

# Critical evaluation of the Global DOTS Expansion Plan

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**Abstract** The development of the DOTS Expansion Plan has been a milestone in tuberculosis (TB) control at the global and national levels. Key challenges that remain are overcoming the weakness of a strategy built on case management, sustaining commitment, competing priorities, the threat of HIV, maintaining high quality of care and preventing drug resistance, building human resource capacity, improving diagnosis and fostering operations research. The ability to address these challenges will determine the success or failure of the Global Plan to Stop TB, 2006–2015.

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Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

## Introduction

The recent Global Plan to Stop TB, 2006–2015<sup>1</sup> takes into account the challenges identified during the five years of the Global DOTS Expansion Plan (GDEP), which ran from 2001 to 2005. At a workshop in Cairo in November 2000, national TB programme (NTP) managers from the 22 high-burden countries, WHO, technical partners, development agencies and donors agreed to develop the GDEP in response to the Amsterdam Declaration and a resolution of the World Health Assembly (WHA) in May 2000.<sup>2</sup> The focus of the GDEP would be to establish national DOTS expansion plans and develop partnerships to control TB. Participants at the workshop identified nine key areas of work as critical to achieving the goals of the Amsterdam Declaration and the WHA resolution – development of five-year plans, increased political commitment, enhanced national and international partnerships, social mobilization, human resource development, improved TB drug procurement, quality assurance of smear examination and operational research to improve TB control.

Major progress has been made since that time, including:<sup>3</sup>

- a vibrant international Stop TB partnership;
- several programmes with national TB partnerships;
- national DOTS expansion plans in all high-burden countries;
- the Global TB Drug facility (GDF);
- sustained interest of international policy-makers;

- mobilization of substantial financial resources through established mechanisms (e.g. development agencies) and new mechanisms (e.g. the Global Fund for AIDS, TB and Malaria);
- commitment of national public authorities to adoption and adaptation of international policies;
- implementation of case management in routine health services; and
- increased support for development of new diagnostics, drugs and vaccines.

However, key challenges remain and may not have been sufficiently addressed in the GDEP. This paper discusses these challenges.

## Weakness of the core strategy

Prevention based on case management has never eliminated or eradicated any disease — only vaccine-based strategies have achieved this.<sup>4</sup> Situating prevention in case management (i.e. in routine health services) means that all the challenges of establishing and maintaining quality health services (e.g. access, equity and competing priorities) must be faced. The focus on “downstream” interventions prioritizes case management and even the application of the currently available vaccine (which prevents serious forms of disease in small children but has not been demonstrated to prevent primary infection).<sup>5</sup> This approach fails to address factors related to poverty, with which TB is intimately associated.

## Sustaining ownership and empowerment

In fighting TB, economic arguments have been used to engage key stakeholders. These arguments are based on the relative cost-effectiveness of the interventions and the economic gains to be made from following the strategy. For example, the World Bank promoted the view that governments could not afford not to implement DOTS.<sup>6</sup> Although this approach has been successful in certain locations, bilateral and multilateral agencies have sometimes undermined the economic argument by shifting responsibility for budgets for TB control from national to international sources.<sup>7,8</sup> Ownership of the domain has consequently been taken up by interested parties at an international level, rather than by those primarily affected. This situation tends to disempower local and national stakeholders.

## Addressing competing interests and fashions

Health services worldwide have limits on their resources, particularly where resources are scarce. Also, resources are not always allocated according to evidence, especially in poor and marginalized communities.<sup>9</sup> Rather, they are often subject to special interests and fashions in the area of international development policy, with the only stable factor in such policy being the desire to change it.

The example of WHO reflects this tendency. When formed, the organization

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included a specialized TB unit.<sup>10</sup> Efforts in TB control coincided with steady declines in TB mortality and morbidity in industrialized countries.<sup>11</sup> However, similar progress was not observed in low-income countries, and the approach was heavily criticized.<sup>12</sup> A subsequent shift of emphasis from specialized to generalized primary care services followed the adoption of the slogan “Health for all by the year 2000”.<sup>13</sup> As the year 2000 approached, however, this slogan disappeared, and targeted approaches (to TB, malaria, tobacco and other specific issues) emerged and gained high visibility. If fashions change, will it be possible to provide the decades of commitment required to achieve the GDEP’s goals?

### Stemming the tide of HIV

In some countries, particularly in southern sub-Saharan Africa, TB and HIV are closely linked; for example, in the highest-burden settings, 75% of TB patients are also living with HIV/AIDS.<sup>14</sup> Due to the link between TB and HIV, sub-Saharan Africa is likely to supersede all other regions in the burden of TB over the coming decades.<sup>15</sup>

The trend of rising TB case rates can only be reduced if HIV infection rates are also reduced. The Stop TB Partnership (the organization that developed the GDEP) and its TB/HIV working group recognize this situation, but not all current approaches address the challenge. Failure to link efforts in TB control to those aimed at reducing HIV infection rates will undermine all other efforts to stop TB. Many countries have attempted to improve collaboration between TB and HIV services, but progress has been painfully slow and inadequate.<sup>16</sup>

### Maintaining service quality, preventing drug resistance

The quality of care for TB patients is inextricably linked to the future of the TB epidemic.<sup>12</sup> By keeping patients alive but failing to cure them, poor treatment actually augments the spread of TB. Also, a high proportion of previously treated cases harbour drug-resistant bacilli and transmit infection in the community.<sup>17,18</sup> Recently, there have been outbreaks of extensively drug-resistant (XDR) TB, even in locations that have supposedly adopted international recommendations for standard case management.<sup>19</sup> Access to second-line medications and im-

proper use of these medications has not prevented, and may even have promoted, these outbreaks.

