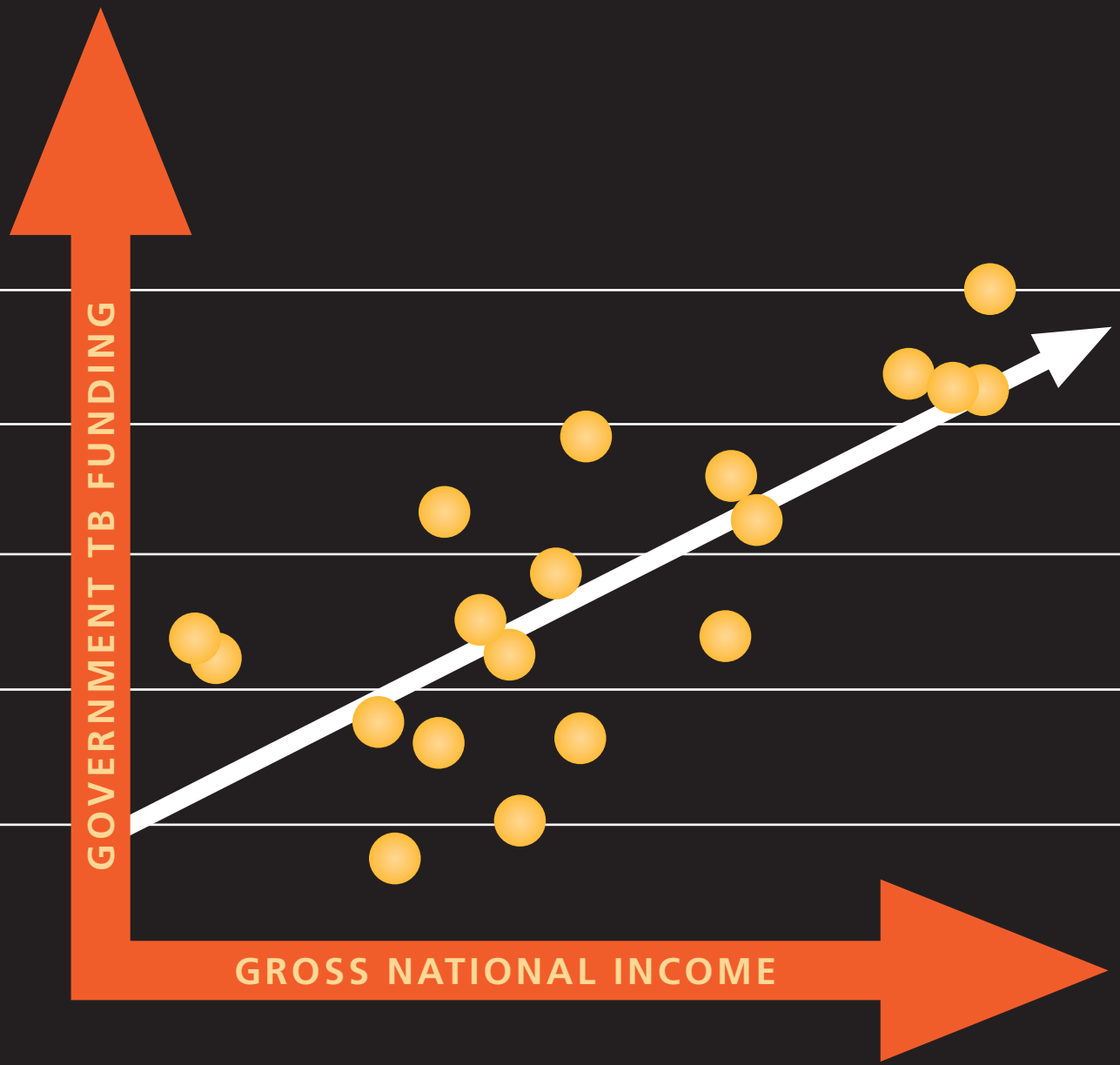


WHO REPORT 2006

# Global Tuberculosis Control Surveillance, Planning, Financing



**WHO REPORT 2006**

# Global Tuberculosis Control

## **Surveillance, Planning, Financing**



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For reasons of space, the names of Member States are sometimes shortened in certain figures.

**Cover:** Gross national income per capita of 19 high-burden countries compared with the proportion of funds for TB control that is provided by their governments (rather than by donor agencies). Countries with a higher average income per capita tend to contribute more to the cost of TB control. The financial contributions made by governments will be crucial to the success of *The Global Plan to Stop TB, 2006–2015*. The data are presented in detail in Figure 33 of the main text.

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The following WHO staff assisted in compiling, analysing and editing information:

**WHO HQ Geneva:** Mohamed Aziz, Karin Bergström, Léopold Blanc, Karen Ciceri, Valérie Diaz, Giuliano Gargioni, Haileyesus Getahun, Andrea Godfrey, Malgorzata Grzemska, Ernesto Jaramillo, Jun-Wook Kwon, Knut Lönnroth, Rafael Lopez-Olarte, Dermot Maher, Pierre-Yves Norval, Paul Nunn, Salah-Eddine Ottmani, Thaddeus Pennas, Rose Pray, Mario Raviglione, Krystyna Ryszewska, Fabio Scano, Igor Toskin, Mukund Uplekar, Lana Velebit, Diana Weil, Matteo Zignol.

**WHO African Region:** Ayodele Awe (Nigeria), Oumou Bah-Sow (AFRO), Joseph Imoko (Uganda), Joel Kangangi (Kenya), Bah Keita (AFRO, West Africa), Daniel Kibuga (AFRO), Motseng Makhetha (South Africa), Robert Makombe (AFRO), Giampaolo Mezzabotta (Uganda), Vainess Mfungwe (AFRO), Wilfred Nkhoma (AFRO), Angélica Salomão (Mozambique), Henriette Wembanyama (DR Congo).

**WHO Region of the Americas:** Ademir Albuquerque (Brazil), Raimond Armengol (El Salvador), Marlene Francis (CAREC), Mirtha del Granado (AMRO), Juan Carlos Millan (Peru), Pilar Ramon-Pardo (AMRO), Rodolfo Rodriguez-Cruz (Brazil), Matías Villatoro (Brazil).

**WHO Eastern Mediterranean Region:** Aaiyad Al Dulaymi Munim (Somalia), Samiha Baghdadi (EMRO), Yuriko Egami (Pakistan), Laura Gillini (Pakistan), Sevil Husseinova (Afghanistan), Akihiro Seita (EMRO), Ireneus Sindani (Sudan).

**WHO European Region:** Pierpaolo de Colombani (EURO), Irina Danilova (Russian Federation), Lucica Ditiu (Balkans), Wieslaw Jakubowiak (Russian Federation), Konstantin Malakhov (Russian Federation), Kestutis Miskinis (Ukraine), Andrey Mosneaga (Caucasus), Jerod Scholten (EURO), Gombogaram Tsogt (Central Asia), Elena Yurasova (EURO/Russian Federation), Richard Zaleskis (EURO).

**WHO South-East Asia Region:** Marijke Becx-Bleumink (Bangladesh), Erwin Cooreman (SEARO), Christian Gunneberg (Nepal), Hans Kluge (Myanmar), Franky Loprang (Indonesia), Davide Manissero (Indonesia), Firdosi Mehta (Indonesia), Nani Nair (SEARO), Myo Paing (SEARO/Myanmar), Suvanand Sahu (India), Chawalit Tantinimitkul (Thailand), Fraser Wares (India).

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Copies of *Global tuberculosis control* are available from the World Health Organization, 20 Avenue Appia, CH-1211 Geneva 27, Switzerland, and at [www.who.int/tb](http://www.who.int/tb).

# Abbreviations

ACSM	Advocacy, communication and social mobilization	IPT	Isoniazid preventive therapy
AFB	Acid-fast bacilli	ISAC	Intensified support and action in countries, an emergency initiative to reach targets for DOTS implementation by 2005
AFR	WHO African Region	IUATLD	International Union Against Tuberculosis and Lung Disease
AFRO	WHO Regional Office for Africa	JICA	Japan International Cooperation Agency
AIDS	Acquired immunodeficiency syndrome	LACEN	Brazilian public health laboratories
AMR	WHO Region of the Americas	LGU	Local government unit
AMRO	WHO Regional Office for the Americas	LGA	Local government area
ART	Antiretroviral therapy	MDG	Millennium Development Goal
BPHS	Basic package of health-care services	MDR	Multidrug resistance
BRAC	Bangladesh Rural Advancement Committee	MDR-TB	Multidrug-resistant tuberculosis
CAREC	Caribbean Epidemiology Centre	MoH	Ministry of Health
CDP	Community DOT providers	MoPH	Ministry of Public Health
CPT	Co-trimoxazole preventive therapy	MSH	Management Sciences for Health
DCT	Diagnostic counselling and testing for HIV	NAP	National AIDS control programme or equivalent
DFB	Damien Foundation Belgium	NGO	Nongovernmental organization
DFID	UK Department for International Development	NHLS	National Health Laboratory Services
DoH	Department of Health	NPO	National professional officer (WHO-appointed)
DOT	Directly observed treatment	NRL	National reference laboratory
DOTS	The internationally recommended strategy for TB control	NTP	National tuberculosis control programme or equivalent
DRS	Drug resistance surveillance or survey	PAHO	Pan-American Health Organization
DST	Drug susceptibility testing	PAL	Practical Approach to Lung Health
EMR	WHO Eastern Mediterranean Region	PhilTIPS	Philippine Tuberculosis Initiatives for the Private Sector
EMRO	WHO Regional Office for the Eastern Mediterranean	PPM	Public-private or public-public mix
EQA	External quality assurance	SEAR	WHO South-East Asia Region
EUR	WHO European Region	SEARO	WHO Regional Office for South-East Asia
EURO	WHO Regional Office for Europe	SILT	Brazilian laboratory information system
FDC	Fixed-dose combination (or FDC anti-TB drug)	SINAN	Brazilian health information system
FIDELIS	Fund for Innovative DOTS Expansion, managed by IUATLD	TB	Tuberculosis
GDF	Global TB Drug Facility	TBCTA	Tuberculosis Coalition for Technical Assistance
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria	UNAIDS	Joint United Nations Programme on HIV/AIDS
GLC	Green Light Committee	UNDP	United Nations Development Programme
GLRA	German Leprosy and TB Relief Association	USAID	United States Agency for International Development
GNI	Gross national income	VCT	Voluntary counselling and testing for HIV infection
HBC	High-burden country of which there are 22 that account for approximately 80% of all new TB cases arising each year	VHV	Village health volunteers
HEW	Health extension workers	WHO	World Health Organization
HIV	Human immunodeficiency virus	WPR	WHO Western Pacific Region
HNPSP	Health Nutrition and Population Sector Programme	WPRO	WHO Regional Office for the Western Pacific
HR	Human resource(s)		
IEC	Information, education, communication		

# Key points

## TB EPIDEMIC

- There were 9 million new TB cases and approximately 2 million TB deaths in 2004.
- The number of TB cases was stable or falling in 5 of 6 WHO regions, but growing in Africa where the TB epidemic is still driven by the spread of HIV.
- More than 80% of all TB patients live in sub-Saharan Africa and Asia.

## DOTS AND THE NEW STOP TB STRATEGY

- DOTS, which remains at the heart of the new Stop TB Strategy, was being applied in 183 countries in 2004; population coverage was complete in 9 of 22 high-burden countries (HBCs), and almost complete in 5 others.
- Expanding areas of work within the new strategy include: community and NGO participation in TB care; advocacy, communication and social mobilization; and improved management of multidrug-resistant TB and TB/HIV.
- Six Asian countries and Kenya have already improved links between national TB control programmes (NTPs), hospitals and other health-care providers, but PPM-DOTS is still at an early stage in most other HBCs.
- Areas of particular weakness are laboratory services, human resource development and the monitoring of TB/HIV control.

## FINANCES

- The total cost of TB control in 2006, including NTP budgets and costs to the general health-care system, has grown to US\$ 1.6 billion in the 22 HBCs. This increases to US\$ 2.0 billion for all 74 countries that provided financial data.
- Funding to support TB control in the 22 HBCs has increased by almost US\$ 500 million since 2002, reaching US\$ 1.4 billion in 2006.
- Governments of the wealthier HBCs (notably Brazil, China, the Russian Federation and South Africa) provide most of the funding needed for TB control in their countries; other countries rely more on grants from donors, including the Global Fund to Fight AIDS, Tuberculosis and Malaria.
- The funding gap reported by the 22 HBCs for 2006 was US\$ 141 million; it was US\$ 180 million in total for the 74 countries that reported data.
- NTP budgets for 2006 are broadly in line with the Global Plan to Stop TB, 2006–2015, except for TB/HIV control where NTP budgets are much lower.

## TARGETS

- Case detection was 53% globally in 2004, and is likely to exceed 60% in 2005, falling short of the 70% target.
- Treatment success was 82% in the 2003 cohort of 1.7 million patients, approaching the 85% target.
- Three WHO regions are expected to have met both of the 2005 targets: the Region of the Americas and the South-East Asia and Western Pacific regions.
- At least 7 HBCs should have met the 2005 targets: Cambodia, China, India, Indonesia, Myanmar, the Philippines and Viet Nam.
- Implementation of the Global Plan is expected to reverse the rise in incidence globally by 2015, as specified by the Millennium Development Goals, and to halve 1990 prevalence and death rates globally and in most regions by 2015, though not in Africa and eastern Europe.

# Summary

## Background and methods

- 1.** The 10th WHO annual report on surveillance, planning and financing for global tuberculosis (TB) control includes data on case notifications, treatment outcomes, activities, budgets, costs and expenditures. Results are given for all national TB control programmes (NTPs) that have reported to WHO, although the emphasis is on progress in 22 high-burden countries (HBCs).
- 2.** Eleven consecutive years of data (1994–2004) are now available to assess progress towards the Millennium Development Goals (MDGs) for TB control, and towards targets set by the World Health Assembly (WHA) and the Stop TB Partnership. WHA targets are to detect, by 2005, 70% of new sputum smear-positive cases and to successfully treat 85% of these cases. MDG target 8 (of 18) is to have halted and begun to reverse the TB incidence rate by 2015. The Stop TB Partnership has endorsed additional targets of halving 1990 prevalence and deaths rates by 2015.

## Improving case detection and treatment

- 3.** A total of 200 (of 211) countries and territories reported to WHO on their strategies for TB control, and on TB case notifications and/or treatment outcomes.
- 4.** Using surveillance and survey data to update estimates of incidence, we calculate that there were 8.9 million new cases of TB in 2004 (140/100 000 population), of which 3.9 million (62/100 000) were smear-positive and 741 000 were in adults infected with the human immunodeficiency virus (HIV). There were 14.6 million prevalent cases (229/100 000), of which 6.1 million were smear-positive (95/100 000). More than 80% of all new TB patients in 2004 were in the African, South-East Asia and Western Pacific regions. An estimated 1.7 million people (27/100 000) died from TB in 2004, including those coinfecting with HIV (248 000).
- 5.** A total of 183 countries and territories were implementing the DOTS strategy during 2004. By the end of 2004, 83% of the world's population lived in countries, or parts of countries, covered by DOTS. DOTS programmes notified 4.4 million new and relapse TB cases in 2004, of which 2.1 million were new smear-positive. In total, 21.5 million TB patients, and 10.7 million smear-positive patients, were treated in DOTS programmes over the 10 years 1995–2004.
- 6.** At the end of 2004, DOTS expansion was complete in nine HBCs and nearing completion in five others. Pakistan reported full DOTS coverage by the end of 2005, and coverage has increased considerably in Afghanistan, Brazil, India and the Russian Federation.
- 7.** The 2.1 million smear-positive cases notified by DOTS programmes in 2004 represent 53% of the estimated incidence. The increment in smear-positive cases notified under DOTS between 2003 and 2004 (350 000) was greater than ever before (the average annual increment from 1995–2000 was 134 000). If the observed acceleration in case-finding is maintained, DOTS programmes will detect more than 60% of cases in 2005, but they will fall short of the 70% target.
- 8.** The acceleration in case-finding since 2000 has been observed in the case reports from all sources, as well as from DOTS programmes. We infer that case detection has continued to improve because patients are being reported from new sources, including public and private clinics and hospitals, especially in the South-East Asia and Western Pacific regions.
- 9.** Of the additional smear-positive cases reported under DOTS in 2004, three-quarters (75%) were in China, India and Indonesia. These three countries have been driving the global acceleration in case detection, backed by Bangladesh, Brazil and Myanmar. Among patients who suffered a first episode of TB in 2004 but were not detected by DOTS programmes, 61% lived in eight countries: Bangladesh, China, Ethiopia, India, Indonesia, Nigeria, Pakistan and the Russian Federation.
- 10.** The smear-positive case detection rate within established DOTS areas remained stable at an average of 51% up to 2001, but increased to 64% in 2004. These recent improvements in case-finding within DOTS areas have taken place predominantly in Bangladesh, Brazil, China, India, Indonesia, Myanmar and the Philippines.
- 11.** While WHO measures case detection principally with reference to smear-positive disease, statistics for detection based on other diagnostic methods give a different view of programme performance. A comparison of 25 European countries in 2004 showed that the proportion of estimated smear-positive cases detected was always higher than the proportion of estimated culture-positive cases detected, but lower than the proportion of all estimated TB cases detected. In the Region of the Americas, by contrast, smear-positive detection rates were typically higher than the detection rates of all TB cases. These differences need further investigation because they are likely to be important in evaluating TB epidemiology and control now, and when assessing the role of new and more sensitive diagnostic tools.
- 12.** Treatment success in the 2003 DOTS cohort of 1.7 million patients was 82% on average, edging closer to the 85% target. As in previous DOTS cohorts, treatment suc-

cess was substantially below average in the African Region (72%) and the European Region (75%). The relatively poor outcomes in these two regions can be attributed, in part, to the complications of HIV coinfection and drug resistance, respectively. Equally important, though, is the failure of DOTS programmes in these two regions to monitor the outcome of treatment for all patients. To reach the target of 85% treatment success globally, a special effort must be made to improve cure rates in the African and European regions.

**13.** Based on case reports and WHO estimates, 26 countries had reached the targets for case detection and treatment success by the end of 2004. The Philippines and Viet Nam were the only HBCs among them. Cambodia, China, India, Indonesia and Myanmar may also have reached the targets by the end of 2005 (i.e. a total of 7 out of 22 HBCs), but this will not be known until the end of 2006.

### Epidemiological trends and the impact of TB control

**14.** In 2004, per capita TB incidence was stable or falling in five out of six WHO regions, but growing at 0.6% per year globally. The exception is the African Region, where TB incidence was still rising, following the spread of HIV. However, the annual increase in case notifications from the African Region is declining each year, probably because the HIV epidemics in African countries are also slowing. In eastern Europe (mostly countries of the former Soviet Union), incidence per capita increased during the 1990s, but peaked around 2001, and has since fallen.

**15.** There are few good data with which to establish TB prevalence and death rates for the MDG baseline year of 1990 and for 2004. Our best estimates are that prevalence fell from 297 per 100 000 population globally in 1990 to 229 per 100 000 in 2004 (including HIV-positive TB patients), partly as a consequence of DOTS expansion. TB mortality declined from 29 per 100 000 in 1990 to 27 per 100 000 in 2004. But for the strongly adverse trends in Africa, prevalence and death rates would be falling more quickly worldwide.

**16.** The epidemiological forecast for 2005 and beyond is set out in the Global Plan to Stop TB, 2006–2015, which will cost US\$ 56 billion to implement. The improvements in case detection proposed in the Global Plan, when implemented alongside other elements of the Stop TB Strategy, should reverse the rise in TB incidence by 2015, and halve prevalence and death rates globally and in all regions except Africa and eastern Europe.

### DOTS implementation and planning

**17.** Although laboratory networks have expanded through national and international efforts, TB laboratory services need to be improved in many countries. The areas requiring

special attention include national reference laboratories, external quality assurance for all laboratories, and the development of capacity and infrastructure for culture and for drug susceptibility testing.

**18.** A total of 15 HBCs have plans for the development of human resources, but most of these plans are limited to training; 18 HBCs listed investments in staff among the five most beneficial ways to improve DOTS and to strengthen health systems. NTPs supported health system development during 2005 mostly by bringing TB control programmes into line with the process of health service decentralization.

**19.** The decentralization of diagnostic and treatment services is intended to improve access for all patients, but especially for those who are poor. NTPs are beginning to involve communities and NGOs so as to improve awareness of, and access to, these services.

**20.** Community participation in TB control is part of NTP strategy in 14 HBCs. The number of HBCs with national strategies for advocacy, communication and social mobilization (ACSM) has increased from 2 in 2002 to 11 in 2005, and is expected to reach 19 by 2007.

**21.** HBCs are in various stages of developing collaborations within and among public and private health sectors (through PPM-DOTS). While Bangladesh, China, India, Indonesia, Kenya, Myanmar and the Philippines have already improved links between NTPs, hospitals and other health-care providers, PPM-DOTS is still at an early stage in most other HBCs.

**22.** The treatment of drug-resistant TB is still inadequate in many countries. In some, laboratory diagnosis is of poor quality; others lack national policies on MDR-TB management; first- and second-line anti-TB drugs of uncertain quality are widely available; and large numbers of MDR-TB patients are subject, outside NTPs, to inappropriate diagnostic and treatment procedures. Part of the remedy will be to implement widely new WHO guidelines on the programmatic management of drug-resistant TB.

**23.** Many of the countries that are most affected by HIV/AIDS have national plans and policies for collaborative TB/HIV activities, and for providing ART. But most have still to make ART available to more than a small proportion of eligible people. In those countries that have rapidly increased access to ART, and where the prevalence of HIV infection is high, the challenge will be to maintain access to and fund ART without draining resources from other programmes.

### Financing DOTS expansion

**24.** Financial reports were received from 140 out of 211 (66%) countries. These countries account for 91% of the estimated global burden of TB. Complete budget data for 2005 and 2006 were reported by 87 and 71 countries respectively, while 73 countries provided complete expendi-

ture data for 2004. All of the 22 HBCs except South Africa provided complete budget data, and 17 provided complete expenditure data. The quantity and quality of financial data have continued to improve since WHO began collecting financial data in 2002.

**25.** NTP budgets reported by the 22 HBCs amount to a combined total of US\$ 990 million in 2006, double the US\$ 446 million total for 2002. The Russian Federation, China, India and Indonesia have by far the largest budgets (amounting to 72% of the total for the 21 HBCs that reported data).

**26.** Funding for NTP budgets in the 22 HBCs has increased by almost US\$ 500 million in the past five years, reaching a total of US\$ 830 million in 2006. This is mainly a result of increased funding from the governments of China and the Russian Federation, and the Global Fund to Fight AIDS, Tuberculosis and Malaria. In Afghanistan, Uganda, the United Republic of Tanzania and Viet Nam, funding in 2006 was similar to or less than funding in 2002.

**27.** Among the 21 HBCs that reported data, national governments will provide US\$ 600 million (61%) of the funding required by NTPs in 2006, US\$ 230 million (23%) will be funded by donor agencies and for US\$ 19 million (2%) the source of funding is currently unknown. This leaves a reported funding gap of US\$ 141 million (14%). These figures conceal important variation, with many countries relying extensively on donor financing.

**28.** The total cost of TB control, which includes the general health-system staff and infrastructure used for TB control in addition to NTP budget requirements, is projected to be US\$ 1.6 billion in the 22 HBCs in 2006, compared with US\$ 876 million in 2002. The Russian Federation and South Africa have by far the largest costs, with a combined total of US\$ 810 million. Assuming that health systems have the capacity to manage a growing number of TB patients in 2006, the funding gap for total TB control costs in 2006 is the same as for NTP budgets, i.e. US\$ 141 million. Total costs increase to US\$ 2.0 billion, and the funding gap increases to US\$ 180 million when all 74 countries that reported data are included. These 74 countries represent 89% of TB cases globally.

**29.** All but one of the 22 HBCs that increased spending between 2003 and 2004 also increased the number of new smear-positive cases that were detected and treated in DOTS programmes. Cambodia increased spending, but did not increase the total number of smear-positive patients treated under DOTS.

**30.** Among the 22 HBCs, 5 (India, Indonesia, Myanmar, the Philippines and Viet Nam) were in the best financial position to reach the WHA targets in 2005; 2 (Cambodia and China) were well placed to do so, if able to make up funding shortfalls.

**31.** Estimates of the investment that is required to achieve the MDG and Stop TB Partnership targets for TB control are set out in the Global Plan. These estimates have been made for each year 2006–2015 for 7 regions that collectively include 172 countries. The investment needs detailed in the Global Plan for 2006 are similar to those reported by countries, with two important exceptions. The first is that in the African Region, the Global Plan includes much greater investment in collaborative TB/HIV activities and ACSM. The second is that the Global Plan includes a budget of US\$ 243 million globally for technical cooperation in 2006, which is usually not part of NTP budgets and for which the gap is estimated to be US\$ 183 million. If planned investment in collaborative TB/HIV activities and ACSM in the African Region was increased in line with the Global Plan, and needs for technical cooperation included, the funding gap would be much higher than the reported total of US\$ 180 million.

**32.** There are four priorities for further work on the financing of TB control: (a) to ensure that country budgets and plans from 2006 onwards are based on the Stop TB Strategy and that they are in line with the Global Plan; (b) to conduct financial assessments of how the additional resources required to implement these plans can be mobilized; (c) to conduct more accurate assessments of the investment in health systems that is required to support expansion in TB and other disease control efforts; (d) to improve financial data for South Africa and the European Region.

# Points clés

## L'ÉPIDÉMIE DE TUBERCULOSE

- En 2004, il y a eu 9 millions de nouveaux cas de tuberculose et près de 2 millions de décès dus à la tuberculose.
- Le nombre de cas de tuberculose est resté stable ou a diminué dans cinq des six régions de l'OMS. Cependant ce nombre a progressé en Afrique où l'épidémie de tuberculose est aggravée par la propagation du VIH.
- Plus de 80% de l'ensemble des patients souffrant de tuberculose vivent en Afrique subsaharienne ou en Asie.

## LA STRATÉGIE DOTS ET LA NOUVELLE STRATÉGIE HALTE À LA TUBERCULOSE

- La stratégie DOTS, qui reste au cœur de la nouvelle stratégie Halte à la tuberculose, était appliquée dans 183 pays en 2004 ; une couverture complète de la population par cette stratégie a été atteinte dans 9 des 22 pays les plus touchés, et la couverture est presque complète dans 5 autres pays.
- Dans le cadre de la nouvelle stratégie, les domaines de travail seront plus étendus et comprendront la participation de la communauté et des ONG au traitement de la tuberculose ; sur la sensibilisation, la communication et la mobilisation sociale ; et sur l'amélioration de la prise en charge de la tuberculose multirésistante et de la co-infection tuberculose-VIH.
- Six pays d'Asie ainsi que le Kenya ont d'ores et déjà amélioré les liens existant entre les programmes nationaux de lutte antituberculeuse (PNT), les hôpitaux et les autres prestataires de soins, mais les initiatives public-privé (PPM-DOTS) en sont encore à un stade précoce dans la plupart des autres pays les plus touchés par la tuberculose.
- Les domaines particulièrement fragiles sont ceux des services de laboratoire, du développement des ressources humaines et du suivi de la lutte contre l'association tuberculose-VIH.

## FINANCES

- En 2006, le coût total de la lutte antituberculeuse a atteint US\$ 1,6 milliard dans les 22 pays les plus touchés, y compris les budgets nationaux et les coûts relatifs au système de santé en général. Ce montant s'élève à US\$ 2 milliards pour l'ensemble des 74 pays qui ont fourni des données financières.
- Les fonds visant à soutenir la lutte antituberculeuse dans les 22 pays les plus touchés ont augmenté de près de US\$ 500 millions depuis 2002, pour atteindre US\$ 1,4 milliard en 2006.
- Les gouvernements des pays les plus touchés ayant le plus de ressources (notamment l'Afrique du Sud, le Brésil, la Chine et la Fédération de Russie) fournissent la majeure partie des fonds nécessaires pour lutter contre la tuberculose dans leurs pays ; d'autres pays sont davantage tributaires des subventions de donateurs, notamment du Fonds mondial de lutte contre le SIDA, la tuberculose et le paludisme.
- Le déficit de financement signalé par les 22 pays les plus touchés était de US\$ 141 millions pour 2006 ; il s'élevait à US\$ 180 millions au total pour les 74 pays qui ont fourni des données financières.
- Les budgets des PNT pour 2006 sont dans l'ensemble conformes au Plan mondial Halte à la tuberculose pour la période 2006–2015, à l'exception de la lutte contre l'association tuberculose-VIH pour laquelle les budgets des programmes nationaux sont nettement inférieurs.

## OBJECTIFS

- Le dépistage était de 53% à l'échelle mondiale en 2004 et devrait dépasser 60% en 2005, mais rester inférieur à l'objectif de 70%.
- Le succès thérapeutique a été de 82% dans la cohorte de l'année 2003 (1,7 million de patients), soit proche de l'objectif de 85 % pour 2005.
- Trois des régions de l'OMS devraient atteindre les deux objectifs de 2005 : la Région des Amériques et celles de l'Asie du Sud-Est et du Pacifique occidental.
- Au moins 7 des pays les plus touchés devraient avoir atteint les objectifs de 2005 : le Cambodge, la Chine, l'Inde, l'Indonésie, le Myanmar, les Philippines et le Viet Nam.
- La mise en œuvre du Plan mondial devrait permettre d'inverser la tendance à l'augmentation de l'incidence à l'échelle mondiale d'ici à 2015, comme le prévoient les objectifs du Millénaire pour le développement, et de réduire de moitié en 2015 à l'échelle mondiale et dans la plupart des régions, les taux de prévalence et de mortalité de 1990. Deux exceptions toutefois pour l'Afrique et l'Europe de l'Est.

# Résumé

## Contexte et méthodes

**1.** Le dixième rapport annuel de l'OMS sur la surveillance, la planification et le financement de la lutte antituberculeuse contient des informations sur le nombre de cas notifiés, les résultats thérapeutiques, les activités, les budgets, les coûts et les dépenses, pour l'ensemble des programmes nationaux de lutte antituberculeuse (PNT) qui ont communiqué des données à l'OMS, bien que l'accent soit mis sur les progrès réalisés dans les 22 pays les plus touchés par la tuberculose.

**2.** On dispose désormais de données sur 11 années consécutives (1994–2004) pour évaluer les progrès accomplis en vue d'atteindre les objectifs du Millénaire pour le développement (OMD) qui concernent la lutte antituberculeuse, et les objectifs fixés par l'Assemblée mondiale de la Santé et le partenariat Halte à la tuberculose. Les objectifs de l'Assemblée mondiale de la Santé sont de dépister, en 2005, 70% des nouveaux cas à frottis positif et de traiter avec succès 85% d'entre eux. Dans le cadre des OMD, la cible 8 (sur 18) est d'avoir maîtrisé la tuberculose et d'avoir commencé à inverser la tendance de l'incidence d'ici à 2015. Le partenariat Halte à la tuberculose s'est fixé des objectifs supplémentaires : diminuer de moitié d'ici 2015, le taux de prévalence de la tuberculose et le taux de mortalité lié à cette maladie observés en 1990.

## Améliorer le dépistage et le traitement

**3.** Au total, 200 pays et territoires (sur 211) ont fait parvenir à l'OMS un rapport sur leur stratégie de lutte contre la tuberculose, sur le nombre de cas de tuberculose notifiés et/ou sur les résultats du traitement.

**4.** Nous avons calculé, en utilisant les données de surveillance et d'enquête pour établir de nouvelles estimations de l'incidence, qu'il y a eu 8,9 millions de nouveaux cas de tuberculose en 2004 (140/100 000 habitants), dont 3,9 millions (62/100 000) avaient un frottis positif et 741 000 d'entre eux étaient des adultes porteurs du virus de l'immunodéficience humaine (VIH). Le nombre total de cas était de 14,6 millions (229/100 000), parmi lesquels 6,1 millions avaient un frottis positif (95/100 000). Plus de 80% de tous les nouveaux patients atteints de tuberculose en 2004 habitaient la Région africaine, la Région de l'Asie du Sud-Est ou celle du Pacifique occidental. Le nombre de décès dus à la tuberculose en 2004 est estimé à 1,7 million (27/100 000) ; ce chiffre englobe les cas de co-infection tuberculose-VIH (248 000).

**5.** En 2004, 183 pays et territoires appliquaient la stratégie DOTS. A la fin de 2004, 83% de la population mondiale

le vivait dans des pays, ou dans des régions de pays, où la stratégie était appliquée. Les programmes DOTS ont notifié 4,4 millions de cas nouveaux et de rechutes en 2004, parmi lesquels on recense 2,1 millions de cas nouveaux à frottis positif. Au total, 21,5 millions de patients atteints de la tuberculose et 10,7 millions de sujets à frottis positif ont suivi un traitement dans le cadre des programmes DOTS entre 1995 et 2004.

**6.** A la fin de 2004, l'extension de la stratégie DOTS était achevée dans 9 des pays les plus touchés et sur le point de l'être dans 5 autres. Le Pakistan a fait état d'une couverture complète par la stratégie à fin 2005, et cette couverture s'est considérablement étendue en Afghanistan, au Brésil, en Inde et dans la Fédération de Russie.

**7.** Les 2,1 millions de cas à frottis positif signalés par les programmes DOTS en 2004 représentent 53% du taux d'incidence estimé. L'augmentation du nombre de cas à frottis positif notifiés dans le cadre de la stratégie DOTS n'a jamais été aussi forte qu'entre 2003 et 2004 (350 000) (l'augmentation annuelle moyenne entre 1995 et 2000 était de 134 000). Si l'accélération observée dans le dépistage se poursuit, les programmes DOTS permettront de détecter plus de 60% des cas en 2005, mais n'atteindront pas l'objectif de 70%.

**8.** L'accélération du dépistage depuis 2000 a été observée dans tous les rapports, toutes sources confondues, y compris dans les programmes DOTS. Nous en déduisons que le dépistage a continué de s'améliorer du fait que les patients sont signalés par de nouvelles sources, y compris les cliniques et les hôpitaux publics et privés, en particulier dans les Régions de l'Asie du Sud-Est et du Pacifique occidental.

**9.** Trois pays, la Chine, l'Inde et l'Indonésie, concentraient les trois quarts (75%) de tous les cas supplémentaires à frottis positif signalés dans le cadre de la stratégie DOTS en 2004. Ces 3 pays sont à la pointe de l'accélération mondiale du dépistage des cas, suivis du Bangladesh, du Brésil et du Myanmar. Parmi les patients qui ont souffert d'un premier épisode de tuberculose en 2004, mais qui n'ont pas été détectés par les programmes DOTS, 61% habitaient dans 8 pays : le Bangladesh, la Chine, l'Éthiopie, la Fédération de Russie, l'Inde, l'Indonésie, le Nigéria et le Pakistan.

**10.** Le taux de dépistage des cas à frottis positif dans les zones où la stratégie DOTS est établie est resté stable, se situant à 51% en moyenne jusqu'en 2001, puis augmentant pour atteindre 64% en 2004. Ces améliorations récentes dans le dépistage des cas au sein des zones DOTS ont essentiellement eu lieu au Bangladesh, au Brésil, en

Chine, en Inde, en Indonésie, au Myanmar et aux Philippines.

**11.** Tandis que l'OMS mesure le dépistage des cas en se référant essentiellement aux cas à frottis positif, les statistiques de dépistage reposant sur d'autres méthodes de diagnostic donnent une image différente des résultats des programmes. Une comparaison effectuée dans 25 pays européens en 2004 a montré que la proportion de cas à frottis positif estimés qui sont détectés était toujours supérieure à la proportion de cas à culture positive estimés qui sont détectés, mais inférieure à la proportion de l'ensemble des cas de tuberculose estimés qui sont détectés. Dans la Région des Amériques, à l'inverse, la proportion des cas à frottis positif estimés qui sont détectés était nettement supérieure à la proportion de l'ensemble des cas de tuberculose estimés qui sont détectés. Ces différences doivent faire l'objet de recherches plus approfondies, car elles seront sans doute importantes pour l'évaluation de l'épidémiologie et de la lutte actuelles contre la tuberculose, et lorsqu'il s'agira de déterminer le rôle de nouveaux outils de diagnostic plus sensibles.

**12.** Le taux de succès thérapeutique dans la cohorte DOTS de 2003 (1,7 million de patients) était de 82% en moyenne, se rapprochant de l'objectif de 85%. Comme pour les précédentes cohortes DOTS, il était nettement inférieur à la moyenne dans la Région africaine (72%) et dans la Région européenne (75%). Ces résultats relativement médiocres dans ces deux régions s'expliquent en partie par les complications de l'association tuberculose-VIH dans la Région africaine, et par la pharmacorésistance dans la Région européenne. Cependant, un autre facteur tout aussi important dans ces deux régions est l'incapacité des programmes DOTS à assurer le suivi des résultats du traitement pour l'ensemble des patients. Pour atteindre l'objectif d'un taux de succès thérapeutique de 85% à l'échelle mondiale, des efforts particuliers doivent être faits pour améliorer les taux de guérison dans les Régions africaine et européenne.

**13.** Sur la base des cas notifiés et des estimations de l'OMS, fin 2004, 26 pays avaient atteint les objectifs en matière de détection et de succès thérapeutique. Les Philippines et le Viet Nam sont, parmi ceux-ci, les seuls pays du groupe des pays les plus touchés. Il est possible que le Cambodge, la Chine, l'Inde, l'Indonésie et le Myanmar aient aussi atteint ces objectifs avant la fin de 2005 (soit un total de 7 pays sur les 22 pays les plus touchés), mais on ne le saura pas avant fin 2006.

### **Tendances épidémiologiques et impact de la lutte antituberculeuse**

**14.** En 2004, le taux d'incidence de la tuberculose par habitant fléchissait ou se stabilisait dans cinq des six régions de l'OMS, mais augmentait de 0,6% par an à l'échelle mondiale. La région qui fait exception est la Région africai-

ne, où l'incidence continuait de progresser, parallèlement à la propagation du VIH. Toutefois, l'augmentation annuelle des cas notifiés en provenance de la Région africaine régresse chaque année, probablement parce que l'épidémie de VIH ralentit également dans les pays africains. En Europe de l'Est (essentiellement dans les pays de l'ex-Union soviétique), l'incidence par habitant a augmenté pendant les années 90, pour atteindre un pic vers 2001, et baisse depuis.

**15.** Nous disposons de peu de données valables permettant d'établir les taux de prévalence et de mortalité pour 1990, années de référence pour les OMD, et pour 2004.. Selon nos estimations les plus fiables, le taux de prévalence mondiale est passé de 297 pour 100 000 habitants en 1990 à 229 pour 100 000 en 2004 (cas de co-infection tuberculose-VIH compris), en partie du fait de l'extension de la stratégie DOTS. Le taux de mortalité due à la tuberculose a diminué, passant de 29 décès pour 100 000 en 1990 à 27 pour 100 000 en 2004. Si les tendances n'étaient pas si défavorables en Afrique, les taux de prévalence et de mortalité baisseraient beaucoup plus rapidement à l'échelle mondiale.

**16.** Les prévisions épidémiologiques pour 2005 et au-delà figurent dans le Plan mondial Halte à la tuberculose, pour la période 2006–2015, dont la mise en œuvre est évaluée à US\$ 56 milliards. Les améliorations que le Plan mondial propose pour le dépistage des cas devraient, lorsqu'elles seront mises en pratique conjointement à d'autres éléments de la nouvelle stratégie Halte à la tuberculose, permettre d'arrêter la progression de l'incidence de la tuberculose d'ici à 2015, et d'inverser la tendance pour réduire de moitié les taux de prévalence et de mortalité à l'échelle mondiale et dans toutes les régions, à l'exception de l'Afrique et de l'Europe de l'Est.

### **Mise en œuvre et planification de la stratégie DOTS**

**17.** Bien que les réseaux de laboratoire se soient étendus grâce aux efforts déployés aux niveaux national et international, les services de laboratoire consacrés à la tuberculose doivent être améliorés dans de nombreux pays. Parmi les domaines qui requièrent une attention particulière figurent notamment les laboratoires de référence nationaux, les systèmes de contrôle de qualité pour tous les laboratoires, et l'amélioration des capacités et des infrastructures permettant de mener à bien les cultures et les tests de sensibilité aux médicaments.

**18.** Quinze pays parmi les 22 plus touchés ont des plans pour le développement des ressources humaines, mais la plupart de ceux-ci se limitent à la formation ; 18 de ces pays ont mentionné les investissements en matière de ressources humaines parmi les cinq moyens les plus efficaces pour améliorer la stratégie DOTS et renforcer les systèmes de santé. Au cours de l'année 2005, les PNT ont contribué

au développement des systèmes de santé, essentiellement en mettant leurs programmes de lutte antituberculeuse en conformité avec le processus de décentralisation des services sanitaires.

**19.** La décentralisation des services de diagnostic et de traitement vise à améliorer l'accès pour tous les patients, mais en particulier pour les plus démunis. Les PNT commencent à intégrer la participation des communautés et des ONG de façon à améliorer la sensibilisation et l'accès à ces services.

