

Report on the Epidemiology of Tuberculosis in the Eastern Region 2000

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November 2000**

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Acknowledgements

We would like to thank all those who participated in the collection of information used in the preparation of this report. Thank you to notifying physicians, public health doctors, nurses and microbiologists without whom this report would not have been possible.

Introduction

This document presents the epidemiological data for cases of tuberculosis (TB) notified for Dublin, Wicklow and Kildare in 2000. Sources of notification used in this report included hospital physicians, general practitioners, community pharmacists and the regional laboratory surveillance system. Notification forms were completed by public health doctors at community care level and collated in the Department of Public Health.

Materials and methods

Case definitions

A notified case of TB refers to clinically active disease due to infection with organisms of the Mycobacterium Tuberculosis complex (M Tuberculosis, M Bovis and M Africanum). Active disease was presumed if the patient was commenced on a full curative course of antituberculosis chemotherapy.

Persons placed on chemoprophylaxis for preventative treatment or infected by mycobacterium other than the M tuberculosis complex were not included as cases.

Pulmonary TB was defined as a laboratory confirmed case (positive smear, histology, or culture) with or without radiological abnormalities consistent with active pulmonary TB.

Presumed pulmonary TB was defined as a case treated for TB by the physician without laboratory confirmation.

Pulmonary TB was further divided into smear positive and smear negative cases based on direct microscopic examination of spontaneously produced or induced sputum. Cases, which were positive on microscopy of bronchoalveolar or gastric lavage, were considered laboratory confirmed but sputum smear negative.

Extrapulmonary TB was defined as a patient with a smear, culture or histology specimen from an extra pulmonary site positive for M tuberculosis complex or with clinical signs of active extrapulmonary disease and the attending physician treating the patient with a full curative course of antituberculosis chemotherapy.

Primary TB was defined as a patient with negative smear, culture or histology specimen but with radiological signs of hilar lymphadenopathy on chest X-ray, positive skin test or clinical evidence leading the physician to treat with a curative course of antituberculosis chemotherapy.

Data Analysis

Population data were taken from the 1991 and 1996 Census of Population from the Eastern Health Board area. Data were analysed using Epi-Info 6.04. The χ^2 test was used to compare proportions in groups and 95% confidence intervals were used to compare rates between groups of interest. A three year moving average was calculated by applying the formula $(a+2b+c)/4$ to each of three successive points a, b, and c in the series and using the result as the smoothed value of b.

Results

One hundred and forty three cases were notified as having been treated for TB in 2000. The crude notification rate was 11.0/100,000 population, which was lower than in 1999, when 180 cases were notified (13.9 per 100,000). The increase in the 3 year moving average, evident each year since 1997 has continued. Sixteen other cases originally notified as TB were subsequently denotified in 2000 and 2001 and are not included in the statistical analysis. They are mentioned here as full contact tracing has often taken place for these cases at local level prior to the denotification process.

Table 1: Notified cases of tuberculosis Eastern Health Board/Eastern Regional Health Authority 1990-2000

Year	Number*	Number per 100,000	3 year moving average
1990	191	15.3	
1991	183	14.7	190
1992	202	16.2	183
1993	144	11.6	162
1994	159	12.8	153
1995	150	12.0	143
1996	113	8.7	126
1997	129	9.9	131
1998	154	11.9	154
1999	180	13.9	154
2000	143	11.0	164

Seasonal Distribution

Notification of TB was lowest in the fourth quarter and highest in the third quarter of 2000, the same pattern as in 1999 (Table 2).

Table 2: Number of Notifications of TB in each quarter, ERHA 2000

2000	No Cases Notified	Percentage
January-March	34	23.7
April – June	39	27.3
July- September	40	28.0
October- December	30	21.0
Total	143	100.0

Distribution of cases by Community Care Areas

Crude notification rates per 100,000 in each community care area fluctuate each year as seen in Table 4. In 2000, the highest crude rate was seen in Community Care Area (CCA) 7 (19.4 per 100,000), followed by CCAs 6 and 5 respectively. CCAs 5, 6 and 7, which cover the north inner city area and parts of Dublin South West are areas of poverty, unemployment and illicit drug use.

