



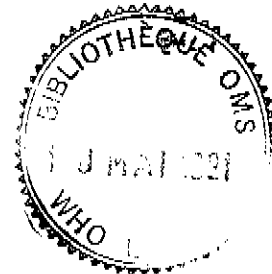
WORLD HEALTH ORGANIZATION  
ORGANISATION MONDIALE DE LA SANTE

3 5563  
DISTR. : LIMITED  
DISTR. : LIMITEE

WHO/TB/91.157 Rev.1  
ORIGINAL: ENGLISH

**TUBERCULOSIS CONTROL  
AND  
RESEARCH STRATEGY  
FOR THE 1990s**

**Report and Recommendations  
of a WHO meeting  
Geneva, 26-27 October 1990**



**Tuberculosis Unit  
Division of Communicable Diseases  
WHO, 20 Ave Appia, CH-1211 Geneva 27**

This document is not issued to the general public, and all rights are reserved by the World Health Organization (WHO). The document may not be reviewed, abstracted, quoted, reproduced or translated, in part or in whole, without the prior written permission of WHO. No part of this document may be stored in a retrieval system or transmitted in any form or by any means - electronic, mechanical or other - without the prior written permission of WHO.

The views expressed in documents by named authors are solely the responsibility of those authors.

Ce document n'est pas destiné à être distribué au grand public et tous les droits y afférents sont réservés par l'Organisation mondiale de la Santé (OMS). Il ne peut être commenté, résumé, cité, reproduit ou traduit, partiellement ou en totalité, sans une autorisation préalable écrite de l'OMS. Aucune partie ne doit être chargée dans un système de recherche documentaire ou diffusée sous quelque forme ou par quelque moyen que ce soit - électronique, mécanique, ou autre - sans une autorisation préalable écrite de l'OMS.

Les opinions exprimées dans les documents par des auteurs cités nommément n'engagent que lesdits auteurs.

## ADDRESSING THE PROBLEM OF TUBERCULOSIS

This document summarizes the presentations and deliberations of the WHO Meeting on TUBERCULOSIS CONTROL AND RESEARCH STRATEGY FOR THE 1990s held in Geneva at the World Health Organization, October 26-27, 1990. The participants included representatives of tuberculosis control programmes in developing and industrialized countries, non-governmental organizations, development agencies, and scientists<sup>1</sup>. The document describes the consensus established on the urgency and magnitude of the tuberculosis problem, the power of existing tools, and the need for new tools. It provides background for the Recommendations of the meeting (Appendix 1), in particular the "urgent need for a focused global programme on tuberculosis" integrating components of control, research and capacity building under the leadership of WHO.

**The Tuberculosis Problem**

Tuberculosis is one of the most widespread infections known to man; 1.7 billion people, or 33% of the world's population, harbour the bacterial pathogen, *Mycobacterium tuberculosis*, although for most of these the infection is inactive. Every year, 8 million individuals develop new clinical disease. The spectrum of clinical manifestations of tuberculosis is wide, including pulmonary tuberculosis, the most highly infectious form of the disease; tuberculous meningitis, the major form causing mortality in children; and tuberculosis of other organs. Out of 8 million new cases, 3.6 million have infectious pulmonary tuberculosis<sup>2</sup>, in which the bacteria, which can be microscopically detected in sputum, are spread by droplets resulting from chronic cough. An equal number have pulmonary tuberculosis in which the numbers of bacilli are not readily detectable by sputum examination, and 0.8 million have various forms of extra-pulmonary tuberculosis. Tuberculosis is a chronic infectious disease that inflicts great suffering on the individuals who have the disease and their households. The impact of such a debilitating chronic disease on the family is far reaching; for example, a study in Bangladesh showed that children in households where one parent suffers a disease like tuberculosis are twice as likely to be severely malnourished as in households with healthy parents.

