

## SURVEILLANCE REPORT

### Annual Epidemiological Report for 2016

# Mumps

#### Key facts

- In 2016, 14 795 cases of mumps were reported to ECDC by 28 EU/EEA Member States.
- The overall notification rate was 3.4 cases per 100 000 population.
- The Czech Republic, Poland, Spain and the United Kingdom accounted for 77% of all notified cases.
- Young children and adolescents were the most affected age groups.
- About half of the cases were vaccinated with two or more doses.
- The current epidemiology of mumps in Europe may largely be explained by waning immunity post-vaccination in the absence of natural boosting.
- High vaccination coverage is of paramount importance to prevent mumps outbreaks.

#### Methods

This report is based on data for 2016 retrieved from The European Surveillance System (TESSy) on 7 February 2018. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1].

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].

ECDC has coordinated the surveillance of mumps at the European level since the transfer of EUVAC.NET (European surveillance network for selected vaccine-preventable diseases), previously hosted by Statens Serum Institut, Denmark, to ECDC in 2011.

Twenty-eight EU/EEA Member States routinely report mumps data to ECDC, the majority using the 2008 or 2012 EU case definitions (Decision 2012/506/EU) [4] and reporting data from comprehensive passive surveillance systems with national coverage. Belgium and Poland reported aggregated data in 2016.

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## Epidemiology

In 2016, 28 EU/EEA countries reported 14 795 cases of mumps, of which 6 939 (47%) were laboratory-confirmed. The remaining 7 856 cases were reported as probable (29%) and possible (24%). Four countries (Czech Republic, Poland, Spain and United Kingdom) accounted for 77% of all notified cases, although their combined populations represented approximately 31% of the EU/EEA population. Luxembourg reported no cases, while no data were reported by Austria, France and Liechtenstein. The overall notification rate was 3.4 cases per 100 000 population, which is higher than the notification rates observed in 2014 (2.7) and 2015 (3.1), but below the notification rates observed in 2012 (5.4) and 2013 (5.9) (Table 1, Figure 1).

Notification rates ranged from 0.0 to 54.3 cases per 100 000 population in EU/EEA countries in 2016. The Czech Republic reported the highest notification rate (54.3), followed by Ireland (10.3). In the Czech Republic, the notification rate more than tripled in 2016 compared with 2015 (15.3) and has increased since 2014 (6.4). In Ireland, the notification rate increased from 2012 (1.0) to 2015 (43.5), but decreased in 2016. In Spain, the notification rate increased from 2014 to 2016 (from 2.1 to 5.6), while in Poland and the United Kingdom, there was a decrease from 6.6 to 5.2 and from 4.4 to 1.5 respectively in the same time-period. Notification rates decreased considerably in Slovakia and Iceland since 2015. In the majority of other countries, there were small changes in reported notification rates (Table 1, Figure 2).

