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Resources for controlling tuberculosis in Malawi

Anthony D. Harries,¹ John H. Kwanjana,² Nicola J. Hargreaves,³ Jeroen Van Gorkom,⁴ & Felix M.L. Salaniponi⁵

Objective To document resources for controlling tuberculosis (TB) in Malawi.

Methods We performed a countrywide study of all 43 hospitals (3 central, 22 district and 18 mission) which register and treat patients with TB. To collect data for 1998 on the TB-related workload, diagnostic facilities, programme staff and treatment facilities, we used laboratory, radiographic and TB registers, conducted interviews and visited hospital facilities.

Findings The data show that in 1998, 88 257 TB suspects/patients contributed approximately 230 000 sputum specimens for smear microscopy, 55 667 chest X-rays were performed and 23 285 patients were registered for TB treatment. There were 86 trained laboratory personnel, 44 radiographers and 83 TB programme staff. Of these, about 40% had periods of illness during 1998. Approximately 20% of the microscopes and X-ray machines were broken. Some 16% of the hospital beds were designated for TB patients in special wards, but even so, the occupancy of beds in TB wards exceeded 100%. Although stocks of anti-TB drugs were good, there was a shortage of full-time TB ward nurses and 50% of district hospitals conducted no TB ward rounds. In general, there was a shortage of facilities for managing associated HIV-related disease; central hospitals, in particular, were under-resourced.

Conclusion Malawi needs better planning to utilize its manpower and should consider cross-training hospital personnel. The equipment needs regular maintenance, and more attention should be paid to HIV-related illness. The policies of decentralizing resources to the periphery and increasing diagnostic and case-holding resources for central hospitals should be continued.

Keywords: Tuberculosis, Pulmonary/prevention and control; Health resources/organization and administration Health care surveys; Malawi (*source: MeSH*).

Mots clés: Tuberculose pulmonaire/prévention et contrôle; Ressources santé/organisation et administration; Enquête système de santé; Malawi (*source: INSERM*).

Palabras clave: Tuberculosis pulmonar/prevención y control; Recursos en salud/organización y administración; Encuestas de atención de la salud; Malawi (*fuentes: BIREME*).

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Voir page 335 le résumé en français. En la página 335 figura un resumen en español.

Introduction

In sub-Saharan Africa there has been an upsurge in the number of patients with tuberculosis (TB) in the past 10 years, mainly because of coinfection with the human immunodeficiency virus (HIV) (1), and this has placed an immense burden on efforts to control TB. Currently, there is a need for: (i) adequate

laboratory services to identify smear-positive TB cases and to follow-up patients during treatment; (ii) radiographic services to identify patients with smear-negative pulmonary TB (PTB) and extrapulmonary TB (EPTB); (iii) TB officers to safeguard logistics and to ensure TB programme policies are adhered to at both hospital and district levels; (iv) stationery to register, record and report on case finding and treatment; (v) TB wards for the isolation and treatment of infectious TB cases; (vi) clinical and nursing staff to provide care of patients in such isolation facilities; and (vii) drugs for treating TB and for managing HIV-related complications.

“DOTS” (directly observed treatment, short course) is the acronym for the TB control strategy recommended by the World Health Organization. Success of the strategy depends on implementing a five-point policy package: (i) government commitment to a national TB programme; (ii) case finding based on sputum smear microscopy; (iii) a standardized short course of chemotherapy for at least all smear-positive TB cases; (iv) a regular, uninterrupted

¹ National Technical Adviser, National Tuberculosis Control Programme, Ministry of Health, PO Box 30377, Capital City, Lilongwe 3, Malawi. Correspondence should be addressed to Professor A.D. Harries, British High Commission, PO Box 30042, Lilongwe 3, Malawi (email: adharries@malawi.net).

² Deputy Tuberculosis Programme Manager, National Tuberculosis Control Programme, Ministry of Health, Lilongwe, Malawi.

³ Clinical Lecturer, Liverpool School of Tropical Medicine, Pembroke Place, Liverpool, England.

⁴ External Tuberculosis Adviser, The Royal Netherlands Tuberculosis Association (KNCV), The Hague, Netherlands.

