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Tuberculosis control in the Eastern Mediterranean Region

Progress report 2009

World Health Organization
Regional Office for the Eastern Mediterranean

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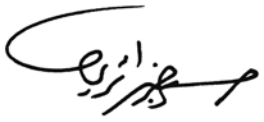
Foreword

Tuberculosis control remains one of the most important public health challenges in the WHO Eastern Mediterranean Region. In 2008, a total of 397 726 tuberculosis cases were notified in the Region, compared to 383 364 in 2007. These notified cases represented only 63% of the 772 039 tuberculosis cases estimated to have occurred in 2007. In the same year, the Region reported a case detection rate of 60% for smear-positive pulmonary tuberculosis and a treatment success rate of 86%. The under-detection of tuberculosis cases is a major challenge that is hindering progress in tuberculosis control in the Region. Under-detection is mainly the result of tuberculosis cases being treated by public, private or informal health care providers without being notified to the national tuberculosis control programmes, or not being treated at all, mainly in countries with incomplete health system coverage.

The Global Stop Tuberculosis (TB) Strategy addresses several challenges related to case detection, such as the need for a mixture of public and private health service providers and for advocacy, communication and social mobilization activities. Countries of the Region have adopted the strategy and are making significant progress in its implementation. As well, countries have developed plans to carry out WHO-recommended methods for estimating the tuberculosis burden with a higher degree of precision. The national tuberculosis control programmes in 14 countries are receiving financial support from the Global Fund to Fight AIDS, Tuberculosis and Malaria. This support has contributed tremendously to progress in developing national strategic plans aligned with the Stop TB strategy.

This annual report on the Stop TB programme is the first produced by the WHO Regional Office for the Eastern Mediterranean. It aims at documenting the activities and progress made in tuberculosis control in the Region during 2008. The report is divided into two main sections, covering the epidemiological situation in the Region and progress made in the implementation of the Stop TB strategy. It is planned to produce this report on an annual basis in order to monitor progress in reducing the burden of tuberculosis in the Region.



Hussein A. Gezairy MD FRCS
WHO Regional Director for the Eastern Mediterranean

Executive summary

In 2007, the estimated number of tuberculosis cases in the Eastern Mediterranean Region was 772 039. Twelve countries, out of a total of 22 in the Region, contributed to 99% of the cases, while Pakistan alone harboured half of the total cases. In 2007, coverage of DOTS (the basic package of services that underpins the Stop TB Strategy) in the Region was reported to be 97%, and a total of 383 364 tuberculosis cases were notified; five countries achieved a 70% case detection rate for smear-positive tuberculosis and an 85% treatment success rate for the detected cases. The available information shows that there were 25 475 multidrug-resistant tuberculosis cases in the Region in 2006, with nearly 60% of these cases estimated to be in Pakistan alone. Since 2002, the Region has made good progress in drug-resistance survey coverage, reporting data from six countries. Since 1994, eight countries in the Region have reported drug-resistance data from areas representing 22% of all tuberculosis cases in the Region, but covering only 36% of the countries in the Region. The primary limiting factor to expanding survey coverage in the Region is the high number of countries currently facing conflict and complex emergency situations.

All national tuberculosis programmes in the Region, with the exception of Lebanon and southern Sudan, have national strategic plans. Reports on national governmental contribution to national tuberculosis programmenational tuberculosis programme budgets varied in different countries. In Djibouti, Somalia and southern Sudan, national tuberculosis programmes relied entirely on external donors such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). In countries of the Gulf Cooperation Council (GCC), the governments covered all the national tuberculosis programme budgets while in the remaining countries, governmental financial contribution ranged from 30% to half or more of the planned budget. Up until the 2007 reporting period, 14 national tuberculosis programmes had received grants from the GFATM, while 13 national tuberculosis programmes reported having received grants from donors other than GFATM.

In all countries in the Region, sputum smear microscopy was the basis of diagnosis of pulmonary tuberculosis and was provided free of charge at all diagnostic centres. In 2007, 18 countries reported a laboratory network coverage for direct smear microscopy within the recommended level of one laboratory per 50 000–250 000 population. All countries except Djibouti and Somalia reported having culture laboratories. External quality assessment for culture laboratories was reported to be 100% in six countries. All countries in the Region, except Afghanistan, Djibouti, occupied Palestinian territory and Somalia, had drug susceptibility testing laboratories.

All countries reported using standardized regimens in line with the internationally recommended guidelines in 2007. All countries reported using 6-month regimens for Category I tuberculosis, except Afghanistan, Pakistan, Sudan and Yemen, which used 8-month regimens. All countries reported that DOTS was in place, at least during the intensive phase, for all patients in all centres, with the exception of Jordan, Saudi Arabia, Sudan and Yemen, where DOTS was not uniformly carried out for all patients. In 2007, out of the total 23 national tuberculosis programmes, antituberculosis medicines were reported to be out of stock in five. Tuberculosis programmes in six countries had introduced the revised recording reporting system, while those in remaining countries were at different stages of introducing it. All programmes submitted quarterly reports to the WHO Regional Office for the Eastern Mediterranean, through the web-based surveillance system, DQ-online [1]. With the help of the Regional Office, national tuberculosis programmes in three countries introduced a case-based computerized system, the E-nominal recording and reporting system, at the level of the tuberculosis-monitoring units; other types of computerized case-based systems were introduced in six other countries.

By the start of 2008, Pakistan, Qatar, Saudi Arabia, Tunisia and Yemen had a joint national HIV/tuberculosis strategic plan, a joint HIV/tuberculosis work plan, integrated HIV/tuberculosis monitoring and evaluation plans, and surveillance of HIV prevalence among tuberculosis patients. Most other national tuberculosis programmes had established, or were in the process of establishing, (some of) these activities. All countries except Pakistan had established a system of surveillance for HIV among tuberculosis patients. In 2007, eight national tuberculosis programmes registered HIV-positive tuberculosis patients on co-trimoxazole prophylactic treatment, while 15 programmes provided antiretroviral treatment to eligible patients.

During 2007, 10 national tuberculosis programmes had rather incomplete data about contact management for the notified cases. However, with the introduction of the revised recording and reporting system in most countries in 2008–2009, more data became available, as evident from the quarterly reports submitted through DQ-online [1].

During 2007–2008, increased collaboration was reported between national tuberculosis programmes and key non-programme health-care providers. In some countries the proportion of cases detected by non-programme workers constituted one third or more of the total tuberculosis cases.

In 2007, countries reported increasing use of innovative advocacy, communication and social mobilization approaches in tuberculosis care. The Regional Office assisted several countries in the Region by providing technical help in the implementation and effective monitoring of advocacy, communication and social mobilization approaches. In addition to hosting a multicountry workshop on implementation of advocacy, communication and social mobilization grants from GFATM, the Regional Office provided technical support to Egypt, Morocco, Pakistan and Sudan and a multicountry advocacy, communication and social mobilization planning workshop was held in Jordan. During 2008, the Regional Office provided technical support to cover project management capacity gaps in advocacy, communication and social mobilization in Afghanistan, Egypt, Iraq, Jordan, Morocco, Pakistan, Sudan and Syrian Arab Republic. The Regional Office hosted an orientation on advocacy, communication and social mobilization in Cairo in 2008 for national tuberculosis programme managers and WHO field teams in the Region. The Regional Office also assisted several countries in the production of advocacy documents in 2008. In addition, it organized advocacy visits by the Global Stop TB Ambassador, Ms Anna Cataldi, to Afghanistan, Jordan and Pakistan.

The Eastern Mediterranean Partnership to Stop TB was launched in May 2008, with a Coordinating Board, Secretariat and committees for resource mobilization and scaling-up tuberculosis care. The launch was announced on the occasion of the 14th Coordinating Board Meeting of the Global Stop TB Partnership in Cairo. The opening ceremony was presided by H.E. Mrs Suzanne Mubarak, First Lady of Egypt. The Secretariat of the Eastern Mediterranean Partnership to Stop TB is hosted at the Regional Office and is responsible for coordinating the work of its partners.

Twelve countries in the Region reported operational research studies during 2007–2008. The total number of projects was 46, with the highest number of projects in northern Sudan. An intercountry research methodology and proposal development workshop was held in 2007, where proposals were developed and submitted for funding to the Regional Office/Special Programme for Research and Training in Tropical Diseases (TDR) Small Grants Scheme during 2008. All countries that applied for Round 8 GFATM funds were given technical support to develop the research components of their proposals.

1. Introduction

This report is the first annual report of the progress in tuberculosis control activities in the Eastern Mediterranean Region. Different data sources were used to provide information about these activities. These sources are: the quarterly reporting system to the Stop TB Unit, WHO Regional Office for the Eastern Mediterranean, the DOTS quarterly online system (DQ-online) [1]; the WHO global tuberculosis report 2009 [2]; review mission reports; final reports of surveys or studies; country annual reports and other documents. It is planned to sustain an annual publication of this report. The aim is to compile information about national tuberculosis programme activities so as to monitor the implementation of the Stop TB Strategy and evaluate the progress made in subsequent years.

The report begins with an overview of tuberculosis burden and progress in tuberculosis control and includes: the latest estimated burden of tuberculosis in the various countries in the Region in 2007; the burden of HIV in tuberculosis patients and the burden of multidrug resistance and extensively drug-resistant tuberculosis case notifications reported in 2008; estimates of the case detection rate for sputum smear positive cases; treatment outcomes and progress towards achieving the case detection and treatment success rate targets.

It then details progress in the implementation of the Stop TB Strategy and describes and assesses implementation of each of the six major components of the strategy as well as their subcomponents. The major components are: 1) pursuing high-quality DOTS expansion and enhancement; 2) addressing tuberculosis/HIV co-infection, multidrug-resistant tuberculosis and other challenges; 3) contributing to health-system strengthening; 4) engaging all care providers; 5) empowering patients and communities; 6) enabling and promoting research.

Important checklists for supervisory visits are included in the two annexes. Annex 1 is a checklist that can be used during routine supervisory visits at all levels. This checklist is a comprehensive tool for all areas of the programme, except the laboratory. It focuses on data quality through cross-checking registers and reports. Annex 2 is a laboratory checklist for laboratory supervisory visits. These tools were tested in several review missions and proved to be sensitive in identifying gaps in surveillance and in laboratory performance. The aim of publishing these checklists is to present reliable and standardized tools to help national tuberculosis programmes improve their performance.

In short, this annual report 2009 documents the progress in the implementation of the Stop TB Strategy, the challenges faced and the progress made in reducing tuberculosis burden in countries in the Region.

2. Epidemiology

2.1 Estimated burden of tuberculosis

In 2007, the estimated number of prevalent tuberculosis cases in the Region was 772 039, with a rate of 139 per 100 000 population. The estimated number of tuberculosis cases in 2007 was 582 767, with an estimated incidence of 105 per 100 000 population. Of these, 258 877 were sputum smear positive pulmonary tuberculosis. Twelve countries contributed to 99% of the tuberculosis cases in the Region and Pakistan alone accounted for half of the cases in the Region (Figure 1). Progress in reducing tuberculosis incidence in 2007, compared with 1990, is shown in Figure 2. Ten countries reduced their tuberculosis incidence rates to below 25 cases per 100 000 population in 2007, compared with only one country in 1990. Similarly, the number of countries with high tuberculosis incidence, i.e. rates exceeding 100 per 100 000 population, decreased from seven to five during the same period [2]. The estimated number of tuberculosis deaths in the Region in 2007 was 104 303, with

Table 1. Estimated tuberculosis deaths in the Region in 2007

Country	Deaths
Pakistan	47 587
Sudan	27 450
Afghanistan	8 169
Somalia	5 483
Iraq	3 190
Yemen	2 188
Morocco	2 586
Egypt	1 845
Islamic Republic of Iran	1 844
Saudi Arabia	1 327
Djibouti	1 304
Others	1 330

11 countries contributing to 99% of the deaths (Table 1).

2.2 Case notification

In 2007, the coverage of DOTS, the basic package of services that underpins the Stop TB Strategy, was 97%. Six countries did not achieve 100% coverage: Afghanistan (97%), Iraq (87%), Pakistan (99%), occupied Palestinian territory (45%), Sudan (91%) and United Arab Emirates (20%). Yemen achieved 100% coverage in 2007. A total of 383 364 tuberculosis cases were notified in 2007; of these, 155 572 were sputum smear positive. The notification rate of tuberculosis increased at around 6% annually for all forms and smear-positive cases (Figure 3). The regional trend was mainly driven by the increased notification rate in Afghanistan and Pakistan and, to some extent, in Somalia (Figure 4). The remaining countries showed either a declining or a stable trend during the same period. The age and sex distribution of case notification in high-burden countries is shown in Figure 5.

2.3 Achievement of case detection and treatment success targets

In 2007, six countries achieved the global targets for case detection and treatment success: a 70% case detection rate for smear-positive tuberculosis and an 85% treatment success rate for the detected smear-positive cases. These countries were Bahrain, Egypt, Morocco, Oman, Syrian Arab Republic and Tunisia. The situation in countries in the Region is shown in Figure 6.

2.4 Other challenges

2.4.1 HIV prevalence and burden of tuberculosis/HIV co-infection

HIV prevalence among tuberculosis patients is the most sensitive and reliable indicator for the HIV and tuberculosis epidemic in a country. All countries should choose appropriate surveillance methods, ensure that surveillance is set up periodically and that it covers all regions. All countries except Afghanistan, Libyan Arab Jamahiriya, Morocco, Pakistan, Saudi Arabia, Somalia and United Arab Emirates reported on HIV prevalence in tuberculosis patients.

Among programmes with prevalence data, nine used routine testing (Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, occupied Palestinian territory, Qatar, southern Sudan); seven used sentinel surveillance (Djibouti, Egypt, Islamic Republic of Iran, northern Sudan, Syrian Arab Republic, Tunisia, Yemen). Afghanistan and Somalia relied on periodic surveys to monitor the prevalence of HIV in tuberculosis patients. Table 2 shows the number of tuberculosis patients tested for HIV and the prevalence of HIV in tested notified cases.

Figure 7 shows the distribution of countries in the Region by the different levels of HIV epidemic and the correlation with tuberculosis incidence. Countries in the Region are categorized regarding the HIV epidemic as follows:

- Countries in generalized epidemic (≥ 1% in the general population): Djibouti, Somalia, Sudan
- Countries in concentrated epidemic (≥ 5% in risk groups): Islamic Republic of Iran, Libyan Arab Jamahiriya, Pakistan

Table 2. Addressing tuberculosis/HIV in 2008 [2]

Country	Total no. of registered tuberculosis patients	Tuberculosis patients tested for HIV (%)	HIV-positive tuberculosis patients (%)	HIV-positive tuberculosis patients on cotrimoxazole preventive therapy (%)	HIV-positive tuberculosis patients on antiretroviral therapy (%)
Afghanistan	28 301	NA	NA	NA	NA
Bahrain	304	74.3	3.1	0	0
Djibouti	3 717	44.1	11.7	84.8	28.8
Egypt	9 760	5.3	1.7	100	100
Iran, Islamic Republic of	9 579	6.6	30.3	8.3	12.5
Iraq	9 280	48.6	0	100	NA
Jordan	339	30.7	0	0	0
Kuwait	867	100	0.2	100	100
Lebanon	534	1.9	100	100	100
Libyan Arab Jamahiriya	1 261	NA	NA	NA	NA
Morocco	27 119	NA	NA	NA	NA
Oman	352	100	2	100	100
Pakistan	24 8115	3.4	0.2	100	100
Qatar	567	100	0.4	100	50
Saudi Arabia	4 064	NA	NA	100	100
Somalia	12 481	NA	NA	NA	NA
Sudan	25 444	11.9	NA	NA	NA
Syrian Arab Republic	3 938	5.2	0	0	0
Tunisia	2 280	NA	NA	0	100
United Arab Emirates	93	NA	NA	NA	NA
Occupied Palestinian territory	41	97.6	0	NA	NA
Yemen	9 290	NA	NA	NA	NA
Region	397 726	5.1	2.4	54.7	33.7

NA not applicable

- Countries in low level of the epidemic (< 1% in general population and < 5% in risk groups): the remaining countries.

The countries in generalized HIV epidemic had a high estimated tuberculosis incidence of more than 100 per 100 000 population.

2.4.2 Burden of multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis

Based on available information it is estimated that there were 25 475 (95% confidence interval [CI]: 15 737–73 132) incident multidrug-resistant tuberculosis cases in the Region in 2006; almost 60% of these cases were estimated to be in Pakistan.

The Region has made good progress in survey coverage since 2002, reporting data from six countries. The population-weighted mean of multidrug-resistant tuberculosis, based on all countries that reported in the Region in 2007, was 2.0% (95% CI: 0.0–4.3) among new cases, 35.3% (95% CI: 16.4–54.3) among previously treated cases, and 5.4% (95% CI: 0.5–10.4) among combined cases (Table 3).

Lebanon, Morocco and Oman reported low proportions of multidrug-resistant tuberculosis among new cases, ranging from 0.5% (95% CI: 0.2–1.1) in Morocco to 1.3% (95% CI: 0.2–4.7) in Oman. Yemen reported a higher proportion of resistance, 2.9% (95% CI: 1.7–4.8), while Jordan reported 5.4% (95% CI: 2–11.4) multidrug-resistant tuberculosis among new cases.

Table 3. Estimated burden of multidrug-resistant tuberculosis in 2007 [3]

Country	Estimated multidrug resistance in new tuberculosis cases (95% confidence interval in parenthesis) (%)	Estimated multidrug resistance in previously treated tuberculosis cases (95% confidence interval in parenthesis) (%)	Method
Afghanistan	3.4 (0.5–18.3)	37 (8.7–76.2)	Model
Bahrain	2.2 (0.3–12.9)	36.5 (8.8–75)	Model
Djibouti	3.3 (0.5–17.7)	35.4 (8.8–74.5)	Model
Egypt	2.2 (1.2–3.7)	38.2 (31.8–45.1)	Drug resistance survey
Iran, Islamic Republic of	5 (3.4–6.9)	48.2 (34.7–62)	Drug resistance survey
Iraq	3 (0.5–16.6)	38 (9.5–77)	Model
Jordan	5.4 (2.0–11.4)	40 (22.7–59.4)	Drug resistance survey
Kuwait	1.9 (0.3–11.5)	36.5 (8.8–75.7)	Model
Lebanon	1.1 (0.1–3.8)	62.5 (35.4–84.8)	Drug resistance survey
Libyan Arab Jamahiriya	2.6 (0.4–14.4)	38.7 (9.7–77.3)	Model
Morocco	0.5 (0.2–1.1)	12.2 (7.8–17.8)	Drug resistance survey
Oman	1.3 (0.2–4.7)	35.7 (12.8–64.9)	Drug resistance survey
Pakistan	3.4 (0.5–18.4)	36.5 (8.7–75.3)	Model
Qatar	–	–	–
Saudi Arabia	2.2 (0.3–12.6)	36.4 (8.5–75.9)	Model
Somalia	1.8 (0.3–11.2)	9.8 (1.9–38.3)	Model
Sudan	1.9 (0.3–11.7)	9.8 (1.9–37.5)	Model
Syrian Arab Republic	3.1 (0.5–16.6)	36.8 (9.1–76.0)	Model
Tunisia	2.7 (0.4–15.0)	36.1 (8.8–74.9)	Model
United Arab Emirates	2.3 (0.4–12.9)	36.7 (8.9–75.4)	Model
Occupied Palestinian territory	3.1 (0.5–17.4)	36.8 (10.2–77.1)	Model
Yemen	2.9 (1.7–4.8)	11.3 (4.3–23.0)	Drug resistance survey

– information not available

Jordan, Lebanon and Oman reported very high proportions of resistance among retreated cases, though sample sizes were small and confidence intervals were wide. The high proportions of resistance found in Jordan were similar to those reported from the Islamic Republic of Iran in 1998. Jordan reported high success rates and low proportions of re-treatment cases, suggesting that further evaluation is required to confirm the high proportion of multidrug-resistant tuberculosis found among new cases (Table 4).

Trends are available only for Oman and Qatar, both with small numbers of total cases and low to moderate levels of resistance, much of which was imported. Trends are difficult to interpret because of the small numbers of cases, though drug resistance does not appear to be a problem in either of these countries. The extent of second-line drug resistance is not known in the Region. The only available data, reported from Islamic Republic of Iran, Oman, Qatar and United Arab Emirates, showed the existence of extensively drug-resistant tuberculosis but denominators were not available. Morocco plans to have multidrug-resistant tuberculosis isolates collected from its nationwide survey tested for second-line drug resistance.

Table 3 shows that the prevalence of multidrug-resistant tuberculosis in new tuberculosis patients was greater than or equal to 5% in the Islamic Republic of Iran and Jordan; ranged between 3% and 4% in Afghanistan, Djibouti, Iraq, Pakistan, Syrian Arab Republic and the occupied Palestinian territory; and was less than 3% in the rest of the countries. Around one third of previously treated tuberculosis cases were multidrug-resistant tuberculosis in countries in the Region. This proportion ranged from 9.8% in Sudan and Somalia to 62.5% in Lebanon.

Table 4. Notified multidrug-resistant tuberculosis and extensively drug-resistant tuberculosis cases, 2007

Country	Multidrug-resistant tuberculosis cases among new cases	Multidrug-resistant tuberculosis cases among re-treatment cases	Extensively drug-resistant tuberculosis cases
Afghanistan	0	0	–
Bahrain	–	–	–
Djibouti	–	–	–
Egypt	8	269	0
Iran, Islamic Republic of	4	39	3
Iraq	0	9	–
Jordan	1	4	–
Kuwait	7	1	0
Lebanon	0	2	0
Libyan Arab Jamahiriya	1	–	–
Morocco	39	9	0
Oman	3	2	0
Pakistan	0	0	–
Occupied Palestinian territory	0	0	–
Qatar	–	–	2
Saudi Arabia	–	–	–
Somalia	0	0	–
Sudan	21	30	–
Syrian Arab Republic	2	10	–
Tunisia	–	–	–
United Arab Emirates	–	1	1
Yemen	1	1	–
Region	87	377	8

– Information not available

Table 4 shows that the total number of notified multidrug-resistant tuberculosis cases in 2007 was 464; of these, 87 were detected in new tuberculosis cases. These figures indicate that only a limited number of multidrug-resistant tuberculosis cases are detected, since the estimated number of incident multidrug-resistant tuberculosis cases was 25 475 in 2007. Three countries reported extensively drug-resistant tuberculosis cases: Islamic Republic of Iran, Qatar and United Arab Emirates.

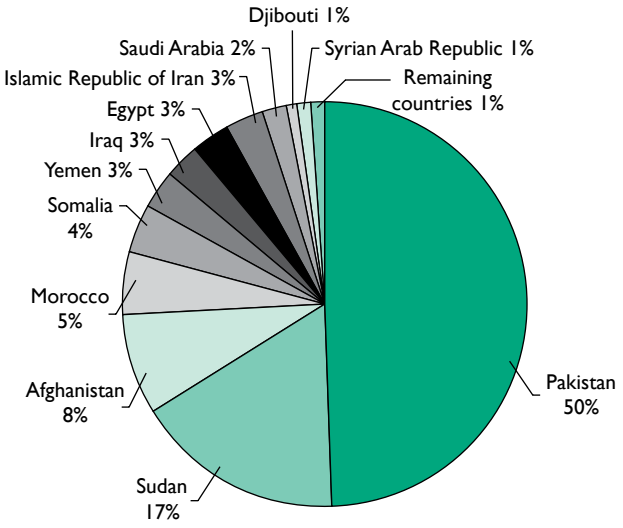


Figure 1. Contribution of countries to tuberculosis cases in the Region

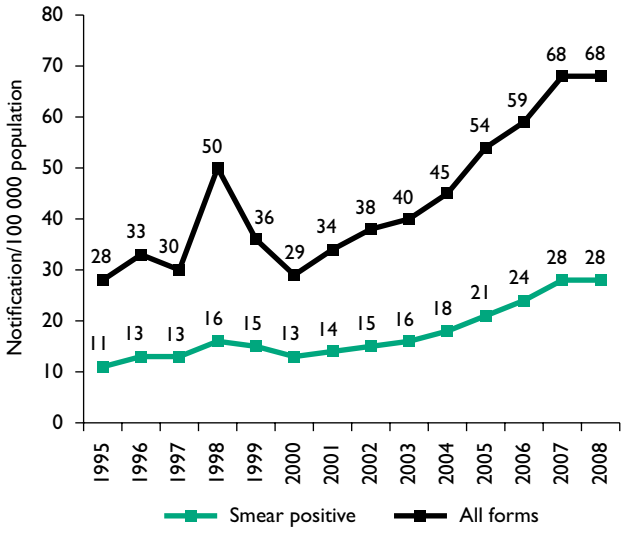


Figure 3. Trend in the tuberculosis case notification rate in the Region, 1995–2008

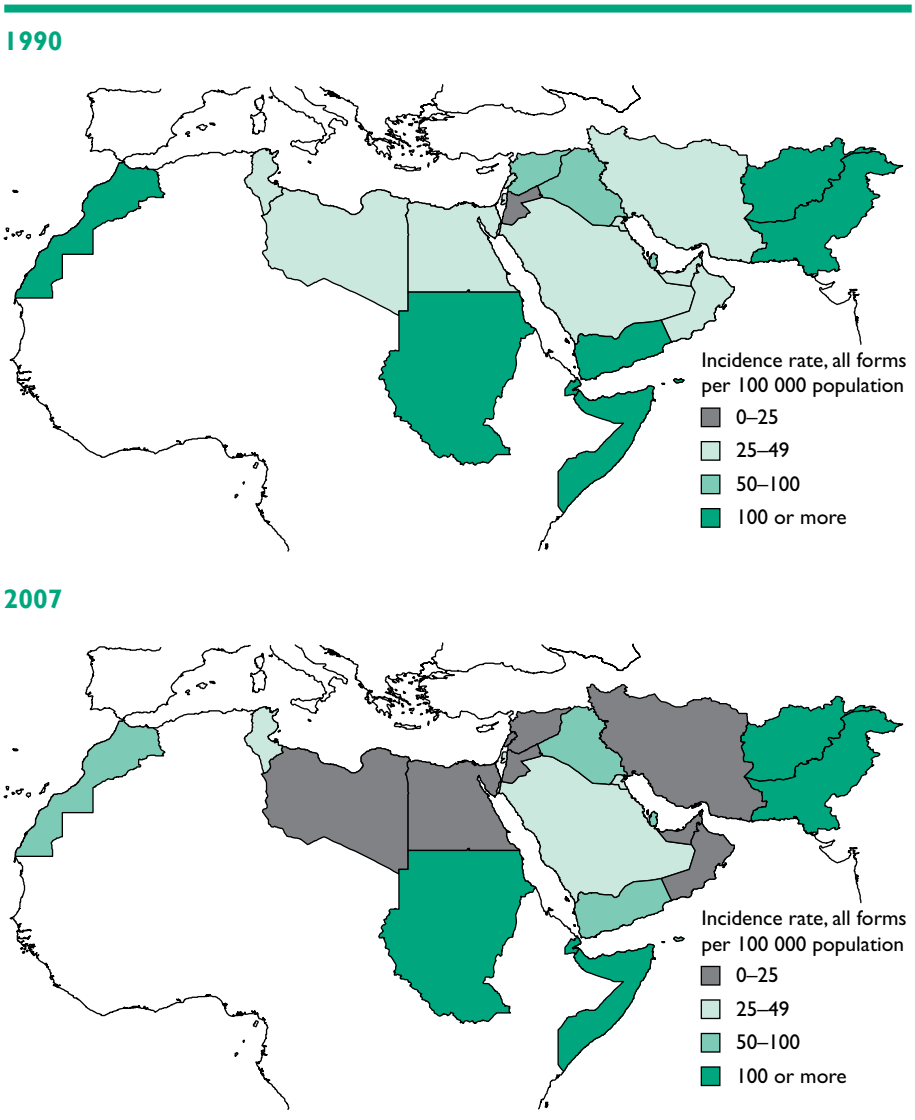


Figure 2. Progress in reduction of tuberculosis incidence in the Region, 1990–2007