**20.** La participation des communautés à la lutte contre la tuberculose fait partie de la stratégie adoptée par les PNT dans 14 des pays les plus touchés. Le nombre de ces pays disposant d'une stratégie nationale favorisant la sensibilisation, la communication et la mobilisation sociale est passé de 2 en 2002 à 11 en 2005, et devrait atteindre le chiffre de 19 d'ici à 2007.

**21.** Les pays les plus touchés mettent actuellement au point des initiatives de collaboration qui ont atteint des stades différents, au sein des secteurs public et privé de la santé et d'un secteur à l'autre (par l'intermédiaire des initiatives PPM-DOTS). Tandis que le Bangladesh, la Chine, l'Inde, l'Indonésie, le Kenya, le Myanmar et les Philippines ont déjà amélioré les liens existant entre les PNT, les hôpitaux et les autres prestataires de soins, les initiatives PPM-DOTS n'en sont encore qu'à un stade précoce dans la plupart des autres pays les plus touchés.

**22.** Le traitement de la tuberculose pharmacorésistante reste inapproprié dans de nombreux pays. Dans certains d'entre eux, le diagnostic en laboratoire est de qualité médiocre; d'autres ne disposent pas de politique nationale pour la prise en charge de la tuberculose à bacilles multirésistants (TB-MR); les médicaments antituberculeux de première et de deuxième intention de qualité douteuse sont largement répandus; et un nombre important de patients atteints de tuberculose à bacilles multirésistants font l'objet, en dehors des PNT, de procédures de diagnostic et de traitement inappropriées. Ces problèmes seront en partie résolus par la mise en œuvre sur une grande échelle des nouvelles directives de l'OMS sur la prise en charge de la tuberculose pharmacorésistante.

**23.** Bon nombre des pays qui sont les plus touchés par le VIH/SIDA disposent de plans et de politiques au niveau national prévoyant des activités concertées TB/VIH et la fourniture de traitements antirétroviraux (ARV). Mais, pour bon nombre d'entre eux, il faut encore que le traitement ARV ne soit pas seulement mis à la disposition d'un petit pourcentage des personnes justiciables du traitement. Dans les pays où l'accès au traitement ARV a rapidement progressé et où la prévalence de l'infection à VIH est élevée, le défi consistera à maintenir l'accès au traitement ARV et à le financer, sans pour autant épuiser les ressources destinées à d'autres programmes.

## Financement de l'extension des programmes DOTS

**24.** Des rapports financiers ont été reçus de 140 pays sur 211 (66%). Ces pays représentent 91% de la charge de morbidité estimée de la tuberculose au niveau mondial. Des données complètes concernant le budget 2005 ont été fournies par 87 pays et par 71 pays pour le budget 2006, tandis que 73 pays fournissaient des données complètes concernant les dépenses 2004. Les 22 pays les plus touchés ont tous fourni des données complètes concernant le budget, à l'exception de l'Afrique du Sud, et 17 d'entre eux ont également fourni des données concernant les dépenses. La quantité et la qualité des données financières n'ont cessé de s'améliorer depuis que l'OMS a commencé leur collecte en 2002.

**25.** Les budgets des PNT dont font état les 22 pays les plus touchés représentent un montant total de US\$ 990 millions en 2006, soit le double du montant total de US\$ 446 millions correspondant à l'année 2002. La Chine, la Fédération de Russie, l'Inde et l'Indonésie ont, de loin, les budgets les plus importants (s'élevant à 72% du total pour les 21 pays les plus touchés ayant fourni des données).

**26.** Les crédits destinés aux budgets des PNT dans les 22 pays les plus touchés ont augmenté de près de US\$ 500 millions au cours des cinq dernières années, pour atteindre un montant total de US\$ 830 millions en 2006. Cette augmentation est essentiellement due aux fonds supplémentaires alloués par les Gouvernements de la Chine et de la Fédération de Russie, ainsi que par le Fonds mondial de lutte contre le SIDA, la tuberculose et le paludisme. En Afghanistan, en Ouganda, en République-Unie de Tanzanie et au Viet Nam, les fonds alloués en 2006 ont été identiques ou inférieurs à ceux de 2002.

**27.** Dans les 21 pays les plus touchés qui ont transmis des données, les gouvernements fourniront US\$ 600 millions (61%) au fonds requis par les PNT en 2006, les organismes donateurs US\$ 230 millions (23%), et, pour US\$ 19 millions (2%), la source de financement n'est pas encore connue, ce qui correspond à un déficit de financement de US\$ 141 millions (14%). Ces chiffres masquent d'importantes variations, de nombreux pays étant largement tributaires des subventions des donateurs.

**28.** Le coût total de la lutte contre la tuberculose, qui comprend, outre les budgets des PNT, le financement du personnel des services de santé généraux et des infrastructures utilisées pour la lutte antituberculeuse, est estimé pour 2006 à US\$ 1,6 milliard dans les 22 pays les plus touchés, à comparer avec les US\$ 876 millions de 2002. C'est en Afrique du Sud et dans la Fédération de Russie que les coûts sont les plus élevés puisqu'ils représentent un total combiné de US\$ 810 millions. A supposer que les systèmes de santé aient la capacité de prendre en charge un nombre croissant de patients atteints de la tuberculose en 2006, le

déficit de financement pour l'ensemble des coûts de la lutte contre la tuberculose en 2006 est le même que pour les budgets des PNT, soit US\$ 141 millions. Les coûts totaux atteignent US\$ 2 milliards et le déficit de financement s'élève à US\$ 180 millions lorsqu'on inclut l'ensemble des 74 pays qui ont transmis des données. Ces 74 pays représentent 89% des cas de tuberculose à l'échelle mondiale.

**29.** Parmi les 22 pays les plus touchés, tous – sauf un – dont les dépenses ont augmenté entre 2003 et 2004 ont aussi vu progresser le nombre des nouveaux cas à frottis positif détectés et traités dans le cadre des programmes DOTS. Le Cambodge a augmenté ses dépenses, mais le nombre total de patients à frottis positif traités dans le cadre de la stratégie DOTS n'a pas bougé.

**30.** Parmi les 22 pays les plus touchés, 5 (l'Inde, l'Indonésie, le Myanmar, les Philippines et le Viet Nam) sont dans une position financière propice pour atteindre les objectifs de l'Assemblée mondiale de la Santé en 2005 et 2 (le Cambodge et la Chine) sont bien placés pour y parvenir s'ils arrivent à combler le déficit financier.

**31.** Les estimations des investissements nécessaires pour atteindre les OMD et les objectifs fixés par le partenariat Halte à la tuberculose sont données dans le Plan mondial. Ces estimations ont été effectuées par année, de 2006 à 2015, et pour sept régions qui, ensemble, représentent 172 pays. Les besoins d'investissement détaillés dans le Plan mondial pour 2006 sont semblables à ceux dont font état les pays, à deux importantes exceptions près. La

première tient au fait que, dans la Région africaine, le Plan mondial prévoit un investissement beaucoup plus important dans les activités concertées TB/VIH et les activités de sensibilisation, de communication et de mobilisation sociale. La seconde tient au fait que le Plan mondial prévoit un budget de US\$ 243 millions au niveau mondial pour la coopération technique en 2006, qui ne fait habituellement pas partie du budget des PNT, et pour lequel le déficit est estimé à US\$ 183 millions. Si l'investissement planifié dans les activités concertées TB/HIV et les activités de sensibilisation, de communication et de mobilisation sociale dans la Région africaine progressait conformément au Plan mondial, et si les besoins de coopération technique étaient inclus, le déficit financier serait beaucoup plus important que le montant total rapporté de US\$ 180 millions.

**32.** Dans les futurs travaux sur le financement de la lutte antituberculeuse, les priorités seront au nombre de quatre : a) veiller à ce que les budgets et les plans des pays soient, à partir de 2006 et par la suite, basés sur la nouvelle stratégie Halte à la tuberculose et qu'ils soient conformes au Plan mondial ; b) mener des évaluations financières sur les moyens de mobiliser les ressources supplémentaires nécessaires pour mettre en œuvre ces plans ; c) mener des évaluations plus précises de l'investissement nécessaire dans les systèmes de santé pour soutenir les efforts visant à élargir les efforts de lutte contre la tuberculose et d'autres maladies ; d) améliorer les données financières pour l'Afrique du Sud et la Région européenne.

# Puntos clave

## EPIDEMIA DE TUBERCULOSIS

- En 2004 hubo nueve millones de casos nuevos y dos millones de muertes por tuberculosis (TB).
- El número de casos de TB se mantuvo estable o descendió en cinco de las seis regiones de la OMS pero aumentó en África, donde la epidemia de TB sigue estando dirigida por la propagación del VIH.
- Más del 80% de los pacientes de TB del mundo viven en el África subsahariana y Asia.

## DOTS Y LA NUEVA ESTRATEGIA ALTO A LA TUBERCULOSIS

- El tratamiento DOTS, que sigue siendo el núcleo de la nueva Estrategia Alto a la Tuberculosis, se estaba aplicando en 183 países en 2004; la cobertura de la población fue completa en 9 de 22 países de alta carga de tuberculosis (PACT), y casi completa en otros cinco.
- Las áreas de trabajo que van a ampliarse en la nueva estrategia son, entre otras: participación comunitaria y de ONG en atención de la tuberculosis; promoción, comunicación y movilización social; y mejora de la gestión de la TB multirresistente y la TB/VIH.
- Seis países de Asia y Kenya ya han mejorado los vínculos entre los programas nacionales de lucha antituberculosa, los hospitales y otros proveedores de atención, pero el PPM-DOTS (cooperación entre los sectores público y privado) sigue en una fase temprana en la mayoría de los PACT.
- Las áreas particularmente deficientes son los servicios de laboratorio, el desarrollo de los recursos humanos y la supervisión de la lucha contra la TB/VIH.

## FINANCIACIÓN

- El costo total de la lucha contra la tuberculosis en 2006, incluidos los presupuestos de los programas nacionales contra la tuberculosis (PNT) y los costos del sistema sanitario general, ha aumentado hasta US\$ 1600 millones en los 22 PACT. Este costo aumenta hasta US\$ 2000 millones para todos los 74 países que proporcionaron datos financieros.
- La financiación para apoyar la lucha antituberculosa en los 22 PACT ha aumentado en casi US\$ 500 millones, llegando a US\$ 1400 millones en 2006.
- Los Gobiernos de los PACT en mejor situación económica (el Brasil, China, la Federación de Rusia y Sudáfrica) proporcionan la mayor parte de los fondos necesarios para combatir la tuberculosis en sus países; otros países dependen más de los fondos de donantes, entre ellos el Fondo Mundial de Lucha contra el SIDA, la Tuberculosis y la Malaria.
- El déficit de financiación comunicado por los 22 PACT respecto de 2006 era de US\$ 141 millones, y de US\$ 180 millones en total respecto de los 74 países que comunicaron datos.
- Los presupuestos de los PNT para 2006 concuerdan en general con el Plan Mundial para Detener la Tuberculosis, 2006–2015, salvo en la lucha contra la TB/VIH, en la que los presupuestos de los PNT son mucho menores.

## METAS

- La detección de casos en todo el mundo fue del 53% en 2004 y probablemente pase del 60% en 2005, pero permanece por debajo de la meta del 70%.
- El éxito del tratamiento llegó al 82% en la cohorte de 2003 de 1,7 millones de pacientes, lo que se aproxima a la meta del 85%.
- Está previsto que tres regiones de la OMS alcancen las dos metas previstas para 2005: la Región de las Américas y las Regiones de Asia Sudoriental y del Pacífico Occidental.
- Al menos siete PACT deberán haber alcanzado las metas de 2005: Camboya, China, Filipinas, la India, Indonesia, Myanmar y Viet Nam.
- Está previsto que con la ejecución del Plan Mundial se invierta el aumento de la incidencia en todo el mundo de aquí a 2015, como se especifica en los Objetivos de Desarrollo del Milenio, y se reduzcan a la mitad las tasas de prevalencia y de mortalidad de 1990 en el nivel mundial y en la mayoría de las regiones de aquí a 2015, aunque no en África ni en Europa oriental.

# Resumen

## Antecedentes y métodos

**1.** El décimo informe anual de la OMS sobre vigilancia, planificación y financiación de la lucha mundial contra la tuberculosis (TB) incluye datos sobre las notificaciones de casos, los resultados del tratamiento, las actividades, los presupuestos, los costos y los gastos. Se ofrecen los resultados correspondientes a todos los programas nacionales de lucha contra la TB (PNT) que han informado a la OMS, aunque se hace hincapié en los progresos realizados en 22 países con alta carga de TB (PACT).

**2.** En la actualidad se dispone de datos reunidos durante once años consecutivos (1994–2004), que permiten evaluar los progresos realizados hacia el logro de los Objetivos de Desarrollo del Milenio (ODM) relativos a la lucha contra la TB, así como hacia las metas fijadas por la Asamblea Mundial de la Salud y la Alianza Alto a la Tuberculosis. Las metas de la Asamblea Mundial de la Salud son detectar, para 2005, el 70% de los nuevos casos bacilíferos y tratar con éxito el 85% de esos casos. La meta 8 de los ODM (de 18) es haber detenido y comenzado a reducir la incidencia de la TB para 2015. La Alianza Alto a la Tuberculosis ha respaldado las metas adicionales de reducir a la mitad, para 2015, las tasas de prevalencia y mortalidad de la TB de 1990.

## Mejora de la detección y el tratamiento de casos

**3.** Un total de 200 países (de 211) han informado a la OMS de sus estrategias de lucha contra la TB, así como de las notificaciones de casos y/o de los resultados del tratamiento.

**4.** Tras actualizar las estimaciones de la incidencia tomando como base los datos de la vigilancia y de las encuestas, hemos calculado que en 2004 hubo 8,9 millones de nuevos casos de TB (140/100 000 habitantes), de los cuales 3,9 millones (62/100 000) eran bacilíferos y 741 000 se presentaron en adultos infectados por el virus de la inmunodeficiencia humana (VIH). Hubo 14,6 millones de casos prevalentes (229/100 000), de los cuales 6,1 millones eran bacilíferos (95/100 000). Más del 80% de los nuevos pacientes de TB en 2004 vivían en las regiones de África, Asia Sudoriental y Pacífico Occidental. Se estima que 1,7 millones de personas (27/100 000) murieron de TB en 2004, incluidos los casos de coinfección por el VIH (248 000).

**5.** Un total de 183 países y territorios aplicaron la estrategia DOTS en 2004. A finales de 2004, el 83% de la población mundial vivía en países (o regiones de países) que disponían de cobertura de DOTS. Los programas DOTS notificaron 4,4 millones de casos de TB nuevos y recidivan-

tes, de los cuales 2,1 millones eran nuevos bacilíferos. En los diez años comprendidos entre 1995 y 2004, un total de 21,5 millones de pacientes con TB y 10,7 millones de pacientes bacilíferos recibieron tratamiento en los programas DOTS.

**6.** A finales de 2004, la expansión de DOTS era completa en nueve PACT y casi completa en otros cinco. El Pakistán comunicó que su cobertura con DOTS era completa a finales de 2005; además, la cobertura ha aumentado considerablemente en el Afganistán, el Brasil, la India y la Federación de Rusia.

**7.** Los 2,1 millones de casos bacilíferos notificados por los programas DOTS en 2004 representan el 53% de la incidencia estimada. El aumento de los casos bacilíferos notificados en el ámbito de los programas DOTS entre 2003 y 2004 (350 000) fue mayor que nunca (el incremento medio anual entre 1995 y 2000 había sido de 134 000). Si la aceleración observada en la detección de casos se mantiene, los programas de DOTS detectarán más del 60% de los casos en 2005, aunque no llegarán a la meta del 70%.

**8.** La aceleración de la detección de casos desde 2000 se ha observado en las notificaciones de casos de todas las procedencias, así como en las de los programas DOTS. Deducimos de ello que la detección de casos ha seguido mejorando porque se están notificando pacientes de nuevas fuentes, incluidos dispensarios y hospitales públicos y privados, especialmente en las regiones de Asia Sudoriental y del Pacífico Occidental.

**9.** Las tres cuartas partes (75%) de los casos bacilíferos adicionales notificados a través de DOTS en 2004 provenían de China, la India e Indonesia. Esos tres países han sido los motores de la aceleración mundial de la detección de casos, apoyados por Bangladesh, el Brasil y Myanmar. De los pacientes que sufrieron un primer episodio de TB en 2004 pero no fueron detectados por los programas DOTS, el 61% vivía en ocho países: Bangladesh, China, Etiopía, la Federación de Rusia, la India, Indonesia, Nigeria y el Pakistán.

**10.** La tasa de detección de casos bacilíferos en las zonas donde se aplica la estrategia DOTS se mantuvo estable hasta 2001 (media del 51%), pero aumentó hasta el 64% en 2004. Estas recientes mejoras en la localización de casos dentro de las zonas DOTS se han producido sobre todo en Bangladesh, el Brasil, China, Filipinas, la India, Indonesia y Myanmar.

**11.** Mientras que la OMS mide la detección de casos principalmente en relación con la forma bacilífera de la enfermedad, las cifras de detección basadas en otros métodos

de diagnóstico ofrecen un panorama distinto del desempeño de los programas. Una comparación de 25 países europeos en 2004 mostró que la proporción de casos bacilíferos detectados era siempre mayor que la proporción de casos de cultivo positivo que se detectan, aunque menor que la proporción del total de casos de TB encontrados. En la Región de las Américas, por el contrario, las tasas de detección de casos bacilíferos fueron típicamente mayores que las tasas de detección respecto del total de casos de TB. Estas diferencias deben ser investigadas más a fondo porque probablemente sean importantes para la evaluación de la epidemiología y la lucha contra la TB en la actualidad, y cuando se valore el papel de los medios de diagnóstico nuevos y más sensibles.

**12.** La tasa media de éxito del tratamiento en la cohorte de DOTS de 2003 (1,7 millones de pacientes) fue del 82%, lo que se acerca a la meta del 85%. Como en anteriores cohortes de DOTS, dicha tasa fue considerablemente inferior a la media en las regiones de África (72%) y Europa (75%). Las bajas tasas de éxito del tratamiento en esas dos regiones pueden atribuirse en parte a las complicaciones de la coinfección por el VIH y a la farmacoresistencia, respectivamente. Sin embargo, igualmente importante es el fracaso de los programas DOTS en la vigilancia de los resultados del tratamiento en todos los pacientes en esas dos regiones. Para alcanzar la meta del 85% de éxito del tratamiento a nivel mundial, hay que hacer un esfuerzo especial para mejorar las tasas de curación en las regiones de África y Europa.

**13.** Con base en los casos notificados y las estimaciones de la OMS, 26 países habían alcanzado a finales de 2004 las metas fijadas en materia de detección de casos y éxito del tratamiento. Filipinas y Viet Nam eran los únicos PACT entre ellos. Camboya, China, la India, Indonesia y Myanmar tal vez hayan alcanzado también las metas a finales de 2005 (lo que supone siete PACT de un total de 22), pero esto no se sabrá hasta finales de 2006.

### Tendencias epidemiológicas e impacto de la estrategia DOTS

**14.** En 2004, la incidencia de la TB por habitante estaba disminuyendo o se mantenía estable en cinco de las seis regiones de la OMS, si bien a escala mundial aumentaba a razón de un 0,6% al año. La excepción fue la región de África, donde la incidencia seguía aumentando, de la mano de la propagación del VIH. Sin embargo, el aumento anual de la notificación de casos en la Región de África va disminuyendo de año en año, probablemente porque la epidemia de VIH en los países africanos también se está frenando. En Europa oriental (principalmente en los países de la ex Unión Soviética), la incidencia por habitante aumentó durante los años noventa, pero alcanzó su valor máximo en 2001 y desde entonces ha disminuido.

**15.** Hay pocos datos de calidad que permitan determinar las tasas de prevalencia y mortalidad de la TB entre 1990, año de referencia de los ODM, y 2004. Según nuestras mejores estimaciones, la prevalencia disminuyó desde 297 por 100 000 habitantes a escala mundial en 1990 hasta 229 por 100 000 habitantes en 2004 (incluidos los pacientes tuberculosos con VIH), en parte como consecuencia de la expansión de la estrategia DOTS. La mortalidad disminuyó desde 29 por 100 000 habitantes en 1990 hasta 27 por 100 000 habitantes en 2004. De no ser por las tendencias extremadamente adversas que se observan en África, las tasas de prevalencia y de mortalidad estarían disminuyendo más rápidamente en todo el mundo.

**16.** Las previsiones epidemiológicas para 2005 y más adelante se presentan en el Plan Mundial para Detener la Tuberculosis, 2006-2015, para cuya ejecución se necesitarán US\$ 56 000 millones. Las mejoras de la detección de casos propuestas en el Plan Mundial, cuando se apliquen junto con otros elementos de la nueva Estrategia Alto a la Tuberculosis, probablemente inviertan el aumento de la incidencia de la TB en el mundo para 2015, y reduzcan a la mitad las tasas de prevalencia y mortalidad en el mundo y en todas las regiones salvo África y Europa oriental.

### Planificación y aplicación de la estrategia DOTS

**17.** Aunque se han ampliado las redes de laboratorio gracias a los esfuerzos nacionales e internacionales, aún es necesario mejorar los servicios de laboratorio para la TB en muchos países. Los aspectos que requieren especial atención son los laboratorios nacionales de referencia, la garantía de la calidad externa para todos los laboratorios, y la mejora de la capacidad y la infraestructura para realizar cultivos y pruebas de susceptibilidad a los medicamentos.

**18.** Un total de 15 PACT tienen planes para el desarrollo de los recursos humanos, pero la mayoría se limitan a la capacitación; 18 PACT citaron las inversiones en personal entre las cinco maneras más ventajosas de mejorar la estrategia DOTS y fortalecer los sistemas de salud. Los programas nacionales de TB apoyaron el desarrollo de los sistemas de salud durante 2005 principalmente incorporando los programas de TB al proceso de descentralización de los servicios de salud.

**19.** La descentralización de los servicios de diagnóstico y tratamiento tiene por objeto mejorar el acceso para todos los pacientes, pero especialmente para los pobres. Los programas nacionales de TB están empezando a hacer participar a las comunidades y las ONG con el fin de mejorar el conocimiento de estos servicios y el acceso a ellos.

**20.** La participación comunitaria en la lucha contra la TB forma parte de la estrategia de los programas nacionales de 14 PACT. El número de PACT que cuentan con estrategias nacionales de promoción, comunicación y movilización

social ha pasado de dos en 2002 a 11 en 2005, y está previsto que llegue a 19 de aquí a 2007.

**21.** Los PACT se encuentran en distintas fases del desarrollo de la colaboración entre los sectores de salud público y privado (PPM-DOTS). Mientras que Bangladesh, China, Filipinas, la India, Indonesia, Kenya y Myanmar ya han mejorado los vínculos entre los programas nacionales contra la TB, los hospitales y otros proveedores de atención sanitaria, la PPM-DOTS sigue en una fase temprana en la mayoría de los otros PACT.

**22.** El tratamiento de la TB farmacorresistente aún presenta deficiencias en muchos países. En algunos, el diagnóstico de laboratorio es de escasa calidad; otros carecen de políticas nacionales sobre la gestión de la TB multirresistente; pueden encontrarse fácilmente en muchos lugares medicamentos antituberculosos de primera y segunda línea de dudosa calidad, y gran número de pacientes de TB multirresistente son sometidos, fuera de los PNT, a procedimientos inapropiados de diagnóstico y tratamiento. Parte de la solución consistirá en aplicar de modo generalizado las nuevas directrices de la OMS sobre la gestión de la TB multirresistente.

**23.** Muchos de los países más afectados por el VIH/SIDA cuentan con planes y políticas nacionales para las actividades de colaboración en la lucha contra la TB/VIH, así como para la administración de TAR. Sin embargo, la mayoría de ellos sólo proporcionan TAR a una pequeña parte de las personas que lo necesitarían. En los países que han aumentado rápidamente el acceso al TAR y donde la prevalencia de la infección por el VIH es elevada, lo difícil será mantener el acceso al TAR y financiarlo sin distraer recursos de otros programas.

### Financiación de la expansión de la estrategia DOTS

**24.** Se ha recibido información financiera de 140 países sobre un total de 211 (66%). Esos países representan el 91% de la carga mundial estimada de TB. Ochenta y siete y 71 países han presentado datos completos en materia de presupuestos para 2005 y 2006, respectivamente, mientras que 73 países han presentado datos completos sobre gastos correspondientes a 2004. Se recibieron datos presupuestarios completos de los 22 PACT, con excepción de Sudáfrica; 17 de ellos presentaron datos completos sobre gastos. La cantidad y calidad de los datos financieros han seguido mejorando desde que la OMS empezó a acopiar datos financieros en 2002.

**25.** Los presupuestos de los programas nacionales de TB presentados por los 22 PACT suman un total de US\$ 990 millones en 2006, el doble de la cifra correspondiente a 2002 (US\$ 446 millones). La Federación de Rusia, China, la India e Indonesia son los países con mayores presupuestos (que combinados representan el 72% del total correspondiente a los 21 PACT que han presentado datos).

**26.** En los últimos cinco años, la financiación de los presupuestos de los PNT en los 22 PACT ha aumentado en casi US\$ 500 millones, para alcanzar un total de US\$ 830 millones en 2006. Ello se debe principalmente a los nuevos recursos proporcionados por los Gobiernos de China y la Federación de Rusia, así como del Fondo Mundial de Lucha contra el SIDA, la Tuberculosis y la Malaria. En Afganistán, Uganda, la República Unida de Tanzania y Viet Nam, la financiación durante 2006 fue parecida o menor que la correspondiente a 2002.

**27.** De los 21 PACT que presentaron datos, los gobiernos nacionales proporcionarán US\$ 600 millones (61%) de los fondos que necesitan los PNT en 2006, los organismos donantes proporcionarán US\$ 230 millones (23%), y para US\$ 19 millones (2%) la fuente de financiación es actualmente desconocida. Con ello, el déficit de financiación comunicado es de US\$ 141 millones (14%). Estas cifras esconden una variación importante, pues muchos países dependen en gran medida de la financiación de donantes.

**28.** El costo total de la lucha contra la TB, que incluye al personal del sistema de salud general y la infraestructura utilizada para combatir la enfermedad además de las necesidades presupuestarias de los PNT, se eleva a una cifra proyectada de US\$ 1600 millones en los 22 PACT en 2006, frente a US\$ 876 millones en 2002. La Federación de Rusia y Sudáfrica son los que tienen mayores costos; el total combinado asciende a US\$ 810 millones. Suponiendo que los sistemas de salud tengan la capacidad necesaria para atender a un número cada vez mayor de pacientes de TB en 2006, el déficit de financiación en el costo total de lucha contra la TB en 2006 es el mismo que el correspondiente a los presupuestos de los PNT, es decir, US\$ 141 millones. Los costos totales aumentan hasta US\$ 2000 millones, y el déficit de financiación se eleva a US\$ 180 millones cuando se incluye todos los 74 países que presentaron datos. Esos 74 países representan el 89% de los casos de TB en el mundo.

**29.** Salvo uno, los 22 PACT que aumentaron sus gastos entre 2003 y 2004 también aumentaron el número de nuevos casos bacilíferos detectados y tratados en programas de DOTS. Camboya aumentó el gasto pero no el número total de pacientes bacilíferos tratados con DOTS.

**30.** De los 22 PACT, cinco (Filipinas, la India, Indonesia, Myanmar y Viet Nam) eran los mejor situados desde el punto de vista financiero para alcanzar las metas de la Asamblea Mundial de la Salud en 2005: dos más, Camboya y China, estaban en buenas condiciones de conseguirlo siempre que puedan resolver sus déficit de financiación.

**31.** En el Plan Mundial figuran las estimaciones de inversión que se necesita para alcanzar las metas de los ODM y de la Alianza Alto a la Tuberculosis para controlar la enfermedad. Esas estimaciones se han calculado para cada uno de los años del periodo 2006–2015 respecto de siete regio-

nes que en conjunto abarcan 172 países. Las necesidades de inversión que se detallan en el Plan Mundial para 2006 son análogas a las comunicadas por los países, salvo dos importantes excepciones. La primera es que en la Región de África, el Plan Mundial prevé inversiones mucho mayores en actividades de colaboración en materia de TB/VIH y de promoción, comunicaciones y movilización social. La segunda es que el Plan Mundial incluye un presupuesto mundial de US\$ 243 millones para actividades de cooperación técnica en 2006, que no suele formar parte de los presupuestos de los PNT y respecto de lo cual se calcula un déficit de US\$ 183 millones. Si se aumentaran las inversiones previstas en actividades de colaboración en materia de TB/VIH y de promoción, comunicación y movilización social en la Región de África en consonancia con el Plan Mundial, y se incluyeran las necesidades en materia de cooperación técnica, el déficit de financiación sería mucho mayor que el total comunicado de US\$ 180 millones.

**32.** La continuación de la labor en materia de financiación de la lucha contra la TB tiene cuatro prioridades: a) garantizar que los presupuestos y planes de los países desde 2006 en adelante estén basados en la nueva Estrategia Alto a la Tuberculosis y en consonancia con el Plan Mundial; b) realizar estimaciones financieras sobre la forma de movilizar los recursos suplementarios que se necesitan para aplicar esos planes; c) llevar a cabo evaluaciones más precisas de la inversión que es necesario hacer en los sistemas de salud para apoyar la expansión de las actividades de control de la TB y otras enfermedades; y d) mejorar los datos financieros correspondientes a Sudáfrica y la Región de Europa.

# Introduction

The goal of this series of annual reports, published since 1997, is to chart the course of the global tuberculosis (TB) epidemic and to evaluate progress in TB control. This tenth report in the series retraces some familiar ground but also expands into new territory. The new landscape of TB control has been shaped, during 2005, by the new *International standards for tuberculosis care*<sup>1</sup> and by their incorporation, with DOTS, into the expanded Stop TB Strategy.<sup>2</sup> The strategy is to be implemented over the next 10 years as described in the *Global Plan to Stop TB, 2006–2015*.<sup>3</sup> The Global Plan also outlines the technological developments that can be expected in the coming decade, which will almost certainly include new diagnostics and improved drug regimens by 2010.

Against this background we present, as usual, WHO's assessment of the scale and direction of the epidemic, expressed in terms of incidence, prevalence and deaths for 22 high-burden countries (HBCs), for the six WHO regions, for selected subregions and for the world as a whole. Within the framework of the United Nations Millennium Development Goals (MDGs), the principal target for TB control is to ensure that the global incidence rate is falling by 2015.<sup>4,5</sup> Supplementary targets, endorsed by the Stop TB Partnership, are to halve the 1990 prevalence and death rates by 2015. The tables and annexes in this report therefore give estimates of all three key indicators and their trends, for all countries and regions in 1990 and 2004.

The principal mechanism for achieving these impact targets is the treatment of patients with active TB, following the DOTS strategy. DOTS has been central to effective TB control for more than a decade, and continues to be the primary component of the expanded Stop TB Strategy. The broader strategy makes explicit some aspects of TB control that need to be given more emphasis than they have received under DOTS. These include the management of multidrug-resistant TB (MDR-TB) and of TB associated with HIV. That HIV is among the most important risk factors for TB is now well known, but work to address the TB/HIV problem was given greater impetus when African ministers of health declared TB a continent-wide emergency in 2005.

The Stop TB Strategy also includes measures to assess TB control in the context of health system performance, to encourage the participation of all health-care providers (not just those working for government health institutions), to empower TB patients and communities that suffer from TB, and to enable and promote research. This report presents information and data on all these aspects of TB control (see, e.g., country profiles in Annex 1), except the last (because we presently have no method of collecting

information on TB research). It also sets out the costs and budgets needed to implement DOTS and other components of the strategy, together with funding sources, budget gaps and expenditures.

Because DOTS remains at the heart of global TB control this report gives, like its predecessors, our best assessment of progress towards the targets for DOTS implementation; that is, to achieve 70% case detection and 85% treatment success by the end of 2005.<sup>6,7</sup> Case detection is traditionally expressed in terms of the diagnosis and treatment of patients with sputum smear-positive pulmonary disease, because these patients are typically more infectious and usually have more severe illness than patients with smear-negative disease. However, "definite cases" of TB are patients in whom TB has been bacteriologically confirmed, including those found to be positive by the more sensitive technique of culture. In addition, it is widely accepted that a faster, more sensitive and more specific technique is needed to replace sputum smear microscopy, and new diagnostic methods are under development.<sup>8</sup> For these reasons, we have continued in this report to explore other methods of evaluating case detection, comparing in particular case detection rates calculated in terms of smear and culture for countries in the European Region.

Between 1980 and 2004, 86 million TB patients were registered in national surveillance systems and reported to WHO, including 22 million notified by DOTS programmes since 1995. With each annual round of data collection, our epidemiological assessments are based on better surveillance and survey data. Planning for TB control, and reports on the process of planning and implementation, are more comprehensive and better targeted to the needs of national control programmes. The financial monitoring system has accounted for nearly US\$ 6 billion spent on TB in the

<sup>1</sup> Tuberculosis Coalition for Technical Assistance (TBCTA). *International standards for tuberculosis care*. The Hague, TBCTA, 2005.

<sup>2</sup> Raviglione MC, Uplekar MW. The new Stop TB Strategy of WHO. *Lancet*, 2006 [in press].

<sup>3</sup> *The Global Plan to Stop TB, 2006–2015*, launched by the Stop TB Partnership in January 2006, describes how the Stop TB Strategy should be implemented over the next decade, including costs and the expected epidemiological impact in seven regions of the world.

<sup>4</sup> The MDGs are described in full at <http://unstats.un.org/unsd/>

<sup>5</sup> Dye C et al. Targets for global tuberculosis control. *International Journal of Tuberculosis and Lung Disease*, 2006 [in press].

<sup>6</sup> Resolution WHA44.8. Tuberculosis control programme. In: *Handbook of resolutions and decisions of the World Health Assembly and the Executive Board*. Volume III, 3rd ed. (1985–1992). Geneva, World Health Organization, 1993 (WHA44/1991/REC/1).

<sup>7</sup> *Stop Tuberculosis Initiative. Report by the Director-General*. Fifty-third World Health Assembly. Geneva, 15–20 May 2000 (A53/5, 5 May 2000); available at [www.who.int/gb/ebwha/pdf\\_files/WHA53/ea5.pdf](http://www.who.int/gb/ebwha/pdf_files/WHA53/ea5.pdf)

<sup>8</sup> A range of new approaches to diagnosis is described at <http://www.finddiagnostics.org/>

HBCs between 2002 and 2006, and is now beginning to show how greater investment leads to more effective TB control.

The Global TB Surveillance, Planning and Financing Project generates, in short, the information needed to make the best possible case for investing in the Stop TB Strategy. The 2006 report is a further step towards evaluating, with still greater precision, progress towards the MDGs, and ultimately towards TB elimination.

# Methods

## Monitoring progress in TB control Goals, target and indicators for TB control

The target and indicators for TB control, defined within the framework of the MDGs, have been supplemented and endorsed by the Stop TB Partnership (Table 1).<sup>1</sup> These will be used to measure progress made under the Stop TB Strategy,<sup>2</sup> which extends and enhances the DOTS strategy (Tables 2, 3). The Global Plan<sup>3</sup> describes how the Stop TB Strategy should be implemented over the next decade (2006–2015).

This report focuses on the five principal indicators that are used to measure the implementation and impact of TB control: case detection and treatment success, and incidence, prevalence and deaths. The objective of reducing incidence is made explicit by MDG Target 8; the targets for case detection and treatment success have been set by WHO's World Health Assembly;<sup>4</sup> the targets for prevalence

**TABLE 1**  
Goals, target and indicators for TB control

Millennium Development Goal	
<b>Combat HIV/AIDS, malaria and other diseases</b>	
<b>Target 8:</b>	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
<b>Indicator 23:</b>	Prevalence and death rates associated with tuberculosis
<b>Indicator 24:</b>	Proportion of tuberculosis cases detected and cured under DOTS (the internationally recommended strategy for TB control)
Stop TB Partnership targets	
<b>By 2005:</b>	At least 70% of people with sputum smear-positive TB will be diagnosed (i.e. under the DOTS strategy), and at least 85% cured. These are targets set by the World Health Assembly of WHO.
<b>By 2015:</b>	The global burden of TB (prevalence and death rates) will be reduced by 50% relative to 1990 levels. This means reducing prevalence to ≈150 per 100 000 or lower and deaths to ≈15 per 100 000 per year or lower by 2015 (including TB cases coinfecting with HIV). The number of people dying from TB in 2015 should be less than approximately 1 million, including those coinfecting with HIV.
<b>By 2050:</b>	The global incidence of TB disease will be less than or equal to 1 case per million population per year.

<sup>1</sup> Dye C et al. Targets for global tuberculosis control. *International Journal of Tuberculosis and Lung Disease*, 2006 [in press].

<sup>2</sup> Raviglione MC, Uplekar MW. The new Stop TB Strategy of WHO. *Lancet*, 2006 [in press].

<sup>3</sup> *The Global Plan to Stop TB, 2006–2015*. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.35).

<sup>4</sup> Resolution WHA44.8. Tuberculosis control programme. In: *Handbook of resolutions and decisions of the World Health Assembly and the Executive Board*. Volume III, 3rd ed. (1985–1992). Geneva, World Health Organization, 1993 (WHA44/1991/REC/1).

**TABLE 2**  
The Stop TB Strategy

### Vision:

A world free of TB

### Goal:

To dramatically reduce the global burden of TB by 2015 in line with the Millennium Development Goals and the Stop TB Partnership targets

### Objectives:

- Achieve universal access to high-quality diagnosis and patient-centred treatment
- Reduce the human suffering and socioeconomic burden associated with TB
- Protect poor and vulnerable populations from TB, TB/HIV and MDR-TB
- Support development of new tools and enable their timely and effective use

### Targets:

#### MDG 6, Target 8:

Halt and begin to reverse the incidence of TB by 2015.

#### Targets linked to the MDGs and endorsed by the Stop TB Partnership:

- By 2005: detect at least 70% of infectious TB cases and cure at least 85% of these cases
- By 2015: reduce TB prevalence and deaths rates by 50% relative to 1990
- By 2050: eliminate TB as a public health problem (≤1 case per million population)

### Components of the strategy and implementation approaches

- 1. Pursuing high-quality DOTS expansion and enhancement**
  - a. Political commitment with increased and sustained financing
  - b. Case detection through quality-assured bacteriology
  - c. Standardized treatment with supervision and patient support
  - d. An effective drug supply and management system
  - e. Monitoring and evaluation system, and impact measurement
- 2. Addressing TB/HIV, MDR-TB and other challenges**
  - Implement collaborative TB/HIV activities
  - Prevent and control MDR-TB
  - Address prisoners, refugees, other high-risk groups and special situations
- 3. Contributing to health system strengthening**
  - Actively participate in efforts to improve system-wide policy, human resources, financing, management, service delivery and information systems
  - Share innovations that strengthen health systems, including the Practical Approach to Lung Health (PAL)
  - Adapt innovations from other fields
- 4. Engaging all care providers**
  - Public–Public and Public–Private Mix (PPM) approaches
  - Implement International Standards for Tuberculosis Care
- 5. Empowering people with TB, and communities**
  - Advocacy, communication and social mobilization
  - Community participation in TB care
  - Patients' Charter for Tuberculosis Care
- 6. Enabling and promoting research**
  - Programme-based operational research
  - Research to develop new diagnostics, drugs and vaccines

**TABLE 3**  
**Technical elements of the DOTS strategy**

**Case detection through quality-assured bacteriology**

Case detection among symptomatic patients self-reporting to health services, using sputum smear microscopy. Sputum culture is also used for diagnosis in some countries, but direct sputum smear microscopy should still be performed for all suspected cases.

**Standardized treatment with supervision and patient support**

Standardized short-course chemotherapy using regimens of 6–8 months for at least all confirmed smear-positive cases. Good case management includes directly observed treatment (DOT) during the intensive phase for all new smear-positive cases, during the continuation phase of regimens containing rifampicin and during the entirety of a re-treatment regimen. In countries that have consistently documented high rates of treatment success, DOT may be reserved for a subset of patients, as long as cohort analysis of treatment results is provided to document the outcome of all cases.

**An effective drug supply and management system**

Establishment and maintenance of a system to supply all essential anti-TB drugs and to ensure no interruption in their availability.

**Monitoring and evaluation system, and impact measurement**

Establishment and maintenance of a standardized recording and reporting system, allowing assessment of treatment results (Table 4).

and deaths are based on a resolution of the year 2000 meeting of the Group of Eight (G8) industrialized countries, held in Okinawa, Japan.