Untreated tuberculosis has an extremely high case fatality rate, over 50%. Treatment with drugs reduces the case fatality rate drastically but, because of inadequate treatment programmes in many countries, the best estimates are that 2.9 million people die from tuberculosis each year. More people die from tuberculosis than from malaria or measles. While the magnitude of the problem has been largely ignored by the world community, tuberculosis is, in fact, the largest single infectious cause of death in the world. The age-distribution of tuberculosis incidence and death in the developing world is unique among the major infectious killers. While people of all ages suffer, the heaviest toll is on young adults. These are the parents, workers and future leaders of society. If there are diseases that impede social and economic development, tuberculosis must be among the most important. It is estimated that one quarter of avoidable adult (age 15-59 years) deaths in the developing world are due to tuberculosis.

---

<sup>1</sup> The recommendations and list of participants are given in Appendix 1.

<sup>2</sup> In this context, infectious tuberculosis is defined as pulmonary tuberculosis that has bacilli detectable in the sputum - sputum smear-positive tuberculosis.

The burden of tuberculosis is not uniformly distributed throughout the world. Tuberculosis morbidity and mortality rates are greatest in Sub-Saharan Africa, where the incidence of the disease is greater than 260 per 100 000. Because of high incidence and a large population, each year more than 60% of new cases and deaths occur in Asia. Temporal trends in tuberculosis are also variable. Rates of decline in the incidence of tuberculosis<sup>3</sup> are highest in industrialized countries and lowest in Sub-Saharan Africa and South Asia. Before World War II, when tuberculosis was the first or second major cause of death, Europe and other industrialized nations enjoyed declines in tuberculosis of 5-6% per year; these accelerated to 10-14% per year with the introduction of effective chemotherapy after 1952. Some developing regions such as Latin America, the Caribbean and North Africa, have experienced rates of decline of 5-10% per year because of a combination of moderately effective national treatment programmes and socio-economic development. Where the problem is worst, Sub-Saharan Africa and South Asia, the incidence of tuberculosis has been declining at only 0-3% per year. Rates of decline in this order barely match the rate of population growth so that the absolute number of cases in many countries is increasing.

Two new problems threaten to make the tuberculosis problem even worse: the HIV epidemic and drug resistance. HIV infection is the highest risk factor so far identified which substantially increases the chance of latent tuberculous infection progressing to active disease by reducing protection provided by cell-mediated immunity. HIV infection also increases the risk that new tuberculous infection will progress to disease. This problem is significantly exacerbating the epidemiological situation of tuberculosis in both developed and developing countries. In Africa, nearly half of HIV seropositive individuals are also infected with tuberculosis. Of these, it is estimated that about 10% will develop clinical tuberculosis each year. Tuberculosis programmes in Central and East African countries have already reported substantial increases in the number of patients presenting for tuberculosis treatment in the last 5 years. This is currently overburdening many hospitals, where more than half the patients in the medical wards may suffer from both AIDS and tuberculosis. While tuberculosis in those infected with HIV is itself a great tragedy, the fear is that increasing numbers of HIV-positive patients with infectious tuberculosis will increase the transmission of tuberculosis in the rest of the population, and rates of tuberculosis infection may increase in countries with high tuberculosis and HIV prevalence.

Resistance to the major drugs used for the treatment of tuberculosis (isoniazid, rifampicin and others) is a growing problem. Fuelled by ineffective treatment programmes which, in fact, foster the emergence of drug-resistant strains (e.g. by providing inadequate therapy or allowing treatment to be discontinued before the disease is cured) there is compelling evidence that in some parts of the world, resistance is already a major problem. In industrialized countries, reports of focal epidemics of drug-resistant tuberculosis are indicative of what may become a more generalized problem.

#### Tools to Control Tuberculosis are Available Now.

Strategies proven to combat tuberculosis effectively currently exist. Since the early 1920s, BCG vaccine has been available to prevent some types of tuberculosis. While the effectiveness of BCG in preventing infectious types of tuberculosis in adults is limited, there is strong evidence that it is effective

---

<sup>3</sup> Rates of decline are actually calculated in terms of changes in the annual risk of infection (which is the probability that an individual of a particular age-group will be infected or reinfected in a given year). For epidemiological purposes, the annual risk of infection is the best measure of tuberculosis transmission and is used for monitoring changes in the epidemiological situation.

in preventing the lethal forms of tuberculosis, meningitis and disseminated disease, in children. BCG coverage in developing countries is now greater than 80%, although the average coverage level in Sub-Saharan Africa is less than 60%. However, this high coverage of BCG vaccination does not contribute significantly to reducing the transmission of infection because of its limited preventive effect on infectious types of tuberculosis.