**Table 1. Number of mumps cases and rate per 100 000 population by country and year, EU/EEA, 2012 to 2016**

Country	2012		2013		2014		2015		2016			
	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	Reported cases	Rate	ASR	Confirmed cases
Austria	17	0.2	.	.	.	.	.	.	.	.	.	.
Belgium	2684	24.2	4554	40.9	228	-	163	-	152	-	-	152
Bulgaria	58	0.8	25	0.3	31	0.4	18	0.2	19	0.3	0.3	14
Croatia	0	0.0	32	0.8	32	0.8	32	0.8	27	0.6	0.7	0
Cyprus	3	0.3	0	0.0	1	0.1	2	0.2	1	0.1	0.1	0
Czech Republic	3902	37.1	1553	14.8	677	6.4	1616	15.3	5 734	54.3	61.3	2463
Denmark	15	0.3	59	1.1	42	0.7	15	0.3	15	0.3	0.3	15
Estonia	4	0.3	12	0.9	10	0.8	3	0.2	4	0.3	0.3	1
Finland	3	0.1	1	0.0	2	0.0	2	0.0	6	0.1	0.1	6
France	.	.	.	.	.	.	.	.	.	.	.	.
Germany	.	.	.	.	835	1.0	703	0.9	741	0.9	1.0	465
Greece	2	0.0	0	0.0	1	0.0	4	0.0	4	0.0	0.0	0
Hungary	4	0.0	8	0.1	2	0.0	6	0.1	1	0.0	0.0	1
Iceland	0	0.0	1	0.3	0	0.0	68	20.7	8	2.4	2.3	8
Ireland	44	1.0	222	4.8	739	16.0	2 015	43.5	488	10.3	10.7	252
Italy	975	1.6	808	1.4	821	1.4	675	1.1	782	1.3	1.5	732
Latvia	41	2.0	15	0.7	11	0.5	21	1.1	6	0.3	0.3	5
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	62	2.1	67	2.3	45	1.5	39	1.3	53	1.8	1.9	53
Luxembourg	0	0.0	4	0.7	1	0.2	0	0.0	0	0.0	0.0	0
Malta	2	0.5	2	0.5	3	0.7	4	0.9	2	0.5	0.5	1
Netherlands	408	2.4	201	1.2	38	0.2	87	0.5	70	0.4	0.4	62
Norway	30	0.6	35	0.7	18	0.4	181	3.5	83	1.6	1.6	42
Poland	2 779	7.3	2 436	6.4	2 508	6.6	2 208	5.8	1 978	5.2	-	1
Portugal	160	1.5	159	1.5	82	0.8	146	1.4	138	1.3	1.5	4
Romania	163	0.8	98	0.5	107	0.5	449	2.3	643	3.3	3.4	94
Slovakia	5	0.1	218	4.0	1 559	28.8	1707	31.5	203	3.7	3.9	57
Slovenia	8	0.4	1	0.0	1	0.0	1	0.0	0	0.0	0.0	0
Spain	5 551	11.9	5 813	12.4	959	2.1	1 579	3.4	2 616	5.6	6.4	1 493
Sweden	33	0.3	44	0.5	21	0.2	23	0.2	22	0.2	0.2	19
United Kingdom	2 699	4.3	4 568	7.1	2 858	4.4	1 800	2.8	999	1.5	1.6	999
<b>EU/EEA</b>	<b>19 652</b>	<b>5.4</b>	<b>20 936</b>	<b>5.9</b>	<b>11 632</b>	<b>2.7</b>	<b>13 567</b>	<b>3.1</b>	<b>14 795</b>	<b>3.4</b>	<b>3.7</b>	<b>6 939</b>

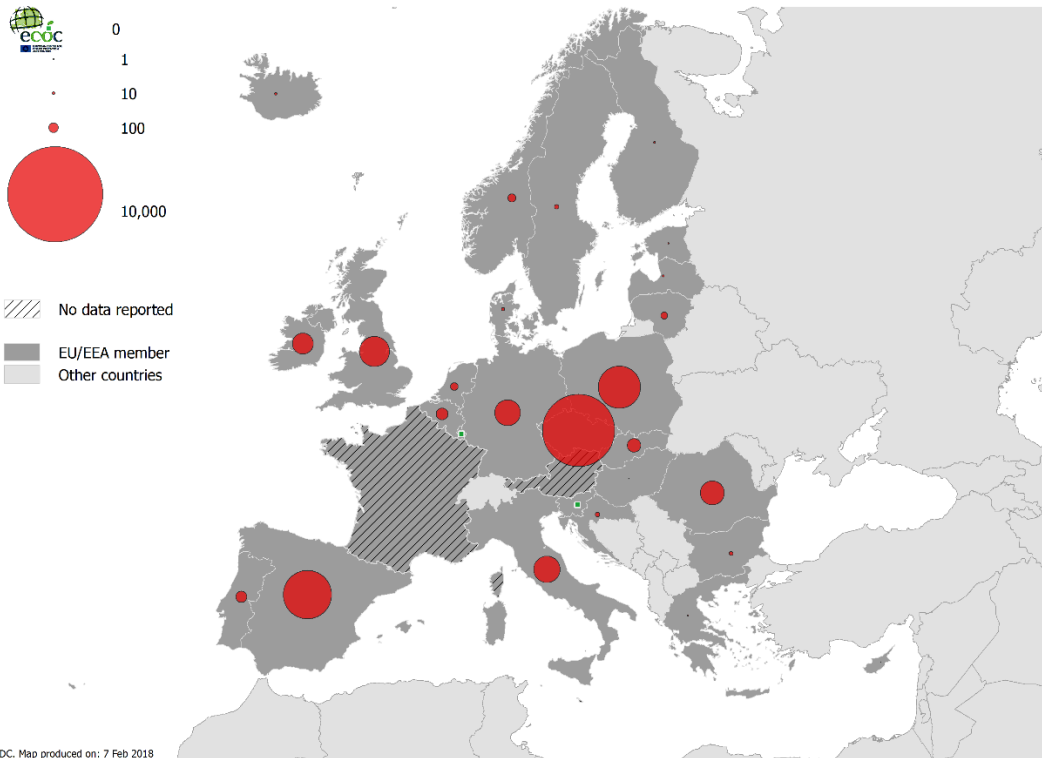
Source: Country reports.

