SURVEILLANCE REPORT

Pertussis

Annual Epidemiological Report for 2024

Key facts

- In 2024, 209 674 cases of pertussis were reported by 29 EU/EEA countries.
- Three countries (Czechia, Poland and Spain) accounted for more than 46% of all reported cases.
- The notification rate in 2024 was 54.9 cases per 100 000 population, which was an over eight-fold increase from 6.7 per 100 000 population in 2023, and a 78-fold increase from 0.7 per 100 000 population in 2022.
- Infants below the age of one year and adolescents between 10 and 14 years were the most affected age groups, with notification rates of 318.5 and 204.2 per 100 000 population. Individuals aged ≥ 15 years accounted for 53% of all cases reported.
- The sharp rise in pertussis incidence likely reflects the accumulation of susceptible individuals following prolonged COVID-19 control measures, including unvaccinated or under-vaccinated people, waning immunity, and reduced natural immune boosting during the pandemic. In addition, the COVID-19 pandemic accelerated the improvement in testing capacity in many countries and affected testing practices.
- The clinical presentation of pertussis in adolescents and adults may be mild and is often not recognised, which contributes to bacterial circulation in the population. This poses a transmission risk to infants who are too young to have completed the primary pertussis vaccination series.
- The objectives of pertussis prevention and control include the prevention of severe disease and deaths among infants younger than six months old through the implementation of well-adapted vaccination programmes. As of April 2026, 26 countries have implemented maternal immunisation programmes, while 25 countries introduced booster doses for adolescents (10 to 19 years), and 10 countries recommended booster doses for adults (18 years and above).

Introduction

Pertussis is a highly infectious bacterial disease involving the respiratory tract. It is caused by a bacterium (*Bordetella pertussis* or *Bordetella parapertussis*) that is found in the mouth, nose and throat of a person with the infection. It is also known as whooping cough.

Symptoms usually appear seven to 10 days after infection but can also appear up to 21 days later. Initially, symptoms resemble those of a common cold, including sneezing, runny nose, low-grade fever and a mild cough. Within two weeks, the cough becomes more severe and is characterised by episodes of numerous rapid coughs, followed by a crowing or high-pitched whoop. These episodes frequently end with the expulsion of a thick, clear mucous, often followed by vomiting.

Suggested citation: European Centre for Disease Prevention and Control. Pertussis. In: ECDC. Annual epidemiological report for 2024. Stockholm: ECDC; 2026.

Stockholm, April 2026

They initially occur at night and then become more frequent during the day, and may recur for one to two months. In young infants, the typical 'whoop' may never develop, and the coughing fits may be followed by brief periods when breathing stops. After this phase, the coughing fits become less frequent and less severe, and the infant gradually gets better, although this can take up to three months.

Adolescents, adults, or partially immunised children generally have milder or atypical symptoms, so pertussis might be more difficult to diagnose in these groups, as well as in very young infants.

Methods

This report is based on data for 2024 retrieved from EpiPulse Cases (EPC) on 10 April 2026. EpiPulse Cases is a system for the collection, analysis and dissemination of data on communicable diseases that has replaced The European Surveillance System (TESSy) in October 2024

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

A subset of the data used for this report is available through the interactive Surveillance atlas of infectious diseases [2].

In 2024, 29 European Union/European Economic Area (EU/EEA) countries reported data on pertussis to EpiPulse Cases. Liechtenstein has never reported pertussis data to ECDC.

Most countries reported case-based data in accordance with the EU case definition, based on comprehensive passive surveillance systems with national coverage [3,4]; only pertussis data due to *Bordetella pertussis* are reportable according to the EU case definition. Belgium and Bulgaria reported aggregate data in 2024. Belgium operates a voluntary sentinel-laboratory-based surveillance system covering the entire population. France operates a hospital-based sentinel surveillance system, which includes only infants below the age of six months; for 2018 (in addition to 2016 and 2017 in previous reports) the cases below the age of one year identified through the ECDC study PERTINENT (Pertussis in Infants in Europe) were reported to ECDC as part of the annual data collection and are included in ECDC's outputs.

Epidemiology

Geographical distribution

For 2024, 29 EU/EEA countries reported 209 674 pertussis cases, of which 86% were classified as confirmed, 4% as probable and 10% as possible. Four countries (Czechia, Poland, Spain, and Germany) accounted for 58% of all reported cases, with the highest number of cases reported by Czechia (18%) and Poland (15%) (Table 1). In Czechia, 88% cases reported were confirmed while in Poland it was 51%, in Spain 89% and in Germany 97%. The EU/EEA notification rate was 54.9 per 100 000 population, which was an over eight-fold increase from 6.7 per 100 000 population in 2023, and a 78-fold increase from 0.7 per 100 000 population in 2022. Notably, notification rates increased in all reported countries compared to the previous year except in Croatia and Denmark, where the notification rates decreased. The largest increases were observed in Lithuania (from 0.2 to 31.1), Romania (from 0.1 to 15.5), Bulgaria (from 0.3 to 42.2), Luxembourg (from 2.3 to 190.6) and Czechia (from 4.6 to 342.9) per 100 000 population (Figure 1).