Chemotherapy has the proven potential to reduce morbidity and mortality and render sputum-positive cases noninfectious, thereby reducing transmission of tuberculosis and accelerating its decline. "Standard" long-course chemotherapy regimens using isoniazid, thiacetazone and streptomycin require 12-18 months of therapy. Many people experienced in delivering health services in developing countries are familiar with the difficulty in obtaining regular drug supplies and of maintaining patient compliance over such long periods. In fact, despite the availability of effective drugs for nearly four decades, most national programmes have been able to cure far less than half of all new cases using standard chemotherapy regimens. Testimony to the widespread failure of tuberculosis control efforts is the fact that the epidemiological situation in Africa and South Asia has barely changed over the last thirty years.

The introduction of short-course chemotherapy (SCC) has sparked a revolution in some national tuberculosis control programmes. Over the last 10 years, the International Union Against Tuberculosis and Lung Disease (IUATLD) has assisted national tuberculosis programmes in several developing countries including Tanzania, Mozambique, Malawi and Nicaragua. These well managed programmes with short-course chemotherapy as their primary tool, have shown that impressive results can be achieved even in the most exacting of environments. In these programmes, the cure rate for patients has been around 80% (Table 1). These are not pilot programmes in one or two districts, but results of national attempts to combat tuberculosis. In the absence of other factors such as HIV, such cure rates would be expected to accelerate the decline in tuberculosis incidence from 0-3% per year to 6-8% per year in these countries. With these effective programmes, projections indicate that the incidence of tuberculosis can be reduced to half its present level in only 8 to 12 years.

Evaluation of the IUATLD-assisted national tuberculosis control programmes has shown that well managed short course chemotherapy is highly cost-effective in a variety of diverse and difficult conditions. Treatment of infectious pulmonary tuberculosis in hospital for the first two months followed by ambulatory therapy for the next 6 months costs only 55-85 US dollars per death averted and 2-4 dollars per discounted year of life saved.<sup>4</sup> Purely ambulatory treatment for infectious tuberculosis, where feasible, is even cheaper: 30-36 US dollars per death averted and 1-2 dollars per discounted year of life saved. For comparison, these costs are lower than the cost of measles immunization or oral rehydration therapy per discounted year of life saved. However, as experienced on many occasions, the introduction of short-course chemotherapy does not automatically lead to the high cure rate achieved by IUATLD-assisted projects unless there is simultaneous improvement in the management of the treatment system. Two important components of an improved management system are provision of regular anti-tuberculosis drugs supplies to the treatment centres and rigorous cohort analysis of treatment outcome at the treatment centres. The analysis may be used to show the health workers how well or poorly they are implementing the treatment activities.

Tuberculosis is unique among diseases because improved control, even if only temporary, will "ratchet down" incidence of the disease permanently. Any increase in the cure rate will decrease transmission so that fewer infectious

---

<sup>4</sup> These calculations take into consideration the benefits of reduced transmission over the next twenty years.

cases will occur in the next period and subsequent periods after that. Even if a programme is only temporarily successful at improving the cure rate, transmission is so stable that tuberculosis will not return to former levels. Unlike investments in diseases such as schistosomiasis or malaria, tuberculosis investments have a sustained long-term yield.<sup>5</sup>

#### Why Has There Been So Little Progress?

The sheer magnitude of the burden of tuberculosis and the existence of cost-effective treatment strategies should have made tuberculosis control a major national and international priority. Yet in most countries there has been disappointingly little progress. There are at least three fundamental reasons for this failure.

First, tuberculosis has been neglected as a major priority. Since the early-1970s, international and national interest has waned. By that time, tuberculosis had begun to disappear rapidly in industrialized countries. There was also a popular perception that effective tools, namely BCG and the five major drugs, existed and further research was not needed. It was expected that the conquest of the disease in the industrialized countries would be mirrored in the developing countries using the apparently powerful preventive and curative interventions available. Unfortunately, as research interest disappeared so did interest in concerted efforts at control in developing countries. The extent of the neglect was profound; for most of the 1980s WHO had only three, and ultimately two, professional persons working on tuberculosis. International reviews of priorities for research and action rarely mentioned tuberculosis. Until national governments, the development agencies and the international health community are informed and recognize the urgency for action, little improvement can be expected.

