

# Tuberculosis

## Annual Epidemiological Report for 2021

### Key facts

- For 2021, the 30 countries in the European Union/European Economic Area (EU/EEA) reported a total of 33 527 tuberculosis (TB) cases (7.4 per 100 000 population).
- The overall notification rate continued to fall, as did most country-specific rates. However, the EU/EEA is not on track to reach the goal of ending the TB epidemic by 2030.
- The decline in total case numbers and notification rates in 2021 should be interpreted with caution, given the potential impact of measures put in place to mitigate the COVID-19 pandemic across the EU/EEA on TB clinical services and surveillance.
- Rifampicin resistance/multidrug resistance (RR/MDR) was reported for 4.2% of TB cases with drug susceptibility testing results reported. Extensive drug resistance (XDR) was reported for 54.4% of MDR TB cases that underwent second-line drug susceptibility testing.
- HIV status was reported by 21 countries for 70.2% of their total TB cases, and of TB cases with known HIV status, 3.8% were HIV-positive.
- Treatment success was achieved in 71.7% of all TB cases notified in 2020, 53.5% of HIV-co-infected TB cases notified in 2020, 51.7% of RR/MDR TB cases notified in 2019, and 66.7% of XDR TB cases notified in 2018.

### Introduction

Tuberculosis (TB) is an infectious disease caused by a group of *Mycobacterium species* called the *Mycobacterium tuberculosis* complex. TB typically affects the lungs (pulmonary tuberculosis), but it can also cause disease in any organ (extrapulmonary tuberculosis). TB is transmitted from person to person when, for example, an individual with pulmonary TB expels bacteria into the air by coughing or sneezing. While most TB infections present as asymptomatic and are not infectious, about 10% of those infected will develop TB disease during their lifetime, with a higher risk among immunocompromised individuals (such as people infected with HIV).

### Methods

This report is based on data for 2021 retrieved from The European Surveillance System (TESSy) on 31 December 2022. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

An overview of the national surveillance systems for TB is available online [1].

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A subset of the data used for this report is available through ECDC's online 'Surveillance Atlas of Infectious Diseases' [2].

ECDC and the World Health Organization's Regional Office for Europe jointly coordinate the collection and analysis of TB surveillance data in Europe. This report only includes data from EU/EEA countries. For 2021, all reporting countries had comprehensive surveillance systems. All countries used the EU case definition for tuberculosis during the period included in this report.

Confirmed cases required either a positive culture, or both detection of acid-fast bacilli by microscopy and detection of *Mycobacterium tuberculosis* complex by nucleic acid amplification testing.

Multidrug resistance (MDR) was defined as resistance to at least isoniazid and rifampicin. Pre-extensive drug resistance (pre-XDR) refers to resistance to: (i) at least rifampicin (that is, rifampicin resistance/multidrug resistance (RR/MDR)) and (ii) any fluoroquinolone. Extensive drug resistance (XDR) was defined as resistance to (i) at least rifampicin (that is rifampicin resistance/multidrug resistance (RR/MDR)), and (ii) a fluoroquinolone, and (iii) at least one additional Group A drug.

'Foreign origin' refers to cases born in (or citizens of) a country different to the reporting country.

Periods of observation for treatment outcome monitoring were 12 months for all TB cases, 24 months for RR/MDR TB and 36 months for XDR TB cases. Treatment success was defined as the proportion of cases reported as cured or having completed their treatment.