ASR: Age-standardised rate

∴ No data reported

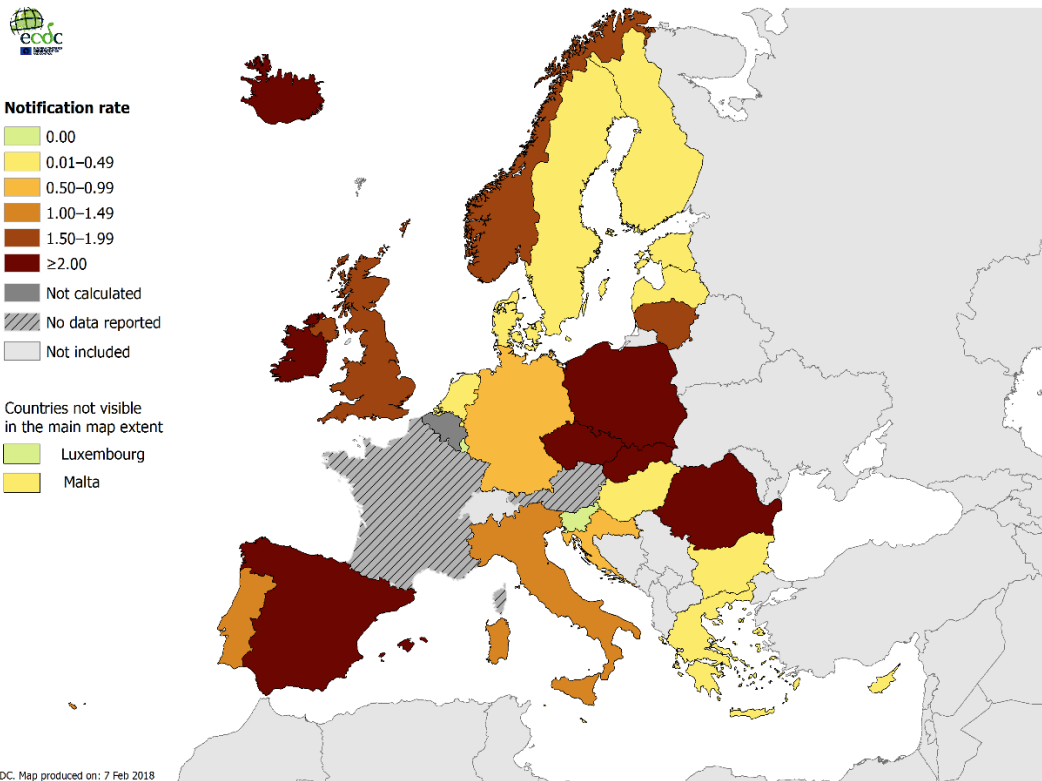
-∴ No notification rate calculated.