Among the 27 countries that reported case-based data, 24 had a higher proportion of cases in people younger than 18 years old than in those aged 18 years and above. The highest proportion of cases among people aged 18 years and above were reported in France (100%), Romania (95%), Bulgaria (85%), Portugal (78%), Croatia (77%), Belgium (76%), Slovenia (74%), Ireland (74%), Luxembourg (74%), and Estonia (71%).

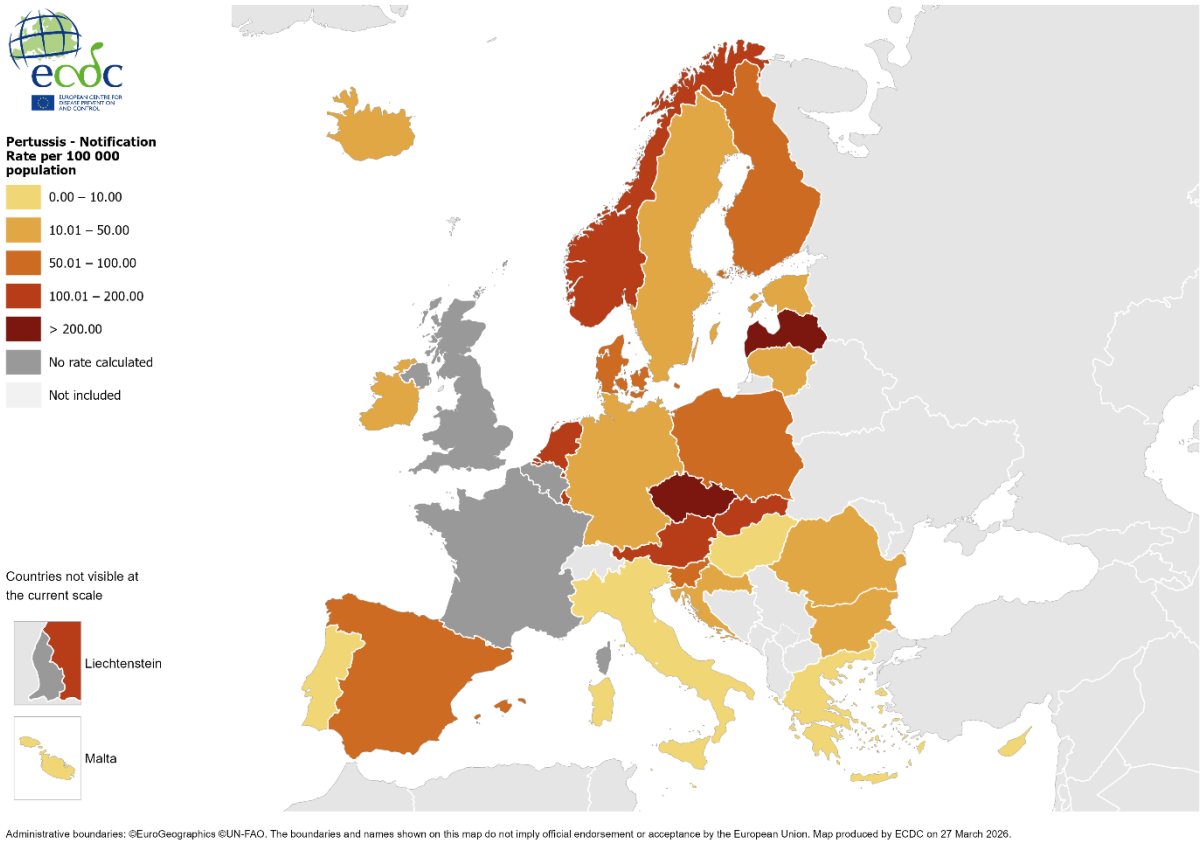
Table 1. Pertussis cases and rates per 100 000 population by country and year, EU/EEA, 2020–2024