⁵ Tuberculosis Programme Manager, National Tuberculosis Control Programme, Ministry of Health, Lilongwe, Malawi.

supply of essential anti-TB drugs; and (v) a monitoring system for programme supervision and evaluation (2). TB programmes which have adopted the DOTS strategy have good data on case finding, high rates of smear-positive pulmonary TB, and better cure rates than programmes which do not use DOTS (3).

Since 1984, Malawi has implemented a DOTS strategy in its TB control programme, and has been supported by the International Union against Tuberculosis and Lung Disease. Initially, the TB programme was successful, but in the early 1990s its performance deteriorated as it struggled to cope with increasing numbers of HIV-infected TB patients and worsening economic conditions (4). In 1995, for example, Malawi ranked as the ninth poorest country in the world with an annual gross national product of US\$ 170 per capita, and over 60% of the population below the absolute poverty line. The country's health indicators are among the worst in the world. Life expectancy at birth stands at 44 years. The infant mortality rate is 134 per 1000 live births; the under-five mortality rate is 234 per 1000 live births, and this is expected to rise as a result of the HIV/AIDS epidemic. HIV/AIDS is now the leading cause of death in the most productive age group (20–50 years). In 1995, the HIV-seropositive rate in antenatal women was estimated to be over 30% in urban areas and 12–14% elsewhere (5, 6).

In recent years, the deteriorating trend in the TB programme has been partly countered by strengthening TB control efforts at central, regional and district levels and by increasing donor support for TB control. Malawi has three main types of hospital. There are three central hospitals serving the large urban districts of Lilongwe, Blantyre and Zomba, which act as referral hospitals for TB cases. In addition, there are district hospitals for their catchment populations which serve as centres for health-related activities in the districts. There are also mission hospitals within the administrative districts that provide health care activities for the rural population. Although TB control efforts in Malawi reach health centres and the community, resources such as laboratory and radiographic facilities, TB personnel, supplies of TB stationery, anti-TB drugs and wards for treating and isolating TB patients, are all based in hospitals.

To our knowledge, there is little information in sub-Saharan Africa about human and material resources available for controlling TB. We therefore conducted a countrywide study to document resources for controlling TB in Malawi and compared these resources at central, district and mission hospitals.

Methods

Structure of the Malawi TB programme

In 1998, there was a central unit consisting of a programme manager, a deputy programme manager, a technical adviser and a national TB officer. There

were 1–2 regional TB officers for each of the 3 regions. At each district and mission hospital a TB officer with or without an assistant should have been in place. TB programme officers at district and mission hospitals are responsible for registering, recording and reporting TB cases, as well as all other logistics of TB control at district level. Diagnosis of TB suspects and the clinical care of registered patients is provided by hospital, clinical and nursing staff.

The disease burden of TB and financial expenditures

Due mainly to the effects of HIV infection, the number of patients with TB has increased dramatically in the last 15 years (Table 1), causing a decline in the performance of the TB programme. Consequently, the cure rate for new patients with smear-positive PTB has declined and the number of fatalities has increased. In 1998, it was estimated that the Malawi government contributed US\$ 1.5 million to national TB control efforts for staff salaries, hospital bed costs, laboratory consumables, radiographic examinations, and anti-TB drugs. A further US\$ 2 million was provided by donors for programme activities such as the purchasing of vehicles, stationery and anti-TB drugs, for staff supervision and training, and for operational research.

Determining resources for TB control

There are 43 hospitals in Malawi (3 central, 22 district and 18 mission) that register and treat patients with TB. These hospitals were all visited as part of a countrywide operational research study in 1999. At each hospital, the administrative sections provided information for 1998 about district populations, numbers of health centres and the number of hospital beds. Hospital departments were also visited and information relevant to TB control was documented in a structured pro forma.

In addition, 45 laboratories were visited, including two laboratories in each of the two central hospitals of Lilongwe and Blantyre. The number of patients (new and follow-up) who had sputum smears examined for acid-fast bacilli (AFB) in 1998 was obtained from the laboratory sputum register. A detailed inspection of the register for the first quarter of 1998 was also made in 40 laboratories, to determine the number of new suspects, the number of sputum specimens examined for each suspect, and the number of follow-up patients. The number of patients receiving all types of radiographs, including chest radiographs, in 1998 was determined from the radiography register. TB registers in all hospitals were used to count the number of patients registered with TB in 1998.