## Epidemiology

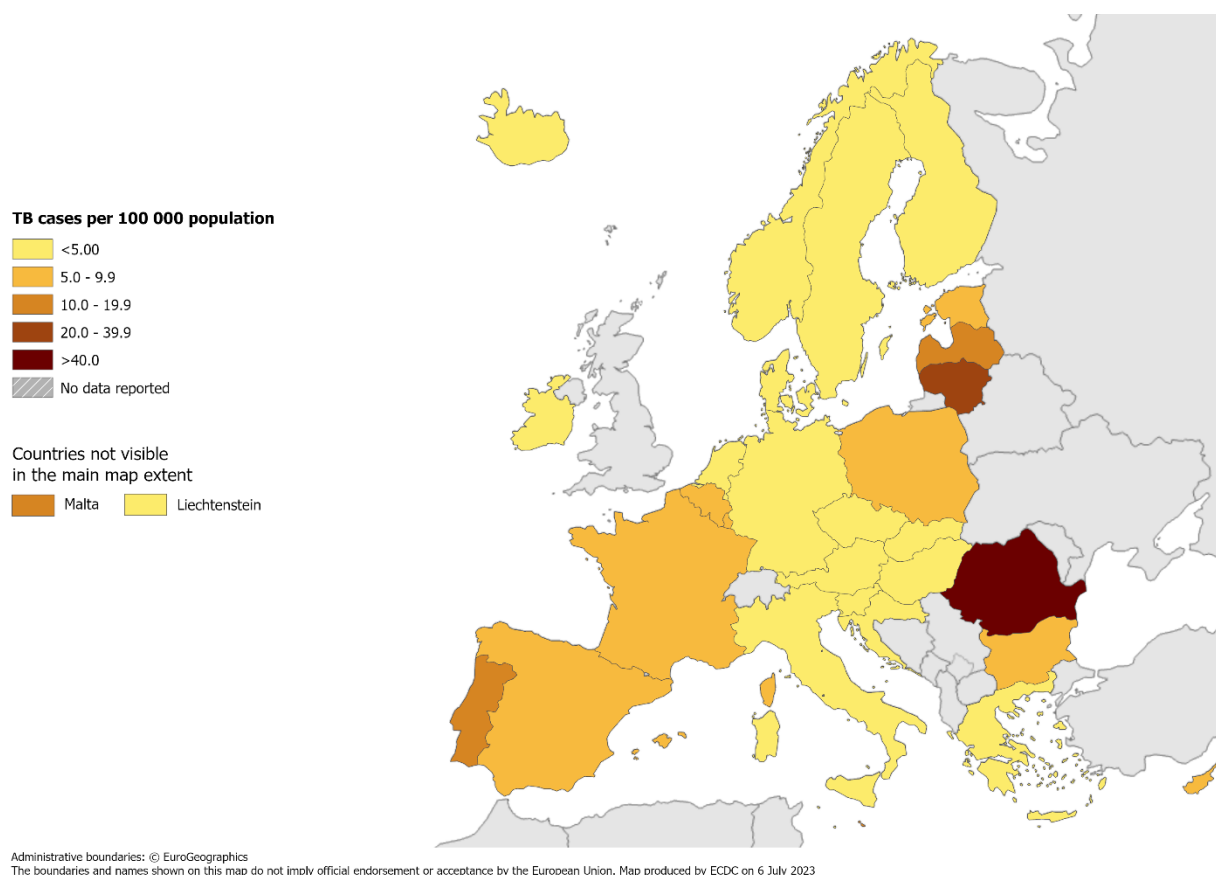
In 2021, a total of 33 527 TB cases were reported by all EU/EEA countries. Ten countries reported 88.3% of the total cases, with Romania alone accounting for 23.8% of all TB cases reported in 2021 (Table 1). The rate of notifications per 100 000 population was 7.4, continuing the downward trend observed since the launch of European enhanced TB surveillance in 1996. As reported for previous years, country-specific rates differed considerably in 2021, ranging from 1.9 in Iceland and Greece to 41.6 in Romania (Table 1 and Figure 1). Notification rates in the majority of countries have continued to decline or have remained largely stable since 2017. Age-standardised notification rates did not differ substantially from crude rates.

**Table 1. Distribution of tuberculosis cases and rates per 100 000 population by country and year, EU/EEA, 2017–2021**

Country	2017		2018		2019		2020		2021		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	569	6.5	482	5.5	474	5.4	388	4.4	396	4.4	4.5
Belgium	967	8.5	977	8.6	963	8.4	825	7.2	875	7.6	8.0
Bulgaria	1 463	20.6	1 358	19.3	1 344	19.2	930	13.4	687	9.9	9.5
Croatia	378	9.1	372	9.1	302	7.4	194	4.8	157	3.9	3.5
Cyprus	53	6.2	52	6.0	69	7.9	36	4.1	48	5.4	5.4
Czechia	501	4.7	443	4.2	461	4.3	363	3.4	357	3.3	3.3
Denmark	275	4.8	291	5.0	284	4.9	221	3.8	208	3.6	3.7
Estonia	176	13.4	147	11.1	150	11.3	124	9.3	111	8.3	8.2
Finland	244	4.4	227	4.1	226	4.1	174	3.1	170	3.1	2.9
France	5 006	7.5	5 048	7.5	5 183	7.7	4 515	6.7	4 274	6.3	6.7
Germany	5 516	6.7	5 496	6.6	4 811	5.8	4 159	5.0	3 896	4.7	4.9
Greece	467	4.3	432	4.0	459	4.3	396	3.7	206	1.9	2.1
Hungary	685	7.0	640	6.5	552	5.6	406	4.2	335	3.4	3.3
Iceland	14	4.1	8	2.3	13	3.6	12	3.3	7	1.9	2.0
Ireland	300	6.3	310	6.4	257	5.2	236	4.8	217	4.3	4.6