Country	2020		2021		2022		2023		2024		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	632	7.1	129	1.4	164	1.8	2 791	30.7	15 470	168.9	183.1
Belgium	124	NRC	16	NRC	80	NRC	1 046	NRC	3 392	NRC	NRC
Bulgaria	27	0.4	3	0.0	21	0.3	20	0.3	2 721	42.2	48.9
Croatia	10	0.3	7	0.2	0	NRC	4 806	124.8	1 863	48.2	55.3
Cyprus	8	0.9	2	0.2	0	NRC	2	0.2	34	3.5	3.7
Czechia	696	6.5	51	0.5	96	0.9	494	4.6	37 375	342.9	361.2
Denmark	2 390	41.0	80	1.4	54	0.9	6 058	102.1	3 890	65.3	66.8
Estonia	44	3.3	13	1.0	8	0.6	30	2.2	250	18.2	18.8
Finland	290	5.2	33	0.6	35	0.6	131	2.4	2 814	50.2	53.3
France	0	NRC	0	NRC	0	NRC	0	NRC	528	NRC	NRC
Germany	3 212	3.9	776	0.9	1 191	1.4	2 318	2.8	24 795	29.7	33.3
Greece	8	0.1	0	NRC	1	0.0	9	0.1	439	4.2	5.0
Hungary	13	0.1	0	NRC	2	0.0	2	0.0	632	6.6	6.9
Iceland	0	NRC	0	NRC	0	NRC	0	NRC	145	37.8	36.2
Ireland	66	1.3	5	0.1	7	0.1	18	0.3	717	13.4	12.7
Italy	189	0.3	5	0.0	62	0.1	132	0.2	4 651	7.9	10.2
Latvia	340	17.8	9	0.5	46	2.5	111	5.9	4 259	227.5	237.4
Liechtenstein	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Lithuania	68	2.4	0	NRC	2	0.1	7	0.2	898	31.1	33.9
Luxembourg	3	0.5	3	0.5	3	0.5	15	2.3	1 281	190.6	198.2
Malta	10	1.9	0	NRC	0	NRC	4	0.7	42	7.5	8.4
Netherlands	970	5.6	79	0.5	142	0.8	2 944	16.5	18 207	101.5	103.9
Norway	812	15.1	38	0.7	44	0.8	1 201	21.9	10 209	183.9	184.3
Poland	753	2.0	182	0.5	371	1.0	922	2.5	32 656	89.2	94.7
Portugal	33	0.3	3	0.0	9	0.1	28	0.3	927	8.7	10.4
Romania	18	0.1	1	0.0	9	0.0	16	0.1	2 960	15.5	16.5
Slovakia	700	12.8	92	1.7	109	2.0	221	4.1	7 306	134.7	136.6
Slovenia	42	2.0	6	0.3	51	2.4	123	5.8	1 920	90.4	101.2
Spain	206	0.4	39	0.1	72	0.2	2 414	5.0	26 748	55.0	62.2
Sweden	269	2.6	11	0.1	13	0.1	138	1.3	2 545	24.1	24.5
EU/EEA (30 countries)	**11 933**	**3.2**	**1 583**	**0.4**	**2 592**	**0.7**	**26 001**	**6.7**	**209 674**	**54.9**	**59.1**
United Kingdom	NDR	NRC	NA	NA	NA	NA	NA	NA	NA	NA	NA
EU/EEA (31 countries)	**11 933**	**3.2**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Source: country reports; ASR: age-standardised rate; NDR: no data reported; NRC: no rate calculated; NA: not applicable.

No data from 2020 onwards were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020. Notification rates for Belgium and France are not calculated, as these countries have surveillance systems that are voluntary and sentinel, respectively.

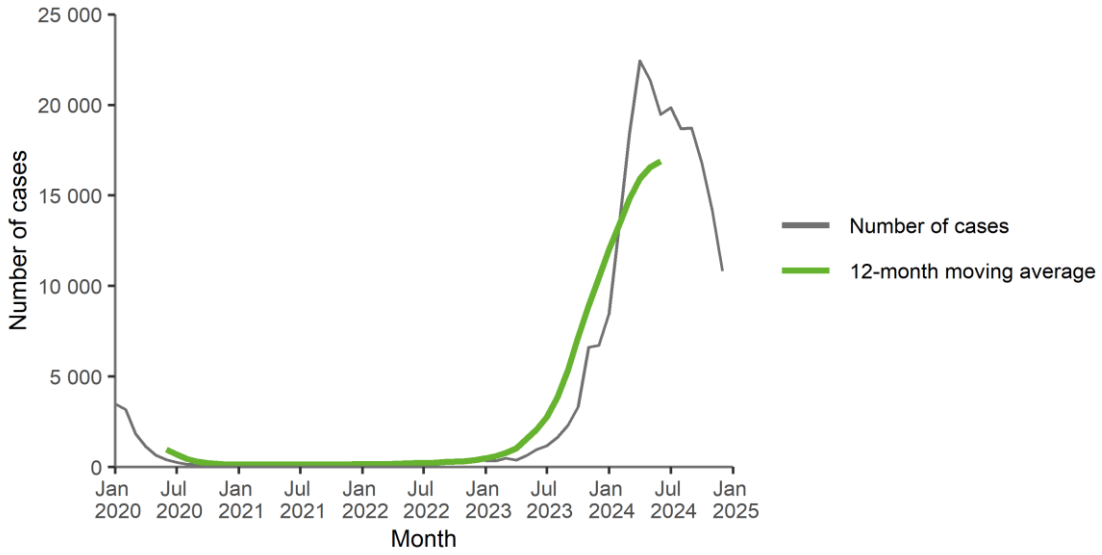
Figure 1. Pertussis cases per 100 000 population by country, EU/EEA, 2024



Seasonality and trend

In the five-year period between 2020 and 2024, the number of cases were low from the spring of 2020 until summer 2023, and then spiked from July 2023 (n=1 223) until April 2024 (n=22 460) (Figure 2).

