

This section looks back to some ground-breaking contributions to public health, reproducing them in their original form and adding a commentary on their significance from a modern perspective. To complement the theme of this month's issue, Mukund Uplekar & Mario C Raviglione review a paper by Halfdan Mahler on tuberculosis programmes in developing countries that was published in the *Bulletin of the International Union against Tuberculosis and Lung Disease* (1966;37:77-82). The paper is reproduced here in full.

The "vertical–horizontal" debates: time for the pendulum to rest (in peace)?

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"Historia magistra vitae" said Cicero: history is the teacher of life.¹ It is an inevitable law of nature that unless there is a solid foundation of the past, no secure edifice of the future can be raised. Those who do not look at the past cannot devise means for the future; and unless the future is built on the past, it will be raised merely on stubble.² The article on tuberculosis (TB) programmes in developing countries published in *The Bulletin of the International Union against Tuberculosis and Lung Disease* (1966; 37:77-82; reproduced here in full)³ four decades ago illustrates how past efforts to control TB could and should inform future interventions.

Dr Halfdan Mahler, WHO Director-General from 1973 to 1988, spent a decade in India beginning in the early 1960s and was instrumental in designing what became a blueprint for a national tuberculosis programme in a developing country. As WHO's Director-General he later promoted the concept of primary health care (PHC), eliciting extensive global support and initiating the health-for-all movement. Like the swing of a pendulum, both PHC and global TB control efforts subsequently suffered a decline.⁴ The pendulum has, however begun to swing in the opposite direction. TB programmes have been reinforced and the PHC concept is being revived by WHO's new Director-General, Dr Margaret Chan (<http://www.who.int/dg/speeches/2007/>

[eb120_opening/en/index.html](http://www.who.int/dg/speeches/2007/eb120_opening/en/index.html)). The challenges facing national TB programmes today include TB/HIV co-infection, multidrug-resistant TB (MDR-TB), health sector reforms, effective community engagement and a need for new tools for diagnosis, treatment and prevention. These problems seem more complex, yet the fundamental approaches discussed in Mahler's article are still central to TB control and to addressing these current challenges. In addition to raising some pertinent questions, this commentary draws four key messages from the article that deserve the attention of all concerned: policy-makers, programme managers, scientists and activists.

Sporadic efforts to control TB are wasteful

A third of the world's population is infected with TB, but the tools currently available cannot identify who will be responsible for producing millions of infectious cases of TB in the foreseeable future. The history of TB demonstrates that "Any sporadic effort in tuberculosis, however spectacular, will be wasteful; and it is wholly unrealistic to propose crash programmes with the objective of eliminating TB within a ten-year period". This is perhaps the most important message of Mahler's article. Notwithstanding some new tools that

are emerging, this statement is as true today as it was four decades ago. TB control demands sustained and steadfast efforts on the part of everyone concerned.

Programme management is distinct from patient management

National TB programmes, as the article rightly suggests, ought to be a system with organizational and administrative features that allow pursuit of the optimal set of actions within the resources available to countries, currently and in the near future, leading to specific and systematic reduction of the TB problem. It draws attention to the tendency to confuse the individual TB patient with the public health problem of TB and of identifying the operational conditions for a hospital, clinic or research project with those of the programme.

The recent outbreak of extensively drug-resistant TB (XDR-TB) in a hospital in South Africa, and demonstration of its presence worldwide in diverse settings, raised an outcry and continues to receive media attention. Conversely, it is common to read accounts of spectacular demonstrations of managing TB in a small district or a project area by a voluntary or a research organization. Both failures and successes need to be viewed

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in the larger context, with an eye on scalability and appropriate lessons drawn to inform the national programme and to ensure that basic TB control is not derailed.

“The NTP does not emerge by simply pooling or multiplying sanatoria, clinics, research projects, rehabilitation centres, etc. ... there is no escape from having as *the* primary objective, the systematic reduction of the TB problem.” This calls for a strong national programme sustained over a period of decades, taking into consideration “what is technically desirable for a few and what is operationally feasible for the many”.