Country	2017		2018		2019		2020		2021		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Italy	3 944	6.5	3 912	6.5	3 346	5.6	2 287	3.8	2 480	4.2	4.3
Latvia	552	28.3	NDR	NRC	NDR	NRC	NDR	NRC	261	13.8	13.4
Liechtenstein	1	2.6	1	2.6	NDR	NRC	2	5.2	1	2.6	2.1
Lithuania	1 387	48.7	1 142	40.7	1 058	37.9	726	26.0	646	23.1	22.3
Luxembourg	32	5.4	42	7.0	50	8.1	34	5.4	35	5.5	5.6
Malta	42	9.1	55	11.6	98	19.9	140	27.2	54	10.5	11.1
Netherlands	783	4.6	795	4.6	754	4.4	622	3.6	680	3.9	4.0
Norway	261	5.0	208	3.9	166	3.1	159	3.0	157	2.9	3.0
Poland	5 787	15.2	5 487	14.4	5 321	14.0	3 388	8.9	3 704	9.8	9.5
Portugal	1 914	18.6	1 926	18.7	1 907	18.6	1 519	14.8	1 504	14.6	13.9
Romania	12 997	66.2	12 199	62.5	11 618	59.8	7 693	39.8	7 979	41.6	40.5
Slovakia	249	4.6	281	5.2	214	3.9	158	2.9	137	2.5	2.6
Slovenia	112	5.4	99	4.8	101	4.9	77	3.7	80	3.8	3.5
Spain	5 660	12.2	4 766	10.2	4 532	9.7	3 697	7.8	3 508	7.4	7.3
Sweden	519	5.2	488	4.8	479	4.7	324	3.1	357	3.4	3.6
<b>EU-EEA</b>	<b>50 854</b>	<b>11.3</b>	<b>47 684</b>	<b>10.6</b>	<b>45 192</b>	<b>10.0</b>	<b>33 805</b>	<b>7.5</b>	<b>33 527</b>	<b>7.4</b>	<b>7.4</b>

Source: Country reports  
ASR: age-standardised rate  
NDR: no data reported  
NRC: no rate calculated