It is unclear how much the rather strict conditions of the DOTS strategy can be liberalized without adverse consequences. What is clear is that, in locations where the rather old-fashioned strict policies have been conscientiously followed (e.g. United Republic of Tanzania,<sup>20</sup> Benin<sup>21</sup> and Nicaragua<sup>22</sup>), the numbers of multidrug resistant (MDR) cases are low; whereas, in situations where only some elements of the strategy have been strictly adopted, MDR-<sup>23</sup> and XDR-TB<sup>19</sup> have emerged. These findings suggest that strict policies are crucial in preventing emergence of drug resistance.

Such considerations have particular relevance where standard case management is provided in multiple sectors, particularly the private sector, where quality of services repeatedly has been shown to be deficient.<sup>24,25</sup> Can the quality of such services be improved? And if so, can improved quality be sustained? In other conditions (e.g. asthma), standard case management (i.e. care based on guidelines) has been demonstrated to be the management of choice (i.e. the best standard of care), but although professional bodies and specialists subscribe to the theory, they rarely carry it out in practice.<sup>26</sup> Efforts to improve quality of care within the private sector have been initiated within WHO’s Stop TB Department; for example, through the publication of the International Standards for Tuberculosis Care.<sup>27</sup> Also, some studies suggest that quality of care can be improved through targeted interventions to encourage partnership.<sup>28,29</sup> Ensuring the consistent delivery of high-quality of care at all levels of the health service and within all sectors will be a key challenge. If the GDEP plan (or the more recent Global Plan to Stop TB) has not sufficiently addressed this point, it will be a major challenge to the strategy.

### Ensuring sufficient human resource capacity

The GDEP succeeded in mobilizing additional resources from a variety of sources, and many countries have been able to expand DOTS according to their 5-year plans, often creating interagency committees to improve coordination between the various stakeholders. Improving coordination, avoiding duplication of efforts and avoiding giving conflicting recom-

mendations will continue to be a challenge for all partners. Today, NTP managers spend much of their time writing funding proposals, preparing reports (in different formats for each donor) and organizing review visits for their multitude of partners. NTP managers and programme staff need to have enough time for activities critical to improving TB control.

The Cairo workshop identified the need to increase political commitment to secure adequate human resources and finances for all TB control components at national and sub-national levels.<sup>30</sup> Substantial funding has been obtained from many donors — in particular from the Global Fund.<sup>31</sup> However, many countries still find it difficult to implement effective human resource development strategies and to secure sufficient funding for this purpose.<sup>32</sup> Although training courses are offered at national and international levels, countries are struggling to retain qualified personnel. For example, qualified and well-trained staff often seek employment in the private sector or in international bodies, or migrate to industrialized countries.<sup>33</sup> Provision of additional funding can overwhelm some countries, particularly where absorption capacity is hampered by inadequate management systems.<sup>34</sup> Thus, reinforcement and maintenance of human resource capacity in technical and management domains probably represents the main challenge for TB control in the next decade.

### Assuring quality of diagnosis

Establishment and implementation of quality assurance for diagnostic examination (sputum-smear microscopy) was one of the GDEP’s main goals. This basic test, which should be technically feasible at any location, is fundamental to a TB diagnostic service. Great progress has been made in establishing global consensus on methods for quality assurance of sputum-smear microscopy,<sup>35</sup> and a group of experts has been set up to develop improved tools and strategies for diagnostic services.<sup>36</sup> In spite of these advances, the quality of sputum-smear examination remains deficient in many (if not most) sites, and recommended programmes for quality assurance have not been widely implemented.<sup>37</sup>

Current diagnostic procedures remain cumbersome and time-consuming.

Confirming a diagnosis by definitively demonstrating the presence of *Mycobacterium tuberculosis* continues to take days or weeks, and even sputum-smear microscopy may necessitate visits to health facilities over several days. The need for, and benefits of, new technology that can provide on-the-spot, reliable diagnostic tools are obvious.

### Maintaining a critical spirit

A climate of critical reflection is necessary for effective and efficient public

health.<sup>38</sup> This can be achieved through an imbedded programme of operations research (another “plank” of the GDEP and important in the first formulation of the NTP’s ideal structure).<sup>39</sup> Although studies from a limited number of locations have been published over the past decade,<sup>40–42</sup> the establishment and maintenance of operations research is rarely a routine activity within NTPs.

Implementation of routine standardized monitoring of diagnosis and treatment outcomes using cohort analy-

sis has helped to improve NTPs’ quality of services,<sup>43</sup> and has provided valuable information for operational planning and management.

Clearly, the GDEP and the Global Plan to Stop TB have made great strides towards reducing the huge burden to health caused by TB, but much more remains to be done if we are to overcome the challenges discussed here. ■

**Competing interests:** None declared.

## Résumé

### Evaluation critique du plan mondial d’élargissement de la stratégie DOTS

Le développement du plan d’élargissement de la stratégie DOTS a constitué une étape importante dans la lutte contre la tuberculose (TB) à l’échelle tant nationale que mondiale. Les principales difficultés à surmonter restent : la faiblesse d’une stratégie reposant sur la prise en charge des cas, la durabilité des engagements, la concurrence entre les diverses priorités, la menace

liée au VIH, le maintien de la qualité des soins, la prévention de la pharmacorésistance, la constitution de capacités dans le domaine des ressources humaines, l’amélioration du diagnostic et l’encouragement de la recherche opérationnelle. La capacité à faire face à ces difficultés est déterminante pour le succès ou l’échec du Plan « Mondial Halte à la tuberculose » 2006-2015.

