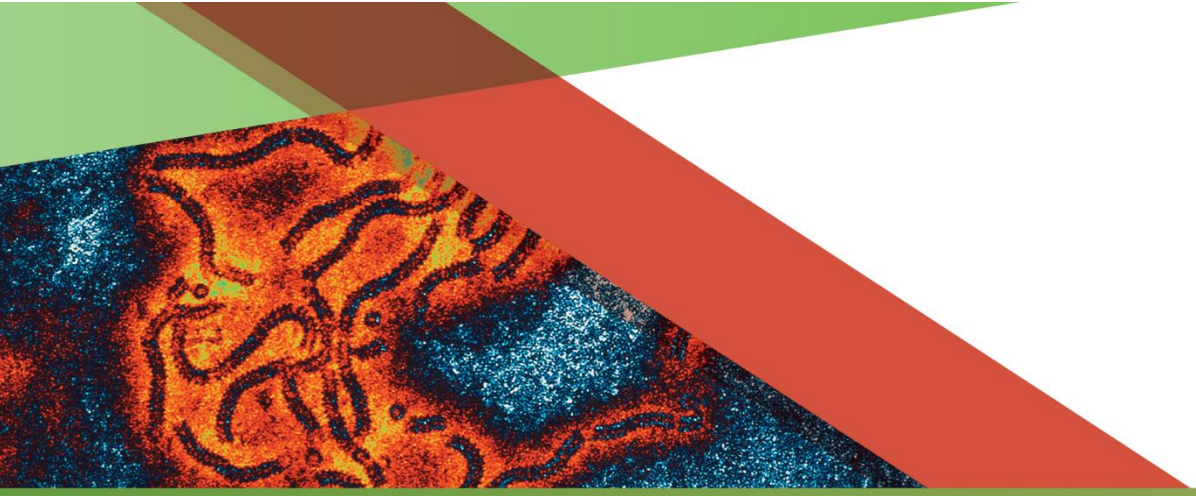


SURVEILLANCE REPORT

Mumps

Annual Epidemiological Report for 2022

Key facts

- For 2022, 27 EU/EEA countries reported 2 593 mumps cases, with an overall notification rate of 0.7 cases per 100 000 population. This was slightly higher than the notification rate reported in 2021 (0.4 cases) but significantly lower than the notification rates reported during the preceding three years (range 1.7–4.2 cases)
- In 2022, there was a shift towards younger age groups for mumps cases, with a median of 10 years compared to the previous four years (median 13-21 years).
- The overall male to female ratio for mumps cases was 1:1.18. Notification rates for males were higher than for females in the younger age groups (1–4, 5–9 and 10–14 years) and slightly lower for males than females among adults (20–29, and 30+ years groups).
- Those aged 1–4 and 5–9 years experienced the highest age-specific notification rates.
- Among notified cases with known vaccination status with the measles, mumps and rubella (MMR) vaccine, 24% were unvaccinated. The highest proportion of unvaccinated cases were among the 30+ years group (71%) followed by those between 20 and 29 years (38%) and those aged under one year (below the age of routine vaccination against mumps, 25%). The proportion of unvaccinated cases among children 1–4 years, which is the when the first dose of MMR is administrated in most countries, accounted for 15%.
- Nearly one-third of cases with reported complications (29%) with known vaccination status were among unvaccinated cases, the majority of which were in the 30+ years age group.
- Continuous high-quality surveillance, outbreak investigations and accelerated efforts to increase the uptake of both routine childhood immunisation as well as catch-up campaigns aimed at adolescents and adults, are key tools to closely monitor the mumps epidemiology in the EU/EEA and close immunity gaps in the population.

Introduction

Mumps is a viral infection, caused by an RNA virus of the genus Rubulavirus in the family Paramyxoviridae. In its classical form it causes acute parotitis (inflammation of the parotid salivary glands) and less frequently, orchitis, meningitis and pneumonia. Complications include sensorineural deafness, oligospermia, subfertility (rarely) and occasionally death from encephalitis. It is spread from person to person by airborne or droplet transmission. People should be considered infectious from 12 to 25 days after exposure. The mean incubation period is 19 days, with a range of 14–25 days. Immunisation is the only effective method of prevention. The mumps vaccine is given in the form of the combined trivalent MMR (measles-rubella-mumps) vaccine in all European countries, with a first dose normally given in the second year of life. The timing of the second dose varies across countries. In the pre-vaccine area, mumps was primarily a childhood illness, but now it mostly causes outbreaks among military recruits or college students.

Suggested citation: European Centre for Disease Prevention and Control. Mumps. In: ECDC. Annual epidemiological report for 2022. Stockholm: ECDC; 2024.