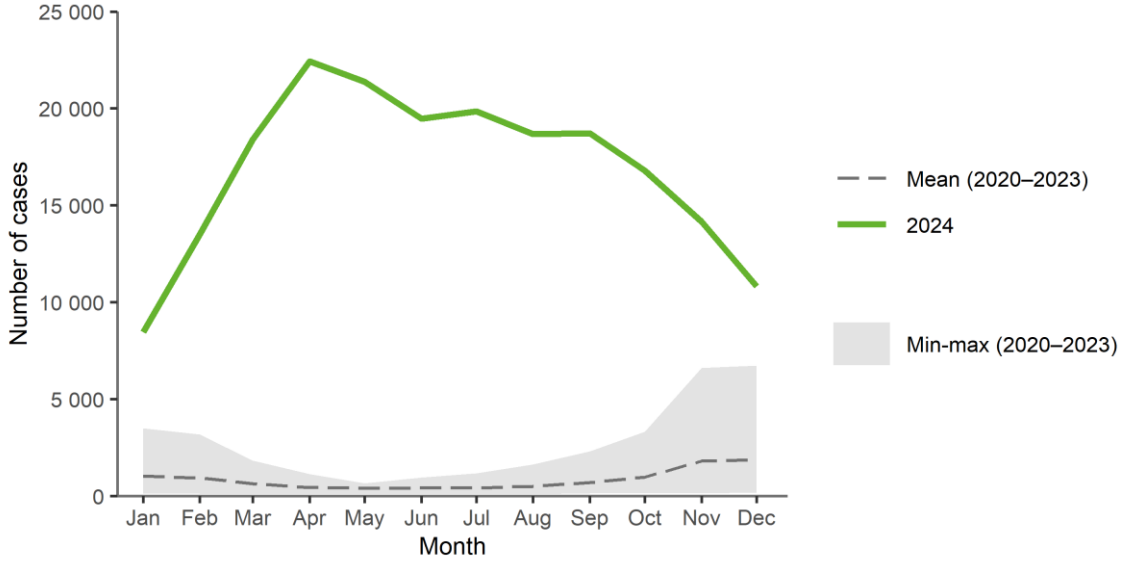
Figure 2. Pertussis cases by month, EU/EEA, 2020–2024



Source: Country reports from Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

In 2024, after the spike in the number of cases in April, the number of cases gradually decreased (Figure 3).

Figure 3. Pertussis cases by month, EU/EEA, 2024 and 2020–2023



Source: Country reports from Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

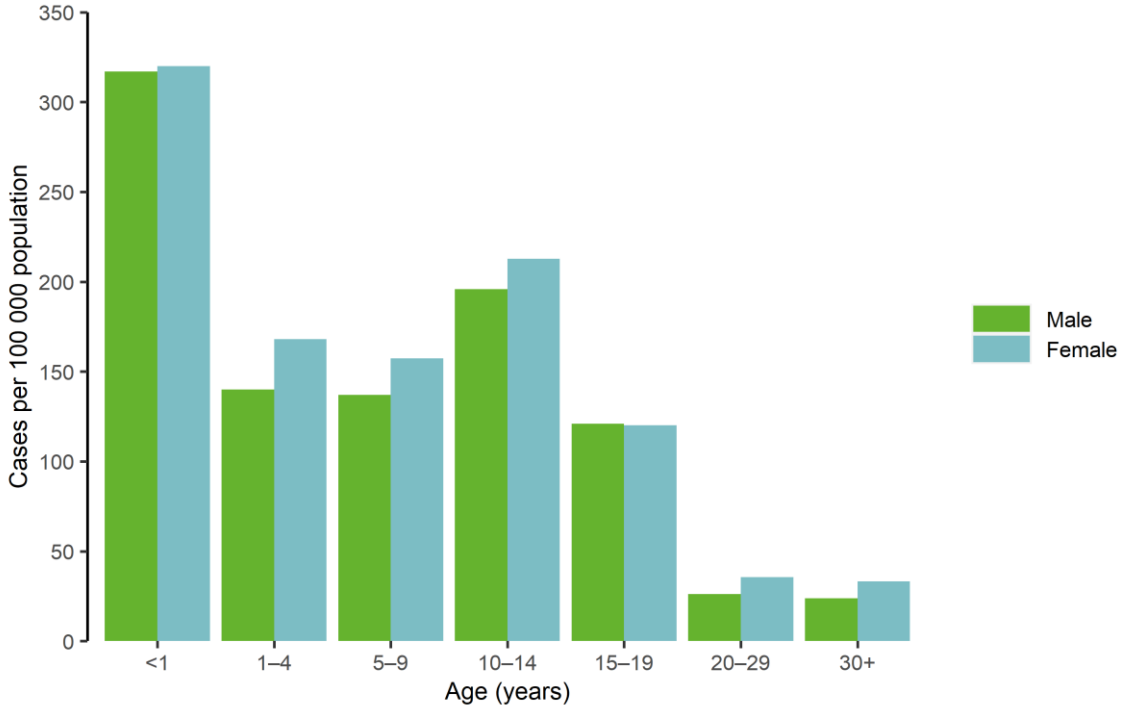
Age and gender distribution

Information on age was available for almost all reported cases and 53% of these cases were 15 years and above, including 36% aged 30 years and above, and 17% in the age group 15 to 29 years.

The highest notification rate was observed among infants below one year of age (318.5 cases per 100 000 population), followed by adolescents 10-14 years old (204.2 cases per 100 000 population) (Figure 4). Infants below one year of age constituted 4.8% of all cases reported; among those with known month of age (95.5%), 66% were ≤ six months old and 43% were ≤ three months old.