Diagnosis, registration and treatment of TB

Diagnosis of TB in Malawi is based on passive case finding. Adult patients who have been coughing for more than three weeks are regarded as PTB suspects.

The patients first submit three sputum specimens which are analysed for AFB by smear microscopy at hospital laboratories. Patients who test sputum smear-positive for AFB are classified as smear-positive PTB and undergo no further investigations. Patients who are sputum smear-negative undergo routine chest radiography, and a diagnosis of smear-negative PTB is made on those with radiographic abnormalities consistent with TB. Diagnosis of EPTB is made according to clinical features, radiographic and laboratory findings.

Once the diagnosis of TB has been made, patients are registered with the district TB officer. Standardized treatments are given according to type and category of TB. New patients with smear-positive PTB and severe forms of EPTB receive a short course of chemotherapy, consisting of an initial two months of treatment in hospital with daily supervised doses of streptomycin, rifampicin, isoniazid and pyrazinamide, followed by six months of daily doses of isoniazid and ethambutol self-administered at home. New patients with smear-negative PTB and other forms of EPTB are given an initial treatment of one month of daily doses of streptomycin, isoniazid and ethambutol, supervised in hospital, followed by eleven months of daily self-administered isoniazid and ethambutol at home. Smear-positive TB patients with previously treated episodes of TB are given an eight month retreatment regimen, in accordance with World Health Organization guidelines (2). In the three central hospitals and in four pilot districts, the initial phase of treatment for new TB patients was changed in 1997–98 to two months of rifampicin, isoniazid, pyrazinamide and ethambutol, given under direct observation three times a week, followed by six months of daily self-administered isoniazid and ethambutol. Patients could opt to stay in hospital, or go home to receive treatment from a health centre or from a guardian.

Laboratory and radiographic personnel were interviewed about staff numbers, staff illness, equipment and consumables, the frequency of investigations and the constraints to performing investigations. In addition, we documented the number of TB officers and assistant TB officers, their grade, training experience, work routines and time off work because of illness in 1998. Information was also collected on TB offices, equipment and programme stationery.

To obtain information about treatment facilities, we visited TB wards and recorded information about bed numbers, bed occupancy at the time of the visit, ward rounds, HIV counselling and testing services, and links with community care groups. The pharmacy was also visited, and a record was made of the number of anti-TB drugs in stock, as well as drugs commonly used to treat HIV-related complications in TB patients.

Data analysis

Data were analysed using EpiInfo 6.01 software (Centres for Disease Control, Atlanta, Georgia, USA).

Table 1. TB case notifications and outcomes for new smear-positive PTB cases in Malawi, 1985–97^a

Year	Total TB case notifications	New smear-positive PTB cases	Outcomes for new smear-positive PTB cases		
			Cured (%)	Died (%)	Other outcomes (%) ^b
1985	5334	2277	79	5	16
1987	7581	3269	90	6	4
1989	9450	3587	75	10	15
1991	14 322	3944	67	11	22
1993	17 105	5692	68	16	16
1995	19 155	6295	65	19	16
1997	20 676	7587	69	21	10

^a Source: Malawi national TB control programme.

^b Other outcomes include: failure, default from treatment, transfer to another district with unknown treatment outcome, completed treatment with no smears done.