**Figure 1. Distribution of tuberculosis cases per 100 000 population by country, EU/EEA, 2021**

## Previous treatment, laboratory confirmation, and TB site

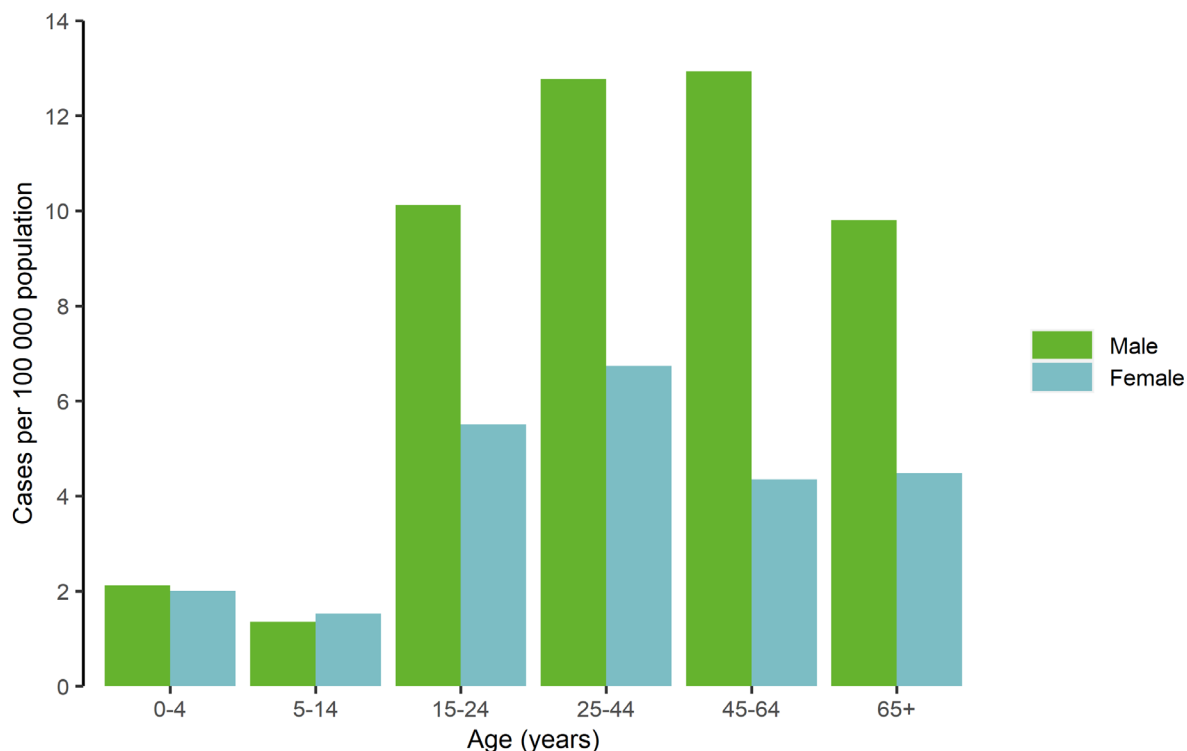
The distribution of cases by previous treatment history in 2021 was similar to that reported in previous years: 25 403 (75.8%) of 33 527 TB cases reported in 2021 were newly diagnosed, 3 332 (9.9%) had been previously treated for TB, and 4 792 (14.3%) had an unknown previous treatment status. The proportion of previously treated cases was 10% or above in eight countries: Bulgaria (10.3%), Estonia (17.1%), Hungary (12.6%), Latvia (11.1%), Lithuania (14.9%), Norway (10.8%), Poland (12.9%), and Romania (19.8%).

Among TB cases reported in 2021, 24 133 (72.0%) were laboratory-confirmed. Of these cases, 17 897 (74.2%) had laboratory confirmation based only on culture-positive results, 442 (1.8%) were both smear and nucleic acid test positive (but culture negative), and 5 794 (24.0%) cases were culture, smear, and nucleic acid test-positive.

Of all 33 527 TB cases reported in 2021, 24 041 (71.7%) were diagnosed with pulmonary TB, 7 027 (21.0%) with extrapulmonary TB, 2 254 (6.7%) with a combination of both, and 205 (0.6%) had no TB site reported.

## Age and gender

In 2021, the highest notification rate was observed in the 25 to 44 years age group (9.4 per 100 000 population). Overall, the rate in males was twice the rate in females, but this imbalance was limited to age groups above 14 years (Figure 2).

**Figure 2. Distribution of tuberculosis cases per 100 000 population, by age and gender, EU/EEA, 2021**

## Origin of cases

Of the 33 527 TB cases notified in 2021, 20 691 (61.7%) were born in, or were citizens of, the reporting country, 11 339 (33.8%) were of foreign origin, and 1 497 (4.5%) were of unknown origin. Of the five countries with TB notification rates higher than 10 per 100 000 population, three reported fewer than 5% of TB cases as being of foreign origin: Latvia (2.3%), Lithuania (1.1%), and Romania (0.6%). The remaining two countries reported a higher proportion of TB cases of foreign origin: Malta (98.1%), and Portugal (25.6%).

## Drug resistance

Of 21 397 bacteriologically confirmed TB cases notified in 2021, 16 544 (77.3%) had drug susceptibility testing results for at least rifampicin. Of these, 695 (4.2%) had rifampicin resistance/multidrug resistance. In 2021, the proportion of TB cases with rifampicin resistance or with resistance to multiple anti-TB drugs was similar to that in 2020 (rifampicin resistance 4.4% in 2021 and 4.3% in 2020, and resistance to multiple anti-TB drugs 3.8% for both years).

In 2021, 54.4% of RR/MDR-TB cases (404 of 742) had drug-susceptibility testing results for any fluoroquinolone. Among these, 115 (28.5%) met the definition for pre-XDR. The majority (68.7%, 79 of 115) of pre-XDR cases had drug-susceptibility testing results reported for at least one other Group A drug. Of these cases, 43 (54.4%) met the XDR case definition. The proportion increased in 2021 (from 45.1%, 37 in 2020), but the numbers reported remain low overall.