## Resumen

### Evaluación crítica del Plan Mundial de Expansión del DOTS

La formulación del Plan de DOTS ha sido un hito de la lucha antituberculosa a nivel mundial y nacional. Entre los grandes retos que aún habrá que superar cabe citar la debilidad de una estrategia basada en el manejo de los casos, el mantenimiento del compromiso, la competencia de otras prioridades, la amenaza del VIH, el mantenimiento de la alta calidad de la atención y la

prevención de la farmacorresistencia, la creación de capacidad de recursos humanos, la mejora del diagnóstico y el fomento de las investigaciones operativas. La capacidad de afrontar esos desafíos determinará el éxito o el fracaso del Plan Mundial para Detener la Tuberculosis 2006–2015.

## ملخص

### تقييم ناقد للخطة العالمية لتوسيع استراتيجية المعالجة القصيرة الأمد تحت الإشراف المباشر

الجودة الرفيعة في إيتاء الرعاية، وأتقاء ظهور المقاومة للأدوية، وبناء قدرات الموارد البشرية، وتحسين التشخيص، وتفعيل البحوث الميدانية. إن القدرة على مواجهة هذه التحديات هي التي ستحدّد نجاح أو فشل الخطة العالمية لدر الس 2006 – 2015.

تعدّ الخطة العالمية لتوسيع استراتيجية المعالجة القصيرة الأمد تحت الإشراف المباشر من الملامح البارزة لمكافحة السل على الصعيد الإقليمي والوطني. إلا أن هناك تحديات لاتزال ماثلة أمامها، وهي الضعف الغالب على الاستراتيجية في كلٍّ من معالجة الحالات، وضمان استمرار الالتزام، والأولويات المتنافسة، وتهديدات الإيدز والعدوى بفيروسه، والمحافظة على

## References

1. *Stop TB Partnership. The Global Plan to Stop TB, 2006-2015*. Geneva: WHO; 2006.
2. Fifty-third World Health Assembly. *WHA53/2000/REC/1*. Geneva: WHO; 2000.
3. Gupta R, Espinal MA, Raviglione MC. Tuberculosis as a major global health problem in the 21st century: a WHO perspective. *Semin Respir Crit Care Med* 2004;25:245-53.
4. Henderson DA. The challenge of eradication: lessons from past eradication campaigns. *Int J Tuberc Lung Dis* 1998;2:54-8.
5. Sutherland I, Lindgren I. The protective effect of BCG vaccination as indicated by autopsy studies. *Tubercle* 1979;60:225-231.
6. *World Development Report 1993: Investing in health*. Oxford: Oxford University Press/World Bank; 1993.
7. Trébuq A. *Report on a visit to Benin, 13-25 February 2004*. Paris: International Union Against Tuberculosis and Lung Disease; 2004.
8. Malmborg R. *Correspondence: Subject TB Drug for Sudan. 7 February 2007*. Paris: International Union Against Tuberculosis and Lung Disease; 2007.
9. Shiffman J. Donor funding priorities for communicable disease control in the developing world. *Health Policy Plan* 2006; 21: 411-420, Epub 2006 Sep 18.
10. Raviglione MC, Pio A. Evolution of WHO policies for tuberculosis control, 1948-2001. *Lancet* 2002;359:775-80.
11. Styblo K, Meijer J, Sutherland I. The transmission of tubercle bacilli. Its trend in a human population. *KNCV Selected Papers* 1971;13:1-104.
12. Grzybowski S, Enarson DA. The fate of cases of pulmonary tuberculosis under various treatment programs. *Bull Int Union Tuberc* 1978;53:70-5.
13. Brown TM, Cueto M, Fee E. The World Health Organization and the transition from ‘international’ to ‘global’ public health. *Am J Public Health* 2006; 96:62-72.