Second, many countries need to learn from the successful programmes of the past decade. Technical expertise is needed to help countries adapt and apply the control strategies that have been proven effective in other countries to their own institutional and physical environments. Whether this process of adaptation and implementation is termed operational research or good management is semantic. The existing gap among countries in technical understanding and expertise is, however, profound.

Third, in terms of the cost per death averted or the cost per year of life saved, tuberculosis chemotherapy is cheap. But from a national government perspective, drugs for short-course chemotherapy are expensive and a significant foreign exchange burden for many countries. Countries need assistance in making a cogent well-articulated case to their own Ministries of Finance and/or Planning for increased funding for tuberculosis control. Assistance is also needed in making a convincing argument to bilateral development agencies, the World Bank and regional development banks, and other multilateral development agencies for supporting tuberculosis control efforts.

#### The Role of a Programme and The Need for New Tools.

The participants in the WHO MEETING ON TUBERCULOSIS CONTROL AND RESEARCH STRATEGY FOR THE 1990s unanimously recommended that there be a strong new programme for control, research and capacity building in tuberculosis (Appendix 1). It was affirmed that national tuberculosis programmes with similar components are needed in countries where the disease is a significant public health problem.

---

<sup>5</sup> The HIV epidemic in some areas may disturb the transmission dynamics so that this ratchet effect no longer holds true.

Of utmost importance in realizing a strong national tuberculosis programme is the political will of each country, which leads to the mobilization of its own resources. In many resource-poor countries the development of political will must be matched and supported by coordinated external assistance by bilateral and multilateral agencies and international NGOs.

Such efforts at the national level need technical assistance and coordinated servicing by an international tuberculosis control programme.

The international programme would have three essential functions: control, research and capacity building and would be coordinated under the leadership of WHO.

In tuberculosis control, the role of the programme would be manifold. First, the programme would need to address the problem of neglect by encouraging, through information and advocacy, national governments and the donor community to give due attention to tuberculosis.

Second, the traditional role of WHO in many disease control programmes, including tuberculosis control, has been viewed as one of technical information support. For tuberculosis, however, there is a need for the programme to play a more active role in assisting countries and donor agencies in the preparation, development and initiation of enhanced tuberculosis control efforts. One of the barriers for governments and donors to supporting tuberculosis control is the widespread perception that tuberculosis control is a difficult field. A programme that provided technical expertise to assist in preparing and initiating plans could overcome donor and government resistance to entering the tuberculosis arena. The role of technical guidance should extend beyond preparation and initiation and include a component of ongoing monitoring and evaluation of control efforts.

Third, the programme should continue the traditional WHO role of setting standards and disseminating new technical policies. Finally, the programme should encourage capacity building in control through training courses, exchanges of personnel between and among developing and industrialized countries and provision of up to date information and knowledge.

A need for research is seen in two areas. First, operations research to apply and adapt proven technologies to local conditions is a clear necessity. As much of this operations research needs to be conducted by national programmes, a focus on capacity building for operations research and control management is needed. Second, with the threat of the HIV epidemic and rising rates of drug resistance, the need for continued basic research must be appreciated. The tragic lesson of the history of malaria control, where research activities stopped for several decades because "adequate tools" existed, is familiar to all. Some priority topics in more basic and applied research include: 1) Testing new drugs, such as some of the fluoroquinolones, for their ability to shorten treatment regimens and combat strains resistant to existing therapeutic agents; 2) Alternative delivery methods to improve compliance, such as calendar packs and depot preparations; 3) Development of new diagnostic methods, e.g. based on more sensitive immunological techniques or new gene amplification technology, such as the polymerase chain reaction (PCR), would provide more rapid and earlier diagnosis, leading to earlier treatment and reduction in transmission; 4) Epidemiological studies on the containment of drug resistant strains and of the impact of chemoprophylaxis on HIV/TB infected patients; 5) Improved recombinant vaccines effective against tuberculosis in adults.