There were more cases among females in all age groups, except for infants below one year of age and 15-19-year-olds. Overall notification rates were 66.7 cases per 100 000 population for females and 57.3 cases per 100 000 population in males, with a male-to-female ratio of 0.8:1.

Figure 4. Pertussis cases per 100 000 population, by age and gender, EU/EEA, 2024



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Vaccination status

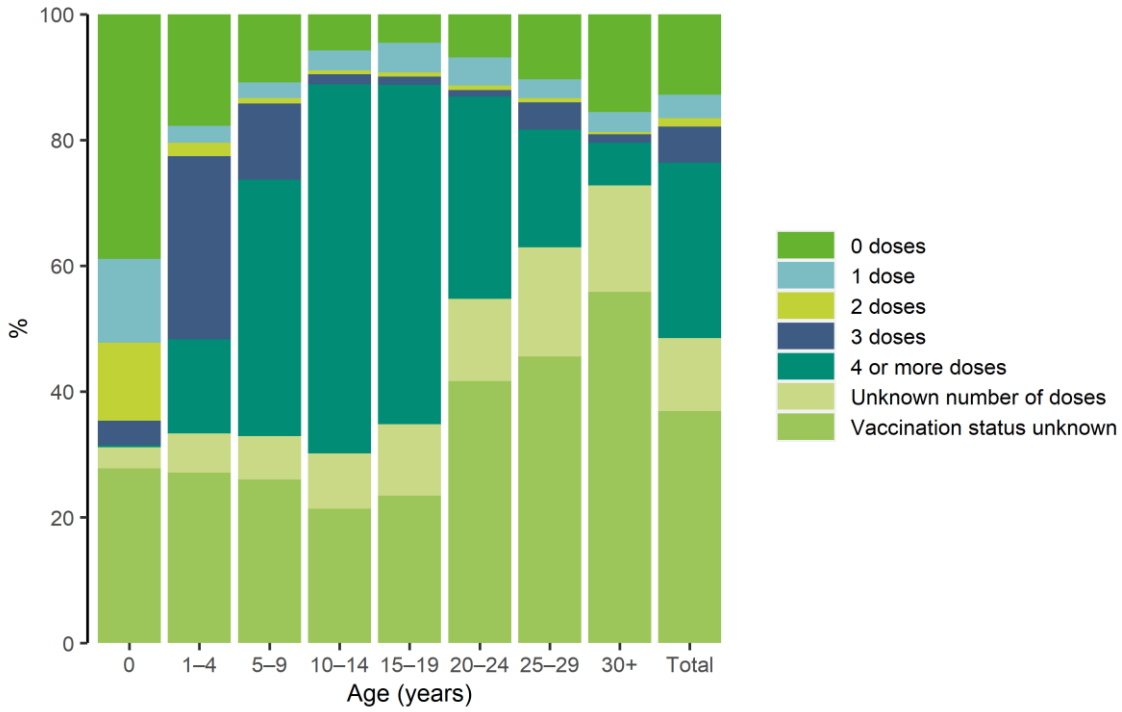
Vaccination status (reported through both case-based and aggregate datasets) was known for 132 350 cases (Figure 5). Of these cases, 26 872 (20%) were unvaccinated, 10 594 (8%) were vaccinated with one or two doses, 12 124 (9%) with three doses, and 58 385 (44%) with four or more doses. A total of 24 375 cases (18%) were vaccinated, but the number of doses was unknown. Among all 10 166 infants below the age of one year, 2 826 (28%) had an unknown vaccination status and 346 (3.4%) were vaccinated with an unknown number of doses.

The proportion of unvaccinated cases was highest among infants below one year of age (39%) and among children one to four years old (18%). The highest proportion of individuals vaccinated with four or more doses was (59%) in the 10- to 14-year-old age group, followed by 15- to 19-year-olds (54%).

The vaccination status of the mother was requested for cases in infants younger than two years at the time of disease onset and was reported for 1 164 cases. Among these, 285 mothers (24%) were reported as vaccinated during pregnancy. Of these, four received the vaccine during the first trimester, 87 during the second trimester, and 18 during the third trimester. For the remaining 176 individuals, information on the gestational age at vaccination was not provided. Maternal vaccination status was introduced as a new variable in pertussis surveillance in 2024 and was reported by four countries: the Czechia, France, the Netherlands, and Portugal.

Vaccination coverage estimates for the third dose of diphtheria, tetanus toxoid and pertussis-containing vaccine (DTP3) among one-year-olds were available from WHO (WUENIC estimates). In 2024, the weighted average vaccination coverage for the EU/EEA was 92.6%. Compared with 2000, three countries reported an DTP3 vaccination coverage increase of 1-3% in 2024 (Bulgaria, Finland and Iceland), while nine countries (Austria, France, Hungary, Italy, Luxembourg, Norway, Poland, Portugal and Spain) had the same estimates as in 2020. The remaining countries reported lower coverage in 2024 than in 2020, ranging from 1% to 11% reduction. Nevertheless, overall coverage remains high in the EU/EEA (Table 2).