14. Corbett EL, Marson B, Churchyard GJ, De Cock KM. Tuberculosis in sub-Saharan Africa: opportunities, challenges, and change in the era of antiretroviral therapy. *Lancet* 2006;367:926-37.
15. Schulzer M, Fitzgerald JM, Enarson DA, Grzybowski S. An estimate of the future size of the tuberculosis problem in sub-Saharan Africa resulting from HIV infection. *Tuber Lung Dis* 1992;73:52-8.
16. Dye C, Watt CJ, Bleed DM, Hosseini SM, Raviglione MC. Evolution of tuberculosis control and prospects for reducing tuberculosis incidence, prevalence, and deaths globally. *JAMA* 2005;293:2767-75.
17. Schulzer M, Enarson DA, Grzybowski S, Hong YP, Kim SJ, Lin TP. An analysis of tuberculosis data in Taiwan and Korea. *Int J Epidemiol* 1987;16:584-9.
18. Kanavaki S, Mantadakis E, Nikolaou S, Papavassiliou A, Karambela S, Anagnostou S, et al. Resistance of *M. tuberculosis* isolates from different populations in Greece, 1993-2002. *Int J Tuberc Lung Dis* 2006;10:559-64.
19. Van Rie A, Enarson D. XDR tuberculosis: an indicator of public health negligence. *Lancet* 2006;368:1554-6.
20. Chonde TM. The role of bacteriologic services in the National Tuberculosis and Leprosy Programme in Tanzania. *Bull Int Union Tuberc* 1989;64:37-9.
21. Trébuqç A, Anagonou S, Gninafon M, Lambregts K, Boulahbal F. Prevalence of primary and acquired resistance of *Mycobacterium tuberculosis* to antituberculosis drugs in Benin after 12 years of short-course chemotherapy. *Int J Tuberc Lung Dis* 1999;3:466-70.
22. Helda E, Arnadottir T, Cruz JR, Tardencilla A, Chacon L. Low failure rate in standardised retreatment of tuberculosis in Nicaragua: patient category, drug resistance and survival of 'chronic' patients. *Int J Tuberc Lung Dis* 2001;5:129-36.
23. Dosso M, Bonard D, Msellati P, Bamba A, Douhourou C, Vincent V et al. Primary resistance to antituberculosis drugs: a national survey conducted in Cote d'Ivoire in 1995-1996. Ivorian Study Group on Tuberculosis Resistance. *Int J Tuberc Lung Dis* 1999;3:805-9.
24. Uplekar MW, Shepard DS. Treatment of tuberculosis by private medical practitioners in India. *Tubercle* 1991;72:284-90.
25. Mahendradhata Y, Lambert ML, Boelaert M, Van der Stuyft P. Editorial: Engaging the private sector for tuberculosis control: much advocacy on a meagre evidence base. *Trop Med Int Health* 2007; (Feb):5.
26. Boulet LP, Phillips R, O'Byrne P, Becker A. Evaluation of asthma control by physicians and patients: comparison with current guidelines. *Can Respir J* 2002;9:417-23.
27. International Standards for Tuberculosis Care. Available at: [http://www.who.int/tb/publications/2006/istc\\_report.pdf](http://www.who.int/tb/publications/2006/istc_report.pdf)
28. Newell JN, Pande SB, Baral SC, Bam DS, Malla P. Control of tuberculosis in an urban setting in Nepal: private-public partnership. *Bull World Health Organ* 2004;82:92-8.
29. Balasubramanian R, Rajeswari R, Vijayabhaskara RD, Jaggarajamma K, Gopi PG, Chandrasekharan V, et al. A rural public-private partnership model in tuberculosis control in South India. *Int J Tuberc Lung Dis* 2006;10:1380-5.
30. Global DOTS Expansion Plan. *Progress in TB control in high-burden countries, 2001, one year after the Amsterdam Ministerial Conference*. Geneva: WHO; 2001 (WHO/CDS/STB/2001.11).
31. The Global Fund for Tuberculosis, AIDS and Malaria. Available at: [http://www.theglobalfund.org/en/funds\\_raised/distribution/#disease](http://www.theglobalfund.org/en/funds_raised/distribution/#disease)
32. Figueroa-Munoz J, Palmer K, Poz MR, Blanc L, Bergstrom K, Raviglione MR. The health workforce crisis in TB control: a report from high burden countries. *Hum Resour Health* 2005;3:2.
33. Stark O, Helmenstein C, Prskawetz A. Human capital depletion, human capital formation, and migration: a blessing or a 'curse'? *Economic Letters* 60:363-367.
34. Green A, Collins C. Health systems in developing countries: public sector managers and the management of contradictions and change. *Int J Health Plann Manage* 2003;18:S67-78.
35. *External Quality Assessment for AFB Smear Microscopy*. Washington: Association of Public Health Laboratories; 2002: 111 pages.
36. Foundation for Innovative New Diagnostics. Available at: <http://www.findiagnostics.org/>
37. Hawken MP, Muhindi DW, Chakaya JM, Bhatt SM, Ng'ang'a LW, Porter JD. Under-diagnosis of smear-positive pulmonary tuberculosis in Nairobi, Kenya. *Int J Tuberc Lung Dis* 2001;5:360-3.
38. Evans JR, Castillo GT, Abed FH, et al. *Health research: essential link to equity in development*. New York: Oxford University Press; 1987; 1-136.
39. National Tuberculosis Association. Recommendations of the Arden House Conference on tuberculosis. *Am Rev Respir Dis* 1960;81:482-4.
40. Harries AD, Boxshall M, Phiri S, Kwanjana J. Managing HIV and tuberculosis in sub-Saharan Africa. *Lancet* 2006;367:1817-8.
41. Huong NT, Duong BD, Co NV, Quy HT, Tung LB, Broekmans JF, et al. Tuberculosis epidemiology in six provinces of Vietnam after the introduction of the DOTS strategy. *Int J Tuberc Lung Dis* 2006;10:963-9.
42. Marais BJ, Gie RP, Hesselink AC, Schaaf HS, Lombard C, Enarson DA, et al. A refined symptom-based approach to diagnose pulmonary tuberculosis in children. *Pediatrics* 2006;118:e1350-9.
43. El-Sony AI, Mustafa SA, Khamis AH, Enarson DA, Baraka OZ, Bjune G. The effect of decentralization on tuberculosis services in three states of Sudan. *Int J Tuberc Lung Dis* 2003;7:445-50.

## Round Table Discussion

### Public–private mix DOTS in India

LS Chauhan<sup>a</sup>

The base paper highlights the challenge of maintaining the quality of TB services while working with multiple sectors, and this discussion is very relevant to the Indian setting. Despite having a large network of state government-owned public health facilities, a significant proportion of Indian patients seek health care from the private sector.<sup>1</sup> Numerous nongovernmental organizations (NGOs) provide TB services. Moreover, many large and small state and national public-sector providers – including railways, social insurance, ports, mines and the armed forces – also manage large numbers of TB patients but are not under the direct purview of the Revised National TB Control Programme (RNTCP).