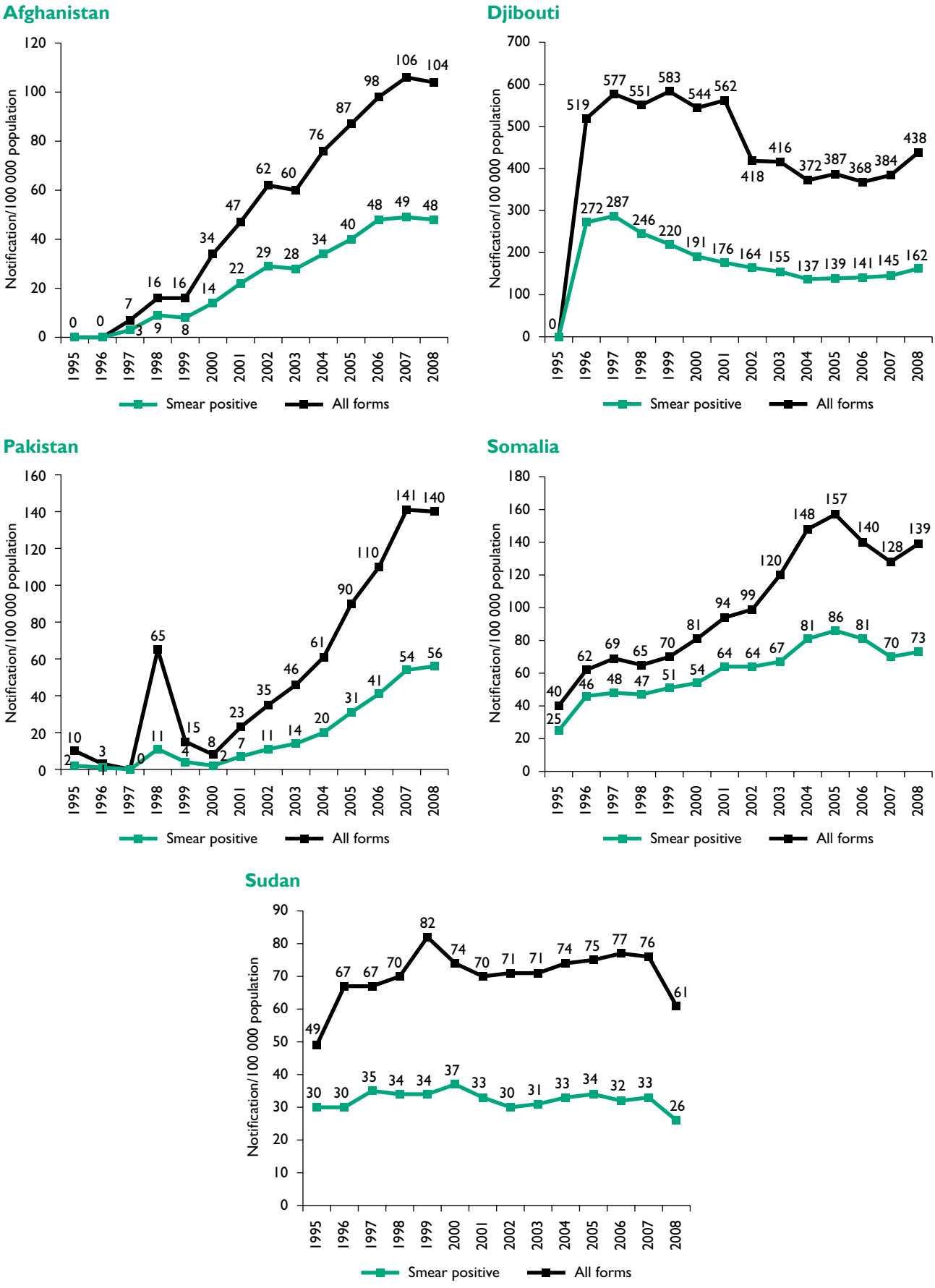


Figure 4. Trend in notification rate in the high-burden countries (> 100/100 000 population) that contributed 80% of the tuberculosis burden in the Region

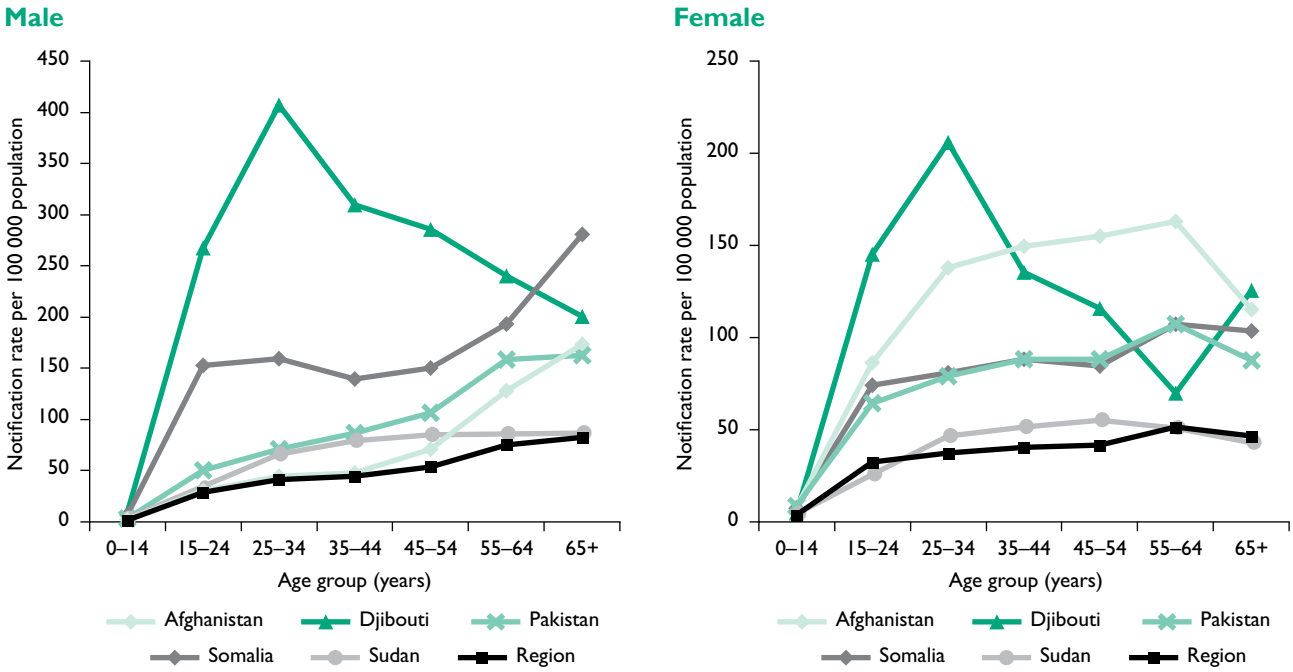


Figure 5. Age-specific notification rates in males and females in high-burden countries (> 100/100 000 population) that contribute to 80% of the tuberculosis burden in the Region

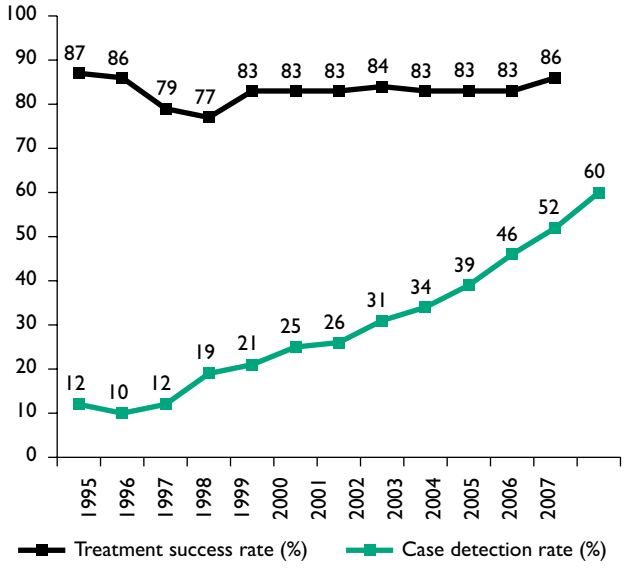
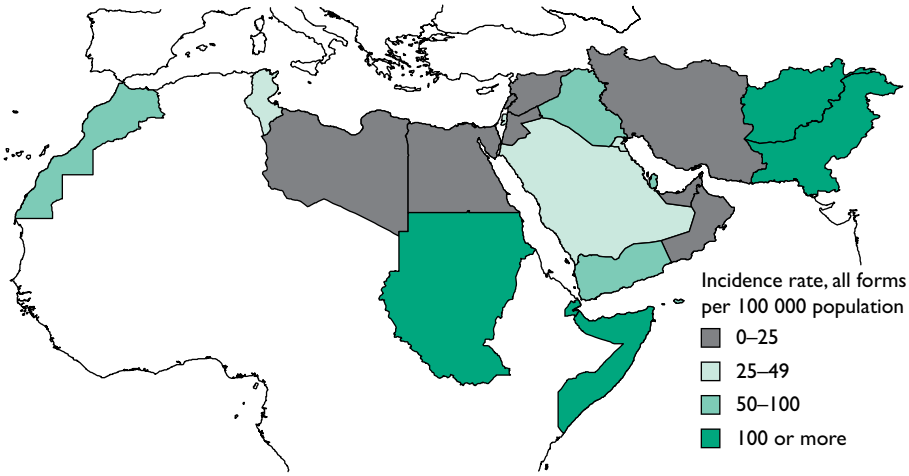


Figure 6. Case detection and treatment success rates for smear-positive tuberculosis in countries in the Region, 2007

Tuberculosis incidence in 2007



Level of HIV epidemic in 2007

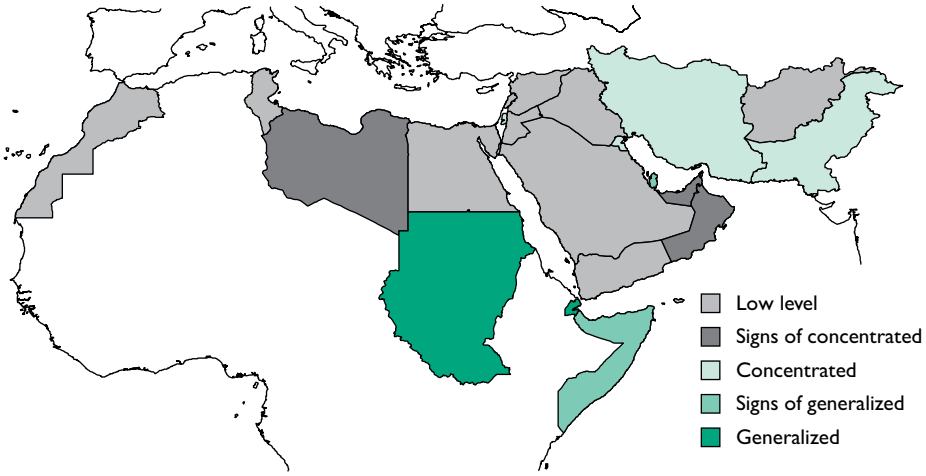


Figure 7. Distribution of countries in the Region by level of HIV epidemic and correlation with tuberculosis incidence

3. Main activities in DOTS expansion and enhancement

3.1. Political commitment

All national tuberculosis programmes, except in Lebanon and southern Sudan, have developed national strategic plans. Interagency coordination mechanisms existed in all countries except Djibouti, Iraq, Lebanon, occupied Palestinian territory and Tunisia. National partnerships to Stop TB were developed in Afghanistan, Bahrain, Egypt, Iraq, Jordan, Kuwait, Qatar, Somalia, Sudan (northern and southern), United Arab Emirates and Yemen.

Governmental contribution to national tuberculosis programme budgets varied throughout the Region. In Djibouti, Somalia and southern Sudan, tuberculosis programmes relied entirely on external donors such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). In other countries, governmental financial contribution was less than 30% of the planned budget: Afghanistan (21%), Pakistan (10%), occupied Palestinian territory (27%) and Syrian Arab Republic (0.5%). In the countries of the Gulf Cooperation Council (GCC), the governments covered all national tuberculosis programme budgets, while in the remaining countries governmental financial contribution was around half or more of the planned budget.

Fourteen tuberculosis programmes received grants from the GFATM: Afghanistan, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Morocco, Pakistan, occupied Palestinian territory, Somalia, northern and southern Sudan, Syrian Arab Republic and Yemen.

Thirteen tuberculosis programmes received grants from other donors: Afghanistan, Djibouti, Egypt, Iraq, Jordan, Lebanon, Morocco, Pakistan, occupied Palestinian territory, northern and southern Sudan, Syrian Arab Republic and Yemen.

Most of the countries had enough staff at central, intermediate and peripheral levels, where more than 90% of the planned posts were filled. However, some national tuberculosis programmes were understaffed, e.g. Kuwait (72% filled posts), Lebanon (83%), occupied Palestinian territory (25%) and Qatar (66%).

Table 5 shows the status of political commitment in the different programmes.

3.2 Case detection through quality-assured tuberculosis laboratory network

3.2.1 Suspect management

Standardized tuberculosis suspect registers were printed and distributed in the outpatient clinics of the chest facilities as part of the revised recording and reporting system for tuberculosis to allow the monitoring and evaluation of tuberculosis suspect management.

The registers supported effective monitoring of tuberculosis suspects in chest clinics, i.e. tuberculosis-monitoring units. Follow-up on the testing of the recording and reporting cases referred for sputum examination in other centres was seen in some chest centres.

All countries plan to implement the revised recording and reporting system, including the suspect register, by the end of 2009. They will subsequently complete data on suspect management by the end of 2010. Currently, only programmes in Djibouti, Egypt, Islamic Republic of Iran, Iraq and Morocco have introduced the revised recording and reporting system. Other programmes, such as in Afghanistan, Kuwait, northern Sudan and Syrian Arab Republic, have printed forms and conducted training on the revised recording and reporting system but the forms are not yet routinely utilized.

Only eight countries were able to report on suspect management during the second quarter of 2008: Egypt, Jordan, Islamic Republic of Iran,

Table 5. Status of political commitment in the different national tuberculosis programmes *(continued)*

Programme	National strategic plan and dates	National interagency coordination	National partnership	Planned/ expected budget in 2008 (US$)	Government contribution	GFATM contribution	Other donors contribution	Financial gap	Staff at all levels
Afghanistan	Yes, 2009–2013	Yes, since 2003	Yes, 2008	14.5 million	3 million (21%)	304 800 (2%)	4.7 million (32%)	6.5 million (45%)	>90% of posts filled
Bahrain	Yes, 2000–2010	Yes, 2000	Yes, 2000	No separate budget for tuberculosis	NA	NA	NA	NA	–
Djibouti	Yes	No	No	321 155	0 (0%)	198 840 (62%)	122 315 (38%)	None	100% of posts filled
Egypt	Yes, 2007–2011	Yes, 1997	Yes, 2009	12.1 million	9 million (74%)	2.9 million (24%)	251 990 (2%)	None	≈100% of posts filled
Iran, Islamic Republic of	Yes, 2008–2010	Yes, 2001	Yes, 2004	–	–	–	–	–	–
Iraq	Yes, 2008–2012	No	No	3.9 million	2.4 million (61%)	967 269 (25%)	20 000 (1%)	522 731 (13%)	97% of posts filled
Jordan	Yes, 2007–2011	Yes, 2007	Yes, 2005	2.1 million	1.3 million (61%)	304 000 (14%)	22 000 (1%)	464 000 (22%)	–
Kuwait	Yes, 2008–2009	Yes, 2004	Yes, 2004	4.8 million	4.8 million (100%)	NA	NA	0	72% of posts filled
Lebanon	No	No	No	4.7 million	4.2 million (88%)	NA	16 500 (3%)	40 000 (8%)	83%
Libyan Arab Jamahiriya	Yes, 2008–2015	Yes, 2008	–	–	–	–	–	–	–
Morocco	Yes, 2006–2015	Yes, 2006	No	3.3 million	2.3 million (69%)	1 million (31%)	4000 (0.1%)	0	100% of posts filled
Oman	Yes, 2005–2010	Yes, 1996	No	No separate budget for tuberculosis	NA	NA	NA	NA	100% of posts filled
Pakistan	Yes, 2005–2010	Yes, 2001	No	105.3 million	10.1 million (10%)	6 million (6%)	1 million (1%)	88 million (84%)	99.8% of posts filled
Occupied Palestinian territory	Yes, 2009–2014	No	No	1.2 million	320 000 (27%)	0	48 000 (4%)	832 000 (69%)	25% of posts filled
Qatar	Yes, 2000–2010	Yes, 1998	Yes, 1998	No separate budget for tuberculosis	NA	NA	NA	NA	60% of posts filled
Saudi Arabia	Yes, 2004–2009	Yes, 2000	No	No separate budget for tuberculosis	NA	NA	NA	NA	100% of posts filled
Somalia	Yes, 2006–2015	Yes, 1995	Yes, 2001	653 976	0	653 976 (100%)	0	0	100% of posts filled
Sudan (northern)	Yes, 2006–2010	Yes, 2002	Yes, 2003	3.1 million	1.4 million (46%)	1.6 million (50%)	106 393 (3%)	0	100% of posts filled

Table 5. Status of political commitment in the different national tuberculosis programmes (*concluded*)

Programme	National strategic plan and dates	National interagency coordination	National partnership	Planned/ expected budget in 2008 (US$)	Government contribution	GFATM contribution	Other donors contribution	Financial gap	Staff at all levels
Sudan (southern)	No	Yes, 2005	Yes, 2007	6.3 million	0	4.2 million (67%)	522 000 (8%)	1.6 million (25%)	100% of posts filled
Syrian Arab Republic	Yes, 2006–2011	Yes, 1998	No	8.5 million	40 525 (0.5%)	2.3 million (27%)	10 000 (0.1%)	6.2 million (73%)	99% of posts filled
Tunisia	Yes, 2008–2015	No	No	2.1 million	1.2 million (58%)	0	0	890 000 (42%)	100% of posts filled
United Arab Emirates	Yes, 2006–2015	Yes, 2002	Yes, 2008	No separate budget for tuberculosis	NA	NA	NA	NA	100% of posts filled
Yemen	Yes, 2006–2010	Yes, 2006	Yes, 2006	2.9 million	1.7 million (58%)	1.1 million (39%)	75 250 (3%)	0	–

GFATM Global Fund to Fight AIDS, Tuberculosis and Malaria
NA not applicable
– information not available

Libyan Arab Jamahiriya, Oman, Qatar, Syrian Arab Republic and Yemen. Jordan, Libyan Arab Jamahiriya, Qatar and Yemen reported testing all tuberculosis suspects, while Egypt, Syrian Arab Republic and Oman tested more than 90% of suspects. The regional average positivity rate was 6.6%, with significant variations between countries: Egypt (6%), Jordan (5.1%), Libyan Arab Jamahiriya (32%), Oman (0.4%), Syrian Arab Republic (7%) and Yemen (13.6%).

Table 6 shows the status of suspect management in the countries with available data.

Review missions carried out during 2008–2009 reported incomplete testing of suspects in the countries visited (Egypt, Morocco, Pakistan and Sudan). For example, in Shobra tuberculosis monitoring unit in Cairo, 14.2% (18/127) of tuberculosis suspects had only one smear examination during the fourth quarter of 2008 and 55 of identified suspects (8.7%) were not tested. In Alexandria, of 3591 suspects registered, 448 (12.5%) had one sputum smear examination, or none at all, during the same quarter.

Table 7 shows an example of monthly statistics from Gulab Devi tertiary care hospital in Punjab province, Pakistan. During one month (June 2008) a total of 1145 suspects were examined at this hospital; of these, 282 were sputum smear-positive (positivity rate of 25%). Of the 282 sputum smear-positive cases, 147 (52%) were registered, 93 (33%) were admitted to the hospital due to the severity of their condition, and 15 (6.3%) of diagnosed cases did not collect their reports.

The health management information system outpatient department register is used in rural health centres in Pakistan and tuberculosis suspects are given the code "105". During June 2008, 3294 patients were registered in the outpatient department of Chak Number 104 North health centre. Of these, 9 (0.3%) were identified as tuberculosis suspects but only 7 were traced in the laboratory register, i.e. 2 (22%) were missed.

Table 6. Suspect management in countries in the Region, 2008

Country	Period	Suspects tested by sputum-spear examination (%)	Positivity rate among suspects (%)
Egypt	2008[a]	94	6
Jordan	Q2, 2008[b]	100	5
Iran, Islamic Republic of	Q2, 2008[b]	–	4
Libyan Arab Jamahiriya	Q2, 2008[b]	100	32
Oman	Q2, 2008[b]	93	0.4
Qatar	Q2, 2008[b]	100	0
Syrian Arab Republic	Q2, 2008[b]	95	7
Yemen	Q2, 2008[b]	100	14
Region	Q2, 2008[b]	95	7

[a][4]
[b][1]
Q2 second quarter
– information not available

Table 7. Monthly tuberculosis statistics from Gulab Devi tertiary care hospital in Punjab province, Pakistan, June 2008

	Tuberculosis suspects			Sputum smear-positive				
June 2008	Male	Female	Total	Registered	Admitted	Referred	Primary defaulter	Total
2	36	20	56	4	5	1	0	10
3	34	25	59	9	5	0	0	14
4	30	26	56	10	4	1	0	15
5	22	22	44	4	1	3	1	9
6	21	9	30	5	1	1	0	7
7	22	21	43	1	2	0	0	3
9	45	31	76	12	11	0	0	23
10	29	17	46	4	1	0	0	5
11	33	30	63	9	2	0	1	12
12	22	23	45	5	3	0	0	8
13	16	6	22	3	2	2	1	8
14	26	11	37	9	1	2	1	13
16	23	31	54	8	6	0	1	15
17	23	14	37	9	6	1	1	17
18	28	28	56	3	5	0	1	9
19	23	9	32	2	4	3	2	11
20	8	9	17	2	2	1	0	5
21	30	20	50	6	4	1	2	13
23	47	46	93	16	10	2	0	28
24	28	23	51	4	5	3	0	12
25	34	17	51	5	3	3	1	12
27	15	16	31	5	4	0	2	11
28	18	26	44	8	3	2	1	14
30	30	22	52	4	3	1	0	8
Total	643	502	1145	147	93	27	15	282

A suspect register had not yet been introduced in Sudan during the time of the mission in 2008. Outpatient-department registers were poorly maintained and improperly filled. All chest symptomatics were categorized as "chest infection" and their prevalence was very low at 2.5% (expected 30%). Registration was carried out by a secretary, without supervision from a medical officer. There was no information about investigations requested or final diagnosis. In one centre visited, 5 out of 9 (56%) sputum smear positive patients registered in the laboratory register were not registered for treatment and there was no information on whether they had been referred to other centres or followed up on the status of registration in the centres they were referred to.

Suspect management in other sectors (e.g. health insurance organization and university hospitals) is still a challenge for national tuberculosis programmes in the Region and a scale-up of that part of tuberculosis management within the public–private mix approach is much needed. For example, out of 80 chest symptomatic cases attending health insurance organization facilities in Al Mahalla governorate, Egypt, only 6 suspects were registered in one quarter. Tuberculosis suspect registration and testing is not yet done uniformly in all the primary health care centres. At the main governorate chest hospitals in Egypt, the clinics were not supported for tuberculosis suspect management, either by a separate suspect register or by a modified outpatient department register.

Recommendations

- Ensure testing of all suspects and registration of all positive cases for treatment through the nurses in charge of the suspect and laboratory registers.
- Establish suspect registers in the outpatient clinics of the chest centres and in the primary health care centres as well as in the outpatient and chest clinics of non-programme providers, such as universities, governorate chest hospitals and others.
- Strengthen follow-up of referred cases using a list to ensure registration of all cases in the centres they are referred to.

3.2.2 Laboratory network expansion, including external quality assurance

In all countries of the Region, sputum-smear microscopy was the basis of diagnosis of pulmonary tuberculosis and was provided free of charge in all the diagnostic centres.

A total of 18 countries reported a laboratory network coverage for direct smear microscopy within the recommended level of one laboratory per 50 000–250 000 population in all countries (as of August 2008). The four countries that had a lower coverage were: Egypt, Iraq, occupied Palestinian territory and Qatar. The direct smear microscopy laboratory network was under 100% external quality assurance in only six countries: Islamic Republic of Iran, Kuwait, Morocco, Oman, Qatar and Yemen. There was no external quality assurance system, or a low external quality assurance coverage of less than 50% of the laboratories, in 10 countries of the Region. These were Bahrain, Jordan, Lebanon, Pakistan, occupied Palestinian territory, Saudi Arabia, Somalia, Syrian Arab Republic, Tunisia and United Arab Emirates. Six countries reported laboratories with major errors in direct smear microscopy (high false positives and high false negatives): Afghanistan, Islamic Republic of Iran, Morocco, Pakistan, Somalia and Sudan (Table 8).

