# CHARACTERISTICS OF NATIONAL TB CASE NOTIFICATION SYSTEMS

## 3.1 Sources of case notification

In 1999, TB cases were notified by both clinicians and laboratories in a total of 26 countries (Table 1), whereas in the other countries TB cases were notified by clinicians only.

Laboratory reporting of TB cases is recommended in Europe in order to obtain a higher completeness of notification and a more complete information on bacteriological confirmation **[1]**.

## 3.2 Bacteriological diagnosis

In 1999, culture for *Mycobacteria* was considered to be routinely performed for TB diagnosis in the whole country in 34 countries and in some areas in 14 countries, and was not routinely performed in Albania, Georgia and Turkey (Table 11). Sputum smear was considered to be routinely used for TB diagnosis in the whole country in 43 countries (Table 14). The differences in the availability and use of diagnostic facilities result in different criteria for the classification of "definite" TB cases (see below).

## 3.3 Case classification

*Laboratory criteria*
In 1999, both "definite" and "other than definite" TB cases were notified in all countries. Laboratory criteria for classifying a case as "definite" were "positive culture" in 28 countries (compared to 22 countries in 1998) and "positive culture and/or sputum smear" in 23 countries (Table 11).

*Site of disease*
The pulmonary classification was used in 20 countries in the West, eight countries in the Centre and four countries in the East (Table 9). The other 18 countries provided data based on the respiratory classification (see technical note). These differences limit the comparisons between proportions of pulmonary cases and, among them, of sputum smear positive cases.

*Geographic origin*
Geographic origin was classified based on country of birth, recommended, in 25 countries and based on nationality in nine countries.

*Previous anti-TB treatments*
Information on previous anti-TB treatment was available for 43 countries, whereas five countries provided information on previous history of TB.

## 3.4 Completeness of TB notifications

*Geographic coverage*
In 49 countries, data were provided on TB cases notified in the whole country. In Yugoslavia cases in Kosovo and Metohija were not included and in Denmark cases from Greenland and the Faeroe islands were not included. The population of these areas was excluded for the calculation of notification rates.

*Previously treated cases*
In all countries, both new and previously treated TB cases were notified. However, according to a survey done in 1998, the criteria for notification of previously treated cases differ across countries **[6]**. In some countries, notification of previously treated cases is limited to cases with specific outcomes of the previous treatment (e.g. cure or treatment interruption) or to "definite" cases, which can result in different completeness of notification for these cases.

*Extrapulmonary cases*
In all countries except Spain, TB cases were notified with any disease localisation; in Spain, notification of extra-respiratory cases is limited to meningeal TB and total notification rates are therefore not comparable with those of other countries.

*Cases diagnosed in specific population groups*
As in previous years, information was collected on the notification of TB cases diagnosed in specific

population groups, such as foreigners or prisoners (Table 1). Due to the organisation of national health and surveillance systems, in some countries these cases may be excluded from TB notification statistics, resulting in lower completeness of TB notification.

In 1999, TB cases diagnosed in all the population groups listed in Table 1 (foreigners, prisoners, military personnel, homeless, persons with HIV infection and institutionalised persons) were included in notification in 32 countries (20 countries in the West, 8 in the Centre and 4 in the East) compared to 29 countries in 1998**.** In 19 countries cases diagnosed in one or more groups were not included in notifications.

Overall, the trend towards increasing inclusion in TB notifications of cases diagnosed in specific population groups, observed since the mid 1990s, continued through 1999. TB cases among prisoners, which may represent a non negligible proportion of TB cases in some countries **[11],** were included in 46 countries in 1999 compared to 39 countries in 1998.

As in 1998, cases of foreign origin were not included in eight countries in the Centre and East, while in eight further countries only foreign cases who were legal residents were included. Compared with 1998, in 1999, one or more groups of foreigners were included for the first time in notifications in four countries.

Even though inclusion in notifications does not necessarily mean that case notifications for a specific group are complete, this process results overall in increasing completeness of notification. On the other hand, changing completeness of notification makes the interpretation of trends for recent years difficult in the East **[12]** and in some countries in the Centre.

The differences in diagnostic practices, definitions used and characteristics of national surveillance systems still limit the comparability of TB surveillance data at the European level and further efforts are needed in order to improve the harmonisation of surveillance data.

# TUBERCULOSIS CASES NOTIFIED IN 1999

## 4.1 Information provided

All the 51 countries in the WHO European Region provided data on TB cases notified in 1999 and on the characteristics of the national notification systems. Individual data on TB cases were provided by 22 countries, of which 15 countries in the West (Table 2). Numbers of cases by sex and age group, previous anti-TB treatment status, site of disease and sputum smear result were available for most countries, whereas information on geographic origin and culture results was less complete. In 12 countries in the Centre and in the East, some data (e.g. case distribution by age group) were provided only for new cases, and are presented this year for the first time in the report.