**Data collection and verification**

Every year, WHO requests information from national TB control programmes (NTPs) or relevant public health authorities in 211 countries or territories via a standard data collection form (posted at [www.who.int/tb](http://www.who.int/tb)). The latest form was distributed in mid-2005. The section dealing with monitoring and surveillance asked for data including the following: whether DOTS was implemented during 2004; DOTS population coverage in 2004; TB case notifications in 2004; TB patients tested for HIV and MDR-TB in 2003–2004, and treatment outcomes for TB patients registered during 2003, following definitions given in Table 4. The most recent form can be found at [www.who.int/tb](http://www.who.int/tb).

As NTPs respond to WHO, they are also asked to update information for earlier years if they are able to do so. As a result of such revisions, the data (case notifications, treatment outcomes, etc.) presented in this report for years preceding 2003 and 2004 could differ from those published in previous reports.

The standard data collection form is used to compile aggregated national data. The process of national and international reporting is distinct from WHO's recommendations about procedures for recording and reporting data by NTPs within countries, from district level upwards.<sup>1</sup>

<sup>1</sup> Revised procedures for recording and reporting at district level, to be field-tested during 2006, are described at [www.who.int/tb/publications/recording\\_and\\_reporting\\_draft/en/index.html](http://www.who.int/tb/publications/recording_and_reporting_draft/en/index.html)

Completed forms are collected and reviewed at all levels of WHO, by country offices, regional offices and at headquarters. An acknowledgement form that tabulates all submitted data is sent back to the NTP correspondent in order to complete any missing responses and to resolve any inconsistencies. Then, using the complete set of data for each country, we construct a profile that tabulates all key indicators, including epidemiological and financial data and estimates, and this too is returned to each NTP for review. In the WHO European Region only, data collection and verification are performed jointly by the regional office and a WHO collaborating centre, EuroTB (Paris). EuroTB subsequently publishes an annual report with additional analyses, using more detailed data for the European Region ([www.eurotb.org](http://www.eurotb.org)).

**High-burden countries, WHO regions and other subregions of the world**

Much of the data submitted to WHO is shown, country by country, in the annexes of this report. The analysis and interpretation that precedes these annexes focus on 22 HBCs and the six WHO regions. The 22 HBCs account for approximately 80% of the estimated number of new TB cases (all forms) arising worldwide each year. These countries are the focus of intensified efforts in DOTS expansion (Annex 1). The HBCs are not necessarily those with the highest incidence rates per capita; many of the latter are medium-sized African countries with high rates of TB/HIV coinfection. The WHO regions are the African Region, the Region of the Americas, the Eastern Mediterranean Region, the European Region, the South-East Asia Region and the Western Pacific Region. All essential statistics are summarized for each of these regions and globally. However, to make clear the differences in epidemiological trends within regions, we divide the African Region into countries with low and high rates of HIV infection (high is greater than an estimated infection rate of 4% in adults aged 15–49 years). We also distinguish central from eastern Europe (countries of the former Soviet Union plus Bulgaria and Romania), and combine western European countries with the other established market economies. The countries within each of the resulting nine regions are listed in the legend to Figure 5.

**DOTS classification**

DOTS remains central to the public health approach to TB control, which is now presented as the Stop TB Strategy (Table 1). Before the launch of the strategy during 2006, NTPs reporting to WHO classified their programmes as either DOTS or non-DOTS, referring to the elements listed in Tables 2 and 3. To be classified as DOTS in this report, a country must have officially accepted and adopted the strategy in 2004, and must have implemented the four technical components of DOTS in at least part of the country (Annex 2). Based on NTP responses to standard questions about policy – and usually on further discussion with

**TABLE 4**  
**Definitions of tuberculosis cases and treatment outcomes**

### A. Definitions of tuberculosis cases

**Case of tuberculosis** A patient in whom tuberculosis has been confirmed by bacteriology or diagnosed by a clinician.

**Definite case** A patient with positive culture for the *Mycobacterium tuberculosis* complex. In countries where culture is not routinely available, a patient with 2 sputum smears positive for acid-fast bacilli (AFB+) is also considered a definite case.

**Pulmonary case** A patient with TB disease involving the lung parenchyma.

**Smear-positive pulmonary case** A patient with at least 2 initial sputum smear examinations (direct smear microscopy) AFB+; or one sputum examination AFB+ and radiographic abnormalities consistent with active pulmonary tuberculosis as determined by a clinician; or one sputum specimen AFB+ and culture positive for *M. tuberculosis*.

**Smear-negative pulmonary case** A patient with pulmonary tuberculosis not meeting the above criteria for smear-positive disease. Diagnostic criteria should include: at least 3 sputum smear examinations negative for AFB; and radiographic abnormalities consistent with active pulmonary TB; and no response to a course of broad-spectrum antibiotics; and decision by a clinician to treat with a full course of anti-TB therapy; or positive culture but negative AFB sputum examinations.

**Extrapulmonary case** A patient with tuberculosis of organs other than the lungs (e.g. pleura, lymph nodes, abdomen, genitourinary tract, skin, joints and bones, meninges). Diagnosis should be based on one culture-positive specimen, or histological or strong clinical evidence consistent with active extrapulmonary disease, followed by a decision by a clinician to treat with a full course of anti-TB chemotherapy.

Note: a patient in whom both pulmonary and extrapulmonary tuberculosis has been diagnosed should be classified as a pulmonary case.

**New case** A patient who has never had treatment for tuberculosis or who has taken anti-TB drugs for less than 1 month.<sup>a</sup>

**Relapse case** A patient previously declared cured but with a new episode of bacteriologically positive (sputum smear or culture) tuberculosis.

**Re-treatment case** A patient previously treated for tuberculosis, undergoing treatment for a new episode of bacteriologically-positive tuberculosis.

### B. Definitions of treatment outcomes

(expressed as a percentage of the number registered in the cohort)

**Cured** An initially smear-positive patient who was smear-negative in the last month of treatment and on at least one previous occasion.

**Completed treatment** A patient who completed treatment but did not meet the criteria for cure or failure.

**Died** A patient who died from any cause during treatment.

**Failed** A smear-positive patient who remained smear-positive at month 5 or later during treatment.

**Defaulted** A patient whose treatment was interrupted for 2 consecutive months or more.

**Transferred out** A patient who transferred to another reporting unit and whose treatment outcome is not known.

**Successfully treated** A patient who was cured *and* who completed treatment.

**Cohort** A group of patients in whom TB has been diagnosed, and who were registered for treatment during a specified time period (e.g. the cohort of new smear-positive cases registered in the calendar year 2003). This group forms the denominator for calculating treatment outcomes. The sum of the above treatment outcomes, plus any cases for which no outcome is recorded (e.g. still on treatment) should equal the number of cases registered. Some countries monitor outcomes among cohorts defined by smear and/or culture, and define cure and failure according to the best laboratory evidence available for each patient.

<sup>a</sup> Cases reported as "history unknown" in the European Region are included as new cases in this report.

the NTP – WHO has accepted or revised each country's own determination of its DOTS status.

### DOTS coverage

Coverage is defined as the percentage of the national population living in areas where health services have adopted DOTS. "Areas" are the lowest administrative or management units in the country (townships, districts, counties, etc). If an area (with its one or more health facilities) is considered by the NTP to have been a DOTS area in 2004, then all the cases registered and reported by the NTP in that area are considered DOTS cases and the population living within the boundaries of that area counts towards the national DOTS coverage. In some cases, treatment providers that are not following DOTS guidelines (e.g. private practitioners, or public health services outside the NTP

such as those within prisons) notify cases to the NTP. These cases are considered non-DOTS cases, even if they are notified from within DOTS areas. However, when certain groups of patients treated by DOTS services receive special regimens or management (e.g. nomads placed on longer courses of treatment), these are considered DOTS cases. Where possible, additional information about these special groups of patients is provided in the country notes in Annex 2. Ideally, the DOTS coverage in any one year should be calculated by evaluating the number of person-years covered in each quarter, and then summing across the four quarters of the year (although some countries simply report the population coverage achieved by the end of the year).

DOTS coverage calculated as described above is a crude indicator of the actual proportion of people who have access to DOTS, but it is easy to calculate and is most useful

during the early stages of DOTS expansion. As a measure of patient access to diagnosis and treatment under DOTS, coverage is an approximation, and usually an overestimate. Where countries are able to provide more precise information about access to DOTS services, this information is reported in the country notes of Annex 2. The case detection rate (defined below) is a more precise measure of DOTS implementation but is also more demanding of data.

### Estimating TB incidence, prevalence and death rates

Estimates of TB incidence, prevalence and deaths are based on a consultative and analytical process; they are revised annually to reflect new information gathered through surveillance and from special studies, such as surveys of the prevalence of infection and disease. The details of estimation are described elsewhere.<sup>1,2,3</sup> In brief, estimates of incidence (number of new cases per year) for each country are derived using one or more of four approaches, depending on the available data:

$$\text{incidence} = \frac{\text{case notifications}}{\text{proportion of cases detected}} \quad (1)$$

$$\text{incidence} = \frac{\text{prevalence}}{\text{duration of condition}} \quad (2)$$

$$\text{incidence} = \text{annual risk of infection} \times \text{Stýblo coefficient} \quad (3)$$

$$\text{incidence} = \frac{\text{deaths}}{\text{proportion of incident cases that die}} \quad (4)$$

The Stýblo coefficient in equation (3) is taken to be a constant, with an empirically derived value in the range 40–60, relating risk of infection (% per year) to the incidence of sputum smear-positive cases (per 100 000 per year). Given two of the quantities in any of these equations, we can calculate the third, and these formulae can be rearranged to estimate incidence, prevalence and death rates. The available data differ from country to country but include case notifications and death records (from routine surveillance and vital registration), and measures of the prevalence of infection and disease (from population-based surveys).

For each country, estimates of incidence for each year during the period 1995–2004 are made as follows. We first select a reference year for which we have a best estimate of incidence; this may be the year in which a survey was carried out, or the year for which incidence was first estimated. We then use the series of case notifications (all new and relapse cases) to determine how incidence changed before and after that reference year. The time series of estimated incidence rates is constructed from the notification series in one of two ways: if the rate of change of incidence is

roughly constant through time, we fit exponential trends to the notifications; if the rate varies through time (eastern Europe, central Europe and high-HIV Africa), we use a three-year moving average of the notification rates. If the notifications for any country are considered to be an unreliable guide to trend (e.g. because reporting effort is known to have changed; or because reports are clearly erratic, changing in a way that cannot be attributed to TB epidemiology), we apply the aggregated trend for all other countries from the same epidemiological region that have reliable data. For some countries (China, Indonesia and Nepal), we have used an assessment of the trend in incidence based on risk of infection derived from other sources (tuberculin surveys for China and Nepal; disease prevalence surveys for Indonesia). For those countries that have no reliable data from which to assess trends in incidence (e.g. for countries such as Iraq, for which data are hard to interpret, and which are atypical within their own regions), we assume that incidence is stable. Further details are available at [www.who.int/tb](http://www.who.int/tb).

Since most countries have not yet measured HIV infection rates in TB patients directly, we have used, for all countries, an indirect estimate derived from estimates of the HIV prevalence in the general population, and from the incidence rate ratio (the TB incidence rate in HIV-infected people divided by the incidence rate in HIV-uninfected people).<sup>2</sup>

Estimates of incidence form the denominator of the case detection rate. Trends in incidence are determined by underlying epidemiological processes, modified by control programmes.

The prevalence of TB is calculated from the product of incidence and duration of disease, and the TB mortality rate from the product of incidence and case fatality (proportion of incident cases that ever die from TB). The duration of disease and the case fatality are estimated, country by country, for patients treated within or outside DOTS programmes and for patients who receive no recognized TB treatment. Because the duration of disease and case fatality are typically shorter for patients treated under DOTS than for patients who are treated elsewhere or untreated, the average duration of disease and average case fatality decrease as the proportion of patients treated under DOTS increases.<sup>1,2,3</sup>

Where population sizes are needed to calculate TB indicators, we use the latest revision of estimates provided by

<sup>1</sup> Dye C et al. Global burden of tuberculosis: estimated incidence, prevalence and mortality by country. *Journal of the American Medical Association*, 1999, 282:677–686.

<sup>2</sup> 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.

<sup>3</sup> Dye C et al. Evolution of tuberculosis control and prospects for reducing tuberculosis incidence, prevalence, and deaths globally. *Journal of the American Medical Association*, 2005, 293:2767–2775.

the United Nations Population Division.<sup>1</sup> These estimates sometimes differ from those made by the countries themselves, some of which are based on more recent census data. The estimates of some TB indicators, such as the case detection rate, are derived from data and calculations that use only rates per capita, and discrepancies in population sizes do not affect these indicators. Where rates per capita are used as a basis for calculating numbers of TB cases, these discrepancies sometimes make a difference. Some examples of important differences are given in the country notes in Annex 2.

## Case detection

Sputum smear-positive cases are the focus of DOTS programmes because they are the principal sources of infection to others, because sputum smear microscopy is a highly specific (if somewhat insensitive) method of diagnosis, and because patients with smear-positive disease typically suffer higher rates of morbidity and mortality than smear-negative patients. As a measure of the quality of diagnosis, we calculate the proportion of new smear-positive cases out of all new pulmonary cases, which has an expected value of 65–80% in areas with negligible HIV prevalence.<sup>2</sup>

While the emphasis is on new smear-positive cases, we also present the numbers of all TB cases reported – smear-positive and smear-negative pulmonary cases – in addition to those in whom extrapulmonary disease is diagnosed. The number of cases notified in any year is given primarily as the sum of new and relapse cases, i.e. the sum of new (or presumed to be new) episodes of TB. Case reports that represent a second registration of the same patient/episode (i.e. re-treatment after failure or default) are presented separately.

The term “case detection”, as used here, means that TB is diagnosed in a patient and is reported within the national surveillance system, and then to WHO. The case detection rate is calculated as the number of cases notified divided by the number of cases estimated for that year, expressed as a percentage. Detection is presented in four main ways: (i) for new smear-positive cases (excluding relapses), (ii) for all new and relapse cases (i.e. all forms of TB), (iii) for DOTS programmes only, or (iv) for cases notified from all sources. The next section describes, as part of a special investigation carried out for this report, case detection based on diagnosis by culture. For new smear-positive cases aggregated as in (iii) and (iv):

$$\text{DOTS case detection rate} = \frac{\text{annual new smear-positive notifications (DOTS)}}{\text{estimated annual new smear-positive incidence (country)}} \quad (5)$$

$$\text{case detection rate} = \frac{\text{annual new smear-positive notifications (country)}}{\text{estimated annual new smear-positive incidence (country)}} \quad (6)$$

The target of 70% case detection applies to the DOTS case detection rate in formula (5). Even when a country is not 100% DOTS, we use the incidence estimated for the whole country as the denominator of the case detection rate, as in equation (5). The DOTS detection rate and the case detection rate for the whole country are identical when a country reports only from DOTS areas. This generally happens when DOTS coverage is 100%, but in some countries where DOTS is implemented in only part of the country, no TB notifications are received from the non-DOTS areas. Furthermore, in some countries where DOTS coverage is 100%, patients may seek treatment from non-DOTS providers, that in some cases notify TB cases to the national authorities.

Although these indices are termed “rates”, they are actually ratios. The number of cases notified is usually smaller than estimated incidence because of incomplete coverage by health services, under-diagnosis, or deficient recording and reporting. However, the calculated detection rate can exceed 100% if case-finding has been intense in an area that has a backlog of chronic cases, if there has been over-reporting (e.g. double-counting) or over-diagnosis, or if estimates of incidence are too low. If the expected number of cases per year is very low (especially if it is less than one), the case detection rate can vary markedly from year to year because of chance. Whenever this index comes close to or exceeds 100%, we attempt to investigate, as part of the joint planning and evaluation process with NTPs, which of these explanations is correct.

The ratio of the DOTS case detection rate to coverage is an estimate of the case detection rate within DOTS areas (as distinct from the case detection rate nationwide), assuming that the TB incidence rate is homogeneous across counties, districts, provinces or other administrative units. The detection rate within DOTS areas should exceed 70% as DOTS coverage increases within any country. Where the value of this indicator is much lower, it is clear that the DOTS programme has been poorly implemented, at least in some parts of the designated DOTS area. Changes in the value of this ratio through time are a measure of changes in the quality of TB control, after the DOTS programme has been established.

<sup>1</sup> *World population prospects – the 2004 revision*. New York, United Nations Population Division, 2005.

<sup>2</sup> *Tuberculosis handbook*. Geneva, World Health Organization, 1998 (WHO/TB/98.253).

## Comparison of methods for evaluating case detection

Since sputum smear microscopy is an insensitive method of diagnosing pulmonary TB, and since culture and other new diagnostic methods are likely to be used more frequently in the near future, we have continued to explore alternative methods of evaluating case detection and the outcome of treatment.<sup>1</sup>

We compared case detection rates based on smears and cultures in two steps. First, by examining the results of smears and cultures for individual patients with pulmonary TB in 25 European countries, we obtained an estimate of the proportion of culture-positive patients that are also smear-positive. Second, we used this estimate in the following formula to derive culture-positive incidence rates for European countries:

$$\text{culture-positive incidence} = \frac{\text{smear-positive incidence}}{\text{proportion culture-positive patients that are also smear-positive}} \quad (7)$$

These estimated incidence rates are the denominators of the culture-positive case detection rates for countries in the European region. The numerators are the numbers of pulmonary TB patients reported to be positive by culture.

Broadening the analysis, we also compared the smear-positive detection rates (for countries in the European and other regions) with the detection rates of all laboratory-confirmed cases of TB (i.e. smear-positive and/or culture-positive) and the detection rates of all cases of TB (new and relapse, pulmonary and extrapulmonary, diagnosed by smear, culture, radiography or by clinical examination).

## Outcomes of treatment

Treatment success in DOTS programmes is the percentage of new smear-positive patients that are cured (negative on sputum smear examination), plus the percentage that complete a course of treatment, without bacteriological confirmation of cure (Table 4). Cure and completion are among the six mutually exclusive treatment outcomes.<sup>2</sup> The sum of cases assigned to these outcomes, plus any additional cases registered but not assigned to an outcome, adds up to 100% of cases registered (i.e. the treatment cohort).

We also compare the number of new smear-positive cases registered for treatment (for this report, in 2003) with the number of cases notified as smear-positive (also in 2003). All notified cases should be registered for treatment, and the numbers notified and registered should therefore be the same (discrepancies arise, for example, when subnational reports are not received at national level).

<sup>1</sup> A comparison of treatment outcomes evaluated by smear and culture conversion is in *Global tuberculosis control. WHO report 2001*. Geneva, World Health Organization, 2001 (WHO/CDS/TB/2001.287), p.22.

<sup>2</sup> *Treatment of tuberculosis: guidelines for national programmes*. 3rd ed. Geneva, World Health Organization, 2003 (WHO/CDS/TB/2003.313).

If the number registered for treatment is not provided, we take as the denominator for treatment outcomes the number notified for that cohort year. If the sum of the six outcome categories is greater than the number registered (or the number notified), we use this sum as the denominator.

The number of patients presenting for a second or subsequent course of treatment, and the outcome of further treatment, are indicative of NTP performance and levels of drug resistance. We present in this report the numbers of patients registered for re-treatment, and the outcomes of re-treatment, for each of three registration categories: re-treatment after relapse, failure and default. However, some countries do not yet compile data on cases registered for re-treatment after failure and default separately at national level. Furthermore, some countries do not have outcome data for each of these re-treatment case categories.

The assessment of treatment outcomes for a given calendar year always lags case notifications by one year, to ensure that all patients registered during that calendar year have completed treatment. A DOTS country must report treatment outcomes, unless it is newly-classified as DOTS, in which case it would take an additional year to report outcomes from the first cohort of patients treated.

NTPs should ensure high treatment success before expanding case detection. The reason is that a proportion of patients given less than a fully-curative course of treatment remain chronically infectious and continue to spread TB. Thus DOTS programmes must be shown to achieve high cure rates in pilot projects before attempting countrywide coverage.

## DOTS implementation and planning

The information on DOTS implementation and planning presented and analysed in this report reflects activities carried out mostly between July 2004 and June 2005. Country plans and activities are monitored through several mechanisms, including direct discussion with NTP managers, analysis of the responses to a questionnaire on DOTS implementation and planning sent by WHO to all HBCs during 2005, e-mail and telephone communications with NTPs, consultation with international technical agencies, monitoring missions, comprehensive programme reviews, applications to the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), regional NTP managers' meetings and the annual DOTS Expansion Working Group Meeting of the Stop TB Partnership. In writing this report, WHO staff worked closely with NTP managers of the 22 HBCs to:

- assess main national TB control activities carried out and planned, focusing on improving political commitment, expanding access to DOTS, strengthening laboratory and diagnostic services, ensuring human resource development, strengthening drug management, and improving programme monitoring and supervision;

- summarize the progress made by the end of 2005 in implementing, or scaling up, national plans for DOTS expansion;
- identify challenges to reaching the targets for case detection and treatment success;
- determine the status of collaborative TB/HIV activities;
- assess levels of drug resistance and activities planned to address MDR-TB, including mechanisms of drug-resistance surveillance, MDR-TB diagnosis and treatment policies, and the availability of second-line anti-TB drugs;
- identify barriers faced by poor and disadvantaged communities in accessing services for TB diagnosis and treatment;
- describe the contribution of TB control activities to the strengthening of health systems;
- determine the status of additional strategies to expand DOTS, including community participation in TB care, advocacy, communication and social mobilization (ACSM) strategies, and public-private mix (PPM) approaches;
- review and revise the list of partners supporting DOTS implementation and expansion.

A questionnaire (posted at [www.who.int/tb](http://www.who.int/tb)) on DOTS implementation and expansion was sent by e-mail to NTP managers of the 22 HBCs in July 2005. The questionnaire was structured around the components of the Stop TB Strategy (Table 2) and included questions on: general DOTS expansion, including major activities carried out and planned; health system strengthening and TB control; human resource (HR) development; laboratory and diagnostic services; community TB care; PPM-DOTS; collaborative TB/HIV activities; drug management; drug resistance surveys and treatment of MDR-TB; the GFATM; ACSM; TB and poverty; and national coordination activities. The questionnaire did not include the sixth component of the Stop TB Strategy on enabling and promoting research.

Country profiles were developed from the responses to questionnaires, and from reports on monitoring missions and programme reviews. Additional information and clarifications were obtained from NTP staff and collaborating technical agencies by e-mail and telephone.

### Collaborative TB/HIV activities

The WHO policy on collaborative TB/HIV activities<sup>1</sup> describes ways in which HIV and TB control programmes can collaborate to their mutual benefit, with the emphasis on three areas. First, organizational structures should be put in place to plan and manage collaborative TB/HIV activities. Second, people should be screened for TB when they test positive for HIV and again whenever they attend the health services; if they have active disease they should be treated

for TB; if they have latent but not active TB they should be offered isoniazid preventive therapy (IPT). Third, all TB patients should be offered HIV counselling and testing; if they are HIV positive, they should be offered co-trimoxazole preventive therapy (CPT) and should be assessed for, and if necessary started on, antiretroviral therapy (ART). HIV testing, and provision of CPT or ART may be done at any time during TB treatment. Information and advice on HIV prevention should be given to all TB patients. Indicators for monitoring and evaluating collaborative TB/HIV activities are available from WHO.<sup>2</sup>

In the TB/HIV section of the standard WHO data collection form, NTP managers or their correspondents were asked if they had a national policy of HIV testing for TB patients in 2004 and asked to report on the number of TB patients who were tested for HIV, the number who tested positive for HIV, and those who started CPT and ART in 2003. For 41 countries<sup>3</sup> with a high burden of HIV-positive TB cases, the TB/HIV section of the data collection form was expanded, and included questions about screening for TB and provision of IPT among people with HIV in 2003 (posted at [www.who.int/tb](http://www.who.int/tb)). The data were reviewed at WHO regional offices and headquarters, and inconsistencies or missing data were discussed with the national correspondent.

### Surveillance and management of drug resistance

Data on the prevalence of drug resistance among TB patients are collected through the WHO/IUATLD Global Project on Antituberculosis Drug Resistance Surveillance (Global DRS Project), which began in 1994.<sup>4</sup> The project carries out surveys of drug resistance, using established and agreed methods, among patients who present to clinics, hospitals and other health institutions. The profiles of the 22 HBCs (Annex 1) contain estimates of the national prevalence of MDR-TB among both new and previously-treated TB patients, based on survey data for those countries participating in the Global DRS Project and for which data

<sup>1</sup> *Interim policy on collaborative TB/HIV activities*. Geneva, World Health Organization, 2004 (WHO/HTM/TB/2004.330; WHO/HTM/HIV/2004.1; available at [http://whqlibdoc.who.int/hq/2004/WHO\\_HTM\\_TB\\_2004.330.pdf](http://whqlibdoc.who.int/hq/2004/WHO_HTM_TB_2004.330.pdf)).

<sup>2</sup> *A guide to monitoring and evaluation for collaborative TB/HIV activities*. Geneva, World Health Organization, 2004 (WHO/HTM/TB/2004.342 and WHO/HIV/2004.09; available at [http://whqlibdoc.who.int/hq/2004/WHO\\_HTM\\_TB\\_2004.342.pdf](http://whqlibdoc.who.int/hq/2004/WHO_HTM_TB_2004.342.pdf)).

<sup>3</sup> These 41 countries are the focus of intensified efforts to implement collaborative TB/HIV activities: Angola, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, China, Congo, Côte d'Ivoire, Djibouti, Democratic Republic of the Congo, Ethiopia, Ghana, Haiti, India, Indonesia, Kenya, Lesotho, Malawi, Mali, Mozambique, Myanmar, Namibia, Nigeria, Russian Federation, Rwanda, Sierra Leone, South Africa, Sudan, Swaziland, Thailand, Togo, Uganda, Ukraine, United Republic of Tanzania, Viet Nam, Zambia, Zimbabwe.

<sup>4</sup> The WHO/IUATLD Global Project on Anti-tuberculosis Drug Resistance Surveillance. *Anti-tuberculosis drug resistance in the world. Third global report*. Geneva, World Health Organization, 2003 (WHO/HTM/TB/2004.343). More information about the project can be found at: [www.who.int/tb/dots/dotsp/surveillance/en/index.html](http://www.who.int/tb/dots/dotsp/surveillance/en/index.html)

are considered reliable. For those countries that have not carried out surveys, or that do not have representative data on previously-treated cases, the figures given in the country profiles are estimates based on a regression model described in detail elsewhere.<sup>1,2</sup>

Besides the survey data available from the Global DRS Project, many NTPs also compile information on drug susceptibility testing (DST) carried out as part of their routine surveillance activities, and they record the number of patients with MDR-TB. We therefore asked NTPs this year, for the first time, to provide the following information via the standard data collection form (part 3):

- The number of laboratory-confirmed cases of MDR-TB that were identified among new and re-treatment TB patients diagnosed in 2004.
- The number of new and re-treatment patients, registered in 2004, who received DST at the start of treatment.
- The number of new and re-treatment patients who were identified as MDR-TB cases based on DST at the start of treatment.

Drawing on information from all these sources, this report summarizes the number and status of drug resistance surveys carried out for the Global DRS Project, and compares the estimates of MDR-TB prevalence derived from these surveys with those measured by routine surveillance.

WHO has a global policy for managing MDR-TB, and facilitates access to second-line anti-TB drugs through the Green Light Committee (GLC). Projects approved by the GLC have access to quality-assured, second-line drugs at reduced prices and benefit from independent external monitoring. This report also lists the GLC-approved projects that had been established by 2005.

In addition to the standard data collection form, the questionnaire on DOTS implementation (see above) sent to HBCs provided further information on plans for DRS and MDR-TB diagnosis and treatment, and identified the principal obstacles to implementing these activities.

## Financing TB control

Financial analysis was introduced into the annual WHO report on global tuberculosis control in 2002.<sup>3</sup> The main developments in this year's report are (a) to include analysis of whether increased funding for TB control has resulted in an increase in the number of cases detected and treated in DOTS programmes, and (b) to compare funding needs based on data reported by countries with the funding needs set out in the Global Plan.<sup>4</sup> The report has eight objectives:

- For each HBC, and for all HBCs combined, to present and assess total NTP budgets and expenditures for the period 2002–2006, with breakdowns by funding source and line item.

- For each HBC and for all HBCs combined, to present and assess total TB control costs<sup>5</sup> for the period 2002–2006, with breakdowns by funding source and line item.
- For each HBC, to estimate and compare per patient costs, budgets and available funding for the period 2002–2006 and per patient expenditures for 2002–2004.
- For each HBC, to assess whether increased spending on TB control is resulting in an increase in the number of cases detected and treated in DOTS programmes.
- For the HBCs, to summarize progress in financing for TB control by categorizing countries according to financial criteria.
- To assess the contribution of the GFATM to funding for TB control.
- For countries other than the HBCs, to quantify NTP budgets, total TB control costs and funding gaps in 2006.
- For the HBCs and other countries, to compare funding needs based on data reported by countries with the funding needs set out in the Global Plan.

## Data collection

We collected data from four main sources: NTPs, the WHO-CHOICE team,<sup>6</sup> GFATM proposals and databases, and previous WHO reports in this series. In 2005, data were collected directly from countries by means of a two-page questionnaire included in the standard WHO data collection form. NTP managers were asked to complete three tables. The first two tables required a summary of the NTP budget for fiscal years 2005 and 2006 in US\$, broken down by line item and funding source (including a column for funding gaps). The third table requested NTP expenditure data for 2004, broken down by line item and source of funding. The form also requested information about infrastructure dedicated to TB control and the way in which general health infrastructure is used for TB control (for example, the number of dedicated TB beds that exist, the number of outpatient visits that patients need to make to a health facility during treatment and the average number of days for which patients are hospitalized). We also asked for

<sup>1</sup> Dye C et al. Worldwide incidence of multidrug-resistant tuberculosis. *Journal of Infectious Diseases* 2002, 185:1197–1202.

<sup>2</sup> Zignol M et al. Global incidence of multidrug-resistant tuberculosis [submitted for publication].

<sup>3</sup> *Global tuberculosis control: surveillance, planning, financing. WHO report 2002*. Geneva, World Health Organization, 2002 (WHO/CDS/TB/2002.295).

<sup>4</sup> *The Global Plan to Stop TB, 2006–2015*. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.35).

<sup>5</sup> i.e. including costs not reflected in NTP budget data.

<sup>6</sup> The WHO-CHOICE (Choosing Interventions that are Cost-Effective) team conducts work on the costs and effects of a wide range of health interventions.

an estimate of the number of patients that would be treated in 2005 and 2006. We used a costing database developed by the WHO-CHOICE team to identify the average costs, in local currency units, of a hospital bed-day and an outpatient clinic visit in every country. These were converted into US\$ using exchange rate data provided in the *IMF Financial statistics yearbook*.<sup>1</sup>

## Data entry and analysis

### High-burden countries

Data entry and analysis focused on the 22 HBCs. We created a standardized workbook, with one worksheet for each country. Additional worksheets were included for summary analyses and for the data required as inputs to the country-specific analyses (e.g. notification data, unit costs for bed-days and outpatient clinic visits). For each country worksheet, seven tables were created:

- NTP budget by source of funding for each year 2002–2006, with the funding sources defined according to the 2005 data collection form, i.e. government (excluding loans), loans, GFATM, grants (excluding GFATM) and budget gap.
- NTP budget by line item for each year 2002–2006, with the line items defined according to the 2005 data collection form, i.e. first-line drugs, second-line drugs, dedicated NTP staff, initiatives to increase case detection and cure rates, collaborative TB/HIV activities, buildings/equipment/vehicles and other.
- NTP expenditures by source of funding for 2002–2004, with funding sources as defined for NTP budgets.
- NTP expenditures by line item for 2002–2004, with line items as defined for NTP budgets.
- Total TB control costs by funding source for each year 2002–2006, with funding sources as defined for NTP budgets.
- Total TB control costs by line item for each year 2002–2006, with the line items defined as NTP budget items, hospitalization and clinic visits.
- Per patient costs, NTP budget, available funding, expenditures and budget for first-line drugs.

Budget data for 2005 and 2006 were taken from the 2005 data collection form. Budget data for 2002–2004 were taken from the 2005 annual report. Expenditure data for 2002, 2003 and 2004 were based on the 2003, 2004 and 2005 data collection forms, respectively. Total TB control costs were estimated by adding costs for hospitalization and outpatient clinic visits to either NTP expenditures (for 2002–2004) or NTP budgets (for 2005–2006).<sup>2</sup> Expenditures were used in preference to budgets for 2002–2004 because they reflect actual costs, whereas budgets can be higher than actual expenditures (for example, when large

budgetary funding gaps exist or the NTP does not spend all the available funding). When expenditures are known for 2005 and 2006, they will be used instead of budget data to calculate, retrospectively, the total cost of TB control in these years. For some HBCs, expenditures were not available for 2002–2004. When this was the case, we estimated expenditures based on available funding, which was calculated as the total budget minus the funding gap.

The total cost of outpatient clinic visits was estimated in two steps. First, the unit cost (in US\$) of a visit was multiplied by the average number of visits required per patient (estimated on the WHO data collection form), to give the cost per patient treated. This was done separately for (a) new smear-positive cases and (b) new smear-negative and extrapulmonary cases. Second, we multiplied the cost per patient treated by the number of patients notified (for 2002–2004) or the number of patients that the NTP projects will be treated (for 2005–2006). The total costs for the two categories of patient were then summed. The cost of hospitalization was generally calculated in the same way, replacing the unit cost of a clinic visit with the unit cost of a bed-day. The procedure differed for eight countries that have dedicated TB beds and where the total cost of these beds is higher than when the total cost is estimated by multiplying bed-days per patient by the number of patients treated (this applied to Bangladesh, Brazil, Cambodia, India, Myanmar, the Russian Federation, the United Republic of Tanzania and Zimbabwe). We assumed that all clinic visits and hospitalization are funded by the government, because staff and facility infrastructure are the major inputs included in the unit cost estimates and these are typically not funded by donors.

Per patient costs, budgets, available funding and expenditures were calculated by dividing the relevant total by the number of cases notified (for 2002–2004) and the number of patients that the NTP projects will be treated (for 2005–2006). Since the total costs of TB control for 2002–2004 were based on expenditure data, it is possible for the total TB control cost per patient treated to be less than the NTP budget per patient treated when the funding gap is large or there is an important budgetary under-spend. In addition, for 2002–2004, expenditures per patient were sometimes higher than the available funding per patient. This can occur when the NTP budget funding gap is reduced after the reporting of budget data to WHO (since available funding is estimated as the total budget minus the funding gap). To try to eliminate this problem, from 2005 the data collection form allows countries to update budget data reported in the previous round of data collection (for

<sup>1</sup> *International financial statistics yearbook*. Washington, DC, International Monetary Fund, 2003.

<sup>2</sup> The exception was South Africa, because no data on hospitalization and clinic visits, or on NTP budgets, were provided in the data collection form. Costs were therefore estimated based on recent costing studies, as described in the country profile (Annex 1).

example in the 2005 round of data collection, countries were able to update 2005 budget data originally reported in 2004).

All data are reported in nominal prices (i.e. they have not been adjusted for inflation) rather than constant prices (i.e. all data are adjusted to a common year of prices) for two reasons. First, this means that values reported in the 2002–2005 reports in this series do not have to be adjusted, which makes it easier for country staff to review the data for previous years. Second, the adjustment only makes a small difference to the numbers reported (about 8% to 2002 values and less for other years). However, as data are collected for an increasing number of years, presentation of data in constant prices will be necessary.

Once the data were entered, any queries were discussed with NTP staff and the appropriate WHO regional and country office and a final set of charts was produced. Four of these charts appear in the profiles for each country at Annex 1: NTP budget by funding source, NTP budget by line item, total TB control costs by line item, and per patient costs, budgets, available funding, expenditures and budget for first-line drugs. These charts were chosen because they illustrate the most important trends in financing. A full set of charts and data is available upon request. In some instances, the review process led to revisions to data included in previous annual reports. For this reason, figures sometimes differ from those reported in the 2002–2005 reports.

To assess whether increased spending on TB control has resulted in an increase in the number of cases detected and treated in DOTS programmes, we compared total NTP expenditures and total TB control costs in 2003 and 2004 with the total number of TB cases treated in DOTS programmes in 2003 and 2004 for all HBCs for which the necessary data existed (not all countries have reported expenditure data for both years). The relationship between the change in total expenditures and total costs and the change in the total number of cases treated was explored.

Finally, we compared the total costs of TB control with total government health expenditure to estimate the percentage of total government health expenditure that is used for TB control.<sup>1</sup> We also explored the association between GNI (gross national income) per capita in 2004 and (a) government contributions to total NTP budgets and TB

control costs, and (b) the cost per patient treated. Data on GNI per capita were taken from *World development indicators 2005*.<sup>2</sup>

### Other countries

For countries other than the HBCs, we used the data provided on the 2005 data collection form to assess NTP budgets by region in 2006, and compared these data with the budgets reported by the HBCs. Only countries that submitted complete data of sufficient quality (e.g. subtotals and totals were consistent by both line item and funding source) were used.

### GFATM contribution to TB control

We evaluated GFATM funding for both HBCs and other countries, as announced after the first five rounds of funding. We assessed total approved funding at the end of 2005, disbursements to the end of 2005, the time taken between approval of a proposal and the signature of grant agreements, and the time taken between the signing of the grant agreement and the first disbursement of funds.

### Country reports compared with the Global Plan

The data collected from countries through the annual WHO questionnaire allowed us to estimate total TB control costs in the 22 HBCs and 52 other countries in 2006. These costs should reflect actual country plans for TB control. An important question is whether these costs are in line with the Global Plan,<sup>3</sup> which provides costing projections for each year 2006–2015 for 7 regions that collectively comprise 172 countries. Differences may occur if the intervention coverage and rates of scale-up planned by countries in 2006 are more or less ambitious than the projections included in the Global Plan, and if country-specific budget development is based on input prices that are more or less than the average regional prices used in the Global Plan. To make fair comparisons, we grouped countries according to the regions used in the Global Plan. We adjusted Global Plan cost estimates according to the fraction of regional cases accounted for by the countries reporting data and, where relevant, adjusted unit prices so that they reflected prices in the subset of 74 countries being considered.

<sup>1</sup> See [www.who.int/nha/country/en](http://www.who.int/nha/country/en)

<sup>2</sup> Consulted in December 2005: [devdata.worldbank.org/data-query](http://devdata.worldbank.org/data-query)

<sup>3</sup> *The Global Plan to Stop TB, 2006–2015*. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.35).

# Results

## Monitoring progress in TB control Countries reporting to WHO

By the end of 2004, 200 (95%) of 211 countries and territories reported case notifications for 2004 and/or treatment outcomes for patients registered in 2003 (Annex 2). These countries include 99.9% of the world's population. Reports were submitted by all 22 HBCs.

## Case notifications and incidence estimates

The 200 countries reporting to WHO in 2004 notified 4.9 million new and relapse cases, of which 2.2 million (46%) were new smear-positive (Table 5; Figure 1). Among these notifications, 4.4 million were from DOTS areas, including 2.1 million new smear-positives. A total of 21.5 million new and relapse cases, and 10.7 million new smear-positives, were notified by DOTS programmes between 1995 and

2004. Based on surveillance and survey data, we estimate that there were 8.9 million new cases of TB in 2004 (140 per 100 000), including 3.9 million (62 per 100 000) new smear-positive cases (Table 6; Figures 2, 3).

Comparing different parts of the world, the African Region (24%), South-East Asia Region (35%) and Western Pacific Region (24%) together accounted for 83% of all notified new and relapse cases and similar proportions of new smear-positive cases in 2004. Since DOTS emphasizes diagnosis by sputum smear microscopy, 47% of all new and relapse cases were new smear-positive (45–60% expected) in DOTS areas, compared with 30% elsewhere. Among new pulmonary cases reported by DOTS programmes, 58% were new smear-positive (55–70% expected), compared with 40% elsewhere (Table 5).