All countries had culture laboratories, except Djibouti and Somalia. A low culture laboratory coverage of one laboratory for more than 5 million population was reported in six countries: Afghanistan, Iraq, Pakistan, Sudan, Syrian Arab Republic and Yemen. The remaining countries had culture laboratory coverage of less than one laboratory for 5 million population. External quality assurance for culture laboratories was 100% in six countries: Egypt, Kuwait, Qatar, Saudi Arabia, Sudan and Syrian Arab Republic. The remaining countries either had no external

Table 8. Laboratory network and quality in countries in the Region (as of August 2008) *(continued)*

Country	Direct smear microscopy laboratory coverage	Culture laboratory coverage	Drug susceptibility testing laboratory coverage	External quality assurance coverage for direct smear microscopy (%)	External quality assurance coverage for culture (%)	External quality assurance coverage for drug susceptibility testing (%)	Laboratories with major error	Non-NTP laboratories
Afghanistan	500 (1 per 65 000 pop)	1 (1 per 32 million pop)	None	72	None	None	50/360 = 14%	463 out of 500
Bahrain	11 (1 per 68 300 pop)	2 (1 per 376 000 pop)	2 (1 per 376 000 pop)	9	50	50	0	10 out of 11
Djibouti	14 (1 per 59 000 pop)	None	None	93	NA	NA	0	0
Egypt	293 (1 per 258 000 pop)	18 (1 per 4.2 million pop)	1 (1 per 75.5 million pop)	74	100	100	0	77 out of 293
Iran, Islamic Republic of	314 (1 per 226 000 pop)	27 (≈ 1 per 2.6 million pop)	2 (1 per 35.5 million pop)	100	None	None	21/314 = 6.7%	(
Iraq	20 (≈ 1 per 1.5 million pop)	1 (1 per 29 million pop)	1 (1 per 29 million pop)	95	None	None	0	0
Jordan	150 (1 per 39 000 pop)	50 (1 per 118 000 pop)	1 (1 per 5.9 million pop)	8	2	100	0	31 out of 150
Kuwait	12 (1 per 230 417 pop)	1 (1 per 2.8 million pop)	1 (1 per 2.8 million pop)	100	100	100	0	1 out of 12
Lebanon	168 (≈ 1 per 24 000 pop)	4 (1 per 1 million pop)	1 (1 per 4 million pop)	4	None	None	0	160 out of 168
Libyan Arab Jamahiriya	24 (1 per 250 000 pop)	3 (1 per 2 million pop)	3 (1 per 2 million pop)	–	100	100	0	(
Morocco	158 (1 per 196 000 pop)	1 (1 per 2.2 million pop)	1 (1 per 15 million pop)	100	None	None	20/158 = 13%	11
Oman	205 (≈ 1 per 13 000 pop)	10 (1 per 260 000 pop)	1 (1 per 2.6 million pop)	100	100	100	0	7 out of 205
Pakistan	1131 (1 per 145 000 pop)	3 (1 per 55 million pop)	1 (1 per 164 million pop)	32	None	None	56%	175 out of 1131
Occupied Palestinian territory	5 (1 per 800 000 pop)	1 (1 per 4 million pop)	None	None	None	None	NA	3 out of 5
Qatar	1 (1 per 821 313 pop)	1 (1 per 821 313 pop)	1 (1 per 821 313 pop)	100	100	100	0	(
Saudi Arabia	320 (≈ 1 per 78 000 pop)	11 (1 per 2.2 million pop)	11 (1 per 2.2 million pop)	None	100	100	0	0
Somalia	47 (≈ 1 per 185 000 pop)	None	None	26	NA	NA	1/12 = 8%	0
Sudan	321 (1 per ≈ 120 000 pop)	1 (1 per ≈ 38.5 million pop)	1 (1 per ≈ 38.5 million pop)	58	100	100	48%	96

Table 8. Laboratory network and quality in countries in the Region (as of August 2008) (*concluded*)

Country	Direct smear microscopy laboratory coverage	Culture laboratory coverage	Drug susceptibility testing laboratory coverage	External quality assessment coverage for direct smear microscopy (%)	External quality assessment coverage for culture (%)	External quality assessment coverage for drug susceptibility testing (%)	Laboratories with major error	Non-NTP laboratories
Syrian Arab Republic	289 (1 per 69 000 pop)	1 (1 per 20 million pop)	1 (1 per 20 million pop)	4.8	100	100	0	224 out of 289
Tunisia	66 (1 per 152 000 pop)	7 (1 per 1.5 million pop)	5 (1 per 2 million pop)	None	None	None	NA	27 out of 66
United Arab Emirates	24 (1 per 167 000 pop)	3 (1 per 1.3 million pop)	–	None	None	None	NA	4 out of 24
Yemen	245 (1 per 90 000 pop)	3 (1 per 7 million pop)	1 (1 per 22 million pop)	100	33	100	16%	6 out of 245

NA not applicable
pop population
– information not available

quality assurance for culture or reported low external quality assessment coverage (Table 8).

All countries had drug susceptibility testing laboratories except four: Afghanistan, Djibouti, occupied Palestinian territory and Somalia. External quality assurance for drug susceptibility testing laboratories was 100% in six countries: Islamic Republic of Iran, Kuwait, Morocco, Oman, Qatar and Yemen. External quality assurance was partially implemented in Bahrain, Egypt, Pakistan and Syrian Arab Republic. The remaining countries had no external quality assessment for drug susceptibility testing laboratories (Table 8).

The contribution of the non-national tuberculosis programme laboratories to the laboratory network in the different countries is shown in Table 8. Non-national tuberculosis programme laboratories constituted the majority of the laboratory network in only five countries: Afghanistan, Bahrain, Lebanon, occupied Palestinian territory and Syrian Arab Republic.

All countries had national reference laboratories, except five: Pakistan, occupied Palestinian territory, Saudi Arabia, Somalia and United Arab Emirates. Pakistan and Somalia plan to establish a national reference laboratory during 2008–2009 [2]. National reference laboratories were linked to supranational reference laboratories in the Islamic Republic of Iran, Jordan, Lebanon, Morocco, Oman, Sudan, Syrian Arab Republic and Tunisia. The following countries are in the process of linking their national reference laboratory to the supranational reference laboratories: Djibouti, Iraq, Libyan Arab Jamahiriya and Saudi Arabia.

All countries adequately managed their laboratory reagents and supplies and did not face any stock-out at the central and peripheral levels, except three: Iraq, Pakistan and Tunisia.

Staff training, whether new/replacement or refresher training courses for laboratory staff, is planned and conducted within the overall human resources development plans of the national tuberculosis programmes. Training is mainly focused on direct smear microscopy for most of the laboratory staff in addition to culture and

drug susceptibility testing for the laboratory staff working in the relevant laboratories. Several countries conducted training on laboratory management, external quality assurance, culture and drug susceptibility testing, including infection control. These countries were Egypt (supported by the supranational reference laboratory, which is also conducting national training activities in Egypt), Iraq, Libyan Arab Jamahiriya, Somalia, Sudan, Syrian Arab Republic and Yemen.

Supervision is carried out within the overall supervisory activities of the programme. External quality assurance is also integrated in these supervisory visits. The supervisors use checklists and provide feedback reports. The frequency of visits varied among the different Programmes.

Challenges and recommendations

The review missions conducted during 2008 showed the several challenges in the countries visited.

- In most national tuberculosis programmes there were weak surveillance systems to monitor laboratory performance, including external quality assurance, due to the lack of data entry and analysis of laboratory data. Reports were found in hard copy but it was difficult to analyse results by time or governorates. The missions recommended developing a system for regular collection and analysis of laboratory data to monitor laboratory indicators and perform trend analysis. The missions also recommended defining quality indicators for monitoring of microscopy services and proposed corrective actions in case of identified problems.
- There was weak follow-up of the suspects. In some visited laboratories, up to 30% of suspects were examined by single smear only and corrective actions were not taken during supervisory visits. The missions recommended taking full contact details of all the suspects, including their mobile phone numbers or those of close relatives, in order to follow-up on defaulters. It was also recommended that a list of all referred cases to other centres was developed to ensure their registration for treatment in these centres.
- Procurement and preparation of Ziehl-Neelsen staining reagents was decentralized, with different quality of reagents at different places, and quality control for stain preparation was weak in some laboratories (e.g. no log book, no records of quality checks). The missions recommended ensuring the procurement of standardized laboratory equipment, reagents and supplies.
- There was a lack of equipment calibration in some laboratories. Laboratory equipment requires proper detailed records, including routine service dates, reasons for any breakdowns that occur and difficulty experienced in restoring service. Such information should be clearly displayed on the equipment. National reference laboratories were recommended in order to ensure proper calibration of laboratory equipment, with proper detailed records kept on their performance.
- Standard operating procedures (posters and manuals) were not available in some peripheral laboratories. These procedures also needed to be reviewed and updated in most of the visited laboratories. Equipment instruction manuals from the manufacturer should be available nearby at all times. Staff, particularly senior staff, should be familiar with the content of manuals rather than being reliant on service engineers.
- The period of slide collection for blind rechecking was variable, extending between two visits, and quarters were not clearly demarcated in some national tuberculosis programmes.
- There was weak infrastructure in some culture laboratories, e.g. culture by centrifugation was performed without proper biosafety, work flow, space and equipment.

- Measurement of air flow in class II cabinets needs to be monitored on a daily/weekly basis and recorded. In some countries, there was no device to carry out this necessary safety function.
- Some infection control hazards were observed in some countries, indicating the need to give more emphasis to infection control measures in the laboratory networks. National reference laboratories were recommended to develop a common infection control policy between the national laboratory infection control authority and the national tuberculosis programme.
- There was weak quality control of culture performed at intermediate level (no log book of media used, culture growth not graded, quality indicators, e.g. contamination and recovery rates, not monitored). Contamination rates reached 20% and there was a recovery rate of only 50% in one laboratory in the fourth quarter of 2008. The missions recommended defining quality indicators for monitoring of culture services and collecting reports on these indicators on a quarterly basis from all intermediate laboratories to provide feedback. They also recommended training intermediate laboratory staff on laboratory management and quality control of culture. National reference laboratories were recommended to develop and implement plans for appropriate infrastructure (BSL-II) of tuberculosis culture laboratories at the intermediate level.

Long turn-around time for drug susceptibility testing at national reference laboratories (up to 3–4 months) was observed in two country missions.

With the expansion of public–private mix, more non-programme laboratories became engaged in the diagnosis and monitoring of the treatment for tuberculosis cases. However, the country missions observed that the quality of laboratory services in the other sectors was not always optimum. National reference laboratories were recommended to provide technical support, including training and supervision, to other non-programme laboratories.

3.3 Standardized treatment with supervision and patient support

All countries used standardized regimens in line with the internationally recommended guidelines (Tables 9–12). All national tuberculosis programmes used the 6-month regimens for Category I tuberculosis, except Afghanistan, Pakistan, northern Sudan and Yemen, which used the 8-month regimen. Based on the 2008 mission recommendations, the programme in northern Sudan is planning to shift to the 6-month regimen in a phased manner, during which the use of streptomycin instead of ethambutol during the intensive phase will be withdrawn. HIV-coinfected patients were treated with the rifampicin-based 6-month regimens in all programmes, including in Pakistan and northern Sudan.

Fixed-dose combinations were introduced in all countries, except Bahrain, Lebanon, Libyan Arab Jamahiriya, Morocco, Somalia and Tunisia.

Treatment outcomes of sputum-spear positive tuberculosis patients are shown in Table 9. The Regional average treatment success was 86%. Eleven national tuberculosis programmes achieved a treatment success rate of at least 85%. These were: Bahrain, Egypt, Lebanon, Morocco, Oman, Pakistan, occupied Palestinian territory, Somalia, southern Sudan, Syrian Arab Republic and Tunisia. The regional average death rate was 3%. A death rate of more than 5% was reported from Bahrain, Islamic Republic of Iran, Jordan, Oman, occupied Palestinian territory and Saudi Arabia. The regional average failure rate was 1% and a rate exceeding 3% was reported from Jordan. The regional average default rate was 6%. Twelve programmes reported a default rate of more than 5: Djibouti, Iraq, Jordan, Libyan Arab Jamahiriya, Morocco, Pakistan, Saudi Arabia, northern Sudan, southern Sudan, Syrian Arab Republic and Yemen. There was no significant

Table 9. Treatment regimens[a] used for Category I in the different national tuberculosis programmes and treatment outcome of smear-positive tuberculosis (2006 cohort)

Programme	Category I regimen	Treatment success rate (%)	Died (%)	Failed (%)	Default (%)	Transferred out
Bahrain	2HRZE / 4HR	86	14	0	0	0
Lebanon		90	4	0	5	1
Libyan Arab Jamahiriya		77	1	0	20	2
Morocco		87	2	1	9	1
Somalia		89	3	1	4	3
Tunisia		91	3	1	3	2
Djibouti	2(HRZE) / 4(HR)	78	1	1	16	4
Egypt		87	3	3	3	3
Iraq		84	2	3	9	2
Oman		86	12	0	0	2
Iran, Islamic Republic of	2HRZE / 4(HR)	83	7	3	3	0
Qatar		69	1	0	0	3
Saudi Arabia		69	6	1	7	27
Kuwait	2(HRZE) / 4HR	78	0	0	5	16
Jordan	2(HR)ZE / 4(HR)	71	8	4	17	0
Sudan (southern)		86	5	2	6	2
Pakistan	2HRZE / 6HE	88	3	1	6	2
Sudan (northern)		81	2	1	8	2
Yemen	2HRZS / 6HE	83	3	2	7	4
Occupied Palestinian territory	2(HR)ZE / 4(HR)3	94	6	0	0	0
Syrian Arab Republic	2(HRZ)E / 4(HR)	86	3	2	7	2
Afghanistan	2(HR)ZE / 6(HE)	84	2	1	2	6
Region		86	3	1	6	3

[a]Between parentheses, fixed-dose combinations, present in blisters or loose tablets
For abbreviations, refer to Table 10 footnote

association between the treatment regimen and formulations (fixed-dose combinations or single formulations) and the treatment outcome.

All countries reported that direct observation of treatment (DOT) was in place at least during the intensive phase for all patients in all centres, except Jordan, Saudi Arabia, Sudan and Yemen, where DOT was not uniformly done for all patients. Health workers were the treatment supporters, mainly in the primary health care centres, in Djibouti, Egypt, Kuwait and Morocco. Health workers along with family members were the treatment supporters in eight countries: Iraq, Lebanon, occupied Palestinian territory, Saudi Arabia, Sudan, Somalia, Tunisia and United Arab Emirates. Bahrain reported that family members were the treatment supporters. In the remaining countries, health workers were the main treatment supporters, in addition to community members and family members. Table 13 shows the status of DOT and treatment support in the different countries.

Financial and nutritional support was given to patients in some countries, e.g. Egypt, Iraq, Syrian Arab Republic, Yemen and GCC countries.

Defaulter tracing was by telephone or home visits by health workers, social workers or nongovernmental organizations.

Challenges and recommendations

- DOT is still not regularly carried out, particularly when treatment is provided

Table 10. Treatment regimens[a] used for Category II in different national tuberculosis programmes

Programme	Category II regimen
Egypt, Islamic Republic of Iran, Oman, occupied Palestinian territory, Somalia, Yemen	2HRZES / 1HRZE / 5HRE
Jordan, southern Sudan	2(HR)ZES / 1(HR)ZE / 5HRE
Afghanistan, Libyan Arab Jamahiriya	2(HRZE)S / 1HRZE / 5(HRE)
Djibouti, Iraq	2(HRZE)S / 1(HRZE) / 5(HRE)
Kuwait	2HRZES / 1(HRZE) / 5(HRE)
Morocco	2(HR)ZES / 1(HR)ZE / 5(HRE)
Pakistan	2(HRZE)S / 1HRZE / 5(HRE)
Syrian Arab Republic	2(HRZE)S / 1(HRZE) / 5HRE

[a]Between parentheses, fixed-dose combinations, present in blisters or loose tablets

Recommended formulations, first-line drugs [5]:

Ethambutol (E): tablet 100–400 mg (hydrochloride)

Isoniazid (H): tablet 100–300 mg; tablet (scored) 50 mg

Isoniazid + ethambutol: tablet 150 mg + 400 mg

Pyrazinamide (Z): tablet 400 mg; tablet (dispersible) 150 mg; tablet (scored) 150 mg

Rifampicin (R): capsule or tablet 150 mg; 300 mg

Rifampicin + isoniazid: tablet 60 mg + 30 mg; 150 mg + 75 mg; 300 mg + 150 mg; 60 mg + 60 mg (for intermittent use three times weekly); 150 mg + 150 mg (for intermittent use three times weekly)

Rifampicin + isoniazid + ethambutol: tablet 150 mg + 75 mg + 275 mg

Rifampicin + isoniazid + pyrazinamide: tablet 60 mg + 30 mg + 150 mg; 150 mg + 75 mg + 400 mg; 150 mg + 150 mg+ 500 mg (for intermittent use three times weekly)

Rifampicin + isoniazid + pyrazinamide + ethambutol: tablet 150 mg + 75 mg + 400 mg + 275 mg

Streptomycin (S): powder for injection 1 g (as sulphate) in vial

Table 11. Treatment regimens[a] used for Category III in different national tuberculosis programmes

Programme	Category III regimen
Afghanistan	2HRZ / 6(HE)
Iraq, Jordan	2(HR)Z / 4(HR)
Kuwait	2HRZ / 4(HR)
Lebanon	2HRZE / 4HR
Morocco, Somalia, Syrian Arab Republic	2HRZ / 4HR
Sudan (northern)	2HRZE / 6HE

[a]Between parentheses, fixed-dose combinations, present in blisters or loose tablets
For abbreviations, refer to Table 10 footnote

Table 12. Treatment regimens used for children in different national tuberculosis programmes

Programme	Children regimen
Djibouti	2(HRZ)E / 4(HR)
Egypt, Islamic Republic of Iran, Lebanon, Tunisia	2HRZE / 4HR
Jordan	2(HRZ) / 4(HR)
Kuwait	2(HRZ)E / 4HR
Oman	2(HRZ)E / 4HR
Sudan (northern)	2HRZE / 6HE
Sudan (southern)	2HRZE / 4(HR)

For abbreviations, refer to Table 10 footnote

Table 13. Direct observation of treatment (DOT) and treatment support

DOT implementation status	Treatment supporters: health care workers mainly in addition to community members and family members for some cases	Treatment supporters: health care workers only	Treatment supporters: health care workers in addition to family members	Treatment supporters: family members only
DOT at least during the intensive phase for the majority of patients (documented and evaluated in review missions)	–	Egypt	–	–
DOT at least during the intensive phase as guidelines but not for all patients	Jordan Yemen	–	Saudi Arabia Sudan	–
DOT at least during the intensive phase for all patients (reported but not evaluated)	Afghanistan Iran, Islamic Republic of Libyan Arab Jamahiriya Oman Pakistan Qatar Sudan (southern) Syrian Arab Republic	Djibouti Kuwait Morocco	Iraq Lebanon Occupied Palestinian territory Somalia Tunisia United Arab Emirates	Bahrain

– information not available

only at chest facilities without involving primary health care centres. The catchment area for one chest facility is huge, and it is impossible for all patients to come to chest facilities on a daily basis. It is recommended that more emphasis is put on DOT, utilizing the primary health care centre network and nongovernmental organizations when needed during the full period of treatment. Community participation in tuberculosis control can be supportive in this regard.

- In most countries in the Region, medicines are given on a weekly basis during the continuation phase without information about adherence to DOT. It is recommended to report on adherence to DOT.
- Hospitalization is still used for DOT in some countries, e.g. Egypt, GCC countries, Libyan Arab Jamahiriya and in some regions in Pakistan.
- Non-adherence to DOT is found in some sectors where drugs are collected monthly (e.g. health insurance organization in Egypt). A model of collaboration is currently being evaluated in Egypt where the health insurance organization patients collect their medicines from the nearest primary health care centre. Similar models of collaboration could be tested for other sectors and in other countries. Increasing supervision by national tuberculosis programmes on the other providers is also recommended, to ensure their adherence to guidelines.

3.4 Medicine supply and management

3.4.1 Selection of medicines

The medicine authority control units in the Ministries of Health are responsible for the selection of antituberculosis medicines in all countries in the Region. The governments of all countries are committed to provide antituberculosis medicines free of charge to tuberculosis patients.

Selection of antituberculosis medicines in countries is based on WHO and national essential medicines lists and treatment protocols and national tuberculosis programme guidelines. Antituberculosis medicines are included in the essential medicines list; however, registration of Global Drug Facility (GDF) medicines is not yet done in all countries in the Region.

There is a quality-control department responsible for monitoring and evaluation of tuberculosis medicines in the countries in the Region. Moreover, in some counties such as Egypt and Syrian Arab Republic, monitoring and evaluation is done by national tuberculosis programme staff (governorate coordinators for tuberculosis) during their regular supervision visits to all facilities. The quality control department takes this responsibility in most of the other countries in the Region.

In some countries, the GDF annual missions noted the presence of some antituberculosis medicines in the national essential medicines list in concentrations different from those in the WHO essential list.

3.4.2 Medicine procurement

The national medicine authority in each country estimates the quantity of medicines needed for procurement. The Ministry of Health is committed to allocating resources for the procurement of antituberculosis first-line and second-line drugs in most of the countries in the Region. The following countries were supported by GDF grants for first-line drugs in 2007–2008: Afghanistan, Djibouti, Iraq, Pakistan, Sudan and Syrian Arab Republic. The national tuberculosis programmes were partially supported by the GDF for first- and second-line drugs in Egypt, Iraq, Jordan, Somalia, northern and southern Sudan and Syrian Arab Republic. Some programmes were supported partially by some external donors; such as the United States Agency for International Development (USAID) and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). All programmes reported using paediatric formulations, except Bahrain, Iraq, Kuwait, occupied Palestinian

Table 14. Antituberculosis medicine procurement and management in national tuberculosis programmes, 2007–2008 *(continued)*

Programme	Antituberculosis drugs procurement, distribution and stock management with other essential drugs	% of antituberculosis drugs to total budget, and source of funding (2008)	Stock-out during 2007–2008	Paediatric formulations
Afghanistan	No	1.9%, GDF (grant)	Yes, first-line drugs at central level	No
Bahrain	Yes	Integrated in Ministry of Health budget	No	Yes
Djibouti	No	First-line: 38%, GDF (grant) Second-line: 62%, GFATM (budget excluding staff, running cost, etc.)	Yes, second-line drugs at central level	Yes
Egypt	Yes	First-line: 8%, government Second-line: 2%, GFATM (GDF/IDA direct procurement)	No	Yes
Iran, Islamic Republic of	Yes	–	No	No
Iraq	No	First-line: 7%, GFATM (GDF direct procurement) and GDF grant Second-line: 9%, government	Yes, second-line drugs at central level	No
Jordan	No	First-line: 6%, government Second-line: 3%, GFATM (GDF/IDA direct procurement)	No	Yes
Kuwait	Yes	3.3% for first-line and second-line drugs, government	No	Yes
Lebanon	No	15% for first- and second-line drugs, government and GDF direct procurement	No	Yes
Libyan Arab Jamahiriya	No	Integrated in Ministry of Health budget	No	Yes
Morocco	Yes	20% for first- and second-line drugs, government	No	Yes
Oman	Yes	Integrated in Ministry of Health budget	No	Yes
Pakistan	Yes	First-line: 19%, government, GDF emergency grant and GTZ Second-line: 6.8%, government	No	Yes
Occupied Palestinian territory	Yes	11%, other donors	Yes, first-line and second-line drugs at central and peripheral levels	No
Qatar	–	Integrated in Ministry of Health budget	No	–
Saudi Arabia	Yes	Integrated in Ministry of Health budget	No	No
Somalia	No	GFATM (GDF direct procurement)	No	Yes
Sudan (northern)	Yes	First-line: 16%, GFATM (GDF direct procurement) Second-line: 13%, government	No	No

Table 14. Antituberculosis medicine procurement and management in national tuberculosis programmes, 2007–2008 (*concluded*)

Programme	Antituberculosis drugs procurement, distribution and stock management with other essential drugs	% of antituberculosis drugs to total budget, and source of funding (2008)	Stock-out during 2007–2008	Paediatric formulations
Sudan (southern)	No	First-line: 3%, GFATM (GDF direct procurement)	No	No
Syrian Arab Republic	Yes	First-line: 5%, government, GDF grant and GFATM (GDF direct procurement) Second-line: 1.8%, GFATM	No	Yes
Tunisia	Yes	First- and second-line drugs: 48.7%, government (partially GDF direct procurement)	Yes, first- and second-line drugs at central and peripheral levels	No
United Arab Emirates	–	Integrated in Ministry of Health budget	No	–
Yemen	Yes	First-line: 10%, government and GDF grant	No	Yes

GDF Global Drug Facility; GFATM The Global Fund to Fight AIDS, Tuberculosis and Malaria
GTZ Deutsche Gesellschaft für Technische Zusammenarbeit
IDA IDA Foundation
– information not available

territory, Qatar, Saudi Arabia, northern Sudan, Syrian Arab Republic, Tunisia and United Arab Emirates (Table 14).

In most countries in the Region, procurement of antituberculosis medicines is centralized; however, in some countries (e.g. Egypt and Sudan) both procedures (centralized and decentralized) are used for procurement of antituberculosis medicines at the governorate/provincial levels.

At the beginning of each fiscal year, ministries of health call for an open general tender for all interested companies with proven qualifications to apply. Each company should submit a file containing all the documents of prequalification and financial issues. The list of medicines within this tender and all the technical specifications are set by a scientific committee. After the settlement of the tender, each governorate procures its needed medicines. Antituberculosis medicines for every governorate are included with other drugs in the same procurement list.

In most countries in the Region, each facility within the governorate first calculates its needs, based on annual consumption. It then sends its list of needs to the governorate level, which in turn adds the needs of all facilities plus a buffer stock and then carries out the procurement from a list of local manufacturers. This list is according to an open tender set by the Ministry of Health and includes a list of local and/or international companies according to each country's situation. After ordering the requirements from the specified company, it delivers the order by its own vehicles to the governorate stores where they are received by the pharmacist in charge. The pharmacist maintains special manual records for recording the invoice in detail (e.g. the dates, quantities, dosage form, source or the company name).

As stated above, GDF played an important role in supporting more than 13 countries in the Region through grants and/or direct procurement of adult antituberculosis medicines. Moreover, the emergency grant support service of GDF has been taken up in some countries, e.g. Pakistan and Sudan.

By 2007, GDF began paediatric grant support of antituberculosis formulations. The following national tuberculosis programmes in the Region received GDF grants: Afghanistan, Djibouti, Egypt, Iraq, Jordan, Lebanon, Oman, Pakistan, Somalia, southern Sudan and Yemen. Direct procurement of drugs took place in the following Programmes: Afghanistan, Iraq, Lebanon, Oman, Pakistan, Somalia, northern Sudan, southern Sudan, Syrian Arab Republic and Yemen. Direct procurement was covered either by governmental funds or by GFATM support. All GFATM-supported countries have planned to cover the cost of first- and/or second-line medicines from the Global Fund. The countries that applied to the new Round 9 have also included the cost of medicines in their applications.

Procurement of second-line antituberculosis medicine was through the GDF/IDA Foundation. The following countries received second-line antituberculosis medicines: Egypt, Jordan, Lebanon, Syrian Arab Republic and Tunisia. Some countries also produce second-line drugs, e.g. Egypt and Pakistan.

First-line and second-line antituberculosis medicines were available over the counter in private facilities and pharmacies, except in most GCC countries, Jordan, Lebanon and Syrian Arab Republic. Nevertheless, these medicines were under the supervision of the medicine authority control department in most of the countries.

Some of the antituberculosis medicines available in the private pharmacies were not in the correct concentration recommended by WHO (i.e. ethambutol 500 mg and pyrazinamide 500 mg instead of 400 mg in Egypt and rifampicin–isoniazid–pyrazinamide–ethambutol in Pakistan).

In the private pharmacies visited during review and GDF regular missions, it was noted that the available first-line antituberculosis medicines in the pharmacies were used as antibiotics, not as tuberculosis medicines. In Afghanistan and Pakistan the combined therapy was available in the local market and the available second-line antituberculosis drugs in the pharmacies were also used as broad-spectrum antibiotics.

3.4.3 Storage and distribution of medicines

All countries had a central medical store in the capital that was used to store the required tuberculosis medicines in addition to buffer stock (safety stock) for when any level was out of stock. In some countries, the central medical store was used for emergencies only and/or for prisons and refugees (e.g. Egypt). The national tuberculosis programme is responsible for management of central warehouse stocks, but there is an assistant who is in charge of dispensing according to national tuberculosis programme instructions. A checklist is used to evaluate storage conditions during supervisory visits and review missions (Annex 1).

Full responsibility for management and distribution of antituberculosis medicines is taken by the national tuberculosis programme. The distribution cycle of antituberculosis medicines is the following: port clearance > receipt and inspection > inventory control at central warehouse > storage > requisition by health facilities > dispensing to the patient > consumption and reporting.