## HIV co-infection

HIV status was reported for 12 277 (70.2%) of 17 480 TB cases from the 21 countries that reported the HIV status of TB cases. Of cases with known HIV status, 472 (3.8%) were reported as HIV-positive. There were 17 countries with at least 50% reporting completeness for HIV status. Across these countries and among cases with known HIV status, the proportion of co-infected cases were highest in Estonia (12.1%), Hungary (14.3%), and Latvia (13.1%). The number of countries reporting data on HIV coinfection peaked at 23 in 2016 and 2017, decreased to 21 in 2018, and dropped again to 19 in 2019 and 2020.

## Treatment outcome

Of the 20 760 new and relapsed TB cases notified in 2020 with a treatment outcome reported in 2021, 14 876 (71.7%) were treated successfully, 1 750 (8.4%) died, 160 (0.8%) experienced treatment failure, 678 (3.3%) were lost to follow-up, 454 (2.2%) were still on treatment in 2021, and 2 842 (13.7%) had not been evaluated.

Treatment success was achieved in 228 (53.5%) of 426 HIV co-infected cases who were reported in 2020 and on first-line TB treatment. Among all 781 RR/MDR TB cases notified in 2019, 404 (51.7%) were reported to have treatment success. A total of 18 (66.7%) of 27 XDR TB cases notified in 2018 had reported a successful treatment.

## Discussion

In 2021, all EU/EEA countries reported TB notification data, with a total of 33 527 TB cases. As in previous years, a few countries reported a large proportion of the total number of cases, including Romania, which reported almost a quarter of all TB cases in 2021.

There was a further decline in the overall TB notification rate, to 7.4 per 100 000 population, which continued the decreasing trend observed since 2002. The United Nations Sustainable Development Goal 3 at the EU/EEA level is to reach a notification rate of 2.4 per 100 000 by 2030 (an 80% reduction of the 2015 TB notification rate of 11.9 per 100 000); although progress is being made towards this goal, at the current rate of decline the majority of EU/EEA countries are not on track to reach the 80% reduction target by 2030, or the elimination target by 2050 [3]. Countries need to accelerate their progress towards these goals to meet them.

Despite the slight increase observed for the number of MDR TB and XDR TB cases in the EU/EEA in 2021, the number of drug-resistant TB cases in the EU/EEA area remains relatively stable, in contrast with the high number of drug-resistant TB cases in the European Region High Priority Countries (HPCs) bordering the EU/EEA. Drug-susceptibility testing results for first-line drugs were only reported for approximately 79% of laboratory-confirmed TB cases in 2021, indicating that there is still considerable room for improvement here. Countries need drug-susceptibility testing results to be able to diagnose and treat drug-resistant TB, as well as to monitor this threat.

WHO has set a target of 85% for TB treatment success [4-5]. Data reported in 2021 (71.7% treatment success rate) indicate that improvement is needed to reach the treatment success target. The target for successful treatment among RR/MDR TB cases after 24 months is 75%, and overall, the EU/EEA is far below where it should be (at 51.7% of RR/MDR TB cases with treatment success). In 2020, WHO released updated treatment guidelines for drug-resistant TB [6]. The move away from injectable agents to all-oral regimens, and new agents such as pretomanid, will facilitate treatment and with that the rate of treatment success for RR/MDR TB may improve in the future.

The decline in total case numbers and notification rates in 2021 should be interpreted with caution due to the impact on TB clinical services and surveillance across the EU/EEA of measures to mitigate the COVID-19 pandemic, which continued throughout 2021.

If the continued decline in TB incidence also observed during 2021 was real and not solely an artefact of the COVID-19 pandemic, this report indicates that despite ongoing progress toward reaching the goals set by the United Nations and WHO, countries continue to face several challenges in achieving elimination. Additional resources will be required to accelerate progress towards achieving these goals and to counteract any increase in TB cases resulting from the impact of the COVID-19 pandemic on TB services.

## Public health implications

TB is a poverty-related disease, so some of the reasons for the differences between high- and low-incidence countries are socio-economic and will eventually need to be addressed on that level rather than by public health measures alone. Meanwhile, all countries are encouraged to continue to ensure rapid diagnosis of TB and drug-resistant TB and provide adequate treatment as the most effective intervention to stop TB transmission. High-incidence countries should consider assessing whether and where their TB programmes need further strengthening. Low-incidence countries need to consider focusing their screening, diagnostic, and treatment efforts even more on sub-populations vulnerable to TB.

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