Results

TB-related workload

In 1998 there were an estimated 11.5 million people living in Malawi. Of these, 2.8 million (25% of the total population) were served by the three central hospitals, while other district hospitals served the remaining population of 8.7 million. The TB-related workload for all hospitals is shown in Table 2. The 3 central hospitals carried out 29% of sputum smears and 46% of chest radiographs, and they treated 30% of all registered TB cases. During 1998, some 88 257 patients submitted sputum specimens for AFB smear microscopy to 45 laboratories. In 40 of the laboratories, 17 479 patients submitted sputa in the first quarter of 1998. This included 12 292 (70%) new suspects, 4916 (28%) follow-up patients and 271 (2%) patients where registration details had not been recorded. Of the new suspects, 89% submitted 3 sputum samples, 8% submitted 2 samples and 3% submitted a single sample. Using this information, and the fact that smear-positive patients normally submit a further two sputum specimens at 2, 5 and 8 months for AFB smear microscopy (i.e. a total of 6 follow-up sputum specimens), the number of sputum smears examined in 1998 was calculated to be approximately 230 000. In addition, a total of 116 409 patients had a radiographic examination, including 55 667 patients who had chest radiography. Some 23 285 patients were registered and treated for TB, 9615 with smear-positive PTB, 8542 with smear-negative PTB and 5128 with EPTB.

Resources for diagnosing and treating TB.

Laboratories. There were 86 laboratory personnel, 37 trained as laboratory technicians (3-year training programme) and 49 trained as laboratory assistants (2-year training programme) (Table 3). Of the 45 hospital laboratories, 16 had one trained laboratory worker, the majority of these single-staffed units

Table 2. TB-related workload in Malawi, 1998

Parameter	Type of hospital			Total
	Central	District	Mission	
Number of hospitals	3	22	18	43
Sputum smear examination				
Number of laboratories	5	22	18	45
Number of patients submitting sputum	25 952 (29%)	40 049 (45%)	22 256 (26%)	88 257
Approximate number of smears examined	67 500 (29%)	104 000 (45%)	58 500 (26%)	230 000
Radiographic examination				
Number of hospitals with X-ray facilities	3	21	17	41
Number of patients receiving any type of X-ray	56 749 (49%)	35 789 (31%)	2371 (20%)	116 409
Number of patients receiving a chest X-ray	25 796 (46%)	14 021 (25%)	15 850 (29%)	55 667
Registered TB cases				
All types of TB	7070 (30%)	10 828 (47%)	5387 (23%)	23 285
Smear-positive PTB	2860 (30%)	4779 (50%)	1976 (20%)	9615
Smear-negative PTB	2936 (34%)	3599 (42%)	2007 (24%)	8542
EPTB	1274 (25%)	2450 (48%)	1404 (27%)	5128

Percentages shown in parentheses were calculated from the totals for all 43 hospitals.

Table 3. Resources and constraints for TB diagnosis in Malawi

Parameter	Type of hospital			Total
	Central	District	Mission	
Number of hospitals	3	22	18	43
Sputum smear examination				
Number of laboratories	5	22	18	45
Number of trained laboratory staff	13	35	38	86
Number (%) of hospitals with only one laboratory staff member	0 (0%)	12 (55%)	4 (22%)	16 (37%)
Number of microscopes	8	40	38	86
Number (%) of microscopes broken	2 (25%)	11 (28%)	6 (16%)	19 (22%)
Radiographic examination				
Number of hospitals with X-ray facilities	3	21	17	41
Number of trained radiographers	14	14	16	44
Number (%) of hospitals with no trained staff	0 (0%)	7 (33%)	6 (35%)	13 (32%)
Number of X-ray machines	10	39	26	75
Number (%) of X-ray machines broken	3 (30%)	10 (26%)	4 (15%)	17 (23%)

Percentages shown in parentheses were calculated from the corresponding totals in each column.

being in district hospitals. Some 47 personnel were in the laboratory at the time of the visit and were interviewed about illness in 1998. Of these, 17 (36%) claimed to have been ill for a total of 430 working days during the year. Our survey also found that there were 86 microscopes, 19 (22%) of which were broken. On average, sputum smear examinations were carried out 4 times a week at central and mission hospitals, and 2.6 times a week at district hospitals. Information about the number of days in 1998 when sputum smear microscopy could not be performed was provided by 40 laboratories. The data showed that 18 (45%) laboratories could not do smear microscopy for a median of 10 days in 1998, mainly

because of shortages of Ziehl–Neelsen staining reagents (67% of cases).