Table 3: No of cases of TB notified for each Community Care Area in ERHA, 2000

CCA	No cases (%)
1	7 (4.6)
2	14 (9.8)
3	10 (6.9)
4	11 (7.7)
5	15 (10.5)
6	27 (18.8)
7	23 (16.1)
8	22 (15.4)
9	9 (6.3)
10	5 (3.5)
Total	143 (100.0)

Table 4: Crude rate per 100,000 for notified cases of TB by Community Care Area, Eastern Health Board/ERHA 1990-2000

Year	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
CCA											
1	5.5	8.7	6.3	11.0	2.4	12.7	7.2	7.2	8.8	6.4	8.1
2	10.9	11.8	11.6	5.4	10.1	8.4	16.0	13.5	19.4	13.5	15.7
3	10.8	14.6	9.7	17.2	10.1	22.4	21.3	10.1	12.4	18.0	23.1
4	7.7	15.4	11.9	5.6	11.7	6.2	8.9	9.0	15.2	19.3	15.5
5	13.3	13.2	16	8.0	17.0	22.7	27.4	16.1	11.4	14.2	13.6
6	19.1	19.1	18.4	14.1	8.1	13.9	12.5	17.6	22.8	22.7	15.3
7	19.4	25.1	22.8	15.2	13.0	13.8	13.8	19.9	16.5	24.2	20.0
8	11.4	10.1	9.3	7.8	7.4	8.5	11.1	10.1	22.8	6.9	14.4
9	6.6	20.4	8.1	8.9	7.3	10.6	5.7	7.3	18.8	17.1	23.2
10	4.9	7.2	5.7	9.7	5.1	7.2	9.3	5.1	6.2	7.2	7.4

Sex Distribution

Fifty nine (41.3%) cases were female and eighty four (58.7%) were male. Notification rates increased with age and were higher in men. Rates in males over 65 years old remain higher than rates in females for this age group.

Table 5: Age and sex specific rates (per 100,000) for notified cases of TB in ERHA, 2000 (n=143)

Age group	Female		Male	
	No cases	Rate per 100,000	No Cases	Rate per 100,000
0-4	1	2.3	1	2.1
5-14	0	0	1	0.9
15-24	9	7.5	8	6.7
25-34	8	7.3	16	15.7
35-44	10	10.7	16	18.4
45-54	7	9.4	9	12.7
55-64	2	3.8	13	26.8
65+	22	28.9	20	40.6

Accommodation Status

One hundred and twenty seven people lived at home, seven in institutions, three in hostel accommodation two in B&B and one was homeless. Three cases were categorised as residing in other accommodation, which was not specified on the surveillance forms.

Risk Categories

1. Age

As shown in Table 5, forty two cases (30.8%) were 65 years of age or older.

2. Employment status

Forty two (29.4%) were employed, 30 (21%) were unemployed and 36 (25.2%) had retired. Among those under 65 years of age, 27 (27.8%) were unemployed compared to 30.3% in 1999. Twenty two (15.4%) were classified as housewives, nine as students (6.3%) and four (2.8%) as other, which was not specified.

3. Ethnicity

One hundred and eighteen cases were born in Ireland and 25 (17.5%) were of foreign nationality, reflecting a decrease in notifications in non-nationals compared to the 1999 figures (44 or 24.4% cases notified in non-nationals). Thirteen (9.1%) were classified as Asylum Seekers/Refugees. One hundred and twenty six (88%) were classified as Caucasian, seven as Black, two as Chinese, four as Indian subcontinent and four as others, nationality not specified.

Table 6: Country of Origin of TB cases in non-nationals, ERHA, 2000.

Country of Origin	Number of Cases
Angola*	1
Bosnia*	1
Burundi*	1
China	1
France	1
India	3
Korea S	1
Nigeria*	2
Romania*	2
Scotland	1
Sierra Leone*	1
Spain	2
Vietnam	4 (* =2)
Yugoslavia	3
Zambia	1
Total	25

* = Asylum Seeker/Refugee

Ten of these patients came from among the 22 high TB burden countries as defined by the World Health Organisation (WHO), namely China (n=1), Nigeria (n=2), India (n=3) and Vietnam (n=4).

In 1999, the number of cases of TB in non-nationals had increased to more than three-fold compared to previous years. This figure had only increased two-fold in 2000.