Requests for tuberculosis medicines are submitted from the governorates to the central unit through the Programme logistic officers. Distribution from governorate to either district or peripheral level is done on a quarterly basis.

3.4.4 Use of antituberculosis medicines

Tuberculosis treatment is free in all countries in the Region. During interviews with patients and health workers in the review missions, confirmation was given that treatment was provided free of charge.

First-line tuberculosis drugs were included in the essential medicines list in most countries in the Region; however, some second-line drugs are not yet included in the essential medicines list in some countries, e.g. Egypt.

Samples were taken for quality control tests after medicines arrived in the medical store; however, certificates of analysis of these medicines were not always available during the field visit to the central medical store in the review missions to countries.

3.4.5 Recommendations

- The Ministry of Health should review and update the national essential medicines list so that all antituberculosis medicines (first-line and second-line) are in accordance with international standards.
- The Ministry of Health should facilitate the procurement of fixed-dose combinations. A procurement and distribution plan for four fixed-dose combinations is needed, taking into consideration the available stock of single formulations.
- There is a need to set up a regular drug distribution/supply system in all districts with a regular schedule of delivery. In the event of emergency, special arrangements may be made.
- There is a need for a regular internal audit system to monitor the national tuberculosis programme and health facilities. This system would improve record-keeping of deliveries and receipt of antituberculosis medicines in and out of facilities.
- National tuberculosis programmes, in collaboration with national medicine authorities and the Regional Office, should establish a policy to limit over-the-counter use of antituberculosis medicines in private pharmacies, e.g. banning sale of antituberculosis drugs in the private market or at least issuing a decree to sell antituberculosis drugs by prescription only.

3.5 Monitoring and evaluation

3.5.1 Recording and reporting

National tuberculosis programmes adapted, printed and distributed the revised recording and reporting forms, trained staff in all governorates and used the forms routinely used in six countries: Djibouti, Egypt, Islamic Republic of Iran, Iraq, Libyan Arab Jamahiriya and Morocco. The remaining countries are in different stages of introducing the forms but all plan to introduce them by the end of 2009 (Table 15).

All national tuberculosis programmes, except Morocco, submitted quarterly reports to the Regional Office through the web-based surveillance system, DQ-online [1], which has been upgraded according to the revised recording and reporting system. Using this web-based system, the Regional Office is able to monitor and evaluate the performance of programmes using a set of indicators. Table 16 shows performance of different countries using monitoring and evaluation indicators.

National tuberculosis programmes, with the help of WHO, introduced a case-based computerized system, or E-nominal recording and reporting system at the level of the tuberculosis monitoring units in three countries: Egypt, Jordan and Syrian Arab Republic. The E-nominal recording and reporting system has also been piloted in Libyan Arab Jamahiriya, Somalia and Yemen. Other countries have been trained in the system and plan to implement it, e.g. Iraq and Sudan. The system consists of four e-registers: suspects, contacts, laboratory and tuberculosis registers. Egypt's national tuberculosis programme conducted a survey in 13 governorates on the implementation of the system. The survey showed that data entry was at a satisfactory level in most governorates, with data quality verification and feedback available. The main challenges were data transportation, and the capacity of governorate coordinators for

Table 15. Status of surveillance system in 12 national tuberculosis programmes *(continued)*

Programme	Report completeness (case finding and treatment outcome)	Implementation of revised recording and reporting	Types of forms used	Electronic system in place	If, yes, type and components	Communication means	Revised recording and reporting in non-national tuberculosis programme sectors	Supervisory visits	Human resources for monitoring and evaluation	Integration of surveillance in the health management information system
Afghanistan	–	Adaptation, printing, distribution and training, but not yet routinely utilized	All except the request for sputum-spear examination, quarterly order forms for tuberculosis drugs and laboratory supplies	No – only e-versions of aggregated reports	NA	By hand	–	Less than quarterly – using a checklist with feedback reports with corrective measures	Enough at chest unit only	No
Bahrain	–	None	NA	Yes	Tuberculosis register and laboratory register – e-reports generated	e-mail, by hand, book register and telephone	No	None	Enough trained staff at all levels	No
Djibouti	100% for each type	Routine utilization	All except quarterly report on suspect and contact management, quarterly order form of tuberculosis drugs and laboratory supplies (culture and drug susceptibility testing)	Yes	Tuberculosis register – e-reports generated	By courier, by hand, others	No	Monthly and quarterly for tuberculosis monitoring units – using a checklist, feedback reports with corrective measures. Enough means of transportation (vehicles)	Enough trained staff at all levels	Number of notified tuberculosis cases (all forms and sputum smear positive) communicated to health management information system
Egypt	100% for each type	Routine utilization	All except tuberculosis identity card and quarterly order form for tuberculosis drugs and laboratory supplies	Yes	ENRS, four registers	e-mail, flash memory	Partially in public non-national tuberculosis programme (university and. health insurance organization) – hard versions only	2 per year from chest unit to governorates, and quarterly from governorate to districts– using a checklist, feedback reports with corrective measures. Enough means of transportation (vehicles)	Enough trained staff at all levels	No

Table 15. Status of surveillance system in 12 national tuberculosis programmes *(continued)*

Programme	Report completeness (case finding and treatment outcome)	Implementation of revised recording and reporting	Types of forms used	Electronic system in place	If, yes, type and components	Communication means	Revised recording and reporting in non-national tuberculosis programme sectors	Supervisory visits	Human resources for monitoring and evaluation	Integration of surveillance in the health management information system
Iran, Islamic Republic of	100% for each type	Routine utilization	All except suspect register, quarterly report on suspect management, yearly report on programmatic management, quarterly order form for drugs and laboratory supplies	Yes	Tuberculosis register by district on Microsoft Access software, with data quality verification	e-mail, flash memory	No	2 per year from governorate to tuberculosis monitoring unit – using a checklist, feedback reports with corrective measures	Insufficient	–
Iraq	100% for each type	Routine utilization	All except the request for sputum-spear examination, quarterly order form for drugs and laboratory and tuberculosis referral/transfer form	No – only e-versions of aggregated reports	NA	e-mail, flash memory, by hand	No	Quarterly from governorate to districts – using a checklist, feedback reports with corrective measures. Enough means of transportation (vehicles)	Enough at chest unit but insufficient at peripheral levels	No
Jordan	100% for each type	–	–	Yes	ENRS	e-mail	No	–	–	–
Kuwait	100% for each type	Adaptation, printing, distribution and training, but not yet routinely utilized	All	No – only e-versions of aggregated reports	NA	e-mail (digital subscriber line), flash memory, courier, by hand, others	No	–	–	–
Lebanon	100% for each type	Planned for end of 2009	NA	Yes	Access	–	No	–	–	–
Libyan Arab Jamahiriya	100% for each type	–	All	Pilot phase	e-versions of aggregated reports – pilot phase of ENRS in Tripoli	e-mail (digital subscriber line), flash memory, courier, by hand	No	Quarterly from governorate to districts – using a checklist, feedback reports with corrective measures. Enough means of transportation	Enough but inadequate training	Yes, communicated to health management information system

Table 15. Status of surveillance system in 12 national tuberculosis programmes *(continued)*

Programme	Report completeness (case finding and treatment outcome)	Implementation of revised recording and reporting	Types of forms used	Electronic system in place	If, yes, type and components	Communication means	Revised recording and reporting in non-national tuberculosis programme sectors	Supervisory visits	Human resources for monitoring and evaluation	Integration of surveillance in the health management information system
Morocco	100% for each type	Routine utilization	All except the quarterly reports on sputum conversion, suspects and contact management, and quarterly order forms for drugs and laboratory supplies	No	NA	By courier and by hand	No	–	Insufficient staff	Yes, communicated to health management information system
Oman	100% for each type	–	–	Yes	Epi Info™	–	No	–	–	–
Pakistan	–	–	–	No	e-versions of aggregated reports	–	No	Less than quarterly – using a checklist, feedback reports with corrective measures	Enough trained human resources	–
Occupied Palestinian territory	100% for each type	–	–	Yes	Access with GIS, in Gaza Strip only	–	–	–	–	–
Qatar	100% for each type	–	–	Yes	–	–	–	–	–	–
Saudi Arabia	–	–	–	–	–	–	–	–	–	–
Somalia	100% for each type	Adaptation	All	Pilot phase		–	–	–	–	–

Table 15. Status of surveillance system in 12 national tuberculosis programmes *(continued)*

Programme	Report completeness (case finding and treatment outcome)	Implementation of revised recording and reporting	Types of forms used	Electronic system in place	If, yes, type and components	Communication means	Revised recording and reporting in non-national tuberculosis programme sectors	Supervisory visits	Human resources for monitoring and evaluation	Integration of surveillance in the health management information system
Sudan (northern)	87% for case finding, 83% for treatment outcome	Adaptation, printing, training	All	No	Aggregated data from tuberculosis monitoring unit level – e-reports generated	Fax, courier, by hand, others	No	Less than 1 visit per year per governorate from chest unit and quarterly from governorates to tuberculosis monitoring unit – using a checklist, feedback reports with corrective measures. More vehicles are needed for transportation	Enough trained staff at all levels	Key indicators communicated to.health management information system: case detection rate , case notification, treatment outcome and mortality rate
Sudan (southern)	100% for each type	Adaptation and printing	NA	No	NA	By hand, and high frequency radio in some states	No	At central level – all tuberculosis monitoring units are run by nongovernmental organizations	Insufficient at all levels	No health management information system
Syrian Arab Republic	70% for each type	Adaptation, printing and training. Distribution and routine utilization will be completed in 2009	All	Yes	ENRS, four registers with data quality verification – e-reports generated	Flash memory, courier, by hand and ordinary mail	No	Quarterly visits from central to provincial and from provincial to districts – enough means of transportation at the central level but not enough at the provincial and districts levels – feedback reports with corrective measures	Enough trained staff at all levels	Tuberculosis indicators communicated to health management information system (number notified and treatment outcome)
Tunisia	100% for each type	Not yet	NA	No	–	–	No	–	–	–

Table 15. Status of surveillance system in 12 national tuberculosis programmes (*concluded*)

Programme	Report completeness (case finding and treatment outcome)	Implementation of revised recording and reporting	Types of forms used	Electronic system in place	If, yes, type and components	Communication means	Revised recording and reporting in non-national tuberculosis programme sectors	Supervisory visits	Human resources for monitoring and evaluation	Integration of surveillance in the health management information system
United Arab Emirates	100% for each type	Not yet	NA	–	–	–	–	–	–	–
Yemen	96% for case finding, 78% for treatment outcome reports	Adaptation	All except yearly programmatic management of tuberculosis	No	Only e-versions of aggregated reports – pilot phase of ENRS	By flash memory for ENRS, by hand, faxes	No	2 per year from chest unit to governorates, and quarterly from governorate to districts – using a checklist, feedback reports with corrective measures. Enough means of transportation (vehicles)	Enough trained human resources	Key indicators communicated to health management information system: case detection rate, treatment success rate

ENRS E-nominal Recording and Reporting System; NA not applicable; – information not available

tuberculosis and district coordinators for data analysis, presentation and interpretation.

Other computerized case-based systems were used in six countries: Bahrain (Epi Info™), Djibouti (Epilat), Islamic Republic of Iran (Microsoft Access-based), Oman (Epi Info™), occupied Palestinian territory (Microsoft Access with geographical information system in Gaza Strip) and Qatar (unknown). Monthly data were collected and quarterly reports were consolidated at governorate level. There was a process of data verification at governorate level before consolidation of data from the different tuberculosis monitoring units and sending reports to the central unit.

Electronic versions of aggregated data were developed in four countries: Afghanistan, Iraq, Kuwait and Pakistan.

3.5.2 Supervision

Regular supervisory visits with feedback reports were made by central units to governorate tuberculosis centres and from the governorate coordinators for tuberculosis to the tuberculosis monitoring units. However, the frequency of the visits varied from one programme to another. Also, all programmes had a supervision checklist but its quality and its ability to detect errors varied among programmes. Feedback reports with corrective measures were not always found during the review missions to countries. Copies of supervision checklists were collected from the different programmes and a comprehensive checklist focusing on data quality was developed (Annex 1).

Figure 8 shows the increase in the number of supervisory visits from the central unit during the period 2004–2008 in Egypt; this was associated with an annual decline of 4% in the number of notified tuberculosis cases. The monthly supervisory visits from governorate coordinators for tuberculosis to tuberculosis monitoring units were also sustained during the same period.

Table 16. Case finding monitoring and evaluation indicators (second quarter 2008) [1]

Country	Population per one functioning laboratory	Smear-positive pulmonary tuberculosis out of pulmonary tuberculosis cases (%)	Smear-positive pulmonary tuberculosis out of all cases (%)	Extrapulmonary tuberculosis out of all cases (%)	Re-treatment rate (%)	Public–private mix coverage (%)
Afghanistan	46 226	67	44	23	4	0
Bahrain	72 727	30	11	14	50	0
Djibouti	52 429	68	33	45	7	0
Egypt	247 710	82	51	29	9	75
Iran, Islamic Republic of	226 367	74	49	29	5	100
Iraq	1 440 522	56	35	30	6	0
Jordan	500 000	67	18	57	6	71
Kuwait	254 320	63	33	47	0	0
Lebanon	23 810	57	30	45	3	100
Libyan Arab Jamahiriya	220 833	61	35	42	0	0
Oman	13 786	75	44	41	0	0
Pakistan	148 251	0	0	0	0	10
Occupied Palestinian territory	777 648	0	0	100	0	0
Qatar	1 700 000	100	100	0	0	100
Saudi Arabia	263 098	74	49	32	3	0
Somalia	175 946	63	48	20	4	0
Sudan	125 876	58	42	17	8	33
Syrian Arab Republic	279 507	70	28	50	7	64
Tunisia	152 076	90	50	43	2	0
United Arab Emirates	176 208	73	55	25	0	0
Yemen	74 421	87	69	16	0	80
Region	141 364	66	44	24	6	18

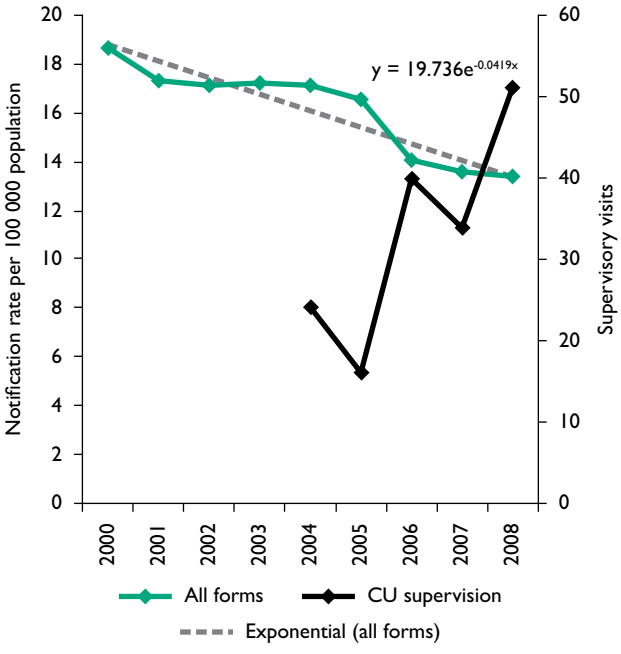


Figure 8. Declining notifications with increasing number of supervisory visits from the central unit (CU) in Egypt from 2000 to 2008

In the majority of countries, quarterly meetings were held during which feedback given during visits was discussed and corrective measures agreed upon. Follow-up on the corrective measures will take place in future visits.

3.5.3 Challenges

- Data quality was not always at the optimum level. In some countries, there were inconsistencies between the number of detected cases in the tuberculosis registers and quarterly reports, as well as between treatment cards and registers. Cases were missed in different settings: outpatient departments, laboratories and chest clinics.
- There was weak supervision and a poor quality supervision checklist, or no checklist at all, in some countries.

- The revised recording and reporting system was not adequately utilized, if at all, in other sectors.
- Several problems were identified with the computerized systems:
  - » Discrepancies between the hard versions of the case-finding reports and the aggregated numbers generated from the e-register
  - » Limited office equipment and communication tools, e.g. unavailability of a suitable office to coordinate the activities; and no fax machine, internet with digital subscriber line and printer at the governorate coordinator for tuberculosis level
  - » Slow data flow, owing to lack of access to internet
  - » Lack of antivirus protection
  - » Weak data analysis capacity at district level
  - » Discrepancies between paper and electronic versions of the suspect registers.

3.5.4 Recommendations

- Strengthen supervision using the standardized checklist with feedback reports and corrective measures.
- Strengthen the referral link from the outpatient department to the laboratory and from the laboratory to the chest unit by cross-checking the suspect, laboratory and treatment registers and ensuring that all suspects are tested and that all diagnosed cases are registered for treatment. A list of cases referred outside the chest centres should be developed to follow up the registration of referred diagnosed cases.
- Introduce the revised recording and reporting system in other sectors.
- Sustain and strengthen the data quality verification at all levels.
- Ensure net access at data entry and governorate coordinator for tuberculosis levels and ensure suitable office facilities for governorate coordinators for tuberculosis.
- Strengthen data analysis capacity at governorate coordinator for tuberculosis and district levels.

4. Challenges and high-risk groups

4.1 Collaborative HIV/tuberculosis activities

4.1.1 WHO interim policy

In order to assess national responses to the HIV/tuberculosis epidemic in the countries of the Region during 2007, and to facilitate technical support to them, the WHO global data collection form was distributed in 2008. This comprised sections on the three components of WHO's interim policy on collaborative tuberculosis and HIV activities: A) establish mechanisms for collaboration; B) decrease the burden of tuberculosis in people living with HIV; and C) decrease the burden of HIV in tuberculosis patients. Table 17 shows the recommended mechanisms of collaboration between the tuberculosis and HIV/AIDS programmes.

The collaborative HIV/tuberculosis activities listed in Part A of the WHO HIV/tuberculosis policy are recommended for all countries. They form the basis for a functioning collaboration between the national AIDS and tuberculosis programmes. All countries in the Region should have implemented these activities by the end of 2007 (Table 18).

Fourteen national tuberculosis programmes reported that they had a functioning HIV/tuberculosis coordinating body at national level. These were: Afghanistan, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Libyan Arab Jamahiriya, Morocco, Oman, northern and southern Sudan, Syrian Arab Republic, Tunisia

Table 17. Mechanisms of tuberculosis/HIV collaboration
A. Establish the mechanisms for collaboration
A.1. Set up a coordinating body for tuberculosis/HIV activities, effective at all levels
A.2. Conduct surveillance of HIV prevalence among tuberculosis patients
A.3. Carry out joint tuberculosis/HIV planning
A.4. Conduct monitoring and evaluation
B. Decrease the burden of tuberculosis in people living with HIV/AIDS
B.1. Establish intensified tuberculosis case finding
B.2. Introduce isoniazid preventive therapy
B.3. Ensure tuberculosis infection control in health care and congregate settings
C. Decrease the burden of HIV in tuberculosis patients
C.1. Provide HIV testing and counselling
C.2. Introduce HIV prevention methods
C.3. Introduce co-trimoxazole preventive therapy
C.4. Ensure HIV/AIDS care and support
C.5. Introduce antiretroviral therapy

and Yemen. All countries except Djibouti, Iraq, Lebanon, Pakistan, Qatar, Saudi Arabia, Tunisia and Yemen had a joint national HIV/tuberculosis strategic plan, a joint HIV/tuberculosis workplan and integrated HIV/tuberculosis monitoring and evaluation plans, and surveillance of HIV prevalence among tuberculosis patients. Most national tuberculosis programmes have established or are in the process of establishing (some of) these activities. All countries have established a system of surveillance for HIV among tuberculosis patients, except Pakistan. The United Arab Emirates did not report on these activities.

The collaborative activities included in Part B of the policy were recommended for all countries. All people living with HIV should be screened for tuberculosis. In addition, screening for tuberculosis should be implemented in settings where HIV-infected people are concentrated. Active tuberculosis should be treated with DOTS, and latent tuberculosis with isoniazid preventive therapy. Tuberculosis infection control should be ensured in health care and congregate settings.

In 2007, 15 national tuberculosis programmes (Djibouti, Egypt, Islamic Republic of Iran, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman, Pakistan, occupied Palestinian territory, Somalia, northern and southern Sudan and Syrian Arab Republic) screened all, or some, people living with HIV attending HIV facilities for tuberculosis symptoms. Eleven programmes (Bahrain, Egypt, Jordan, Lebanon, Oman, occupied Palestinian territory, Somalia, northern and southern Sudan, Syrian Arab Republic and Tunisia) actually found tuberculosis cases through this screening.

Nine programmes treated newly diagnosed HIV-positive patients with latent tuberculosis with isoniazid prophylactic therapy in 2007 (Islamic Republic of Iran, Jordan, Kuwait, Libyan Arab Jamahiriya, Oman, occupied Palestinian territory, Somalia, Syrian Arab Republic and Tunisia).

All countries should provide HIV testing and counselling to all tuberculosis patients, with initial expansion of these services from most-at-risk settings. HIV prevention methods should also be available to tuberculosis patients. Co-trimoxazole preventive therapy and HIV/AIDS care and support should be provided to HIV coinfected patients, and antiretroviral treatment to eligible patients.

In 2007, 17 national tuberculosis programmes (Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, occupied Palestinian territory, Somalia, northern and southern Sudan, Syrian Arab Republic, Tunisia and Yemen) tested tuberculosis patients for HIV. However, the proportion of tuberculosis patients tested varied considerably among these Programmes.

In 2007, eight programmes registered HIV-positive tuberculosis patients on co-trimoxazole prophylactic treatment (Djibouti, Egypt, Islamic Republic of Iran, Jordan, Kuwait, Libyan Arab Jamahiriya, Oman, southern Sudan). Fifteen programmes provided antiretroviral treatment to eligible patients (Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Jordan, Kuwait, Oman, Libyan Arab Jamahiriya, Pakistan, occupied Palestinian territory, Somalia, northern and southern Sudan, Syrian Arab Republic and Tunisia).

Table 18. Status of indicators in national tuberculosis programmes

Programme	A.1 Coordinating body	A.2 Surveillance	A.3 Joint planning	B.1 Screen people living with HIV for tuberculosis	B.2 Isoniazid prophylactic therapy	B.3 Infection control	C.1 Test tuberculosis patients for HIV	C.2 Co-trimoxazole prophylactic therapy	C.5 Antiretroviral treatment for eligible patients
Afghanistan	Yes	Yes	Yes	Not available	No	No	No	No	No
Bahrain	No	Yes	Yes	NA	No	Yes	Yes	No	Yes
Djibouti	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes
Egypt	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Iran, Islamic Republic of	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes
Iraq	Yes	Yes	No	No	No	No	No	No	No
Jordan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Kuwait	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lebanon	No	Yes	No	No	No	Yes	No	No	No
Libyan Arab Jamahiriya	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Morocco	Yes	Yes	No	Yes	No	No	Yes	No	Yes
Oman	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pakistan	No	No	No	Yes	No	No	No	No	Yes
Occupied Palestinian territory	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Qatar	No	Yes	No	NA	Yes	Yes	Yes	Yes	NA
Saudi Arabia	No	Yes	No	NA	Yes	Yes	Yes	Yes	Yes
Somalia	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sudan (northern)	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Sudan (southern)	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No
Syrian Arab Republic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Tunisia	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
United Arab Emirates	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yemen	Yes	Yes	No	No	No	No	No	No	No

NA information not available

4.1.2 Progress

Although significant progress was made in the implementation of collaborative HIV/tuberculosis activities during 2007 compared with 2006, the scale of collaboration was still limited. Fourteen national tuberculosis programmes reported that they had established collaborative mechanisms for HIV/tuberculosis at the national level. Tuberculosis care was provided to people living with HIV in many countries, but this was not always universal. Although 17 national tuberculosis programmes provided HIV testing to tuberculosis patients, it was not comprehensive. HIV care was also not widely provided to HIV-infected tuberculosis patients.

These results indicate an urgent need for countries to scale up HIV/tuberculosis collaborative activities. As a first step, all countries should develop national-level collaborative mechanisms immediately and implement the full range of tuberculosis/HIV collaborative activities. The Regional Office should also increase its technical support to the countries in the Region.

Table 19 shows the status of HIV testing for tuberculosis patients in the second quarter of 2008. Twelve programmes reported HIV testing for tuberculosis patients compared with 10 programmes in the first quarter of 2008: Bahrain, Djibouti, Islamic Republic of Iran, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Oman, occupied Palestinian territory, Qatar, northern Sudan and Syrian Arab Republic. The average regional testing was 13.5%, and the mean prevalence of HIV among tested tuberculosis patients was 10.2% at the regional level.

Bahrain, Kuwait, Oman, occupied Palestinian territory and Qatar reported testing all tuberculosis patients for HIV, while Jordan tested 73% of tuberculosis patients. The highest prevalence of HIV among tested tuberculosis patients was reported from nationals in the Islamic Republic of Iran (32.9%) and Libyan Arab Jamahiriya (42.4%), followed by Djibouti (13.2%) and northern Sudan (12.6%). Bahrain reported a prevalence of 5% and 3.2% among nationals and non-nationals, respectively. Oman reported a prevalence of 4% among nationals. Qatar and Kuwait reported a prevalence of 0.7% and 0.5% among non-nationals, respectively. The remaining countries, i.e. Lebanon, occupied Palestinian territory and Syrian Arab Republic, reported zero cases.

Table 19. Tuberculosis/HIV indicators, second quarter 2008 [1]

Programme	HIV-tested tuberculosis patients (%)	HIV positive among tested (%)
Afghanistan	0	0
Bahrain	100	5
Djibouti	48	13
Egypt	0	0
Iran, Islamic Republic of	7	33
Iraq	0	0
Jordan	73	0
Kuwait	100	0
Lebanon	28	0
Libyan Arab Jamahiriya	7	42
Oman	100	4
Pakistan	0	0
Occupied Palestinian territory	100	0
Qatar	100	0
Saudi Arabia	0	0
Somalia	0	0
Sudan (northern)	9	13
Syrian Arab Republic	4	0
Tunisia	0	0
United Arab Emirates	0	0
Yemen	0	0
Region	14	10

Seven programmes reported on treatment outcome of tuberculosis/HIV-coinfected patients who were registered for treatment in 2006 (Table 20). Treatment success rates ranged from 50% in Lebanon to 98% in the occupied Palestinian territory. A high death rate was reported from Lebanon and Oman, and the two cases that were registered for treatment in Kuwait were transferred outside the country.

Table 20. Treatment outcome of tuberculosis/HIV-coinfected patients (2006 cohort) [1]

Programme	Treatment success rate (%)	Death (%)	Failure (%)	Default (%)	Transferred out (%)
Egypt	67	17	0.0	8	8
Iran, Islamic Republic of	60	23	0.5	10	2
Kuwait	0	0	0.0	0	100
Lebanon	50	50	0.0	0	0
Oman	70	30	0.0	0	0
Occupied Palestinian territory	98	2	0.0	0	0
Sudan (southern)	83	7	2.2	8	0

4.2 Management of multidrug-resistant tuberculosis

4.2.1 Overview of multidrug resistance

The incidence of drug resistance has increased since the first drug treatment for tuberculosis was introduced in 1943. The emergence of multidrug-resistant tuberculosis followed the widespread use of rifampicin since the 1970s.