Radiographic facilities. The results of our survey showed that 41 hospitals had radiographic facilities (Table 3). Of these, 13 hospitals had no trained radiographers at the time of the visit, in 6 of the hospitals the staff were away on training courses (lasting from 12–18 months), and in 4 of the 6 hospitals the X-ray service had stopped functioning completely. In 7 hospitals no trained radiographers had been appointed, and the service depended on using other paramedical health care workers. Of the 44 trained radiographers on site, 27 were technicians and 17 were assistants. Inter-

views with 25 staff members revealed that 10 (40%) had been ill for a total of 269 working days in 1998. There were 75 X-ray machines, of which 17 (23%) were broken, and 3 of 41 hospitals with radiographic facilities had no stock of X-ray films. The 38 hospitals with stocks had a combined total of 94 129 X-ray films with a median number of 1250 per hospital.

Central hospitals. The central hospitals had 13 (15%) laboratory staff, 8 (9%) microscopes, 14 (32%) trained radiographers and 10 (13%) X-ray machines.

TB Officers and TB office facilities

There were 43 district TB officers (DTOs) and 40 assistant district TB officers (ADTOs), of whom 8 (10% of the total) worked at central hospitals (Table 4). In central and district hospitals, DTOs were health assistant grade, while in mission hospitals 50% were health assistant grade; others came from nursing, medical assistant or clinical officer grades. ADTOs were mainly health surveillance assistants. All hospitals had a DTO, but in mission hospitals a significant number of DTOs (56%) had other duties in addition to TB control, and there was a higher proportion (22%) who had no formal district TB management training. In 1998, 19 DTOs had been ill for a total of 108 days off work. All central and most district hospitals had an ADTO, while 50% of mission hospitals did not, and 58% of all ADTOs had other duties in addition to TB control activities.

All DTOs in central and district hospitals had an office, although in 4 district hospitals the office was shared with other health programmes. In 3 mission hospitals there was no office for TB staff, and in 8 hospitals the office was shared. All DTOs had TB-related stationery (registers, treatment cards, sputum request forms, etc.). In 12 (28%) hospitals the DTO did not have weighing scales and in 6 (14%) hospitals the DTO had no calculator to perform drug ordering or case finding calculations. In 23 of the 25 central and district hospitals there was a functioning motorcycle for TB control activities. There were a total of 500 health centres in these 25 districts, and all DTOs were able to visit all their health centres on a regular

(usually monthly) basis, either by motorcycle or by hospital ambulance if the motorcycle did not function.

Resources for case holding and treatment

Ward-based facilities. The 43 hospitals had a total of 9021 hospital beds, and 37 of the hospitals had specially designated TB wards with 1425 beds (16% of the total number of hospital beds) (Table 5). Of the 37 TB wards, 20 were for patients with all types of TB, while 17 were only for patients with smear-positive PTB. TB patients who were not placed in TB wards were kept in the general wards. Three central, 3 district and 5 mission hospitals had decentralized the care of TB patients in the initial phase of treatment to peripheral health centres. Despite decentralization, in central hospitals the bed occupancy in the TB wards was 164%. Bed occupancy rates were worse for women (249%) than for men (121%). TB bed occupancy rates were 101% in district hospitals and 77% in mission hospitals. Nearly 50% of TB wards in district and mission hospitals had no full-time nursing staff, and over 50% of district hospitals had no regular clinical rounds on the TB wards. There was a general absence of HIV-counselling and testing services on TB wards and of links with community groups to provide care for TB patients after hospital discharge.

Drugs for TB and HIV-related complications. All hospitals had stocks of pyrazinamide (median 12 000 tablets) and isoniazid-ethambutol (median 62 000 tablets), and 42 hospitals had stocks of streptomycin (median 3000 g) and rifampicin-isoniazid (median 10 000 tablets). Six hospitals had no ethambutol and 7 had no isoniazid tablets in stock. For treating HIV-related complications of TB, 43 (100%) hospitals had drugs for treating sexually transmitted infections (erythromycin, doxycycline, gentamicin and benzathine penicillin); 43 (100%) had antihistamines; 37 (86%) had indomethacin; 37 (86%) had nystatin; 34 (79%) had pyridoxine; 30 (70%) had amitriptyline; 30 (70%) had gentian violet; 12 (28%) had ketoconazole; and 10 (23%) of the hospitals had codeine phosphate.