Table 7: Cases of TB in indigenous population and in non-nationals, EHB/ERHA, 1996-2000

Year	Indigenous Irish		Non Nationals	
	<i>Number</i>	<i>% of total cases</i>	<i>Number</i>	<i>% of total cases</i>
1996	103	91.2	10	8.8
1997	117	90.7	12	9.3
1998	130	84.5	24	15.5
1999	136	75.5	44	24.4
2000	118	82.5	25	17.5

The non-national population did not differ from the Irish in sex, sputum status, culture results, history of TB in the past and whether the diagnosis was pulmonary or extrapulmonary. However, overall they were significantly younger ($p=0.0001$).

4. HIV Infection

Six patients had HIV associated TB. All had pulmonary disease. Mycobacterium tuberculosis was isolated in five cases and there was no culture result available for the sixth case. Four of the six were sputum positive on direct examination, one was negative and no sputum result was available on the sixth. Four were culture positive. In all cases the organism was fully sensitive to standard TB chemotherapy.

5. Prior History of TB

There was a small increase in the proportion of patients notified in 2000, with a history of TB in the past, ($n=23$, 16.1%) compared to 1999 ($n=23$, 14.2%). This increase is not statistically significant. Five patients, notified in 2000, had a history of TB within the previous five years. One patient had defaulted from therapy, one was an intravenous drug user (IVDU), another was an IVDU and HIV positive and no risk factors were documented for the remaining two patients.

Case Finding

One hundred and eleven patients (77.6%) presented as cases, 12 (8.4%) were found by contact tracing, two cases (1.4%) by screening of asylum seekers, three (2.1%) by other screening methods and 15 (10.5%) by other methods, not specified.

Hospitalisation

Data on hospitalisation status, whether for diagnosis or treatment of tuberculosis were not available for the 2000 TB report, as it is not routinely collected on the new NDSC surveillance form.

Diagnosis

One hundred and fifteen cases were diagnosed with pulmonary or combined pulmonary and extra-pulmonary TB, of whom 88 (76.5%) were laboratory confirmed (tables 8 and 9). Pulmonary TB alone was diagnosed in 107 cases, of whom 82 (76.6%) were laboratory confirmed. There were eight cases of combined pulmonary and extra-pulmonary TB, of whom six (75%) were laboratory confirmed.

Table 8: Classification of cases of TB notified to the ERHA in 2000

Diagnosis	No. Cases (%)
Pulmonary TB	107 (74.8)
Pulmonary + Extrapulmonary	8 (5.6)
Extrapulmonary	28 (19.6)
Total	143 (100)

Table 9: Sputum smear and culture status for notified pulmonary TB cases and notified extrapulmonary cases associated with pulmonary disease (in brackets) in the ERHA, 2000

Sputum smear			
Pulmonary TB	Positive	Negative	Not done
Culture +	48 (4)	26 (1)	8 (1)
Culture -	1 (1)	19 (0)	1 (0)
Not done	1 (0)	1 (1)	2 (0)
Total	50 (5)	46 (2)	11 (1)

Extra-pulmonary TB alone was notified in 28 cases. The sites involved were as shown in table 10.

Table 10: Extrapulmonary disease sites in the ERHA (includes cases with combined pulmonary and extrapulmonary disease) in 2000

Site	Number Cases
Pleural	29
Lymph-Extrathoracic	9
Lymph intrathoracic	1
CNS	1
Meningeal	1
Disseminated	1
Peritoneal	4
Spinal	5
Eyes	1
Bone	5
Skin	3
Colon	1

Table 11: Histology and culture status of extrapulmonary cases of TB in the ERHA in 2000

Extrapulmonary TB	Culture		
	Positive	Negative	Total
Histology +	9	2	11
Histology -	10	7	17
	19	9	28

*Histology- means histology negative or not done
Culture negative means culture negative or not done*

One case of presumed TB meningitis was notified. This case was a 26 year old Irish national (originally from Northern Ireland) a male who had never received neonatal BCG.