The objectives of the WHO/International Union Against Tuberculosis and Lung Disease (IUATLD) Global Project on Antituberculosis Drug Resistance Surveillance are to gather data on drug resistance using a standard methodology and to determine the global magnitude of resistance to four first-line antituberculosis drugs: isoniazid, rifampicin, ethambutol and streptomycin. The standard methodology includes representative sampling of patients with adequate sample sizes, standardized data collection distinguishing between new and previously treated patients and quality-assured laboratory drug susceptibility testing supported by a network of supranational tuberculosis reference laboratories. By 2007, four rounds of the global project had been completed, covering 109 countries or regions within large countries.

Drug resistance was strongly associated with previous treatment. In previously treated patients, the probability of any resistance was over fourfold higher, and of multidrug-resistant tuberculosis over 10-fold higher, than for untreated patients. The overall prevalence of drug resistance was often related to the number of previously treated cases in the country. Among countries with a high burden of tuberculosis, previously treated cases ranged from 4.4% to 26.9% of all patients registered in DOTS programmes. In the two largest high-tuberculosis burden countries (China and India), re-treatment cases accounted for more than 20% of sputum smear-positive cases.

Many identified multidrug-resistant tuberculosis cases have resistance to drugs other than isoniazid and rifampicin. In fact, one third of multidrug-resistant tuberculosis cases had resistance to all four of the first-line drugs tested in the global survey.

Moreover, multidrug-resistant tuberculosis patients often live for several years before succumbing to the disease. Prevalence of multidrug-resistant tuberculosis may therefore be three times greater than its incidence, suggesting that the true number of multidrug-resistant tuberculosis cases in the world today may approach, or exceed, 1 million.

Since 1994, eight countries in the Region have reported drug resistance data from areas representing 22% of all tuberculosis cases in the Region, but covering 36% of the countries in the Region.

The primary limiting factor to expanding survey coverage in the Region is the large number of countries currently addressing conflict situations. In many of these countries basic health services must be prioritized over expansion of surveillance. The second limiting factor is the poor laboratory infrastructure in many countries. Currently, there

is only one supranational reference laboratory in the Region; however, three candidate supranational reference laboratories have been nominated and are undergoing evaluation.

Pakistan has a widely expanded external quality assurance of microscopy laboratories and has identified the laboratory of Aga Khan University as national reference laboratory, which is a prerequisite for a nationwide survey as well as being desirable for the successful implementation of a multidrug-resistant tuberculosis treatment programme under the national tuberculosis programme. The Islamic Republic of Iran has been planning a second nationwide survey. The Libyan Arab Jamahiriya, Saudi Arabia and Sudan conducted drug resistance surveys during 2008 but results are not yet disseminated. Egypt, Somalia and Yemen plan to conduct drug resistance surveys in 2009. All 14 countries eligible for GFATM projects have included one or two drug-resistance surveys in their 5-year workplans.

4.2.2 The global response to multidrug-resistant tuberculosis

The WHO Working Group on DOTS-Plus for multidrug-resistant tuberculosis was established in 1999 to lead the global effort to control multidrug-resistant tuberculosis. This working group, part of the Stop TB Partnership, formed the Green Light Committee (GLC) in 2000 to provide technical assistance to DOTS programmes, promote rational use of second-line medicines worldwide and improve access to concessionally priced, quality-assured, second-line medicines.

The GLC has developed a mechanism to assist countries in adapting the framework described in these guidelines to country-specific contexts. Countries that meet the framework requirements, with a strong DOTS foundation and a solid plan to manage drug-resistant tuberculosis, can benefit from quality-assured second-line drugs at reduced prices. The GLC also offers technical assistance before implementation of drug-resistant tuberculosis control programmes and monitors approved projects.

A well-functioning DOTS programme is a prerequisite for GLC endorsement and for continuation of GLC support. Experience has shown that implementing a drug-resistant tuberculosis control programme substantially strengthens overall tuberculosis control for both drug-susceptible and drug-resistant cases

For the control of drug-resistant tuberculosis worldwide, WHO and its partners recommend integrating management of the disease into essential services for tuberculosis control and expanding treatment for drug-resistant tuberculosis as rapidly as human, financial and technical resources will allow.

Patients who meet WHO diagnostic Category IV criteria are treated with regimens designed to treat multidrug-resistant tuberculosis. These regimens are referred to as "Category IV regimens" throughout the guidelines.

Currently, Egypt, Iraq, Jordan, Lebanon, Morocco, Pakistan, Syrian Arab Republic and Tunisia have approved GLC projects. Djibouti and Sudan received technical assistance to develop their GLC proposals and have submitted their GLC applications. Iraq and Somalia are still in the process of developing proposals for the GLC.

Human resources were trained internationally (in Latvia) and regionally (in Egypt). During the period 2007–2008, two regional training courses were supported by the GLC.

All countries that provided management for multidrug-resistant tuberculosis in the Region have complied with the five components of the DOTS strategy as applied to drug-resistant tuberculosis (Table 21).

4.2.3 Proper case management conditions

Overview

As shown in Table 21, proper case management conditions include designing the treatment regimen based on evidence, strict DOT through treatment supporters, monitoring adverse effects of treatment and having trained human resources. It also includes prevention of transmission of

Table 21. Five components of the DOTS strategy as applied to drug-resistant tuberculosis.
1. Sustained political commitment
Addressing the factors leading to the emergence of multidrug-resistant tuberculosis
Long-term investment of staff and resources
Coordination of efforts between communities, local governments and international agencies
A well-functioning DOTS programme
2. Appropriate case-finding strategy including quality-assured culture and drug susceptibility testing
Rational triage of patients into drug susceptibility testing and the multidrug-resistant tuberculosis control programme
Relationship with supranational tuberculosis reference laboratory
3. Appropriate treatment strategies that use second-line medicines under proper case management conditions
Rational treatment design (evidence based)
DOT
Monitoring and management of adverse effects
Properly trained human resources
4. Uninterrupted supply of quality-assured, second-line antituberculosis medicines
5. Recording and reporting system designed for multidrug-resistant tuberculosis control programmes that enables performance monitoring and evaluation of treatment outcomes

multidrug-resistant tuberculosis by providing adequate infection control measures.

Administrative measures

- Physical separation of patients known or suspected to have tuberculosis or multidrug-resistant tuberculosis (especially smear-positive cases) from other patients.
- Physical separation of the different patient types according to sputum and culture positivity.
- Minimizing the length of time patients spend in hospital departments, e.g. laboratory or X-ray departments, to minimize nosocomial infection.
- Patients meeting their visitors in the open air.

Environmental measures

In addition to natural and mechanical ventilation by fans, national tuberculosis programmes have introduced equipment for sterilizing air such as ultraviolet germicidal irradiation lamps and mobile units containing ultraviolet lamps and high-efficiency particulate air filters.

Personal protection measures

National tuberculosis programmes provided the following personal protection measures:

- N95 respirators to protect the wearer from tiny (1–5 μm) airborne infectious droplets. These respirators fit tightly on the face, especially around the bridge of the nose. They are also "fit tested" in most of the countries.
- Surgical masks for the patients during their examination by health workers or for their transfer to other sections in the hospitals.

Monitoring and evaluation system

The recording and reporting for multidrug-resistant tuberculosis includes specifically designed forms. Some national tuberculosis programmes, e.g. Egypt, used electronic forms in addition to hand-written versions. Human resources were trained in international centres. Study tours were also carried out in some regional centres, e.g. in Egypt. Supervision on the management of multidrug-resistant tuberculosis is routinely carried out and international monitoring and evaluation is conducted through the GLC and WHO review missions.

Progress in the management of multidrug-resistant tuberculosis is summarized in Table 22.

Eight countries reported on drug susceptibility testing for first-line drugs during the fourth round of the DQ-online [1: Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Sudan and Syrian Arab Republic. The prevalence of multidrug resistance among new and re-treatment cases in the Region was 0.2% and 23.2%, respectively.

Table 23 shows performance of the different programmes using indicators for monitoring and evaluation of programme performance.

Table 22. Progress in the management of multidrug-resistant tuberculosis (as of 2007)

Programme	Progress
Afghanistan, Djibouti, Pakistan, occupied Palestinian territory, Somalia	Multidrug-resistant tuberculosis management is not yet in place due to the non-availability of all the components of the strategy in the country, e.g. the presence of a drug susceptibility testing laboratory or appropriate treatment conditions. Afghanistan developed a national plan for management of multidrug-resistant tuberculosis and Somalia developed national guidelines for multidrug-resistant tuberculosis management. There is no routine susceptibility testing for first-line drugs in these countries
Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates	The five components of the strategy are in place. National plans for multidrug-resistant tuberculosis management were developed in all GCC countries except Saudi Arabia, guidelines were developed in Bahrain and Qatar, and Oman developed training materials based on the national guidelines. Routine susceptibility testing for first-line drugs for all types of patients (new, re-treatment, failure after Category I, chronic and contacts of multidrug-resistant tuberculosis). In Saudi Arabia, testing for first-line drugs is recommended for re-treatment, failure after Category I and chronic patients. Second-line drugs are procured via the national drug authorities in all the GCC countries. Multidrug-resistant tuberculosis management is countrywide in GCC countries, except in Saudi Arabia. The United Arab Emirates did not provide a complete report on the status of multidrug-resistant tuberculosis management
Egypt	The five components of the strategy are in place. A national focal point was identified at the central unit. National plan, guidelines and training materials were developed. Drug susceptibility testing for first-line drugs is recommended for all re-treatment cases, for failure after Category I, chronic tuberculosis cases and contacts of multidrug-resistant tuberculosis cases. A GLC application for second-line drugs was approved in 2004. The multidrug-resistant tuberculosis management is currently in the scaling-up phase. Two centres were created in Cairo and Alexandria, and two additional centres will be established
Iran, Islamic Republic of	The five components of the strategy are in place. A national focal point was identified at the central unit. National plan, guidelines and training materials were developed. Drug susceptibility testing for first-line drugs is recommended for all re-treatment cases, for failure after Category I and chronic tuberculosis cases
Iraq, Sudan, Yemen	Multidrug-resistant tuberculosis management is not yet in place. No GLC application for second-line drugs was submitted for Iraq and southern Sudan programmes but one GLC application is under way for the northern Sudan programme. Drug susceptibility testing for first-line drugs is recommended for all re-treatment cases, chronic tuberculosis cases and contacts of multidrug-resistant tuberculosis cases in the programmes in Iraq, northern Sudan and Yemen but no routine drug susceptibility testing is performed in southern Sudan
Jordan, Lebanon	The five components of the strategy are in place. A national focal point was identified at the central unit. National plan, national guidelines and training materials were developed in Jordan, and training on international guidelines was conducted in Lebanon. Drug susceptibility testing for first-line drugs is recommended for all types of patients in Jordan and for all re-treatment cases, for failure after Category I, chronic tuberculosis cases and contacts of multidrug-resistant tuberculosis cases in Lebanon. GLC applications for second-line drugs were approved. The multidrug-resistant tuberculosis management is currently countrywide
Syrian Arab Republic, Tunisia	The five components of the strategy are in place. A national focal point was identified at the central unit. National plan, national guidelines and training materials were developed. Drug susceptibility testing for first-line drugs is recommended for all re-treatment cases, for failure after Category I, chronic tuberculosis cases and contacts of multidrug-resistant tuberculosis cases. A GLC application for second-line drugs was approved in 2004 for the Syrian Arab Republic and in 2005 for Tunisia. Multidrug-resistant tuberculosis management is currently in the pilot phase

4.2.3 Programme treatment strategies

Standardized treatment

Regimens are designed on the basis of representative drug-resistance survey data for specific treatment categories. However, suspected multidrug-resistant tuberculosis should always be confirmed by drug susceptibility testing results whenever possible. All patients in a defined group or category receive the same treatment regimen.

Currently, patients with chronic tuberculosis are tested for resistance to first-line drugs only. Before initiating the project in the Syrian Arab Republic and before the GLC-approved project commenced in Jordan, the practice was to send patients with resistant forms of tuberculosis to Jordan (Massah Al-Nur/Anoor sanatorium) for treatment. The treatment cost Syrian patients 350 Syrian pounds (approximately US$ 7) per month. Since ofloxacin was not available in Jordan, this medication was sent from the Syrian Arab Republic with the patients. The patients received 6 months of treatment during the intensive phase in Jordan and during the continuation phase in

Table 23. Indicators of multidrug-resistant tuberculosis during the second quarter of 2008 [1]

Programme	Multidrug-resistant tuberculosis among new cases (%)	Multidrug-resistant tuberculosis among previously treated (%)
Iraq	0	30
Jordan (non-nationals)	10	100
Kuwait (non-nationals)	1	0
Lebanon (non-nationals)	0	100
Oman (non-nationals)	50	–
Sudan (northern)	17	30
Syrian Arab Republic	0	50
Syrian Arab Republic (non-nationals)	0	67

the Syrian Arab Republic using the treatment regimens shown in Table 24.

With the regimen shown in Table 24, sputum and culture conversion occurred for some of the patients in the third month. Adverse reactions encountered during the treatment were minimal.

There were several multidrug-resistant tuberculosis patients for whom treatment was initiated:

- Seven patients in Homs provincial hospital (in-patient, not culture converted).
- Two patients in Hasaka provincial hospital (in-patient, not culture converted).
- Three patients continued treatment regimens started in Jordan and were in the Damascus area, in Aleppo and in Rakka (outpatients, culture converted).

All patients received treatment as outlined in the GLC application and approved by the GLC. The following two regimens were utilized:

- For newly identified multidrug-resistant tuberculosis patients: injectable phase of Km-Z-levofloxacin (Lfx)-cycloserine (Cs)-ethionamide (Eto), minimum 6 months or 4 months after culture conversion, and continuation phase with Lfx-Cs-Eto prolonged until reaching 18 months postculture conversion.

Table 24. Standardized treatment in Jordan and the Syrian Arab Republic

Intensive phase	Duration (months)
Kanamycin (Km)	6
Thiacetazone (Th)	6
Ofloxacin (Ofx)	6
Pyrazinamide (Z)	6
Ethambutol (E)	6
Rifampicin (R) / isoniazid (H)	6

Continuation phase	Duration (months)
Thiacetazone (Th)	18
Ofloxacin (Ofx)	18
Ethambutol (E)	18
Rifampicin (R) / isoniazid (H)	18

- For patients with identified multidrug-resistant tuberculosis and who received treatment previously (Anoor sanatorium old regimen): injectable phase with capreomycin + cycloserine + ethionamide + P-amino salicylic acid (Cm-Cs-Eto-PAS) minimum 6 months or 4 months after culture conversion, and a continuation phase with Cs-Eto-PAS prolonged until reaching 18 months post culture conversion.

Empirical treatment

Each regimen is individually designed on the basis of the previous history of antituberculosis treatment and with the help of representative drug-resistance survey data. Commonly, an empirical treatment is adjusted in each patient when his or her drug susceptibility test results become available.

Individualized treatment

Each regimen is designed on the basis of the previous history of antituberculosis treatment and individual drug susceptibility test results. Examples of individualized treatment strategies in Egypt are shown in Table 25.

All national tuberculosis programmes that provide management for multidrug-resistant tuberculosis monitor the treatment of patients during the whole treatment duration (Table 26). In Egypt during multidrug-resistant tuberculosis management, gastritis, peripheral neuritis, diarrhoea and hypothyroidism were the commonest side-

Table 25. Individualized treatment strategies applied in Egypt

Patients resistant to	Regimen	3 months	6 months	12 months
RHZE	I	Kanamycin or capreomycin daily + ofloxacin + cycloserine + ethionamide + PAS then	Kanamycin 5 times a week + previous drugs then	Ofloxacin + cycloserine + ethionamide + PAS
RHS	II	Kanamycin or capreomycin daily + ofloxacin + cycloserine + ethionamide + ethambutol then	Kanamycin 5 times a week + previous drugs then	Ofloxacin + ethionamide + ethambutol + cycloserine
RH	III	Streptomycin daily + ethambutol + pyrazinamide + ofloxacin + PAS then	Streptomycin 5 times a week + previous drugs then	Ethambutol + pyrazinamide + ofloxacin + PAS

PAS P-amino salicylic acid; RH rifampicin/isoniazid; RHS rifampicin/isoniazid/streptomycin; RHZE rifampicin/isoniazid/pyrazinamide/ethambutol

Table 26. Monitoring during treatment of multidrug-resistant tuberculosis

Monitoring and evaluation	Recommended frequency
Evaluation by clinician	At baseline, and at least monthly until conversion, then every 2–3 months
Screening by DOTS worker	At every DOTS encounter
Sputum smear and culture	Monthly until conversion, then monthly smears and quarterly cultures
Weight	At baseline, then monthly
Drug susceptibility	At baseline in programmes doing individualized treatment testing (drug susceptibility testing) or in programmes doing standardized treatments that need to confirm multidrug-resistant tuberculosis. For patients who remain culture positive, it is not necessary to repeat drug susceptibility testing within less than 3 months of treatment
Chest radiograph	At baseline, then every 6 months
Serum creatinine	At baseline, then monthly if possible while receiving an injectable drug
Serum potassium	Monthly while receiving an injectable agent
Thyroid-stimulating hormone	Every 6 months if receiving ethionamide/prothionamide and/or PAS; and monitor monthly for signs/symptoms of hypothyroidism
Liver serum enzymes	Periodic monitoring (every 1–3 months) in patients receiving pyrazinamide for extended periods or for patients at risk for, or with symptoms of, hepatitis
HIV screening	At baseline, and repeat if clinically indicated
Pregnancy tests	At baseline for women of childbearing age, and repeat if indicated

PAS P-amino salicylic acid

effects while hepatitis was the less common. The treatment outcome of multidrug-resistant tuberculosis patients is shown in Table 27.

4.3 Management of household contacts

Ten national tuberculosis programmes had rather incomplete data about contact management for cases notified during 2007. These were Bahrain, Islamic Republic of Iran, Iraq, Kuwait, Oman, occupied Palestinian territory, Qatar, Syrian Arab Republic, southern Sudan and Tunisia. With the introduction of the revised recording and reporting system during 2008–2009 in most of the programmes, more data became available as shown in the quarterly reports submitted to DQ-online [1] (Table 28).

The average number of contacts screened per one index sputum smear-positive case was highest in Qatar (15.8) and Jordan (10.2), followed by Tunisia (7.6), Oman (7.1) and Kuwait (6.6). It exceeded three contacts per index case in Bahrain, Egypt and occupied Palestinian territory and was less than three in the Islamic Republic of Iran, Iraq, southern Sudan and Syrian Arab Republic. Only seven countries gave isoniazid preventive therapy to under 5-year-old contacts of smear-positive cases in 2007. The incidence of tuberculosis among contacts was significantly higher than in the general population (from hundreds to thousands per 100 000 population) (Table 28).

Only 10 countries were able to report on contact management during the second quarter of 2008 (4th round of DQ-online [1]): Egypt, Islamic

Table 27. Treatment outcome of multidrug-resistant tuberculosis patients

Country	GLC/non-GLC	Cohort	Registered	Still on treatment (as of August 2008)	Treatment success rate (%)	Death (%)	Failure (%)	Default (%)	Transferred out (%)	Still on treatment (%)
Egypt	GLC	Registered in 2006	27	0	67	19	11	4	0	0
Islamic Republic of Iran	Non-GLC	Registered in 2005	24	6	33	21	0	13	8	25
	Non-GLC	Registered in 2006	32	10	25	13	0	22	9	31
Jordan	GLC	Registered in 2005	20	0	75	5	0	10	10	0
		Registered in 2006	12	3	25	25	0	8	17	25
Kuwait	Non-GLC	Registered in 2005	7	1	43	0	0	0	43	14
		Registered in 2006	10	3	40	0	0	0	30	30
Lebanon	GLC	Registered in 2005	8	1	75	0	0	13	0	13
		Registered in 2006	2	0	100	0	0	0	0	0
Morocco	Non-GLC	Registered in 2005	101	84	1	9	0	6	1	83
Syrian Arab Republic	GLC	Registered in 2005	12	0	83	8	8	0	0	0
		Registered in 2006	11	6	18	18	0	9	0	55
Tunisia	GLC	Registered in 2005	45	21	22	27	2	0	0	47
		Registered in 2006	36	29	6	6	0	8	0	81

Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Syrian Arab Republic, Tunisia and United Arab Emirates. The incidence of smear-positive pulmonary tuberculosis among household contacts ranged from 439 per 100 000 population in Iraq to 12 253 per 100 000 population in Egypt, with a regional average of 1255 per 100 000 population.

A total of 81.4% of household contacts under 5 years old started isoniazid preventive therapy in eight reporting countries, with the highest rates reported from Iraq and Jordan (100% each), Islamic Republic of Iran (91.5%) and Egypt (85.4%).

Table 29 shows performance of the different programmes using indicators for monitoring and evaluation of programme performance.

Table 28. Contact management in programmes in the Region, 2007 [1]

Programmes	Notified sputum smear positive	Contacts screened	Average contacts per case	Incidence of tuberculosis per 100 000 contacts	All contacts on isoniazid preventive therapy	Under 5 year old contacts on isoniazid preventive therapy
Bahrain	109	512	4.7	–	54	–
Egypt	4 887	20 385	4.2	–	–	–
Iran (Islamic Republic of)	4 701	9 938	2.1	472.9	–	2 268
Iraq	2 726	6 531	2.4	1 669	–	2 401
Jordan	109	1 112	10.2	449.6	134	61
Kuwait	274	1 820	6.6	1 373.6	360	46
Oman	187	1 321	7.1	–	70	71
Occupied Palestinian territory	13	50	3.8	–	10	0
Qatar	116	1 828	15.8	54.7	430	–
Sudan (southern)	2 513	136	0.05	61 764.7	0	27
Syrian Arab Republic	1 155	2 968	2.6	1 718.3	409	135
Tunisia	941	7 184	7.6	626.4	–	–

– information not available

Table 29. Contact management during the second quarter of 2008 [1]

Programme	Sputum smear positive pulmonary tuberculosis per 100 000 household contacts	All tuberculosis forms per 100 000 household contacts	Under 5 year olds who started isoniazid preventive therapy (%)
Egypt	12 253	16 206	85.4
Iran, Islamic Republic of	642	1 283	91.5
Iraq	439	1 043	100
Jordan	0	0	100
Kuwait	586	1 563	19
Lebanon	3 226	9 677	30
Oman	0	0	50
Syrian Arab Republic	831	3 324	37.8
Tunisia	0	1 081	0
United Arab Emirates	0	21 229	0
Region	1 255	2 612	–

5. Health system strengthening

5.1 Leadership and governance

5.1.1 Afghanistan

The Grant and Contract Management Unit, which coordinates all donor activities, holds regular review meetings with donors and agencies implementing the Basic Package of Health Services/Essential Package of Health Services. The Consultative Group of Health and Nutrition, chaired by the Deputy Minister, undertakes regular quarterly health programme reviews to address interdepartmental/ministerial coordination, policy and issues related to the Basic Package of Health Services/Essential Package of Health Services and donors.

5.1.2 Egypt

Increasing collaboration and integration with all relevant sectors inside and outside the Ministry of Health and Population:

- Inside the Ministry of Health and Population: primary health care units; information, education and communication departments; fever hospitals
- Outside the Ministry of Health and Population: health insurance organizations; health services administration within the Ministry of the Interior; university hospitals; the private sector; nongovernmental organizations; refugee foundations

5.1.3 Pakistan

Programme (district) performance management (and specifically integrated supervision processes) has been strengthened through the national tuberculosis programme.

5.1.4 Occupied Palestinian territory

In line with the Palestinian Reconstruction and Development Plan, the national strategic health plan is outlining strategies on how to overcome constraints in health system development. A number of strategies have been translated into project documents, collected and compiled by the Ministry of Planning for tracking funding for development programmes. These projects include support for licensing; certification and accreditation; human resource management and development; and developing a health management information system.

A health sector working group is chaired by the Ministry of Health, co-chaired by the Italian Cooperation; WHO acts as technical adviser. Members of the working group include key donors in the health sector, UN agencies and representatives from the Association of International Development Agencies group. The United Nations Relief and Works Agency for Palestine Refugees in the Near East and the Union of Palestinian Medical Relief Committees are observers. Main objectives of the health sector working group are to support the Ministry of Health in producing annual health sector workplans, to develop jointly aid policies and guidelines, to coordinate donors and to promote alignment between external assistance and national processes.

Thematic groups were established for mental health, nutrition, women and child health, pharmaceuticals and recently for health management information system. Thematic groups assemble the technical expertise available at the various organizations and are set up to provide technical support to the Ministry of Health in specific fields.

In 2002, the Ministry of Health supported by WHO started to convene health emergency coordination meetings at central and district level. These meetings provided regular reports on the humanitarian situation, held at monthly or weekly basis if needed, co-chaired by WHO. International and national nongovernmental organizations in addition to the UN agencies that are/were involved in emergency response participated in the meetings. Health emergency coordination meetings transformed into the central and district health coordination meetings.

The Ministry of Health has only recently established a working group on health sector reform to identify strategies that are critical for overcoming health system weaknesses.

5.1.5 Somalia

The health system is being strengthened through GFATM grants for tuberculosis, malaria and HIV/AIDS. Through these grants, specific disease management and prevention activities are being carried out. Policies and policy guidelines for tuberculosis, malaria and HIV/AIDS management are being put in place while tuberculosis/HIV collaborative activities are being initiated through the GFATM Round 7.

5.1.6 Sudan

In the programme in northern Sudan, the 25-year health-sector plan has emphasized the need to build a stronger health care system to achieve a vision of a healthy nation and citizens. The policy priorities of the coming 25 years include:

- Improving health-service coverage and accessibility and eliminating geographical and financial barriers
- Capacity building and health system management
- Health human resources development (policies, planning, production and management to ensure balanced and equitable distribution)
- Improving financing of health services and reducing the burden of direct out-of-pocket payment for health services
- Research

Control of communicable diseases (e.g. malaria, HIV/AIDS, tuberculosis, schistosomiasis, etc.) was listed among the disease-specific priorities in this plan.

5.1.7 Tunisia

The national strategic plan aims at engaging the private sector in tuberculosis control in order to reduce the delay in diagnosis and treatment of cases and to reduce disease transmission.

5.1.8 Yemen

The Ministry of Public Health and Population has adopted the health sector reform strategy by decentralization (some consolidated decentralization in some governorates), adopting a district health system supported by capacity building, including human resources, and implementing local administration law, which gives district level the authority to implement and finance.

5.2 Finance

5.2.1 Overview

National tuberculosis programmes with the help of GFATM have been trying to address finance in health system strengthening. Governmental contributions to the tuberculosis budget have increased over the years. Performance-based incentives for full-time health personnel have been introduced in several countries.

5.2.2 Tunisia

A new health insurance system has been developed in Tunisia to reduce the economic burden of the disease on the population.

5.2.3 Yemen

In Yemen, the national tuberculosis programme has worked with the World Food Programme to provide food support for tuberculosis patients, which would certainly serve as social protection for impoverished tuberculosis patients. Financial and nutritional support has been given to patients.