To address this, the RNTCP piloted and documented innovative public–private mix DOTS (PPM DOTS) models during the early phase of expansion. Evaluation of these models provided evidence for additional TB case detection with good treatment success rates.<sup>2</sup> Subsequently, the RNTCP recognized PPM DOTS as a strategy to manage TB patients reporting to multiple sectors and different types of health-care providers. From as early as 2002, RNTCP had expanded PPM DOTS activities country-wide using the programme guidelines for involvement of NGOs and private practitioners.<sup>3,4</sup> The strategy is built around developing a DOTS task mix for each provider type, with the RNTCP offering support for tasks that the relevant provider is unable to perform, such as defaulter retrieval or laboratory quality assurance. For medical college involvement, state-level and national task forces were created.

In 2003, the RNTCP launched intensified PPM DOTS activities in 14 urban districts. WHO-PPM medical consultants and peripheral field supervisors were recruited and posted to these districts. An expanded version of the existing routine RNTCP surveillance system collected disaggregated data from the different health-care providers. Providers were involved through a systematic process of situational analysis and listing of health-care facilities, sensitization and training of practitioners on RNTCP, training of RNTCP staff on PPM-DOTS, identification of facilities for RNTCP service delivery, memoranda of understanding and RNTCP service delivery.

The data from the intensified PPM sites have shown an overall increase in the number of TB cases notified under RNTCP. The state government public health departments remain the largest contributors to case detection, followed by medical colleges and the NGO sector. The yield of cases from the private sector to RNTCP has not been proportionate to the numbers involved. This is because there are numerous private clinics and hospitals in urban areas which usually have very low TB patient loads. NGOs and private practitioners contribute more to treatment observation than to case detection. These findings have highlighted and reinforced the importance of initially prioritizing and targeting PPM-DOTS activities for

those facilities used by the largest numbers of patients. The intensified PPM-DOTS activities strengthened the wider government health sector's involvement in the programme, leading to increased case detection from this sector.

Economic evaluations in Hyderabad, New Delhi and Bangalore show that PPM-DOTS is affordable and cost-effective, and that it reduces the financial burden on patients and society.<sup>5,6</sup> Another evaluation in Bangalore shows that the intensified PPM initiative has predominantly reached people from lower socio-economic groups.<sup>7</sup> Thus, although demanding in terms of efforts required, PPM DOTS is essential in the long-term interests of patients, providers and programmes.

Currently more than 12 000 private practitioners, over 2000 NGOs, over 230 medical colleges and 110 corporate-sector health facilities are involved in RNTCP activities. The Indian Medical Association is an important partner of RNTCP at national and state levels, and has adopted the International Standards for TB Care. As the base paper's authors point out, RNTCP is aware that adopting standards alone may not lead to improved management practices. This will require continuous engagement and working in partnership with the diverse providers. Building on their achievements, the RNTCP and the Indian Medical Association are working together to implement the PPM component of a project recently approved by the Global Fund to Fight AIDS, Tuberculosis and Malaria. ■

#### References

1. Uplekar M, Juvekar S, Morankar S, Rangan S, Nunn P. Tuberculosis patients and practitioners in private clinics in India. *Int J Tuberc Lung Dis* 1998; 2:324-9.
2. Dewan PK, Lal SS, Lonroth K, Wares F, Uplekar M, Sahu S, et al. Improving tuberculosis control through public-private collaboration in India: literature review. *BMJ* 2006;332:574-8.
3. *Involvement of non-governmental organizations in the revised national tuberculosis control programme*. Delhi: Central TB Division, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; 2001.
4. *Involvement of private practitioners in the revised national tuberculosis control programme*. Delhi: Central TB Division, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; 2002.
5. *Cost and cost-effectiveness of public-private mix DOTS*. Geneva: WHO; 2004 (WHO/HTM/TB/2004.337).
6. Pantoja A, Lal SS, Lonroth K, Chauhan LS, Uplekar M, Padma MR, et al. Cost and cost-effectiveness of scaled-up and intensive PPM DOTS in Bangalore. *Int J Tuberc Lung Dis* 2006;10:S281.
7. Unnikrishnan KP, Lal SS, Pantoja A, Lonroth K, Chauhan LS, Jitendra R, et al. Economic analysis of health care seeking behaviour by tuberculosis patients in Bangalore, India. *Int J Tuberc Lung Dis* 2006;10:S281.

### TB-DOTS in the Philippines: impact of decentralization and health sector reform

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The base paper by Enarson & Billo includes a thoughtful account of the DOTS programme's development, from its inception following the Declaration of Amsterdam, the World Health Assembly resolution, and the workshop of National TB Programme Managers of 22 high-burden countries.

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As a high-burden country, the Philippines participated in all three milestone events. The story of DOTS implementation in the country had begun five years before, when the WHO Regional Director for the Western Pacific Region and the newly appointed Philippine Secretary of Health agreed in mid-1995 to give priority attention to tuberculosis by allocating at least half of the country's WHO funds (roughly US\$ 2 million per biennium) to initiate a major TB control effort. By mid-1996, 16 out of the country's 77 provinces were selected as pilot sites.

From the start, the NTP had to deal with the administrative difficulties introduced by a 1992 law transferring responsibility for health services to local governments. By 1995 the Department of Health had devolved control of health service units to 77 provinces and over 1600 cities and municipalities. Nevertheless, the NTP's well-motivated, technically competent and well-managed staff was able to start up the DOTS strategy in all 16 selected sites in less than two years. Learning from the experience of other national programmes, like immunization and family planning, NTP developed mechanisms to work with local government units to implement its activities.

Results of the National TB Survey of 1997 confirmed that the Philippines, with an estimated prevalence of almost half a million cases, still had a major TB problem. This provided the impetus for nationwide implementation of the DOTS strategy, which was expanded starting in 1999. By the end of 2000, the Philippines reported 100% DOTS coverage.