Table 12: Diagnosis for notified cases of TB, Eastern Health Board 1992-2000

Year	2000	1999	1998	1997	1996	1995	1994	1993	1992
Pulmonary TB only (lab confirmed)	82	83	79	66	66	76	83	68	95
Presumed Pulmonary TB	26	41	32	31	16	39	45	45	
Extrapulmonary TB only	28	36	29	25	22	24	21	20	31
Pulmonary + extrapulmonary TB	8	11	12	6	6	7	7	10	5
(Pulmonary disease lab confirmed)	6	9	4	5	N/A	N/A	N/A	N/A	N/A
Primary TB	1	9	2	1	3	4	3	1	10

Drug Resistance

Two cases of tuberculosis had an organism resistant to one or more antibiotics. One case occurred in a Chinese national (student) and the other in an Irish national. The Irish national was an IVDU with a previous history of TB in 1995. It was unsure if this patient had completed a full course of anti-TB chemotherapy in 1995. Both patients were diagnosed with pulmonary disease. The isolate from the Chinese patient was Isoniazid resistant (a first line drug) and the isolate from the second patient was streptomycin resistant (a second line drug).

Outcomes

Sixteen patients (11.2%) died following the diagnosis of TB. TB was considered to be the cause of death in only one of the cases. Five patients (3.5%) including one smear positive were lost to follow up. Three patients (2.1%) were categorised as having their treatment interrupted for greater than two months. Fourteen patients (9.8%) had an unknown outcome, six of whom were direct smear positive, two of whom were classified as asylum seekers/refugees, one as an IVDU and one as having excess alcohol intake documented as a risk factor.

Delay in Notification

Data on the date of diagnosis was only available for 138 patients, while data on date of notification was available for all 143 patients. The 1996 Working Party Document on Tuberculosis³ recommends that cases of tuberculosis should be notified within three working days of diagnosis and that contact tracing should commence within seven working days of notification.

The mean number of days from diagnosis to notification for all cases was 16 days in 2000. For smear positive cases this figure was 7.7 days. Only 60% of cases were notified to the Health Board within the Working Party's Recommendations. Data on the time interval between notification and initiation of contact tracing is not routinely collected.

Notification of TB through Community Pharmacy Returns, which was introduced in 2000, identified two unnotified cases reflecting a failure of the Tuberculosis Notification System, as responsibility for notification rests with the clinician. This highlights the usefulness of using diverse and multiple health information sources for the surveillance of TB.

The information on notification source for TB cases was not possible for the 2000 report, as this data is not recorded on the current TB notification form, which was introduced in 1999-2000.

Table 13: Delay in Notification of TB cases in the ERHA, 2000

Days to notification	Number
0 - 6	87
7 - 13	21
14 -20	8
21 - 26	4
27 - 34	4
35 -41	3
42 - 48	2
49 - 55	0
56 - 62	1
63 - 69	1
70 +	7
Total	138

Contact tracing

Contact tracing constitutes a large workload for medical and public health nursing staff who work in the community care areas.

Public Health doctors provide a screening service for TB at three hospital clinics attached to TB/Respiratory units in Dublin, namely, the Mater Hospital (NAHB), St. Vincent's Hospital (ECAHB) and St. James's Hospital (SWAHB). Advice on site is available from a Respiratory Physician with a special interest in TB. The medical staff of Peamount Hospital continues to be a valuable resource of medical advice on TB for public health physicians and the hospital also provides invaluable isolation facilities for infectious and difficult to treat patients.

Screening also takes place on-site where a case of smear positive pulmonary TB occurs in a school, a workplace or an institution. The number of contacts and institutions screened for TB was available from some Community Care Areas (Table 14). Workplace and institution screening continues to be a heavy workload in some Community Care Areas in 2000 and while data of workload generated are not systematically collected, anecdotal evidence suggests that the trend documented in last year's report is increasing.

Screening of healthcare workers exposed to a case of smear positive TB in the workplace continues to generate a large workload in some areas. Protocols for contact tracing in this occupational group differ between public health and occupational health physicians. Clarification of the respective roles of both groups in the contact tracing of healthcare staff is needed.