Figure 5. Percentage of confirmed, probable and possible pertussis cases by vaccination status and age group, EU/EEA, 2024



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Hospitalisation status and outcome

Of 170 911 cases reported with case-based information and known hospitalisation status, 12 827 (7.5%) were hospitalised; 5 246 (41%) of them were aged under one year, 2 266 (18%) were aged 30 years or above, and 2 191 (17%) were between one and four years.

Outcomes were known for 186 209 (89%) of all reported cases, including 84 deaths - 44 among infants aged one year and under, and 29 in individuals aged 65 years old and older. Deaths were reported in Czechia (12), Spain (11), Italy (10), France (9), the Netherlands (8), Germany (7), Malta (6), Hungary (5), Romania (5), Greece (3), Austria (2), Portugal (2) and four other countries.

Among the 10 166 cases among infants aged one year and under, 8 830 (87%) had a known outcome and 8 641 (85%) had a known hospitalisation status. Among those with known hospitalisation status, 5 246 (61%) were hospitalised.

Laboratory confirmation

Of the 179 901 laboratory-confirmed cases with case-based information, 87 599 (49%) were confirmed by PCR, 855 (0.5%) by culture, 46 971 (26%) by serology, and 279 (0.2%) by oral fluid IgG. The laboratory confirmation method was not available for 44 197 (25%) of all cases: 32% in the 1-4 years age group, 28% in the 5–19 years age group, and 19% among adults aged 20 years and above.

Among cases with available laboratory confirmation method, PCR was used predominantly among infants below one year of age (91%), children one to nine years old (72%), adolescents 10-19 years old (64%), and less commonly among adults over 20 years old (47%).

The proportion of laboratory-confirmed cases was 100% in Belgium, Cyprus, Denmark, Finland, France and Island.

Table 2. Diphtheria tetanus toxoid and pertussis-containing vaccine (DTP3) immunisation coverage among one-year-olds (%) (WUENIC), EU/EEA, 2020–2024

Country	2020	2021	2022	2023	2024	% change[a] (2020–2024)
Austria	85	86	84	87	85	0%
Belgium	98	98	98	98	97	-1%
Bulgaria	91	89	91	92	94	3%
Croatia	94	92	92	93	92	-2%
Cyprus	96	96	96	95	94	-2%
Czechia	97	94	94	90	86	-11%
Denmark	97	97	97	97	96	-1%
Estonia	91	90	87	84	81	-11%
Finland	89	89	91	91	91	2%
France	96	96	96	96	96	0%
Germany	91	91	89	89	89	-2%
Greece	99	99	98	95	95	-4%
Hungary	99	99	99	99	99	0%
Iceland	93	92	92	92	94	1%
Ireland	94	94	93	93	92	-2%
Italy	94	94	95	95	94	0%
Latvia	99	94	95	98	97	-2%
Liechtenstein	NDR	NDR	NDR	NDR	NDR	NRC
Lithuania	91	90	90	90	89	-2%
Luxembourg	99	99	99	99	99	0%
Malta	98	99	98	98	97	-1%
The Netherlands	94	95	93	92	91	-3%
Norway	97	97	97	96	97	0%
Poland	94	94	94	95	94	0%
Portugal	99	99	99	99	99	0%
Romania	87	86	85	79	79	-9%
Slovakia	97	97	97	96	96	-1%
Slovenia	95	86	89	89	90	-5%
Spain	94	93	95	93	94	0%
Sweden	97	98	94	94	96	-1%
EU/EEA average[b]	**93.9**	**93.6**	**93.4**	**92.8**	**92.6**	**NRC**

Source: WHO Immunization Data Portal, WHO and UNICEF Estimates of National Immunization Coverage (WUENIC).
NDR: no data reported; NRC: no rate calculated.
[a] The percentage of change was calculated for each dose as the percentage of increase or decrease between 2020 and 2024, i.e. ((coverage in 2024 - coverage in 2020)/coverage in 2020) x 100.
Colour code: Red indicates a decrease, green indicates an increase, and black indicates no change in %.
[b] EU/EEA: population weighted average vaccination coverage rate.

Discussion

The overall notification rate of pertussis disease in the EU/EEA increased strikingly in 2024 and was the highest it has been in the past decade. This resurgence was possibly due to the removal of measures against SARS-CoV-2 after the pandemic and a low level of community immunity that resulted from the reduced circulation of pertussis in the EU/EEA during 2020-22. The resurgence in 2023-2024 has been further analysed in an ECDC risk assessment [5].

Pertussis usually observes epidemic cycles occurring every three to five years in addition to a seasonal pattern, with most cases occurring in spring and summer [6,7]. Pertussis epidemics reported across many EU/EEA countries between 2012 and 2019 showed considerable fluctuation, with notification rates generally ranging from about eight to nine cases per 100 000 population and peaking at 11 cases per 100 000 in 2016. Following a period of very low incidence in 2020–2022, notification rates rose sharply in 2024, exceeding both the levels observed in 2021–2022 and those seen before the pandemic.

In 2024, infants under one year and individuals aged 10–14 years were the most affected age groups. The proportion of cases among individuals 15 years and older (53%) was similar to 2023 (52%) and lower than in 2022 (70%) and 2021 (77%).