Meanwhile, analysis of national health expenditures led to a health sector reform agenda that significantly streamlined DOH operations, beginning with the central office. In the ensuing central office staff reductions, NTP positions were reduced from 22 to 2 in 2001. However, a subsequent staffing review enabled the restoration of 7 posts. Additionally, NTP trained regional health office staff, who work closely with local governments.

NTP's 2000 data showed that DOTS was implemented throughout the country, that its treatment success rate was 88% and its case detection rate was 48%. To improve case detection, NTP strengthened its links with the Philippines Coalition Against Tuberculosis (an NGO of private individuals and institutions) by developing the public-private mix (PPM) DOTS approach. The National Health Insurance Programme also included implementation of DOTS strategy in its benefits package.

DOTS thrives today, thanks to local and national political commitment, the support of WHO-WPRO, funding from the Global Fund to Fight AIDS, Tuberculosis and Malaria and the introduction of the Global Drug Facility for procurement of DOTS supplies. It has met the global targets with 75% case detection and 87% success rates. Nevertheless, some concerns persist, such as whether such levels of commitment and support can be maintained for another decade. Additional concerns include the possible emergence of uncontrolled multidrug-resistant strains of TB and increases in what is now a low and slow HIV/AIDS situation in the Philippines. A final concern is whether the National Health Insurance Programme, pivotal in health-care financing reform, can expand its coverage of the DOTS strategy fast enough to cover anticipated reductions in external support beyond 2010. ■

## Lessons from the DOTS Expansion Plan in Indonesia: highlighting human resource development

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Indonesia ranks third among the TB high-burden countries. A decade of TB control using the DOTS strategy has facilitated progress towards reaching the 2005 international targets for TB control. Indonesia reported a case detection rate of 68% for 2005 and a success rate of 87% for the 2004 patients' cohort. The strong political commitment and leadership shown by the Indonesian government from 1999 onwards have led to the development of today's TB control strategy. This commentary highlights three key pillars towards the achievement of the 2005 targets.

First, a sound and well-budgeted five-year strategic plan,<sup>1</sup> following the Global DOTS Expansion Plan as explained in Enarson & Billo's paper, laid the foundation for implementation and attracted donor funding, including two grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund).

Second, the NTP focused on human resources development and cascaded training through a bilateral donor grant. The cascaded training programme, which started in late 2000, allowed training of different categories of staff. During the biennium 2002–2003, over 5000 (34.7%) doctors and nurses at the health-centre level were trained out of the total pool of trainees estimated at 14 474. The health ministry reports that 98% of TB staff at health centre facilities and approximately 24% of TB staff at hospitals are trained in DOTS. A core of master trainers at the regional level initiated and supervised the planning and coordination of training activities. Training activities were gradually shifted to the districts after a central training group was established to act as catalyst and reference point in accordance with guidelines and curricula.<sup>2</sup> Through the Global Fund funding, as part of the overall human resource development plan, teams of mobile master trainers helped clear the training backlog at the health-centre level. In addition, training coordinators are in place at the NTP and in most provinces.

Third, management capacity has been strengthened at all levels, with a key initiative to establish provincial DOTS teams as well as to decentralize the Global Fund management to district level. The Global Fund has acted as a pull mechanism for improving surveillance and information flows.

Indonesia is moving forward in implementing the new 2006–2010 five-year plan for TB control<sup>3</sup> in line with the new Stop TB Strategy. The 2004 prevalence survey<sup>4</sup> shows a large geographical difference in TB burden, reflecting the need for area-specific planning, including adoption of the International Standards for TB Control (ISTCs) among all health-care providers. This also addresses the challenge of TB/HIV in affected provinces, and prevents multidrug-resistant TB by strengthening laboratory networks and surveillance. The involvement of all health-care providers in Java and Bali prioritizes linkages between hospitals and health-care centres. In eastern Indonesia and remote areas of Sumatra, the main focus is on strengthening the most peripheral health centres,

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supported by community-based schemes and NGOs. Many inconsistencies remain in translating these TB policies into local plans and budgets; fostering local government commitment is a related challenge. The 2006–2010 strategic plan outlines strategies addressing these issues. The challenge is to sustain momentum and build on the foundations laid in the first strategic plan. ■

## References

1. *National TB control program strategic plan 2002-2006*. Jakarta: Republic of Indonesia Ministry of Health; 2001.
2. *TB control curricula and modules*. Jakarta: Republic of Indonesia Ministry of Health; 2000.
3. *Framework for TB strategic plan in Indonesia: 2006-2010*. Jakarta: Republic of Indonesia Ministry of Health; 2006.
4. *Tuberculosis prevalence survey in Indonesia*. Jakarta: Directorate General of Communicable Disease Control and Environmental Health, Republic of Indonesia Ministry of Health; 2005.

## A new disease reporting system increases TB case detection in China

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In the base paper, Enarson & Billo provide a critical evaluation of the Global DOTS Expansion Plan and addressed many of the challenges confronting global tuberculosis control. They did not, however, elaborate on one of the key challenges – the low percentage of infectious tuberculosis (TB) patients identified and treated in DOTS programmes. In this report, we describe a key intervention taken by China to address this important problem.