Stockholm, April 2024

Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 22 January 2024. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of the methods used to produce this report, please refer to the 'Methods' chapter in the 'Introduction to the Annual Epidemiological Report [1].

An overview of the national surveillance systems is available online. An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online Surveillance Atlas of Infectious Diseases [3].

Twenty-seven European Union/European Economic Area (EU/EEA) Member States routinely report mumps data to ECDC. The majority use the 2008, 2012 or 2018 EU case definitions and report data from comprehensive, passive surveillance systems with national coverage. Belgium and Poland reported aggregated data in 2022. Austria has reported no data since 2013; France and Liechtenstein reported no data.

Vaccination coverage estimates for mumps vaccine presented in this report use the measles-containing-vaccine (MCV) as a proxy indicator, since all EU/EEA countries are using measles-mumps-rubella-containing-vaccines (MMR). The data were obtained from the WHO Global Health Observatory, and WHO and UNICEF estimates of national immunisation coverage (WUENIC). The method of calculating measles-containing-vaccine first-dose (MCV1) and measles-containing-vaccine second-dose (MCV2) coverage are outlined in the metadata available for each indicator online [7, 8].

Epidemiology

For 2022, 27 EU/EEA countries reported 2 593 cases of mumps, of which 1 089 (42%) were laboratory-confirmed. The remaining 358 cases were reported as probable (14%) and 1 133 as possible (44%).

Similar to 2021, three countries (Italy, Poland, Spain) reported the majority of (68%) of notified cases in 2022. Of these, Italy did not use the EU case definition but used another case definition. Poland did not use the EU case definition for reporting purposes, as all their reported cases met the national case definition used for possible cases, which includes anyone meeting the clinical criteria of fever and sudden swelling of the parotid or other salivary glands [9] (Table 1).

The EU/EEA overall notification rate in 2022 was 0.7 cases per 100 000 population which is slightly higher than in 2021 (0.4) but significantly lower than the notification rate observed in the preceding three years (2020:1.7, 2019:4.2, 2018:2.6) (Table 1).

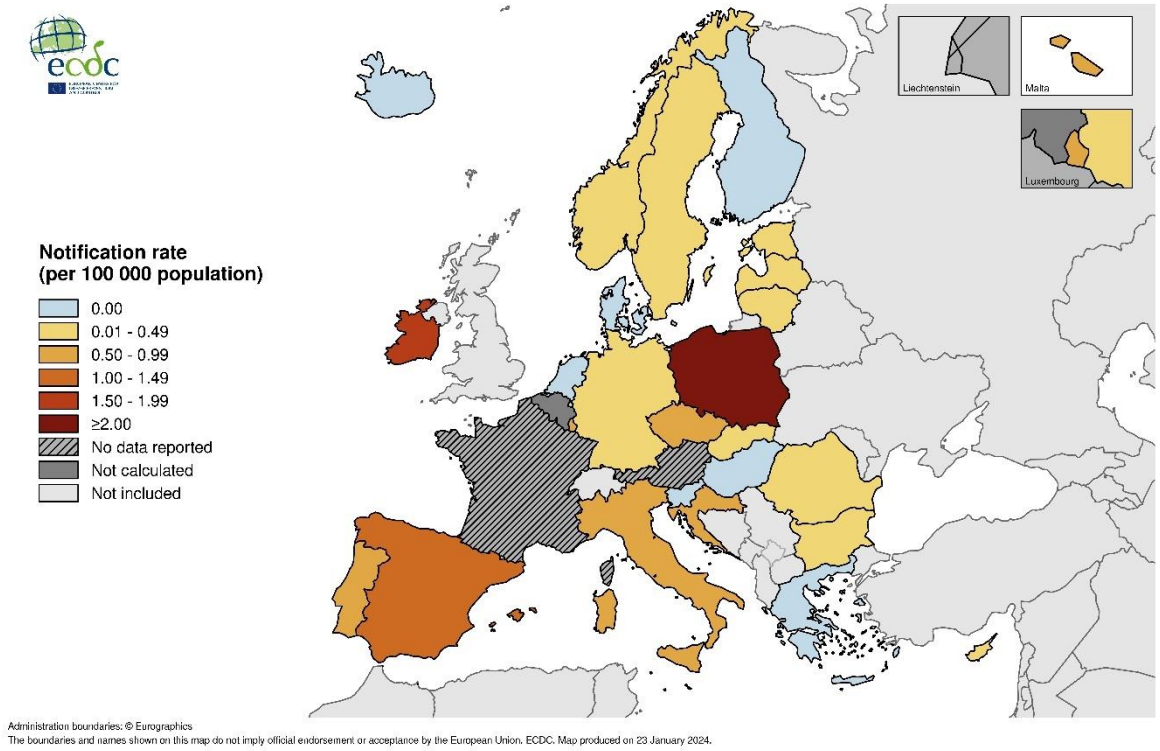
Notification rates ranged from 0.0 to 2.4 cases per 100 000 population in EU/EEA countries in 2022 (Table 1 and Figure 1). Compared to 2021, most countries reported an increase in the notification rates in 2022. Two countries (Greece and Iceland) reported zero cases for 2022.