The ranking of countries by number of incident TB cases has given prominence to the 22 HBCs, but the magnitude

**TABLE 5**  
**Case notifications, 2004**

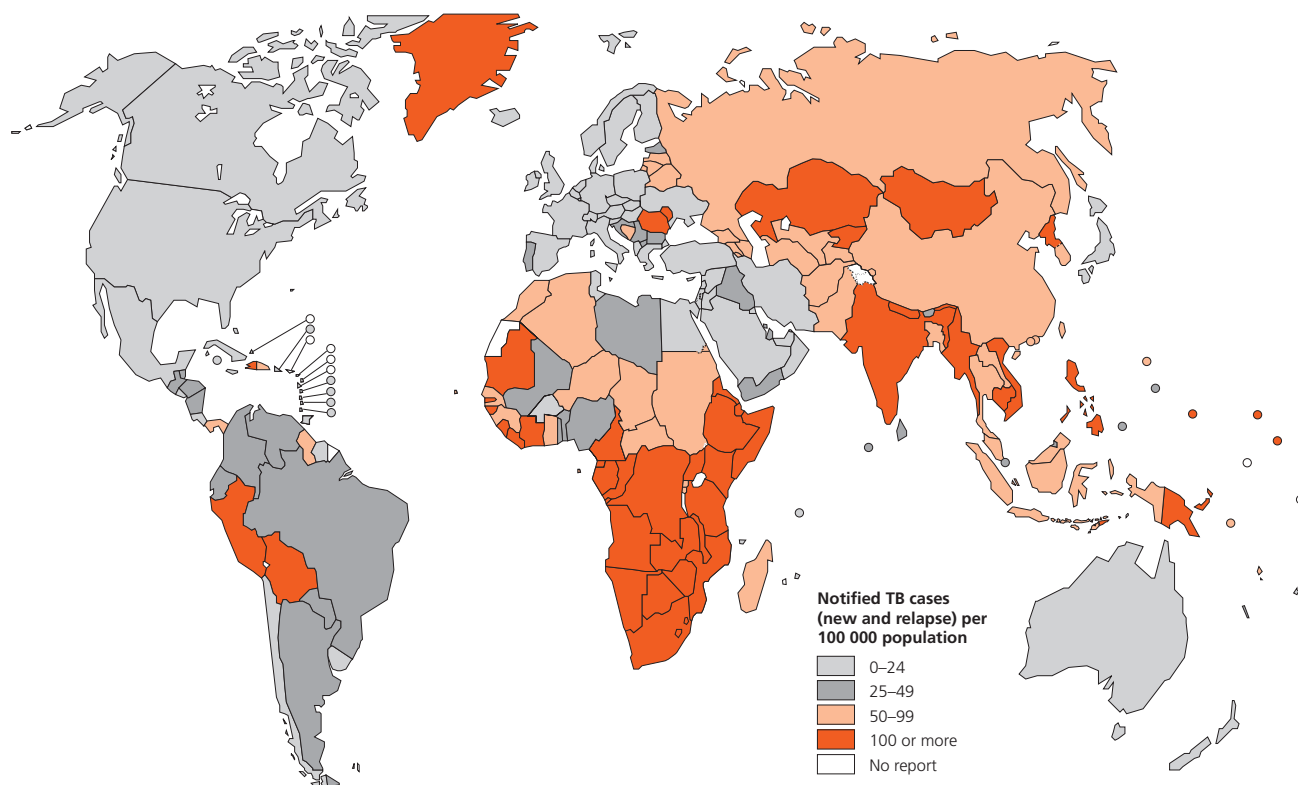
	NEW AND RELAPSE CASES		NEW CASES						RE-TREATMENT CASES EXCLUDING RELAPSE		OTHER <sup>a</sup>		% OF NEW PULMONARY CASES SMEAR-POSITIVE <sup>b</sup>	
			SMEAR-POSITIVE		SMEAR-NEGATIVE/ UNKNOWN		EXTRAPULMONARY		DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY
	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY	DOTS	WHOLE COUNTRY						
1 India	1 053 364	1 136 506	465 354	489 031	381 198	432 862	144 471	151 263	136 112	139 492	—	—	55	53
2 China	763 035	790 603	377 546	384 886	269 226	284 433	37 566	39 395	85 409	86 459	7 592	7 830	58	58
3 Indonesia	210 229	—	128 981	—	76 981	—	4 267	—	4 429	—	—	—	63	—
4 Nigeria	57 246	—	33 755	—	20 134	—	1 876	—	1 940	—	307	—	63	—
5 South Africa	256 667	264 183	114 227	117 971	66 547	68 923	39 797	40 718	14 762	15 077	—	—	63	63
6 Bangladesh	98 234	—	62 500	—	23 871	—	8 630	—	—	—	—	—	72	—
7 Pakistan	101 562	—	33 746	—	50 311	—	15 476	—	3 280	—	—	—	40	—
8 Ethiopia	123 127	—	41 430	—	37 119	—	42 477	—	1 096	—	—	—	53	—
9 Philippines	130 530	—	78 163	—	47 937	—	1 275	—	79	—	—	—	62	—
10 Kenya	100 573	—	41 167	—	41 220	—	14 949	—	5 245	—	—	—	50	—
11 DR Congo	93 336	—	62 192	—	9 229	—	18 359	—	1 907	—	669	—	87	—
12 Russian Federation	35 204	121 426	9 926	30 890	20 002	83 614	2 774	4 420	2 374	31 012	—	—	33	27
13 Viet Nam	98 389	—	58 389	—	17 106	—	16 218	—	773	—	—	—	77	—
14 UR Tanzania	62 512	—	25 823	—	21 591	—	13 320	—	3 153	—	—	—	54	—
15 Uganda	43 721	—	20 986	—	17 674	—	3 469	—	891	—	—	—	54	—
16 Brazil	44 230	86 881	22 532	42 881	13 349	26 186	5 619	11 781	2 299	4 974	—	—	63	62
17 Afghanistan	18 404	—	8 273	—	5 437	—	3 800	—	—	—	—	—	60	—
18 Thailand	55 306	—	28 421	—	18 088	—	7 093	—	—	—	—	—	61	—
19 Mozambique	31 150	—	17 058	—	8 830	—	3 950	—	522	—	—	—	66	—
20 Zimbabwe	56 162	—	14 581	—	31 610	—	7 996	—	4 956	—	—	—	32	—
21 Myanmar	96 662	—	31 408	—	34 332	—	26 216	—	2 769	—	—	—	48	—
22 Cambodia	30 838	—	18 978	—	5 800	—	5 415	—	267	—	—	—	77	—
<b>High-burden countries</b>	<b>3 560 481</b>	<b>3 807 580</b>	<b>1 695 436</b>	<b>1 771 510</b>	<b>1 217 592</b>	<b>1 363 288</b>	<b>425 013</b>	<b>442 363</b>	<b>272 263</b>	<b>308 321</b>	<b>8 568</b>	<b>8 806</b>	<b>58</b>	<b>57</b>
AFR	1 154 428	1 173 743	529 956	541 849	349 337	353 688	205 962	208 110	44 303	45 203	2 231	—	60	61
AMR	175 100	235 187	95 663	126 289	42 173	59 509	25 354	33 581	9 481	12 686	1 333	1 359	69	68
EMR	240 146	243 232	96 776	96 971	81 131	82 848	54 627	55 798	3 992	—	—	—	54	54
EUR	163 167	354 954	50 690	92 233	77 982	161 595	22 226	36 944	21 401	59 680	221	498	39	36
SEAR	1 602 810	1 686 903	755 121	779 172	566 530	618 597	205 140	212 089	151 922	155 314	134	180	57	56
WPR	1 097 378	1 161 201	560 632	579 594	370 103	400 509	73 346	81 372	88 645	92 095	9 218	11 272	60	59
<b>Global</b>	<b>4 433 029</b>	<b>4 855 220</b>	<b>2 088 838</b>	<b>2 216 108</b>	<b>1 487 256</b>	<b>1 676 746</b>	<b>586 655</b>	<b>627 894</b>	<b>319 744</b>	<b>368 970</b>	<b>13 137</b>	<b>15 540</b>	<b>58</b>	<b>57</b>

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

<sup>a</sup> Cases not included elsewhere in table.

<sup>b</sup> Expected percentage of new pulmonary cases that are smear-positive is 65–80%.

**FIGURE 1**  
Tuberculosis notification rates, 2004



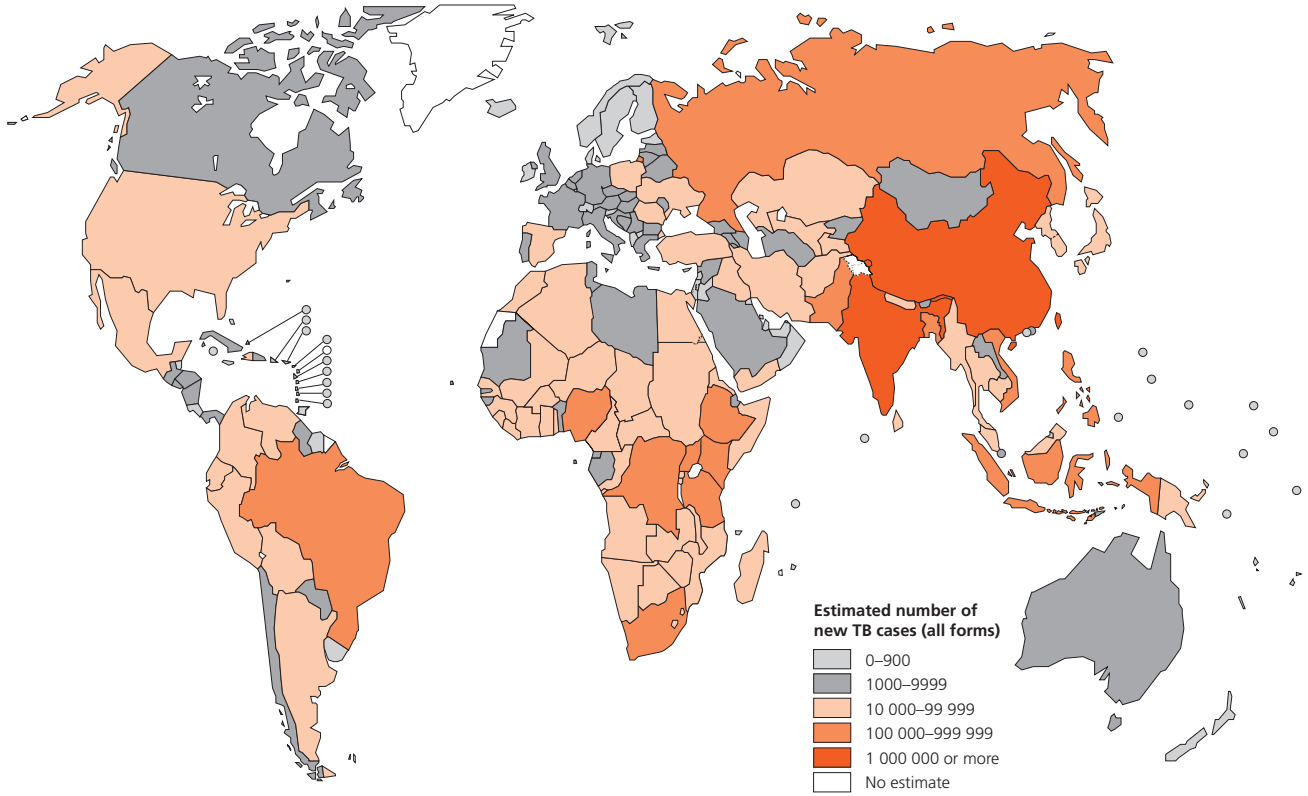
**TABLE 6**  
Estimated TB burden, 2004

	POPULATION 1000s	INCIDENCE <sup>a</sup>				PREVALENCE		MORTALITY		HIV PREV. IN INCIDENT TB CASES <sup>b</sup> %
		ALL FORMS	SMEAR-POSITIVE	PER 100 000 POP	PER 100 000 POP PER YEAR	ALL FORMS	PER 100 000 POP PER YEAR	ALL FORMS	PER 100 000 POP PER YEAR	
1 India	1 087 124	1 824	168	815	75	3 394	312	329	30	5.2
2 China	1 307 989	1 325	101	595	46	2 892	221	217	17	0.9
3 Indonesia	220 077	539	245	242	110	606	275	101	46	0.9
4 Nigeria	128 709	374	290	161	125	684	531	106	82	27
5 South Africa	47 208	339	718	138	293	316	670	64	135	60
6 Bangladesh	139 215	319	229	144	103	606	435	70	51	0.1
7 Pakistan	154 794	281	181	126	81	509	329	63	40	0.6
8 Ethiopia	75 600	267	353	116	154	403	533	60	79	21
9 Philippines	81 617	239	293	108	132	378	463	39	48	0.1
10 Kenya	33 467	207	619	89	266	297	888	45	133	29
11 DR Congo	55 853	204	366	89	159	308	551	44	79	21
12 Russian Federation	143 899	166	115	74	51	231	160	30	21	6.8
13 Viet Nam	83 123	147	176	66	79	193	232	19	22	3.0
14 UR Tanzania	37 627	131	347	55	147	180	479	29	78	36
15 Uganda	27 821	112	402	49	175	180	646	26	92	19
16 Brazil	183 913	110	60	48	26	141	77	14	7.8	17
17 Afghanistan	28 574	95	333	43	150	189	661	26	92	0.0
18 Thailand	63 694	91	142	40	63	132	208	12	19	8.5
19 Mozambique	19 424	89	460	37	191	123	635	25	129	48
20 Zimbabwe	12 936	87	674	35	271	87	673	20	151	68
21 Myanmar	50 004	85	171	38	76	90	180	10	21	7.1
22 Cambodia	13 798	70	510	31	226	98	709	13	94	13
<b>High-burden countries</b>	<b>3 996 465</b>	<b>7 102</b>	<b>178</b>	<b>3 140</b>	<b>79</b>	<b>12 037</b>	<b>301</b>	<b>1 362</b>	<b>34</b>	<b>0.0</b>
AFR	721 955	2 573	356	1 098	152	3 741	518	587	81	33
AMR	880 036	363	41	161	18	466	53	52	5.9	10
EMR	530 359	645	122	289	55	1 090	206	142	27	2.4
EUR	881 211	445	50	199	23	575	65	69	7.8	4.7
SEAR	1 632 982	2 967	182	1 327	81	4 965	304	535	33	3.9
WPR	1 740 099	1 925	111	865	50	3 765	216	307	18	1.4
<b>Global</b>	<b>6 386 642</b>	<b>8 918</b>	<b>140</b>	<b>3 939</b>	<b>62</b>	<b>14 602</b>	<b>229</b>	<b>1 693</b>	<b>27</b>	<b>13</b>

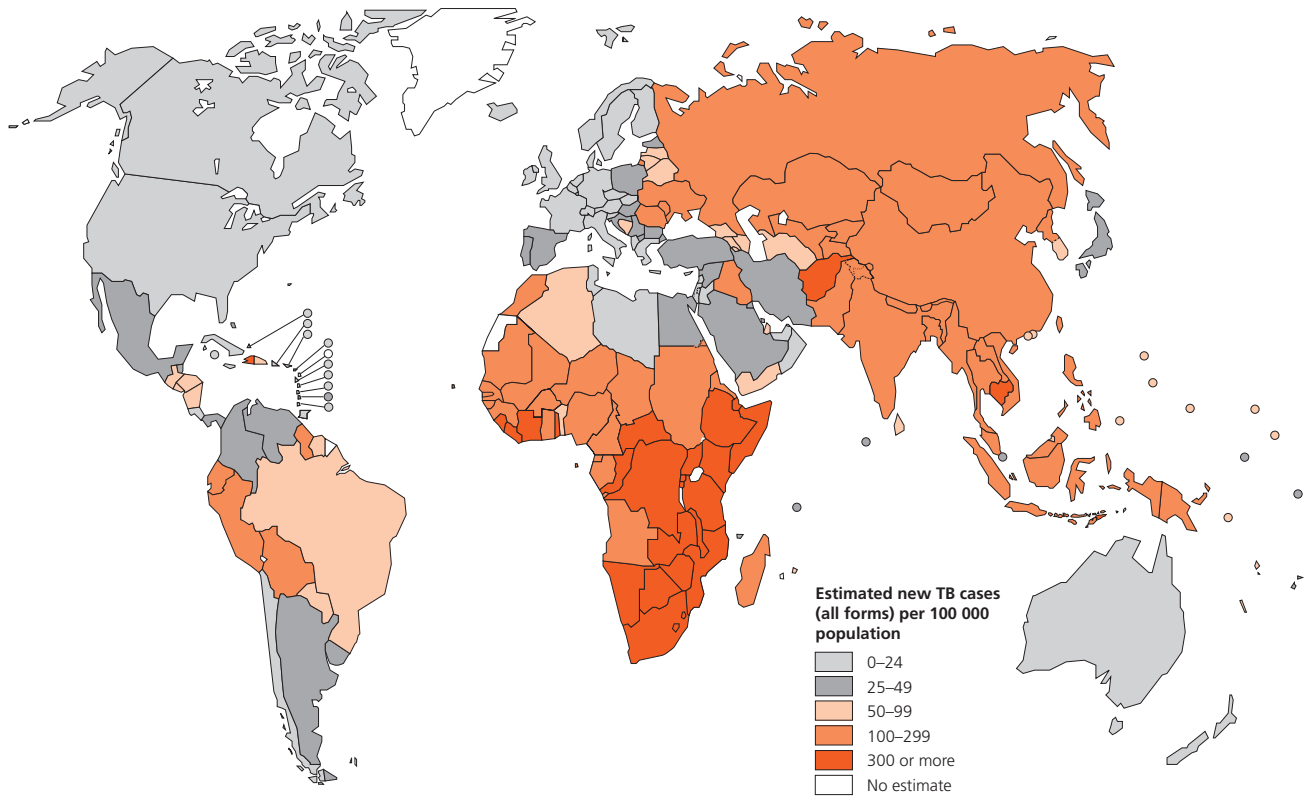
<sup>a</sup> All estimates include TB in people with HIV.

<sup>b</sup> Prevalence of HIV in incident TB cases in adults aged 15–45 years.

**FIGURE 2**  
**Estimated number of new TB cases, 2004**



**FIGURE 3**  
**Estimated TB incidence rates, 2004**



of the TB burden in individual countries can also be expressed as the incidence rate per capita. Among the 15 countries with the highest estimated TB incidence rates per capita, 11 are in Africa (Figure 4).

Using the 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 rate (all forms) for nine epidemiologically different regions of the world (which are subdivisions of the six WHO regions) for the period 1990 to 2004. In six of these regions, the incidence rate was stable or falling (Figure 5). As reported in 2005, 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 rates of HIV infection, incidence has been driven upwards by the spread of HIV, but the rate of increase has fallen from a maximum exceeding 14% per year in the early 1990s to less than 3% per year by 2004 (Figure 5). In African countries with lower rates of HIV infection, TB incidence has increased more slowly (1–2% per year), but there are no signs that the increase is slowing. Where HIV infection rates are higher in adult populations, they are also estimated to be higher among new TB patients. Figure 6 maps the distribution of HIV among TB patients, showing the relatively high rates in countries of eastern and southern Africa.

In eastern Europe, the rate of increase reached nearly 14% annually by 1995, but the increase appears to have

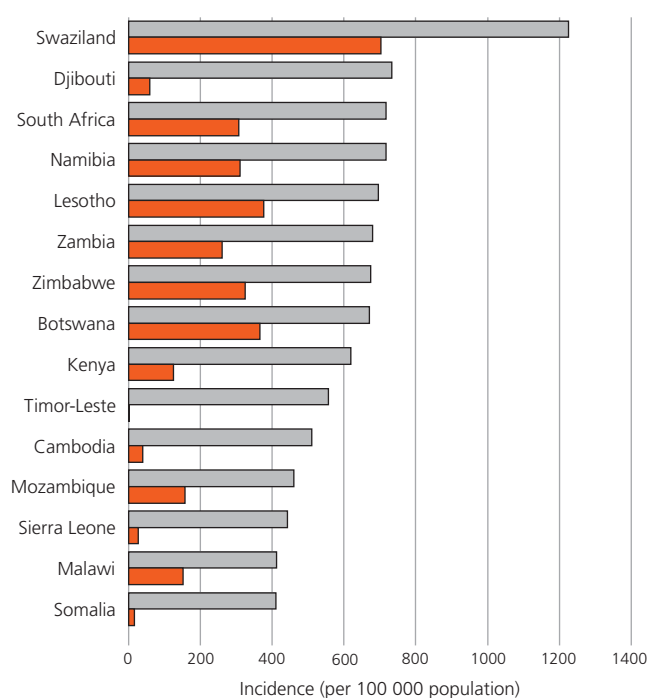
halted around year 2000, and incidence is once again in decline. The resurgence of TB in eastern Europe during the 1990s has been associated with (but primarily not caused by) relatively high rates of MDR-TB among new and previously treated patients.

Worldwide, the incidence rate of TB was growing at a maximum of 1.2% per year in 1997, but at 0.6% per year by 2004 (Figure 5).

### DOTS coverage

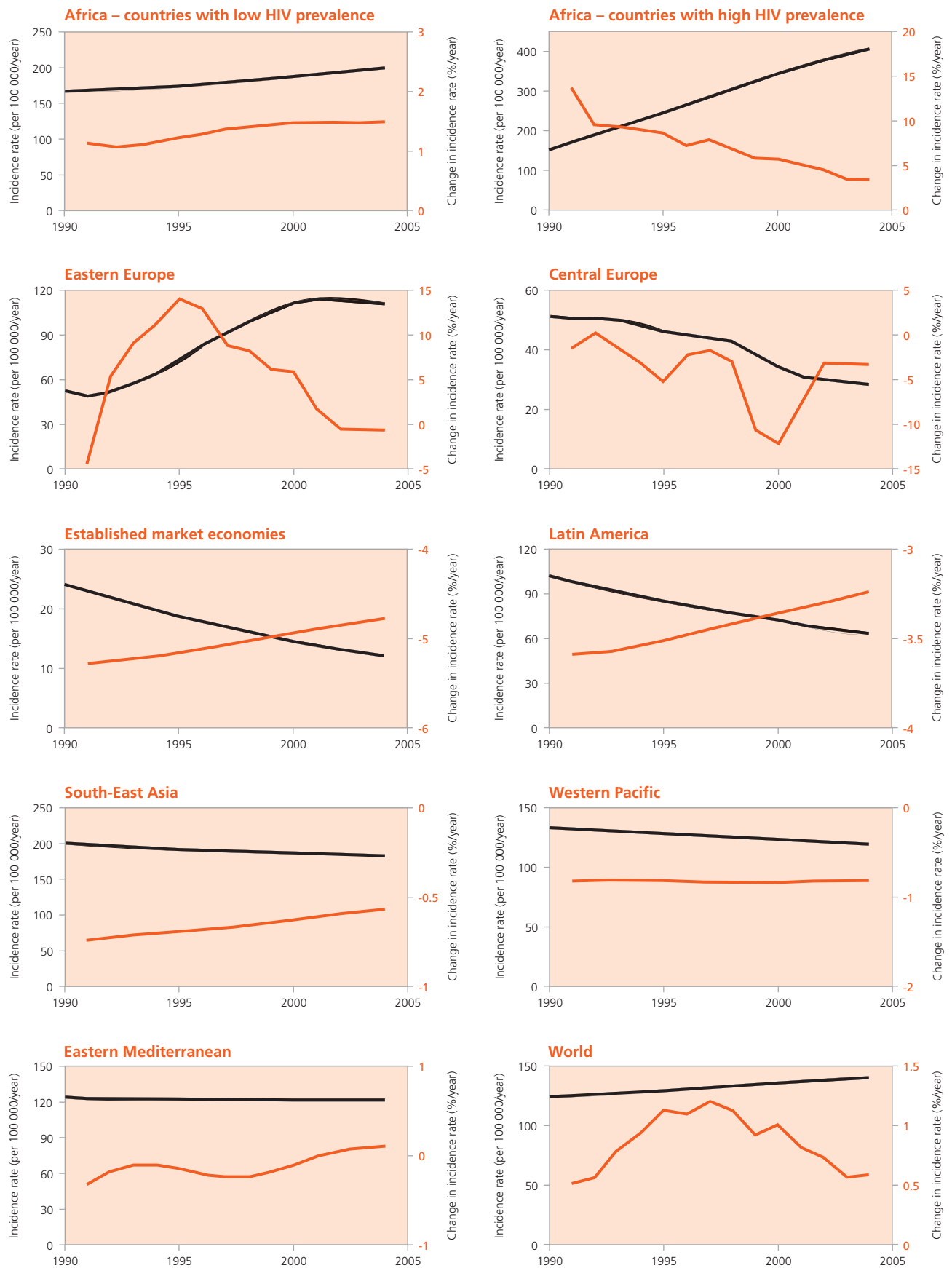
The total number of countries implementing DOTS increased steadily since 1995 and is approaching a limit at 183 in 2004 (Figure 7). All 22 HBCs have had DOTS programmes since 2000, many of which have been established for much longer. DOTS coverage within countries has steadily increased since 1995 (Figure 8; Table 7). By the end of 2004, 83% 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 80% in all regions except Europe (Figure 9).

**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 (red bars), 2004

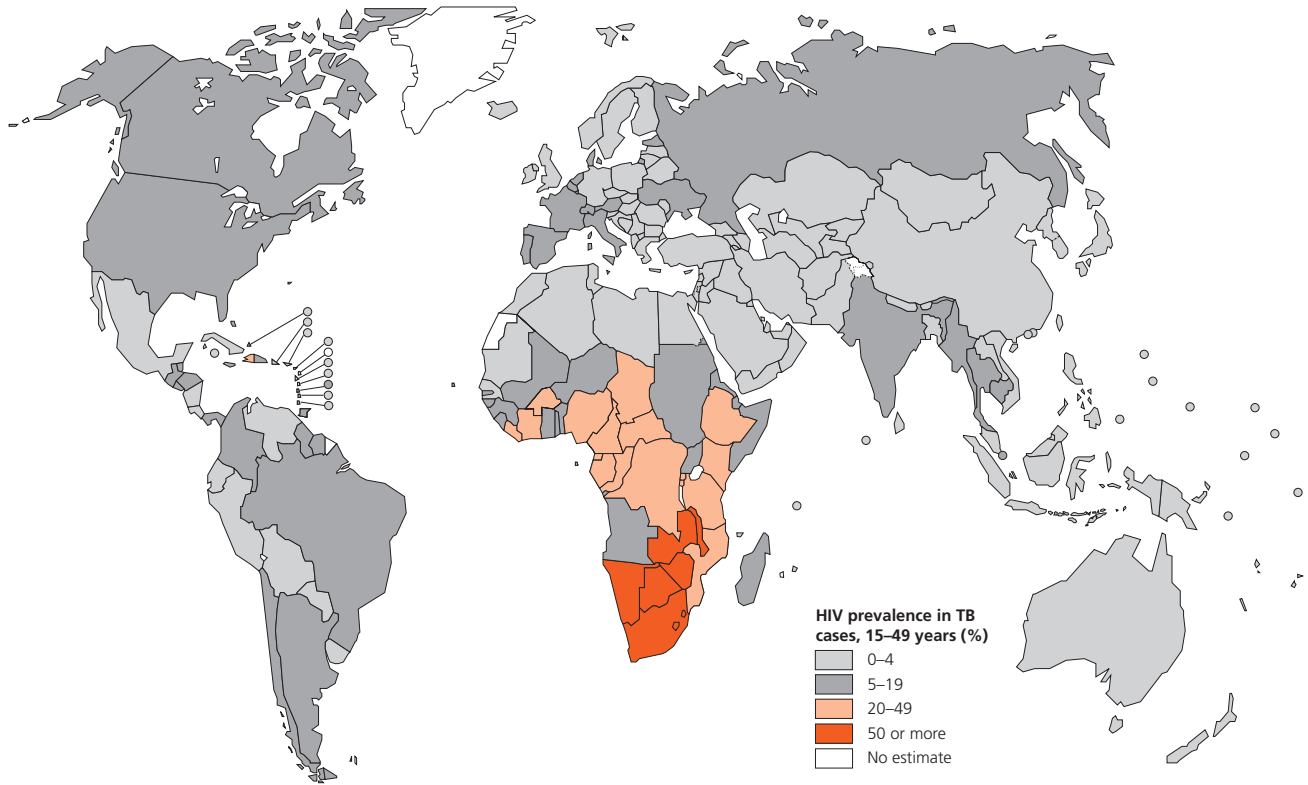


**FIGURE 5**  
**Africa – high HIV:** Botswana, Burkina Faso, Burundi, Cameroon, Central African Rep, Chad, Congo, Côte d'Ivoire, DR Congo, Ethiopia, Equatorial Guinea, Gabon, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Swaziland, Uganda, UR Tanzania, Zambia, Zimbabwe. **Africa – low HIV:** Algeria, Angola, Benin, Cape Verde, Comoros, Eritrea, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Togo. **Central Europe:** Albania, Bosnia & Herzegovina, Croatia, Cyprus, Hungary, Poland, Serbia & Montenegro, 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, 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, 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. **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.

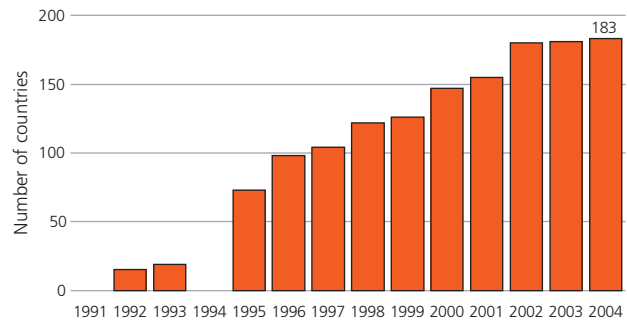
**FIGURE 5**  
Trends in estimated TB incidence rates (all forms, black lines), and the annual change in incidence rates (red lines), for nine groups of countries and the world, 1990–2004



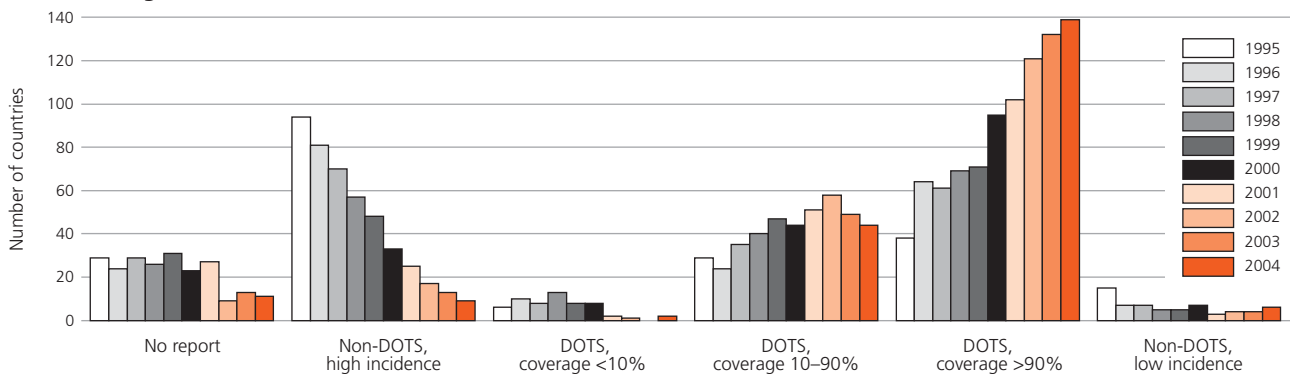
**FIGURE 6**  
Estimated HIV prevalence in new adult TB cases, 2004



**FIGURE 7**  
Number of countries implementing DOTS (out of a total of 211 countries), 1991-2004



**FIGURE 8**  
DOTS coverage, 1995-2004



**TABLE 7**  
**Progress in DOTS implementation, 1995–2004**

	PERCENT OF POPULATION COVERED BY DOTS									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1 India	1.5	2	2.3	9	13.5	30	45	51.6	67.2	84.0
2 China	49	60.4	64.2	63.9	64	68	68	77.6	91	96
3 Indonesia	6	13.7	28.3	80	90	98	98	98	98	98
4 Nigeria	47	30	40	45	45	47	55	55	60	65
5 South Africa	—	0	13	22	66	77	77	98	99.5	93
6 Bangladesh	40.5	65	80	90	90	92	95	95	99	99
7 Pakistan	2	8	—	8	8	9	24	45	63	79
8 Ethiopia	39	39	48	64.4	63	85	70	95	95	70
9 Philippines	4.3	2	15	16.9	43	89.6	95	98	100	100
10 Kenya	15	100	100	100	100	100	100	100	100	100
11 DR Congo	47	51.4	60	60	62	70	70	70	75	75
12 Russian Federation	—	2.3	2.3	5	5	12	16	25	25	45
13 Viet Nam	50	95	93	96	98.5	99.8	99.8	99.9	100	100
14 UR Tanzania	98	100	100	100	100	100	100	100	100	100
15 Uganda	—	0	100	100	100	100	100	100	100	100
16 Brazil	—	0	0	3	7	7	32	25	33.6	52
17 Afghanistan	—	—	12	11	13.5	15	12	38	53	67.9
18 Thailand	—	1.1	4	32	59	70	82	100	100	100
19 Mozambique	97	100	84	95	—	100	100	100	100	100
20 Zimbabwe	—	0	0	100	11.6	100	100	100	100	100
21 Myanmar	—	59	60	60.3	64	77	84	88.3	95	95
22 Cambodia	60	80	88	100	100	99	100	100	100	100
<b>High-burden countries</b>	<b>24</b>	<b>32</b>	<b>36</b>	<b>43</b>	<b>46</b>	<b>55</b>	<b>61</b>	<b>68</b>	<b>79</b>	<b>87</b>
AFR	43	46	56	61	56	71	69	81	85	84
AMR	12	48	50	55	65	68	73	73	78	83
EMR	16	12	18	33	50	66	71	77	86	90
EUR	5.4	8.2	17	22	23	26	32	40	42	47
SEAR	6.6	12	16	29	36	49	60	66	77	89
WPR	43	55	57	58	57	67	68	77	90	94
<b>Global</b>	<b>22</b>	<b>32</b>	<b>37</b>	<b>43</b>	<b>47</b>	<b>57</b>	<b>62</b>	<b>69</b>	<b>77</b>	<b>83</b>

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

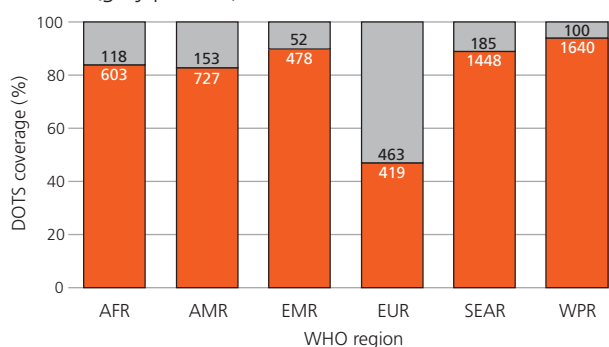
### Case detection

The 4.9 million new and relapse cases of TB notified in 2004 represent 54% of the 8.9 million estimated new cases; the 2.2 million new smear-positive cases notified account for 56% of the 3.9 million estimated (Tables 5, 6). The detection rate of all TB cases, from DOTS and non-DOTS programmes, remained approximately stable from 1995 to 2001, but increased between 2002 and 2004 (Figure 10b). The detection rate of new smear-positive cases from all sources slowly increased from 1995 to 2001, and then more quickly from 2002 to 2004 (Figure 10a). The increase from 2002 to 2004 is attributable mostly to increases in the numbers of new smear-positive cases reported in the South-East Asia and Western Pacific regions.

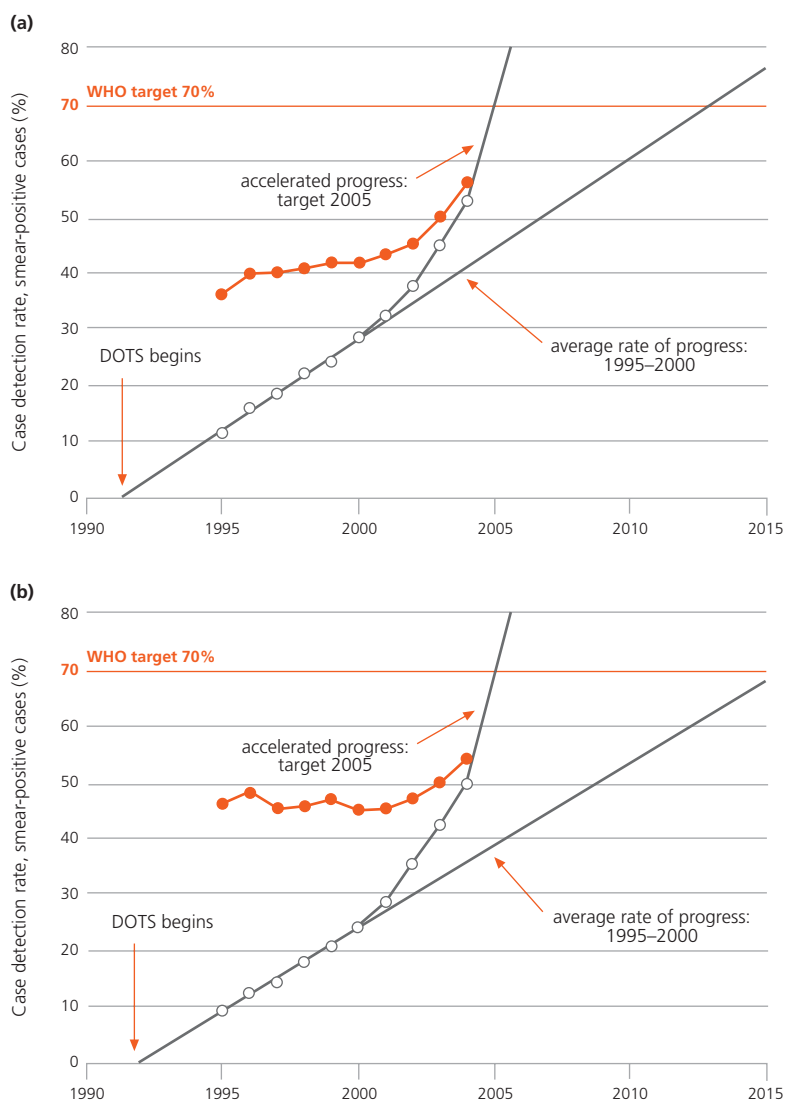
DOTS programmes detected an estimated 50% of all new and relapse cases and 53% of new smear-positive cases in 2004. The detection rate achieved by DOTS programmes, of both smear-positive and all TB cases, has accelerated sharply since 2000, rising more quickly than the overall (DOTS and non-DOTS) case detection rate (Figure 10). The key observation in relation to the WHA target is that DOTS case detection increased from 45% in 2003 to 53% in 2004 – an additional 350 000 new smear-positive cases – the largest annual increase so far reported. In order

**FIGURE 9**  
**DOTS coverage by WHO region, 2004**

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 (red portion) or outside (grey portion) DOTS areas.



**FIGURE 10**  
**Progress towards the 70% case detection target.** (a) Open circles mark the number of 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 with the increment from 2003 to 2004 of about 350 000 cases; the steeper line represents a higher increment of approximately 716 000 cases needed to reach the 70% target in 2005 (horizontal line). 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 and relapse cases.



to reach the target of 70% by the end of 2005, DOTS programmes must find 2 805 000 new smear-positive cases during 2005; that is, 716 000 more than the 2004 total.

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 94% in 2004. Thus, almost all (91%) TB cases reported to WHO in 2004 were reported by DOTS programmes.

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 64% by 2004 (Figure 11). Similarly, the detection rate within DOTS areas in the HBCs was roughly stable from 1997 to 2001 (average 48%), but increased to 62% in 2004, mostly because of improvements in Bangladesh, Brazil, China, India, Indonesia, Myanmar and the Philippines (Figure 11).

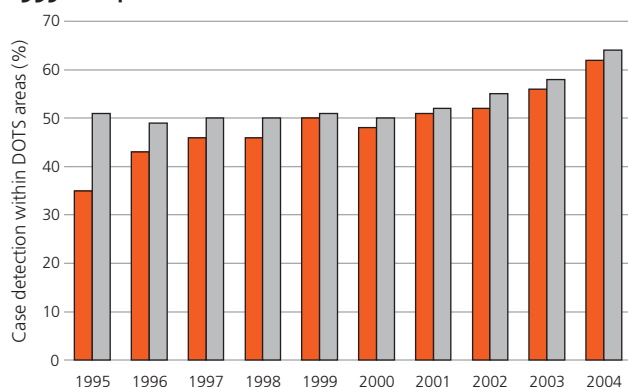
Returning to national detection rates, and comparing the WHO regions, new smear-positive case detection rates by DOTS programmes in 2004 were lowest in the European (26%) and Eastern Mediterranean regions (33%) and highest in the Region of the Americas (59%) and the Western Pacific Region (65%; Figure 12, Table 8).

The rate of improvement in case detection by DOTS programmes has been roughly the same in the African Region, the Eastern Mediterranean Region and the European Region. None of these three regions is on course to reach the 70% target by the end of 2005.

Case-finding in the South-East Asia Region has been accelerating since 1998, mainly as a result of the rapid implementation of DOTS in India, supported by improvements more recently in Bangladesh, Indonesia and Myanmar. There were marked increases in case detection in the Region of the Americas and the Western Pacific Region between 2003 and 2004 attributable mostly to improvements, respectively, in Brazil and China. If the rate of improvement in case-finding is maintained in these three regions, all will reach the 70% target by the end of 2005.