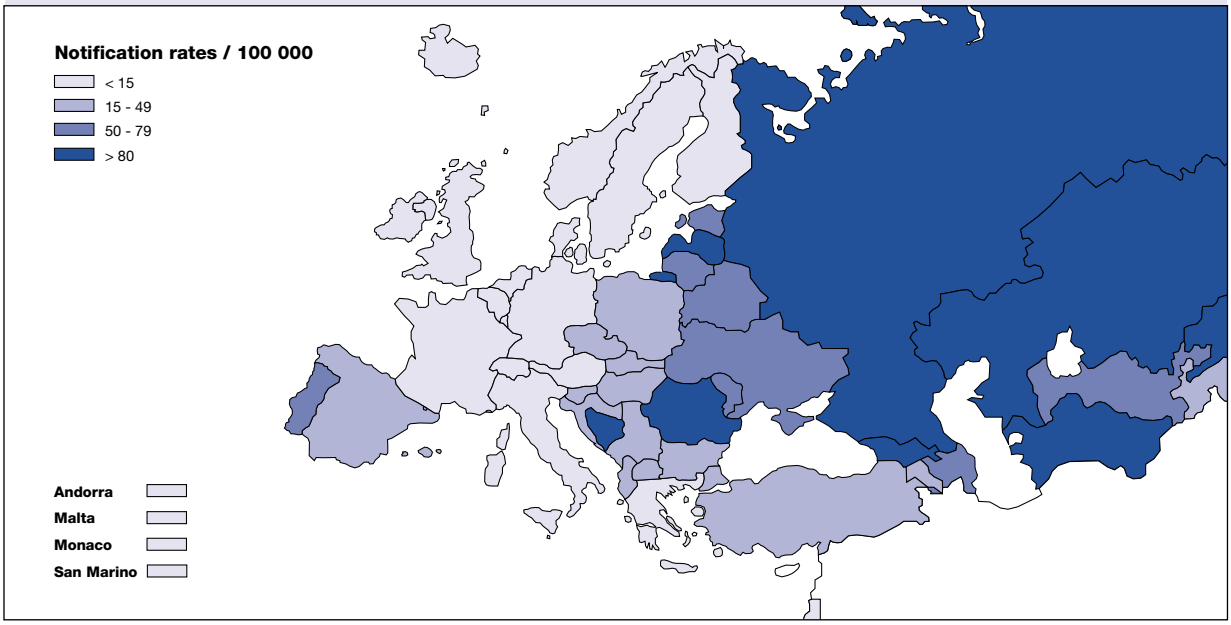
## 4.2 Global figures and trends

In 1999, a total of 381 975 TB cases were notified in the 51 countries of the WHO European Region, of which 66% in the East, 21% in the Centre and 13% in the West (Table 3). In the East, 54% of the cases were notified from the Russian Federation. In the Centre, 60% of the cases were notified from Romania and Turkey.

The overall notification rate was 44 per 100 000 population, with important geographic variations between areas and countries (Table 3, Map 1, country profiles). TB notification rates in 1999 were:

- 12.6 per 100 000 in the West, where rates were lower than 20 per 100 000 population in all countries, except Spain (21.2 per 100 000; only respiratory and meningeal cases notified) and Portugal (52.3 per 100 000);
- 43.7 per 100 000 in the Centre, where rates ranged between 20 and 49 per 100 000 in all countries except the Czech Republic (16 per 100 000), Bosnia-Herzegovina (80.1 per 100 000) and Romania (119.9 per 100 000);
- 86.3 per 100 000 in the East, where rates were over 50 per 100 000 population in all countries except Armenia (42.5 per 100 000) and Tajikistan (41.8 per 100000). Rates were higher than 130 per 100 000 in Kazakhstan, Kyrgyzstan and Georgia.

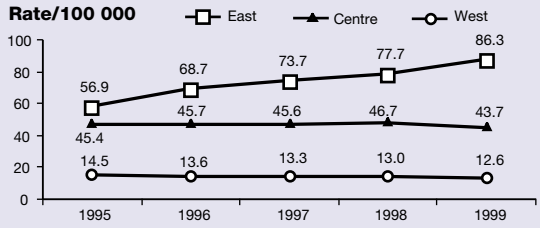
**MAP 1** **Tuberculosis notification rates per 100 000 population, 1999**



Trends in notification rates between 1995 and 1999 varied widely across areas and countries (Table 3, Figure 2, Map 2, country profiles). In the West, the overall notification rate was 12% lower in 1999 than in 1995. Excluding Greece, Israel and Spain, where changes in notification were implemented in recent years, annual decreases in rates were around –4% between 1995 and 1998 and –1.6% between 1998 and 1999 (Map 2). In the 14 countries with more than 50 cases notified annually, rates were 6% to 25% lower in 1999 than in 1995 in 10 countries, were stable in Ireland (-2%) and the United Kingdom (+1%) and were higher in Norway (+13%) and Denmark (+17%), due to increasing numbers of cases of foreign origin **(country profiles).** In 10 countries with available data**,** average annual decreases in the numbers of notified cases between 1995 and 1999 were more marked among nationals (-7%) than among cases of foreign origin (-1.5%) (Figure 4). These trends confirm previous reports of a slowing decrease or stabilisation of TB incidence in Western Europe since the late 1980s **[13].**