Table 1. Mumps cases and rates per 100 000 population by country and year, EU/EEA, 2018–2022

Country	2018		2019		2020		2021		2022		
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	ASR
Austria	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Belgium	238	NRC	234	NRC	207	NRC	105	NRC	186	NRC	NRC
Bulgaria	27	0.4	50	0.7	13	0.2	0	0.0	12	0.2	NRC
Croatia	26	0.6	15	0.4	13	0.3	5	0.1	18	0.5	NRC
Cyprus	3	0.3	0	0.0	1	0.1	0	0.0	2	0.2	NRC
Czechia	537	5.1	191	1.8	93	0.9	38	0.4	68	0.6	NRC
Denmark	17	0.3	NDR	NRC	NDR	NRC	1	0.0	1	0.0	NRC
Estonia	6	0.5	4	0.3	3	0.2	0	0.0	4	0.3	NRC
Finland	4	0.1	4	0.1	4	0.1	1	0.0	2	0.0	NRC
France	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Germany	535	0.6	593	0.7	338	0.4	114	0.1	260	0.3	NRC
Greece	1	0.0	2	0.0	2	0.0	0	0.0	0	0.0	0.0
Hungary	1	0.0	1	0.0	0	0.0	0	0.0	2	0.0	NRC
Iceland	3	0.9	4	1.1	1	0.3	0	0.0	0	0.0	0.0
Ireland	580	12.0	2 780	56.7	2 899	58.4	111	2.2	94	1.9	NRC
Italy	777	1.3	657	1.1	241	0.4	222	0.4	308	0.5	NRC
Latvia	2	0.1	6	0.3	10	0.5	2	0.1	2	0.1	NRC
Liechtenstein	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NRC
Lithuania	19	0.7	32	1.1	10	0.4	3	0.1	11	0.4	NRC
Luxembourg	1	0.2	4	0.7	13	2.1	0	0.0	5	0.8	NRC
Malta	0	0.0	8	1.6	3	0.6	3	0.6	3	0.6	NRC
Netherlands	72	0.4	128	0.7	64	0.4	1	0.0	7	0.0	NRC
Norway	11	0.2	20	0.4	9	0.2	4	0.1	8	0.1	NRC
Poland	1 585	4.2	1 338	3.5	582	1.5	484	1.3	922	2.4	NRC
Portugal	106	1.0	152	1.5	57	0.6	50	0.5	80	0.8	NRC
Romania	120	0.6	105	0.5	28	0.1	16	0.1	54	0.3	NRC
Slovakia	13	0.2	16	0.3	0	0.0	3	0.1	13	0.2	NRC
Slovenia	0	0.0	0	0.0	0	0.0	1	0.0	1	0.0	NRC
Spain	5 423	11.6	6 039	12.9	1 766	3.7	399	0.8	524	1.1	NRC
Sweden	21	0.2	33	0.3	23	0.2	6	0.1	6	0.1	NRC
EU/EEA (30 countries)	**10 128**	**2.7**	**12 416**	**3.4**	**6 380**	**1.7**	**1 569**	**0.4**	**2 593**	**0.7**	**NRC**
United Kingdom	1 135	1.7	5 718	8.6	NDR	NRC	NA	NA	NA	NA	NA
EU/EEA (31 countries)	**11 263**	**2.6**	**18 134**	**4.2**	**6 380**	**1.7**	**NA**	**NA**	**NA**	**NA**	**NA**

Source: Country reports.
ASR: Age-standardised rate; NA: Not applicable; NDR: No data reported; NRC: No rate calculated.
No data from 2020 onwards were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020.