Table 4. TB officers, resources and constraints in Malawi

Parameter	Type of hospital			Total
	Central	District	Mission	
Number of hospitals	3	22	18	43
Number of TB programme staff	8	46	29	83
Number of district/hospital TB officers (DTOs)	3	22	18	43
Number (%) of DTOs not employed full-time in TB control	0 (0%)	4 (18%)	10 (56%)	14 (33%)
Number (%) DTOs with no TB management training	0 (0%)	2 (9%)	4 (22%)	6 (14%)
Number of assistant TB officers (ADTOs)	5	24	11	40
Number (%) of hospitals with no ADTO	0 (0%)	2 (9%)	9 (50%)	11 (26%)

Percentages shown in parentheses were calculated from the corresponding totals in each column.

Table 5. Resources for case holding and treatment of TB in Malawi

Parameter	Type of hospital			Total
	Central	District	Mission	
Number of hospitals	3	22	18	43
Total number of hospital beds	2348	3847	2826	9021
Number (%) of hospitals with TB wards	3 (100%)	21 (95%)	13 (72%)	37 (86%)
Number of TB beds in the TB wards	198	885	342	1425
Number (%) TB beds occupied ^a	325 (164%)	893 (101%)	263 (77%)	1481 (104%)
Number (%) of TB wards with full-time nurses	3 (100%)	12 (57%)	6 (46%)	21 (49%)
Number (%) of TB wards with rounds	3 (100%)	10 (48%)	12 (92%)	25 (68%)
Number (%) of TB wards with HIV counselling	1 (33%)	0 (0%)	3 (23%)	4 (11%)
Number (%) of TB wards with community care	0 (0%)	0 (0%)	1 (8%)	1 (3%)

Percentages shown in parentheses were calculated from the corresponding totals in each column.

^a Patients with no bed occupied the floor.

Discussion

This study provides countrywide data on the TB-related workload and the resources available for the diagnosis and treatment of TB in Malawi. The private sector in Malawi makes very little contribution to TB control, so the results reflect the general status of TB control for the whole country. TB imposes a heavy workload on all hospitals in terms of sputum smear examination, chest radiography, registration and treatment of cases. We were unable to determine the precise reasons for chest radiography, although it is likely that most chest X-rays are performed to diagnose smear-negative PTB and EPTB. The central hospitals in particular bear a heavy TB workload, more than would be expected from population demographics alone. There may be many reasons for this, including TB suspects coming into urban districts because of a belief that services are better than in rural areas; the higher HIV-seroprevalence rates in urban areas (7); and the greater opportunity for TB transmission in overcrowded urban areas.

All hospitals, particularly the central hospitals, were short of laboratory, radiographic and TB personnel. The staff shortage was compounded by staff illness and training courses away from the duty station. We have previously documented the annual losses of TB officers from the TB programme because of death, retrenchment and other factors (8), but illness also reduces the ability of the health service to function at full capacity. It is likely that many staff also spent time away from work attending funerals of relatives and colleagues, and HIV-related disease is likely to play a major role in this regard (9). A World Bank AIDS assessment study in Malawi estimated that up to half of the 1996 urban-based health care staff will die from AIDS by the year 2005 (10).

About 70% of TB patients in the country have associated HIV infection and approximately one-half of these patients have HIV-related complications (11). Compounding the problem are serious omissions in the overall care of TB patients, including the absence of regular TB ward rounds by clinical staff

(particularly in district hospitals); the paucity of HIV-counselling and testing services; an almost complete absence of links with community care groups to provide ongoing support during the continuation phase of treatment; and a shortage of drugs to treat HIV-related complications. These factors may contribute to the high mortality rates of TB patients in Malawi (11, 12).

The results of this study are relevant for the Malawi TB Control Programme. First, planners should take into account the shortage of trained staff (laboratory, radiographic and TB officer personnel) and ensure that sufficient numbers of staff are trained annually by health service institutions, and that replacements are guaranteed before qualified staff undertake further professional training courses. Hospital staff could also be cross-trained for tasks outside their work designation. For example, hospital orderlies could be trained to prepare sputum smears for laboratory technicians.