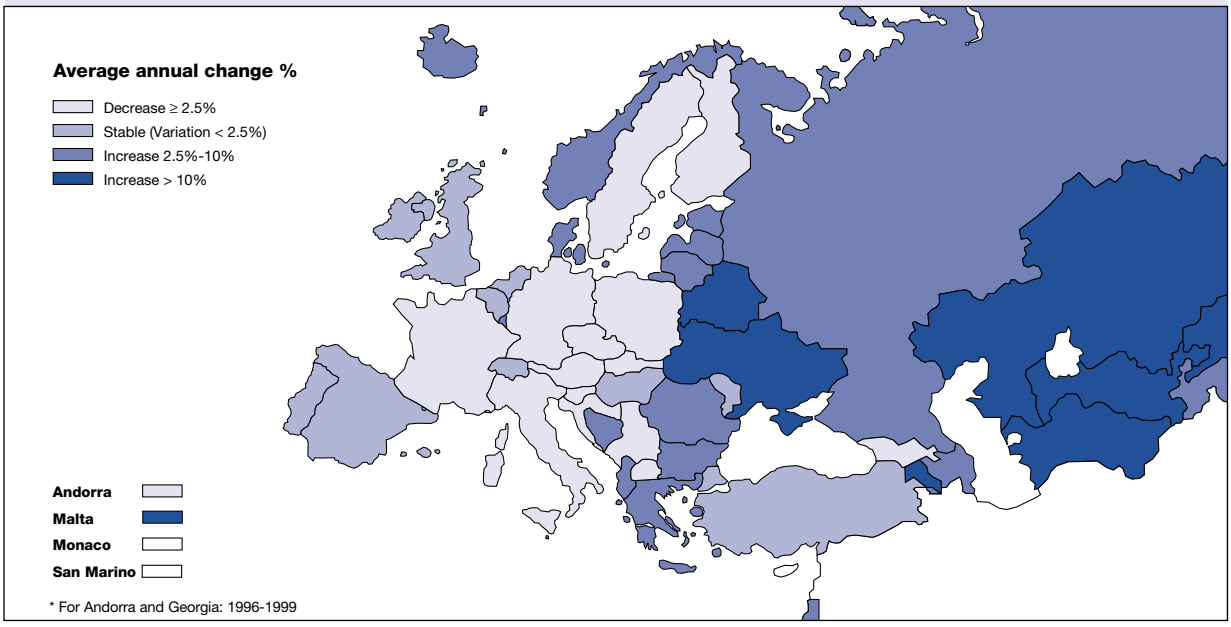
In the Centre, overall notification rates were 4% lower in 1999 than in 1995, with diverging trends across countries (Map 2): 9% to 24% lower in nine countries but higher in Romania (+15%), Bulgaria (+18%), Albania (+27%) and Bosnia-Herzegovina (+30%). The increase in notification rates in Bosnia-Herzegovina can be partly attributed to the return of refugees after the war. In the other countries it may reflect increasing incidence **(country profiles)** but also changes in national surveillance systems, on which detailed information is not available.

**FIGURE 1** **Tuberculosis notification rates by geographic area, 1995-1999**




In the East (Georgia excluded; data not available for 1995), notification rates were 50% higher in 1999 than in 1995, with increases higher than 20% in all countries except the Republic of Moldova (+8%). In several countries in the East, recent trends in notification rates may have been variably affected by global changes in health and surveillance systems, including the increasing notification of cases diagnosed in specific population groups such as prisoners and foreigners, previously not counted in statistics (see section 3.4).