Figure 1. Cases of mumps per 100 000 population by country, EU/EEA, 2022

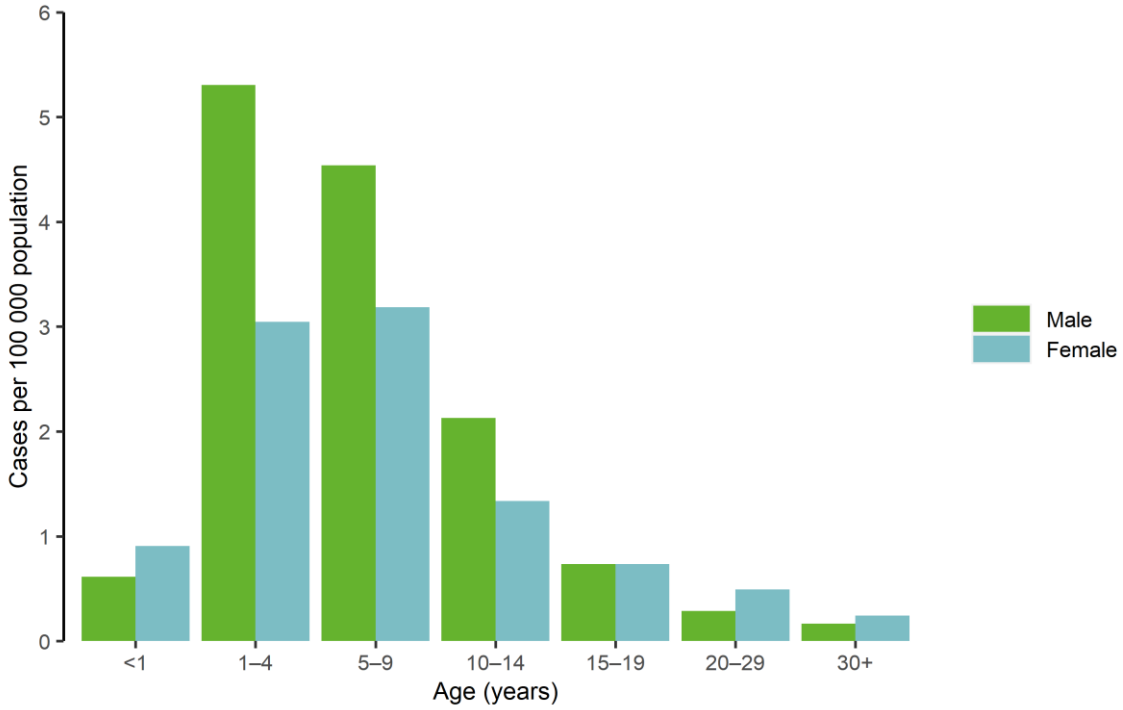


Age and gender

In 2022, the most affected age group was 1–4 years with a notification rate of 4.2 cases per 100 000 population followed by the 5–9 years group (notification rate 3.9). In terms of absolute case numbers, the most affected group was the 5–9 years group (27%) followed by the 1–4 years and the 30+ years group (23%). The median age of cases across all EU/EEA countries submitting case-based data in 2022 (i.e. excluding Belgium and Poland) was 10 years (interquartile range, IQR: 5–32 years), which is lower than the previous four years, where the median age fluctuated between 13 and 21 years.

Mumps was slightly more common among males (54%) than females with an overall male-to-female ratio of 1:1.18. Notification rates for males were higher in the younger age groups (1–4, 5–9 and 10–14 years) and slightly lower in males than females among adults (20–29 and 30+ years groups) (Figure 2).

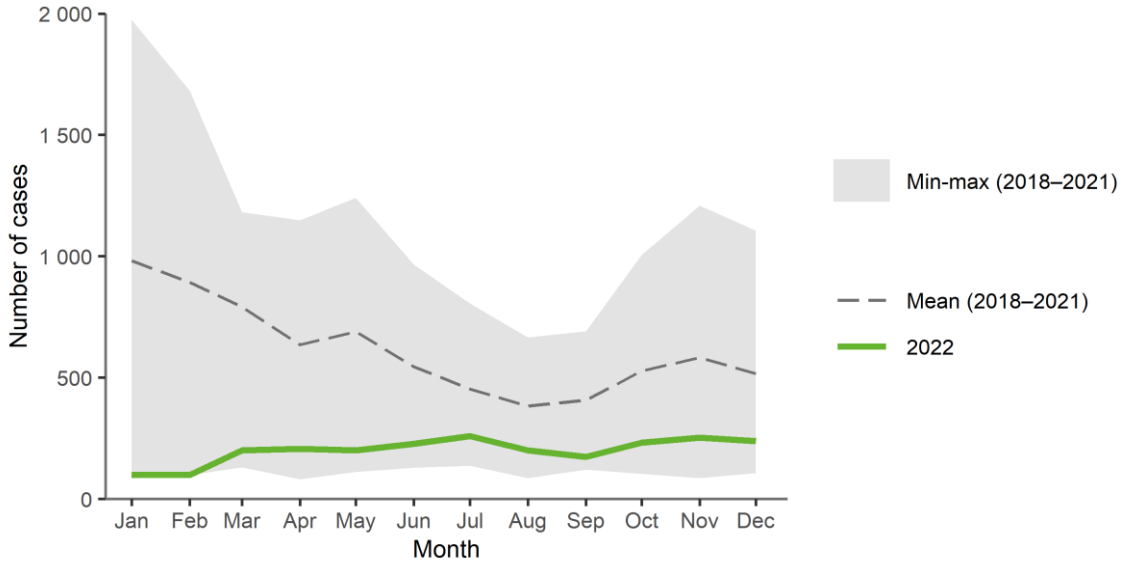
Figure 2. Cases of mumps per 100 000 population, by age and gender, EU/EEA, 2022