Understandably, the article repeatedly draws attention to developing countries’ limited resources and the need to match actions to these available resources. With public health receiving increasing attention and resources globally, the current situation is better. Also thanks to the “globalization of solidarity”⁵ and the pressure of activism, mechanisms such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and UNITAID have been created. As a consequence, unprecedented funding is now available to poor countries to address specific public health problems of global concern. In this scenario, Dr Mahler’s advice to countries would very likely be about sustainability, accountability and performance.

Integrate, not disintegrate

As they come straight from someone who was both a TB stalwart and a “father” of PHC, Dr Mahler’s thoughts on strengthening general health services and integrating TB control are highly relevant to these current debates. Although it was penned years before the 1978 International Conference on Primary Health Care, in Alma-Ata, the article foreshadows the PHC concept that was to later occupy the centre stage in international public health. PHC’s origins seemed to be rooted, as does its current

revival, in “an acute shortage of medical personnel in developing countries for all major public health priorities including tuberculosis”.

To address the then-prevailing human resource crisis, the paper suggests that “the staff of multi-purpose health centres can be trained in a few weeks in standard techniques of diagnosis, treatment, and immunization” and declares that “all communicable disease campaigns have overwhelmingly demonstrated that only through falling back on strong basic health services in developing countries is it possible to achieve an effective consolidation of these campaigns”.

Does this mean that the national TB programmes should be fully integrated into general health services? While advocating that TB services indeed be thus integrated, Dr Mahler clarifies that integration, far from being a laissez-faire approach, requires “maximum involvement of all specialized personnel such as programmers, organizers, tutors and assessors”.

Furthermore, he warns that “training (of multi-purpose workers) is of no avail – yes, even potentially harmful, if the techniques are not employed within the supervisory framework of a programme having pre-determined efficiency forecasts and built-in control of actual achievements”. He addresses the doubts related to integration in concluding that, “... a TB programme first and foremost needs specialists in epidemiology, operational research, programming, training and evaluation”. And finally, “no amount of lip-service to planning, training and evaluation will bring out the benefit ... to the receiving end without a unifying central direction with adequate powers to enforce and, when necessary, modify the national programme”. It is unclear why, despite this clarity about the need for specialist attention, the TB programme within WHO experienced a rapid decline in PHC’s heyday. Dr Mahler, in 1966 at least, visualized a TB programme that maintained and monitored a supervisory structure to

ensure delivery of essential first-level TB care integrated into general health services. As for strengthening general health services, his expectation and that of WHO’s new Stop TB Strategy⁶ has been that “the integrated TB programme ... will grow organically together with the health services, each strengthening the other by adding to the confidence they inspire in public”. In the artificial dichotomy of vertical and horizontal approaches, the truth, like a pendulum, rests in-between.

What is effective?

The article concludes by emphasizing four conditions for implementing effective national TB programmes in developing countries, which again are as relevant today as they were in 1966. First, programmes should be planned based on a “systematic analysis of existing epidemiological and socio-economic situation”. This highlights the need to look into social and economic determinants to understand what factors beyond TB programmes and health systems sustain the TB epidemic at current levels. Second, “training and retraining of all specialized and multi-purpose health personnel” is essential, especially on managerial aspects in addition to technical basics. This remains a weakness to be adequately addressed in many settings. Third, there must be a built-in evaluation at all levels, including impact evaluation “to serve as the conscience of the programme”. Finally, the article stresses the need for “a unifying central direction with adequate powers” indicating true political commitment. The masterstroke the article offers is in describing the two essential characteristics of TB programme managers: “emotional detachment to choose their programme priorities and the courage to stick to them under immense counter-pressures from vested interests”. Is this too tall an order in today’s world? ■

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'It is bad public health practice to treat a case of infectious tuberculosis at home'. If you cannot achieve at least 95% treatment success, do not treat; 'Emphasis should be on chemoprophylaxis because it is epidemiologically too late to treat the active case of tuberculosis'. These statements are casually picked from the vintage of advice given to developing countries in recent months.