**MAP 2** **Average annual change in TB notification rates, 1995-1999 ***

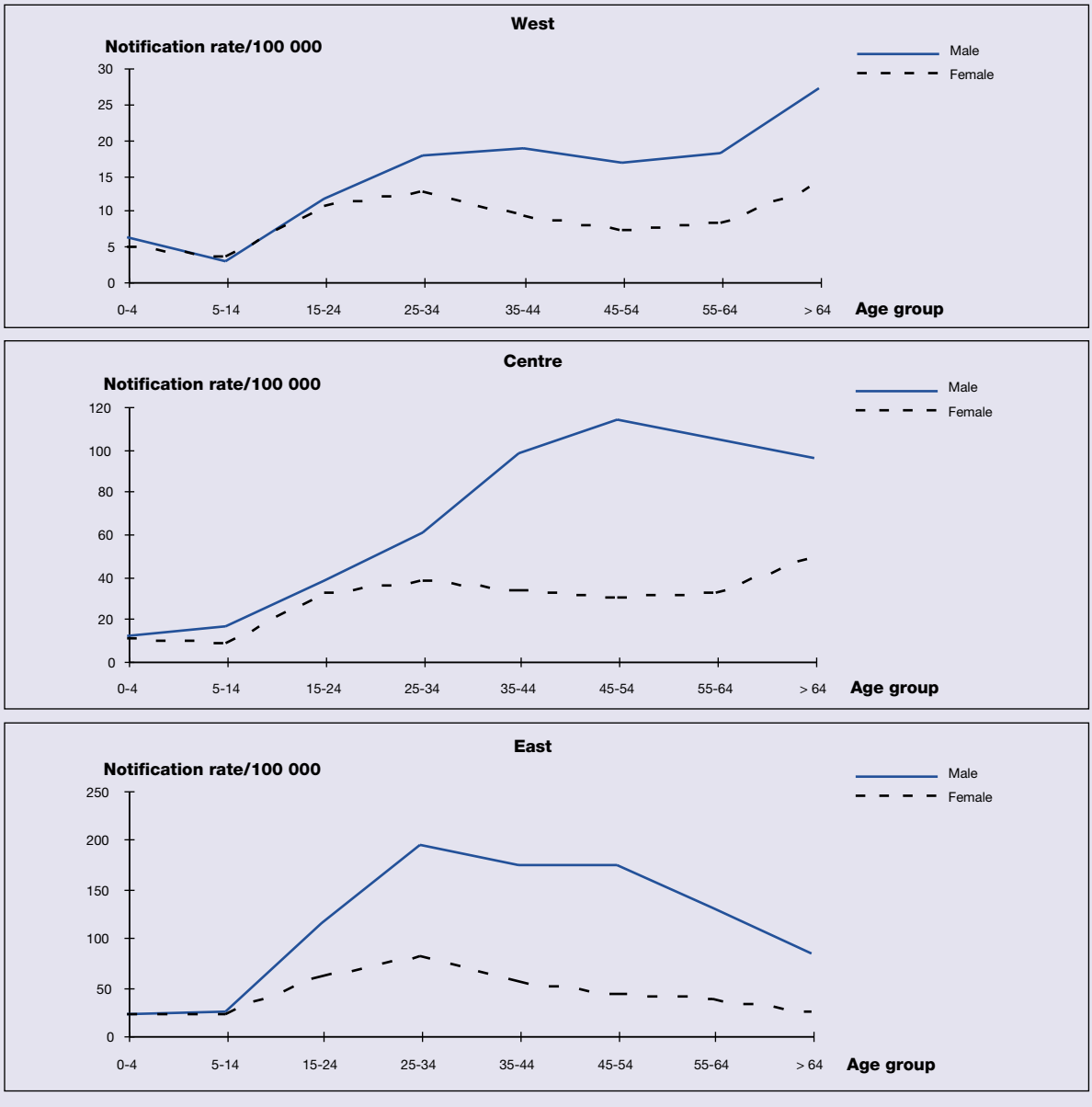


With the possible exception of the Baltic countries in which rates appear to level off in the most recent years **(country profiles)**, these increases in TB notification rates indicate an increase of TB incidence continuing through 1999. The very high levels of anti-TB drug resistance (see below and **[4])** and the recent spread of HIV infection in several countries in the East **[14]** constitute further threats to TB control, which deserve urgent public health interventions.

## 4.3 Sex and age

Numbers of cases by sex were provided from all countries except Turkey (Table 4). Data were provided for new cases only in nine countries in the East. Overall, 68% of the TB cases notified in 1999 were male. The sex ratio (number of male cases per one female case) was 2.3 overall and ranged from 1.6 in the West to 2.5 in the East. A total of 18 countries, of which nine in the

**FIGURE 2** **Notification rates by age group and sex, 1999**



East, reported at least twice as many cases in men as in women. The sex ratio varied by age. It was 1.1 among paediatric cases, increased up to 3.6 in the age group 45-54 years and then decreased again to 1.4 in the age group over 64 years.

Numbers of cases by age group were provided from all countries except Azerbaijan, Belarus and Turkey (Table 5). In Bulgaria and in seven countries in the East, information was provided on new cases only. Paediatric cases (0-14 years of age) accounted for 6% of cases overall, of which one third were among children under 5. Paediatric cases represented more than 10% of cases notified in Bulgaria, Kyrgyzstan, FYR of Macedonia, Turkmenistan and Uzbekistan, possibly suggesting overnotification of paediatric TB cases in some of these countries. Among adults, the age groups 15-44 years accounted for 46% of the cases notified in the West, 45% in the Centre and 62% in the East. Conversely, the age group over 64 years represented 21% of the cases in the West, 17% in the Centre and 7% in the East.

The distribution of cases by age and sex was also available for most countries (Figure 3 and country profiles). Among children, notification rates did not differ by sex. In the West, rates were higher in children under 5 than in older children, reflecting higher risk of developing TB after infection in younger children than in older children **[15]**. Rates were similar in the two paediatric age groups in the Centre and in the East, suggesting a possible under-reporting of cases in children under 5 in some countries.

In the West, age specific notification rates among men were relatively stable across the age groups 25-34 years to 55-64 years and were highest among the elderly (over 64 years). In women, rates were highest in the age groups 25-34 and among the elderly. In the Centre, rates increased markedly after age 14 in men but less so in women, resulting in large sex differences in the age groups 35-44 and older. In the East, rates were highest in the age group 25-34 years in both sexes. Rates decreased regularly form the age group 35-44 in women. Among men rates remained high until the age group 45-54 and decreased markedly in the older age groups.

Higher TB notification rates in adult men compared to women observed in all countries result from higher prevalence of infection in men **[16]**. The larger difference in notification rates by sex observed in the Centre and in the East could be also partly explained by underreporting of female cases due to differences in the access to health services in some countries **[17]**.

The higher notification rates in the older age group in the West mainly reflects reactivation of old *M. tuberculosis* infection. Higher notification rates in young adults in the East indicate high levels of transmission in recent years in this area. However it should be pointed out that in several countries in the East data were provided for new cases only, which are expected to be younger than cases with previous TB episodes.

In the 30 countries providing the age and sex distribution of TB cases by geographic origin, the proportion of cases aged 15 to 34 years was much higher in foreigners (45%) than in nationals (27%) (country profiles). The proportion of male cases was also higher in foreigners (66%) than in nationals (59%). These differences influence age-specific notification rates in countries in the West with large proportions of cases reported in foreigners (see below and country profiles).

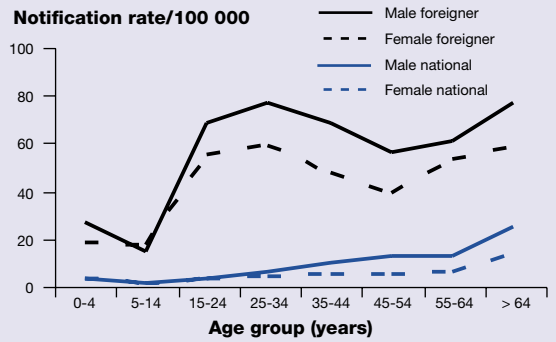
In most countries in the West and in the Centre with decreasing notification rates in recent years, age specific notification rates in 1999 were lower than those in 1995 among all age groups (see country profiles) suggesting decreasing TB transmission. In the East, (data from five countries) recent trends in age specific rates are variable across countries and should be interpreted cautiously, due to the increasing inclusion of cases from specific population groups, which may have affected the age distribution of cases.