Finally, both control and research efforts must have, as a primary focus, steps to develop national capacity to have a self-sustaining national tuberculosis control programme. Capacity building for control and research activities will require training, learning by doing, exchanges and visits from the scientific

community and a range of services, including information support and conferences, that are essential in relating health workers in countries to the broader community committed to combatting tuberculosis.

Any programme that will address these needs must be a broad based coalition of all interested parties. While WHO provides the technical leadership and the overall coordination, other parties are also needed in the programme. Other members of the United Nations family, such as UNDP, the World Bank, UNICEF and the regional development banks, should be involved in this effort. Tuberculosis is unique in having an international non-governmental organization, IUATLD, with members organizations in more than 100 countries. Their close cooperation and participation would be essential to the success of a tuberculosis programme. Other non-governmental organizations, such as the international and national leprosy organizations, and foundations also have much to contribute. Finally, the participation of bilateral development agencies in the programme is essential. These groups should participate in the design of the programme direction through mechanisms such as an overall advisory, oversight and donor body. In addition, there is a clear need for broad participation in technical steering committees of the programme. The experience of the TDR, CDR, EPI and GFA programmes at WHO is clearly relevant to the design of a programme to address the problem of tuberculosis.

#### A Question of Scale

To have a real impact on a problem of the magnitude of tuberculosis, such a programme must bring the problem to the world's attention and mobilize support on a major scale. In a world of scarce and competing resources, a substantial commitment to tuberculosis control must be considered as a good investment. By treating and preventing disease, transmission is blocked and the number of individuals who will suffer this disease in the future is reduced. A first approximation would indicate that the increased cost of detecting and treating all new cases in the world through a well managed programme would be US\$ 250-300 million per year. Thus the achievement of the global target<sup>6</sup> of tuberculosis control - 70% detection of all new cases and an 85% cure rate by the year 2000 - will have an approximate total cost of US\$ 200 million per year. If external support covers 30-40% of the total cost, the external cost will be approximately US\$ 75 million per year. It is estimated that the international component of this programme would require US\$ 7-10 million per year for basic organization, communication and support of such a global effort.

By achieving this global target, it is expected that: First, the number of tuberculosis deaths occurring annually will be reduced by 40% from the current 2.9 million to 1.7 million; Second, the worldwide prevalence of tuberculosis will be reduced by 50% from the current level of more than 20 million, as the result of the elimination of a vast number of chronic cases; Third, this would reduce transmission of the bacillus so that the number of new cases would fall by 50% in approximately 8 years.

The cost per life saved would be between US\$ 30-85, and the cost per annual discounted healthy life year saved would be US\$ 1-4 per patient. If these cost-effectiveness ratios are compared to all other health interventions reviewed by Jamison and Mosley in the World Bank Health Sector Priorities Review<sup>7</sup>, tuberculosis treatment is probably the most cost-effective intervention

---

<sup>6</sup> A resolution on tuberculosis including setting this global target will be proposed for the coming World Health Assembly in 1991.

<sup>7</sup> Jamison D.T., Mosley W.H. (Eds). Evolving health priorities in developing countries. Washington DC: Population, Health and Nutrition Division, World Bank, 1991.

available today, supporting the view that a programme to address the problem of tuberculosis represents one of the most advantageous health investments available.

TABLE 1 : RESULTS OF TREATMENT IN 41 720 NEW SMEAR POSITIVE PATIENTS ENROLLED ON SHORT-COURSE CHEMOTHERAPY IN IUATLD-ASSISTED NATIONAL TUBERCULOSIS PROGRAMMES IN TANZANIA, MALAWI, MOZAMBIQUE AND NICARAGUA, 1983-1988.

Country	Percent of Patients				
	Cured	Positive	Died	Absconded	Transferred Out
Tanzania	77	2	7	10	4
Malawi	87	1	7	2	2
Mozambique	78	1	2	11	8
Nicaragua	78	2	3	13	5
Total	79	2	6	9	4

APPENDIX 1

RECOMMENDATIONS  
OF THE WHO MEETING ON  
TUBERCULOSIS CONTROL AND RESEARCH STRATEGY FOR THE 1990S

October 26-27 1990, Geneva

The following recommendations were unanimously adopted. (A list of participants is appended).