Seasonality and trend

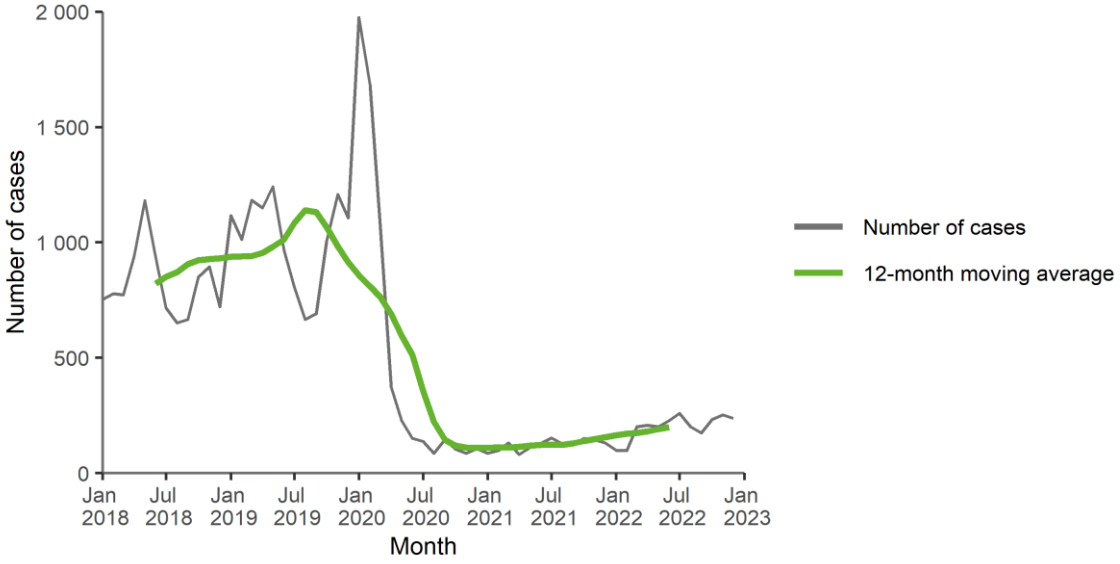
Between 2018 and 2020, the seasonal trends of reported mumps cases were characterised by a peak in late spring (May) and the lowest number of cases reported in the late summer (August), which is consistent with what is described in the literature. For 2021, however, the number of cases remained low throughout the year with not much seasonal variation. During 2022, small peaks were recorded in March and July (Figure 3 and Figure 4).