## 4.4 Geographic origin

Numbers of cases by geographic origin were provided from 34 of the 46 countries in which cases of foreign origin are included in TB notifications (Table 6). Cases were classified by country of birth, as recommended, in 25 countries and by citizenship in nine countries. Information was available from all countries in the West, seven countries in the Centre and five countries in the East. In the West, cases of foreign origin represented 27% of notified cases overall and more than 40% in 10 countries (Map 3). Proportions of cases of foreign origin were generally lower in the countries of the Centre and of the East.

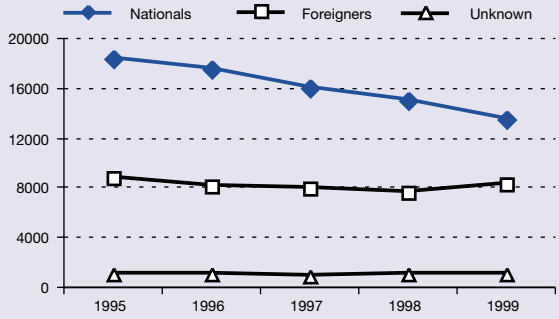
In 12 countries in the West (Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland,

**FIGURE 3** TB notification rates by age group, sex and geographic origin, 1999, West *




* Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Luxembourg, Netherlands, Norway, Sweden

**FIGURE 4** Tuberculosis cases by geographic origin, 1995-1999, West *



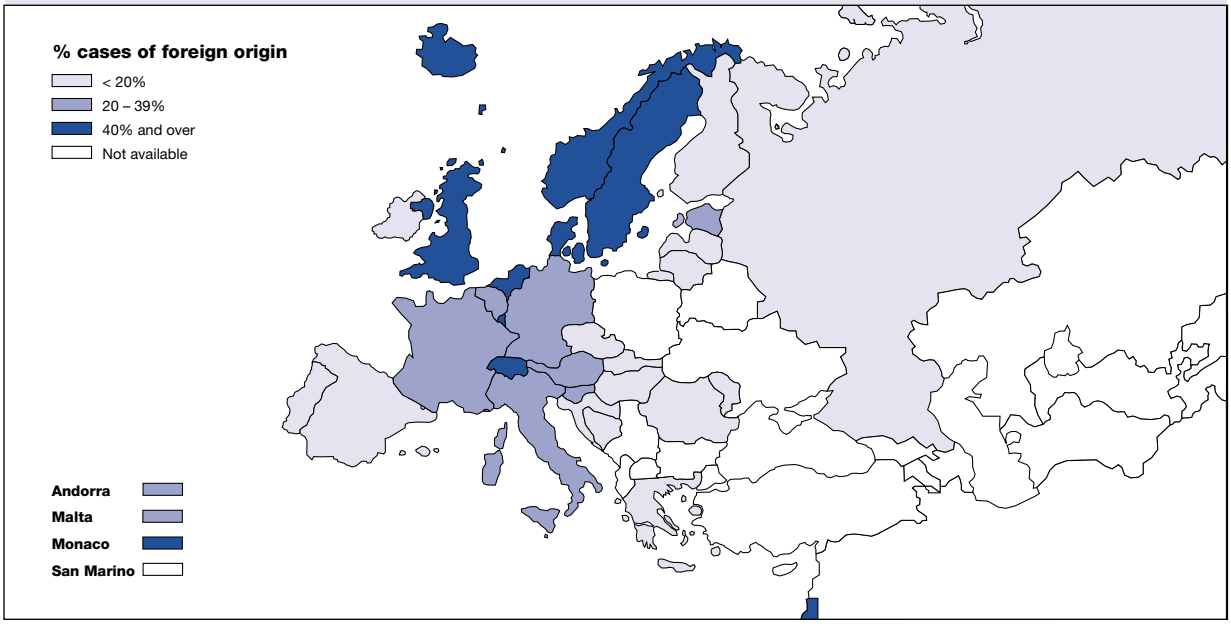

* Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland

Luxembourg, Netherlands, Norway, Sweden), notification rates were overall seven times higher in foreigners (52.4 per 100 000) than in nationals (7.3 per 100 000) with rate ratios ranging from 2.3 in Ireland to 33 in the Netherlands. These differences in rates by geographic origin depend on migration patterns which vary widely across western Europe, and should be interpreted with caution considering the difficulties in obtaining accurate denominators for the population of foreign origin.

In the population of foreign origin, age specific notification rates were highest in the age groups 25-34 and over 64 years, at a higher level in men than in women (Figure 3). Among nationals, adult rates increased regularly with age and were highest in the age group over 64 years. Rates in nationals were much lower at all ages than those in the foreign population.

In 10 countries with available data in the West, trends in the numbers of TB cases were different according to geographic origin (Figure 4 and country profiles). Total numbers of cases were 19%

**MAP 3** Proportion of TB cases of foreign origin, 1999



lower in 1999 than in 1995, with greater decreases among nationals (-26%; average annual decreases of 7%) than among cases of foreign origin (-6%; average annual decreases of 1.5%).

The country of origin of foreign cases was available for 21 countries providing individual data (Table 7). Of the 7765 cases of foreign origin, 34% were from Africa (among which 13% from Somalia and 5% from Morocco), 31% from Asia (20% from the Indian subcontinent) and 26% from a country of the WHO European Region other than the country of notification (6% from Bosnia–Herzegovina, 4% from Yugoslavia, 3% from Turkey).