The number of deaths attributed to pertussis was substantially higher than in previous years, reflecting the markedly increased incidence and the resulting greater exposure of populations more vulnerable to severe outcomes, including infants who are not vaccinated and immunocompromised individuals with underlying conditions. Mortality among adults exceeded levels recorded in previous decades. Fatal outcomes in individuals >65 years old were reported both in countries with the highest notification rates, such as Czechia or the

Netherlands, as well as in countries with moderate (Spain) and relatively lower incidence (Italy, Malta). Conversely, some countries experiencing high incidence did not report any fatal adult cases, likely reflecting differences in case ascertainment and diagnostic practices across age groups.

In 2024, 59% of cases aged 10 to 14 years and 54% of cases aged 15 to 19 years had been vaccinated with four or more doses, and 39% of cases aged under one year, 18% of those aged 1 to 4 years, and 16% of those 30 years and older were unvaccinated. People who are not vaccinated can be a source of transmission to infants, who develop the most severe form of the disease. In addition, clinical suspicion in adults is low, which leads to under-ascertainment of these cases and increases the risk of transmission to infants and children. The resurgence of pertussis, especially in infants and young adolescents (10 to 14 years), is a signal of the need to continue to reach and sustain high vaccination coverage, and strengthen vaccination programmes, including with maternal vaccination.

The 2018 revised version of the EU case definition for pertussis may contribute to highlighting atypical presentations in adults, adolescents and vaccinated individuals, as well as clarifying laboratory confirmation aspects [4]. It is important to test any individual with an atypical clinical presentation, including partially-vaccinated individuals.

Surveillance systems, including the proportion of laboratory-confirmed cases in EU/EEA countries, are heterogeneous, and direct comparisons between countries should be made with caution. The majority of the countries with the highest notification rates were those in which adolescents (aged 10 to 14 and 15 to 19 years) and adults (30 years and above) accounted for the largest proportion of laboratory-confirmed cases.

The post-pandemic increase in pertussis incidence can be partly explained by changes in diagnostic practices and the expanded availability of PCR testing, including multiplex PCR, across EU countries. In 2023–2024, 42% of notified cases were diagnosed using PCR methods, compared with 31% in 2020–2022 and 23% in the pre-pandemic period (2015–2019). This increase was particularly evident among adolescents aged 10–19 years, for whom 44% of cases were confirmed by PCR in 2023–2024, compared with 47% in 2020–2022 and 28% in 2015–2019 prior to the pandemic.

All EU/EEA countries include pertussis vaccination in their routine childhood immunisation schedules and all except Poland are using acellular pertussis-containing vaccines for primary immunisation. In addition, an increasing number of countries have implemented a pertussis vaccination programme in pregnant women, including Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain and Sweden [8].

The current schedules in EU/EEA countries for vaccination below 24 months of age with acellular pertussis-containing vaccines can be, for the majority, divided into the following groups:

- A so-called '2p+1' schedule corresponding to two doses of primary vaccination and a booster dose, with the vaccine given at three, five and 12 months.
- A so-called '3p+1' schedule corresponding to three doses given in the first year of life, starting as early as two months, with a booster dose in the second year of life.

Further doses are given at the time of school entry, adolescence and adulthood varying across countries [8].

As of April 2026, booster dose vaccination for adolescents (10- to 19-year-olds) is implemented in 25 EU/EEA countries, and for adults (18 years and above) in 10 EU/EEA countries [8]. At the EU/EEA level, the weighted average vaccination coverage for the third dose of the pertussis-containing vaccine remained high, with 92.6% in 2024. It slightly and gradually decreased from 93.9% in 2020 to 85% during the past five years, but remained higher than the global average (85%) [9,10]. On the other hand, vaccination coverage for the maternal programme in 2024 shows wide variation among countries (range: 2–89%, median: 50%) [5]. Achieving and maintaining high vaccination coverage is key, including in a population in which the immunity was not naturally boosted during the COVID-19 pandemic. In addition, there has been evidence that the acellular pertussis vaccine may be associated with waning immunity within five to 10 years following its administration, and being less able to prevent nasopharyngeal colonisation of *Bordetella pertussis* than the whole-cell vaccine or a natural infection [11,12].

The 2024 data show there is room for further improvement on data completeness of vaccination status, as ~38% cases were reported with an unknown vaccination status, which was highest among adults aged 30 and above (55%) and lowest among the 10 to 14 years age group (21%). In addition, 28% of cases among infants had an unknown vaccination status. Data on vaccination status of infants should be complemented with the information on the vaccination status of the mother during pregnancy, which has been registered in EpiPulse Cases since 2024. Moreover, there is a need for increasing awareness of pertussis and strengthening vaccination efforts among people over 65 years of age who have a higher risk of severe disease [13,14].

Public health implications

Significant challenges to control pertussis in Europe remain. The priority should be given to achieving and sustaining high vaccination coverage at national and subnational levels for recommended vaccinations, to achieve indirect and direct protection of infants and young children, the two groups which tend to show the most severe symptoms. Protection of infants who are too young to be vaccinated contributes to lower the overall morbidity and mortality of vaccine-preventable diseases [15]. Maternal vaccination is highly effective in preventing disease and death in young infants and warrants broader access and enhanced monitoring.