1. The meeting affirmed the need for a focused global programme on tuberculosis that would provide for the participation of all those parties who may be able to assist countries, financially, technically and practically, to control their tuberculosis problems. The parties would include, in addition to the countries themselves, WHO and other international agencies; the International Union Against Tuberculosis and Lung Disease (IUATLD) and other non-governmental agencies; and bilateral development agencies. This can be achieved by participation of such parties in the overall advisory, oversight and donor body of the programme and by the involvement of individuals with expertise from these organizations in the technical steering committees of the programme.
2. In tuberculosis control the role of the programme is to:
  - 2.1 encourage national governments and donor agencies to give appropriate priority to tuberculosis and strengthen political commitment;
  - 2.2 assist countries and donors in the preparation and initiation of enhanced tuberculosis control efforts;
  - 2.3 provide leadership in the development and dissemination of appropriate tuberculosis control policies and procedures and to conduct ongoing surveillance of the global tuberculosis problem and the adequacy of efforts to control this disease;
  - 2.4 lead the exchange of ideas and experience on operations, monitoring, evaluation and training by countries and all involved, with expertise; thereby catalyzing and assisting national tuberculosis programmes moving towards optimal policies, approaches and operations, so that countries can move rapidly to a situation where tuberculosis is no longer of public health importance.
3. In tuberculosis research, the role of the programme is to find new and more effective ways to use existing technologies and to develop new tools and methodologies. Principal emphasis should be on operational research to address the problem with the best available tools and optimal use of resources, but the programme should include research and development for application of new tools, and encouragement of more basic research by countries with that capacity.
4. For improved control and necessary research, it will be necessary for countries to build national capacity in terms of both increased and better trained manpower at many levels, and the programme needs to have an emphasis on capacity building. The aim of this effort is particularly to assist countries in having a self-sustaining national tuberculosis control effort.

5. Tuberculosis is the largest single infectious cause of death in the world, killing 3 million people every year. This death toll represents 25% of avoidable adult deaths in developing countries. Tuberculosis imposes a heavy burden on the 8 million new individuals who contract the disease each year, and on their households. Tuberculosis morbidity and mortality are concentrated in adults --- the parents, workers and leaders of society. Evidence has accumulated that the HIV/tuberculosis interaction will significantly exacerbate the epidemiological situation of tuberculosis in developed and developing countries, making the need for action all the more pressing.

Broad action is urgently needed to apply proven, effective strategies to reduce the tragic burden of tuberculosis. Research is needed to implement these strategies throughout the world and to ensure that effective tools will remain available for controlling tuberculosis despite emerging problems such as drug resistance and the HIV epidemic.

To make a real impact on the problem of tuberculosis, the programme must bring tuberculosis to the world's attention and mobilize support on a major scale.

WHO MEETING ON TUBERCULOSIS CONTROL  
AND RESEARCH STRATEGY FOR THE 1990s

Friday 26 to Saturday 27 October 1990  
Executive Board Room, WHO Headquarters, Geneva