## 4.5 Previous anti-tuberculosis treatment status

Numbers of cases by previous anti-TB treatment status were available for 43 countries, whereas five countries provided information by previous diagnosis of TB (Table 8). Overall, 87% of TB cases notified in 1999 had never been treated for TB, 11% had been previously treated for TB and 3% had no information on previous anti-TB treatment. Cases with missing information on previous anti-TB treatment status were concentrated in the West, where they represented 21% of cases.

Previously treated cases represented 7% of the cases in the West (range 2-11%), 12% in the Centre (4-18%) and 11% in the East (2-32%). Beyond differences in definitions (previous diagnosis vs. previous treatment) different proportions of previously treated cases may be due to variable inclusion of these cases in TB notifications (see section 3.3) and to the completeness of notification. Therefore these data cannot be interpreted as an indicator of the effectiveness of previous anti-TB treatments.

## 4.6 Site of disease

In 1999, all countries except Spain notified cases with any anatomic localisation; in Spain only respiratory and meningeal TB cases were notified. Numbers of cases by site of disease were provided from all countries except Tajikistan (Table 9). The recommended pulmonary classification (see technical note) was used in 31 countries and the respiratory classification in 18 countries, of which 11 in the East. Pleural and intrathoracic lymphatic cases, (classified differently as “extrapulmonary” cases or as “respiratory” cases), represented 8.4% of TB cases in the countries providing specific site of disease in individual data (see below). Data by site are commented separately according to the classification used.

In the 20 countries in the West using the pulmonary classification, the proportion of pulmonary cases was 68% (range 60 – 98%). In the Centre the proportion of pulmonary cases (eight countries) was 87%, similar to the proportion of respiratory cases (88%) reported in the five countries using the respiratory classification. In the East, respiratory cases represented 94% of the cases notified in the 11 countries using the respiratory classification.

In the 22 countries providing individual data, the site of disease was analysed by sex, age and geographic origin. Extrapulmonary TB was more frequent among children than among adults (28% versus 20%). Among adults, female cases were 1.8 times more likely than male cases to have extra-pulmonary TB (27% versus 15%). In the 14 countries in the West, extrapulmonary TB was more frequent in cases of foreign origin than in nationals (37% versus 24%). Lower proportions of pulmonary cases in the West compared to the Centre, may be due to more frequent extrapulmonary localisation among cases of foreign origin, and possibly to more complete notification of extrapulmonary cases.

Information on the major site and one minor site of disease (see technical note) was available for 15 of the countries providing individual data (Table 10). Pulmonary TB, always classified as major site, was reported in 82% of the cases overall and extrapulmonary localisations were reported as major and/or minor site of disease in 22% of the cases. Among extrapulmonary sites, pleural TB was reported in 9.4% of the cases, extrathoracic lymphatic TB in 3.8% and each of the other sites in less than 2%. Meningeal TB was reported in 316 cases (0.6%). Intra-thoracic lymphatic TB and meningeal TB were more frequently reported among children than among adults (respectively 6.6% versus 1.1% and 4.3% versus 0.5%). Pleural TB was more frequent among children and adults aged 15 – 44 years than among older cases.

## 4.7 Bacteriology results

### 4.7.1 Culture

Data by culture result were provided overall from 38 countries (Table 11). The overall proportion of culture positive cases was around 50% in the West and

in the Centre and 29% in the East, where data were available from seven countries only. Proportions of culture positive cases were:

– higher than 60% in 14 countries in the West and in Croatia, Estonia, Latvia and Slovenia.
– lower than 40% in France and Portugal in the West, Albania and Hungary in the Centre and Armenia, Azerbaijan, Georgia and Rep. of Moldova in the East.

Low proportions of cases with positive culture may be due to:

– difficult access to laboratories, as in several countries in the East,
– diagnostic practices e.g. clinicians request of culture in selected cases (e.g. Hungary),
– characteristics of surveillance, as in France there is no follow-up of clinician notifications with missing culture result.

In some countries in the Centre and in the East (e.g. Russian Federation, Ukraine), results of culture and of sputum smear are not recorded separately, and results of culture and sputum smear are recorded together as "bacteriological confirmation" of diagnosis. This information is not presented in the Tables.

Culture status and results were further analysed by site in countries providing individual data, in which additional categories were available for cases without positive culture (Table 12). Among pulmonary cases, information on culture was missing for 20% of the cases in the West. Culture was not performed in 3% of the pulmonary cases in the West and Centre and was negative in 6% of cases in the West and 22% in the Centre. Culture results for extrapulmonary cases were not available in Italy. In the other countries in the West, 27% of extrapulmonary cases had no information on culture, 41% were culture positive and 6% were culture negative. In the Centre culture was not performed for a high proportion of cases in Romania and in Hungary. Overall, 10% of the cases were culture positive and the majority of the cases were culture negative (36%) or had unknown culture result (20%). High proportions of "negative" culture results may suggesting that coding of culture results needs further validation in some countries.

### 4.7.2 Species identification

Species identification for culture positive TB cases notified in 1999 was provided from 24 countries (Table 13). Overall, 90% of cases were due to *M. tuberculosis* and 9.6% had no information on species. In the West *M. bovis* represented 0.8% of the cases and and *M. africanum* 0.4%. The proportion of cases due to *M. bovis* was higher in Ireland (4.2%) than in the other countries. In the Centre, apart from one case due to *M. bovis* in the Czech Republic all cases were due to *M. tuberculosis*. Trends in the proportions of cases by species were relatively stable in the period 1996-1999 (data from 14 countries, not shown).