5.3. Workforce

5.3.1 Overview

The majority of countries have human resource development plans incorporated into their national strategic plans. The staffing and training needs address all the components of the Stop TB Strategy (Table 30). Details of human resources

Table 30. Human resource development in countries in the Region (as of August 2008) *(continued)*

Programme	Programme staff responsible for human-resource development	Human-resource development plan, dates	Stop tuberculosis strategy components covered by the human-resource development plan	Tuberculosis control present in the curricula of doctors, nurses and laboratory technicians	Staff trained during the past 3 years out of present staff
Afghanistan	Yes	Yes, 2009–2013	All	Yes	Chest unit: 20/20 (100%) Intermediate: 90/105 (86%) Tuberculosis monitoring unit: 1300/1590 (81%)
Bahrain	No	No	DOTS expansion and enhancement and advocacy, communication and social mobilization	Yes	–
Djibouti	No	No	None	Yes	Chest unit: 4/4 (100%) Tuberculosis monitoring unit: 42/42 (100%)
Egypt	Yes	Yes, 2007–2011	All	Yes	Chest unit: 21/21 (100%) Intermediate: 27/27 (100%) Tuberculosis monitoring unit: 3947/3947 (100%)
Iran, Islamic Republic of	Yes	Yes, 2008–2010	All	Yes	Chest unit: 3/3 (100%) Intermediate: 41/41 (100%)
Iraq	Yes	Yes, 2008–2012	All	Yes	Chest unit: 52/52 (100%) Intermediate: 120/191 (63%) Tuberculosis monitoring unit: 130/239 (54%) Health care facility: 830/1020 (81%)
Jordan	Yes	Yes, 2007–2011	All	Doctors only	–
Kuwait	Yes	Yes, 2008–2009	All	Yes	Chest unit: 55/70 (79%) Intermediate: 11/16(69%) Tuberculosis monitoring unit: 7/7 (100%) Health care facility: 1/2 (50%)
Lebanon	Yes	Yes, 2000–2005	All except tuberculosis/HIV	Yes	Chest unit: 7/13 (54%) Intermediate: 14/2 (52%)
Libyan Arab Jamahiriya	Yes	Yes, 2009–2012	All	Yes	–
Morocco	Yes	Yes, 2006–2015	All	Yes	Chest unit: 5/6 (83%) Intermediate, tuberculosis monitoring unit and Health care facility levels: unknown numbers of trained staff
Occupied Palestinian territory	No	Yes, 2009–2014	DOTS expansion and enhancement	No	Chest unit: 0/2 Intermediate: 0/3 Tuberculosis monitoring unit: 0/3

Table 30. Human resource development in countries in the Region (as of August 2008) *(concluded)*

Programme	Programme staff responsible for human-resource development	Human-resource development plan, dates	Stop tuberculosis strategy components covered by the human-resource development plan	Tuberculosis control present in the curricula of doctors, nurses and laboratory technicians	Staff trained during the past 3 years out of present staff
Oman	Yes	Yes, 2006–2010	All	Yes	Chest unit: 2/2 (100%) Intermediate: 11/11(100%) Tuberculosis monitoring unit: 142/142 (100%) Health care facility: 205/205 (100%)
Pakistan	Yes	Yes, 2006–2012	All	Laboratory technicians only	Chest unit: 25/50 (50%) Intermediate: 200/200 (100%) Tuberculosis monitoring unit: 3400/3400 (100%) Health care facility: 10 000/10 000 (100%)
Qatar	Yes	Yes, 2007–2009	DOTS expansion and enhancement and training on advocacy, communication and social mobilization	Yes	Chest unit: 6/30 (20%)
Saudi Arabia	No	No	-	Doctors and laboratory technicians	Chest unit: 4/4 (100%) Tuberculosis monitoring unit: 20/20 (100%)
Somalia	No	Yes, 2005–2009	All	Yes	Chest unit: 6/6(100%) Other levels: unknown
Sudan (northern)	Yes	Yes, 2006–2010	All	Yes	Chest unit: 20/20 (50%) Intermediate: 60/60 (100%) Tuberculosis monitoring unit: 1210/900 (> 100%) Health care facility: 729/600 (>100%)
Sudan (southern)	No	No	–	Yes	Chest unit: 1/1 (100%) None at the other levels
Syrian Arab Republic	Yes	Yes, 2008–2012	All except tuberculosis/HIV	Yes	Chest unit: 2/6 (30%) Intermediate: 70/70 (100%) Tuberculosis monitoring unit: 332/332 (100%) Health care facility: 400/1703 (20%)
Tunisia	Yes	Yes, 2008–2015	All	Yes	Chest unit: 2/2 (100%) Intermediate: 24/48 (50%) Tuberculosis monitoring unit: 24/48 (50%) Health care facility: 60/48 (> 100%)
United Arab Emirates	Yes	No	–	Yes	Unknown numbers
Yemen	Yes	Yes, 2006–2016	All	Yes	–

– information not available

development in different countries are shown in Table 30.

5.3.2 Afghanistan

For technical support in external quality assessment and other areas such as culture and drug susceptibility testing facilities, a long-term and a short-term international consultant has been assured by the Japan International Cooperation Agency (JICA). The government has ensured strict implementation of its policy for assigning health professionals at all health-service outlets, including those in difficult areas.

5.3.3 Djibouti

The Ministry of Health recruited 100 public health officers, based in health posts at the district level. An additional 100 public health officers are to be recruited during 2009. These officers will deliver care for all diseases in a decentralized system and will help in identifying suspects, act as treatment supporters and carry out defaulter and contact tracing.

5.3.4 Egypt

In Egypt, the following measures were carried out:

- Strengthening the managerial capacities at the central, intermediate and peripheral level through training courses in the fields of total quality management, strategic planning, monitoring and evaluation, supervision, epidemiology and data analysis and at the central level by supporting the country coordinating mechanism activities and the project management unit
- Conducting international training courses supported by JICA
- Supporting the central supervisory teams with local independent consultants and/or experts from WHO or the universities
- Supporting the supervisory teams with members from the nongovernmental organizations and representatives of the patients
- Supporting information, education and communication and advocacy initiatives through two missions of technical assistance to establish a comprehensive strategy for advocacy, communication and social mobilization and establishment of health education teams for tuberculosis in all governorates.

5.3.5 Iraq

The workforce will be strengthened through provision of technical medical and managerial training to the national tuberculosis programme, Ministry of Health and Ministry of Finance staff members, doctors, tuberculosis coordinators, and other workforce members. There will be a decentralized system for providing training, which will be run by the programme in collaboration with other partners, to ensure needs are addressed adequately and continuously. In order to reduce the high turnover rate, a system of creating incentives for the workforce will be put in place, e.g. rewarding staff with opportunities to attend international training and study programmes.

5.3.6 Occupied Palestinian territory

Within its biannual planning, WHO is technically supporting the Ministry of Health in "coordination" and "health information" as well as strategy development for the prevention and control of noncommunicable diseases. The Italian Cooperation, which has been designated as the "shepherd" of the health sector following the Oslo agreement, is also providing resources (technical and human) to the policy and planning unit at the Ministry of Health. The European Commission has seconded a technical expert to the Ministry of Health pharmaceutical department for strengthening capacity in procurement.

5.3.7 Somalia

Continuous training of health workers is being conducted to build the capacity of local staff as well as to address weaknesses in the health information system.

5.3.8 Sudan

The "Sudan Declaration" aims to improve human resources available in Sudan through increasing the training of nurses, midwives, medical assistants and other allied staff. This involves a revision of curricula to bring them up to modern requirements and upgrading of the skill levels of these workers. The Government of Sudan is in partnership with the Multi Donor Trust Fund, which contributes 68% of the US$ 70 million for rehabilitation of the health system, including training of the above categories of workers. This activity is focused on four conflict-affected states. Funds from the Global Fund (US$ 2 276 655) are focused on five additional states for training of human resources. These will be supplemented by matching funds from the government, in addition to investment in the infrastructure.

5.3.9 Syrian Arab Republic

There is a capacity-building component relevant to the human resources development related to each of the components of the national strategic plan. The latter is an integral part of health system strengthening.

5.3.10 Tunisia

The national strategic plan aims at strengthening human resources, both in number and quality, at all levels.

5.4 Health service provision

5.4.1 Afghanistan

The limited coverage of Basic Package of Health Services/Essential Package of Health Services has been addressed by the government through additional resources from other donors.

The Ministry of Public Health has intensified its supervision of health services and is ensuring implementation of all basic health components, which will address the issue of underprioritization of tuberculosis control.

The task force constituted by the Ministry of Public Health in November 2006 formulated a policy for involvement of the private sector in government health programmes.

5.4.2 Egypt

In Egypt, the following measures were carried out:

- Procurement of three vans to facilitate transportation during the supervisory visits.
- Decentralization through supporting the monitoring and evaluation committees at the governorates
- Expanding the involvement of the primary health care services to the process of diagnosis and treatment of tuberculosis through DOTS expansion and support to the referral system of the health-sector reform programme and family medicine.
- Strengthening the supervision and the quality assurance programme concerned with the quality of diagnosis and identification of infectious cases in collaboration with the Central Public Health Laboratory.

5.4.3 Iraq

Health service delivery will be improved and expanded by integrating quality DOTS into the primary health care centre system. A total of 887 category A and category C primary health care centres will be strengthened to provide quality DOTS services, 15 category B primary health care centres will be upgraded to provide DOTS training services, and 1020 category D primary health care centre subcentres will be empowered to deliver health awareness services on tuberculosis and on availability of Bacillus Calmette-Guérin (BCG) vaccine. Eighteen laboratories, one in each governorate, will be upgraded to provide culture examination on tuberculosis patients. A quality assurance system for culture examination will be set between the national reference laboratory in Baghdad and central governorate laboratories. An adequate system for tracing and management of tuberculosis contacts will be set up. Engagement

of the private and nongovernmental sectors is also planned.

5.4.4 Syrian Arab Republic

In the Syrian Arab Republic, the following measures were carried out:

- Implementing international standards of care for tuberculosis patients.
- Strengthening peripheral primary health care centres, health points and community volunteers in the targeted areas, mainly through improving access to tuberculosis services by engaging non-programme providers.

5.4.5 Sudan

In Sudan, there is ongoing reform in the Federal Ministry of Health, including reform and establishment of the local health areas, and review and expansion of primary health care centre services. However, there has been no comprehensive review of the higher levels of function. Resources from the GFATM will be utilized for technical assistance in this important area.

5.4.6 Yemen

Health service coverage is still low. The national tuberculosis programme has developed a new national strategic plan for 2009–2013 which incorporates all the components of the new Stop TB strategy that would increase the accessibility of patients to health care, e.g. public–public and public–private approaches and community-based DOTS.

5.5 The Practical Approach to Lung Health initiative

The Practical Approach to Lung Health (PAL) is a tool to improve management of patients with respiratory symptoms, in terms of the standardization and rationalization of their management. This applies to tuberculosis suspects that are part of the pool of people with respiratory symptoms; PAL reduces the chance of missing those cases within the health system. The status of PAL implementation is shown in Table 31.

PAL has been expanded in Morocco but has been stagnant in Jordan, Syrian Arab Republic and Tunisia, the three countries that piloted PAL after Morocco, mainly due to the need for a programmatic approach for expansion. Egypt is in the pilot phase, while Sudan has started developing PAL guidelines. The Islamic Republic of Iran and Kuwait are planning to pilot it with support from the GFATM. The Regional Office hosted two global training workshops for PAL during 2008 and early 2009. With the development of the PAL handbook and the availability of GFATM support to PAL, an enhancement in PAL expansion is expected in the future.

5.6 Health information system

The Stop TB programme has strengthened the health information system in the countries in

Table 31. Status of PAL implementation in various programmes

Programme	PAL implementation	No. of primary health care centres implementing PAL out of total primary health care centres
Egypt	Pilot phase, since 2008	40/4698 (< 0.01%) (March 2009)
Jordan	Yes, since 2007	49/770 (6.3%)
Lebanon	Yes, since 2007	NA
Morocco	Yes, 2002	1700/2267 (75%)
Syrian Arab Republic	Yes, since 2006	506/1703 (30%)
Tunisia	Training of the focal point in 2008	0/2076
Remaining countries in the Region	No	NA

NA not applicable

general. Specific examples include Djibouti, where the Ministry of Health has introduced a health information system that incorporates all communicable diseases, including tuberculosis.

In Egypt, surveillance will be supported through printing standardized registers and key surveillance forms in addition to supporting the E-nominal recording and reporting system and establishing a competent maintenance system to the information technology sets and network.

Support will be given to the research unit for conducting 20 operational research studies to address issues in tuberculosis control, aiming to improve health services within the total quality management concept. One of these activities relates to the application of PAL to improve the management of those with chronic respiratory symptoms and also to tuberculosis suspect management, especially in rural areas.

in the occupied Palestinian territory, following an agreement between the Ministry of Health and the World Bank, a foundation for the design of a computerized health information system was laid that made sure that comparable definitions of clinical and administrative procedures and terms were utilized throughout the health care system. In 2004, the Ministry of Health along with WHO developed a computerized health facility database for primary and secondary health care, together with an online link with an interactive geographic information system.

A thematic group for health information systems has been established and includes key stakeholders to support the Ministry of Health in developing the health management information system further. It is envisaged to strengthen monitoring and evaluation functions within this national system.

In northern Sudan, investing in a health-information system would help the operation of the "three ones" principle, which calls for a unified national monitoring and evaluation HIV/AIDS framework and system. Moreover, investing in the information system is crucial for tracing and measuring indicators related to the United Nations General Assembly Special Session (UNGASS) and the ongoing GFATM implementation process.

Activities to strengthen the health-information system are being undertaken by the federal Ministry of Health through some funding made available from the Health Metrics Network (US$ 400 000) for a situation analysis and limited piloting in 32 out of 88 local health areas (districts). Strengthening the health information system will be carried out with support from the GFATM.

In Tunisia, the national strategic plan aims at improving the health information system and strengthening surveillance. Tuberculosis surveillance is integrated in the general health-information system. Emphasis is also to be given to conducting operational research to address the challenges facing tuberculosis control.

The national tuberculosis programme in Yemen has been supporting districts with modern technologies, e.g. computers and Internet connectivity. It has also piloted an electronic surveillance system and trained human resources. This is primarily for tuberculosis but it will have a beneficial impact on general health system strengthening. There is a plan to integrate tuberculosis surveillance into the general health information system.

6. Public–private mix

6.1 Background

The Region has achieved 60% case detection rates and over 85% treatment success rates. To achieve further substantial progress in detecting and managing missing tuberculosis cases, it is imperative to engage all care providers in tuberculosis care and control across the countries. The review missions carried out in the countries in the Region during 2007–2008 noted that the national tuberculosis programmes had started collaboration with key non-programme health care providers, including prison services, university hospitals, health insurance organization, nongovernmental organizations and the private sector.

A global public–private mix consultation workshop was hosted by the Regional Office on 3–6 June 2008. Most countries in the Region are applying different public–private mix involvement schemes, and have guidelines (Afghanistan, Egypt, Lebanon, Pakistan, Somalia, Yemen), or are drafting guidelines (Iraq, Sudan, Syrian Arab Republic, Tunisia). Most countries also have public–private mix national focal points, and a public–private mix national taskforce/ committee.

6.2 Achievements

6.2.1 Overview

Countries have made considerable progress in public–private mix-related activities during 2007. The following national tuberculosis programmes have identified or recruited a full-time focal person in their central unit who is responsible for public–private mix-related issues: Afghanistan, Egypt, Pakistan and northern Sudan. National situation analyses were conducted in four countries: Afghanistan, Egypt, Pakistan and Yemen. Task forces and guidelines were developed in these countries as well as in the Islamic Republic of Iran.

Four countries reported that all non-programme providers were engaged in tuberculosis control, either by referring tuberculosis suspects to the national tuberculosis programme, referring their diagnosed cases or notifying their treated cases to the programme. These countries are: Bahrain, Lebanon, Oman and Qatar. In addition, the proportion of cases detected by non-programme providers constituted one third or more of the total tuberculosis cases in Egypt, Islamic Republic of Iran, Jordan, southern Sudan and Syrian Arab Republic.

In contrast, the proportion of cases detected by non-programme providers constituted less than 10% of the total tuberculosis cases in four programmes: Iraq, Pakistan, northern Sudan and Yemen.

The International Standards for Tuberculosis Care constituted part of the training material and was included in the curricula of medical schools in eight countries: Bahrain, Iraq, Islamic Republic of Iran, Jordan, Kuwait, Oman, Saudi Arabia and Syrian Arab Republic. It was the only part of the training material not included in the curricula of medical schools in Lebanon, Qatar and northern Sudan . The status of public–private mix implementation in the Region is shown in Table 32.

The revised recording system enabled the precise contribution of different providers to case notification to be assessed in the countries that had introduced it. The contribution of different care providers to case notification in Egypt during 2008 is shown in Table 33. Figure 9 shows that around 40% of national tuberculosis programme cases in Egypt were referred from other public and private providers, in addition to those notified after diagnosis and treatment listed in Table 34.

6.2.2 Pakistan

The review mission conducted in 2008 was especially encouraged with the national tuberculosis programme's initiatives, particularly regarding public–private mix and advocacy, communication and social mobilization. In Punjab and Sindh, respectively, 30% and 21%

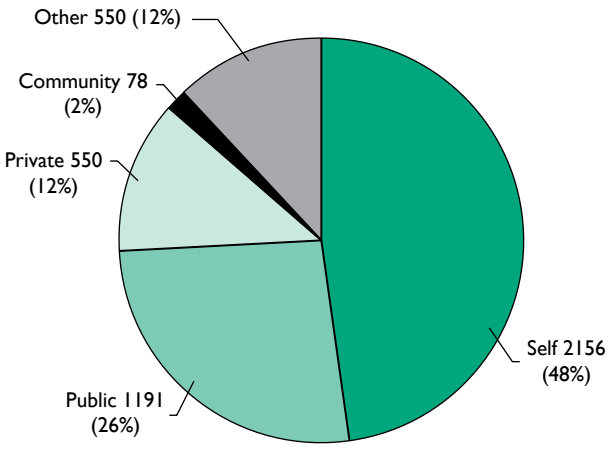


Figure 9. Tuberculosis cases notified by the national tuberculosis programme in Egypt by source of referral (a sample of 4049 cases entered in the E-nominal recording and reporting system in 2008)

Table 32. Public–private mix policy and status of implementation in countries in the Region (2007) *(continued)*

Country	Public–private mix focal point	Steps of public–private mix implementation	Public–private mix coverage, practice	Proportion of cases detected by non-programme providers	ISTC and endorsement by professional association
Afghanistan	Yes	Task force, NSA and guidelines were developed	–	747/28 769 (2.6%) cases in 2007	No
Bahrain	No	None	Public providers refer suspects, diagnose and refer cases, and treat and notify cases with NTP drugs Private sector refers suspects and diagnosed cases to NTP	–	ISTC part of the training material and included in curricula of medical schools
Djibouti	No	None	Non-NTP refers suspects or diagnosed cases to NTP 11/11 (100%) private facilities and 7/7 (100%) public facilities are engaged	–	No
Egypt	Yes	Task force, NSA and guidelines were developed	8 902/55 546 (16%) private facilities and 148/473 (31%) public facilities are engaged	2 266/9 732 (23%) cases were notified from non-NTP in 2008. In addition, 38% of NTP cases were detected by referral from non-NTP providers in 2007	No
Iran, Islamic Republic of	–	Public–private mix guidelines exist	100% of public non-NTP facilities are engaged	6 114/9 490 (64%) cases were detected by non-NTP in 2007	ISTC part of the training material and included in curricula of medical schools
Iraq	–	–	4/228 (1.8%) of public non-NTP facilities (prisons and military) are engaged	–	ISTC endorsed by professional associations ISTC part of the training material and included in curricula of medical schools
Jordan	–	–	22/22 (100%) of public non-NTP facilities are engaged	120/344 (35%) cases were detected by non-NTP in 2007	ISTC endorsed by professional associations ISTC part of the training material and is included in curricula of medical schools
Kuwait, Saudi Arabia	–	–	–	–	ISTC part of the training material in Kuwait and Saudi Arabia. ISTC endorsed by professional associations and included in the curricula of medical schools in Kuwait
Lebanon	–	–	All 13 316 of public non-NTP facilities, and the 35 private facilities are engaged	413 out of 476 (87%) cases were detected by non-NTP (by referral) in 2007	ISTC part of the training material but neither endorsed by professional associations nor included in curricula of medical schools
Oman	–	–	All public and private non-NTP facilities are engaged	–	ISTC part of the training material and included in curricula of medical schools

Table 32. Public–private mix policy and status of implementation in countries in the Region (2007) *(concluded)*

Country	Public–private mix focal point	Steps of public–private mix implementation	Public–private mix coverage, practice	Proportion of cases detected by non-programme providers	ISTC and endorsement by professional association
Pakistan	Yes	Task force, NSA and guidelines were developed	5 005/100 030 (5%) private facilities are engaged; 19/78 (24%) public facilities are engaged	7 100/234 100 cases (3%) were detected by non-NTP in 2007	ISTC part of the training material
Occupied Palestinian territory	–	–	–	5/34 cases (15%) were detected by non-NTP in 2007	No
Qatar	–	–	All non-NTP facilities are engaged	All cases were detected by non-NTP and referred or notified in 2007	ISTC part of the training material
Sudan (northern)	Yes	Task force, NSA and guidelines were developed	23/1246 (2%) private facilities are engaged; 184/443 (42%) public facilities are engaged	–	ISTC part of the training material
Sudan (southern)	No	–	17/106 (16%) private facilities are engaged; 3/3 (100%) public facilities are engaged	3 877 out of 5 237 cases (74%) were detected by non-NTP and referred or notified in 2007	No
Syrian Arab Republic	No	–	1 160/1 540 (75%) private facilities are engaged; 162 out of 162 (100%) public facilities are engaged	6 858 out of 12 998 (53%) tuberculosis suspects were referred by non-NTP in 2007	ISTC endorsed by professional associations ISTC part of the training material and included in curricula of medical schools
Yemen	Yes	Task force, NSA and guidelines were developed	300 of non-NTP facilities (public/private) engaged out of 4091 (7%)	–	No

ISTC The International Standards for Tuberculosis Care; NSA national situational analysis; – information not available; NTP national tuberculosis programme

Table 33. Contribution of different care providers to case notification in Egypt during 2008

Type of provider	New smear positive	New smear negative	Extra-pulmonary	Relapse	Treatment after failure	Treatment after default	Total
National tuberculosis programme	3 814	849	1 971	422	141	144	7 341
Prison	219	39	26	9	2	2	297
Health insurance organization	509	192	370	38	9	4	1 122
University	181	40	220	6	0	0	447
Non-nationals	26	5	11	3	0	2	47
African refugees	12	29	37	0	0	0	78
Army chest hospitals	115	1	3	0	0	0	119
Police	24	2	5	0	0	0	31
Private sector	183	23	43	1	0	0	250
Total	5 083	1 180	2 686	479	152	152	9 732

Table 34 Number of notified smear-positive tuberculosis cases by province in Pakistan, 2004–2007[a]

Province	2004	2005	2006	2007
Balochistan	1 859	2 720	3 343	3 659
NWFP	5 887	8 554	10 063	11 874
Punjab	7 527	17 010	30 172	47 926
Sindh	12 078	16 055	18 812	21 591
AJK	1 353	1 221	1 086	1 297
FATA	918	1 033	971	1 043
NA	121	124	139	163
Pakistan	31 557	48 220	65 711	88 747
Case-detection rate (%)	27	37	50	66

[a]Based on the projected population according to the 2004 revision of the United Nations Population Information Network (POPIN).

AJK, Azad Jammu and Kashmir province; CDR, case detection; FATA, Federally Administered Tribal Areas; NA, northern areas; NWFP, North-West Frontier Province.

of all forms of tuberculosis were notified from the private sector. Green Star expanded its care with GFATM Round 6 support, and other private hospitals started tuberculosis care with PC-1 government support. Tertiary care hospitals in large cities, such as Ghulab Devi and Ganga Ram in Lahore, have started expanding tuberculosis care in collaboration with partners JICA and the Association for Social Development, respectively, and also with financial support from GFATM Round 6.

As a result, tuberculosis notifications have continued to increase, reaching 88 747 new smear-positive cases and 234 100 cases of all forms of tuberculosis in 2007, an increase from 65 711 and 179 780 in 2006, respectively. The estimated case detection rate has reached 66% for smear-positive cases, and 78% for all tuberculosis forms. Treatment outcomes also remain high, at 88% in the 2006 cohort. Pakistan has almost achieved the global target of 70% case detection rate according to the current estimated incidence, and certainly achieved the global target of 85% treatment success rate. Pakistan has laid foundations for effective tuberculosis care through the network of government health services and has started to expand the care to private and other non-programme health services.

Table 34 shows the number of notified smear-positive tuberculosis cases by province in Pakistan (2004–2007).

6.2.3 Egypt

Collaboration with the health insurance organization has been strengthened, addressing in particular several past deficiencies. The review mission observed that tuberculosis focal persons of the health insurance organization, at the central and each governorate level, were active. Training of relevant health insurance organization staff has been conducted, and programme-recommended registers and cards with new recording and reporting formats are being used.

Field visits to two health insurance organization-operated tuberculosis centres in Alexandria confirmed that the health insurance organization staff have been trained and were well versed with national tuberculosis programme policies. Programme-supplied registers and formats were in place and the new recording and reporting system was being followed. Though uneven, investigation and management of tuberculosis suspects as well as contacts was being undertaken by the visited health insurance organization facilities in Alexandria.

The national tuberculosis programme has signed memoranda of understanding with the prison services, as well as the army, both of whom have been reporting cases to the programme.

6.2.4 Sudan

The review mission conducted in 2008 noted that the following public–private mix activities were implemented during 2007–2008:

- Workshop for health insurance organizations, police and army (60 participants funded by WHO)
- Public–private mix analysis
- According to GFATM activities:
  - » Training for health workers to establish/reactivate tuberculosis monitoring units in health insurance; uniform (police, prison and army)
  - » Training for charity clinics in Kassala and Khartoum state.

Only the public, non-national tuberculosis programme providers were engaged, and the programme has yet to engage private providers. A survey conducted in the private clinics and hospitals showed that a considerable number of cases were treated in these facilities but they were not notified to the programme. The survey also reported non-adherence of these private providers to programme guidelines.

6.3 Challenges

- There is a general perception that detecting missing cases, which constitute around 40% of the estimated burden in the Region, is likely to be managed mainly by providers not yet linked to the national tuberculosis programme. Therefore, an important challenge is to address the issue of engaging all care providers in tuberculosis care and control more comprehensively than at present.
- The presence of a focal person and a national situation assessment notwithstanding, the national tuberculosis programme strategy to engage other care providers, especially the private, for-profit sector, still remains unclear in some countries.
- Engagement of large hospitals and academic institutions in tuberculosis care and control has by far been the weakest at the regional level. For example, a large, 1200-bedded university hospital that the mission visited in Cairo, with about 800 daily general outpatients and about 200 chest diseases outpatients, reported only 14 pulmonary and 19 extra-pulmonary tuberculosis cases, just eight sputum smear-positive cases among them, in 2008. In the chest department of the hospital, case management was not in line with national recommendations and proper registers or reports were not maintained. The interaction with the national tuberculosis programme has been marginal. Although DOTS strategy was reportedly being taught in the medical school, it was not being implemented in the hospital.
- Some important weaknesses still remain in national tuberculosis programme implementation at the level of the engaged non-programme providers, e.g. quality assurance of sputum spear microscopy and use of the revised recording and reporting system.
- Antituberculosis drugs, first-line as well as second-line, were available in private pharmacies and could be bought without a prescription in most countries of the Region.

