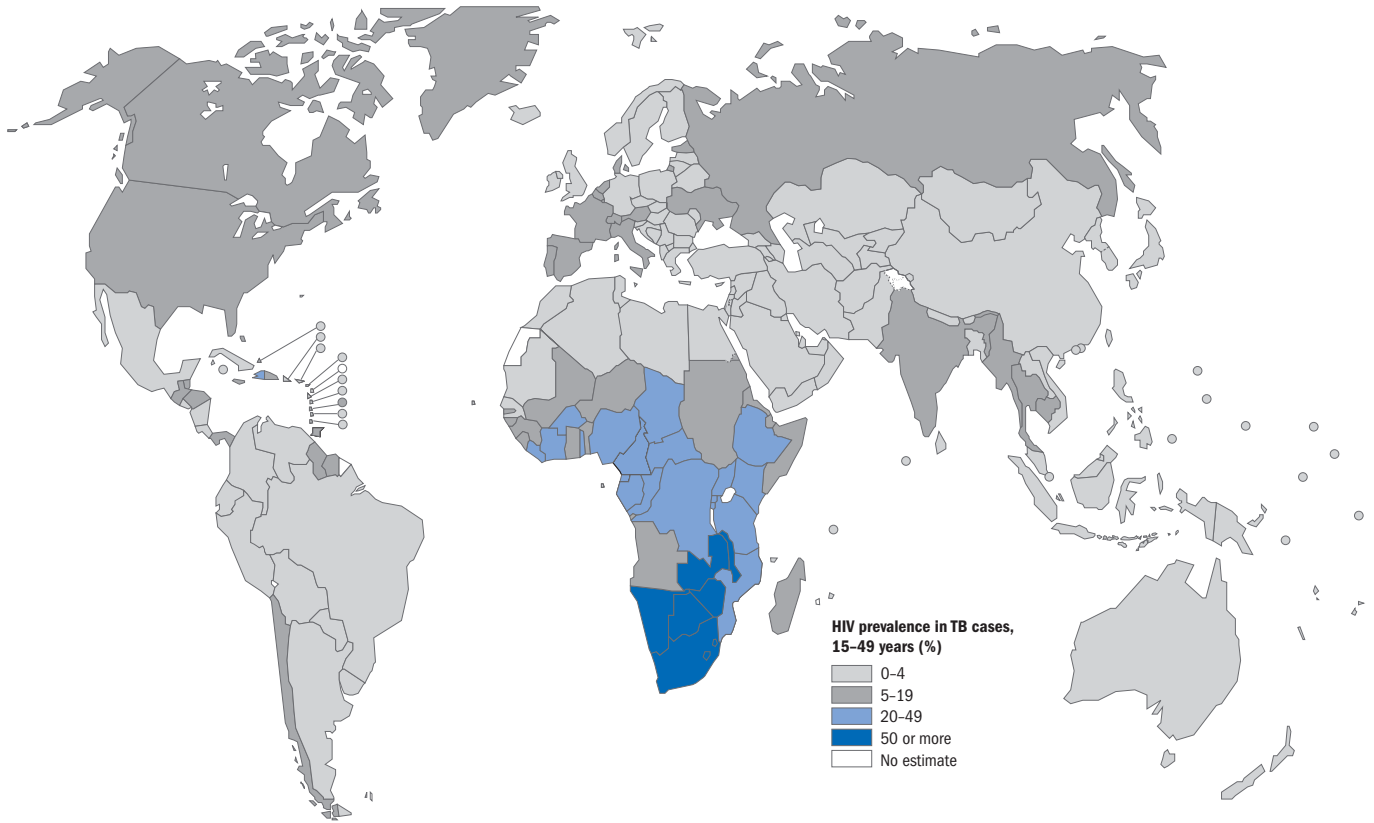


FIGURE 10
Number of countries implementing DOTS (out of a total of 211 countries), 1991-2003