**Figure 1. Distribution of reported cases of mumps by country, EU/EEA, 2016**



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

**Figure 2. Reported cases of mumps per 100 000 population by country, EU/EEA, 2016**



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

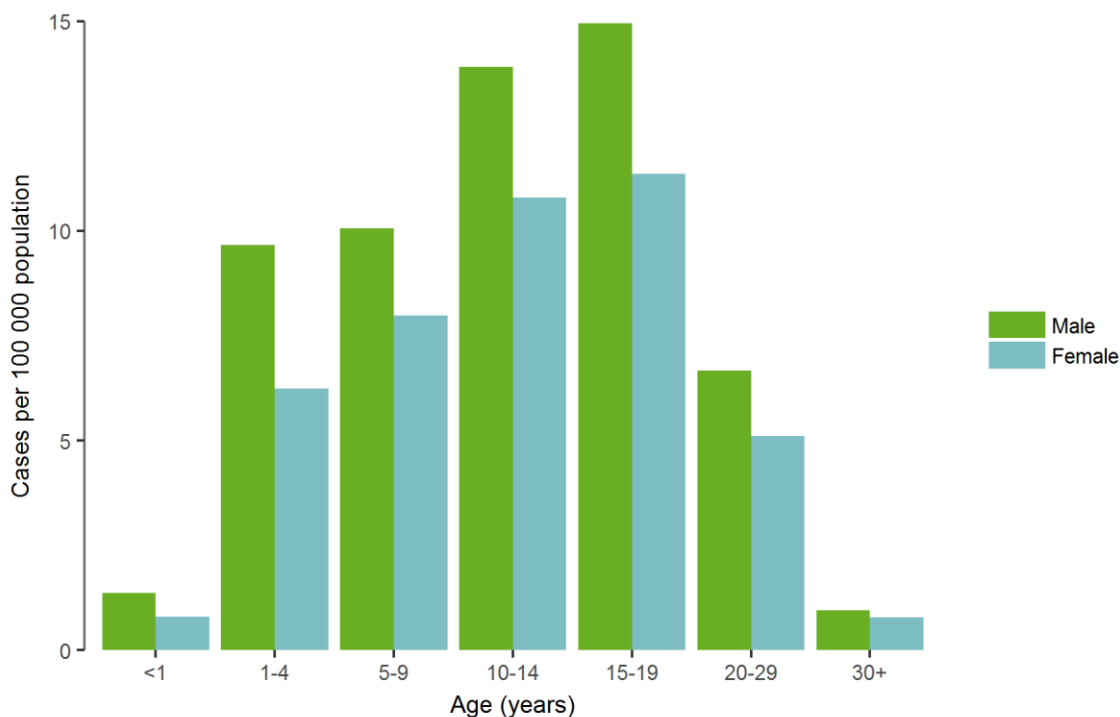
## Age and gender

In 2016, the most affected age group was 15–19-year-olds, with a notification rate of 13.2 cases per 100 000 population (Figure 3). The next most affected age group was 10–14-year-olds (12.4 cases per 100 000 population).

In the Czech Republic, 15–19-year-olds had the highest age-specific notification rate (352.6 per 100 000 population), although rates were also very high among 5–9 year-olds (73.3), 10–14 year-olds (317.9) and 20-29 year-olds (104.2). In Ireland, the notification rate was also highest among 15–19-year-olds (35.5).

Males (3.9 cases per 100 000 population) were more often affected than females (2.9 per 100 000 population) in all age groups, with a male-to-female ratio of 1.3:1.