Figure 3. Cases of mumps by month, EU/EEA, 2022 and 2018–2022



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

Figure 4. Cases of mumps by month, EU/EEA, 2018–2022

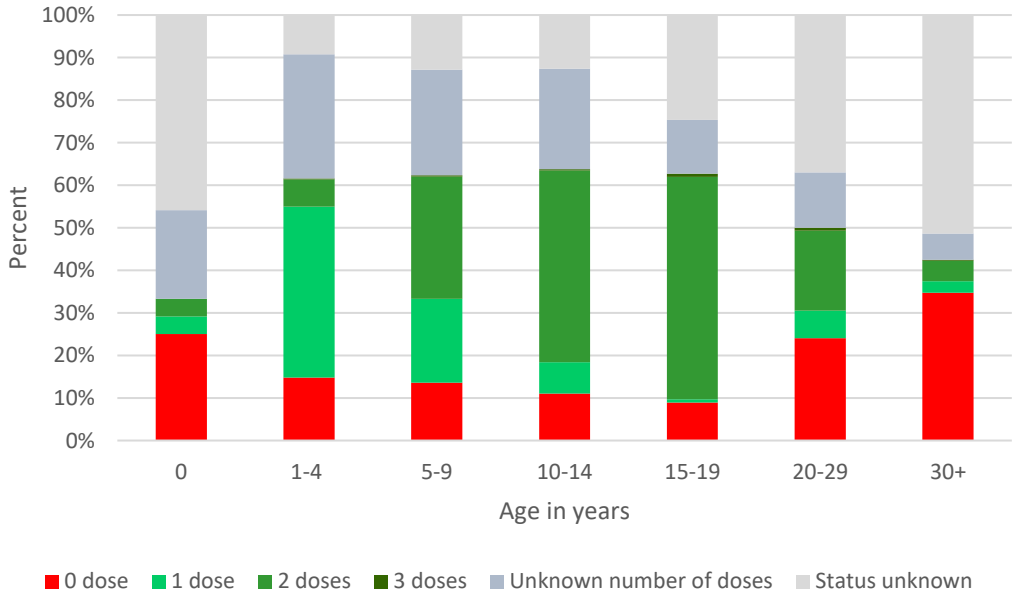


Vaccination status

Data on vaccination status were available for 1 856 cases (72%). Of these cases, 447 (24%) were unvaccinated, 411 (22%) were vaccinated with one dose of the measles, mumps, and rubella (MMR) vaccine, 506 (27%) with two doses, and 7 (0.4%) with three or more doses. For 485 cases (26%), the number of vaccination doses was not known.

Among the 1 856 cases with known vaccination status, the highest proportion of unvaccinated cases were among the 30+ years group (71%) followed by those aged under one year (below the age of routine vaccination against mumps, 25%), followed by those between 20–29 years (38%). The proportion of unvaccinated cases among children 1–4 years of age was 15%. The majority of fully vaccinated cases (with at least two doses) were aged 5-14 years, with those in the 5–9 and 10–14-years age groups representing 39% and 29% of the total cases, respectively. Vaccination status was more likely to be unknown among cases aged <1 and 30+ years (Figure 5).

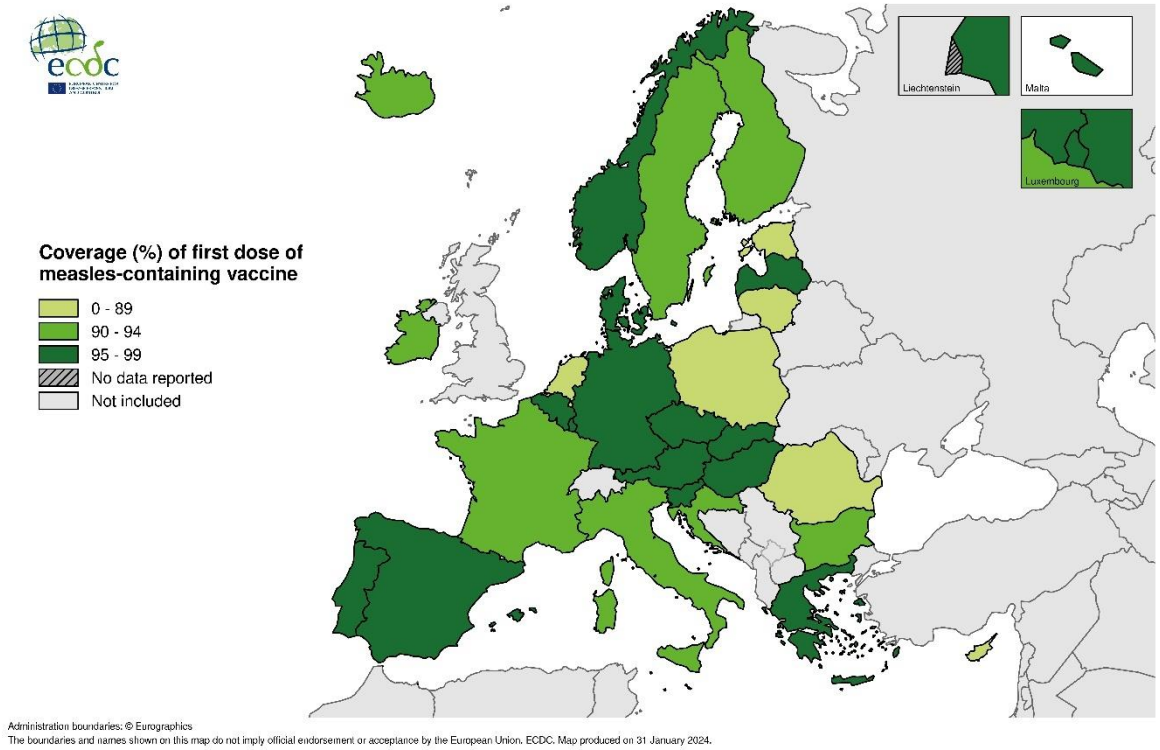
Figure 5. Percentage of mumps cases by age group and vaccination status, EU/EEA, 2022