6.4. Recommendations

National tuberculosis programmes should:

- Give greater attention to engaging all care providers in tuberculosis care and control. This will require stronger commitment, strategic planning, increased financial and human resources, as well as systematic implementation.
- Set up a steering group on public–private mix at the central and governorate levels and organize regular meetings of the group to advise and monitor progress on public–private mix activities. The advisory panel should include high-level representation from all current and potential stakeholders. A public–private mix focal person from each governorate/province should be assigned to support public–private mix implementation.

- With guidance from the advisory panels, define strategies and steps of implementation for engagement of diverse care providers – general practitioners, chest physicians, private hospitals and academic institutions, health insurance, prison and military services. The approaches and roles of different providers would be different.
- Pay particular attention to large hospitals and academic institutions. Piloting hospital involvement in tuberculosis control in one or a few large hospitals in each governorate could inform and benefit subsequent scale-up.
- Consider greater and more productive engagement with professional associations, especially general practitioners, internists and chest physicians. The International Standards for Tuberculosis Care may be used as a tool for this purpose, during mandatory continuing medical education sessions and professional conferences. They should also encourage professional associations to take up the cause of tuberculosis control and motivate their members to contribute to the programme efforts in appropriate ways.
- Assist non-programme providers in introducing and sustaining programme policies that are not yet adopted, e.g. identifying ways to introduce DOTS, laboratory quality assurance, and proper suspect and contact management.
- Advise each chest clinic to map out all care providers in its area, establish regular contact and communication with relevant providers and offer relevant information on programme guidelines and procedures. They should also establish a system for sending prompt feedback letters to referring providers. These interventions should be piloted in selected governorates before a phased, nationwide scale-up.
- Consider regulatory actions to make all antituberculosis medicines available upon prescription only. The use of rifampicin should be restricted for treatment of tuberculosis only and the use of all first-line and second-line antituberculosis medicines rationalized as part of public–private mix initiatives.
- Conduct studies to evaluate the extent of underreporting of tuberculosis cases by non-national tuberculosis programme providers, and the extent of sale of antituberculosis medicines in private pharmacies.

7. Empowering people with tuberculosis and communities

7.1 Advocacy, communication and social mobilization

A multicountry Eastern Mediterranean regional advocacy, communication and social mobilization planning workshop for tuberculosis control, was jointly hosted by Stop TB and Global Stop TB Partnership in Amman. Participants from Egypt, Jordan, Iraq, Morocco, Pakistan and Sudan attended the workshop and planned for effective implementation of GFATM-funded advocacy, communication and social mobilization grants.

7.2 Technical support

Stop TB mobilized and coordinated technical assistance to cover project-management capacity gaps in advocacy, communication and social mobilization in Afghanistan, Egypt, Iraq and Morocco. Technical support was provided in the following areas.

- Case studies were developed on Pakistan's implementation of advocacy, communication and social mobilization interventions in GFATM Rounds 2 and 6 and a national advocacy, communication and social mobilization strategy was finalized.
- Egypt was supported in the development of national advocacy, communication and

social mobilization strategy for 2009–2014, development of protocols for a nationwide knowledge, attitudes and practices study, and first-ever patient-provider communication guidelines on multidrug-resistant tuberculosis.

- Afghanistan was supported to develop its national advocacy, communication and social mobilization strategy and a planning workshop for effective initiation and implementation of GFATM Round 8 interventions.
- Technical support was coordinated for the national tuberculosis programme in Iraq on development of an advocacy, communication and social mobilization national strategic plan.
- Morocco was assisted with a national-level workshop on effective planning and implementation of advocacy, communication and social mobilization interventions in country context.
- Afghanistan and Yemen were given technical support in drafting the advocacy, communication and social mobilization component for GFATM Round 8 grant applications.
- Egypt, Iraq, Morocco, Pakistan, Somalia, southern Sudan and Yemen were given technical support in drafting and budgeting the advocacy, communication and social mobilization component for GFATM Round 9 grant applications.

With support from Stop TB Partnership, Geneva, a day-long exclusive orientation for national tuberculosis programme managers and WHO field teams in the Region was organized by the Reional Office in Cairo. The workshop focused on explaining the role of advocacy, communication and social mobilization in tuberculosis control interventions and how to effectively create synergies with the media.

7.3 Advocacy products

Stop TB assisted countries in the production of the following advocacy documents in 2008:

- *Voices of the unheard* (a pictorial book on tuberculosis in Afghanistan).
- *Not everyone dies in conflict in Iraq* (a pictorial book on tuberculosis and the impact of conflict on tuberculosis control).
- *Endangering lives. TB and its mutation* (a photo book on multidrug-resistant tuberculosis patients in the Region).
- *Revive hope – Stop TB in Pakistan* (a pictorial book on tuberculosis and multidrug-resistant tuberculosis patients in Pakistan).
- A situation analysis report on public–private mix DOTS in Pakistan.
- Translation and adaptation of Global Stop TB Ambassador Luis Figo's campaign in Arabic. The campaign included posters, post cards, comic books and animation films based on comic book stories.
- With support from the Global Stop TB Partnership, translation into Arabic and French of a handbook on advocacy, communication and social mobilization for country programmes.
- Provision of technical support to Afghanistan and Pakistan to prepare and publish annual reports.
- Engagement of two professional photographers in Egypt, Iraq, Jordan, Pakistan, Sudan and Syrian Arab Republic, to photograph tuberculosis patients, their environment and tuberculosis facilities. The photographs have been widely used in the development of advocacy books, post cards, web sites and other information products. Similar activities are planned for 2009 in other countries.

7.4 Case studies in six countries

A multicountry documentation exercise on public–private mix and the role of advocacy, communication and social mobilization in public–private mix interventions was initiated by Stop TB in 2008. This study aims to: describe public–private mix model/s being applied in study countries; discuss how clearly the details of a model have been spelled out, e.g. availability of public–private mix guidelines, standard operating procedures and documentation mechanisms; and investigate the role public–private mix and relevant advocacy, communication and social mobilization interventions have played in enhancing (if any) case detection rates and treatment outcomes for tuberculosis control in the country. The study has been conducted in Afghanistan, Egypt, Islamic Republic of Iran, Pakistan, Tunisia and Yemen.

7.5 Other advocacy activities

The Global Stop TB Ambassador, Anna Cataldi, visited Afghanistan, Jordan and Pakistan in 2008. During her visits, she met ministers for health and senior policy-makers, e.g. the governor in Afghanistan, the royal family in Jordan and the head of the national parliament in Pakistan. Her visits were widely covered by local and national media. Ms Cataldi's support to countries in the Region has been instrumental in raising the profile of tuberculosis at the national level as well as connecting national tuberculosis programmes with potential financing sources, such as the Italian Cooperation.

The 39th Union World Conference on Lung Health was held in Paris from 16 to 20 October 2008. Stop TB assisted Afghanistan, Pakistan and Sudan in organizing donor relation meetings on the sidelines of conference proceedings. A well-visited stall for advocacy products from Stop TB and countries in the Region was also established at the conference venue.

7.6 The Eastern Mediterranean Partnership to Stop TB

The Eastern Mediterranean Partnership to Stop TB was launched in May 2008 with a coordinating board, secretariat and committees on resource mobilization and scaling-up tuberculosis care. The launch was announced on the occasion of the 14th Coordinating Board Meeting of the Global Stop TB Partnership in Cairo. The Secretariat of the Eastern Mediterranean Partnership to Stop TB is hosted at the Stop TB Unit of the Regional Office, which has the responsibility of overseeing partnership and coordination among partners.

Since the launch of the partnership, its governing body, i.e. Coordinating Board, has held regular meetings to review progress of secretariat and partners and has taken policy steps, e.g. prioritizing national partnerships in the Eastern Mediterranean Partnership to Stop TB plan of action.

Through the platform of the partnership, technical support in national partnership creation and strengthening has been initiated for several countries including Afghanistan (Box 1), Egypt, Kuwait, Pakistan, Sudan and Syrian Arab Republic. This support has been instrumental in formation of national tuberculosis partnerships in Egypt, Syrian Arab Republic and Sudan.

In addition, the Secretariat of the Eastern Mediterranean Partnership to Stop TB has also produced partnership introductory products and documents, including a logo, leaflets, a partnership

Box 1. National partnership to Stop TB, Afghanistan

Afghanistan, with assistance from Stop TB, announced the launch of its national tuberculosis programme to Stop TB in November 2008. The programme is financed by the Canadian International Development Agency (CIDA) and hosted by the WHO country office and has broad representation from public and private sectors and development partners. In March 2009, the programme successfully mobilized 1.2 million schoolchildren to march on the occasion of "Million Youth March" in the Region. Governed by a coordinating board, the Programme has functional committees on resource mobilization, international relations and information and is chaired by the Dean of Kabul Medical University.

website (Box 2), meeting reports, draft guidelines on how to create and sustain national tuberculosis programmes and a finance plan for 2009. An easy-to-use guide on developing national tuberculosis programmes in Arabic is also under preparation.

Box 2. Million Youth March – Marching for a tuberculosis-free Eastern Mediterranean

On the eve of World Tuberculosis Day 2009, the Eastern Mediterranean Partnership to Stop TB partnered with national tuberculosis programmes, civil society organizations, development partner institutions and media and organized a gathering of more than 2 million young people for the first time in the history of tuberculosis.

The "I am stopping tuberculosis – Million Youth March" campaign was inspired by the existing 1 million tuberculosis patients in the Region and targeted young people from schools, colleges and universities to gather in streets, playgrounds and educational institutions to raise their voice for stopping tuberculosis.

More than 20 countries from Afghanistan to Morocco actively participated in the campaign and according to available estimates, more than 2 million people gathered on this occasion. In many places, development personalities, politicians, civil society leaders and celebrities joined the marchers.

The Secretariat of the Eastern Mediterranean Partnership produced advocacy material kits, a web site (www.millionmarch4tb.org) and distributed t-shirts, caps, stickers, banners and brochures among students.

8. Operational research

8.1 Operational research studies

Twelve programmes reported having conducted operational research studies during 2007–2008: Afghanistan, Djibouti, Egypt, Jordan, Kuwait, Morocco, Oman, Pakistan, Somalia, northern Sudan, Syrian Arab Republic and Yemen. The total number of projects conducted in the Region was 46; the highest number of projects was in northern Sudan. Only three programmes identified or recruited research focal points in the central unit: Egypt, Pakistan and northern Sudan. Table 35 shows the list of operational research studies conducted during 2007–2008, the sources of the funding and the status of their implementation.

During 2008, a total of 47 projects were submitted in response to the call for applications from the Regional Office/Special Programme for Research and Training in Tropical Diseases (TDR) Small Grants Scheme, and 11 were finally accepted from the following countries: Afghanistan, Egypt, Morocco, Oman, Pakistan, Sudan and Yemen.

8.2 Use of new technology and strategies

Table 36 shows the use of new tools/technologies in tuberculosis diagnosis during 2007–2008. Only five countries used fluorescence microscopy, six countries used liquid culture and drug susceptibility testing, and three countries used line probe assay for the diagnosis of resistance to rifampicin and isoniazid.

8.3 Research capacity strengthening

An intercountry research methodology and proposal development workshop was held in September 2007 in Cairo. Proposals were developed and submitted for funding to the Regional Office/TDR Small Grants Scheme during 2008. All countries that applied for Round 8 GFATM were given technical support to develop the research components of their proposals. Funds were allocated for selection committee meetings, technical support, international and national training, and research dissemination activities, e.g. publications, web site development, newsletters and meetings with policy-makers. As examples, northern Sudan held two selection committee meetings and 20 projects were accepted for funding with technical support from the Regional Office. A surveillance officer received international training in research methods and was recruited as a research focal point. The national tuberculosis programme in Egypt organized a research methodology workshop funded by the GFATM, facilitated by the Regional Office.

Technical support was also given during country missions in Egypt, Jordan, Pakistan and Sudan. This is in addition to the on-line technical support in protocol development, data analysis,

Table 35. Operational research activities during 2007–2008 *(continued)*

Country	Research focal point	Number of projects during 2007–2008	Titles of projects	Sources of funding	Status of dissemination of results and their use in policy and practice
Afghanistan	No	3	Impact of active case finding among household contacts of tuberculosis patients on the case detection rate in Afghanistan	Regional Office/TDR Small Grants Scheme	Final report submitted (2009)
			Identifying all tuberculosis cases detected in the health system in Afghanistan: a new approach to revisit the tuberculosis case detection rate	Regional Office/TDR Small Grants Scheme	Final report submitted (2009)
			Role of private pharmacies in detecting tuberculosis cases	Regional Office/TDR Small Grants Scheme	Final report submitted (2009)
Djibouti	No	1	Identifying all tuberculosis cases detected in the health system in Afghanistan: a new approach to revisit the tuberculosis case detection rate	Regional Office/TDR Small Grants Scheme	Final report submitted A manuscript is under preparation (see Section 9.1)
Egypt	Yes	8	Estimating tuberculosis incidence in resource-limited countries: a capture–recapture study in Egypt case detection	GFATM	Final report submitted A manuscript is under preparation The revised estimated incidence was based on the study results
			Prevalence of HIV infection and pathway to HIV care among tuberculosis cases enrolled in DOTS settings in Egypt in 2008	Regional Office/TDR Small Grants Scheme	Ongoing
			Feasibility of engaging the Health Insurance Organization in tuberculosis control: testing a new public–public model	GFATM	Ongoing
			Drug resistance survey	GFATM	Ongoing
			Molecular characterization of tuberculosis isolates in Egypt	GFATM	Ongoing
			Determinants of re-treatment among tuberculosis cases in four Egyptian governorates	GFATM	Ongoing
			Risk factors of tuberculosis disease and progression from infection to disease	GFATM	Ongoing
			Use of antituberculosis drugs in private pharmacies in Egypt	GFATM	Ongoing
Jordan	No	3	Prevalence and annual risk of tuberculosis infection among unvaccinated children at school entry (~ 6 years old) in Jordan	GFATM	Data analysis and report writing
			Non-compliance of smear-positive pulmonary tuberculosis patients towards direct observation treatment short-course (DOTS) chemotherapy strategy and its determinants in Jordan	GFATM	Data analysis and report writing
			Drug resistance survey	GFATM	Data analysis and report writing

Table 35. Operational research activities during 2007–2008 *(continued)*

Country	Research focal point	Number of projects during 2007–2008	Titles of projects	Sources of funding	Status of dissemination of results and their use in policy and practice
Kuwait	No	3	Epidemiology and management of multidrug-resistant tuberculosis	Ministry of Health	–
			Predictors of mortality from pulmonary tuberculosis	Ministry of Health	–
			Determinants of default from pulmonary tuberculosis treatment in Kuwait	Ministry of Health	–
Morocco	No	3	Quantiferon study	–	–
			Drug resistance survey	–	–
			Thesis	–	–
Oman	No	3	Diagnostic delay	Ministry of Health	–
			Knowledge, attitudes and practices about Ministry of Health policy	Ministry of Health	–
			Knowledge, attitudes and practices among medical doctors in private and public sector	Ministry of Health	–
Pakistan	Yes	5	Extent of under reporting by private sector: a new approach to revisit the tuberculosis burden	Regional Office/TDR Small Grants Scheme	Final report submitted A manuscript is under preparation
			To determine the effect of contact tracing and their impact on treatment outcome in two districts of Baluchistan	Regional Office/TDR Small Grants Scheme	Ongoing
			To asses the acceptability of HIV testing by tuberculosis patients	–	–
			To asses the high risk behaviours and HIV status in tuberculosis patients	–	–
			Prevalence of pulmonary tuberculosis among adult population in Pakistan, during 2010	Tuberculosis Control Assistance Programme	Protocol development and study preparation
Somalia	No	1	Evaluating the effect of DAMMIIN system (grantor system) on tuberculosis drug compliance and its impact in treatment outcome and case detection rate	Regional Office/TDR Small Grants Scheme	Final report submitted A manuscript is under preparation
Sudan (northern)	Yes	12	Supervision practices of the tuberculosis patients receiving DOTS in tuberculosis monitoring unit Jabel Awlia locality	–	–
			Careseeking behaviour of pulmonary tuberculosis patients in Gadarif and Kassala state	–	–
			Evaluation of the tuberculosis contact-tracing system in Khartoum state	–	–

Table 35. Operational research activities during 2007–2008 *(concluded)*

Country	Research focal point	Number of projects during 2007–2008	Titles of projects	Sources of funding	Status of dissemination of results and their use in policy and practice
			Assessment of tuberculosis patient accessibility to DOTS at Gadarif state	–	–
			Knowledge, attitudes and practices of physicians working in public-health facilities with regarded to tuberculosis at Khartoum state	GFATM	Final report submitted in 2009
			System assessment of human resources development capacity for tuberculosis control in Sudan with focus on management staff	–	–
			Active case finding among contacts in Gezira state	Regional Office/TDR Small Grants Scheme	Final report submitted A manuscript is under preparation
			Tuberculin survey	GFATM	Final report submitted A manuscript is under preparation
			Comprehensive approach to lung health project	World Bank	Final report submitted
Syrian Arab Republic	No	1	Detection of tuberculosis in private laboratories in the Syrian Arab Republic	Regional Office/TDR Small Grants Scheme	Final report submitted A manuscript is under preparation
Yemen	No	3	Determination of the prevalence and annual risk of tuberculosis infection in the Republic of Yemen	GFATM	Final report submitted A manuscript is under preparation
			Identification of all tuberculosis cases in the health system: a new approach to revisit the case detection rate – pilot phase	GFATM	Final report submitted A manuscript is under preparation
			Validating the results of the tuberculin survey using the interferon gamma release assay test	GFATM	Final report submitted A manuscript is under preparation

GFATM Global Fund to Fight AIDS, Tuberculosis and Malaria
TDR Special Programme for Research and Training in Tropical Diseases
– information not available

Table 36. Use of new tools/technologies and strategies in tuberculosis diagnosis

New tools/technologies and strategies	Countries
Fluorescence microscopy	Bahrain, Djibouti, Iraq, Islamic Republic of Iran, Oman
Liquid culture and drug susceptibility testing	Bahrain, Egypt, Iraq, Kuwait, Lebanon, Oman
Rapid speciation test for Mycobacterium tuberculosis cultures	Bahrain, Islamic Republic of Iran, Kuwait, Lebanon, Oman
Line-probe assay for detecting resistance to rifampicin	Bahrain, Islamic Republic of Iran, Libyan Arab Jamahiriya, Oman
Line-probe assay for detecting resistance to rifampicin and isoniazid	Bahrain, Islamic Republic of Iran, Oman
Using a smear-positive case definition based on a patient having one positive sputum smear (≥ 1 acid-fast bacilli per smear) instead of two positive smears	Egypt, Libyan Arab Jamahiriya, Oman

report writing and publication in peer-reviewed journals.

8.4 Research dissemination

Final reports of studies supported by the Regional Office/TDR Small Grants Scheme were communicated to policy-makers. Studies were also summarized and published in the Final Report Summary series. The 4th portfolio of the Regional Office/TDR Small Grants Scheme incorporating five tuberculosis studies was developed during 2008 and will be published in 2009.

Publication in peer-reviewed journals is one of the challenges facing researchers in the countries of the Region, mainly due to weak scientific writing skills. Therefore a training of trainers workshop in scientific writing was supported by the Regional Office and focal points were identified from each country to assist researchers in developing manuscripts.

8.5 Recommendations

- Identify/recruit research focal points in all national tuberculosis programmes. Surveillance officers are the best candidates for these positions. These focal points would establish collaboration with academic institutions and coordinate research activities at all levels of the programme.
- Develop research strategy and plans within the programmes.
- Pursue the current efforts of incorporating a research component in the GFATM proposal in order to provide the funds needed to support a comprehensive research strategy and plan.
- Strengthen research capacity of health workers in research methods, proposal development and scientific writing.
- Ensure the translation of research findings into policy and practice of the Programme by communicating research results to policy-makers.

9. Impact measurement

9.1 The WHO Global Task Force on Tuberculosis Impact Measurement

9.1.1 Composition and objectives

Based on WHA 60.19, WHO is required by its Member States to report on whether the 2015 global targets for tuberculosis control are achieved and on progress in the interim, and to help to strengthen health information systems. The Global Task Force on TB Impact Measurement was established by WHO in June 2006. The task force's mandate is to: produce a robust, rigorous and widely endorsed assessment of whether the 2015 targets set for tuberculosis control are achieved at global level as well as for each WHO region and individual countries; report regularly on progress towards these targets in the years leading up to 2015, including analysis of how progress could be accelerated; and strengthen national capacity in monitoring and evaluation of tuberculosis control. The task force includes experts in tuberculosis epidemiology, representatives from major technical and financial agencies, and representatives from countries with a high tuberculosis burden.

Following two task force meetings (June 2006 and December 2007), the task force defined and reached consensus on three major strategic pathways that will need to be followed to fulfil its mandate: 1) strengthening routine surveillance of tuberculosis cases and deaths, including certification and operational research; 2) implementation of disease prevalence surveys; and 3) production of epidemiological estimates and evaluation of how trends are influences by tuberculosis control. Each of these three areas of work is based on a task force review of the methods available to measure the epidemiological burden of tuberculosis and the impact of control efforts, which was published in 2008 [6].

Surveillance data will be essential for measuring tuberculosis incidence, prevalence and mortality

in all countries. A "certification" process designed to allow standardized assessment and benchmarking of the quality of a country's tuberculosis surveillance data will be developed and applied. It will include standardized analysis of routine notification and (where they exist) vital registration data, production or use of evidence from operational research, and either granting of "certified" status or identification of how surveillance systems need to be strengthened. This area of work will become increasingly important over time.

The task force has identified 21 countries in which surveys of the prevalence of disease are necessary, mainly in Asia and Africa. From the Region, only Pakistan is included among the 21 countries identified. Given the current limitations of routine tuberculosis surveillance data and the long-term efforts that will be needed to strengthen them, this area of work is critical for measuring progress towards the 2015 targets.

Measuring progress towards the 2015 targets requires the production of estimates of incidence, prevalence and mortality between 1990 and 2015. Periodic review and updating of the data where appropriate, and of assumptions and analytical methods used by WHO to produce these estimates, are essential to maintain consensus around widely used figures.

9.1.2 Organization of work

A concept note was designed to explain the work of the task force, in particular for the purpose of resource mobilization. The concept note explains: why impact measurement is important; when and why the task force was established; the three major strategic pathways to be followed to implement the task force's mandate; the organization of the task force's work; the budget for 2008–2010; how findings and recommendations will be communicated; and their expected impact.

A policy paper entitled "Measuring progress in global tuberculosis control: WHO policy and recommendations" was prepared based on the paper published by members of the Task Force in January 2008 [6]; the recommendations of the December 2007 meeting; the concept note; the comments from WHO's Strategic and Technical Advisory Group on Tuberculosis during its meeting in June 2008; existing workshop material; and further development of ideas related to the measurement of tuberculosis incidence by the WHO secretariat from mid-2008 onwards. This was the most important background document for the Task Force's September 2008 meeting, as one of the main objectives of the meeting was to review the policy paper.

9.2 Progress to date in the three strategic areas of work

9.2.1 Strengthening routine surveillance

WHO organized a 5-day workshop (14–18 July 2008) in Cairo in which five countries attended: Djibouti, Egypt, Pakistan, Syrian Arab Republic and Yemen. These countries had recently implemented operational research studies with the aim of assessing the number of cases being diagnosed and treated by private providers, but not notified. This assessment included use of capture–recapture methods. The main objective of the workshop was to help participants perform record linkage and data analysis, and to write a preliminary draft report of the main study findings. The methods and the preliminary findings of this workshop were discussed during the task force's September 2008 meeting. The task force endorsed the capture–recapture technique as a method for estimating tuberculosis incidence, conditional to the fulfilment of the assumptions. The results of the capture–recapture studies were used to revisit the estimated tuberculosis incidence in Egypt and the Syrian Arab Republic in the WHO global tuberculosis report [2]. Djibouti did not fulfil the assumptions required to conduct capture–recapture analysis due to cross-border populations. Yemen had few numbers of cases in each data source. It was recommended to use the study results as a pilot and to expand the study in 2009 in a larger number of governorates. Pakistan had to verify the final diagnosis and re-enter the

data; this was completed during 2009, the final report has been submitted and a manuscript is currently under preparation.

9.2.2 Disease prevalence surveys

Two one-week training workshops were held at WHO headquarters, Geneva for 10 of the 21 priority countries without recent experience of conducting a disease prevalence survey. The first was held on 10–14 March 2008 and was attended by participants from Malawi, Nigeria, Pakistan and Uganda; the second was held on 25–29 August 2008 and was attended by participants from Ghana, Kenya, Rwanda, South Africa, Thailand and Zambia. The workshops were facilitated by staff from: Centers for Disease Control and Prevention (CDC); IUATLD; KNCV Tuberculosis Foundation; Research Institute for Tuberculosis, Japan; GFATM; and WHO. The Pakistan disease prevalence survey was developed and then finalized, including the development of a workplan in Cairo in 2009.

9.2.3 Methods for production of epidemiological estimates

The KNCV Tuberculosis Foundation hosted a meeting in The Hague to review current methods on 16–17 June 2008. The meeting was attended by several task force members as well as three experts from outside the task force. Feedback from this meeting and from the work that has been ongoing in this strategic area was provided and discussed during the task force's meeting in September 2008. The task force has developed a framework for estimating tuberculosis burden (Figure 10).