### 4.7.3 Sputum smear

The results of sputum smear microscopy were provided from 46 countries (Table 14). In the countries using the pulmonary classification, the proportion of cases with sputum smear positive for acid fast bacilli was 50% in the Centre and 45% in the West. In the East, 34% of respiratory cases were sputum smear positive (seven countries). Proportions of sputum smear positive cases are expected to be lower in countries using the respiratory classification because pleural and intrathoracic lymphatic cases (classified as respiratory cases together with pulmonary cases), are sputum smear negative. Low proportions of smear positive cases may also be due to differences in the availability of sputum microscopy, which was considered not to be routinely performed in eight countries (Table 14) or to shorter diagnostic delays resulting in lower bacillary load. Also, in some countries sputum microscopy may be replaced by microscopy of bronchoalveolar lavage, not valid to determine sputum smear status according to the definitions in use.

Differences in diagnostic practices and in the quality of the information on culture and on sputum smear available through TB notifications limit the use of these data for international comparisons. More complete and accurate information on bacteriological results for TB cases could be obtained through laboratory reporting of TB cases, recommended in Europe **[1]** but still not implemented in several countries (Table 1).

# DRUG RESISTANCE SURVEILLANCE IN 1999

Data on the results of drug susceptibility testing (DST) at the start of treatment were provided from a total of 34 countries.

## 5.1 Laboratory practices

Information on laboratory practices for DST were provided from all 34 countries providing DST results except Croatia (Table 15). DST was performed by a single laboratory in nine countries (located abroad in two of these), 2-10 laboratories in 12 countries and more than 10 laboratories in 12 countries (Table 15). Among the four methods internationally recommended for DST **[2]**, the non-radiometric proportion method was used in 22 countries, the radiometric proportion in 20 countries, the absolute concentration in eight countries and the resistance ratio in three countries. In 16 countries more than one method was used.

Laboratories had participated in a national and / or international proficiency testing scheme in 26 countries. Among the 19 countries participating in an international proficiency testing scheme, the percentage of agreement between the national results of DST for isoniazid and rifampicin and those obtained by the supranational reference laboratory was generally high. In four countries in the Centre and in the East laboratories did not participate in proficiency testing activities. In three countries information on participation in proficiency testing was incomplete.

## 5.2 Type of data

In 27 countries, DST results were provided on culture positive TB cases notified in 1999 (Table 16). In seven countries, DST results were provided on TB cases diagnosed in selected laboratories or clinical Centres and were not linked to TB notifications. Culture and DST were performed as a diagnostic routine in 25 countries. Based on the type of TB case population included in surveillance, on the use of culture and DST and on geographic coverage of data, countries were classified in two groups, presented separately in Tables 16-21.

**Group A** includes countries in which:

- culture and DST were routinely performed for TB diagnosis and
- DST results were available for all culture positive TB cases notified or for a sample of cases with national coverage.

Under the assumption that in these countries culture positive cases are representative of TB cases notified, these data were considered representative and are described in detail below.

**Group B** includes countries in which:

- culture or DST were not routinely performed for TB diagnosis or
- DST results were available for selected TB cases (e.g. diagnosed in selected laboratories or notified in selected regions).

In these countries, and particularly in those where culture or DST are performed for selected cases, DST results may not be representative and should not be used for international comparisons.

## 5.3 Results

Isoniazid and rifampicin were tested systematically in all countries. Ethambutol was not systematically tested in Germany and streptomycin was not systematically tested in seven countries in the West. Corresponding results are not shown in the Tables. Data were provided for each combination of resistance from all countries except the Russian Federation, where only numbers of multidrug resistant cases were available. DST results were provided by previous anti-TB treatment status in all countries except Albania, Greece and Israel and were provided only for cases never treated from Spain and the Russian Federation.

### 5.3.1 Countries providing representative national data (group A)

Data from 22 countries were included in group A (Table 16). In all these countries culture and DST are performed as a diagnostic routine for TB diagnosis. In 20 of these countries, DST results were collected for all culture positive cases notified at national level. In Croatia and Germany DST results were provided on large national samples of notified cases. In 14 countries, DST results were provided in the individual data set containing other information on TB cases.

Overall, 61% of the TB cases notified in countries in group A were culture positive (range: 49-84%). Among the 19 447 culture positive cases, DST results were available for 17 251 cases (89%). The proportion of cases with missing DST results was highest in Lithuania (31%), Bosnia-Herzegovina (23%), Latvia (17%), Germany (17%) and the Czech Republic (16%) (see country profiles). Global proportions of resistant and multidrug resistant cases were much higher in the Baltic countries and in Israel than in the other countries in the West and Centre (Table 17).

*Resistance by previous anti-TB treatment status*

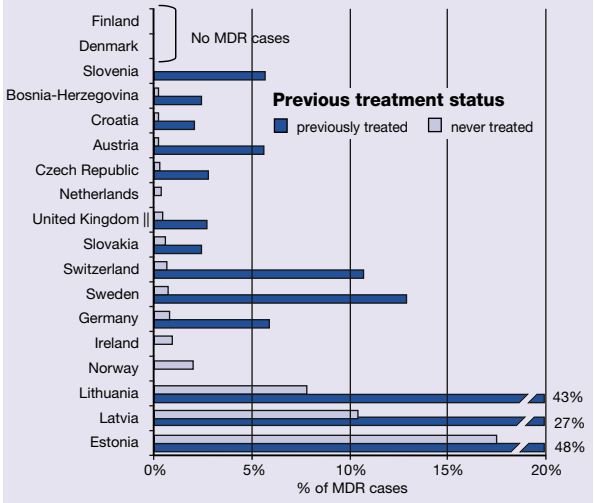
Data by previous anti-TB treatment status were not provided from Israel, where information was only available on previous TB diagnosis. In the remaining countries, among 16 622 cases with DST results, 13 160 (79%) were classified as never treated, 1706 (10%) as previously treated and 1756 (11%) had no information on previous treatments.