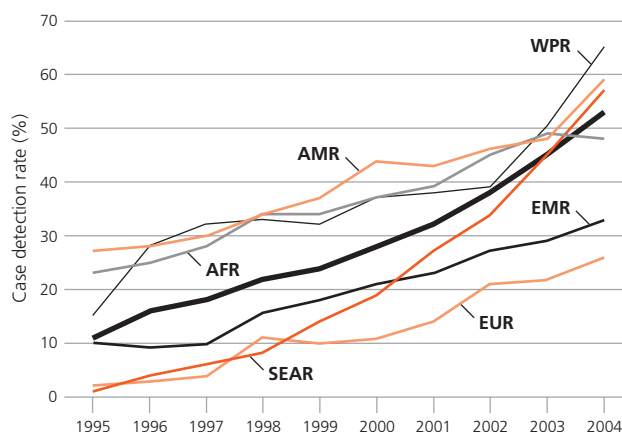
In the Region of the Americas and the European Region, significant numbers of smear-positive cases were reported, as usual, from outside DOTS programmes. In the Region of

**FIGURE 11**  
Smear-positive case detection rate within DOTS areas<sup>a</sup> for high-burden countries (red) and the world (grey), 1995–2004



<sup>a</sup> Calculated as DOTS case detection rate of new smear-positive cases divided by DOTS coverage.

**FIGURE 12**  
Smear-positive case detection rate by DOTS programmes, by WHO region, 1995–2004. Heavy line shows global DOTS case detection rate.



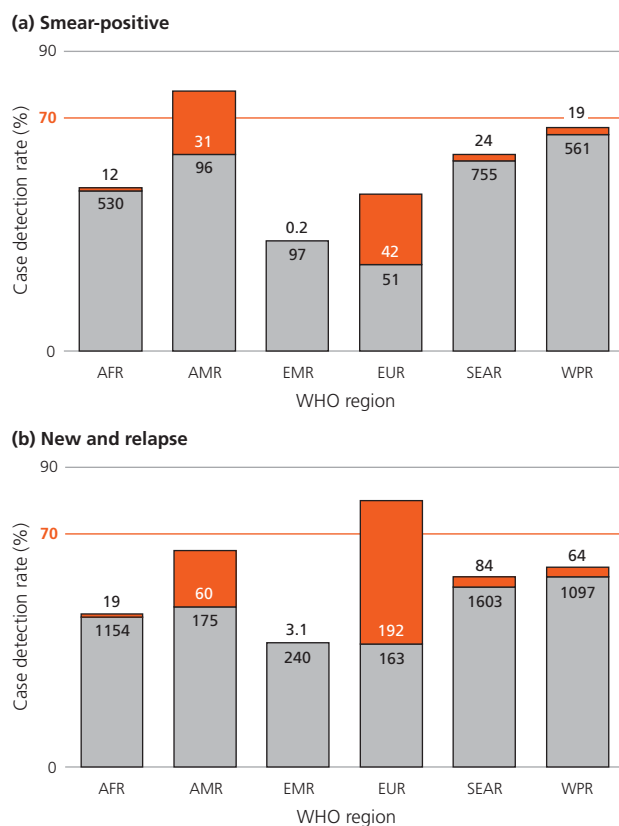
**TABLE 8**  
Case detection rate of new smear-positive cases (%), 1995–2004

	DOTS PROGRAMMES										WHOLE COUNTRY									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1 India	0.3	0.9	1.1	1.7	7.0	12	24	31	45	57	38	41	38	38	46	46	49	50	54	60
2 China	15	28	32	32	29	31	31	30	43	63	22	34	39	33	33	34	34	32	45	65
3 Indonesia	1.3	4.4	7.4	12	19	20	22	31	38	53	12	*	*	*	*	21	*	*	*	*
4 Nigeria	11	12	11	12	13	14	14	13	18	21	*	*	*	*	*	*	17	15	*	*
5 South Africa	—	—	6.0	21	63	65	68	86	92	83	41	68	79	85	83	79	79	87	92	85
6 Bangladesh	7.0	15	19	24	25	26	28	32	38	44	16	22	25	28	28	28	29	33	*	*
7 Pakistan	1.0	1.8	—	3.7	2.0	2.8	5.3	13	17	27	2.5	*	—	14	5.5	*	9	13	*	*
8 Ethiopia	15	20	22	24	25	33	34	35	36	36	*	*	*	*	25	*	*	*	*	*
9 Philippines	0.4	0.5	3.2	10	20	48	57	61	68	73	96	87	80	68	71	64	*	*	*	*
10 Kenya	56	57	53	57	55	46	49	48	47	46	*	*	*	*	*	51	*	*	*	*
11 DR Congo	42	48	45	56	54	52	57	56	64	70	46	*	*	*	*	*	*	*	*	*
12 Russian Federation	—	0.4	0.9	0.9	1.6	4.4	5.0	6.6	8.3	13	68	66	60	56	27	33	32	35	38	42
13 Viet Nam	30	59	78	83	83	82	83	87	85	89	59	77	*	85	83	*	*	*	*	*
14 UR Tanzania	56	55	52	53	51	48	47	44	45	47	*	*	*	*	*	*	*	*	*	*
15 Uganda	—	—	57	57	56	49	44	44	44	43	49	54	*	*	*	*	*	*	*	*
16 Brazil	—	—	—	4.1	4.0	7.6	8.0	9.6	18	47	80	79	79	81	78	79	75	83	81	89
17 Afghanistan	—	—	1.9	5.4	4.8	8.1	13	17	16	19	—	—	*	*	*	*	*	*	*	*
18 Thailand	—	0.3	5.0	21	39	46	73	65	71	71	55	46	35	*	*	*	*	*	*	*
19 Mozambique	54	49	47	47	—	45	44	45	45	46	*	*	*	*	46	*	*	*	*	*
20 Zimbabwe	—	—	—	49	47	44	44	45	41	42	48	52	55	*	*	*	*	*	*	*
21 Myanmar	—	25	26	28	32	47	56	65	73	83	25	28	28	*	*	*	57	*	*	*
22 Cambodia	40	34	44	48	53	50	48	57	61	61	*	42	*	*	*	*	*	*	*	*
<b>High-burden countries</b>	<b>8.4</b>	<b>14</b>	<b>17</b>	<b>20</b>	<b>23</b>	<b>27</b>	<b>31</b>	<b>35</b>	<b>44</b>	<b>54</b>	<b>32</b>	<b>36</b>	<b>37</b>	<b>37</b>	<b>39</b>	<b>39</b>	<b>41</b>	<b>43</b>	<b>49</b>	<b>56</b>
AFR	23	25	28	34	34	37	39	45	49	48	37	42	40	44	43	42	43	46	49	49
AMR	27	28	30	34	37	44	43	46	48	59	72	72	77	74	76	75	76	76	77	78
EMR	10	8.9	10	16	18	21	23	27	29	33	20	24	23	29	27	23	25	27	29	34
EUR	2.5	3.3	4.4	11	10	11	14	21	22	26	61	61	56	56	44	45	41	41	50	46
SEAR	1.5	4.1	5.6	8.2	14	19	27	34	45	57	29	30	30	30	38	40	43	47	51	59
WPR	15	28	32	33	32	37	38	39	50	65	36	45	48	44	44	43	43	43	52	67
<b>Global</b>	<b>11</b>	<b>16</b>	<b>18</b>	<b>22</b>	<b>24</b>	<b>28</b>	<b>32</b>	<b>38</b>	<b>45</b>	<b>53</b>	<b>36</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>42</b>	<b>42</b>	<b>43</b>	<b>45</b>	<b>50</b>	<b>56</b>

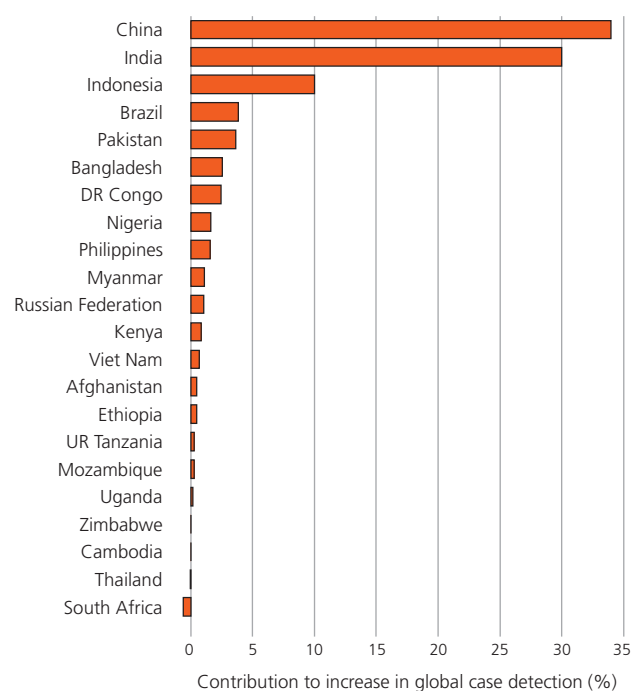
— Indicates not available.

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

**FIGURE 13**  
**Proportion of estimated new smear-positive (a) and of new and relapse cases (b) notified under DOTS (grey portion of bars) and non-DOTS (red portion of bars), 2004.** Numbers indicate the number of cases (in thousands) represented by each portion of each bar.



**FIGURE 14**  
**Contributions to the global increase in the number of new smear-positive cases notified under DOTS made by high-burden countries, 2003–2004**



the Americas, and especially in Brazil, the estimated proportion of smear-positive cases detected from all sources exceeded 70% (Table 8, Figure 13a). Thus, the target for case detection would have been reached in this region if all patients in whom TB had been diagnosed had been treated under DOTS. The Region of the Americas and the European Region also reported significant numbers of new and relapse TB cases from outside DOTS programmes, and the total detected exceeded 70% in the European Region (Figure 13b).

Of the additional new smear-positive cases reported by DOTS programmes in 2004 (compared with 2003), 34% were in China and 30% were in India (Figure 14). Although China and India have made big improvements in case detection, these two countries still account for an estimated 31% of all undetected new smear-positive cases. They are among eight countries that together account for 61% of all cases that were not detected under DOTS in 2004 (Figure 15).

### Comparison of methods for evaluating case detection

To estimate the proportion of culture-positive patients that are also smear-positive, we want, ideally, to compare smears and cultures for every patient, knowing whether each test for each patient was positive or negative. In fact, TB was diagnosed in some patients by smear but not culture, or vice versa, and the missing data could generate biased estimates. Figure 16 shows the ratio of smear-positive to culture-positive TB patients, reported from all sources in 25 countries of the European Region in 2004, where the proportion of patients that were classified by both smear and culture was (a) more than 75% ( $n = 6$ ), (b) 50% to 75% ( $n = 13$ ), or (c) less than 50% ( $n = 6$ ). Because the data in group (a) are most reliable, and because the ratios calculated for countries in groups (b) and (c) mostly do not differ significantly from those in (a),<sup>1</sup> we have used the ratio estimated from countries in group (a), which is 0.59 (95% CL  $\pm$  0.04).

This calibration ratio allows us to estimate culture-positive incidence rates (formula 7) and culture-positive case detection rates for each country, so that the latter can be compared with the smear-positive case detection rates. In the European Region, the case detection rates based on culture alone were seldom better than those based on smears, and commonly much worse. Each point in Figure 17a represents a different country, and most points lie under the line of equality. Some countries reported no culture-positive TB cases (points on horizontal axis). By contrast, the case detection rates for all laboratory-

<sup>1</sup> Outliers are Italy, Portugal, Romania, Slovakia and Switzerland. A full account of the methods underpinning this analysis is given in an unpublished technical note available from WHO: *Estimating smear-positive and culture-positive case detection rates in Europe*.

confirmed cases were not systematically different from those calculated from smears (Figure 17b).

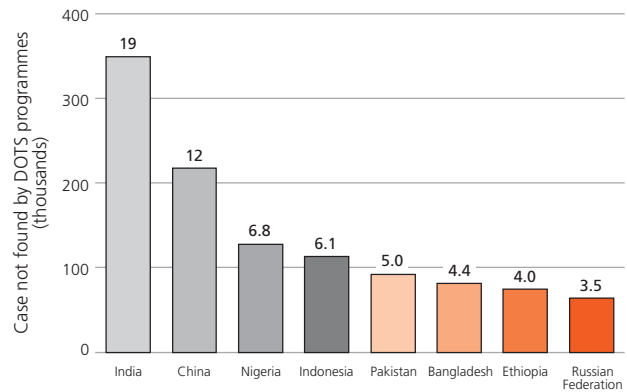
The diagnosis of all forms of TB by all methods (smear, culture, radiography, clinical examination), when compared with diagnosis by smear, shows a different pattern. The case detection rates for all TB patients in European countries are almost always higher than the detection rates based on smears (filled circles representing European countries lie above the line of equality in Figure 17c). This pattern is unique to the European Region, and different from countries in the Region of the Americas, for which points lie mostly below the line of equality in Figure 17c. Figure 17c shows, for the countries of the Americas and Europe, a difference that is also visible in the aggregated data in Figures 13a and 13b. For the other four WHO regions, there is no systematic difference between the detection rates of smear-positive and all forms of TB cases (Figure 17d).

### Outcomes of treatment

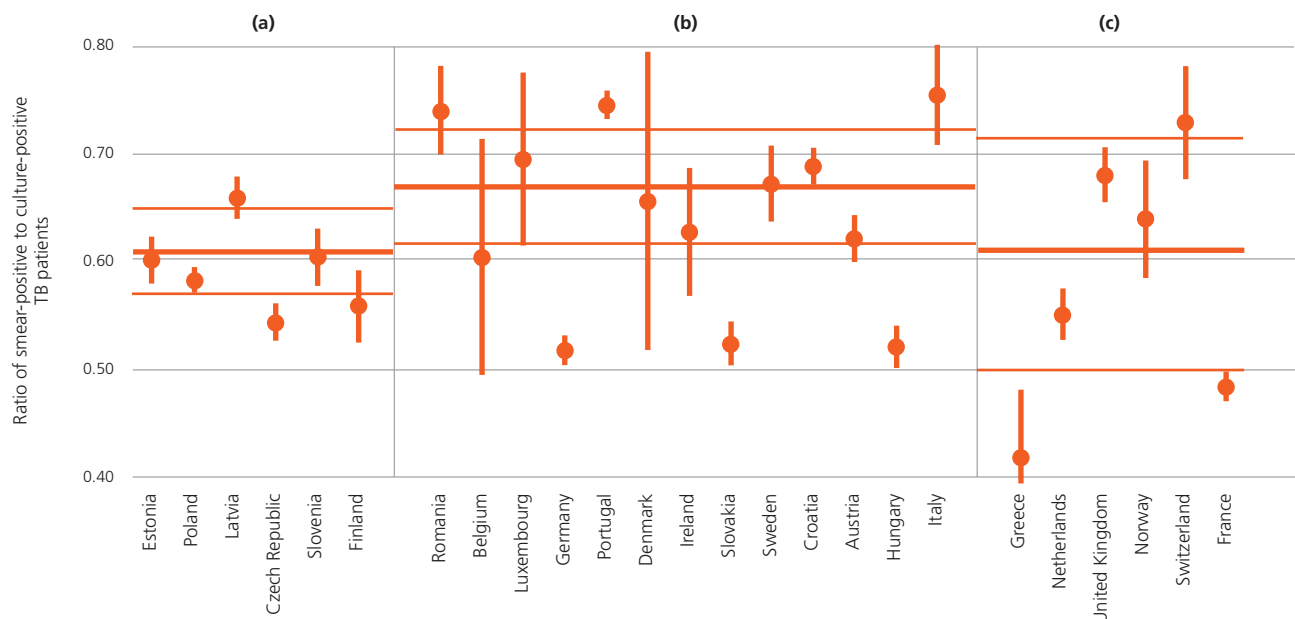
More than 1.7 million new smear-positive cases were registered for treatment in DOTS programmes in 2003, approximately the same number that were notified that year (Table 9). Discrepancies between the numbers of cases notified and registered for treatment were small globally, by region and for most HBCs, the largest differences being in Kenya, the Philippines and South Africa (Table 9).

The cure rate among all cases registered under DOTS was 75%, and a further 7% completed treatment (no laboratory confirmation of cure), giving a reported, overall treatment success rate of 82%. An estimated 36% of all

**FIGURE 15**  
**Smear-positive TB cases undetected by DOTS programmes in six high-burden countries, 2004.** Numbers indicate the proportion of all missed cases that are missed by each country.

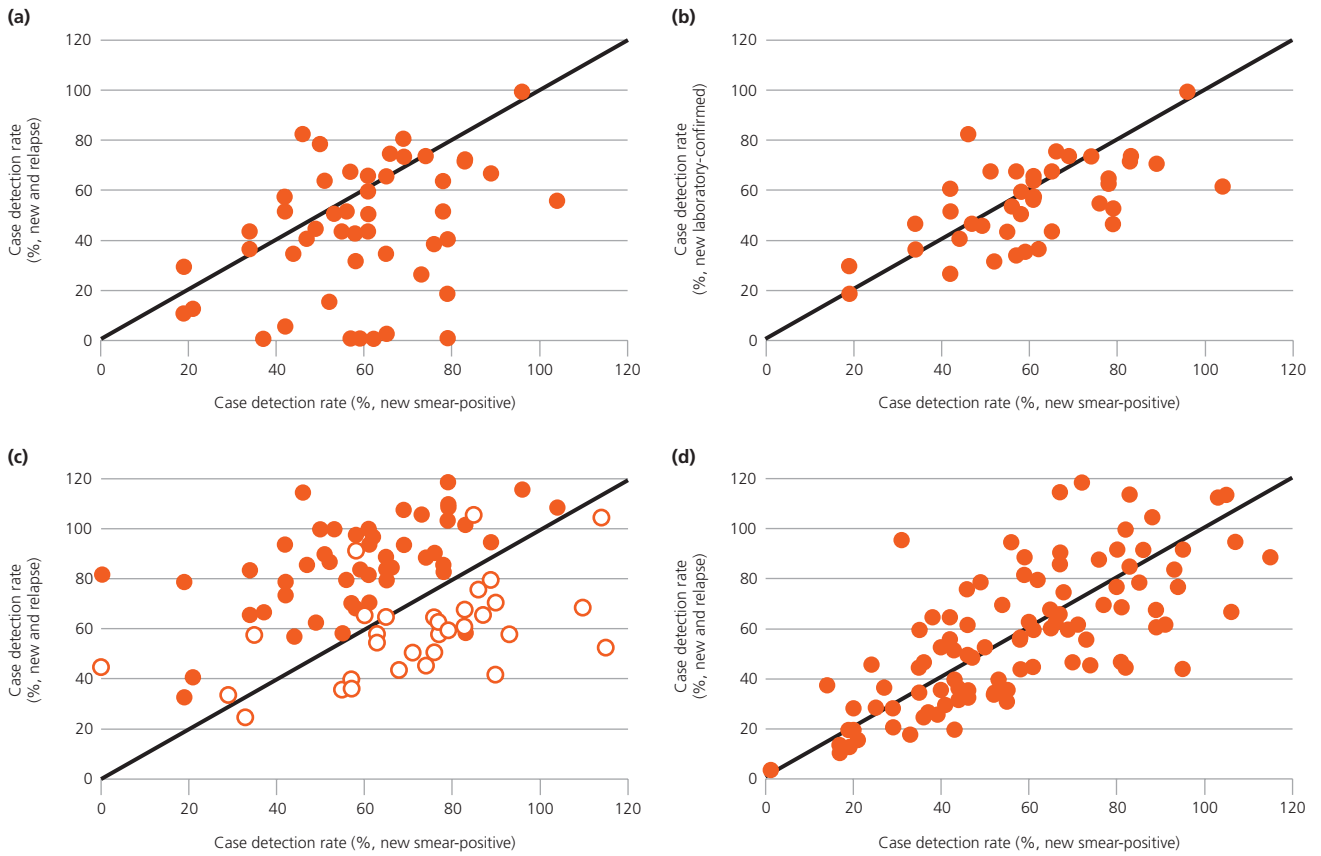


**FIGURE 16**  
**Ratio of new smear-positive to new culture-positive pulmonary TB patients in 25 European countries.** The percentage of patients that were classified by both smear and culture varied among countries: group (a), more than 75%; group (b), 50% to 75%; group (c), less than 50%. Error bars are 95% binomial errors on the estimated ratio for each country. Horizontal lines mark the mean and 95% confidence limits for countries in groups (a), (b) and (c).



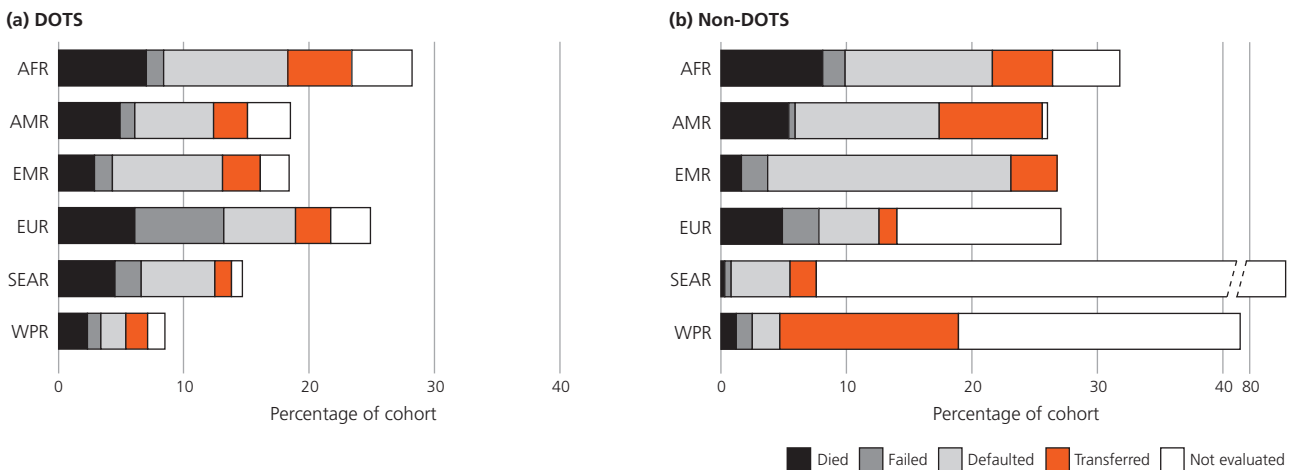
**FIGURE 17**

**Comparison of pulmonary, smear-positive case detection rates (horizontal axes) with alternative methods for evaluating case detection:** (a) pulmonary, culture-positive cases – European Region, (b) all laboratory-confirmed pulmonary cases (including smear- and culture-positive) – European Region, (c) all new and relapse cases, pulmonary and extrapulmonary – European Region (filled circles) or Region of the Americas (open circles), (d) all new and relapse cases, pulmonary and extrapulmonary – African, Eastern Mediterranean, South-East Asia and Western Pacific regions. Data are for 2004. Diagonal lines mark equal rates of case detection.



**FIGURE 18**

**Outcomes for those patients not successfully treated in (a) DOTS and (b) non-DOTS areas, by WHO region, 2003 cohort**



**TABLE 9**  
**Treatment outcomes for new smear-positive cases, DOTS strategy, 2003 cohort<sup>a</sup>**

	NOTIFIED	REGISTERED	REGST'D (%)	TREATMENT OUTCOMES (%)								TREATMENT SUCCESS (%)	% EST CASES SUCCESSFULLY TREATED UNDER DOTS
				CURED	COMPLETED TREATMENT	DIED	FAILED	DEFAULTED	TRANS-FERRED	NOT EVAL'D			
1 India	358 778	358 778	100	85	1.3	4.7	2.5	6.2	0.3	0.1	86†	39	
2 China	257 287	257 287	100	91	2.7	1.4	1.0	1.0	0.8	2.1	94†	40	
3 Indonesia	92 566	92 566	100	77	9.8	2.0	1.7	3.7	1.8	4.1	87†	33	
4 Nigeria	28 173	28 173	100	51	8.1	1.3	5.3	8.3	1.4	25	59	11	
5 South Africa	116 331	109 652	94	54	13	7.8	1.4	12	7.4	4.2	67	58	
6 Bangladesh	53 618	53 618	100	83	2.3	4.8	0.6	5.3	3.6	0.2	85†	32	
7 Pakistan	20 962	20 962	100	62	13	2.3	0.7	13	4.6	4.5	75	13	
8 Ethiopia	39 698	39 698	100	54	16	6.0	0.7	4.6	4.0	15	70	25	
9 Philippines	72 670	68 377	94	81	7.9	2.5	1.1	5.0	2.9	0.0	88†	57	
10 Kenya	38 158	34 068	89	67	13	5.1	0.2	8.8	6.0	0.0	80	34	
11 DR Congo	53 578	53 711	100	76	6.9	6.4	1.0	6.0	3.1	0.8	83	53	
12 Russian Federation	6 322	6 311	100	58	3.3	10	12	7.8	3.6	4.8	61	5.1	
13 Viet Nam	55 937	55 842	100	90	1.7	3.3	0.8	1.5	2.2	0.0	92†	79	
14 UR Tanzania	24 899	24 899	100	77	3.8	10	0.3	4.0	4.3	0.0	81	36	
15 Uganda	20 310	20 310	100	32	36	6.7	0.4	19	3.7	2.8	68	30	
16 Brazil	9 061	9 043	100	47	36	6.5	0.5	8.5	1.3	0.0	83	15	
17 Afghanistan	6 510	6 793	104	81	5.0	3.4	1.7	5.1	3.7	0.0	86†	14	
18 Thailand	28 459	28 459	100	68	4.8	9.5	1.7	8.0	3.5	4.5	73	52	
19 Mozambique	16 138	16 140	100	74	1.7	12	1.2	8.1	3.1	0.0	76	34	
20 Zimbabwe	14 488	14 488	100	61	4.4	12	0.2	12	10	0.0	66	27	
21 Myanmar	27 448	27 448	100	71	9.1	5.7	2.1	9.0	2.6	0.1	81	59	
22 Cambodia	18 923	19 098	101	90	2.6	3.5	0.2	2.1	1.4	0.0	93†	58	
<b>High-burden countries</b>	<b>1 360 314</b>	<b>1 345 721</b>	<b>99</b>	<b>78</b>	<b>5.9</b>	<b>4.4</b>	<b>1.6</b>	<b>5.7</b>	<b>2.3</b>	<b>2.3</b>	<b>84</b>	<b>37</b>	
AFR	506 102	481 970	95	60	12	7.0	1.4	9.9	5.1	4.8	72	33	
AMR	78 804	77 632	99	65	16	4.9	1.2	6.3	2.7	3.4	82	39	
EMR	80 783	81 541	101	71	10	2.9	1.4	8.8	3.0	2.3	82	24	
EUR	46 621	45 474	98	60	15	6.1	7.1	5.7	2.8	3.2	75	17	
SEAR	596 769	598 293	100	82	3.3	4.5	2.1	5.9	1.3	0.9	85†	39	
WPR	431 646	426 675	99	87	4.1	2.3	1.1	2.0	1.7	1.4	91†	45	
<b>Global (DOTS)</b>	<b>1 740 725</b>	<b>1 711 585</b>	<b>98</b>	<b>75</b>	<b>7.2</b>	<b>4.6</b>	<b>1.7</b>	<b>6.2</b>	<b>2.6</b>	<b>2.4</b>	<b>82</b>	<b>36</b>	

<sup>a</sup> Cohort: cases diagnosed during 2003 and treated/followed-up through 2004. See Table 4 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 2003 (as opposed to notified or registered).

† Treatment success  $\geq$ 85%.

smear-positive cases arising in 2003 were treated successfully by DOTS programmes. For non-DOTS areas, only 4 of the 13 HBCs that do not have full DOTS coverage provided data for the 2003 cohort (Table 11).

Comparing WHO regions, the documented treatment success rates by DOTS programmes varied from 72% in the African Region to 85% in the South-East Asia Region and 92% in the Western Pacific Region, the latter two regions having apparently met the 85% target (Table 9, Figure 18). Fatal outcomes were most common in the African Region (7%), where a higher fraction of cases are HIV-positive, and in the European Region (6%), 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 (10%) and the Eastern Mediterranean Region (9%). 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 exceeded 85% in eight HBCs

(Table 9). It was under 70% in Nigeria, the Russian Federation, South Africa, Uganda and Zimbabwe. Treatment results for individual African countries once again point to the effects of HIV: cohort death rates were more than 7% in Mozambique, South Africa, the United Republic of Tanzania and Zimbabwe. HIV may also have contributed to the high death rate in Thailand (10%) although, among Asian countries, Thailand has a relatively high proportion of elderly patients (Annex 1).

Treatment outcomes are persistently poor in some African countries. For example, 15% or more patients were lost to follow-up in Ethiopia, Kenya, Nigeria, South Africa, Uganda and Zimbabwe. Large proportions of patients completed treatment without confirming cure (a final, negative sputum smear) in Ethiopia (16%), Uganda and Brazil (36%). The aggregated treatment results for the European Region are strongly influenced by the performance in the Russian Federation, where 10% of patients died, 12% failed treatment and 16% were lost to follow-up. These relatively poor results are undoubtedly linked to the high prevalence of MDR-TB.

**TABLE 10**  
**Treatment success for new smear-positive cases (%), 1994–2003 cohorts<sup>a</sup>**

	DOTS PROGRAMMES										WHOLE COUNTRY									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1 India	83	79	79	82	84	82	84	85	87	86	*	25	21	18	27	21	34	54	60	76
2 China	94	96	96	96	97	96	95	96	93	94	91	93	94	95	95	95	93	95	92	93
3 Indonesia	94	91	81	54	58	50	87	86	86	87	*	*	*	*	*	*	*	*	*	*
4 Nigeria	65	49	32	73	73	75	79	79	79	59	*	*	*	*	*	*	*	*	*	*
5 South Africa	—	—	69	73	74	60	66	65	68	67	78	58	61	68	72	57	63	61	68	67
6 Bangladesh	73	71	72	78	80	81	83	84	84	85	*	*	63	73	77	79	81	83	*	*
7 Pakistan	74	70	—	67	66	70	74	77	77	75	69	*	—	*	23	*	*	*	*	*
8 Ethiopia	74	61	73	72	74	76	80	76	76	70	*	*	71	*	*	74	*	*	*	*
9 Philippines	80	—	82	83	84	87	88	88	88	88	88	60	35	78	71	*	*	*	*	*
10 Kenya	73	75	77	65	77	78	80	80	79	80	*	*	*	*	*	79	*	*	*	*
11 DR Congo	71	80	48	64	70	69	78	77	78	83	72	74	48	64	*	*	*	*	*	*
12 Russian Federation	—	65	62	67	68	65	68	67	67	61	—	*	57	*	*	*	*	*	*	*
13 Viet Nam	91	91	90	85	93	92	92	93	92	92	*	89	89	85	92	92	*	*	*	*
14 UR Tanzania	80	73	76	77	76	78	78	81	80	81	*	*	*	*	*	*	*	*	*	*
15 Uganda	—	—	33	40	62	61	63	56	60	68	—	44	*	*	*	*	*	*	*	*
16 Brazil	—	—	—	—	91	89	73	67	75	83	70	17	20	27	40	78	71	55	80	77
17 Afghanistan	—	—	—	45	33	87	86	84	87	86	—	—	—	*	*	86	85	*	*	*
18 Thailand	—	—	78	62	68	77	69	75	74	73	58	64	*	58	*	*	*	*	*	*
19 Mozambique	67	39	54	67	—	71	75	77	78	76	*	*	55	65	—	*	*	*	*	*
20 Zimbabwe	—	—	—	—	70	73	69	71	67	66	52	53	32	69	*	*	*	*	*	*
21 Myanmar	—	66	79	82	82	81	82	81	81	81	77	67	79	*	*	*	*	*	*	*
22 Cambodia	84	91	94	91	95	93	91	92	92	93	*	*	*	*	*	*	*	*	*	*
<b>High-burden countries</b>	<b>87</b>	<b>83</b>	<b>78</b>	<b>81</b>	<b>83</b>	<b>81</b>	<b>84</b>	<b>84</b>	<b>83</b>	<b>84</b>	<b>83</b>	<b>53</b>	<b>50</b>	<b>56</b>	<b>62</b>	<b>60</b>	<b>67</b>	<b>72</b>	<b>75</b>	<b>80</b>
AFR	59	62	57	63	70	69	72	71	73	72	60	60	56	64	70	68	71	70	73	72
AMR	77	77	83	82	81	83	81	83	83	82	65	50	51	58	67	79	77	71	81	79
EMR	82	87	86	79	77	83	83	83	83	82	79	79	66	73	57	79	81	83	83	82
EUR	68	69	72	72	76	77	77	75	76	75	67	67	58	72	63	75	75	74	74	75
SEAR	80	74	77	72	72	73	83	84	85	85	66	33	31	29	40	34	50	63	68	79
WPR	90	91	93	93	95	94	92	93	91	91	87	80	72	91	92	91	90	91	90	91
<b>Global</b>	<b>77</b>	<b>79</b>	<b>77</b>	<b>79</b>	<b>81</b>	<b>80</b>	<b>82</b>	<b>82</b>	<b>82</b>	<b>82</b>	<b>75</b>	<b>57</b>	<b>54</b>	<b>60</b>	<b>64</b>	<b>64</b>	<b>69</b>	<b>73</b>	<b>76</b>	<b>80</b>

— Indicates not available.

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

<sup>a</sup> See notes for Table 9.

A comparison of treatment results for 10 consecutive cohorts (1994–2003) of new smear-positive patients shows 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 1.7 million in 2003 (Tables 9, 10). Globally, treatment success rates since 1998 have been close to, but persistently below, the 85% target. The rates are mostly low outside DOTS programmes; the explanation, as in previous years, is that large fractions of registered cases are not evaluated, especially in South-East Asia (Table 11). Furthermore, a smaller proportion of notified cases were registered for treatment (65% globally for non-DOTS compared with 98% for DOTS).

About 323 000 re-treated patients were monitored under DOTS in 2003 (Table 12). Some patients remain on treatment (included with those not evaluated), but the latest data give an overall treatment success rate of 73%. When the three registration categories (re-treatment after relapse (post cure), failure and default) are distinguished and compared with new TB patients, we see three patterns that have been noted in previous WHO reports. First, the treatment success was lower on average for re-treatment (73%) than for new cases (82%). In the 2002 cohort of

re-treated patients, we found that success was highest for those re-treated after relapse, intermediate for previous defaulters and lowest for previous failures. Similarly, in the 2003 cohort, re-treatment success was higher post-relapse than post-default in 8 out of 9 HBCs that provided data, and higher post-default than post-failure in 5 out of 8 HBCs (Annex 2).

Second, patients who defaulted from their first course of treatment tended to default when treated again. In all 9 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 12). Countries in the European Region reported high death rates (11%) and treatment failure (16%). Re-treatment success was much lower than 85% in all regions except the Western Pacific.



**TABLE 12**  
**Re-treatment outcomes for smear-positive cases, DOTS strategy, 2003 cohort<sup>a</sup>**

	REGISTERED	TREATMENT OUTCOMES (%)							TREATMENT SUCCESS (%)
		CURED	COMPLETED TREATMENT	DIED	FAILED	DEFAULTED	TRANSFERRED	NOT EVAL'D	
1 India	112 458	66	4.1	7.7	5.9	15	0.6	0.1	70
2 China	78 265	82	6.1	2.6	3.3	1.9	1.0	2.6	89†
3 Indonesia	4 086	59	19	2.4	2.3	4.8	3.0	8.9	78
4 Nigeria	—	—	—	—	—	—	—	—	—
5 South Africa	29 582	39	13	11	1.8	18	8.1	9.9	52
6 Bangladesh	4 328	69	4.0	4.2	2.6	9.6	5.4	4.9	73
7 Pakistan	4 836	49	16	2.2	1.8	17	7.1	6.5	65
8 Ethiopia	1 716	52	8.6	6.9	2.8	5.3	2.4	22	60
9 Philippines	2 963	57	19	5.0	6.2	9.1	3.4	0.0	76
10 Kenya	3 032	67	7.5	11	0.5	7.3	6.8	0.0	75
11 DR Congo	4 996	68	4.5	9.6	4.4	6.8	4.9	1.9	72
12 Russian Federation	946	40	4.3	14	29	6.9	5.4	0.6	45
13 Viet Nam	6 011	80	5.6	4.8	5.0	2.4	2.5	0.0	85†
14 UR Tanzania	2 196	71	4.2	13	1.3	5.5	4.8	0.1	75
15 Uganda	2 439	28	32	9.7	0.7	16	4.0	10	60
16 Brazil	1 498	32	32	11	2.3	18	5.1	0.0	64
17 Afghanistan	—	—	—	—	—	—	—	—	—
18 Thailand	2 051	56	6.6	16	7.0	9.0	5.8	0.0	62
19 Mozambique	1 682	65	2.5	13	2.3	9.3	7.3	0.0	68
20 Zimbabwe	1 330	56	5.4	18	0.9	10	9.2	0.0	62
21 Myanmar	5 585	57	13	8.5	5.1	10	3.8	2.7	70
22 Cambodia	833	80	7.4	5.8	3.1	2.4	1.3	0.0	87†
<b>High-burden countries</b>	<b>269 887</b>	<b>67</b>	<b>6.9</b>	<b>6.5</b>	<b>4.3</b>	<b>11</b>	<b>2.3</b>	<b>2.5</b>	<b>74</b>
AFR	58 187	48	11	11	2.3	13	6.7	7.5	59
AMR	9 094	56	9.8	6.0	4.0	13	3.0	8.5	66
EMR	11 801	55	16	3.4	3.7	13	5.2	4.3	70
EUR	13 749	40	12	11	16	12	2.9	6.3	52
SEAR	136 390	66	4.9	7.4	5.7	14	1.2	0.6	71
WPR	94 156	80	6.8	3.0	3.5	2.5	2.0	2.3	87†
<b>Global (non-DOTS)</b>	<b>323 377</b>	<b>65</b>	<b>7.4</b>	<b>6.7</b>	<b>4.7</b>	<b>10</b>	<b>2.7</b>	<b>2.9</b>	<b>73</b>

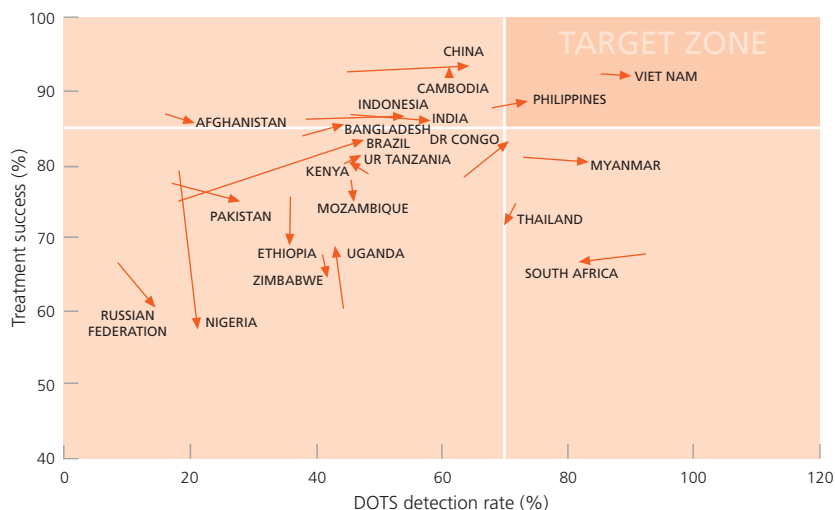
— Indicates not available.

<sup>a</sup> See notes for Table 9.

† Treatment success ≥85%.

**FIGURE 20**

**DOTS progress in high-burden countries, 2003–2004.** Treatment success refers to cohorts of patients registered in 2002 or 2003, and evaluated, respectively, by the end of 2002 or 2004. The DOTS detection rate is the fraction of estimated incident smear-positive cases notified under DOTS in 2003 or 2004. Arrows mark progress in treatment success and DOTS detection rate. Countries should enter the graph at top left, and proceed rightwards to the target zone.



(Uganda and Zimbabwe) had low rates of both case detection (<50%) and treatment success (<70%). Of 166 countries that provided data for both the 2002 and the 2003 cohorts, 93 (56%) showed higher treatment success rates for the 2003 cohort, and 62 of 176 (35%) improved case detection by more than 5%.

Annex 1 has more details of progress in each of the 22 HBCs. Annex 2 tabulates case detection and treatment success rates by country over the 10 years for which data are available.

### Trends in prevalence and death rates

In 2004, there were 14.6 million prevalent cases (229/100 000), of which 6.1 million were smear-positive (95/100 000). An estimated 1.7 million people (27/100 000) died from TB in 2004, including those coinfecting with HIV (248 000).

Figure 22 compares estimates of the prevalence and deaths rates in 1990 (baseline year for the MDGs) and 2004, for each of the six WHO regions. Consistent with trends in incidence (Figure 5), prevalence and death rates have increased over this period in the African and European regions, but most dramatically in the former. Estimates for these two regions in 2004 are very much larger than the 2015 MDG target values (which are half the 1990 rates). Prevalence and death rates have fallen in the other four WHO regions, and the rate of decline between 1990 and 2004 suggests that the MDG targets can be reached in these regions of the world.

### DOTS implementation and planning

The results are organized under the component headings of the new Stop TB Strategy except for research developments (component 6), which are not covered by this report (Table 2).