**Figure 3. Rate of mumps cases per 100 000 population by age and gender, EU/EEA, 2016**

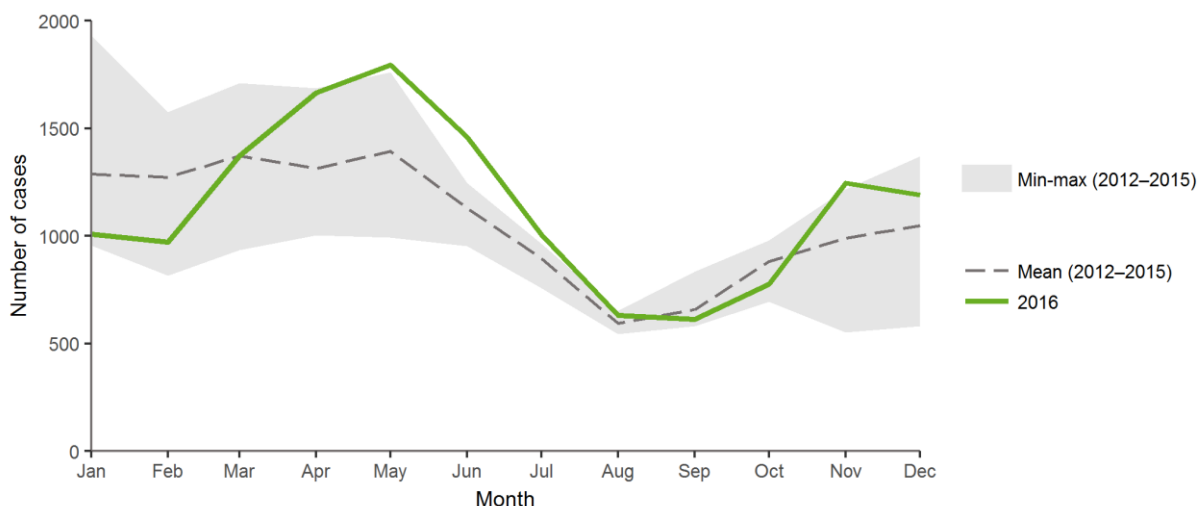


Source: Country reports from Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

## Seasonality and trend

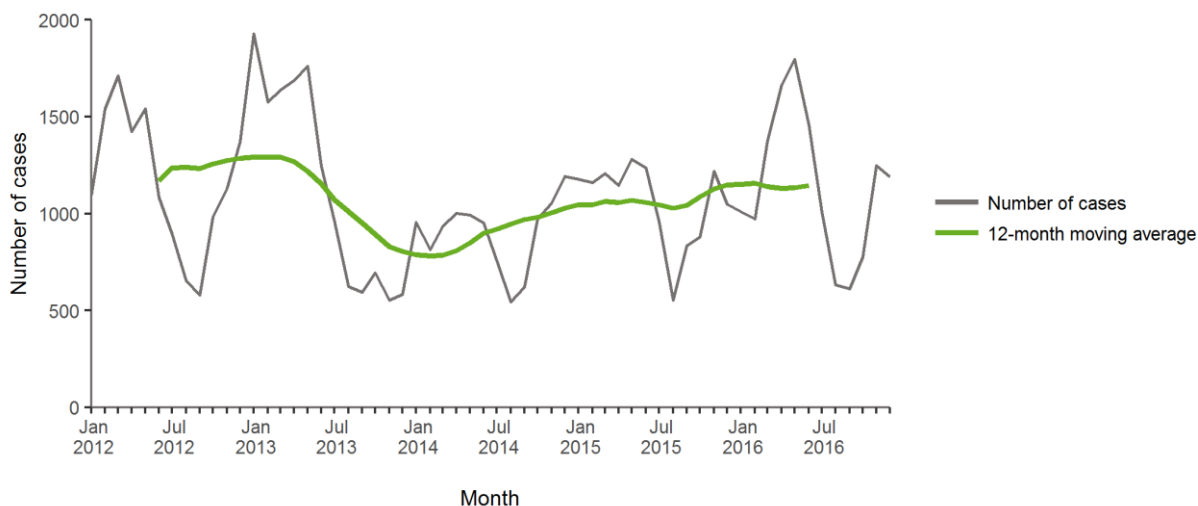
In 2016, the highest number of cases was reported in the first half of the year. More cases were observed in the second half of 2016 than in the previous four years. The number of reported cases steadily increased from 2014 to 2016 (Figures 4–5).