Second, the Ministry of Health should set up a system to ensure that all hospitals have functioning equipment and consumables to run diagnostic laboratory and radiographic services. This is important not only for TB control, but also for the control of other endemic diseases such as malaria.

Third, the TB programme needs to recognize its role in the care of HIV/AIDS patients and develop stronger links with the National AIDS Control Programme. Drugs for treating chronic diarrhoea (codeine phosphate) or oral/oesophageal candidiasis (nystatin or ketoconazole) should always be available in hospitals, and hospitals need to ensure that HIV-counselling services are in place and that ward rounds are carried out.

Fourth, there is a need to continue with the decentralization of TB services to the community. The TB burden is likely to continue increasing and TB bed capacity will be overwhelmed unless ambulatory patients can receive treatment at peripheral centres. Decentralization also allows the possibility of using community structures and home-based care groups to improve the general medical care of patients.

Finally, resources should be concentrated where the burden of TB is greatest. In this regard, the central hospitals are relatively under-resourced in terms of personnel, diagnostic facilities and TB beds. Support for central hospitals has always been difficult because of a perception, especially by donors, that they are centres of excellence and already consume large amounts of the country's health budget. But it must be remembered that central hospitals also serve as district hospitals for 25% of the country's population and that they care for nearly one-third of the total TB caseload in the country. ■

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Conflict of interests: none declared.

Résumé

Ressources pour la lutte contre la tuberculose au Malawi

Objectif Etablir quelles sont les ressources affectées à la lutte contre la tuberculose au Malawi.

Méthodes Nous avons procédé à une étude portant sur l'ensemble des 43 hôpitaux du pays (3 hôpitaux centraux, 22 hôpitaux de district et 18 hôpitaux tenus par des missionnaires) qui reçoivent et traitent les malades atteints de tuberculose. Pour recueillir les données de 1998 sur la charge de travail liée à la tuberculose, les moyens diagnostiques, le personnel du programme et les installations de traitement, nous avons examiné les registres des laboratoires, des services de radiologie et des services de la tuberculose, conduit des entretiens et visité les établissements.

Résultats Il ressort de ces données qu'en 1998, 88 257 cas suspects ou patients atteints de tuberculose ont produit environ 230 000 échantillons de crachats pour examen microscopique de frottis, 55 667 radiographies pulmonaires ont été faites et 23 285 patients ont été enregistrés pour traitement antituberculeux. Le personnel se composait de 86 techniciens de laboratoire qualifiés, 44 techniciens en radiographie et 83 personnes appartenant au programme de lutte contre la tuberculose; pendant l'année 1998, 40 % d'entre eux ont eu des arrêts

de travail pour maladie. Environ 20 % des microscopes et des appareils de radiographie étaient cassés. Sur l'ensemble des hôpitaux, 16 % des lits étaient réservés aux services de la tuberculose, mais malgré cela, le taux d'occupation des lits dans ces services dépassait 100 %. Alors que les stocks de médicaments antituberculeux étaient corrects, les hôpitaux manquaient d'infirmières à plein temps pour les services de la tuberculose et 50 % des hôpitaux de district n'effectuaient pas de visites des malades dans ces services. D'une façon générale, les hôpitaux manquaient de moyens pour la prise en charge de la tuberculose associée au VIH, plus particulièrement au niveau des hôpitaux centraux.

Conclusion Le Malawi a besoin d'une meilleure planification de l'utilisation de son personnel hospitalier et devrait envisager un programme de formation croisée. L'équipement devrait être régulièrement entretenu et il faudrait accorder davantage d'attention à la tuberculose liée au VIH. Les politiques de décentralisation des ressources vers la périphérie et d'augmentation des ressources consacrées au diagnostic et à la prise en charge des cas dans les hôpitaux centraux devront être poursuivies.

Resumen

Recursos para combatir la tuberculosis en Malawi

Objetivo Determinar los recursos disponibles para combatir la tuberculosis (TB) en Malawi.