Vaccination coverage

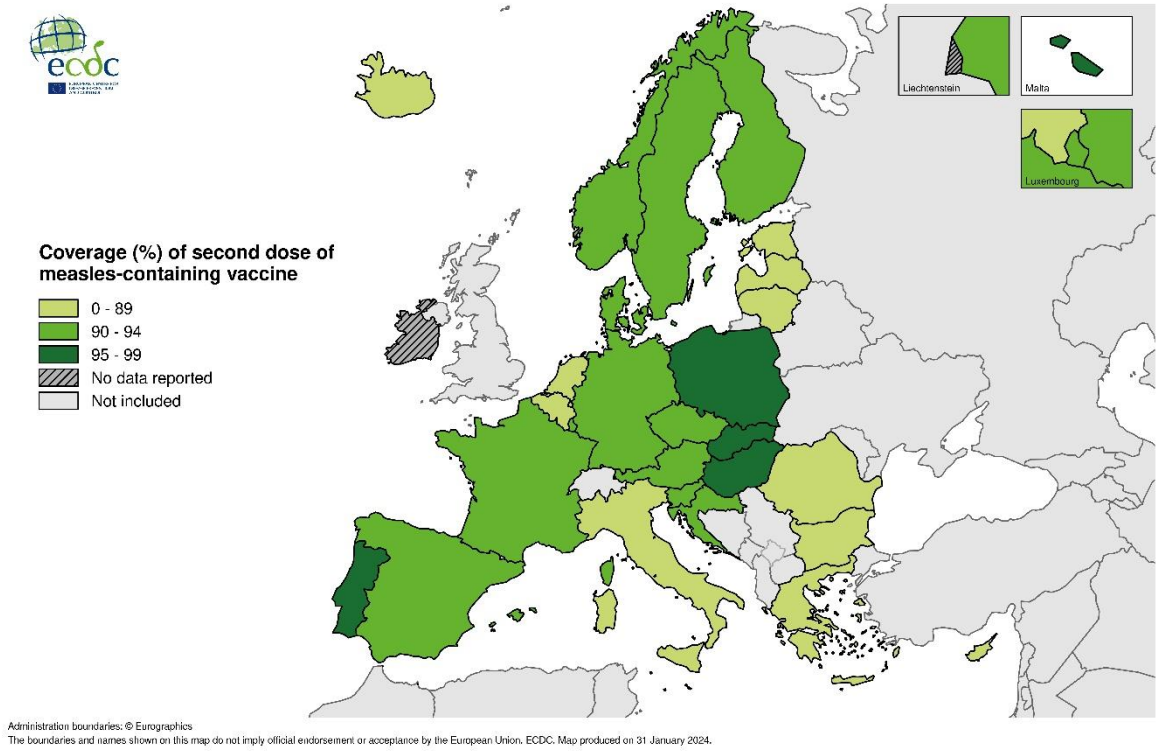
Data on vaccination coverage for the first and second dose of measles-containing vaccine (as a proxy for MMR) were available up to 2022. In 2022, the overall population weighted vaccination coverage for EU/EEA countries was 92% for the first dose and 90% for the second dose. The observed vaccine coverage estimates indicate that in many countries, routine childhood vaccination against measles-containing vaccines is below the level recommended to achieve and sustain measles elimination. Only four countries in the EU/EEA achieved the ≥95% threshold for two doses in 2022.

Figure 6. Vaccination coverage for the first dose of a measles-containing-vaccine[a], EU/EEA, 2022



Source: WHO Immunization Data Portal, WHO and UNICEF estimates of national immunization coverage (WUENIC), from Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.
[a] measles-containing-vaccine is used as a proxy indicator for mumps-containing-vaccine

Figure 7. Vaccination coverage for the second dose of a measles-containing-vaccine[a], EU/EEA, 2022



Source: WHO Immunization Data Portal, WHO and UNICEF estimates of national immunization coverage (WUENIC), from Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.
[a] measles-containing-vaccine is used as a proxy indicator for mumps-containing-vaccine.

Outcome

The outcome of disease was known for 748 (29%) of all cases, with no deaths reported in 2022.

Hospitalisation and complications

Of 953 cases with known hospitalisation status (37%), 90 (9%) cases were hospitalised. The complication status was known for 309 cases which included eight episodes of orchitis, eight episodes of pancreatitis, five episodes of meningitis and nine unspecified complications ('other'). Nearly one-third of the complications (29%) were reported among unvaccinated cases. The most affected age group was adults aged 30 years or older, who accounted for 61% of all complications. Among 30 years or older with reported complications and known vaccination status, 26% were unvaccinated.