How is it possible to give such misleading advice? Probably because of a lack of recognition that a national tuberculosis programme in a developing country is a highly complex system in which organizational and administrative features are far more important than, for instance, the therapeutic difference between a two- and a three-drug regimen or the epidemiological difference between a bacteriologically proven and an X-ray suspect case. What is more, tuberculosis workers tend to identify the operational conditions of a hospital, a clinic, or a research project with those of a national tuberculosis programme.

The consequence of confusing these microsystems with the National TB Programme is high-lighted by an analysis of the tuberculosis budget and the population effectively covered by existing tuberculosis services in developing countries. Often more than 80 per cent of all expenditure on tuberculosis is seen to be consumed by personalized services catering for less than 5 to 10 per cent of the tuberculosis problem, whereas less than 20 per cent of all expenditure is invested in community services for the remaining 90 to 95 per cent of the tuberculosis problem.

The national tuberculosis programme does *not* emerge by simply pooling or multiplying sanatoria, clinics, research projects, rehabilitation centres, BCG campaigns, etc. The national tuberculosis programme in a developing country should instead be the optimal set of actions leading to the specific and systematic reduction of the tuberculosis problem within the resources at the disposal of these countries today and tomorrow — and not in the next century. This, then, is the macrosystem of which I would propose to attempt a short analysis today, starting with the tuberculosis problem, then proceeding with the available resources, and finally merging these two key variables in the national programme.

The very reason for our failure to accelerate the departure of tuberculosis may to a large extent be due to a peculiar tendency to confuse the individual with the problem. It is admittedly much easier to start with the concrete patient-doctor relationship than with the more abstract problem-resource relationship, but for the developing countries there is probably no escape from having as *the* primary objective the systematic reduction of the tuberculosis *problem*.

More than half the population living in most developing countries today have already been infected by tubercle bacilli. We have no tools to recognize whether a

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person's natural resistance finally succeeded in eliminating the bacilli or whether the bacilli survived in a dormant state from which they can be re-activated. But, we do know that these hundreds of millions of infected persons are bound to produce millions of infectious sources of tuberculosis over the next decades. Any sporadic effort in tuberculosis, however spectacular, will, because of this unpalatable epidemiological fact, be wasteful; and it is wholly unrealistic to propose crash programmes with the objective of eliminating tuberculosis within a ten-year period.

There are probably some 10 to 15 million persons in the developing countries who today are capable of transmitting bacilli to their fellow travellers. They are not concentrated in the towns or in any practically identifiable areas or groups, but rather 'splashed' over the whole national territory. Calculating from a large number of sample surveys in developing countries, at the most one quarter of the infectious cases of tuberculosis are living in urban, and at least three quarters in rural areas. Is it then logical to concentrate the fight against tuberculosis on the quarter living in the towns? Or is it not rather obvious from a communicable disease point of view that the tuberculosis programme must be on a country-wide basis if it is to have a significant epidemiological impact?

Far too often, even tuberculosis workers overlook that it is ubiquitous MAN, with his present and future *suffering* caused by tubercle bacilli, who represents the *real* problem that must be the focus of the tuberculosis programme and its priorities. Sociological surveys in several developing countries have shown that more than 90 per cent of reliably diagnosed active cases of tuberculosis were conscious of symptoms suggestive of tuberculosis; that more than 70 per cent of these spontaneously expressed worry over these symptoms; and that more than 50 per cent not only were conscious and worried, but indeed had taken action to search for alleviation of their suffering - mostly in vain! Is then today's social challenge in tuberculosis not to make effective services available to all those who already suffer and who are prepared to accept help? Such a felt-need oriented programme will give maximum stimulation to the confidence of the general population in the tuberculosis services but at the same time this programme will be by far the most economical and will take care of the most dangerous cases from a communicable disease point of view.