In 1992, China began wide-scale implementation of what eventually became known as the DOTS strategy. In the half of China that implemented this strategy, the TB treatment success rate rapidly exceeded 85%.<sup>1</sup> However, during the 1990s, the TB case-detection rate only reached 30% nationwide.<sup>2</sup> The reason for the low case-detection rate was well known within China. Over 90% of patients confirmed to have TB initially access care in China's vast hospital system, but less than 30% of these patients eventually end up in the Center for Disease Control and Prevention (CDC) system where DOTS was implemented.<sup>3</sup> Because most hospitals diagnose TB using only chest X-rays, it can only be confirmed after evaluation by the CDC, where sputum examination is also used. In 1996, the Ministry of Health (MOH) set up a regulation requiring all hospitals to report and refer suspected TB patients and cases identified in these institutions to the CDC system for further follow-up. But this regulation proved difficult to enforce, because it was difficult to monitor whether hospitals were in fact reporting and referring all their TB cases and suspected cases.

In 2003, the SARS epidemic broke out in China. The epidemic brought to light weaknesses in the public health system, especially the problem of incomplete and delayed reporting of SARS and other communicable diseases. Following SARS, the government worked to improve the reporting of communicable diseases, revising the Law on Controlling Infec-

tious Diseases and making it a legal requirement to report all cases of 37 communicable diseases.<sup>4</sup> In January 2004, the MOH launched the nationwide internet-based communicable disease reporting system.<sup>5</sup> By the end of 2005, 93.3% of 19 716 health facilities at and above the county level and 66.1% of 38 518 township-level health facilities were using this system to report the country's 37 notifiable diseases. The average length of time to report from a county-level health facility to the central level has been reduced from 29 days to 1 day. The MOH has instructed all local CDCs to regularly visit hospitals at and above the county level and to monitor the reporting and referral of suspected and confirmed TB cases. As a result, the number of these cases and suspected cases reported by hospitals has increased.

Hospitals are required to refer all patients suspected of having TB or diagnosed with it to the local CDC for further evaluation and treatment. Some referred patients report to the local CDC and some do not. Although the absolute number of referred patients coming to the local CDC has increased over time, the percentage of patients arriving on their own has not. Every working day, CDC staff members across the country access the central database to collect information on recently reported confirmed or suspected TB cases in their area. These staff members seek to contact patients who fail to come to the local CDC within three days of being reported. In 2005, 686 742 confirmed or suspected TB cases were reported from the hospital system. Among them, 301 938 (44%) came to the CDC system by themselves for further evaluation. Of the remaining 384 804 patients, the CDC attempted to contact 282 706 (73.5%) of them, and successfully found and evaluated 134 023 patients (or 47.4% of those sought for follow-up). Overall, 435 961 (63.5%) of all patients reported by the hospital system were eventually evaluated by the CDC system.

In 2005, China achieved the global tuberculosis control target of 70% case-detection and 85% treatment success. Of the 562 788 smear-positive tuberculosis cases reported in 2005, 127 467 (22.6%) were initially reported by hospitals through the Internet. Thus implementation of the system and policies mentioned above has played an important role in tuberculosis case detection. Nevertheless, to ensure that even more patients benefit from DOTS services, more work is needed to ensure that a higher percentage of referred cases get to the CDC before they are followed up, a higher percentage of patients are followed up, and a higher percentage of those who are followed up actually arrive at the CDC system. ■

## References

1. Chen X, Zhao F, Duanmu H, Wan L, Wang L, Du X, Chin DP. The DOTS strategy in China: results and lessons after 10 years. *Bull World Health Organ* 2002;80:430-6.
2. *Global tuberculosis control: surveillance, planning, financing*. WHO Report 2003. Geneva: WHO; 2003 (WHO/CDS/TB/2003.316).
3. *Report on nationwide random survey for the epidemiology of tuberculosis in 2000*. Beijing: Ministry of Health; 2002.
4. Order of the State Council. *Law of the People's Republic of China on the prevention and treatment of infectious diseases*. Available at: <http://www.chinacdc.cn/n272442/n272530/n272907/n272922/6837.html>
5. Ma JQ, Yang GH, Shi XM. Information technology platform in China's disease surveillance system. *Dis Surveillance*. 2006;21:1-3.

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## Building political commitment in Peru for TB control through expansion of the DOTS strategy

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In the context of public health, Peru has a long history in the fight against TB.<sup>1,2</sup> In 1990, the National TB Control Program became a national health priority, receiving government support to establish a programme that has been a model of efficiency at the global level.<sup>1</sup> Maintaining TB's status as national health priority requires a significant level of political commitment, as the base paper noted.<sup>3,4</sup>

However, in a country like Peru where the health situation is closely related to constant change and rapid social transformation, an important element in ensuring political commitment is positioning the National TB Control Program as the key player in TB management. This effort's basic principles must be communicated to administrative, political and financial decision-makers.

Political commitment for TB control must be sustained despite changing heads of government and fluctuating political trends. An important element in ensuring political commitment lies in the participation of civil society and TB patient organizations in all levels of TB control activities, including human rights issues.<sup>4</sup>

When national priorities shift and attention is deflected, TB control efforts can suffer.<sup>3</sup> This is exemplified by the negative impacts that resulted from health sector reform efforts early in the current decade.<sup>5</sup> Until approximately 2001, Peru was on the path to exceeding its Millennium Development Goals regarding TB control. In 2001–2003, the health reform process caused deterioration in TB case-detection activities.<sup>5</sup> Since 2004, this trend has been reversed, yet we must now redouble our efforts to achieve the Millennium Development Goals.

We agree with the lead article's comments relating to maintaining quality of services, and the Peruvian experience shows that expansion of the DOTS strategy has also allowed us to successfully identify and intervene in high vulnerability areas with elevated risk of tuberculosis transmission. These areas include the prison population, the marginalized urban population in extreme poverty, indigenous populations, those with MDR-TB and others co-infected with HIV.