LIST OF PARTICIPANTS

1. Dr M. Aoki, Director, Research Institute of Tuberculosis, Japan Anti-Tuberculosis Association, Kiyose-shi, Tokyo 180-04, Japan.
2. Dr B. R. Bloom, Department of Microbiology and Immunology, Albert Einstein College of Medicine, Yeshiva University, 1300 Morris Park Avenue, Bronx, NY 10461, USA.
3. Dr M. J. Borgono, Chief, Office of International Affairs, Ministry of Health, Casilla 3979, Santiago de Chile, Chile.
4. Dr F. Boulahbal, Chief, TB Laboratory, Institut Pasteur d'Algérie, Rue Docteur Laveran, Alger, Algérie.
5. Dr D. J. Bradley, London School of Hygiene and Tropical Medicine, London, United Kingdom.
6. Dr G. Dahlström, Emeritus Professor of Medicine, Kyrkogardsgatan 11, S-752 35 Uppsala, Sweden.
7. Dr J. M. Grange, Director, Department of Microbiology, National Heart & Lung Institute, Dovehouse Street, London SW3 6LY, United Kingdom.
8. Dr J. Kostrzewski, Professor of Epidemiology, National Institute of Hygiene, Panstowy Zaklad Higieny, 24 Chocimska Street, 00791 Warsaw, Poland.
9. Dr C. J. L. Murray, Commission on Health Research for Development, Center for Population Studies, 9 Bow Street, Cambridge, MA 02138, USA.
10. Dr R. O'Brien, Chief, Clinical Research Branch, Division of Tuberculosis Control, Center for Prevention Services, Centers for Disease Control, Atlanta, GA 30333, USA.
11. Dr T. Ramasoota, Director-General, Department of Communicable Disease Control, Ministry of Public Health, Bangkok, Thailand.
12. Dr A. Salomao, Tuberculosis Section, c/o Dr A. J. R. Cabral, Director of National Health Services, Ministry of Health, C.P. 264, Maputo, Mozambique.
13. Dr J. Sbarbaro, Dept. of Medicine, University of Colorado, Denver, CO, USA.
14. Dr P. Smith, London School of Hygiene and Tropical Medicine, London, United Kingdom.
15. Dr D. E. Snider, Director, Tuberculosis Control Division, Center for Prevention Services, Centers for Disease Control, Atlanta, GA 30333, USA.
16. Dr K. Styblo, Research Director, International Union Against Tuberculosis and Lung Disease, Tuberculosis Surveillance Research Unit (TSRU), Riouwstraat 7, Postbus 146, 2585 GP, The Hague, Netherlands.

17. Dr E. Tala, Professor of Diseases of the Chest, University of Turku, Preitila, Finland.
18. Dr S. P. Tripathy, Additional Director General, Indian Council of Medical Research, New Delhi, India.
19. Ms D. C. Weil, Harvard University, School of Public Health, Boston, MA, USA.
20. Dr T. Yoshida, Tokyo Institute for Immunopharmacology, Tokyo 171, Japan.

#### AGENCIES

##### Multilateral/Bilateral agencies:

1. Department for Development and Cooperation,  
Ministry of Foreign Affairs (Italy) - Dr Missoni
2. Directorate-General for International Cooperation,  
Ministry of Foreign Affairs (Netherlands) - Dr M.A. Bleiker
3. IDRC (Canada) - Dr K. Smith
4. Ministère de la Coopération et du Développement (France) - Dr D. Drevet
5. Ministère Solidarité, Santé, Protection Sociale (France) - Dr J. Grosset
6. Ministry of Health and Welfare (Japan) - Dr K. Kiso
7. World Bank - Mr R. Bumgarner

##### Private Foundations

1. Edna McConnell Clark Foundation - Dr J. Cook

##### NGOs

1. IUATLD - Dr A. Rouillon
2. Deutsches Aussaetzigen-Hilfswerk (DAHW) - Dr A. van Wijnen
3. Damien Foundation - Dr J.P. Schenkelaars
4. Association Française Raoul Follereau (FF) - Dr G. le Gonidec
5. Commission on Health Research for Development - Dr F.H. Abed
6. Task Force for Child Survival - Mr T.G. Ortiz

#### SECRETARIAT

Mr H.G. ten Dam, Scientist, Tuberculosis  
Dr A. Deria, WHO Regional Office for the Eastern Mediterranean  
Dr P. Eriki, Representing WHO Regional Office for Africa  
Dr A. Galazka, Medical Officer, Expanded Programme on Immunization  
Dr T. Godal, Director, Special Programme for Research and Training in Tropical Diseases  
Mr R.C. Hogan, Programme Management Officer, Diarrhoeal and Acute Respiratory Disease Control  
Dr S. Jatanasen, WHO Regional Office for South-East Asia  
Dr H.M. Kahssay, Medical Officer, District Health Systems  
Dr A. Kochi, Chief Medical Officer, Tuberculosis  
Dr J.P. Narain, Medical Officer, Global Programme on AIDS/Tuberculosis  
Dr S.K. Noordeen, Chief Medical Officer, Leprosy Control  
Dr S. Spinaci, Medical Officer, Tuberculosis  
Dr P. Sudre, Epidemiologist, Tuberculosis  
Dr G. Torrigiani, Director, Division of Communicable Diseases