But do the developing countries then have the necessary resources at their disposal to face tuberculosis effectively both as an epidemiological and social problem? Yes, I believe so, if they have the emotional detachment to choose their programme priorities rationally and the courage to stick to them under the immense counter-pressures from vested interests.

I should now like to analyse briefly three key variables relevant to available, resources namely, first the technical tools, then the financial resources, and finally the personnel.

Let me start with case-finding. Everybody living in a given epidemiological situation is marked with a certain ecological probability of encountering tubercle bacilli; of these bacilli being successfully transmitted; of these successfully transmitted bacilli producing disease; of this disease spontaneously healing or resulting in death. Within this range of risks there is a well-meaning tendency to identify a person as a potential case of tuberculosis not only before he becomes infectious

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cent cure, to the most expensive costing 50 dollars and giving 95 to 100 per cent cure. If a developing country is prepared to commit itself to an organized community programme in tuberculosis, then the choice of regimen is a simple formula, namely, roughly the annual drug budget divided by the estimated number of new cases found per year by the national programme. It is strange that still so few countries are prepared to adopt this simple formula and instead permit costly individualized drug regimens — including such entirely dispensable additives as vitamins — to stand in the way of a cheap, standard, combined primary drug treatment for all cases that can be reliably diagnosed.

Last but not least let us not overlook the preventive tools. For obvious financial and manpower reasons, it is impossible to keep the hundreds of millions of infected persons under periodical diagnostic follow-up or under cover of drugs in order to reduce the consequences of unavoidable infection that takes place before the case is discovered in a realistic case-finding programme. But through BCG immunization we have a 'treatment' of the bacilli at the very moment they are producing a potential case of tuberculosis. There prevails an almost uncomfortable agreement that BCG vaccination seems to offer the most important tool for reducing the future suffering caused by tuberculosis in developing countries. This relative lack of controversy probably stems from the comfortable fact that as one BCG vaccination gives a remarkable protection for a decade or more at the cost of a few cents, an effective BCG programme could be operated with some 5 to 15 per cent of present expenditure on tuberculosis in developing countries, and does not, therefore, jeopardize the maintenance of such services as rehabilitation or chest surgery. However, in spite of its appealing efficacy, cheapness and ease of application, BCG vaccination is far, far from being optimally used in developing countries.

Turning from the technical tools to the financial resources, an optimistic assessment of national and international economic prospects for tuberculosis control over the next decade indicates that we cannot realistically count on more than the equivalent of 5 to 10 cents expenditure per head in the developing countries. This corresponds to roughly 5 to 10 per cent of the total health expenditure per head being spent on tuberculosis control. Now, taking the average million population in a developing country, there will be each year in a fully developed tuberculosis programme: some 5000 new cases to detect at a cost of some 10,000 dollars, some 7000 cases to be kept under treatment at a cost of some 35,000 dollars, and some 100,000 ECG vaccinations to be done at a cost of 5000 dollars. This totals 50,000 dollars. Add to this amount some 20,000 dollars in extra overhead expenditure for training, supervision and evaluation and the total comes to 70,000 dollars or 7 cents per head of the population. In principle, then, there are no economic obstacles to an effective tuberculosis programme but it should not be overlooked that at present out of the approximately 5 cents spent today on tuberculosis per head of population, some 80 per cent are blocked by traditional services, such as establishing and maintaining beds. *Let us* hope that at least the next 5 additional cents allocated to tuberculosis will be drained into the right priority channels.

Though it is thus possible to achieve a rational — if not happy — marriage between financial resources and technical knowledge in any developing country, what about availability of personnel to carry out the programme?