Table 14: Number of contacts screened and numbers of institutions screened in the ERHA in 2000

Community Care Area	No. contacts screened	No. institutions screened
1 and 2	Not available	1
3,4 and 5	1004	8
6	236	3
7	443	3
8	183	0
9	32	0
10	93	1

Discussion

TB surveillance involves the systematic collection, collation, analysis and dissemination of information on the epidemiology of TB to all relevant professionals in the region. An enhanced TB surveillance system (NTBSS) based on a European minimum data set was introduced in the Region in 1999 in consultation with the Health Boards, the National Disease Surveillance Centre (NDSC) and the National Working Group on TB and is fully operational since January, 2000.⁴ Quarterly returns are forwarded to the NDSC and are analysed, reported and disseminated to all regions in the country. It is hoped that this enhanced TB Surveillance System will provide better quality information for the planning, provision and evaluation of services for the prevention, control and treatment of TB. Close co-operation between clinicians, microbiologists and public health doctors is essential so that accurate and reliable data is collected and that an accurate picture of the epidemiology of TB in the Eastern Region is described.

A new TB notification form was introduced in 1999-2000 as part of this enhanced TB surveillance system. The 2000 ERHA TB Report is the first prepared using this system. It differs from previous reports in that it doesn't provide information on the source of TB notification, on hospitalisation status and whether inpatient or outpatient facilities were necessary for the diagnosis and/or treatment of TB, as these data are not collected by the new surveillance system. It was therefore not possible to fully audit the source of delayed TB notifications, or whether the patient was hospitalised and the duration of hospitalisation.

The annual rise in the number of TB cases notified in previous reports did not continue in 2000. One hundred and forty three cases of TB were notified in 2000 (Crude notification rate of 11/100,000), compared to one hundred and eighty cases in 1999 (Crude notification rate of 13.9/100,000). However the increase in the three year moving average evident since 1997 has continued. Preliminary analysis of the 2001 TB notifications has shown that the yearly rise in the number of TB cases notified will continue or even increase into 2001.

In 2000, an increase in the number of laboratory confirmed TB cases notified (76.6% of all pulmonary TB cases were laboratory confirmed cases) was observed compared to 1998 and 1999 where 71.2% and 68.1% respectively of all pulmonary TB cases were laboratory confirmed.

Risk factors for TB remain unchanged compared to previous years and include age over 65, being male, unemployed and having a previous history of TB. Twenty three (16.1%) of the cases had a previous history of TB. Of these cases, only five (21.7%) were categorised as cured, two (8.7%) as not cured and sixteen (69.6%) as unknown. Eleven (47.8%) of these cases received chemotherapy for longer than 1 month.

It was not possible to analyse the level of contact with TB previously, as these data are not captured by the new surveillance system. A local page was added to the notification form in mid 2000, to facilitate collection of this information, however, this page was rarely completed. This highlights the importance of completing all sections of the form so that accurate data can be collected. Accuracy and completeness of surveillance data cannot be over emphasised for without this a true epidemiological profile of TB in the Region cannot be provided.

As in previous reports, HIV associated TB has not proven to be as problematic as originally anticipated in the 1980's.³ There was only six cases of HIV associated TB reported in 2000 TB. It is likely that the true prevalence of HIV associated TB is underestimated as immune status was poorly documented on most notification forms. On occasion, cases, which had documented risk factors such as IVDU or Hepatitis C, did not specify immune status. Concerns over confidentiality of information are probably responsible for this non recording of immune status. Improved liaison and information sharing between clinicians and public health physicians will facilitate the provision of more complete data in relation to this.

The marked increase in cases arising in non-nationals in 1999 has not been sustained in 2000. Twenty five cases (17.5%) were of foreign nationality compared to 36 (24.4%) cases in 1999. Thirteen (9.1%) were classified as asylum seekers/refugees in 2000. The number of cases in asylum seekers/refugees in 1999 was

not available for comparison. It is notable that in 1999, 11 (25%) out of the 44 cases involved “programme” refugees from Kosova. Seven of these cases (16%) were part of the same extended family group. This explains the inflated figures for non-nationals in 1999.

At present voluntary screening for TB is offered to asylum seekers from high-incidence countries in three Refugee Reception Centres in the region, but not all avail of the service. Only two cases of TB (2.1%) were found by screening of refugee/asylum seekers. There may be barriers to partaking in screening including language difficulties, low priority given to health issues and a perception that ill health may reflect negatively on decisions being made regarding asylum applications. Further research into the low uptake of voluntary screening among refugee/asylum seekers is needed. Reassuringly only one of the cases showed resistance to one or more first line TB drugs. Nevertheless continuing vigilance is required in view of the global emergence of multi drug resistant TB (MDRTB).