**Figure 4. Seasonal distribution of reported cases of mumps, EU/EEA, 2016 compared with 2012 to 2015**



Source: Country reports from Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

**Figure 5. Trend and number of reported cases of mumps by month, EU/EEA, 2012 to 2016**



Source: Country reports from Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

## Vaccination status

Data on vaccination status were available for 12 014 cases (81%). Of these cases, 2 803 (23%) were unvaccinated, 1 718 (14%) were vaccinated with one dose, 6 014 (50%) with two doses and 58 (1%) with three or more doses. Additionally, 1 421 cases (12%) had been vaccinated with an unknown number of doses. Among laboratory-confirmed cases with known vaccination status, 28% were unvaccinated, compared with 17% of probable and 17% of possible cases.

## Outcome

The outcome of disease was known for 8 632 cases (58%). No deaths were reported in 2016.

## Hospitalisation and complications

Of 9 510 cases with known hospitalisation status (64%), 919 (10%) were hospitalised. Data on complications were reported in 2 042 cases, of which 1 836 (90%) had no complications. There were 56 cases of orchitis, 56 cases of pancreatitis, 19 cases of meningitis and 14 cases of encephalitis. Unspecified complications ('other') were reported for another 62 cases. Complications were more frequently reported in adolescents and young adults than in children.

## Discussion

In 2016, the notification rate of mumps was higher than those observed in 2014 and 2015, but lower than in 2012 and 2013. This increase was predominantly driven by a more than threefold increase in the number of cases reported by the Czech Republic. Results of serological surveys in the Czech Republic have indicated waning post-vaccination immunity and low mumps seroprevalence in adolescents and young adults despite high vaccination coverage [5]. As a consequence, the Ministry of Health recommended deferring administration of the second dose of the measles, mumps and rubella (MMR) vaccine in the Czech Republic until the age of 6 starting in 2018 [6].

The highest age-specific notification rates in Europe were observed in 10–14- and 15–19-year-olds, although the most affected age groups differed between Member States. Several factors may explain the observed differences in the epidemiology between Member States, including differences in surveillance systems, historical or current vaccination policies and vaccination coverage levels.

The fact that all EU/EEA Member States have added mumps vaccination to their routine childhood immunisation schedules has significantly reduced the associated disease burden compared with the pre-vaccine period. Low vaccination coverage in some areas may still play a role, as it is associated with a higher risk of mumps outbreaks [7,8]. However, the majority of the 2016 mumps cases in Europe for which vaccination status was known were vaccinated – about half of the cases had received at least two doses.

Several outbreaks in populations with high vaccination coverage were reported, particularly among populations of teenagers and young adults, both in Europe and globally [9–13]. This may be due to waning immunity in the absence of natural boosting. Studies have shown that the time between the first and second doses [11] and time after vaccination [5,9,14] may play a role in susceptibility to mumps infection, while the immunogenicity and effectiveness varies according to the vaccine strain [15,16]. Also, social conditions that facilitate intense exposure, for example in universities, may increase the transmission of the virus [9,11,13].

In Europe, data are consistent with the understanding that complications are more frequently reported in adolescents and young adults than in children [17]. However, the risk of complications following mumps infection is lower in previously vaccinated persons than in non-vaccinated individuals [18,19].

## Public health implications

Further research into waning immunity to mumps is needed in order to improve future immunisation programmes. Meanwhile, maintaining a high coverage with two doses of MMR vaccine is of paramount importance to prevent mumps outbreaks. The protective effect of vaccination on disease severity is critical and should be considered in current and future mumps prevention and control strategies. Administering a third dose of MMR to adolescents and young adults in an outbreak setting may be considered as a control measure [14,20].

Since all European countries use the MMR vaccine in their national childhood immunisation programmes, mumps prevention benefits indirectly from the efforts made to reach the goal of eliminating measles and rubella in Europe.

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