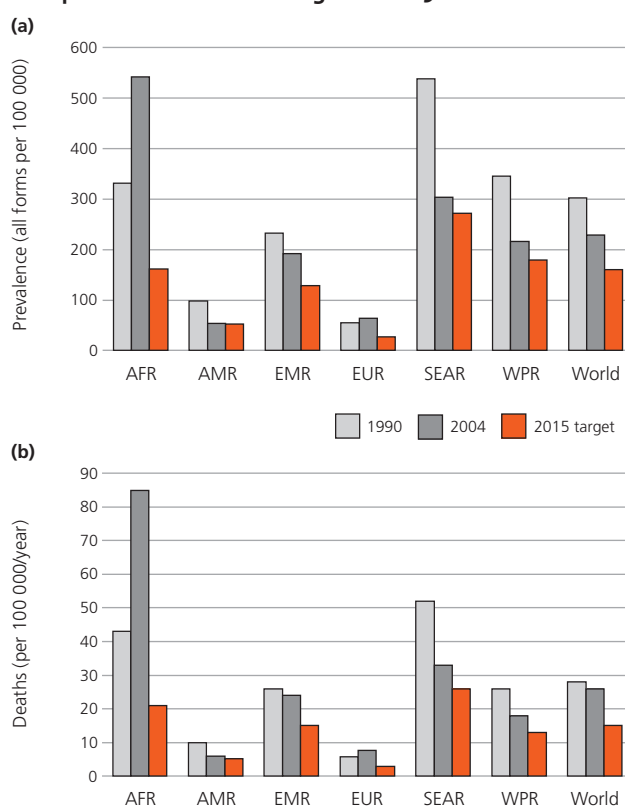
### Pursuing high-quality DOTS expansion and enhancement

By the end of 2005, Pakistan reported full DOTS coverage and India reported a coverage of 1 020 million people in 616 districts. DOTS coverage has increased considerably in Afghanistan (53% in 2003 to 68% in 2004), Brazil (34% in 2003 to 52% in 2004) and the Russian Federation (25% in 2003 to 45% in 2004), and continues to increase in Nigeria (60% in 2003 and 65% in 2004).

A total of 9 HBCs (Afghanistan, Democratic Republic of the Congo, India, Mozambique, Myanmar, Nigeria, Pakistan, Uganda and Viet Nam) have developed a five-year strategic plan for 2006–2010. China has continued to promote political commitment at the provincial level and has further increased government funding of TB control activities. China, the Russian Federation and South Africa strengthened their recording and reporting systems. Pakistan has improved surveillance capacity through the development of a computerized district management system.

Drug supply and management have improved in several

**FIGURE 21**  
Estimated TB prevalence (a) and death rates (b), by WHO region, for the MDG baseline year 1990, for 2004, and compared with the MDG target for 2015



HBCs. Both Mozambique and the United Republic of Tanzania have introduced four-drug fixed-dose combination (FDC) anti-TB drugs, and Indonesia has extended the use of FDCs to 12 provinces. Myanmar has secured anti-TB drugs of guaranteed quality up to 2008 with a second grant from the GDF. The Democratic Republic of the Congo has revised its drug management module and India has developed a comprehensive quality assurance system for anti-TB drugs.

### Laboratory diagnostic services

Substantial progress has been made in the expansion of laboratory networks and in the decentralization of diagnostic services. Yet, despite national and international efforts, TB laboratory services still need to be improved in many countries. While 18 HBCs report that they have a national reference laboratory (NRL) to oversee the organization and performance of the laboratory network, three of these NRLs are not fully functional. Although 18 HBCs claim to have an external quality assurance (EQA) scheme for smear microscopy, more than half report limited implementation of EQA. The lack of staff and poor laboratory infrastructure are major impediments to performing diagnostic tests, especially where culture and DST are performed. Currently, 14 HBCs perform culture according to nationally-defined specifications, but which are not always consistent with international recommendations. The status of laboratory services in the HBCs is summarized in Table 13.

**TABLE 13**  
**TB laboratory services, high-burden countries, 2004–2005<sup>a</sup>**

	NATIONAL REFERENCE LABORATORY (NRL)	NUMBER OF LABORATORIES PERFORMING				EAQ (% OF LABORATORIES INCLUDED)	NATIONAL POLICY FOR USE OF CULTURE	DIAGNOSIS				CULTURE USED FOR DRUG SUSCEPTIBILITY TESTING				SHORTAGE OF / INSUFFICIENT		
		SPUTUM SMEAR (AVERAGE POPULATION PER LABORATORY)	MTB CULTURE	DST	PLAN FOR SUPERVISION			ALL TB SUSPECTS	SMEAR-NEGATIVE TB	EXTRA-PULMONARY TB	OTHER	NON-CONVERTERS	RE-TREATMENT CASES	TREATMENT FAILURES	DRS	OTHER	HUMAN RESOURCES	INFRASTRUCTURE/EQUIPMENT
1	India	Y	>12 000 (<90 000)	5	4	Y	Y (50)	N					Y		Y	Y		
2	China	Y	3 327 (395 000)	data not available	187	Y	Y (100)	N							Y			
3	Indonesia	N (one acting)	8 051 (25 000)	27	9	N	limited	N							Y			
4	Nigeria	Y	598 (215 000)	2	2	Y	Y (67)	Y								Y		
5	South Africa <sup>b</sup>	N (private)	266 (175 000)	16	14	N	N	Y			Y							
6	Bangladesh	Y	635 (220 000)	3	0	Y	Y (80)	N							Operational research	Y		
7	Pakistan	Y (weak)	620 (250 000)	5	3	N	N	N								Y		
8	Ethiopia	Y	645 (115 000)	6	1	Y	N	Y		on request of physician						Y		
9	Philippines	Y	1 858 (45 000)	3	3	limited	limited	Y								Y		
10	Kenya	Y (weak)	620 (55 000)	5	5	limited	Y (20–40)	Y								Y		
11	DR Congo	Y	991 (55 000)	3	3	Y	Y (100)	Y							DST in relapse after cat II	Y		
12	Russian Federation <sup>c</sup>	N	12 805 (10 000)	519	data not available	Y	Y (40)	Y	Y						Monitoring of treatment	Y		
13	Viet Nam	Y	729 (115 000)	15	2	Y	Y (100)	Y								Y		
14	UR Tanzania <sup>d</sup>	Y	581 (65 000)	3	1	Y	Y (86)	Y								Y		
15	Uganda	Y (weak)	472 (60 000)	2	2	Y	Y (24)	Y							25% of new cases	Y		
16	Brazil	Y	4 029 (45 000)	187	33	Y	Y (40)	Y								Y		
17	Afghanistan	N	184 (155 000)	1	1	N	N (piloted in 2 regions)	N								Y		
18	Thailand	Y	846 (75 000)	90	8	Y	Y (100)	Y								Y		
19	Mozambique <sup>e</sup>	Y	206 (95 000)	1	1	Y	limited	Y								Y		
20	Zimbabwe	Y	180 (70 000)	1	1	limited	Y (50)	Y		Y (gastric aspirates)						Y		
21	Myanmar	Y	384 (130 000)	2	1	limited	Y (75)	N								Y		
22	Cambodia	Y	180 (75 000)	3	0	Y	Y (100)	Y								Y		

"Y" or "N" indicates whether the service exists or activity is undertaken; "Limited" indicates that the activity is restricted to certain parts of the country; HIV+ indicates HIV-positive TB suspects.

<sup>a</sup> Information in this table comes from the questionnaire on DOTS implementation and expansion that was sent to HBCs.

<sup>b</sup> Laboratory services in South Africa are not under the direct control of the Department of Health.

<sup>c</sup> A large number of laboratories in the Russian Federation perform culture and DST without proper quality assurance or bio-safety conditions.

<sup>d</sup> There is a need to reduce time taken for transport of sputum samples from periphery to culture facilities in UR Tanzania.

<sup>e</sup> The collaboration between NTP and Department of Laboratories is poor in Mozambique.

## Human resource development

A total of 17 NTPs in HBCs described improvements in the number and skills of staff as key achievements of DOTS expansion, or among the principal contributions of TB programmes to health system strengthening. It is clear, however, that many NTPs still lack competent staff. Only 3 of the 17 NTPs that reported improvements said that they have increased staff numbers in the NTP; improvements in the other 14 are mainly training activities carried out at different levels of the health service. Insufficient numbers of health-care workers, inadequate geographical distribution of staff, high staff turnover, low salaries and lack of incentives were consistently reported by the NTPs.

The emphasis on training, rather than recruitment, also appears in NTP human resource (HR) development plans; 15 NTPs reported that they have HR development plans, but these are mostly plans for training. The HR development plans do at least recognize that regular training activities are a necessity. These training activities become more diverse as countries expand their activities to reach the MDGs; 15 countries also reported that they do not have the information needed to develop and implement an HR development plan for comprehensive TB control.

Of the 22 HBCs, 18 listed investments in staff among the five investments that would be most beneficial in improving DOTS coverage and quality, and in strengthening health systems.

## Addressing TB/HIV, MDR-TB and other challenges

### Collaborative TB/HIV activities

The African Region alone accounts for 81% of the estimated 741 000 cases of TB among HIV-positive people in the world, but for only 4% of those reported to have begun ART in 2003. The Region of the Americas (mainly Brazil), on the other hand, accounts for 3% of the estimated cases but for 96% of the 9388 people reported to have started on ART in 2003.

Many countries, including those in the African Region, have developed policies for the provision of treatment to dually-infected patients. Of all the countries in the world, 106 indicated that they were implementing a policy of offering HIV testing and counselling to all TB patients. Of the 41 countries that were sent the extended data collection form, 32 provided data for all three years from 2002 and 2004 and among these TB/HIV collaboration improved steadily. The number of countries that had a TB/HIV focal person in the NTP increased to 23 and the number that had a formal system for referring patients from HIV to TB services and carrying out intensified case-finding increased. The number of countries that had a policy of providing HIV treat-

## Box 1

### Antiretroviral therapy and tuberculosis in Malawi

In February 2004 the Government of Malawi approved a national, two-year antiretroviral therapy (ART) scale-up plan. Since then, Malawi has expanded its ART programme rapidly while maintaining high levels of compliance and keeping good records of progress. The national TB control programme (NTP) is an important partner in the scale-up plan. All TB patients are offered HIV testing and those who are HIV positive are assessed for eligibility for ART. At the end of 2005, people were being started on ART at about one third of the rate at which people were becoming eligible for ART, and the same was true for HIV-positive TB patients.

During the four quarters from October 2004 to the end of September 2005, the number of people starting ART increased at a rate of 18% per year. In Malawi, an estimated 90 000 adults should start ART each year; in the third quarter of 2005, 7784 adults started ART, a rate of 31 136 per year or about one third of the number of HIV-positive TB patients in need of ART.

In 2004, 26 136 TB patients were registered in public health facilities, 26% were tested for HIV and 72% were HIV-positive. Among TB patients, the proportion starting ART was initially low but has increased at 43% per year; in the third quarter of 2005, 1363 TB patients started ART, a rate of 5000 per year, also about one third of the number in need of ART.

The plan for the next five years (2006–2010) in Malawi is to increase the rate of recruitment to ART so that an additional 45 000 patients begin treatment each year. This rate of recruitment will be maintained so that, by 2010, there will be 208 000 people on ART.

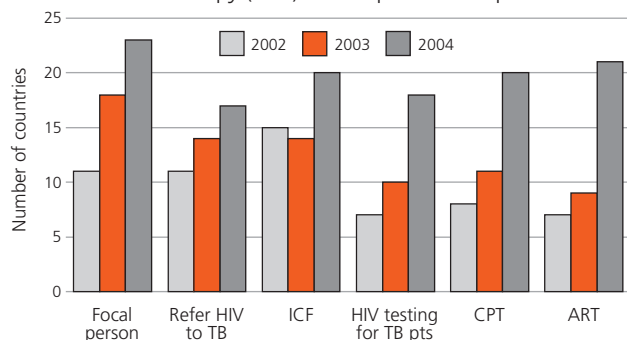
Of those who started ART in the third quarter of 2005, 9% were in WHO clinical Stages I and II but had low CD4 counts, 67% were in WHO Stage III and 24% were in WHO Stage IV. Among these, 18% had TB and were included in Stages III or IV.

Data on the survival of TB patients are not separately available for those with and without HIV, but survival outcomes for all those starting ART are reasonably good. At 6 months after starting treatment, 8.7% ± 0.3% had died, 13.9% ± 0.4% had been lost to follow-up or were transferred out and 0.76% ± 0.02% had stopped treatment. At 12 months after starting treatment, the corresponding figures were 7.8% ± 0.3%, 19.3% ± 0.7% and 0.78% ± 0.03%. In the first 6 months after the start of treatment, mortality is about 10% and in the 6 months after that it is close to zero, a pattern which is seen in other studies of ART. However, the number of people lost to follow-up and transferred out is of concern.

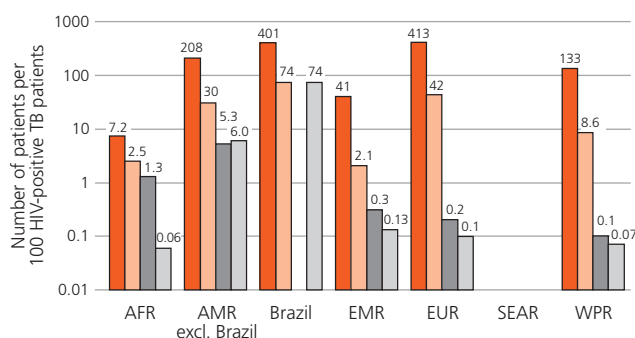
The provision of ART in Malawi provides an excellent example of what can be achieved in a poor country with limited resources and a high prevalence of HIV. Since TB patients are already in the health care system, it is easier to integrate them into long-term chronic care, and NTPs offer a good model for how to make ART accessible and sustainable. The challenge will be to maintain the programme as the number of people on ART accumulates. Much depends on whether or not the prevalence of HIV starts to fall, and there is a pressing need to find ways to reduce the transmission of HIV. Better data on the survival outcomes for TB patients according to their HIV status would enhance our understanding of the impact of HIV on TB and on how to deal with dually infected patients.<sup>1</sup>

<sup>1</sup> Box 1 draws on information from: Chimzizi R et al. *Report of a country-wide survey of HIV/AIDS services in Malawi for the year 2004*. National Tuberculosis Control Programme, MOH, 2005; HIV Unit, Department of Clinical Services, MOH; National AIDS Commission, Lilongwe; Centers for Disease Control and Prevention, Malawi; four quarterly reports on the provision of ART, MOH; and *Treatment of AIDS: a five-year plan for the provision of antiretroviral therapy and good management of HIV-related diseases to HIV-infected patients in Malawi, 2006–2010*. MOH, December 2005.

**FIGURE 22**  
**Development of policies for collaborative TB/HIV activities, 2002–2004.** Data for 32 countries (among the 41 countries with high burdens of HIV-positive TB cases) that have reported data for three years. The bars show the number of countries that had appointed a TB/HIV focal person within the NTP, that had a formal system for referring patients from HIV to TB services and that had policies to carry out intensified TB case-finding (ICF) among people with HIV, to provide HIV testing and counselling for all TB patients, to provide co-trimoxazole preventive therapy (CPT) to HIV-positive TB patients and to provide antiretroviral therapy (ART) to HIV-positive TB patients.



**FIGURE 23**  
**HIV testing and the provision of HIV care and treatment for TB patients, 2003.** The number of TB patients tested for HIV (dark red), that were HIV-positive (light red), that were given CPT (dark grey) and that started ART (light grey) for every estimated 100 HIV-positive TB patients in each WHO region. For the European Region, the number of patients tested and HIV-positive are for 2004. The South-East Asia Region reported 5 HIV-positive TB cases in 2003. Data for the Region of the Americas exclude Brazil; data are presented separately.



ment and care, CPT and ART for HIV-positive TB patients increased two- to three-fold (Figure 22).

In 2003, these policies had still to make a substantial impact outside the Region of the Americas. Among TB cases notified in 2003, only 184 742 (2%) of the estimated 8.8 million incident cases were reported to have been tested for HIV and only 9388 (1.3%) of the estimated 741 000 HIV-positive TB patients were reported to have started ART (Table 14).

Regional differences in HIV testing, and in the provision of CPT and ART, are shown in Figure 23, where the denominator is the estimated number of new cases of TB in adults with HIV. Since not all TB patients that are tested will be HIV-positive, the number tested should exceed the number that are expected to be HIV-positive, as is the case in the Region of the Americas, the European Region and the Western Pacific Region. In Brazil, 71% of the estimated number of HIV-positive adult TB patients are started on ART, while in the rest of the Americas only 30% are tested and 6% start ART. In the rest of the world, the situation is considerably worse. The South-East Asia Region reported only five HIV-positive TB cases for 2003. Of the estimated number of HIV-positive people that develop TB, the proportion that are tested and found to be HIV-positive, outside the Region of the Americas, varies from 3% in the African Region and the Eastern Mediterranean Region to 42% in the European Region; while the proportion that are given CPT varies from 0.2% in the European Region to 1.4% in the African Region; and the proportion that are started on ART varies from 0.06% in the African Region to 0.13% in the Eastern Mediterranean Region.

While the number of TB patients being tested for HIV – and starting ART – is still very low, most countries have only recently begun to implement collaborative TB/HIV activities. In some countries, there has been rapid progress.<sup>1</sup> Between 2002 and 2004, the number of people with HIV screened for TB and the number found to have TB both increased 10-fold, while the number who began IPT more than doubled; between 2002 and 2003, the number of TB patients tested for HIV and the number found to be HIV-positive both increased four-fold (Table 14).

Of the 41 countries that have a high burden of HIV-positive TB cases, the number that reported having a national policy to offer HIV testing to all TB patients increased from 7 in 2003 to 19 in 2004. Furthermore, none of these countries reported any TB patients as having started ART in 2002, while they reported more than 9000 in 2003. In the third quarter of 2005, Malawi alone started 1363 TB patients on ART (Box 1), and at the end of 2005 about one third of all the TB patients that were notified to the TB control programme and who were HIV-positive were started on ART.

<sup>1</sup> Brazil, which has always had a policy of universal access to ART, remains the outstanding example of ART provision in the public sector.

### Surveillance and surveys of drug resistance

In responses provided on the standard data collection form, 139 out of 203 countries (66%) reported data on MDR-TB (Figure 24; Annex 2). In the Region of the Americas and the European Region, about 80% of countries provided information on MDR-TB patients. In total, the 139 countries reported 17 283 MDR-TB cases in 2004, the majority from the European Region (10 595). Among new TB patients, 61 790 received DST and 6149 were diagnosed with MDR-TB; among re-treatment cases the corresponding figures were 28 828 and 5485.

The assessment of MDR-TB prevalence around the world has been done primarily with survey data from the Global DRS Project. The ultimate goal, however, is to evaluate MDR-TB burden and trends from routine surveillance data. As a step in that direction, we compared measures and estimates of MDR-TB prevalence from the Global DRS Project with those derived from the large number of patients reported through routine surveillance. In general, the variation in MDR-TB prevalence between countries was greater in the routine surveillance data than in the survey data from the Global DRS Project. Estimates of MDR-TB prevalence obtained from both sources for more than 100 countries around the world were poorly correlated. Estimates were, however, more closely associated for a restricted sample of 37 European countries ( $r^2 = 0.97$ ; Figure 25).

### Management of drug resistance in high-burden countries

Among the 22 HBCs, 10 had carried out nationwide drug resistance surveys by 2005, and 7 have plans to repeat them; 6 have subnational data and plan to carry out nationwide surveys in the next two years. Afghanistan, Indonesia, Nigeria, Pakistan and the United Republic of Tanzania have never reported drug resistance data, but all except Afghanistan have plans to carry out surveys.

Based on a combination of surveys and estimates, approximately 460 000 MDR-TB cases emerge every year, about half of them among new TB patients and the other half among patients that have been previously treated. China, India and the Russian Federation account for 68% of the estimated annual incidence of MDR-TB cases, but all three countries have ambitious plans to carry out DRS and improve MDR-TB management.

In 8 HBCs (Brazil, Democratic Republic of the Congo, Kenya, Mozambique, Philippines, South Africa, Russian Federation and Thailand) MDR-TB is managed by the NTP; 3 of these (Kenya, Philippines and the Russian Federation) receive support from the GLC in limited pilot areas, and India has a GLC-approved project in New Delhi. Among the HBCs that do not have a programme for managing MDR-TB, all except Afghanistan

TABLE 14

**Collaborative TB/HIV activities, 2002–2004.** Data are from the 41 countries with a high burden of HIV-positive TB cases (and that received the supplementary questions on TB/HIV).

	2002		2004	
	NUMBER OF PEOPLE (NUMBER OF COUNTRIES RESPONDING TO QUESTION)			
HIV-positive people screened for TB	11 013	(5)	97 370	(8)
HIV-positive people diagnosed with TB	1 330	(4)	11 727	(4)
HIV-positive people given isoniazid preventive therapy (IPT)	4 886	(8)	12 017	(5)
TB patients tested for HIV	20 920	(9)	84 947 <sup>a</sup>	(14)
TB patients found to be HIV-positive	5 284	(9)	22 746 <sup>a</sup>	(13)

<sup>a</sup> Data for 2003.

FIGURE 24

### Reporting on MDR-TB patients, by WHO region, 2004.

The red portion of each bar shows the number of countries providing information about MDR-TB; the grey portion shows the number of countries not providing such information. The number of laboratory-confirmed cases of MDR-TB identified among patients in whom TB disease was diagnosed in 2004 is shown above each bar.

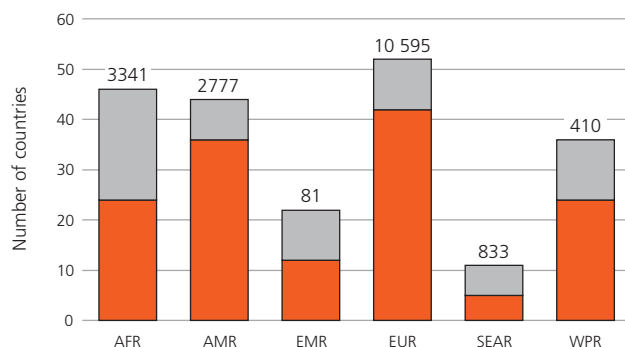
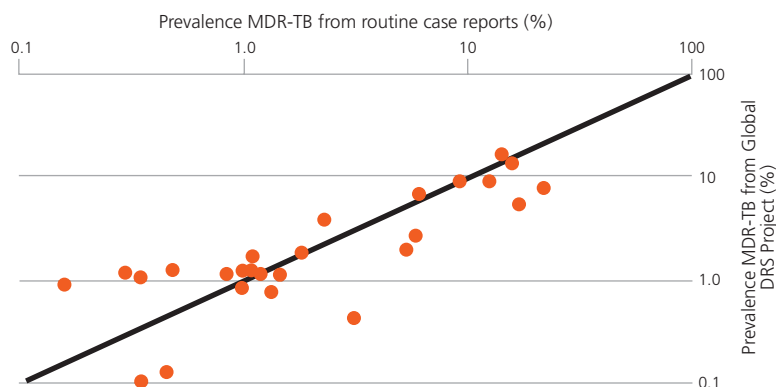


FIGURE 25

**Comparison of two methods for evaluating prevalence of MDR-TB in new TB cases in 26 countries of the European Region.** The vertical axis shows prevalence estimated from surveys carried out within the Global DRS Project. The horizontal axis shows prevalence measured among patients reported through routine surveillance in 2004. The correlation coefficient,  $r = 0.98$ .



and Pakistan plan to develop MDR-TB programmes in the next two years.

In the few HBCs where NTPs do manage MDR-TB, diagnosis and treatment often fail to meet acceptable standards. In many countries, substandard MDR-TB treatment is available in the private sector or at specialized health centres not linked to the NTP, often for a fee. Second-line anti-TB drugs are available in the majority of HBCs, and are locally-produced in Bangladesh, Brazil, China, Kenya, India, Indonesia, Pakistan, the Philippines, the Russian Federation, South Africa, Thailand and Viet Nam.

As of June 2005, the GFATM had approved or was providing funds for DRS in 5 HBCs (Cambodia, China, India, Kenya and Thailand), and funds to manage MDR-TB in 4 (the Democratic Republic of the Congo, India, the Philippines and the Russian Federation). HBCs including Bangladesh, China and Indonesia had MDR-TB projects approved by the GFATM in round five.

The three major obstacles identified by HBCs to DRS implementation were: weak laboratories, lack of funding and a lack of qualified staff. The major obstacles to setting up an MDR-TB diagnosis and treatment programme were: the lack of laboratory skills and infrastructure to perform quality-assured culture and drug susceptibility testing, and failures in the organization of treatment (e.g. hospitalization or ambulatory treatment, the delivery of DOT over two years and poor case-holding), with insufficient funding and too few qualified staff. The main forms of support needed for DRS and MDR-TB management, as identified by the NTPs, are financial resources and technical assistance to design, pilot and scale-up appropriate surveillance, diagnosis and treatment programmes. The planning of activities related to MDR-TB is described in the individual profiles of the 22 HBCs (Annex 1).

### **Management of drug resistance globally**

By December 2005, the Global DRS Project had collected data from areas representing more than 40% of the world's smear-positive TB cases, and the GLC had approved 37 pilot projects for almost 13 000 MDR-TB patients in 31 countries.<sup>1</sup>

Treatment outcomes from GLC-approved projects are available from Estonia, Latvia, Peru (Lima), the Philippines (Manila) and the Russian Federation (Tomsk Oblast).<sup>2</sup> In brief, of 1047 MDR-TB patients evaluated, 119 (11%) were new cases and 928 (89%) had received treatment previously. More than 50% of previously-treated patients had received both first- and second-line anti-TB drugs, and 65% of all patients were resistant to both first- and second-line drugs. Treatment was successful in 70% of all patients, but higher among new (77%) than previously-treated patients (69%).

Studies of the cost and cost-effectiveness of MDR-TB management under programmatic conditions have been completed in Estonia, the Russian Federation (Tomsk

Oblast), the Philippines (Manila) and Peru. The cost per patient treated was about US\$ 2500–3500 in Peru and the Philippines, and about US\$ 9000–10 000 in Estonia and the Russian Federation. The cost per DALY (disability adjusted life year) gained was about US\$ 200 in Peru and the Philippines, and higher at about US\$ 500–1000 in Estonia and the Russian Federation. These estimates of cost per DALY gained compare favourably with benchmarks that are widely used for assessing whether a health intervention is cost-effective (for example, average income per capita), suggesting that MDR-TB management can be considered a cost-effective strategy. It should be emphasized that these costs are derived from studies carried out in populations that have high proportions of severe chronic cases, with patterns of drug resistance that make these patients more difficult to treat and cure. In other areas of the world, the treatment of MDR-TB may pose fewer challenges, and therefore the costs may be lower.

### **TB control in the context of poverty**

Various geographical, economic and sociocultural barriers limit the access of patients to health services, especially poor populations. The factors most commonly linked to the inaccessibility of health services are: distance, time, money, and knowledge about where to obtain diagnosis and treatment free-of-charge. These factors often cause TB patients to first seek care in the private sector. Accessibility is further limited by the centralization of TB control activities in many HBCs.

To improve access to health facilities, especially for impoverished patients, NTPs are decentralizing diagnosis and treatment services to peripheral units (and sometimes to the communities themselves), and incorporating DOTS services into government plans to fight poverty. NTPs are also improving the awareness of services for TB diagnosis and treatment, reinforcing treatment policies that are free-of-charge and seeking funds to reduce patient travel costs. Improving partnerships with NGOs and strengthening community TB care are among the steps believed by NTPs to be most useful in improving access to health care.<sup>3</sup>

### **Contributing to health system strengthening**

Past political and social conflict and/or high levels of poverty have seriously weakened health system infrastructure in Afghanistan, Cambodia, the Democratic Republic of the Congo and Ethiopia. By the end of 2005, however, these NTPs were actively contributing to the extension of basic

<sup>1</sup> Azerbaijan, Bolivia, Costa Rica, Dominican Republic, El Salvador, Egypt, Estonia, Georgia, Haiti, Honduras, India, Jordan, Kenya, Kyrgyzstan, Latvia, Lebanon, Lithuania, Malawi, Mexico, Republic of Moldova, Mongolia, Nepal, Nicaragua, Peru, Philippines, Romania, Russian Federation, Syrian Arab Republic, Timor-Leste, Tunisia and Uzbekistan.

<sup>2</sup> Nathanson E et al. Multidrug-resistant tuberculosis can be successfully treated in resource-limited settings [submitted for publication].

<sup>3</sup> See also: *Addressing poverty in TB control: options for national TB control programmes*. Geneva, World Health Organization, 2005 (WHO/HTM/TB/2005.352).

packages of health care and were involved in training staff from all parts of the health system. In sub-Saharan African countries, such as Kenya, Mozambique and Uganda, building quality-assured laboratory diagnostic networks to meet the needs presented by HIV/AIDS, TB and malaria, has become an increasingly urgent task.

In 2004–2005, NTPs have been involved in health system strengthening mainly through the process of service decentralization. India’s NTP is expanding DOTS services to other ministries (besides the Ministry of Health) that have health facilities, and is increasing management capacity at state and district levels, particularly in rural areas. In Pakistan, the NTP is contributing to health system strengthening through the engagement of district leaders, primary care managers and private partners in DOTS services, and by supporting urgent needs in areas affected by the 2005 earthquake. The NTP in Brazil has advanced DOTS by using a sector-wide health information system, and by making use of family health teams. In China, the integration of TB surveillance, diagnosis and treatment within basic township hospitals has been a priority.

### Engaging all care providers

Among the 22 HBCs, 16 (cf. 7 in 2004) have tested PPM as an approach to improve TB control; 9 countries have begun scaling up PPM beyond the pilot phase, and 7 (China, Bangladesh, India, Indonesia, Kenya, Myanmar and the Philippines) have made noteworthy progress towards mainstreaming PPM into national TB control strategies and implementation plans. However, PPM is still at an early stage in most other HBCs; 15 HBCs reported the involvement of all public hospitals in TB control, 13 reported that they have involved all medical colleges in TB control, while 12 said that all military health facilities collaborate with the NTP. Less than half of NTPs reported that other health providers were fully involved in DOTS. Many NTPs report that corporate health services, and health facilities belonging to special health insurance schemes, are not involved in DOTS (Figure 26).

In order to boost public-private collaboration, 10 HBCs have appointed a PPM focal point at national level, and 10 countries have developed guidelines to involve the full range of health-care providers.

### Empowering people with TB, and communities

#### Community TB care

Until recently, DOTS implementation has relied mainly on government health services. However, many countries have now started to decentralize TB care beyond health facilities into the community. Community participation in TB control is now part of the NTP strategy in 14 of 22 HBCs; an additional 4 NTPs are piloting community participation, and expect to include this approach in future strategic plans, and 11 NTPs (Bangladesh, Brazil, India, Indonesia, Kenya, Myanmar, Pakistan, the Philippines, South Africa, Uganda,

and Viet Nam) provide community-based TB care to at least 25% of the population. These initiatives include DOT supervised by a family or community member, the identification and referral of people with symptoms of TB, and default and contact tracing.

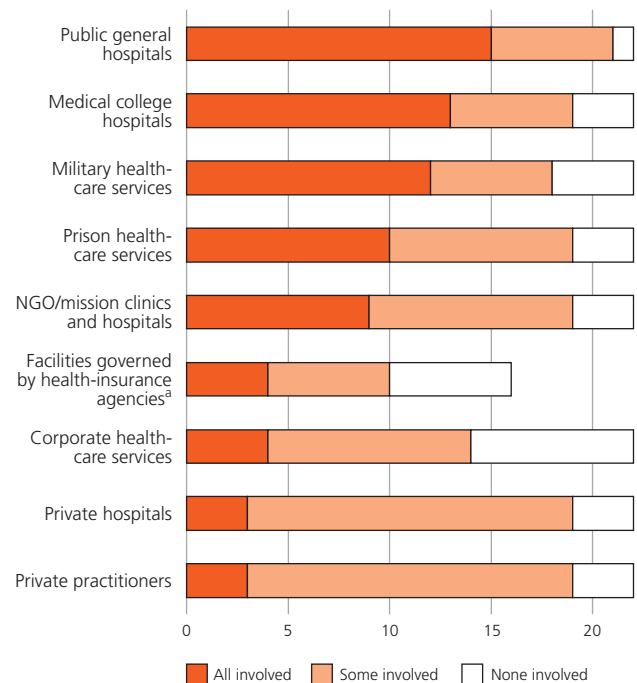
### Advocacy, communication and social mobilization (ACSM)

In the context of the new Stop TB Strategy, ACSM is being scaled up significantly. In February 2005, the Stop TB Partnership inaugurated a new ACSM Working Group to sustain political, social and financial commitment to eliminate TB, and to foster the development of more effective ACSM activities for TB control at country level.

ACSM at global level during 2004–2005 increased the importance of TB on the international agenda. This included intensified advocacy in G8 countries, the declaration of a continent-wide TB emergency in Africa and extensive media coverage for the 2005 edition of this report.

The number of NTPs with national ACSM strategies increased from 2 in 2002 to 11 in 2005, and is expected to

**FIGURE 26**  
**Involvement of different types of providers in TB control, high-burden countries, 2004–2005.** Number of high-burden countries reporting formal involvement in national TB control efforts (referral, diagnosis, treatment initiation, treatment supervision and/or notification) for different types of provider.



<sup>a</sup> Information about involvement of health-insurance agencies provided by only 16 high-burden countries.

reach 19 during 2007. Many countries with national ACSM strategies are well into the implementation phase. In the Philippines, community-based TB task forces are used in active case-finding and for the dissemination of information. Indonesia is rapidly scaling up ACSM through activities at district level, further stimulated by the development of a national ACSM handbook. Viet Nam has integrated ACSM into all levels of its TB control programme, placing particular emphasis on local dissemination of materials for health education. A total of 11 countries have completed, or are close to completing, studies of knowledge, attitudes and practice (KAP), prior to fully launching ACSM activities.

## Financing TB control

### Data received

Financial data were received from 140 out of 211 (66%) countries (Table 15), more in total than for 2005 (135 countries). Complete budget data for 2005 were provided by 87 countries (up from 70 in last year's report), 71 countries provided complete budget data for 2006 and 73 provided complete expenditure data for 2004 (compared with 69 that provided complete expenditure data for 2003). The countries that provided financial reports accounted for 94–99% of the regional burden of TB in four regions, with lower figures of 79% and 58% for the African and European Regions respectively. If data had been reported by

South Africa, the figure for the African Region would have been 92%.

Data were received from all 22 HBCs except South Africa (Table 16). Complete budget data were provided for 19 countries; data were partially complete for Afghanistan and Thailand. Complete expenditure data for 2004 were provided for 17 countries; the only change from the set of expenditure data for 2003 was that Kenya provided complete expenditure data for 2004, whereas Zimbabwe (along with South Africa and Uganda) did not. A total of 21 countries provided data on the utilization of health services and made projections of the number of cases they would treat in 2005 and 2006, up from 20 last year. While considerable follow-up of data is still required, the quality of the data when first submitted to WHO is improving; Bangladesh, Brazil, China, Democratic Republic of the Congo, India and Nigeria provided exemplary data that required almost no follow-up.

### Total NTP budgets and funding in high-burden countries

NTP budgets in 20 of the 22 HBCs have increased during the period 2002–2006, sometimes by substantial amounts (Figures 27–29; Table 17). There are insufficient data to make an assessment for South Africa and Thailand. The total combined budget for 2006 is US\$ 990 million, double

**TABLE 15**  
Budget, expenditure and utilization data received, all countries, 2006

	NUMBER OF COUNTRIES	FINANCIAL REPORTS RECEIVED	BUDGET 2005			BUDGET 2006			EXPENDITURE 2004			UTILIZATION OF HEALTH SERVICES	PROP. OF ESTIMATED REGIONAL TB BURDEN ACCOUNTED FOR BY COUNTRIES THAT REPORTED FINANCIAL DATA (%)
			COMPLETE	PARTIAL	NONE	COMPLETE	PARTIAL	NONE	COMPLETE	PARTIAL	NONE		
AFR	46	37	28	7	2	23	6	8	22	3	12	32	79 <sup>a</sup>
AMR	44	32	17	13	2	14	12	6	13	13	6	24	94
EMR	22	20	13	5	2	11	5	4	10	4	6	15	97
EUR	52	17	11	5	1	8	4	5	10	4	3	16	58
SEAR	11	9	7	2	0	5	2	2	6	2	1	7	98
WPR	36	25	11	13	1	10	14	1	12	11	2	21	99
<b>Global</b>	<b>211</b>	<b>140</b>	<b>87</b>	<b>45</b>	<b>8</b>	<b>71</b>	<b>43</b>	<b>26</b>	<b>73</b>	<b>37</b>	<b>30</b>	<b>115</b>	<b>91</b>

<sup>a</sup> The figure would be 92% if South Africa had reported data.

**TABLE 16**  
Budget, expenditure and utilization data received, high-burden countries, 2006

	NUMBER OF COUNTRIES	FINANCIAL REPORTS RECEIVED	BUDGET 2005			BUDGET 2006		EXPENDITURE 2004			UTILIZATION OF HEALTH SERVICES
			COMPLETE	PARTIAL	NONE	COMPLETE	NONE	COMPLETE	PARTIAL	NONE	
AFR	9	8	8	0	1	7	2	6	1 <sup>a</sup>	2 <sup>a</sup>	8
AMR	1	1	1	0	0	1	0	1	0	0	1
EMR	2	2	1	1 <sup>b</sup>	0	2	0	1	0	1 <sup>b</sup>	2
EUR <sup>c</sup>	1	1	1	0	0	1	0	1	0	0	1
SEAR	5	5	4	1 <sup>d</sup>	0	4	1 <sup>d</sup>	4	0	1 <sup>d</sup>	5
WPR	4	4	4	0	0	4	0	4	0	0	4
<b>Global</b>	<b>22</b>	<b>21</b>	<b>19</b>	<b>2</b>	<b>1</b>	<b>19</b>	<b>3</b>	<b>17</b>	<b>1</b>	<b>4</b>	<b>21</b>

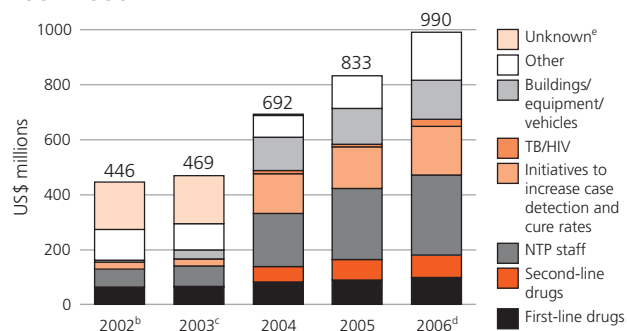
<sup>a</sup> Zimbabwe provided partial expenditure data, South Africa and Uganda did not provide expenditure data.

<sup>b</sup> Afghanistan.

<sup>c</sup> Data for the Russian Federation were compiled by WHO (Moscow Office) in collaboration with the Ministry of Health and Social Development and the Federal Agency for Health and Social Development.

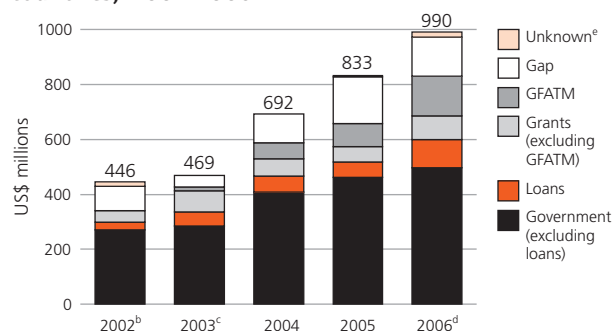
<sup>d</sup> Thailand.

**FIGURE 27**  
Total NTP budgets by line item, 21 high-burden countries,<sup>a</sup> 2002–2006



- <sup>a</sup> Data not available for South Africa.
- <sup>b</sup> Estimates assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).
- <sup>c</sup> Estimates assume budget 2003 equal to expenditure 2003 (Russian Federation and Zimbabwe) or equal to budget 2004 (Thailand).
- <sup>d</sup> 2006 budget for Thailand and UR Tanzania based on 2005 data.
- <sup>e</sup> “Unknown” applies to Afghanistan 2002–2004, Russian Federation 2002–2003 and Mozambique 2002–2003, as breakdown by line item not available.