There is an acute shortage of medical personnel in developing countries for all major public health priorities including tuberculosis. What is more, in the free

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but also almost before he becomes infected. But case-definition for the sake of case-finding must logically be related to case-action. Since the great majority of active cases have one thing in common, namely that they develop symptoms that eventually motivate them to seek help if they have confidence in the health services, it is to this group that permanent diagnostic facilities first should be made available. Furthermore, emphasis on the reliability of the diagnosis through giving first priority to bacteriological case-finding, secures optimum use of scarce treatment resources. The next priority will be to include the group having the next highest probability of suffering from tuberculosis, namely the symptom-motivated, bacteriologically negative persons, with progressive pulmonary pathology as judged by X-ray shadows. It is unlikely that the majority of developing countries can go beyond these two priorities on a national scale during the next two decades, but then these priorities will not be in consonance with the felt-need of the population, but also will, as the health services improve, lead to earlier detection and better treatment, and thus to an increasing fusion of epidemiological and sociological objectives. By sticking to these priorities, a genuine case of tuberculosis can be diagnosed at the cost of less than five dollars in any developing country. Nevertheless, there are many developing countries that long before they have these priorities, are employing funds and personnel on spasmodic mass X-ray efforts covering an insignificant part of the population. It is sometimes forgotten that mass chest radiography was introduced in the affluent countries at a time when the flow of attenders at chest clinics, hospitals, practitioners, etc., was very adequately taken care of, and, to a large extent, was beginning to lessen the pressure on these facilities. It was introduced at a time when there was a relative abundance of capacity and specialized manpower to take care of the additional cases it discovered. To approach the problem in the opposite order in the less resourceful countries is both bad economy and, in terms of social and psychological acceptability, inefficient.

What then are the possibilities for matching rational case-finding with effective treatment?

The last WHO Expert Committee on Tuberculosis recommended that, as there was no evidence that special benefits resulted from hospitalization, all financial resources and manpower available for tuberculosis control in the developing countries should be concentrated on organizing efficient ambulatory services and not on running or constructing new beds. Then it is said, — and it is for any developing country to choose between a modern, scientifically proved treatment approach costing a few dollars per case treated, or traditional practice demanding prolonged hospitalization costing hundreds of dollars per case. Though there is pretty universal agreement that the bed or the diet or the individualized attention are not critical factors in curing tuberculosis, there is still a pronounced tendency to demand institutional captivity because of the alleged high defaulter rate encountered in the ambulatory treatment programme. Permit me to emphasize that the patients initially treated in hospitals per se are no better drug takers than the patients initially treated in an *efficiently* organized ambulatory programme. As a matter of fact, due to the lack of integration in most countries of existing tuberculosis beds into the ambulatory community programme, the institutional patients treated for a week in a hospital ultimately often fare worse than the ambulatory patients. As for the choice between institutional and ambulatory treatment, so for the choice between drug regimens. The choice among the first-line drugs ranges from the cheapest combination costing 3 dollars and giving 80 to 90 per

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market of supply and demand tuberculosis does not carry sufficient social or economic prestige value to attract either the quantity or the quality of doctors any traditional specialized tuberculosis programme would require. Fortunately the staff of a multi-purpose health centre can today be trained within a few weeks in standard techniques of diagnosis, treatment and immunization, but this training is of no avail — yes, perhaps even potentially harmful — if the techniques are not employed within the supervisory framework of a programme having pre-determined efficiency forecasts and built-in control of actual achievements. Therefore, such a tuberculosis programme, first and foremost needs specialists in epidemiology, operational research, programming, training and evaluation. It is unfortunate that tuberculosis specialists often believe that to carry out these functions effectively does not entail any special knowledge beyond the clinical 'know-how' of diagnosis and treatment.