Discussion

From 2018 to 2022, there was a decreasing trend in the notification of mumps cases in EU/EEA countries, from 2.7 (in 2018) to 0.7 (in 2022) cases per 100 000 population, with the exception of 2019, where cases peaked at 4.2 cases per 100 000 cases. The notification rate in 2022 was slightly higher than in 2021 (0.7 compared to 0.4 cases per 100 000 population), albeit still lower than the rates reported between 2018–2020. The majority of countries in 2022 reported an increase in the notification rates compared to 2021, and three countries accounted for the majority of notified cases (Italy, Poland and Spain). Two countries reported zero cases in 2022 (Greece and Iceland), and Ireland continued to decrease the notification rate from 58.4 in 2020 to 1.9 cases in 2022.

The decrease observed in 2021 could be a result of the COVID-19 pandemic, as seen worldwide, especially in airborne respiratory diseases [10]. Indeed, the control measures implemented during the pandemic, such as lock downs, closure of schools, reduction of social contacts, could have contributed to a reduction in the transmission of various respiratory diseases, including mumps. The shift in healthcare services and the extra burden on the public health services during the COVID-19 pandemic, might have resulted in under-reporting of mumps, both from clinicians and public health professionals. It is therefore likely that the increasing number of cases observed in 2022 is partially due to the increased virus circulation and reporting practices returning to pre-pandemic levels.

The peak in the notification rate in mumps cases observed in 2019 (EU/EEA overall rate 4.2), was mainly influenced by a large outbreak reported by Ireland. The outbreak, which started during the second half of 2019 and continued to produce cases until early 2020, was mainly among adolescents and young adults. The main factors that contributed to this extended outbreak were reported as; crowded social environments of students, historical low uptake of MMR vaccine, insufficient effectiveness of the mumps component of the MMR vaccine and the possibility of waning immunity in those appropriately immunised [11]. This outbreak confirmed that mumps epidemics can continue to occur in the EU/EEA and that sustaining a high vaccination coverage of at least two-dose MMR vaccine for all children and young adults is of the highest importance.

Similar outbreaks in which a high proportion of cases have been fully vaccinated with two doses of MMR, usually characterised by high attack rates among adolescents and young adults and often occurring in closed settings such as universities, boarding schools and military barracks have been reported extensively in literature [1121]. EU/EEA data between 2017–2022 showed that 37% of cases with known vaccination status were vaccinated with at least two doses and there was a substantial over-representation of these cases among those aged 10–29 years. This may be due to a combination of incomplete protection offered by two doses of the mumps component of the MMR vaccine, waning immunity and intensity of social contact that facilitates virus transmission [12, 14].

Genotypic variation between the vaccine strain and the circulating virus may also be a factor [19, 20, 22], but its contribution to changes in vaccine effectiveness over time has been disputed [12]. While the administration of MMR in childhood may not offer complete individual protection against mumps in later life, the importance of maintaining high population MMR coverage cannot be overstated. The vaccine has been highly effective at reducing the overall morbidity and mortality of each of the three of the diseases it protects against [23]. Sustained high vaccination coverage lowers the likelihood of outbreaks occurring in a population [24, 25], and being vaccinated also has a direct protective effect on mumps disease severity [11, 26, 27]. A third dose of MMR vaccine can be effective at lowering the risk of mumps during an outbreak [28], but the relatively short duration of the antibody response following a third dose has raised questions about its general applicability beyond outbreak control [29].

Public health implications

Despite the overall decreasing trend in numbers of mumps cases reported during recent years, the continuous enhanced epidemiological surveillance and investigation of mumps outbreaks is of paramount importance for the control of the disease in the EU/EEA. It is important to continue to monitor the increase in numbers of mumps cases observed in 2022 and 2023 and beyond. Further research is needed into how to improve the effectiveness and duration of protection offered by the mumps component of the MMR vaccine. Despite evidence of incomplete protection or waning immunity following vaccination, high MMR vaccination coverage is essential in order to prevent mumps outbreaks, reduce disease severity and progress towards measles and rubella elimination. Administering a third dose of MMR to adolescents and young adults can be considered as an outbreak control measure. In order to strive for the highest vaccination coverage, it is critical to include hard-to-reach populations (refugees, immigrants, asylum-seekers and Roma populations) in immunisation programmes (including catch-up campaigns when necessary), with targeted approaches. Accelerated efforts to improve immunisation campaigns and increase vaccine acceptance are necessary.

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