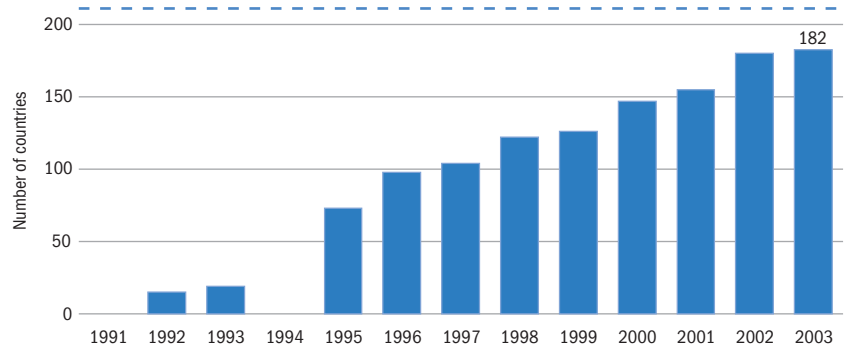
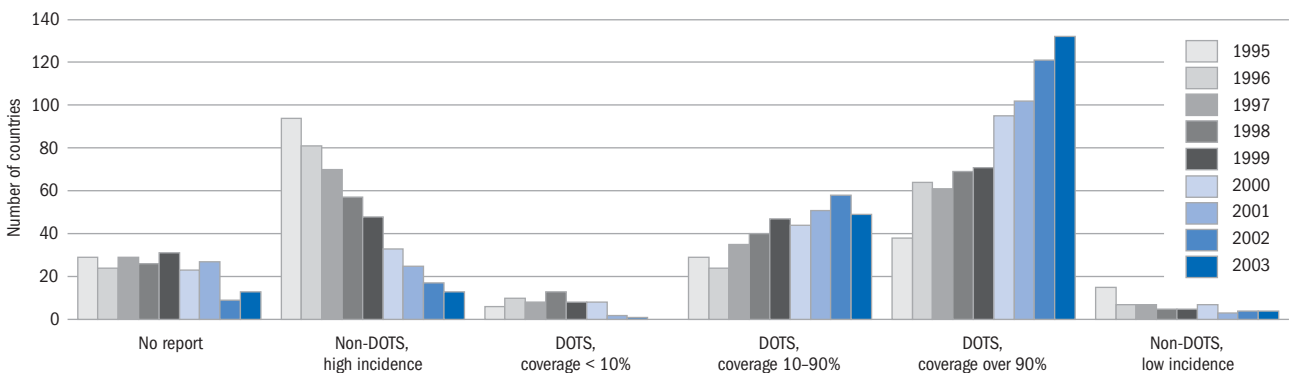


FIGURE 11
DOTS coverage, 1995-2003



10.8), which is higher than, but not significantly different from, the previously published estimate of 6.0 (3.1–8.0).²⁴

Further HIV surveys among TB patients will give, once the data have been validated, better direct measures of the TB/HIV association for the countries surveyed and, through the IRR, better indirect estimates for countries that do not yet test TB patients for HIV infection, thereby improving the distribution map in Figure 9.

DOTS coverage

The total number of countries implementing DOTS increased by two during 2003, bringing the total to 182 out of 211 (Figure 10). All 22 HBCs have had DOTS programmes since 2000; many of these programmes have been established for much longer.

DOTS coverage within countries has steadily increased since 1995 (Figure 11; Table 5). By the end of 2003, 77% of the world's population lived in counties, districts, oblasts and provinces of countries that had adopted DOTS. Coverage was reported to be more than 70% in all regions except Europe (Figure 12).

Case detection

The 4.4 million cases of TB (new and relapse) notified in 2003 represent half (50%) of the 8.8 million estimated new cases; the 1.9 million new smear-positive cases notified also account for half (50%) of the 3.9 million estimated (Table 3, Table 4). In parallel with trends in case notifications, the detection rate of all TB cases, from DOTS and non-DOTS programmes, has remained stable since 1995, while the detection rate of smear-positive cases has slowly increased (Figure 13). Therefore, the proportion of all cases diagnosed as smear-positive has been rising.

DOTS programmes detected an estimated 43% of all new and relapse cases, and 45% of new smear-positive cases, in 2003. The detection rate achieved by DOTS programmes has

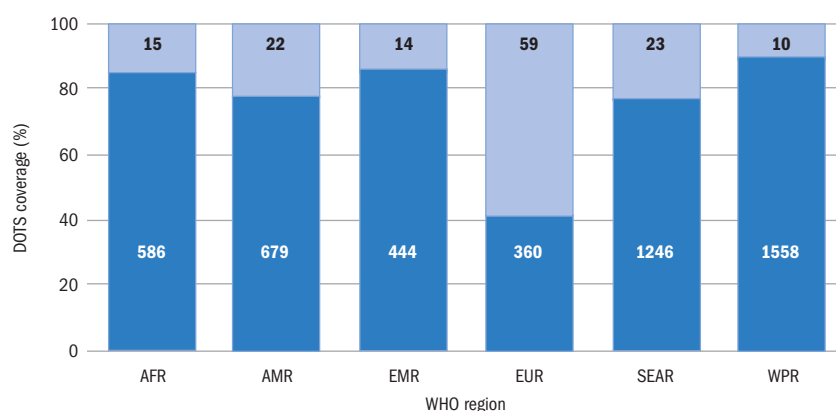
TABLE 5
Progress in DOTS implementation, 1995–2003