The basis for a rational synthesis of the tuberculosis problem and the available resources in developing countries today has been succinctly formulated by the last WHO Expert Committee on Tuberculosis in four principles:

- a. Epidemiological considerations require that a national tuberculosis programme must be on a country-wide and permanent basis — not sporadic or patchy.
- b. Sociological considerations demand that the national tuberculosis programme must satisfy the existing felt-needs before it promotes the awareness of new ones.
- c. Administrative considerations make it mandatory that the tuberculosis services be integrated into the general health services.
- d. Economic considerations require that the programme be such that its application on a national scale is within the resources available.

I believe the first two principles, namely, the epidemiological and sociological MUSTS are logical inferences from the dynamics of tuberculosis as a communicable disease problem with its ubiquitous presence in rural and urban areas, as well as a social problem expressing itself in the majority of active cases of tuberculosis beseeching the health services for alleviation of their suffering.

The last principle, namely, the strictly unsentimental adjustment of the programme to economic realities should, I believe, be quite obvious from what I just said about the financial resources.

I have, so far, not specifically referred to the third principle, namely, that administrative considerations make it mandatory that the tuberculosis services be integrated into the general health services, and since this concept is fundamental to the success of tuberculosis control in developing countries I should like to elaborate somewhat on this.

Thanks to a systematic research programme in a few of the developing countries we have, we have as earlier mentioned, tools that have been simplified and standardized to the point where multi-purpose health workers, after some weeks of training, can diagnose and treat infectious tuberculosis at the cost of a few dollars a case and immunize the susceptible population at the cost of a few cents per vaccination. All developing countries are, and will increasingly be, engaged in a major public health struggle to provide basic, comprehensive community health services in urban, and particularly in rural, areas. The reason for this is not only the acute shortage of health personnel and funds, but also that rural people are increasingly resisting the never-ceasing rush of short-lived special campaigns leaving them without a permanent point of reference for their day-to-day health problems. All, communicable

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disease campaigns have overwhelmingly demonstrated that only through falling back on strong basic health services in developing countries is it possible to achieve an effective consolidation of these campaigns. The integrated tuberculosis programme, though slow in its uptake, will grow organically together with the health services, each strengthening the other by adding to the confidence they inspire in the public.

In the few countries that have started to put integration seriously into practice the reward has far surpassed expectations. Within one to two years from the beginning of integrated operations it was possible to energize the general health services to such an extent that more than half of the total load of infectious tuberculosis was being systematically discovered; that treatment efficiency was raised from an appalling 80 per cent drug default to more than 60 per cent completing one full year of treatment; and vaccination coverage increased from 25 per cent to more than 70 per cent of all eligibles.

Let me emphasize once more: integration is not synonymous with a laissez-faire approach. On the contrary, it requires maximum involvement of all specialized personnel as programmers, organizers, tutors, and assessors, but not as aloof perfectionists.

I should like to end my comments by emphasizing four conditions for implementing effective national tuberculosis programmes in developing countries today.

Firstly, the programme must be planned and the plan must reflect the optimal compromise between what is technically desirable for the few and what is operationally feasible for the many. To achieve this, individual experience, intuition and guesswork must be replaced with a systematic analysis of the existing epidemiological and socio-economic situation supplemented whenever necessary with carefully conducted operational investigations.

Secondly, training and re-training of all specialized and multi-purpose health personnel is a *sine qua non* for the efficiency of the programme. This training must particularly be orientated towards the organizational and administrative aspects as no amount of technical sophistication can compensate for operational deficiencies.

Thirdly, evaluation must be built-in at all levels to serve as the conscience of the programme. This evaluation must verify that the technical and operational commitments of the plan actually are met and that the quality and quantity of the out-put of each worker is satisfactory. The prerequisite for such a meaningful evaluation is strict uniformity of techniques and records combined with an unbiased analysis.

Fourthly, no amount of lip-service to planning, training and evaluation will bring out the benefit of drugs and vaccine to the receiving end without a unifying central direction with adequate powers to enforce and, when necessary, modify the national programme.