Proportions of resistant cases among cases never treated were much lower in the countries of the West and Centre than in the Baltic countries. In the West and Centre, proportions of resistant cases among cases never treated were:

- 4.1% for isoniazid (range: 0-9.3%), compared with 21.7-27.8% in the Baltic countries;
- 0.7% for rifampicin (range 0-2.1%) compared with 10.1-17.8% in the Baltic countries.
- 0.5% for ethambutol (range 0-2.1%; Germany excluded) compared to 4.2-14.0% in the Baltic countries.
- 1.2% for streptomicin (range 0-13.3%; seven countries in the West excluded) compared with 17.5-27.3% in the Baltic countries.

Resistance to rifampicin was combined with resistance to isoniazid (multidrug resistance) in 65% of cases never treated in the West and in the Centre and in 92% in the Baltic countries. The proportions of multidrug resistant cases among cases never treated were 0.5% in the West and Centre (range 0-2.1%) and 7.8-17.5% of those in the Baltic countries.

**FIGURE 5** **Proportion of multidrug resistant TB cases by previous anti-TB treatment status, 1999 ***




* countries in group A (see Table 16) with >50 TB cases notified in 1999
|| except Scotland

The proportions of resistant cases were generally higher among cases previously treated (Table 19), for each drug and drug combination. The proportions of multidrug resistant cases were 3.9% in the West and Centre (range 0-12.9%) and 26.8-48.3% in the Baltic countries.

In countries where culture and DST at the start of treatment are a diagnostic routine and DST results are linked to TB notifications, drug resistance data can be considered as representative of the country situation. In the countries in the West and in the Centre, the levels of primary resistance and of multidrug resistance are relatively low, which indicates that tuberculosis treatment remains globally adequate. The high levels of primary resistance and multidrug resistance reported from the Baltic countries indicate sub-optimal performance of TB treatment programmes in recent years. Proportions of resistance among cases previously treated should be interpreted more cautiously, as criteria for notification of these cases vary across countries **[1]** and numbers of previously treated cases were small.

*Resistance by geographic origin*

DST results by geographic origin were not provided from the Czech Republic and Lithuania (Tables 20-21). Geographic origin was defined according to country of birth in 18 countries and to nationality in Austria and in the Netherlands.

In the countries in the West, cases of foreign origin represented overall 48% of the cases with DST results. Global proportions of resistant cases were generally higher among cases of foreign origin. Among these, 9% were resistant to isoniazid compared with 3.2% of nationals and 2.2% were multidrug resistant compared with 0.2% among nationals. In Israel, where the foreign-born represented 86% of cases notified and 92% of those with DST results, 8.6% of foreign cases were multidrug resistant.

In the thirteen countries of the West and Centre providing individual data, the proportion of multidrug resistant cases was higher among foreigners than among nationals both among cases never treated (1.3% versus 0.1%) and previously treated (9.7% versus 0.9%). Among foreigners, global proportions of multidrug resistant cases were higher among cases of African origin (1.9%) than among cases from a foreign country in the WHO European Region (1.4%) or from Asia (1.1%).

Differences in proportions of resistance by geographic origin should be interpreted cautiously, due to the lack of information on time of immigration and to incomplete information on time and type of previous anti-TB treatment.

In the countries of the Centre and East, foreign-born cases represented 8% of cases tested. Proportions of resistant cases did not differ by geographic origin in Estonia and Latvia. In the countries in the Centre numbers of foreigners were small and comparisons of the proportion of resistant cases by geographic origin inconclusive.

### 5.3.2 Countries providing other data (group B)

Twelve countries were classified in group B. In three of these countries (France, Spain and Yugoslavia) culture and DST are routinely performed (Table 16). In France, data are collected through a stable sentinel network of 20 university hospital laboratories covering 12 regions. Proportions of resistant cases are low, comparable to those reported from other countries in the West and stable over time **[6, 18]**. In Spain, data were available only for TB cases never treated, for which a strain was sent to the National Reference Laboratory and should not be taken as representative. The proportions of resistant cases are low and comparable to those observed in a representative survey done in Barcelona **[4]**. In Yugoslavia, data provided on all culture positive cases notified in the region of Belgrade, show low levels of resistance but they may not be representative of cases notified in other regions.

In the other nine countries in group B, culture or DST are not routinely performed at TB diagnosis. Therefore, DST results from these countries are likely to include selected TB cases, unrepresentative of incident TB cases. Levels of resistance in Greece, Hungary and Romania are higher than those from surrounding countries, possibly due to case selection, as suggested by proportions of resistance varying significantly compared to 1998 **[6]**. Levels of resistance and multidrug resistance in Kazakhstan, Kyrgyzstan, the Russian Federation and Ukraine are very high but they should not be considered representative, as they are likely to include selected TB cases. Data from the Russian Federation include DST results for 36 217 new culture positive pulmonary cases notified to the Ministry of Health; in this case population the level of primary multidrug resistance is similar to that observed in representative surveys done in two oblasts **[4].** In countries where culture or DST cannot be performed routinely, the implementation of representative surveys **[19]**, is needed to obtain representative data.

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