	PERCENTAGE OF POPULATION COVERED BY DOTS									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	
1 India	1.5	2	2.3	9	13.5	30	45	51.6	67.2	
2 China	49	60.4	64.2	63.9	64	68	68	77.6	91	
3 Indonesia	6	13.7	28.3	80	90	98	98	98	98	
4 Nigeria	47	30	40	45	45	47	55	55	60	
5 Bangladesh	40.5	65	80	90	90	92	95	95	99	
6 Pakistan	2	8	–	8	8	9	24	45	63	
7 Ethiopia	39	39	48	64.4	63	85	70	95	95	
8 South Africa	–	0	13	22	66	77	77	98	99.5	
9 Philippines	4.3	2	15	16.9	43	89.6	95	98	100	
10 Kenya	15	100	100	100	100	100	100	100	100	
11 DR Congo	47	51.4	60	60	62	70	70	70	75	
12 Russian Federation	–	2.3	2.3	5	5	12	16	25	25	
13 Viet Nam	50	95	93	96	98.5	99.8	99.8	99.9	100	
14 UR Tanzania	98	100	100	100	100	100	100	100	100	
15 Brazil	–	0	0	3	7	7	32	25	33.6	
16 Uganda	–	0	100	100	100	100	100	100	100	
17 Thailand	–	1.1	4	32	59	70	82	100	100	
18 Mozambique	97	100	84	95	–	100	100	100	100	
19 Zimbabwe	–	0	0	100	11.6	100	100	100	100	
20 Myanmar	–	59	60	60.3	64	77	84	88.3	95	
21 Afghanistan	–	–	12	11	13.5	15	12	38	53	
22 Cambodia	60	80	88	100	100	99	100	100	100	
High-burden countries	24	32	36	43	46	55	61	68	79	
AFR	43	47	56	62	56	70	70	81	85	
AMR	12	48	50	55	65	68	73	73	78	
EMR	23	11	18	33	51	66	72	77	86	
EUR	5.4	8.2	17	22	23	26	32	40	41	
SEAR	6.7	12	16	30	36	50	61	66	77	
WPR	43	55	57	58	57	67	68	77	90	
Global	22	32	37	44	47	57	62	69	77	

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

FIGURE 12

DOTS population coverage by WHO region, 2003. The shaded portion of each bar shows the DOTS coverage as a percentage of the population. The numbers in each bar show the population (in millions) within (dark portion) or outside (light portion) DOTS areas.



²⁴ Corbett EL et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Archives of Internal Medicine*, 2003, 163:1009–1021.

FIGURE 13

Progress towards the 70% case detection target. (a) Open circles mark the number of smear-positive cases notified under DOTS 1995–2003, 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 with the increment from 2002 to 2003 of 324 000 cases; the steeper line represents a higher annual increment of approximately 488 000 cases per year needed to reach the 70% target by 2005. 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 forms of TB.