The data available on treatment outcome are cause for concern. Only one hundred and five cases (73.4%) completed a full course of curative therapy. Five (3.5%) were lost to follow up, one of whom was direct smear positive (i.e. infectious) and two of whom had alcohol problems. Three persons (2.1%) had their treatment interrupted for a period greater than two months, two of whom were asylum seekers/refugees. Fourteen patients (9.8%) had an unknown treatment outcome, six of whom were direct smear positive, two of whom were asylum seeker/refugees, one an IVDU and one had an alcohol problem. This highlights the necessity to institute Directly Observed Therapy (DOTS) in high risk groups in order to reduce spread of infection in the community and to prevent the emergence of MDRTB.

While details on DOTS are not systematically collected, anecdotal evidence suggests that the number of requests from Respiratory Physicians for the initiation of DOTS in the Community has increased. These patients are usually poorly compliant, vulnerable and marginalised individuals with other problems such as HIV, alcoholism and drug addiction. This has placed a considerable burden in some areas on an already over stretched public health nursing service. The appointment of TB liaison public health nurses to specialise in the public health nursing management of TB is strongly recommended. It is also recommended that data on DOTS be incorporated into the TB surveillance system.

Neonatal BCG vaccination is routinely offered to all newborn infants in all maternity hospitals and community BCG clinics in the Eastern Region. The BCG vaccine is consistently effective against tuberculous meningitis and miliary tuberculosis and is also highly effective in preventing childhood tuberculosis. There was one case of TB meningitis in a child in 1998 and one case reported in an 8 year old child in 1999. In 2000, there were no documented cases of TB meningitis in the region, however the WHO criteria for discontinuing routine BCG vaccination state that the rate of TB meningitis in children under age 5 should be less than one case per 10 million general population over the previous five years. The cases in this age group in 1998 and 1999 in the ERHA region gives a rate above WHO criteria for discontinuing BCG vaccination at the moment.

The Working Party on Tuberculosis also recommended that the BCG status of each patient with TB should be documented and audited ¹. In 2000, 36 (25.2%) patients were recorded as having had BCG, 35 (24.5%) patients did not have BCG and 72 (50.3%) had BCG status not recorded or recorded as unknown. Ensuring completeness of this data in the future cannot be overemphasised.

It also recommended that cases of tuberculosis should be notified within three working days of diagnosis and that contact tracing should commence within seven working days of notification ¹. In 2000, only 60% of notifications occurred within the time period recommended by the working party. The mean number of days from diagnosis to notification in 2000 was sixteen. Reassuringly, the mean delay from diagnosis to notification in the fifty-four sputum direct smear positive cases was 7.7 days. Two of these smear positive cases skewed the data with notification delays of 64 and one 151 respectively. If these were excluded from the analysis the mean delay would have been only 3.9 days in smear positive cases.

It was not possible to record the source of the notification using the current notification form, which makes it difficult to audit the source of delay. The interval between date of notification to public health and initiation of contact tracing is not routinely collected or recorded. This information would be helpful in

auditing the efficiency of community contact tracing services and might be a useful topic to return to in future reports.

A new National TB Reference Laboratory was established in St James's Hospital in Dublin in 2001. Preliminary work on molecular typing of M Tuberculosis had already been undertaken in some Centres in order to establish any suspected link between TB cases both in community and institutional settings. It is hoped that with the advent of this new facility that the aforementioned work can be expanded upon, and will become a useful tool for physicians in the public health management and surveillance of TB. The Laboratory will also be able to monitor closely emerging information on drug resistance and MDRTB and will routinely record follow-up microbiological data on TB case notification forms.

Summary recommendations of this report include the following:

1. More accurate and timely recording of data, especially pertaining to risk factors, immune code and BCG status.
2. Modifications to the surveillance form to enable data collection in relation to:
 - Notification source,
 - Date of initiation of contact tracing,
 - Numbers of persons screened,
 - Information on hospitalisation status for diagnosis and/or treatment of TB and
 - Information on DOTS.
3. The appointment of specialised public health nurses to work with patients in the community with TB.

The establishment of the National TB Reference Laboratory is welcomed, as the greater use of molecular typing techniques will enable better linkages to be established between cases of TB in the community and in institutions. This will facilitate identification of outbreaks and lead to the improved control and treatment of TB in the Region.

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