**FIGURE 28**  
Total NTP budgets by source of funding, 21 high-burden countries,<sup>a</sup> 2002–2006



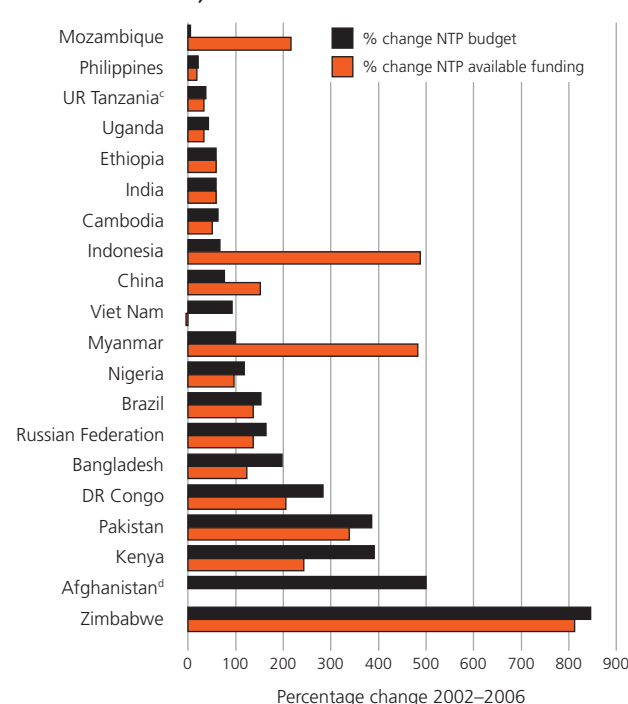
- <sup>a</sup> Data not available for South Africa.
- <sup>b</sup> Estimates assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).
- <sup>c</sup> Estimates assume budget 2003 equal to expenditure 2003 (Russian Federation and Zimbabwe) or equal to budget 2004 (Thailand).
- <sup>d</sup> 2006 budget data for Thailand and UR Tanzania based on 2005 data.
- <sup>e</sup> “Unknown” applies to Afghanistan 2005–2006, Nigeria 2002 and DR Congo 2002, as breakdown by funding source not available.

the US\$ 446 million budgeted in 2002. The Russian Federation has by far the largest budget (US\$ 428 million), followed by China (US\$ 173 million) and then by India and Indonesia (both at US\$ 57 million), making a combined total that is 72% of the NTP budgets reported by HBCs. There are 7 countries with budgets in the range US\$ 20–34 million, while the rest (10 countries) 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\$ 266 million; the second largest increase (in China) was US\$ 75 million. In relative terms, the increases in Afghanistan, the Democratic Republic of the Congo, Kenya, Pakistan and Zimbabwe stand out, with three- to eight-fold increases over five years (Table 17). Countries with relatively small increases are Mozambique, the Philippines, Uganda and the United Republic of Tanzania. The budget increases for initiatives to increase case detection and cure rates, capital items (typically vehicles and microscopes), second-line anti-TB drugs and NTP staff are particularly striking (Figure 27). Budgets for collaborative TB/HIV activities remain small, though Kenya is an exception (see Annex 1).

These large budget increases have been accompanied by big improvements in available funding for NTP budgets (Figures 28, 29; Table 17). For all HBCs, funding for NTP budgets has increased by almost US\$ 500 million since 2002, reaching US\$ 830 million in 2006. Viet Nam is the only country where projected funding for 2006 is less than in 2002 (reflecting a decline in loans and non-GFATM grant funding). Most of the extra US\$ 500 million has come from the governments of the Russian Federation and China (an extra US\$ 260 million including loans since 2002). While almost all other HBC governments have also

**FIGURE 29**  
Changes in NTP budget and available funding, 20 high-burden countries,<sup>a,b</sup> 2002–2006



- <sup>a</sup> Complete data not available for South Africa or Thailand.
- <sup>b</sup> Countries ranked by percentage change in NTP budget.
- <sup>c</sup> Latest available data for UR Tanzania are for 2005; comparison is 2002–2005.
- <sup>d</sup> Sources of funding for Afghanistan for 2006 not available.

**TABLE 17**  
**NTP budgets and available funding, high-burden countries, 2006**

	TOTAL NTP BUDGET (US\$ MILLIONS)	CHANGE FROM 2002 <sup>a</sup> (US\$ MILLIONS)	CHANGE FROM 2002 (%)	AVAILABLE FUNDING (US\$ MILLIONS)					CHANGE IN AVAILABLE FUNDING SINCE 2002 <sup>b</sup> (US\$ MILLIONS)				CHANGE IN FUNDING GAP SINCE 2002
				GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	FUNDING GAP	GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	
1 India	57	21	59	8	27	9	12	0	2	3	4	12	0
2 China	173	75	77	103	11	5	19	35	50	11	3	19	-8
3 Indonesia	57	23	67	25	0	8	25	0	18	0	5	25	-25
4 Nigeria	19	10	117	4	0	5	8	2	2	0	1	8	-5
5 South Africa	—	—	—	—	—	—	—	—	—	—	—	—	—
6 Bangladesh	21	14	198	4	2	2	8	5	0.4	2	-1	8	5
7 Pakistan	26	20	386	3	0	12	0.6	10	0.3	0	12	0.6	8
8 Ethiopia	8	3	58	0.1	0	2	5	0	-1	0	-1	5	0
9 Philippines	20	3	21	11	0	0.7	2	6	-0.6	0	0.7	2	1
10 Kenya	26	20	391	3	0	8	3	11	2	0	6	3	10
11 DR Congo	25	19	284	1	0	11	8	5	0.02	0	5	8	1
12 Russian Federation	428	266	164	290	63	2	29	43	136	63	-5	29	43
13 Viet Nam	22	11	93	9	0	0	2	11	0.7	-2	-1	2	11
14 UR Tanzania <sup>c</sup>	8	2	37	3	0	4	0.2	1	3	0	-1	0.2	0.4
15 Uganda	7	2	42	0.3	0	2	0.3	5	0.1	-1	1	0.3	2
16 Brazil	34	21	152	24	1	2	5	2	10	1	2	5	2
17 Afghanistan	19	15	500	—	—	—	—	—	—	—	—	—	—
18 Thailand <sup>c</sup>	5	-1.3	-22	3	0	0	2	0	—	—	—	2	—
19 Mozambique	8	0.4	5	1	0	2	6	0	0.9	0	-0.8	6	-5
20 Zimbabwe	16	14	845	3	0	6	7	0.6	3	0	4	7	0.6
21 Myanmar	6	3	99	0.4	0	1	2	2	-0.02	0	1	2	-0.1
22 Cambodia	7	3	63	0.7	0	3	1	2	-0.6	-0.7	2	1	1
<b>High-burden countries</b>	<b>990</b>	<b>545</b>	<b>93<sup>d</sup></b>	<b>496</b>	<b>104</b>	<b>87</b>	<b>144</b>	<b>141</b>	<b>225</b>	<b>76</b>	<b>36</b>	<b>144</b>	<b>43</b>

— Indicates not available.

<sup>a</sup> Figures assume budget 2002 equal to expenditure 2002 (Ethiopia), budget 2003 (Afghanistan, Bangladesh, Mozambique and Uganda) or expenditure 2003 (Russian Federation and Zimbabwe).

<sup>b</sup> Total of changes in available funding and funding gap does not equal the total in column 3 because data are incomplete for Afghanistan and Thailand, and comparisons are with 2003 for DR Congo and Nigeria.

<sup>c</sup> Data for Thailand and UR Tanzania are for 2005. Data for Thailand are for the central government only.

<sup>d</sup> Median value.

increased funding (the exceptions are Cambodia, Ethiopia, Myanmar and the Philippines), most of the remaining increase in funding is thanks to the GFATM (US\$ 144 million in 2006 compared with zero in 2002, with the largest grants to China, Indonesia and the Russian Federation). In relative terms, the most impressive improvements in funding have occurred in Zimbabwe (2005–2006), Indonesia (2002–2006), Pakistan (particularly 2005–2006) and Kenya (notably 2005–2006).

Among the 21 HBCs that reported data, national governments will provide US\$ 600 million (61%) of the funding required by NTPs in 2006, US\$ 230 million (23%) will be funded by donor agencies, and for US\$ 19 million (2%) the source of funding is currently unknown. This leaves a reported funding gap of US\$ 141 million (14%). These figures conceal important variations, with many countries relying extensively on grants from the GFATM and other sources.

Despite this progress in securing additional funding, NTPs have reported a budgetary funding gap of US\$ 141 million for 2006 (Table 17). In absolute terms, the largest funding gaps are those reported by China, Kenya, Pakistan, and the Russian Federation (US\$ 97 million, or 69% of the total gap). Proportionally, the largest gaps are in Uganda

and Viet Nam (both with gaps exceeding 50% of the budget), followed by Cambodia, the Democratic Republic of the Congo, Kenya, Myanmar, Nigeria, Pakistan and the Philippines (with gaps that are 20–40% of the budget).

Further details, including charts showing trends in NTP budgets by funding source and line item for HBCs in each year 2002–2006, are provided in Annex 1.

### Total costs of TB control and funding in high-burden countries

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\$ 1.6 billion in 2006, compared with US\$ 876 million in 2002 (Figures 30, 31; Table 18). These increases in projected costs 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. The largest costs are for the Russian Federation and South Africa, which together account for US\$ 810 million, or more than half of

**TABLE 18**  
**Total TB control costs and available funding, high-burden countries, 2006**

	TOTAL COST (US\$ MILLIONS)	CHANGE FROM 2002 <sup>a</sup> (US\$ MILLIONS)	CHANGE FROM 2002 (%)	AVAILABLE FUNDING (US\$ MILLIONS)					FUNDING GAP	CHANGE IN AVAILABLE FUNDING SINCE 2002 <sup>b</sup> (US\$ MILLIONS)				CHANGE IN FUNDING GAP SINCE 2002
				GOVERNMENT (EXCL. LOANS)	LOANS	GRANTS (EXCL. GFATM)	GFATM	GOVERNMENT (EXCL. LOANS)		LOANS	GRANTS (EXCL. GFATM)	GFATM		
1 India	100	38	60	51	27	9	12	0	7	3	4	12	0	
2 China	173	112	184	103	11	5	19	35	50	11	3	19	-8	
3 Indonesia	62	41	198	30	0	8	25	0	20	0	5	25	-25	
4 Nigeria	30	20	194	15	0	5	8	2	9	0	1	8	-5	
5 South Africa	300	—	—	300	—	—	—	—	—	—	—	—	—	
6 Bangladesh	28	17	159	11	2	2	8	5	4	2	-1	8	5	
7 Pakistan	33	28	538	11	0	12	1	10	5	0	12	0.6	8	
8 Ethiopia	14	7	96	7	0	2	5	0	3	0	-1	5	0	
9 Philippines	30	7	30	21	0	1	2	6	1	0	0.7	2	1	
10 Kenya	28	22	409	6	0	8	3	11	3	0	6	3	10	
11 DR Congo	44	25	131	20	0	11	8	5	6	0	5	8	1	
12 Russian Federation	510	265	108	372	63	2	29	43	128	63	-5	29	43	
13 Viet Nam	30	11	55	17	0	0	2	11	-2	-2	-1	2	11	
14 UR Tanzania <sup>c</sup>	15	3	24	10	0	4	0.2	1	3	0	-1	0.2	0.4	
15 Uganda	8	6	207	1	0	2	0.3	5	0.3	-1	1	0.3	2	
16 Brazil	62	21	49	52	1	2	5	2	10	1	2	5	2	
17 Afghanistan	20	16	369	—	—	—	—	—	—	—	—	—	—	
18 Thailand <sup>c</sup>	16	7	86	14	0	0	2	0	—	—	—	2	—	
19 Mozambique	11	7	170	4	0	2	6	0	2	0	-0.6	6	-5	
20 Zimbabwe	20	15	281	7	0	6	7	1	3	0	4	7	0.6	
21 Myanmar	7	4	170	2	0	1	2	2	0.1	0	1.1	1.9	-0.1	
22 Cambodia	9	4	83	3	0	3	1	2	-0.1	-0.7	2	1	1	
<b>High-burden countries</b>	<b>1551</b>	<b>675</b>	<b>159<sup>d</sup></b>	<b>1055</b>	<b>104</b>	<b>87</b>	<b>144</b>	<b>141</b>	<b>253</b>	<b>76</b>	<b>36</b>	<b>144</b>	<b>43</b>	

— Indicates not available.

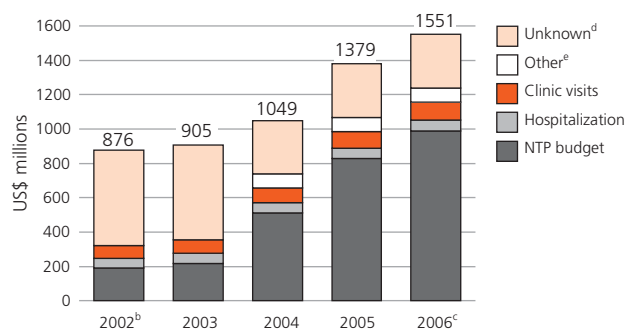
<sup>a</sup> TB control costs for 2006 were estimated using budget data, whereas those for 2002 were estimated using expenditure data wherever possible. Estimates assume expenditure 2002 equal to available funding 2002 (Kenya and UR Tanzania), to expenditure 2003 (Afghanistan, Bangladesh, Mozambique, Nigeria, Russian Federation and Zimbabwe) or to available funding 2003 (Uganda).

<sup>b</sup> Total of changes in available funding and funding gap is different from the total change in TB control costs in column 3 when expenditures are different from available funding, data are incomplete (Afghanistan and Thailand) or comparisons are with 2003 (DR Congo and Nigeria).

<sup>c</sup> Data for Thailand and UR Tanzania are for 2005. Data for Thailand are for the central government only.

<sup>d</sup> Median value.

**FIGURE 30**  
**Total TB control costs by line item, 22 high-burden countries, 2002–2006<sup>a</sup>**



<sup>a</sup> Total TB control costs for 2002–2004 are based on expenditure data, whereas those for 2005–2006 are based on budget data.

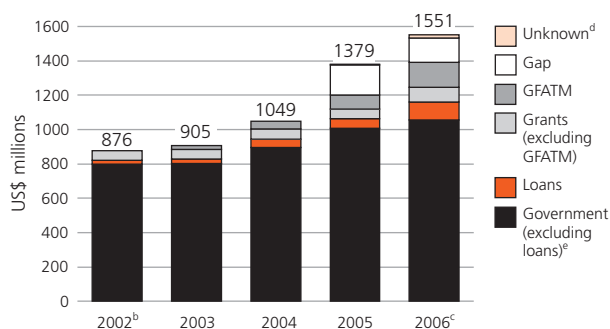
<sup>b</sup> Estimates assume costs 2002 equal to costs 2003 for Afghanistan, Bangladesh, Mozambique, Nigeria, Russian Federation, Uganda and Zimbabwe.

<sup>c</sup> Estimates assume costs 2006 equal to costs 2005 for Thailand and UR Tanzania.

<sup>d</sup> “Unknown” applies to Russian Federation 2002–2003, South Africa 2002–2006 and Thailand 2002–2006, as breakdown by line item not available.

<sup>e</sup> “Other” includes costs for hospitalization and fluorography in the Russian Federation not reflected in NTP budget or NTP expenditure data.

**FIGURE 31**  
**Total TB control costs by source of funding, 22 high-burden countries, 2002–2006<sup>a</sup>**



<sup>a</sup> Total TB control costs for 2002–2004 are based on expenditure data, whereas those for 2005–2006 are based on budget data.

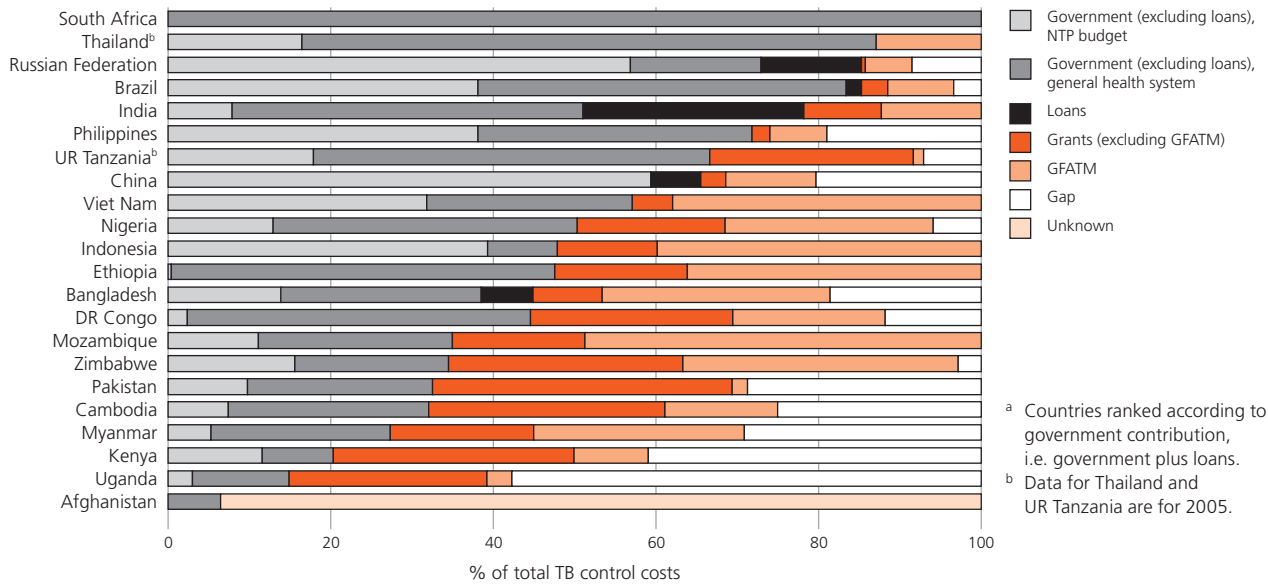
<sup>b</sup> Estimates assume costs 2002 equal to costs 2003 for Afghanistan, Bangladesh, Mozambique, Nigeria, Russian Federation, Uganda and Zimbabwe.

<sup>c</sup> Estimates assume costs 2006 equal to costs 2005 for Thailand and UR Tanzania.

<sup>d</sup> “Unknown” applies to Afghanistan 2005–2006, as breakdown by source of funding not available.

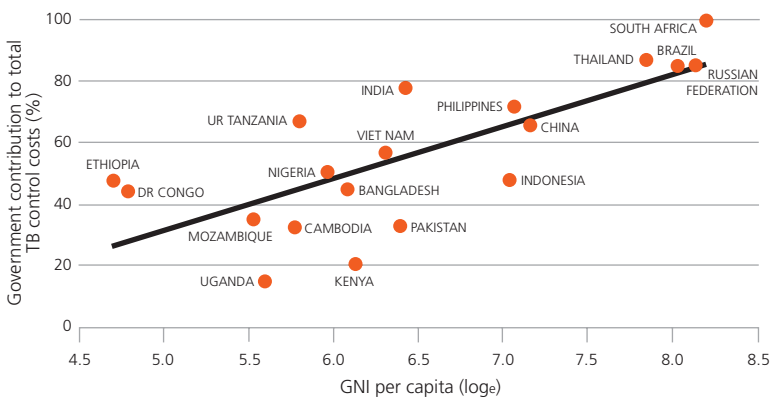
<sup>e</sup> Estimates for South Africa 2002–2006 are based on costing studies and all costs are assumed to be funded by the government.

**FIGURE 32**  
Sources of funding for total TB control costs, 22 high-burden countries, 2006<sup>a</sup>



<sup>a</sup> Countries ranked according to government contribution, i.e. government plus loans.  
<sup>b</sup> Data for Thailand and UR Tanzania are for 2005.

**FIGURE 33**  
Government contribution (including loans) to total TB control costs by gross national income (GNI) per capita, 19 high-burden countries, 2006



<sup>a</sup> Government contribution for Afghanistan not available but likely to be very low. Data on GNI per capita not available for Myanmar and Zimbabwe.

the total cost of US\$ 1.6 billion estimated for 2006. 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. 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, and continued use of mass population screening by fluorography. China (US\$ 173 million), India (US\$ 100 million), Indonesia and Brazil (both US\$ 62 million) rank third to sixth. An additional 7 countries have total costs of US\$ 25–50 million in 2006, 2 have costs of US\$ 20 million; the rest have costs of US\$ 16 million or less.

The countries with the largest projected absolute increases in annual costs between 2002 and 2006 are the Russian Federation and China (US\$ 265 million and US\$ 112 million respectively). Increases of around US\$ 40 million are projected for India and Indonesia, and around US\$ 15–30 million for Afghanistan, Bangladesh, Brazil, the Democratic Republic of the Congo, Kenya, Nigeria, Pakistan and Zimbabwe. The changes for other HBCs are around or below US\$ 10 million. The biggest proportional increases are for Afghanistan, Kenya and Pakistan.

Funding for the general health-service staff and infrastructure used by TB patients during

**TABLE 19**  
**Total TB control costs and NTP budgets per patient, high-burden countries, 2006**

	2006 (US\$)			CHANGES FROM 2002 (FACTOR <sup>a</sup> )		
	FIRST-LINE DRUGS BUDGET	NTP BUDGET	TOTAL COST	FIRST-LINE DRUGS BUDGET	NTP BUDGET	TOTAL COST
1 India	10	43	75	1.0	1.3	1.3
2 China	20	234	234	1.1	1.8	1.8
3 Indonesia	32	192	209	1.0	1.6	1.5
4 Nigeria	26	221	352	0.5	1.7	1.3
5 South Africa	—	—	980–1200	—	—	—
6 Bangladesh	16	106	141	0.7	1.3	1.1
7 Pakistan	32	178	230	0.5	3.9	2.3
8 Ethiopia	34	52	98	1.3	1.2	1.5
9 Philippines	40	145	219	0.9	1.2	1.1
10 Kenya	32	179	196	0.9	3.5	2.9
11 DR Congo	26	233	403	0.7	2.5	1.5
12 Russian Federation	145	1222	1456	2.0	2.9	2.3
13 Viet Nam	38	247	330	1.1	2.6	1.6
14 UR Tanzania <sup>b</sup>	21	123	240	0.5	1.5	1.2
15 Uganda	35	126	143	0.6	1.0	2.1
16 Brazil	62	401	732	1.4	2.4	1.4
17 Afghanistan	21	551	589	—	1.8	1.9
18 Thailand <sup>b</sup>	25	72	246	0.3	0.9	1.4
19 Mozambique	17	270	355	0.7	3.9	2.2
20 Zimbabwe	35	473	583	1.3	14.8	6.6
21 Myanmar	13	71	91	0.7	3.4	2.0
22 Cambodia	26	182	242	0.6	1.7	1.2
<b>High-burden countries (median value)</b>	<b>26</b>	<b>182</b>	<b>240</b>	<b>0.8</b>	<b>1.8</b>	<b>1.5</b>

— Indicates not available.

<sup>a</sup> Calculated as 2006 value divided by 2002 value.

<sup>b</sup> Data for Thailand and UR Tanzania are for 2005. Data for Thailand are for the central government only.

clinic visits and hospitalization is assumed to be provided by governments. This assumption, together with the implicit assumption that health systems have sufficient capacity to support the treatment of growing numbers of patients in 2006, means that the resources available for TB control are estimated to have increased from almost US\$ 900 million in 2002 to US\$ 1.4 billion in 2005 (Figure 31; Table 18). The contribution by HBC governments to the total cost of TB control in 2005 is 75% on average, which is larger than their contribution to NTP budgets. This high average figure conceals important variations among countries; many HBCs are dependent on grants to cover more than one third of the total costs of TB control, or to close large funding gaps (Figure 32). The share of the total costs provided by HBC governments is closely related to average income levels (Figure 33), although India stands out as a low-income country with a high government contribution (78%). For all HBCs, the estimated gap between the funding already available and the total cost of TB control is US\$ 141 million in 2005, i.e. the NTP budget gap reported above.

Further details, including charts that show trends in total TB control costs by line item for each year 2002–2006, are shown in Annex 1.

### Budgets and costs per patient

There is much variation among countries in budgets and costs per patient (Table 19). The budget for first-line anti-TB drugs is lowest in India (US\$ 10) and highest in the

Russian Federation (US\$ 145). In most countries, the budget is in the range US\$ 20–35.

The budget per patient, including all line items, is lowest in India (US\$ 43), and is also relatively low in Ethiopia (US\$ 52) and Myanmar (US\$ 71). A total of 8 countries have budgets in the range US\$ 100–200 per patient, 5 in the range US\$ 200–300 and 3 in the range US\$ 400–600 (budgets for South Africa cannot be estimated; that for Thailand is misleading given only partial budget data). The Russian Federation is the only country with a budget above US\$ 1000, for reasons explained above. The total cost per patient treated in 2006 is lowest in India (US\$ 75), below US\$ 100 in Ethiopia and Myanmar, and below US\$ 150 in Bangladesh and Uganda. It is in the range US\$ 200–300 in 8 countries and around US\$ 300–400 in 4 countries. There are 5 countries with much higher costs: Afghanistan, Brazil, the Russian Federation, South Africa and Zimbabwe. Zimbabwe has developed a much more ambitious plan than in previous years, in the context of the GFATM's fifth call for proposals (round five). Afghanistan's relatively high costs reflect the need to rebuild the country's basic infrastructure, 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. Budgets and costs are generally increasing, with a median increase of 80% per patient for budgets and of 50% for total costs.

Further details, including charts that show five per pa-

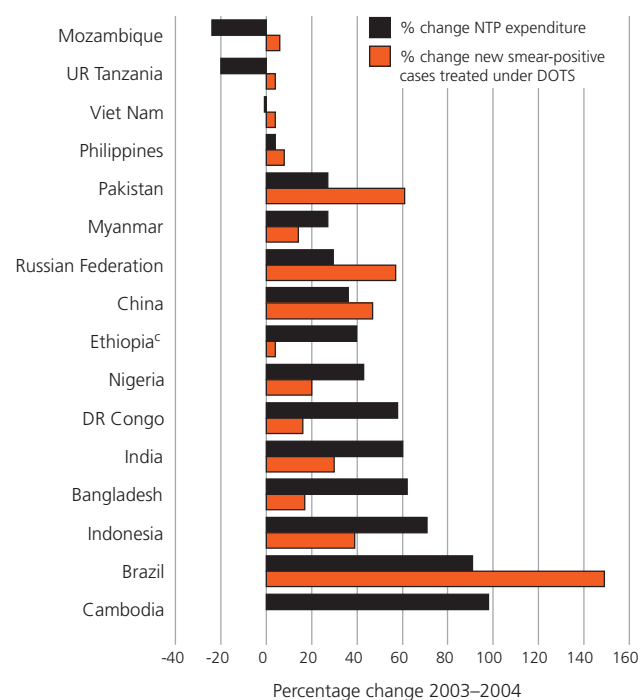
**TABLE 20**  
Budget, available funding and expenditures (US\$ millions),  
high-burden countries, 2004

	BUDGET	AVAILABLE FUNDING	EXPENDITURES	AVAILABLE FUNDING AS % OF NTP BUDGET	EXPENDITURES AS % OF AVAILABLE FUNDING
1 India	44	44	40	100	92
2 China	120	108	108	91	100
3 Indonesia	38	38	36	100	93
4 Nigeria	8	8	8	96	100
5 South Africa	—	—	—	—	—
6 Bangladesh	18	17	11	94	67
7 Pakistan	22	6	4	27	63
8 Ethiopia	7	7	7	99	100
9 Philippines	16	16	14	100	86
10 Kenya	13	10	5	75	52
11 DR Congo	12	10	9	84	87
12 Russian Federation	316	264	210	84	80
13 Viet Nam	13	13	11	98	85
14 UR Tanzania	9	7	3	76	45
15 Uganda	4	4	—	83	—
16 Brazil	20	26	26	130	100
17 Afghanistan	4	—	—	—	—
18 Thailand	4	—	—	—	—
19 Mozambique	7	3	2	44	50
20 Zimbabwe	5	3	—	58	—
21 Myanmar	6	2	2	34	80
22 Cambodia	7	5	4	81	81
<b>Total</b>	<b>692</b>	<b>590</b>	<b>500</b>	<b>82<sup>a</sup></b>	<b>80<sup>a</sup></b>

— Indicates not available.

<sup>a</sup> Average values.

**FIGURE 34**  
Change in NTP expenditure and change in new smear-positive patients treated under DOTS, 16 high-burden countries, <sup>a,b</sup> 2003–2004



<sup>a</sup> Expenditure data not available for Afghanistan, Kenya, South Africa, Thailand, Uganda and Zimbabwe.

<sup>b</sup> Countries ranked by percentage change in NTP expenditure.

<sup>c</sup> Comparison for Ethiopia is with available funding for 2002.

tient indicators (costs, budgets, available funding expenditures and budget for first-line anti-TB drugs) for each year 2002–2006, are provided in Annex 1.

### Expenditures in comparison 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.

The ability to translate additional funding into spending can be assessed by comparing expenditures with available funding (Table 20). Complete sets of data on budgets, funds and expenditures for 2004 were available for 17 HBCs. The funding available to NTPs was generally less than their budgets in 2004, though India, Indonesia, Ethiopia and the Philippines had fully-funded budgets and Brazil was able to mobilize funds in excess of its budget. Expenditures were usually less than available funding, particularly in Kenya, Mozambique and the United Republic of Tanzania, where only around 50% or less of available funds were spent. The Tanzanian NTP has noted that a shortage of adequately qualified staff made it impossible to carry out all planned activities in 2004, while Kenya has suffered from delays in the procurement of vehicles and equipment paid for by a GFATM grant. Mozambique also experienced delays in disbursement of funds.

The ability to translate spending into improved case detection can be assessed by comparing changes in expenditures 2003–2004 with changes in the number of patients treated 2003–2004 (Figure 34; 2004 is the most recent year for which both case detection and expenditure data are available). All but one of the countries that increased spending between 2003 and 2004 also increased the number of new smear-positive cases that were detected and treated in DOTS programmes, though the relationship was variable. The substantial increase in expenditure in Cambodia was not matched by any increase in the number of smear-positive cases reported, even though the extra expenditure was for initiatives to improve case detection and cure (notably active case-finding and community-based care). The relationship between increased spending and the number of patients detected and treated in DOTS programmes

**TABLE 21**  
**Categorization of high-burden countries according to financial criteria, 2005–2006**

CATEGORY	CRITERIA MET	2005	2006 <sup>a</sup>
I	Projected number of cases sufficient to meet 70% case detection target Treatment success rate achieved or close to being achieved for 2003 cohort Budget per patient treated stable or increasing Funding sufficient to reach targets Demonstrated ability to absorb additional funds required to achieve targets	India Indonesia Myanmar Philippines Viet Nam	<b>Brazil</b> India Indonesia Myanmar
IIa	As for I, except funding gap needs to be filled	Cambodia China	Cambodia China <u>Philippines</u> <u>Viet Nam</u>
IIb	As for I, but likely to meet only one of the targets	Brazil South Africa Thailand	South Africa Thailand
IIIa	Funding much improved and no or relatively small reported funding gaps, but projected cases not in line with case detection target, and/or unclear if treatment success target can be achieved	Bangladesh Ethiopia Mozambique	Bangladesh Ethiopia Mozambique <b>Nigeria</b> <b>Russian Federation</b> <b>Zimbabwe</b>
IIIb	Funding much improved but relatively large funding gaps remain and projected cases not in line with case detection target, and/or unclear if treatment success target can be achieved	Pakistan Russian Federation	<b>DR Congo</b> <b>Kenya</b> Pakistan
IV	Funding stable or worsening, and projected cases not in line with case detection target	Afghanistan DR Congo Kenya Nigeria Uganda UR Tanzania Zimbabwe	Afghanistan Uganda UR Tanzania

<sup>a</sup> Countries shown in **bold** have moved up one or more categories. Underlined countries have moved down one or more categories.

was similar when expenditures were compared with the number of all new cases treated (data not shown), though in this instance there was a small improvement in Cambodia. Of the 13 countries where an increase in spending could be documented (of the 16 for which sufficient data were available), there were 8 countries where the proportional increase in spending was higher than the proportional yield of new cases detected and treated in DOTS programmes, possibly reflecting the fact that as case detection rises it becomes increasingly difficult to find cases. The five countries where the increase in cases exceeded the increase in spending included Brazil and the Russian Federation, which is not surprising given that most cases are already being detected and treated in the public sector in these countries. It should be easier to transform non-DOTS cases in the public sector into DOTS cases than to find cases previously not being reached by public health systems. The other countries were China and Pakistan, which were both still expanding DOTS to new geographical areas in 2004, and the Philippines (where case detection is already high and where changes in both spending and cases were small).

### Budgets, funds and targets

Countries can be categorized according to whether projections of the number of patients to be treated are consistent with meeting the targets for 70% case detection, the likelihood of reaching the 85% treatment success target, the extent to which the budget for the projected number of patients is funded, how the budget per patient has changed through time and whether there is evidence that additional funding can be effectively absorbed (Table 21). In 2005, India, Indonesia, Myanmar, the Philippines and Viet Nam are in the best financial position to reach the targets, while Cambodia and China are well placed to do so if they can make up their funding shortfalls. For the remaining 14 HBCs, the planned programmes of treatment are less than required to meet the targets for case detection and/or it is not clear if they are sufficient to meet the target for treatment success, although 7 of these countries report no, or relatively small, shortfalls in funding. In 2006, the main changes are that Brazil is included in the group that is in the best financial position to meet targets, because of a large increase in the NTP budget and funding. The Philippines and Viet Nam move to the group that needs to make up funding shortfalls to meet the targets, and Kenya, Nigeria, Pakistan, the Russian Federation and Zimbabwe move to one of the two groups with much improved funding.

**TABLE 22**  
**Global Fund to Fight AIDS, Tuberculosis and Malaria financing for high-burden countries, as of end 2005**

	ROUND	TOTAL BUDGET	GRANT AMOUNT	GRANT AMOUNT	TOTAL DISBURSEMENT	TOTAL DISBURSEMENT		DATE GRANT AGREEMENT SIGNATURE	PROGRAMME START DATE	DATE OF FIRST DISBURSEMENT	TIME BETWEEN BOARD APPROVAL AND SIGNATURE OF GRANT AGREEMENT <sup>d</sup> (MONTHS)	TIME BETWEEN SIGNATURE OF GRANT AGREEMENT AND FIRST DISBURSEMENT (MONTHS)
		(YEARS 1-5) <sup>a</sup> US\$ MILLIONS	PHASE 1 (YEARS 1-2) <sup>b</sup> US\$ MILLIONS	PHASE 2 (YEARS 3-5) US\$ MILLIONS	(AS OF 27 DEC 2005) US\$ MILLIONS	BY END 2005	BY END 2005 AS % OF GRANT AGREEMENT					
1 India	1 <sup>e</sup>	9	6	3	6	70	91	Jan. 03	Apr. 03	Jul. 03	9	6
	2	29	7	—	4	53	87	Feb. 06	Apr. 04	Mar. 04	13	1
	3 <sup>f</sup>	15	3	—	0.2	6	58	Oct. 04	Nov. 04	Dec. 04	12	2
	4	27	7	—	0.4	6	37	Feb. 05	Apr. 05	Mar. 05	7	1
2 China	1	48	25	23	32	66	55	Jan. 03	Apr. 03	Apr. 03	9	2
	4	56	28	—	10	34	24	Jun. 05	Jul. 05	Jul. 05	11	1
	5	53	18	—	—	—	—	—	—	—	3+	—
3 Indonesia	1	69	22	47	23	33	48	Jan. 03	Aug. 03	Mar. 03	9	2
	5	69	19	—	—	—	—	—	—	—	3+	—
4 Nigeria	5	68	26	—	—	—	—	—	—	—	3+	—
5 South Africa	1 <sup>f</sup>	20	2	—	2	100	100	Aug. 03	Dec. 03	Dec. 03	16	4
			18	—	18	100	100	Aug. 03	Aug. 03	Dec. 03	16	4
	1 <sup>f</sup>	72	27	—	20	75	99	Aug. 03	Jan. 04	Dec. 03	16	4
	2 <sup>f</sup>	25	8	—	1	16	8	Nov. 05	Nov. 05	Dec. 05	34	1
6 Bangladesh	3	42	11	—	9	81	70	Jul. 04	Aug. 04	Jul. 04	9	1
			5	—	4	73	66	Aug. 04	Sept. 04	Sept. 04	10	1
	5	46	10	—	—	—	—	—	—	—	3+	—
7 Pakistan	2	4	2	—	2	77	99	Aug. 03	Jan. 04	Dec. 03	7	4
	3	10	6	—	2	35	49	Oct. 04	Jan. 05	Nov. 04	12	1
8 Ethiopia	1	27	11	—	11	100	100	Mar. 03	Aug. 03	Aug. 03	11	5
9 Philippines	2	11	3	8	5	43	48	Jun. 03	Aug. 03	Jun. 03	5	1
	5	46	14	—	—	—	—	—	—	—	3+	—
10 Kenya	2	11	5	—	2	50	100	Jun. 03	Nov. 03	Aug. 03	5	2
	5	20	8	—	—	—	—	—	—	—	3+	—
11 DR Congo	2 <sup>e</sup>	8	6	1	7	90	80	Jun. 03	Aug. 03	Jul. 03	5	1
	5	36	15	—	—	—	—	—	—	—	3+	—
12 Russian Federation	4	88	49	—	5	10	4	Oct. 05	Dec. 05	Dec. 05	15	3
	Tomsk	3	11	6	—	4	62	54	Oct. 04	Dec. 04	Dec. 04	12
13 Viet Nam	1	10	3	—	2	89	79	Oct. 03	Jun. 04	Apr. 04	9	6
14 UR Tanzania	3 <sup>f</sup>	87	24	—	10	40	62	Sept. 04	Oct. 04	Nov. 04	11	2
	Zanzibar	3	2	1	—	1	70	62	Sept. 04	Oct. 04	Nov. 04	20
15 Uganda	2	6	5	—	5	98	89	Mar. 04	Mar. 04	Mar. 04	14	0.1
16 Brazil	5	27	12	—	—	—	—	—	—	—	3+	—
17 Afghanistan	4 <sup>e</sup>	3	2	—	1	27	16	Jun. 05	Sept. 05	Aug. 05	12	1
18 Thailand	1	13	7	—	5	68	100	May. 03	Oct. 03	Jul. 03	13	2
19 Mozambique	2	15	9	—	1	14	49	Apr. 04	Jan. 05	Dec. 04	15	9
20 Zimbabwe	5	12	9	—	—	—	—	—	—	—	3+	—
21 Myanmar <sup>g</sup>	2	17	3	—	3	100	49	Aug. 04	Jan. 05	Sept. 04	19	1
22 Cambodia	2	6	3	—	2	96	99	Oct. 03	Jan. 04	Dec. 03	9	2
	5	10	3	—	—	—	—	—	—	—	3+	—
<b>Total</b>		<b>1 129</b>	<b>447</b>	<b>82</b>	<b>196</b>	<b>67<sup>h</sup></b>	<b>64<sup>h</sup></b>				<b>12<sup>h</sup></b>	<b>2<sup>h</sup></b>

— Indicates not applicable.

<sup>a</sup> Budgets are for five years, unless otherwise stated.

<sup>b</sup> Phase 1 amounts for round 5 grants are estimated as the budget for years 1 and 2 included in proposals.

<sup>c</sup> Shows the percentage of the grant period that has elapsed since the programme start date.

<sup>d</sup> 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 and 30 September 2005 for round 5.

<sup>e</sup> Budget is for three years.

<sup>f</sup> TB/HIV grant.

<sup>g</sup> Grant has been terminated.

<sup>h</sup> Median values.

## GFATM contribution to TB control

### High-burden countries

The GFATM is the single most important source of grant funding for HBCs, and 8 countries (Bangladesh, Democratic Republic of the Congo, Ethiopia, Indonesia, Mozambique, Myanmar, Nigeria and Zimbabwe) are relying on the GFATM to fund more than 25% of their NTP budgets. After five rounds of proposals, the total value of approved proposals (which are almost always for five years) is US\$ 1.1 billion (Table 22). The amounts in the Phase 1 grant agreements (i.e. the grants that cover the first two years of the proposal) total US\$ 447 million.

By the end of 2005, US\$ 196 million had been disbursed. For each country, we can compare the actual and expected rates of disbursement, where the expected rate assumes that disbursements should be spread evenly over the two years following the programme start date (Table 22). Disbursements are generally similar or higher than the expected rate, though disbursement was especially slow in India, Kenya, and Mozambique, and to a lesser extent in Indonesia, Thailand and the United Republic of Tanzania. The main delay in the flow of funds to countries is the time taken to sign the grant agreement after proposal approval; the median time is one year. Once grant agreements are signed, disbursements are usually made within 2 months.

### Other countries

The GFATM has approved proposals from 71 countries beyond the 22 HBCs. These proposals have a total value of US\$ 576 million. The amounts included in the two-year grant agreements total US\$ 291 million, of which US\$ 154 million had been disbursed by the end of 2005. A summary table with the same indicators as those shown for the HBCs is available upon request. The regional distribution of GFATM grants for HBCs and other countries is shown in Figure 35.