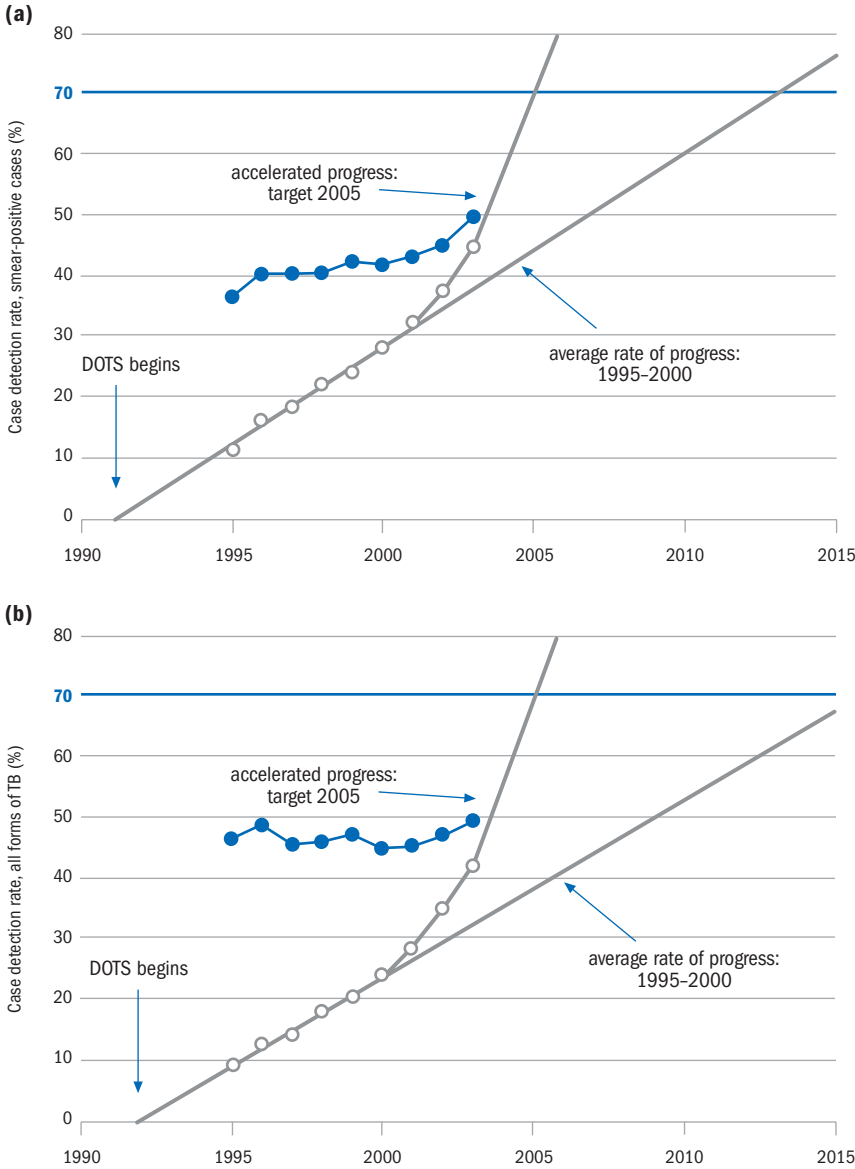
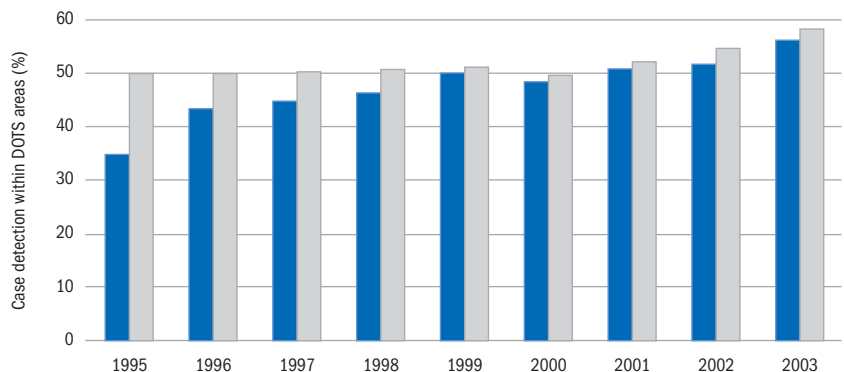


FIGURE 14

Smear-positive case detection rate within DOTS areas for high-burden countries (blue) and the world (grey), 1995–2003. DOTS case detection rate divided by DOTS coverage, expressed as percentage.



been rising more quickly than the overall case detection rate, and has accelerated since 2000. The 7.5% increase in DOTS case detection between 2002 and 2003, an additional 324 000 smear-positive cases, is the largest annual increase so far reported. If this rate of increase is maintained, the estimated detection rate will be 60% in 2005. To reach the 70% target by 2005, DOTS programmes must find and treat an extra 488 000 cases in each of the two remaining years.

Because case detection under DOTS has increased faster than the overall rate of case detection, the proportion of notified smear-positive cases that were notified by DOTS programmes has also increased, reaching 90% in 2003. DOTS programmes have continued to recruit largely from the pool of patients that would have been detected anyway in the public sector.

Although more cases are recruited to DOTS programmes each year, the case detection rate within DOTS areas (measured by the ratio of case detection to population coverage) has changed little, averaging 52% worldwide between 1996 and 2003 (Figure 14). There are signs of a slow rise in the HBCs, from 35% in 1995 to 56% in 2003, due mostly to improvements in Bangladesh, India, Indonesia, Myanmar and the Philippines.

Smear-positive case detection rates by DOTS programmes in 2003 were lowest in the European Region (23%) and highest in the African Region, Region of the Americas and Western Pacific Region (all 50%; see Figure 15, Table 6). The rate of improvement in case detection by DOTS pro-