During 2007–2008, a tuberculin survey was conducted in Yemen. This survey reported a decline in tuberculosis prevalence and annual risk of tuberculosis infection using the mirror image and mixture methods. Both methods reported an annual decline of annual risk of tuberculosis infection of 9% and 5.5%, respectively. Moreover, a higher annual decline in females compared with

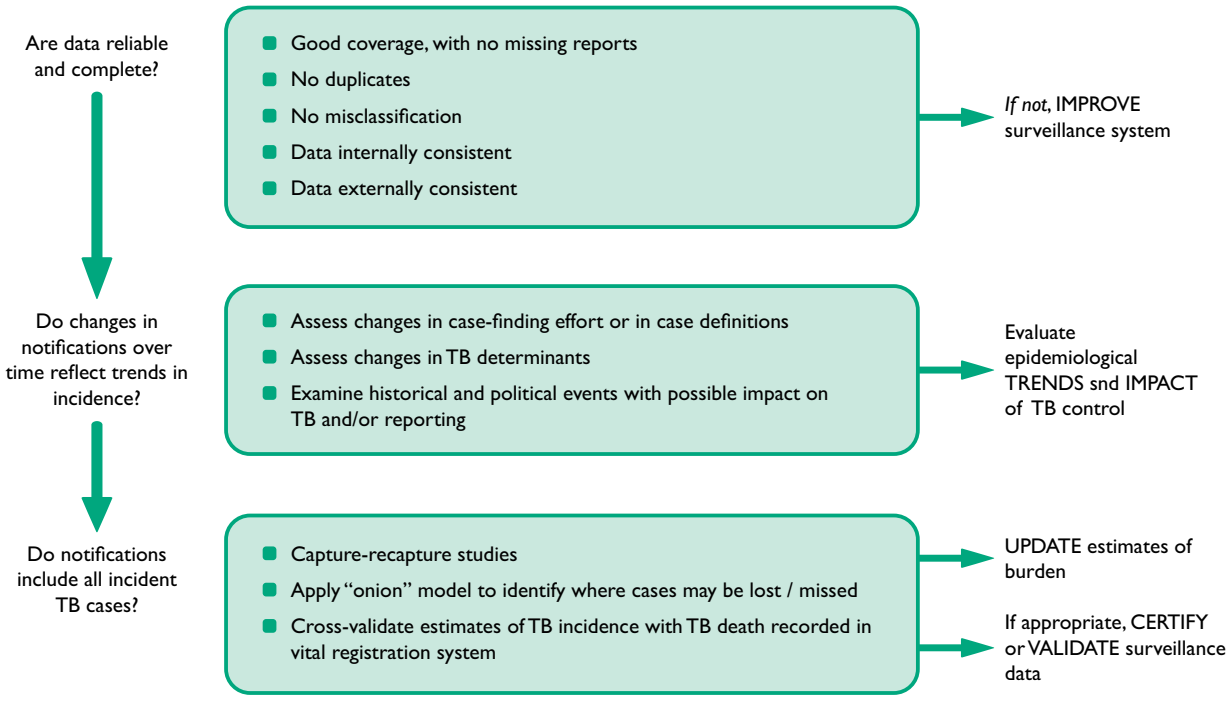


Figure 10. Framework for estimation and measurement of tuberculosis (TB) incidence using surveillance data

Table 37. Methods of estimating tuberculosis incidence in 2007 [1]

Country	Reference year	Incidence estimate based on	Trend
Afghanistan	2005	Notification	Not estimated
Bahrain	1997	Notification	Group, moving average
Djibouti	1997	Notification	Group, exponential
Egypt	2007	Notification/capture–recapture	Group, moving average
Iran, Islamic Republic of	NA	NA	NA
Iraq	2002	Annual risk of infection	Not estimated
Jordan	2002	Notification	Country notifications, moving average
Kuwait	1997	Notification	Group, moving average
Lebanon	2002	Notification	Country notifications, moving average
Libyan Arab Jamahiriya	1997	Annual risk of infection	Group, moving average
Morocco	1997	Notification	Country notifications, exponential
Oman	1997	Annual risk of infection	Country notifications, moving average
Pakistan	1997	Disease prevalence survey	Not estimated
Qatar	2002	Notification	Country notifications, moving average
Saudi Arabia	1997	Annual risk of infection	Country notifications, moving average
Somalia	2001	Annual risk of infection	Not estimated
Sudan	1997	Annual risk of infection	Group, exponential
Syrian Arab Republic	2007	Notification/capture–recapture	Country notifications, exponential
Tunisia	2001	Notification	Country notifications, moving average
United Arab Emirates	1997	Annual risk of infection	Group, moving average
West Bank and Gaza Strip	1997	Annual risk of infection	Group, moving average
Yemen	1997	Annual risk of infection	Group, moving average

– information not available

males was reported: 9.7% versus 8.8% with the mirror image method, and 5.9% versus 5.3% with the mixture method, respectively. Trend estimates of the prevalence were fairly robust, indicating a limited influence of the method of prevalence estimation on the trend estimates.

There were problems with the analysis due to the presence of cross-reactions, which interfered with the true tuberculosis infection. It was not possible to determine tuberculosis incidence based on the Styblo ratio of 50 smear-positive tuberculosis cases per 100 000 population for each 1% of annual risk of tuberculosis infection due to recent reports on the invalidity of this method [7].

Table 37 shows the different methods used to estimate tuberculosis burden in countries of the Region.

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Annex 1 Supervision checklists

Supervision checklist from the central unit to the governorate (intermediate) level		
Name and signature of supervisor		
1. General information		
Governorate	Quarter and year (last quarter prior to the visit dates):	Date of the visit

Total population in the governorate	
Number of districts in the governorate	
Number of districts with tuberculosis monitoring units under DOTS	
Number of tuberculosis monitoring units	
Number of treatment centres (e.g. primary health care centres)	
National tuberculosis programme guidelines available in the governorate tuberculosis centre? (Y/N)	
Number and % of district tuberculosis coordinators that attended the last quarterly meeting	
% of non-programme providers engaged (by referral of their suspects or diagnosed cases or notification to the programme) out of targeted	
% of cases detected by non-programme providers during last quarter	
Do other public or private non-programme providers attend the meetings with district tuberculosis coordinator? (Y/N)	
Number and % of public–private mix training courses during last quarter out of planned	

2. Human resources at governorate level					
	Job description	**Contacts**	**Time lapse since last training course (years)**	**Duration of training**	**Training: type and place**
1					
2					
3					
4					
5					
6					
7					
8					

3. Health education material	**Y/N**
Information, education and communication materials (e.g. on modes of transmission of the disease, importance of adherence to available treatment) available and distributed to the patients?	
Posters for physicians on treatment regimens and drug dosage?	
Patients charter available?	
Training/social mobilization/advocacy activities around tuberculosis?	

4. Supervisory visits	**Answer**
Mention the number of supervisory visits with feedback reports that were conducted during the previous quarter	
Vehicle available for supervisory visits of the governorate coordinator? (Y/N)	

5. Reporting system	**Answer**	
	Case finding	**Treatment outcome**
In line with the internationally recommended recording and reporting? (Y/N)		
Mention the number of reports submitted during the previous quarter		
Review 10 quarterly reports of each type (If less than 10: review all; between 10 and 20: every other report; between 20 and 30: every 3rd, etc.)	**Case finding**	**Treatment outcome**
How many reports were submitted before the deadline during the previous quarter?		
How many of the submitted reports were free of error during the previous quarter?		
How many of the submitted reports had no missing data during the previous quarter?		
Check for the presence of a summary table about the status of quarterly reports received from the district level in the different quarters		
Discuss governorate indicators based on: **The received quarterly report on case notification in the governorate (intermediate level)**	**Smear positive**	**All forms**
Number registered during last year		
Number registered during the last 2 quarters		
Number registered during last quarter		
Total number of smear-positive cases in block 1 equals		
The total number of cases in block 2 (age and sex distribution) (Y/N)		
Ratio of new smear-positive to new smear-negative and extra-pulmonary cases		
% of new smear-positive cases out of all new pulmonary tuberculosis cases (should be ≥ 65%)		
The received quarterly report on sputum conversion in the governorate (case holding for cases registered during the last quarter)	**Still on treatment**	**Treatment interrupted**
Smear positive		
All forms		
% conversion rate		

The received quarterly report on treatment outcome in the governorate for patients registered 12 months ago	**Answer**
% of smear-positive patients registered 12 months ago that were evaluated for treatment	
% cured	
% completed treatment	
% died	
% failure	
% defaulted	
% transferred out	
The received quarterly report on suspect management (last quarter)	**Answer**
% of suspects tested	
% positivity among suspects	
The received quarterly report on contact management (last quarter)	**Answer**
% of contacts evaluated	
% of suspects among evaluated contacts	
% of active tuberculosis among contacts (all forms; sputum-smear positive)	
% of under 5 year old contacts given isoniazid preventive therapy	
% of contacts of all ages given isoniazid preventive therapy	

6. Supplies (laboratory supplies in a separate laboratory checklist)						
6.1. Drugs*	**Current stock**			**Projected utilization over next 6 months**	**Adequate for next 6 months**	**Shortage during last quarter**
	Amount in stock card	**Amount by physical count**	**Difference**		**Y/N**	**Y/N**
RHZE (rifampicin + isoniazid + pyrazinamide + ethambutol)						
HRZ (isoniazid + rifampicin + pyrazinamide)						
RH (rifampicin + isoniazid)						
EH (ethambutol + isoniazid)						
R (rifampicin)						
H (isoniazid)						
Z (pyrazinamide)						
E (ethambutol)						
S (streptomycin) vial 1 gram						
Disposable syringes						
Water for injection						
Presence of expired drugs? (Y/N)						
If yes, which drugs?						
What is the proportion of expired drugs?						
If yes, what is the action taken?						

How does your store match up to the ideal store?		
	Description	**Answer Y/N or NA (not applicable)**
1	Presence of drug store keeper(s)?	
2	Have they been trained?	
3	Are medicines kept in a systematic way (e.g. alphabetical, pharmacological)?	
4	Are medicines stored directly on the floor?	
5	Is there adequate space between medicines and the walls?	
6	Are stock cards being used?	
7	If yes, are they up to date?	
8	Are shipments thoroughly inspected upon arrival (e.g. packaging in good condition, quantities, expiry dates)?	
9	Is there a method to control temperature (e.g. windows, air vents, ceiling, fans, air conditioning)?	
10	Is there a temperature chart for regular recording of temperature?	
11	Is there a method to prevent direct sunlight from reaching the stored drugs (e.g. windowpanes painted, curtains/blinds)?	
12	Is there evidence of moisture (e.g. leaking ceiling, roof, drains, taps, etc.)?	
13	Is there evidence of pests in the area (e.g. droppings, drug containers ruined)?	
14	Are tablets/capsules manipulated by bare hands?	
15	Are expired drugs separated from good drugs?	
16	Is there a system of safeguarding antituberculosis drugs from theft or vandalism (e.g. locked when unattended, only allow authorized persons to enter storage areas)?	
17	Are there fire extinguishers and/or fire alarms in order to deal with fire in warehouse?	

*Supervisor can select one or more drugs as appropriate

6.2. Check the food distribution report and evaluate the distribution system		
Summary of the visit		
Strengths	**Weaknesses**	**Recommended actions**

Supervision checklist from the central unit and/or governorate level to the tuberculosis monitoring unit/district					
Name and signature of supervisor					
1. General information					
Governorate		District		Tuberculosis monitoring unit under supervision	
Quarter and year (last quarter prior to the visit dates)					
Total population in the governorate					
Total population in the district					
Number of tuberculosis monitoring units in the district (could be one or more)					
Number of treatment centres (e.g. primary health care centres) in the district					
National tuberculosis programme guidelines available? (Y/N)					
% of non programme providers engaged out of targeted					
% of cases detected by non-programme providers during last quarter					
Do other public or private non-programme providers attend the meetings with district tuberculosis coordinator? (Y/N)					
Number of public–private mix training courses during last quarter or last year					
2. Human resources at tuberculosis monitoring unit/district level					
	Job description	**Contacts**	**Time lapse since last training**	**Duration**	**Type and place**
1					
2					
3					
4					
5					
2.1. Interview three health workers (district tuberculosis coordinator, nurse, medical assistant) to evaluate their knowledge			**(1 = correct)**	**0 = incorrect/do not know)**	
			1	**2**	**3**
Diagnostic symptoms					
Categorization	Category I				
	Category II				
	Category III				
Definitions	New case				
	Retreatment and types				
Treatment regimens	Category I				
	Category II				
	Category III				
	Children				
Sputum follow-up					
DOTS					
Defaulter tracing					
Contact management					
Treatment outcome	Cured				
	Completed treatment				
	Failure				

	Default			
	Died			
	Transferred out			
2.2. Observe the three health workers. Do they:		**(1 = correct**	**0 = incorrect/do not know)**	
		1	**2**	**3**
Administer correct type and dosage of drugs?				
Watch patients swallow the antituberculosis drugs?				
Use disposable syringes in case of injections?				
Follow universal precautions for disposal of injection materials?				
Refer suspected cases or collect sputum samples and send them to laboratory for examination?				
Provide health education/counselling to the patients in a considerate and appropriate manner?				
Have kind behaviour with patients?				
2.3. Community-based DOTS				
Number of community health workers linked to the tuberculosis monitoring unit				
Community-based DOTS available? (Y/N)				
Number of community health workers trained				
Number of community health workers involved as treatment supporters				
Number of tuberculosis suspects referred by community health workers during last quarter				
Presence of procedures for community health workers DOTS activities?				
2.4. Interview three treatment supporters (including community health worker). Do they know about:		**(1 = correct)**	**0 = incorrect/do not know)**	
		1	**2**	**3**
Treatment regimens? (Y/N)				
Treatment duration? (Y/N)				
When to send the patient for sputum smear examination? (Y/N)				
What to do if sputum is positive after 2 months of treatment? (Y/N)				
Side-effects of antituberculosis drugs? (Y/N)				
3. Evaluate infection control measures (laboratory-related measures should be described in the laboratory checklist)				
Administrative (triage, cough etiquette, etc.)				
Environmental (space, ventilation, air flow, etc.)				
Personal protection (masks, respirators, etc.)				
4. Health education material				
Information, education and communication materials (e.g. on the modes of transmission of disease)				
importance of adherence to treatment available) available and distributed to the patients? (Y/N)				
Posters for physicians on treatment regimens and drug dosage? (Y/N)				
Patients' charter available? (Y/N)				
Training/social mobilization/advocacy activities around tuberculosis? (Y/N)				

5. Supervisory visits		
Review the documentation related to the supervisory visits		
Number of supervisory visits with feedback reports during the last 2–4 quarters		
Actions taken? (Y/N)		

6. Monitoring diagnostic and prescribing aids and practices	Answer
Tuberculosis desk guide available? (Y/N)	
Weighing scale available? (Y/N)	
List of linked treatment centres available? (Y/N)	
List of addresses of treatment supporters available (Y/N)	
Presence of suspect register or outpatient department register where tuberculosis suspects are identified? (Y/N)	
If yes, mention the number of tuberculosis suspects registered during the last quarter	
% positivity rate among suspects	
Condoms distributed amongst tuberculosis patients? (Y/N)	
Nature of HIV testing facilities (describe)	
Presence of HIV test kits (type, number, expiry date)	
% of tuberculosis patients tested for HIV in the last quarter	
% HIV positive	
% of new patients tested by drug-susceptibility testing for first-line drugs	
% of previously treated patients tested by drug-susceptibility testing for first-line drugs	

7. Recording system (Last quarter)		
7.1. Treatment cards		**Answer**
In line with the internationally recommended recording and reporting? (Y/N)		
Count the number of treatment cards of patients during last quarter and mention:	Total number of cases	
	Number of smear-positive cases	
Review 10 treatment cards (if less than 10: review all; between 10 and 20: every other; between 20 and 30: every 3rd, etc.)		
Number of cards with complete and correctly filled information		
Number of cards incorrectly categorized		
Number of cards with incorrect doses		
Number of cards with missed information		
Specify the type of missed information		
Number of cases with incorrectly filled information		
Specify the type of wrong information		
Number of patients referred to treatment centres for DOTS		
Number of patients with treatment supporters		
Type of treatment supporters		

Number of patients taking daily DOTS		
Number of patient with delay in drug collection of more than 1 week during the intensive phase		
Number of patients with delay of more than 2 weeks during the continuation phase		
Mechanism of defaulter tracing (describe)		
Number of cases referred by:	Self	
	Community	
	Public provider	
	Private provider	
	Voluntary counselling and testing	
	Others	
Number of cases tested for HIV		
7.2. Tuberculosis register		**Answer**
In line with the internationally recommended recording and reporting? (Y/N)		
Number of cases registered equals the number of treatment cards? (Y/N)		
Review the tuberculosis register during last quarter (same 10 cases for whom the treatment cards were reviewed)		
Number of cases incorrectly categorized		
Number of cases with missed information		
Specify the type of missed information		
Number of cases with incorrectly filled information		
Specify the type of wrong information (e.g. classification, treatment categories, etc.)		
Number of patients with treatment supporters		
Type of treatment supporters		
Number of patients that defaulted during the last quarter		
7.3. Contact register		**Answer**
Presence of contact register? (Y/N)		
Review the registered contacts (same 10 index cases for whom the treatment cards were reviewed)		
Total number of contacts registered		
Number of contacts under 5 years old		
Number of tuberculosis suspects among contacts		
Number of evaluated contacts with sputum-smear examination (+/- tuberculin skin test)		
Number of evaluated contacts with sputum-smear examination with chest X-ray (+/- tuberculin skin test)		
Number of contacts under 5 years old that were given isoniazid preventive therapy		
Number of contacts of all age groups that were given isoniazid preventive therapy		
7.4. Laboratory register (review the laboratory register during the last quarter)		**Answer**
In line with the internationally recommended recording and reporting? (Y/N)		
Total number of sputum-smear positive cases diagnosed during last quarter		
Number of cases with missed information		
Specify the type of missed information		
Number of cases with incorrectly filled information		

Specify the type of wrong information (e.g. grade of positivity)	
Compare the laboratory register with tuberculosis register and check:	**Answer**
Number of sputum-smear positive cases registered in the laboratory register equals the number of registered in the tuberculosis register during last quarter? (Y/N)	
Number of primary defaulters	
Reasons for not registering the cases for treatment	
Compare the laboratory register with the suspect/outpatient department register and check:	**Answer**
All tuberculosis suspects registered in the suspect register during last quarter were found in the laboratory register? (Y/N)	
Number of initial defaulters	
Reasons for not investigating all tuberculosis suspects	

8. Reporting system		**Case finding**	**Treatment outcome**
In line with the internationally recommended recording and reporting? (Y/N)			
Mention the number of reports submitted during the previous quarter			
How many reports were submitted before the deadline during the previous quarter			
How many of the submitted reports were free of error during the previous quarter			
How many of the submitted reports had no missing data during the previous quarter			
Quarterly report on case notification in the district/ tuberculosis monitoring unit	**Smear positive**	**Re-treatment cases**	**All forms**
Number registered during last year			
Number registered during the last 2 quarters			
Number registered during last quarter			
Total number of smear positive cases in block 1 equals the total number of cases in block 2 (age and sex distribution)? (Y/N)			
Ratio of new smear positive to new smear negative and extra-pulmonary cases			
% of new smear positive cases out of all new pulmonary tuberculosis cases (target ≥ 65%)			
Compare the quarterly report on case finding with tuberculosis register during last quarter and check:			**Answer**
Number of cases registered in the tuberculosis register equals to the number of notified cases during last quarter? (Y/N)			
If no, mention the total number in the tuberculosis register during last quarter			
If, no mention the total number of notified cases in the report during last quarter			
Give details of the types of cases under- or overreported and justify the reasons:			

Quarterly report on sputum conversion in the district/tuberculosis monitoring unit (case holding for cases registered during the last quarter)	**Still on treatment**	**Treatment interrupted**
Smear-positive cases notified during last quarter		
% conversion rate		
Quarterly report on treatment outcome in the district/tuberculosis monitoring unit for patients registered 12 months ago (for sputum-smear positive)		**Answer**
% of smear-positive patients registered 12 months ago that were evaluated for treatment		
% cured		

% completed treatment	
% failure	
% died	
% defaulted	
% transferred out	
Compare the suspect/outpatient department quarterly report and suspect register for the last quarter and check:	
The number of tuberculosis suspects reported equals to the number of tuberculosis suspects registered in the suspect/outpatient department register during last quarter? (Y/N)	
If no, mention the total number in the tuberculosis suspect register during last quarter	
If, no mention the total number of notified suspects in the report during last quarter	
Give details of under- or over-reporting and justify the reasons	
Other information is consistent between register and report during last quarter? (Y/N)	
If no, give details:	
The number of tuberculosis cases reported among contacts equals to	
the number of tuberculosis cases registered in the contact register during last quarter? (Y/N)	
If no, mention the total number in the tuberculosis cases in the contact register during last quarter	
If, no mention the total number of tuberculosis cases in the report during last quarter	
Give details of the under- or over-reporting and justify the reasons	
Other information is consistent between register and report during last quarter? (Y/N)	
If no, give details:	

9. Supplies (laboratory supplies in a separate laboratory checklist)

9.1. Drugs*	**Current stock**			**Projected utilization over next 6 months**	**Adequate for next 6 months?**	**Shortage during last quarter?**
	Amount in stock card	**Amount by physical count**	**Difference**		**Y/N**	**Y/N**
RHZE (rifampicin + isoniazid + pyrazinamide + ethambutol)						
HRZ (isoniazid + rifampicin + pyrazinamide)						
RH (rifampicin + isoniazid)						
EH (ethambutol + isoniazid)						
R (rifampicin)						
H (isoniazid)						
Z (pyrazinamide)						
E (ethambutol)						
S (streptomycin) vial 1 gram						
Disposable syringes						
Water for injection						
Presence of air-conditioning or fan? (Y/N)						

*Supervisor can select one or more drugs as appropriate

Tuberculosis drugs kept on shelves? (Y/N)	
Stock registry book present? (Y/N)	
Are drugs kept according to first in first out/first expired first out (first in first out/first expired first out) rule? (Y/N)	
Presence of expired drugs? (Y/N)	
If yes, which drugs?	
What is the proportion of expired drugs?	
If yes, what is the action taken?	

How does your store match up to the ideal store?

No.	Description	Answer Y/N or NA (not applicable)
1	Presence of drug store keeper(s)?	
2	Have they been trained?	
3	Are medicines kept in a systematic way (e.g. alphabetical, pharmacological)?	
4	Are medicines stored directly on the floor?	
5	Is there adequate space between medicines and the walls?	
6	Are stock cards being used?	
7	If yes, are they up to date?	
8	Are shipments thoroughly inspected upon arrival (e.g. packaging in good condition, quantities, expiry dates)?	
9	Is there a method to control temperature (e.g. windows, air vents, ceiling, fans, air conditioning)?	
10	Is there a temperature chart for regular recording of temperature?	
11	Is there a method to prevent direct sunlight from reaching the stored drugs (e.g. windowpanes painted, curtains/blinds)?	
12	Is there evidence of moisture (e.g. leaking ceiling, roof, drains, taps, etc.)?	
13	Is there evidence of pests in the area (e.g. droppings, drug containers ruined)?	Current stock: In line with the internationally recommended revised recording and reporting? (Y/N):
14	Are tablets/capsules manipulated by bare hands?	
15	Are expired drugs separated from good drugs?	
16	Is there a system of safeguarding antituberculosis drugs from theft or vandalism (e.g. locked when unattended, only allow authorized persons to enter storage areas)?	
17	Are fire extinguishers and/or fire alarms in order to deal with fire in warehouse?	

9.2. Stationery	Current stock	In line with the revised recording and reporting? (Y/N)
Treatment cards		
Identity cards		
Tuberculosis registers		
Laboratory registers		
Suspect registers		
Contact registers		
Sputum request forms		
Treatment referral/transfer forms		
Reports		
Order forms of drugs		
Order forms of laboratory supplies		
Yearly report on programmatic management of tuberculosis		

9.3. Food stock for tuberculosis patients	
Nutritional support available for tuberculosis patients? (Y/N)	
Proper food stock available for tuberculosis patients? (Y/N)	
Mention the monthly nutritional support per patient:	
Check the food distribution report and evaluate the distribution system	

10. Interview 5 patients to evaluate their knowledge, stigma, pathway to care and satisfaction with care					
	(No = 0;Yes = 1)				
	1	**2**	**3**	**4**	**5**
1. Type of the disease and modes of transmission					
2. Treatment duration					
3. Importance of compliance to treatment and drawbacks of treatment interruption					
4. Precautions to prevent the transmission of infection					
5. Importance of contact tracing					
6. Sputum follow-up					
7. Pathway to diagnosis and treatment (describe)					
(a) Facility where the patient sought initial care					
(b) Number of encounters before final diagnosis					
(c) Any issues around stigma / exclusion?					
(d) Any issues around delay?					
8. Costs incurred in diagnosis and treatment					
(a) Specifically – did patient pay for tuberculosis drugs or other drugs (e.g. antiretroviral) or tuberculosis diagnostic tests?					
9. Understanding of diagnosis and treatment					
(a) Who counselled about drug use (dispensary, tuberculosis monitoring unit, other, etc.)?					
10. Sources of information about tuberculosis/HIV treatment and diagnosis					
11. Experiences about treatment delivery and services offered, especially any difficulties around drug availability and accessibility					

Summary of the visit (use additional pages as necessary)		
Strengths	**Weaknesses**	**Recommended actions**

Supervision checklist for evaluation of peripheral level laboratory								
General information								
Laboratory								
Name of health facility								
State								
Name of laboratory in-charge:								
Name and qualification of current staff								
Tuberculosis monitoring unit information on case finding								
Period evaluated		Pulmonary TB			Extra-pulmonary TB		Total	
		SSM +ve	SSM-ve	Not done				
Patient registered	Without past history of TB(Cat-I)							
	With past history of TB(Cat-II)							
Total								
Tuberculosis monitoring unit information on treatment monitoring								
Period evaluated	Patient evaluated	2month		5th month		7th month		
		# recorded	# positive	# recorded	# positive	# recorded	# positive	
PTB SSM+ve Without past history of TB(Cat-I)								
PTB SSM+ve With past history of TB(Cat-II)								
Total								
Laboratory information on workload and performance								
Period evaluated		# of patient examined	# of patient reported positive	% of positive Patients	#of smear examined	# smears reported positive	% of positive smears	
Diagnosis (suspects)								
Follow-up								
Total								
Laboratory information on positive smears (last quarter)								
Period evaluated:		Negative	Positive					
Examination			I-9	I+ve	2+ve	3+ve	Total	
Diagnostic smears								
Follow-up smears								
Information on laboratory external quality assessment								
Period evaluated:		# slide collected			# errors reported			
Feedback report available (yes/no)		Pos	Scanty	Neg	HFN	HFP	Min Er	
On-site evaluation checklist								
		Adequate/acceptable		Comments				
I	Workplace	Yes	No					
	Infrastructure, electric /water supply, cleanliness							
2	Staffing							
	Adequate, trained							
3	Standard operating procedures							
	Laboratory manual, pictorial guide							
4	Laboratory register							
	Register availble, neat, up-to-date							
5	Data collection							
	On workload and performance							

6	Microscope			
	Binocular, electric, functional			
7	Supplies			
	Available, no shortage reported			
7.1	Staining reagents and immersion oil			
7.2	Other laboratory supplies (consumables)			
	Glass slides, sputum cups, filter paper, disinfectant			
7.3	Laboratory supplies (non-consumable)			
	Bunsen burner, wireloop/sticks, glass funnel, sand, alcohol, staining bridge			
8	Laboratory safety and waste disposal			
	Safety: protective clothing, disinfectant, hand-washing facility			
	Disposal of infective material			
9	Specimen submission			
9.1	Collection			
	Instruction, specimen collection in ventillated area, labelling			
9.2	Handling in laboratory			
	Laboratory serial number written on side of the container			
	Specimen quality assessed and recorded			
10	Smear examination			
10.1	Smear preparation (observe while making or already prepared smear for labelling smear size, eveness, thickness)			
10.2	Staining			
	Observed while staining ,whether filtered, heating time, staining time, quality control			
10.3	Microscopic examination			
	Microscope is binocular,electric, functional			
10.4	Reporting			
	Positive marked in Red and grading			
11	External quality assessment – blind rechecking			
	Examined/stored in serial order			
	Slides collected by SLC (frequency,last)			
	Written feedback report received			
	Understands feedback report			

II - On site rechecking

Examine at least three recent positive and negative smears during the survey

S. no	Slide no.	Result PL	Result rechecker	AFB staining	Background/ ccounter-staining	Quality of specimen	Quality of smear
+							
+							
+							
-							
-							
-							

Summary on site evaluation: List major problems identified
A. Operational problems
B. Technical problems

The first annual report on tuberculosis control in the Eastern Mediterranean Region documents the activities and progress made in tuberculosis control in the Region during 2008. It is aimed at programme managers, policy-makers and physicians delivering care to patients symptomatic for tuberculosis. It is hoped that this report will serve as tool for monitoring progress in reducing the burden of tuberculosis in the Region.