In 2004, the National TB Control Program was strengthened by four functional pillars: coordination, management, communication and cooperation. These entities all share the responsibilities of management, leadership and accountability. To further ensure political commitment, a technical committee (from government offices of finance and logistics) and an advisory committee (NGOs, technical and financial institutions, scientific and academic institutions) were set up as essential parts of the National TB Control Program. This type of partnership has been crucial in securing political commitment, as civil society and the Ministry of Health have joined efforts to work as a team by sharing leadership and responsibility and integrating activities under a new organizational culture.

These political commitments come not only from the Ministry of Health, but also from other ministries such as Justice, Internal Affairs, Education and others. Such commitments are in the process of being transferred to regional and local levels. The partnership plays an essential role in maintaining political commitment when leaders change and when health services are decentralized.

Finally, the political commitment gained in Peru can be seen in national budget priorities. In the past 15 years, the average budget allocated to the National TB Control Program was US\$ 3 million per year. In 2006, this was raised to almost US\$ 10 million, representing substantial political commitment.<sup>5</sup> ■

### References

1. *Health, a key to prosperity: successful stories in developing countries*. Geneva: WHO; 2002 (WHO/CDS/2004.4).
2. *Global tuberculosis control: surveillance, planning, and financing*. Geneva: WHO; 2002 (WHO/CDS/TB/2002.295).
3. Nunn, Paul et al. The research agenda for improving health policy systems performance and service delivery for tuberculosis control: a WHO perspective. *Bull World Health Organ*, 2002;80(6):471-476.
4. Stop TB Partnership. The Global Plan to Stop TB, 2006-2015. Actions for life: towards a world free of tuberculosis. *Int J Tuberc Lun Dis*. 2006; 10(3):240-1.
5. *Construyendo alianzas estratégicas para detener la Tuberculosis: La experiencia peruana*. Lima: Ministerio de Salud, Dirección General de Salud de las Personas; 2006.

## DOTS expansion and TB control: the case of Mali

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### Background

Mali is a vast country in west Africa with a population of 13.1 million and a surface area of 1 241 000 km<sup>2</sup>. Poverty is a major problem, with 63.8% of population living below the poverty threshold.<sup>1</sup> Only 47% of population lives less than 5 km from a health centre.<sup>2</sup> In 2002, DOTS was launched in Mali with financial support from the Canadian International Development Agency and technical assistance from the KNCV Tuberculosis Foundation, the World Health Organization and other partners. In 2005, the programme notified 4883 tuberculosis cases (34/100 000 population), far below the WHO estimates of 36 914 cases.<sup>3</sup> The TB case detection rate for sputum smear-positive pulmonary patients in 2005 was 21%. Mali's HIV/AIDS epidemic seems to be less widespread than in eastern and southern Africa, with an estimated 1.8% of the adult population being infected with HIV.<sup>4</sup>

### DOTS expansion: achievements and challenges

Among the achievements of the Global DOTS Expansion Plan mentioned by in the base paper, Mali has benefited from increased external and internal financial resources, in-

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ternational technical assistance and the Global Drug Facility's provision of quality anti-TB drugs.

Laboratory diagnosis has been a major challenge in the initial phase of DOTS expansion. With international technical assistance and availability of additional human and financial resources, the microscopy network has been substantially strengthened. In 2005, 3530 new sputum smear-positive patients were notified, which represents a 26% increase over 2001.

During the 1990s and in line with health sector reform, vertical programmes were abolished or scaled down considerably. Mali has experienced what authors refer to as "competing fashions". Implementation of national TB control guidelines, supervision, monitoring and evaluation were hampered by competing priorities. To address these challenges, the health ministry recruited more staff at the central level and identified regional supervisors. Strengthened monitoring and evaluation led to significant improvement of treatment outcome in most regions. The treatment success rate for new sputum smear-positive patients improved from 61% for 2002 cohort to 77% for mid-2005 cohort, while the default rate significantly decreased from 29% in 2002 to 7% in mid-2005. With further decentralization of treatment, improved supervision and patients' education, higher treatment success rates may be achievable.

Mali is still far from the global target of 70% TB case detection of sputum smear-positive pulmonary patients. Focus group discussions with patients have shown that traditional healers play an important role in the Malian society. Prelimi-

nary results of operational research in the Sikasso region have shown that training and sustainable collaboration with traditional healers may improve TB case detection.<sup>5</sup>

The level of drug resistance is not known, but it is not expected to be high among new patients, as the treatment failure rate among new TB patients is only 2%. The programme considers direct observation of treatment a cornerstone of its strategy to minimize the risk of drug-resistant TB cases emerging.

A limited study in Bamako has shown that 10.1% of TB patients are co-infected with HIV. There is a need to intensify TB/HIV collaborative activities, to offer HIV testing and counselling for TB patients and to address bottlenecks in diagnosis and management of TB/HIV co-infection.

Despite significant progress due to the DOTS expansion in Mali, challenges remain that require strong national and international partnerships to achieve sustainable TB control. ■

#### References

1. *World development indicators*. Washington: World Bank; 2006.
2. *Poverty reduction strategy paper implementation report; Mali Country Report No. 05/439*. Washington: International Monetary Fund; 2005.
3. *Global tuberculosis control: surveillance, planning, financing*. Geneva: WHO; 2006 (WHO/HTM/TB/2006.362).
4. Mishra V et al. HIV testing in national population-based surveys: experience from the Demographic and Health Surveys. *Bull World Health Organ* 84:7;537-545.
5. Dara M, Berthé M, van der Werf M, Naco A, Coulibaly A. *Impact of training and collaboration with traditional healers on TB case detection in Sikasso region of Mali*. Paris: World Lung Health Conference; 2005.