Particular consideration should be given to vaccinating healthcare workers and pregnant women, as well as ensuring these recommendations are effectively implemented, in agreement with national guidelines.

The rise of pertussis indicates that the burden of the disease in Europe is still considerably underestimated and needs sustained attention and further actions in surveillance, vaccination, early diagnosis and treatment. Typical signs and symptoms of pertussis tend to be less specific among those who have been vaccinated, and clinicians' decisions are crucial for early diagnosis of pertussis infection. In addition, the current increase in pertussis cases in Europe raises the concern of antibiotic resistance ,which is a known public health problem [16] and requires enhancing surveillance systems in the EU/EEA [17]. Higher quality pertussis surveillance, associated with increased awareness, as well as improved access to appropriate laboratory diagnosis, could contribute to a more accurate picture of the epidemiology of pertussis and support policy decisions to optimise the impact of vaccination.

References

1. European Centre for Disease Prevention and Control (ECDC). Spreadsheet. Surveillance systems overview 2023. Available at: Table-surveillance_systems_overview_2024_20260413.xlsx
2. European Centre for Disease Prevention and Control (ECDC). Surveillance atlas of infectious diseases. Stockholm: ECDC; 2024. Available at: http://atlas.ecdc.europa.eu
3. Commission implementing Decision 2012/506/EU of 8 August 2012 amending Decision No 2119/98/EC of the European Parliament and of the Council (notified under document C(2012) 5538) – (Text with EEA relevance) – (2012/506/EU). Off J Eur Union 2012 Sep 27;L(262):1-57. Available at: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:262:0001:0057:EN:PDF
4. Commission Implementing Decision (EU) 2018/945 of 22 June 2018 on the communicable diseases and related special health issues to be covered by epidemiological surveillance as well as relevant case definitions (Text with EEA relevance.). Off J Eur Union. 2018 Jul 6;L(170):1-74. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0945
5. European Centre for Disease Prevention and Control (ECDC). Increase of pertussis cases in the EU/EEA. – 8 May 2024. Stockholm: ECDC; 2024. Available at: https://www.ecdc.europa.eu/en/publications-data/increase-pertussis-cases-eueea
6. De Greeff SC DA, Teunis P, Rahamat-Langendoen JC, Mooi FR, De Melker HE. Seasonal patterns in time series of pertussis. 2009 Oct;137(10):1388-95.
7. Wang Y XC, Wang Z, Zhang S, Zhu Y, Yuan J. Time series modeling of pertussis incidence in China from 2004 to 2018 with a novel wavelet based SARIMA-NAR hybrid model. PLOS ONE. 2018 Dec 26;13(12):e0208404.
8. European Centre for Disease Prevention and Control (ECDC). Vaccine Scheduler. Stockholm: ECDC; 2024. Available at: https://vaccine-schedule.ecdc.europa.eu
9. World Health Organization (WHO). Immunization dashboard. Geneva: WHO; 2024. Available at: https://immunizationdata.who.int
10. United Nations Children's Fund (UNICEF). Immunization. UNICEF; 2025. Available at: https://data.unicef.org/topic/child-health/immunization
11. Gill C RP, Thea DM. The relationship between mucosal immunity, nasopharyngeal carriage, asymptomatic transmission and the resurgence of Bordetella pertussis. F1000Research. 2017 Aug 25;6:1568.
12. Locht C. Live pertussis vaccines: will they protect against carriage and spread of pertussis? Clin Microbiol Infect. 2016 2022 Dec 1;22:S96-S102.
13. Hoe Nam L, Chiu CH, Heo JY, Ip M, Jung KS, Menzies R, et al. The need for pertussis vaccination among older adults and high-risk groups: a perspective from advanced economies of the Asia Pacific region. Expert Rev Vaccines. 2021 Dec;20(12):1603-17. Available at: https://www.ncbi.nlm.nih.gov/pubmed/34734556
14. Harrington L, Aris E, Bhavsar A, Jamet N, Akpo EIH, Simeone JC, et al. Burden of Pertussis in Adults Aged 50 Years and Older: A Retrospective Database Study in England. Infect Dis Ther. 2023 Apr;12(4):1103-18. Available at: https://www.ncbi.nlm.nih.gov/pubmed/36966230
15. Leontari K, Lianou A, Tsantes AG, Filippatos F, Iliodromiti Z, Boutsikou T, et al. Pertussis in Early Infancy: Diagnostic Challenges, Disease Burden, and Public Health Implications Amidst the 2024 Resurgence, with Emphasis on Maternal Vaccination Strategies. Vaccines (Basel). 2025 Mar 5;13(3) Available at: https://www.ncbi.nlm.nih.gov/pubmed/40266155
16. Ivaska L, Barkoff AM, Mertsola J, He Q. Macrolide Resistance in Bordetella pertussis: Current Situation and Future Challenges. Antibiotics (Basel). 2022 Nov 7;11(11).
17. Rodrigues C, Bouchez V, Soares A, Trombert-Paolantoni S, Aït El Belghiti F, Cohen JF, et al. Resurgence of Bordetella pertussis, including one macrolide-resistant isolate, France, 2024. Euro Surveill. 2024 Aug;29(31).