Métodos Llevamos a cabo un estudio de ámbito nacional de los 43 hospitales (3 centrales, 22 distritales y 18 de misión) que registran y tratan a enfermos de TB. Para reunir los datos de 1998 sobre la carga de trabajo, los servicios diagnósticos, el personal del programa y los servicios de tratamiento relacionados con la tuberculosis, nos servimos de información de laboratorio, radiografías y registros de TB, realizamos entrevistas y visitamos servicios hospitalarios.

Resultados Los datos muestran que, en 1998, entre 88 257 enfermos confirmados o presuntos de TB se obtuvieron aproximadamente 230 000 muestras de esputo para análisis microscópico, se realizaron 55 667 radiografías de tórax y se registró a 23 285 pacientes para someterlos a tratamiento antituberculoso.

Intervinieron 86 técnicos de laboratorio cualificados, 44 técnicos en radiografía y 83 miembros del personal del programa contra la tuberculosis. De éstos, aproximadamente un 40% enfermaron en algún momento durante 1998. Aproximadamente un 20% de los microscopios y los aparatos de radiografía estaban averiados. Un 16% de las camas de hospital estaban destinadas a los enfermos tuberculosos en salas especialmente concebidas para ellos, pero aun así la ocupación de camas de esas salas superaba el 100%. Aunque las reservas de medicamentos antituberculosos eran satisfactorias, en las salas de tuberculosis escaseaban las enfermeras de dedicación plena, y en el 50% de los hospitales de distrito no se hacían turnos en esas salas. En general, existía una escasez de servicios para manejar los casos de la enfermedad relacionados con el VIH; los hospitales centrales en particular estaban infradotados.

Conclusión Malawi necesita una mejor planificación para utilizar sus recursos humanos y debería procurar implantar un sistema de capacitación cruzada del personal hospitalario. El equipo requiere un mantenimiento regular, y es necesario prestar más atención a

los casos de la enfermedad relacionados con el VIH. Deben proseguirse las políticas encaminadas a descentralizar los recursos y a incrementar la capacidad diagnóstica y de seguimiento de casos de los hospitales centrales.

References

1. **Raviglione MC et al.** Tuberculosis and HIV: current status in Africa. *AIDS*, 1997, **11**: S115–S123.
2. **Maher D et al.** *Treatment of tuberculosis: guidelines for national programmes*, 2nd ed. Geneva, World Health Organization, 1997 (Document No. WHO/TB/97.220).
3. *Global tuberculosis control*. Geneva, World Health Organization, 1998 (Global Tuberculosis Programme, Report No. WHO/TB/98–237).
4. **Harries AD et al.** Tuberculosis programme changes and treatment outcomes in patients with smear-positive pulmonary tuberculosis in Blantyre, Malawi. *Lancet*, 1996, **347**: 807–809.
5. *Malawi fourth national health plan 1999–2004*. Lilongwe, Malawi, Ministry of Health and Population, 1999.
6. *To the year 2020: a vision for the health sector in Malawi*. Lilongwe, Malawi, Ministry of Health and Population, 1999.
7. **Kaluwa OL, Feluzi HG, Zingani AM.** *HIV/Syphilis seroprevalence in antenatal clinic attenders*. Malawi, National AIDS Control Programme, 1996 (Sentinel Surveillance Report).
8. **Salaniponi FML et al.** Loss of tuberculosis officers from a national tuberculosis programme: the Malawi experience, 1993–1997. *International Journal of Tuberculosis and Lung Disease*, 1999, **3**: 174–175.
9. **Watts C, Kumaranayake L.** Thinking big: scaling-up HIV-1 interventions in sub-Saharan Africa. *Lancet*, 1999, **354**: 1492.
10. **Roseberry W et al.** *Malawi AIDS Assessment Study*. Lilongwe, Government of Malawi and the World Bank, 1997 (Report No. 17740 MAI).
11. **Harries AD et al.** Efficacy of an unsupervised ambulatory treatment regimen for smear-negative pulmonary tuberculosis and tuberculous pleural effusion in Malawi. *International Journal of Tuberculosis and Lung Disease*, 1999, **3**: 402–408.
12. **Harries AD et al.** Treatment outcome of an unselected cohort of tuberculosis patients in relation to human immunodeficiency virus serostatus in Zomba hospital, Malawi. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1998, **92**: 343–347.