### NTP budgets by WHO region, HBCs and other countries

NTP budgets and sources of funding by WHO region in 2006 are shown for both HBCs and other countries in Figure 36, based on the 73 countries that submitted data of sufficient quality. These countries accounted for almost all of the regional burden of TB in the South-East Asia and Western Pacific regions, for 87% of the regional burden in the Eastern Mediterranean Region, 70% of the regional burden in Africa,<sup>1</sup> 63% of the burden in the region of the Americas, and 54% of the regional burden in the European Region. Collectively, these 73 countries accounted for 85% of the global burden of TB in 2004. Overall, NTP budgets per TB case (estimated annual incidence) were lower for HBCs than for other countries in the African, Eastern Medi-

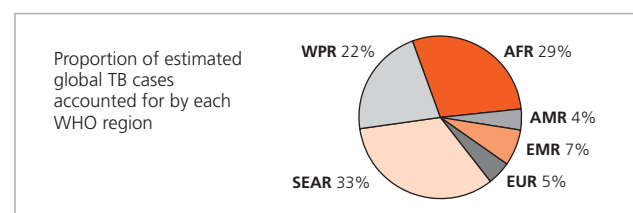
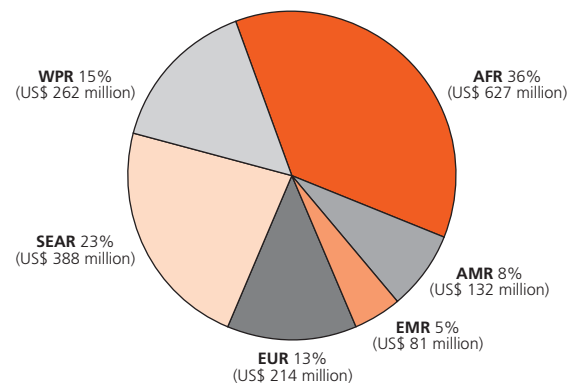
terranean and Western Pacific Regions. In the European, South-East Asia and Western Pacific regions, the budgetary funding gap, expressed as a proportion of the overall budget, was higher in HBCs than in other countries. The NTP budgets reported for 2006 total US\$ 1.3 billion, with a funding gap of US\$ 180 million.

### Costs: country reports compared with the Global Plan

The financial data submitted to WHO allow total TB control costs to be estimated for 73 of the 172 countries that are included in the Global Plan in 2006. These 73 countries account for 89% of all new cases arising each year, while the 172 countries included in the Global Plan account for 98% of cases. In 2006, costs based on country reports are similar to those set out in the Global Plan, with the exception of the African Region (Figure 37). The main reason for the difference in the African Region is that the Global Plan includes much higher costs for collaborative TB/HIV activities, as well as higher costs for ACSM. These two categories

**FIGURE 35**  
GFATM funding for TB control by WHO region, as of end 2005<sup>a</sup>

Total TB and TB/HIV = US\$ 1.7 billion  
Total TB/HIV = US\$ 245 million

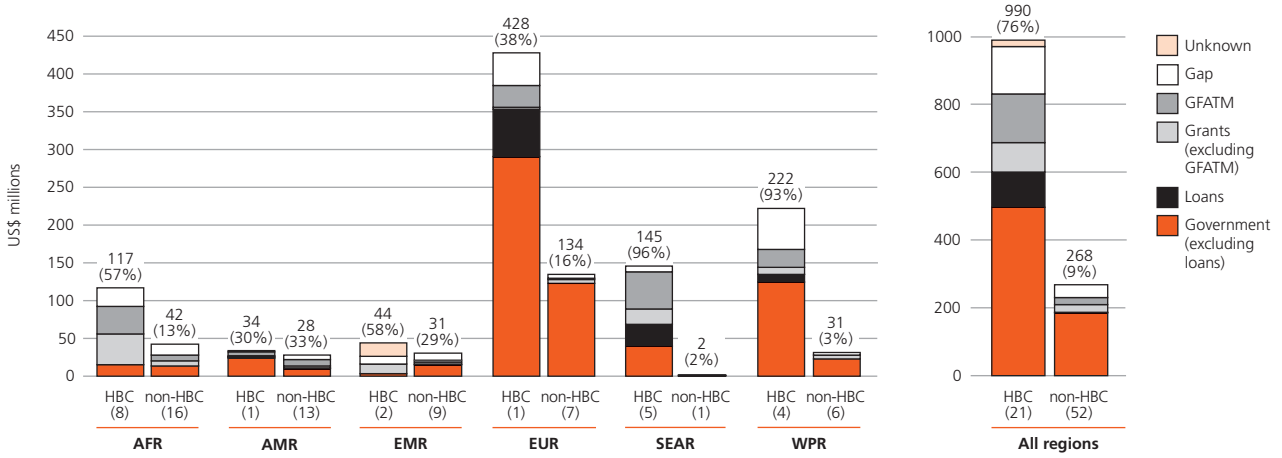


<sup>a</sup> Refers to the total budgets approved in rounds 1–5.

<sup>1</sup> If data for South Africa were available, the figure would be 83%.

**FIGURE 36**

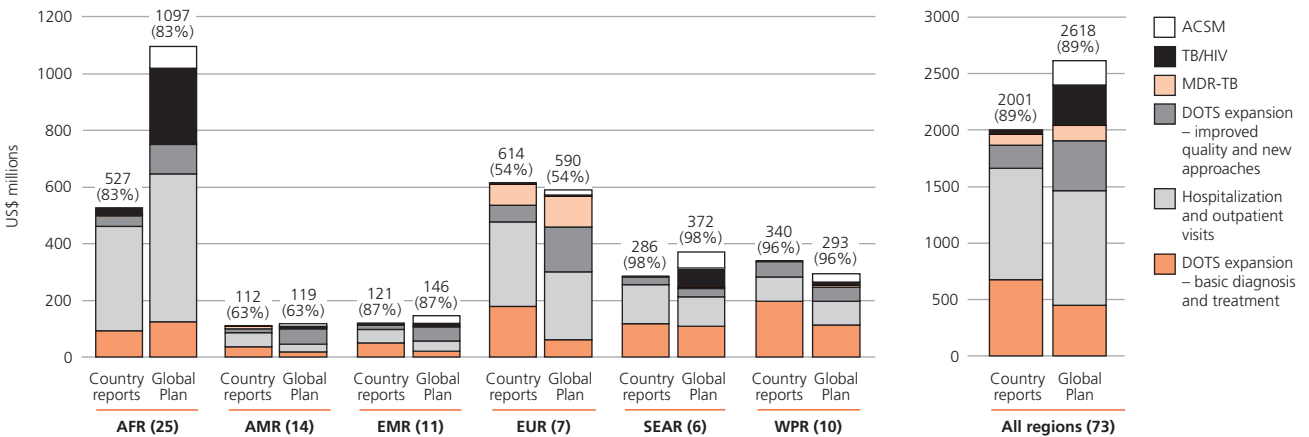
**Regional distribution of NTP budgets by source of funding, 21 high-burden countries<sup>a</sup> and 52 non high-burden countries, 2006.** Numbers in parentheses above bars show the percentage of all estimated TB cases in the region accounted for by the countries included in the bar. Numbers in parentheses in the x-axis show the number of countries contributing to each bar.



<sup>a</sup> Data not available for South Africa.

**FIGURE 37**

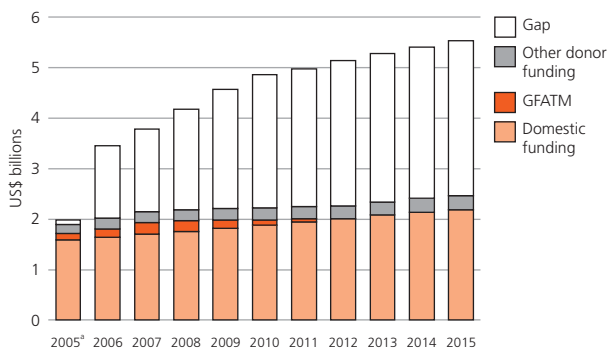
**Total TB control costs in 2006 in 22 high-burden countries and 51 other countries<sup>a</sup> by region: country reports compared with *The Global Plan to Stop TB, 2006–2015*.<sup>b</sup>** Numbers in parentheses above the bars show the percentage of all estimated TB cases in the region accounted for by the countries included in the bar. Numbers in parentheses in the x-axis show the number of country reports included.



<sup>a</sup> The Netherlands is excluded since it was not included in *The Global Plan to Stop TB, 2006–2015*.

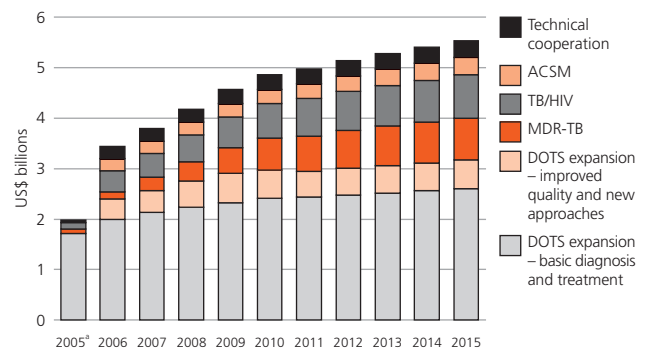
<sup>b</sup> For comparison, "Global Plan" bars show costs adjusted for the TB burden accounted for by the countries that provided reports. See Methods for further details.

**FIGURE 38**  
**Funding and funding gaps for *The Global Plan to Stop TB, 2006–2015*, excluding research and development**



<sup>a</sup> Costs for 2005 are based on *The Global Plan to Stop TB, 2001–2005*.

**FIGURE 39**  
**Funding needs for *The Global Plan to Stop TB, 2006–2015*, excluding research and development**



<sup>a</sup> Costs for 2005 are based on *The Global Plan to Stop TB, 2001–2005*.

of investment also explain the difference between country reports and the Global Plan in the South-East Asia Region, though the absolute differences are much smaller. As in the Global Plan, data reported by countries show that by far the highest costs are in the African and European regions, followed by the Western Pacific and South-East Asia regions, with relatively small costs in the Region of the Americas and the Eastern Mediterranean Region.

The funding projections in the Global Plan are based on adding existing GFATM commitments for 2006–2011 to an estimate of likely domestic funding and funding from donors other than the GFATM, with the assumption that domestic and non-GFATM donor financing will be sus-

tained at existing levels. Any increase in the funding required from 2005 onwards that is not covered by the GFATM is then a potential funding gap. As Figures 38 and 39 show, the Global Plan proposes much greater investment in collaborative TB/HIV activities, programmes to address the problem of MDR-TB, ACSM and technical cooperation compared with the first Global Plan (2001–2005), and this extra investment explains almost all of the funding gap. Since TB/HIV and ACSM are part of the possible shortfall in funding in the Global Plan, it is not surprising that country reports that indicate relatively low investment in these interventions for 2006 also report relatively small funding gaps.

# Conclusions

## Monitoring progress in TB control

### Case detection

The Millennium Development Goals, together with the Stop TB Strategy launched in 2006, have broadened the scope and aims of TB control. In 2004, however, the year in which the data for this report were collected, NTPs were focused on achieving the targets of 70% case detection and 85% treatment success under DOTS. From the data presented in this and preceding reports, we estimate that the detection rate of new smear-positive cases by DOTS programmes has continued to accelerate since 2000, reaching 53% globally by the end of 2004. Only six HBCs (Democratic Republic of the Congo, Myanmar, the Philippines, South Africa, Thailand and Viet Nam) had reached the detection target, and the estimate for at least one of these countries (Democratic Republic of the Congo) is uncertain. No WHO region had reached 70% detection by the end of 2004. If the observed rate of acceleration continues, case detection will exceed 60% by 2005, but will fall short of the 70% target.

The acceleration in case-finding since 2000 has been achieved both by improving detection within established DOTS areas and by expanding geographical coverage. Up to 2001, there appeared to be a ceiling on case detection (smear-positive and all forms of TB) at 40–50%: the series of case notifications showed that, although the detection rate by DOTS programmes had increased substantially between 1995 and 2001, the number of patients reported from all sources was more or less stationary. That was because DOTS programmes were recruiting and reporting TB cases that would have been reported anyway. The new data for 2004, when put together with those for 2002 and 2003, show that this ceiling has been breached.<sup>1</sup> This has happened predominantly in the South-East Asia and Western Pacific regions, where DOTS programmes are recruiting TB patients from new sources, including clinics and hospitals in both the public and private sectors.<sup>2</sup>

The discussion of case detection in this and previous reports has focused on smear-positive cases, largely because the target for DOTS implementation is defined in these terms. Several WHO reports have, however, emphasized that, in the Region of the Americas and in the European Region, many TB cases are reported through the public health system but from outside DOTS programmes. This implies that target rates of case detection could be achieved relatively easily in these two regions by implementing the procedures required under DOTS, including the more frequent use of smear microscopy in the European Region. In other parts of the world, especially the Eastern Mediterranean Region, case detection must be improved by finding

more patients in total, for example by increasing the number and diversity of clinics and hospitals that report TB cases.

Anticipating the development of new and more sensitive diagnostic tools, and pursuing the above comparison of detection rates among regions, we have compared various approaches to estimating case detection. A comparison of 25 European countries in 2004 shows that the proportion of culture-positive cases detected was typically lower than the proportion of smear-positive cases detected. We conclude that culture is seldom used as the principal or sole method of diagnosis in European countries, but rather as a supplementary or complementary method of diagnosis.<sup>3</sup>

On the other hand, the proportion of all TB cases detected in the European Region (diagnosed by all methods – smear, culture, radiography, clinical examination) was mostly higher than the proportion of smear-positive cases detected. There are two possible explanations: either the reported numbers of TB cases of all forms (numerator of the detection rate) are disproportionately high, or the estimated incidence rates of all forms of TB (denominator) are disproportionately low. The first explanation includes the possibility that smear-negative TB is over-diagnosed; the second implies that smear-negative cases – pulmonary or extrapulmonary – are underestimated. The observation that detection rates for all forms of TB exceeded 100% in several countries does not distinguish between these two alternatives.

Whatever the explanation for the pattern in the European Region, it is different from the pattern in the Region of the Americas, where smear-positive case detection rates were almost always higher than the detection rates for all forms of TB. Understanding the variation among case detection statistics is likely to be important in evaluating TB epidemiology and control in the Region of the Americas and in the European Region, and perhaps elsewhere in the world.

### Outcomes of treatment

Although the cohort of patients treated under DOTS has grown from 240 000 in 1994 to 1.7 million in 2003, treatment success has edged closer to the 85% target, falling just short of it in 2003 (82%). The global average has been

<sup>1</sup> The apparent ceiling is discussed in: Dye C et al. What is the limit to case detection under the DOTS strategy for tuberculosis control? *Tuberculosis (Edinb)*, 2003, 83:35–43.

<sup>2</sup> More information about collaborations between public and private practitioners and institutions in TB control can be found at: [www.who.int/tb/dots/ppm/en/index.html](http://www.who.int/tb/dots/ppm/en/index.html).

<sup>3</sup> For further data, see Tables 10 and 13 of: EuroTB. *Surveillance of tuberculosis in Europe*. Paris, Institut de Veille Sanitaire, 2003 ([www.eurotb.org](http://www.eurotb.org)).

held below the target mainly by the African and European regions, where high proportions of patients fail treatment or die, or are lost from DOTS cohorts. HIV/AIDS and MDR-TB are major obstacles to TB control in Africa and eastern Europe, respectively, but incomplete cohort data from these regions show that programme management also continues to be weak. Eight HBCs had met the 85% target for treatment success based on the 2003 cohort. All of them are in the South-East Asia or Western Pacific regions, with the exception of Afghanistan where the case detection rate by the DOTS programme is relatively low.

Among HBCs, only the Philippines and Viet Nam had met the targets for both case detection and treatment success by the end of 2004. Given the delay in assembling data from around the world, the final assessment of whether these targets were reached globally by 2005, and in which countries and regions, cannot be made until the end of 2006.<sup>1</sup> However, it is possible that the targets were reached in 2005 in the Region of the Americas and in the South-East Asia and Western Pacific regions. The HBCs that are most likely to have succeeded are Cambodia, China, India, Indonesia and Myanmar, besides the Philippines and Viet Nam. However, the 2005 reports from each of the regions and countries that appear to have met the targets will require careful verification.

The progress made in global TB control by the end of 2005 depends greatly on what has been achieved in eight countries that were inhabited by 61% of the patients who were undetected in 2004. For this reason, Bangladesh, Ethiopia, Nigeria, Pakistan and the Russian Federation will be under close scrutiny, in addition to China, India and Indonesia.

Whatever the results for 2005, it is clear that NTPs must continue, from 2006 onwards, to improve case-finding and treatment success within the framework of the new Stop TB Strategy. The targets of 70% case detection and 85% treatment success are milestones, not end-points. They should be regarded as minimum requirements for all countries, all regions and globally.

### Epidemiological trends and the impact of TB control

Where DOTS has been intensively implemented in the past five years, we expect to find evidence that incidence is beginning to decline. That evidence may be obscured by the continuing efforts made by NTPs to improve case-finding. However, some countries, or parts of countries, have apparently had high and stable case detection and treatment success rates for at least five years, and yet there are no indications that national case notification rates are falling. Viet Nam is a conspicuous example, and case reports in this country are now being examined for signs that incidence is falling in at least some age groups or in some parts of the country. In other countries, notably India and the Philippines, case notification rates have fallen for some periods

during the past 10 years, but it is not certain that these trends reflect a real decline in incidence (rather than failing surveillance or improved diagnosis, for example) and, if so, whether the decline is the direct result of TB control. To help quantify the impact of DOTS and other factors that influence TB epidemiology, all countries should carry out detailed analyses of trends in case notifications – disaggregated by age, sex, place and other patient attributes – thereby making full use of the wealth of routine surveillance data that are available.

Based on data aggregated at national level, the TB incidence rate was, by 2004, falling or stable in seven out of the nine epidemiologically different regions of the world defined in Figure 5. Incidence rates in eastern Europe (mostly countries of the former Soviet Union) and Africa (countries with low and high HIV rates) increased during the 1990s, but appear to have peaked in Europe around year 2000, and have since fallen. While case notifications are in decline in Europe as a whole, they continue to increase in some eastern European countries, or in parts of these countries. There is no way of predicting when incidence will peak and at what level in African countries, but the rates of increase slowed markedly during the 1990s. Because the epidemic is growing more slowly in the African and European regions, it is also growing more slowly globally. The worldwide incidence of all forms of TB reached 140 per 100 000 population in 2004 (8.9 million new cases, including those who are HIV-positive), and was growing at about 0.6% annually.

Besides the trends in case notifications, changes in TB epidemiology can be measured through sequential population-based prevalence surveys of infection and disease. Such surveys are logistically demanding and costly, though surveys have recently been carried out in Cambodia,<sup>2</sup> China,<sup>3</sup> India<sup>4</sup> and Indonesia,<sup>5</sup> and more are planned or under way in Eritrea, Myanmar, Somalia, the United Republic of Tanzania and Viet Nam, among other countries. While these surveys have provided, or are likely to provide, important additional information about the impact of TB control, routine surveillance will continue to be the principal source of information for all countries.

Since few national, population-based surveys of TB prevalence and deaths have been done, and since TB death

<sup>1</sup> The 2007 report in this series will give case detection rates achieved by the end of 2005, and treatment success rates for patients who are enrolled during 2004 and who complete treatment during 2005. These data will form the basis of WHO's declaration to the 2007 World Health Assembly, stating the number of countries and regions that met the 2005 targets.

<sup>2</sup> National Center for Tuberculosis and Leprosy Control, Ministry of Health, Royal Government of Cambodia. *National TB prevalence survey, 2002, Cambodia. Final report, August 2005.*

<sup>3</sup> China Tuberculosis Control Collaboration. The impact of tuberculosis control in China. *Lancet*, 2004, 364:417–422.

<sup>4</sup> Chadha VK et al. Annual risk of tuberculous infection in four defined zones of India: a comparative picture. *International Journal of Tuberculosis and Lung Disease*, 2005, 9:569–575.

<sup>5</sup> Soemantri S et al. Reduction in the prevalence of pulmonary tuberculosis in Indonesia, 1980–2004 [in preparation].

registrations are far from complete, we have made indirect estimates of progress towards the targets of halving the 1990 prevalence and death rates (Table 1). Prevalence and death rates, like incidence rates, have been rising in Africa, and more steeply in African countries with the highest rates of HIV infection. They have been falling in five out of the six WHO regions (i.e. excluding Africa), and in six of the nine subregions of the world shown in Figure 5 (i.e. excluding two regions of Africa and eastern Europe). The net effect globally, in our assessment, is that prevalence and death rates have fallen between 1990 and 2004.

The epidemiological forecast for 2005 and beyond is set out in the Global Plan. Even if the targets of 70% case detection and 85% treatment success are narrowly missed in 2005, the recruitment of well over 20 million patients by DOTS programmes in the past 10 years gives enormous momentum to the new plan. The \$56 billion plan demands that 50 million patients be treated between 2006 and 2015, reaching case detection rates that will be greater than 75% worldwide by 2010, and over 80% by 2015. These improvements in the number of patients treated, when implemented with other components of the Stop TB Strategy, should reverse the rise in TB incidence by 2015, and halve prevalence and death rates globally (if not in Africa and eastern Europe). The plan must be fully implemented from 2006 onwards, and the targets for epidemiological impact achieved by 2015, if there is to be any chance of eliminating TB by 2050.

## **DOTS implementation and planning**

### **DOTS expansion and the Stop TB Strategy**

By 2005, DOTS expansion was complete, or close to completion, in most HBCs. At this juncture in TB control, NTPs must reinforce the core elements of DOTS to ensure that essential procedures are carried out to the highest standards, while planning to take on the wider range of activities that are part of the Stop TB Strategy. Many countries have already started to work on the components of the new strategy, and are developing five-year strategic plans for 2006–2010 based on its key components (Table 2).

### **Laboratory diagnostic services**

The performance of laboratory diagnostic services urgently needs to be improved in most HBCs. National standards for laboratory procedures still do not exist in many countries. Laboratory training and supervision are essential, as are schemes to enhance staff motivation. As DOTS expands under the Stop TB Strategy and greater efforts are made, for example to manage TB linked to HIV/AIDS and drug-resistant TB, universal access to quality-assured sputum smear microscopy must remain a priority.

As NTPs attempt to incorporate components of the Stop TB Strategy into their programmes, laboratories must be equipped and staffed to identify patients with smear-nega-

tive and drug-resistant TB. Developing the capacity to culture *M. tuberculosis* and to carry out DST will be a major challenge for many national programmes. Investments to improve laboratory infrastructure, and to ensure biosafety, will be needed.

## **Human resource development**

Staff development, in general, is a critical component of any DOTS programme. The challenge of maintaining a competent and sufficient workforce is compounded by high staff turnover, and by the need to diversify training activities to cover new elements of the Stop TB Strategy, including the management of TB linked to HIV/AIDS, MDR-TB and PPM-DOTS.

Several NTPs are preparing staff development plans in order to improve their capacity. However, the majority of the plans prepared in 2005 deal only with training. Although training is essential, a comprehensive approach is needed to the development of human resources, embracing all aspects of staff development. Neglected topics include continuing education, the assessment of staff numbers and the balance of tasks to be undertaken, the geographical distribution of staff, performance evaluation, salaries and incentives. The HR plan for TB control should be considered as part of the overall HR plan for the health system in any country.

## **Collaborative TB/HIV activities**

Progress has been made in developing collaborative TB/HIV activities, but much remains to be done. There have been very substantial increases in the number of HIV-positive people that are screened for TB, treated for TB if they have active disease and started on IPT if they have only latent infections. There have been equally substantial increases in the number of TB patients that are tested for HIV and that are found to be HIV-positive. However, the number of patients who are dually infected and who receive appropriate treatment for both diseases is still a small fraction of the number in need. The progress made in Malawi and Brazil demonstrates that ART can be provided to many more patients in both low- and middle-income countries, with high and low HIV prevalence.

Recording and reporting remains weak, and many of the countries that have collaborative TB/HIV activities are unable to report fully on the recommended indicators. However, new WHO forms for recording and reporting at district level have recently been published (posted at [www.who.int/tb](http://www.who.int/tb)). These forms, which include indicators for collaborative TB/HIV activities, should help to improve the reporting of TB/HIV activities and treatment outcomes for dually-infected patients. It is hoped that all countries will collect these data from 2006 onwards.

While many opportunities to provide appropriate prevention, treatment and care for people who are dually infected with TB and HIV may have been missed, there has

also been substantial progress. Countries with the highest estimated burden of HIV-related TB will need continued financial and technical support. Both TB and HIV control programmes have much to gain if this support can be provided.

### Management of drug resistance

The effective management of drug resistance begins with a good system for surveillance and monitoring. While the Global DRS Project (and its associated reports) has been the principal source of information on prevalence and trends in drug resistance, the project has relied on special surveys carried out among TB patients presenting at clinics. Outside these survey areas, many countries routinely assess TB patients for drug resistance, and the numbers of such patients is large compared with the number identified in surveys. These NTP databases are a potentially useful source of information about MDR-TB prevalence in the patient population, as well as about management procedures and treatment outcomes. However, it is unlikely that many countries have comprehensive data on all patients: the TB patients that come to clinics are not a representative subset of all TB patients and, within clinics, the patients selected for DST are more likely to be chosen on clinical rather than epidemiological grounds.

In this first attempt to compile the routinely-collected MDR-TB data, a surprisingly large number of countries reported to WHO (146). For more than 100 of these countries, we were able to compare MDR-TB prevalence rates among new TB patients calculated from the two main sources of data: from routine surveillance and from the Global DRS Project. The results of the comparison support the view that the Global DRS Project provides more reliable epidemiological measures than can be obtained from routine data. Comparing countries, MDR-TB prevalence rates were more variable in the routinely-collected data, and the absolute prevalence rates calculated from the two sources did not agree closely. They were also poorly correlated in general, though there was a clear association between measures for European countries.

The lack of agreement between the two sets of MDR-TB prevalence measures raises more questions about the routinely-collected information than about the data from the Global DRS Project, though both are subject to uncertainty. If the routinely-collected data are to be used for assessing MDR-TB burden and trends, they must be unbiased, and DST must follow recommended laboratory procedures. In European countries, DST is offered to a large proportion of TB patients, thus reducing the risk of selection bias. This could explain the relatively strong association between measures of MDR-TB prevalence for countries in the European Region.

As routine surveillance improves, the Global DRS Project is continuing to collect more reliable data on both new and previously-treated MDR-TB cases, to better assess epide-

miological trends, the link between TB/HIV coinfection and drug resistance, treatment outcomes and susceptibility to selected second-line drugs.

The response to the call for information about MDR-TB patients, together with the observation that all but two HBCs plan to introduce appropriate MDR-TB management within two years, shows that many NTPs are beginning seriously to address the problem of drug resistance. The Global Plan, the new Stop TB Strategy, the 2005 World Health Assembly resolution on sustainable financing for TB control and the new International Standards of TB Care have all encouraged countries to expand their monitoring, diagnosis and treatment programmes for drug-resistant TB.

However, the treatment of drug-resistant TB is still inadequate in many countries. In some, laboratory diagnosis is of poor quality; others lack national policies on MDR-TB management; first- and second-line drugs of uncertain quality are widely available; and large numbers of MDR-TB patients are subject, outside NTPs, to inappropriate diagnostic and treatment procedures. The high proportions of re-treatment cases reported by some NTPs also indicate that drug-resistant TB could be common in some populations where no surveys have yet been done.

There are several ways in which NTPs can improve the management of MDR-TB patients, following the successes of the DOTS-Plus pilot projects. By the end of 2005, a series of DOTS-Plus projects had been successfully completed, showing that the management of MDR-TB is feasible and cost-effective in resource-limited settings. From now on, the management of MDR-TB will be gradually integrated in the routine activities of NTPs. As a result of additional funding for MDR-TB control at country-level, mainly from the GFATM, there has been a rapid increase in the number of countries implementing the procedures recommended for the management of MDR-TB. New guidelines for both DRS and the management of drug-resistant TB will be published in 2006.<sup>1</sup> These are expected to facilitate the integration of the management of MDR-TB into routine TB control programmes.

The GFATM selected the GLC as the preferred mechanism for second-line drug procurement in 2002. Between 2000 and 2005, the GLC approved treatment for almost 13 000 MDR-TB patients, and more than 17 000 MDR-TB patients were diagnosed in 2004 alone. Many more NTPs can and should seek GLC support to obtain quality-assured, low-priced, second-line drugs and technical assistance.

A strategy to expand quality-assured culture and DST services, so as to facilitate DRS and MDR-TB case detection and management, will be developed by WHO, in collaboration with the Supranational Tuberculosis Reference Laboratory Network, and with the Subgroup on Laboratory

<sup>1</sup> *Guidelines for the programmatic management of drug-resistant tuberculosis*. Geneva, World Health Organization, 2006 (WHO/HTM/TB/2006.361).

Capacity Strengthening of the DOTS Expansion Working Group.

WHO and its partners will focus on assisting countries in planning, piloting and scaling-up procedures for the management of MDR-TB, following the new guidelines and in line with the Global Plan. Several HBCs, including China, India, the Philippines and the Russian Federation, have plans and resources to improve MDR-TB management. Staff training and recruitment in these countries will be essential. Training modules based on the new guidelines will be developed, and WHO will conduct regional courses for programme managers and international consultants during 2006. WHO is also working to establish a long-term competitive market for quality-assured drugs by leading a project to prequalify second-line drugs worldwide. The manufacturers of second-line drugs will be strongly encouraged to apply to the prequalification system.

### **TB, poverty and health systems**

A growing number of NTPs, and their financial and technical partners, are considering TB control in the context of poverty. Many TB patients suffer because DOTS programmes are not easily accessible, but the problem is usually greater for poorer people. The decentralization of basic health services, including DOTS, is beginning to alleviate the problem in some countries. In addition, the identification of vulnerable populations, and the specific barriers they face, should make it possible to provide better access to diagnostic and treatment services.

NTPs face a number of challenges associated with weak health systems, including insecure funding, ambiguous regulatory procedures, insufficient staff, weak management capacity, and inadequate information and referral links between poorly coordinated public and private providers. Recognizing these challenges, some NTPs have become more actively engaged in national initiatives to improve health systems, and have attempted to harmonize NTP planning with general health systems planning. To guide such initiatives, the new Stop TB Strategy identifies three areas of action summarized in Table 2.

PPM-DOTS is central to engaging all health-care providers in TB control. As a component of the new Stop TB Strategy, and playing a prominent role in the Global Plan, PPM-DOTS projects are now being tested and evaluated widely in the HBCs. These projects have already had a positive impact on case detection (e.g. in China, India and the Philippines), they have led to improvements in treatment success, and they have made high-quality treatment free-of-charge available to more patients. PPM-DOTS projects will, however, stretch the resources of NTPs, particularly in providing supervision and in maintaining programme quality.

While the majority of HBCs are carrying out community-based TB care in some form, this approach is often not reflected in local health policies. There are different methods

of building and sustaining motivation in communities, and the term “community participation” means different things to different people. Nonetheless, the approach has been shown to improve access to TB care in rural districts in some countries, and has provided significant gains in terms of equity, access, affordability, cost-effectiveness (for both the patient and the health services) and acceptability.<sup>1</sup> Community-based care offers greater scope for involving civil society in TB control, by providing support to patients receiving TB treatment or ART. Community participation can, in principle, contribute to the implementation of collaborative TB/HIV activities. WHO is reviewing the success of community-based TB care globally, and is promoting better methods for integrating community initiatives into the work of NTPs.

### **Advocacy, communication and social mobilization**

As a new component of the Stop TB Strategy, ACSM is now being integrated into some NTP strategic plans, and budgets have been established for some ACSM activities (see below). In many HBCs, ACSM is being introduced in the effort to accelerate progress towards the global targets. However, NTPs need to make greater use of epidemiological and demographic data to identify which ACSM strategies work; poor planning and evaluation will result in ineffective communication and wasted resources. Long-term initiatives for ACSM, as for other activities, are threatened by uncertain financing for NTP budgets.

### **Financing TB control**

There has been a big increase in NTP budgets and a big improvement in the funding available for TB control globally in the past five years. NTP budgets for the 22 HBCs have reached US\$ 990 million in 2006, more than double their level in 2002. When the costs associated with use of general health systems staff and infrastructure are added to NTP budgets, the total estimated cost of TB control in the 22 HBCs is projected to be US\$ 1.6 billion in 2006, compared with around US\$ 900 million in 2002. When costs for a further 52 countries that reported data are added, the total cost of TB control in the 74 countries that account for 89% of the global burden of TB is estimated to be US\$ 2.0 billion in 2006.<sup>2</sup>

Funding for the NTP budgets of the 22 HBCs has risen to US\$ 830 million in 2006, almost US\$ 500 million more than was available in 2002, but still leaving a gap of US\$ 141 million. Almost all of the extra funding for TB control since 2002 has come from the governments of China and the Russian Federation, and the GFATM. The

<sup>1</sup> *Community contribution to TB care: practice and policy*. Geneva, World Health Organization, 2003 (WHO/CDS/TB/2003.312).

<sup>2</sup> Total TB control costs are NTP budgets plus the costs of hospitalization and outpatient clinic visits of TB patients that are usually not included in NTP budgets.

GFATM is now the single largest source of donor financing, contributing US\$ 144 million in 2006 compared with a total of US\$ 87 million from all other donor sources. The increase in funding has been accompanied by greater spending. The impact of this spending appears to be variable but, in all countries where spending has risen, the number of cases detected and treated in DOTS programmes has grown as well.

While budgets and funding have increased in almost all HBCs, important variation among countries remains. Our analyses show that in 2005, the year for which the WHA targets have been set, the 22 HBCs fall into four categories. In the first group are five countries (India, Indonesia, Myanmar, the Philippines and Viet Nam) that have budgets consistent with reaching the 2005 targets. These countries are likely to have sufficient funding to support their budgets, and have demonstrated that they have the capacity to spend the necessary funds. According to the surveillance data, the Philippines and Viet Nam had met the targets by 2004, and India, Indonesia and Myanmar are good candidates for doing so by 2005.

The surveillance data suggest that Cambodia and China could also meet the targets by 2005, but these countries fall into the second group on financial grounds because they both have shortfalls in funding. Brazil, South Africa and Thailand appear to have sufficient funding, largely from domestic rather than donor sources, but these countries are unlikely to reach both targets by 2005. Although DOTS coverage is rapidly expanding in Brazil, it may not be possible to diagnose 70% of smear-positive cases under DOTS in 2005. South Africa and Thailand reported treatment success rates well below 85% in 2003.

In the third group are five countries that have considerably improved funding, but whose plans are not sufficient to reach the targets for case detection. These are Bangladesh, Ethiopia, Mozambique, Pakistan and the Russian Federation. The latter two also reported a large funding gap for 2005 (despite the big increase in funding in the Russian Federation).

The seven countries in the final group are all in the African Region, with the exception of Afghanistan. In 2005, these countries had neither the plans nor the budgets required to reach the targets for case detection and treatment success. They reported limited or no improvements in funding in 2005, and large funding gaps.

Between 2005 and 2006, the prospects improved for six countries and deteriorated for three others. Brazil moves to the top group in 2006, following a further large increase in funding and the likelihood that DOTS coverage will improve as a result. The Democratic Republic of the Congo, Kenya, Nigeria, the Russian Federation and Zimbabwe also have substantially more funds but, among these, only the Democratic Republic of the Congo appears to have a chance of meeting the targets in 2006.

Of particular concern are three countries that are likely

to have met the targets in 2005, but whose funding may be lower in 2006. In the Philippines, the existing grants for PPM-DOTS end in 2005 and need to be renegotiated, or new sources of funding must be identified. Viet Nam is the only HBC where the existing funding commitments for 2006 are less than in 2002. Failure to maintain financial support for the NTP in Viet Nam is likely to undermine the substantial achievements of this model DOTS programme. Myanmar could be in a similar situation in 2007. If the decision to terminate the country's GFATM grant agreement is not reversed, funding for the NTP will deteriorate substantially unless other donors can compensate for the shortfall. Still in the worst position in 2006 are Afghanistan, Uganda and the United Republic of Tanzania. These are the only three HBCs for which funding has not significantly improved since 2002, and yet enormous efforts are needed to meet the targets. Of these, the NTP in the United Republic of Tanzania illustrates how a shortage of adequately trained and qualified staff creates difficulties in spending even those funds that are available.

The funding gap of US\$ 141 million identified by all NTPs in the 22 HBCs for 2006 is higher than reported in previous years, reaching US\$ 180 million when 52 additional countries that reported data are included (combined with the 22 HBCs, these countries account for 89% of the global burden of TB). Nonetheless, this is far less than the US\$ 1.4 billion funding gap for 2006 (excluding research and development) shown in the Global Plan. There are two reasons for this large difference. The first and most important is that the Global Plan proposes much greater investment in collaborative TB/HIV activities, particularly in Africa, as well as in ACSM. When added to the necessary investment in the management of MDR-TB, these items explain almost all of the funding gap in the plan. Since TB/HIV control and ACSM account for a big part of the shortfall in funding for the plan, it is not surprising that countries planning small investments in these areas also report relatively small funding gaps in 2006 (investment in the management of MDR-TB is similar in country reports and in the Global Plan). The second reason is that the plan includes a budget for technical cooperation, whereas country budgets typically do not (since they are expected to be part of the budgets of technical agencies). The plan's projected funding gap for technical cooperation in 2006 is US\$ 183 million.

Regarding the management of TB linked to HIV, most of the cost in the Global Plan is for ART to be given to HIV-positive TB patients, and the number of patients to be treated increases annually so as to achieve universal access to treatment by 2010 (the target as defined and set by the G8 and UNAIDS). If NTPs plan to provide ART to fewer TB patients than required to achieve universal access by 2010 – as appears to be the case from reported budgets – then funding gaps will be smaller than those shown in the plan. Furthermore, if all of the budget and funding for ART, including treatment for TB patients, is included in HIV/AIDS

programme budgets (rather than in NTP budgets), then NTP budgets and funding gaps will be much smaller for collaborative TB/HIV activities as a whole. Kenya is an example of a country where ART for TB patients is included within the HIV/AIDS programme budget.

Comparing regional financial estimates in the Global Plan with the financial data reported by NTPs highlights four priorities for further work. The first is to ensure that country and regional plans are consistent, and to assess how the resources required to fully implement these plans can be mobilized in and for each country. The large funding gap shown in the plan for 2006 becomes larger over the period to 2015. To fill the gap would require a 10-fold increase in donor funding, but only a doubling of national government funding. It is therefore unlikely that the funding gap will be filled by donor agencies, and that domestic financing from national governments will be crucial to achieving success in TB control. The data from HBCs show a clear relationship between a country's national income (measured as GNI per capita) and the share of funding for TB control that is provided by governments. However, it is possible that all countries can increase their funding of TB control, particularly those that provide less funding than other countries with the same income level, such as Indonesia, Kenya, Pakistan and Uganda. Funding needs and gaps are highest in the African Region, where TB was declared a regional emergency in 2005; financial assessments of how the required resources can be mobilized are therefore a high priority for countries in Africa.

Second, as part of the process of aligning country plans with regional plans, country budgets from 2006 need to be based on the new Stop TB Strategy. One way to do this would be to use the planning and budgeting framework developed for the Global Plan at country level. This has already been done in Afghanistan for the period 2006–2010. Progress has also been made using this framework in other Eastern Mediterranean countries, following two regional planning workshops in 2005. This preparatory work probably contributed to the evident improvements in the completeness and quality of financial data reported by countries in this region in 2005.

A third area of work is needed to establish how NTPs can help to strengthen health systems as a whole, and what investment in health systems is required to support

expanded efforts in TB control as well as the scaling up of control efforts for other priority diseases such as HIV/AIDS and malaria. The health systems debate is taking place around the following themes: health information systems, the health workforce, financing, supply systems, local management capacity and interactions with the private sector.<sup>1</sup> The Global Plan describes how these themes are considered in the cost estimates. However, improving the accuracy of the cost estimates in the plan requires a clear definition of the actions that are needed to strengthen health systems, what they will cost in each country and a good understanding of their effectiveness.

The fourth priority is to improve the quality of financial data for South Africa and countries in the European Region. The cost of TB control in South Africa cannot be estimated through routine reporting systems because budgets and expenditures related to TB control are integrated into general health facility budgets, and the responsibility for allocating funds is fully devolved to the provinces. While costing studies can be used to provide relevant data, those for TB control in South Africa are outdated. In the European Region, the same issues apply for many countries. However, it should be possible to collect more data for countries of the former Soviet Union, which account for most of the burden of TB in the European Region, and which have systems of TB control similar to those in the Russian Federation.

In summary, there have been major improvements in the financing of TB control since 2002. These improvements have put several HBCs on course to reach the WHA targets by the end of 2006. They include Brazil, Cambodia, China, India, Indonesia, Myanmar, the Philippines and Viet Nam, though funding in the last three countries in this list is currently uncertain or fragile. The Russian Federation illustrates the scale of the problem facing eastern Europe, where costs are high and yet diagnostic procedures and treatment outcomes remain poor. The African Region still faces huge challenges in planning and budgeting, and in raising and spending funds to meet the demands presented by the new Stop TB Strategy and the Global Plan. Unless there is a rapid and vigorous response to the African TB emergency, there is unlikely to be a significant reduction, by 2015, in the burden of TB carried by the people of Africa.

<sup>1</sup> World Health Organization. *The Montreux challenge: making health systems work* [draft discussion paper presented at Glion sur Montreux, Switzerland, 4–6 April 2005].