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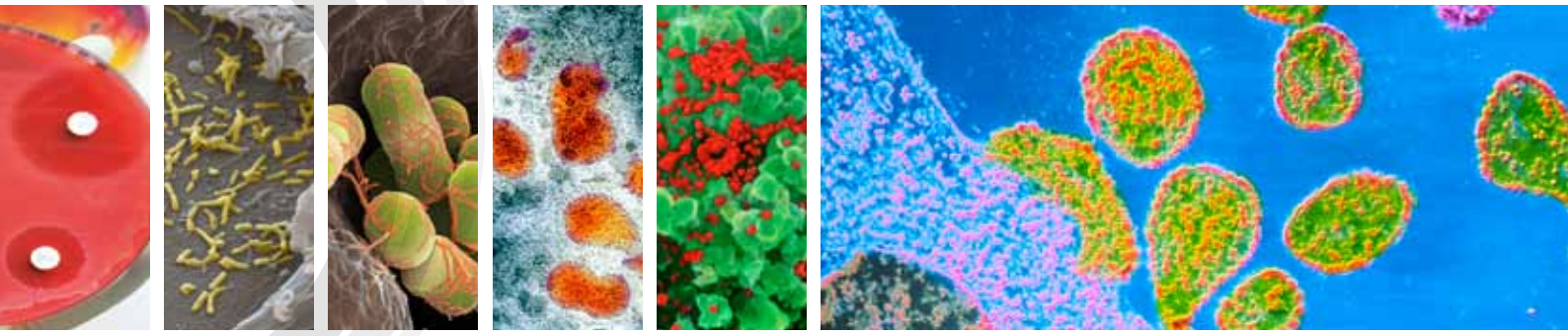
SURVEILLANCE REPORT



Annual epidemiological report

Vaccine-preventable diseases

2014

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Vaccine-preventable diseases

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Stockholm, December 2014

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Abbreviations

EPIS	Epidemic intelligence Information System
EU/EEA	European Union/European Economic Area
GPLN	Global Polio Laboratory Network
OPV	Oral poliovirus vaccine
RCC	Regional Commission for the Certification of Poliomyelitis Eradication
TESSy	European Surveillance System
VAPP	Vaccine-associated polio paralysis
VDPV	Vaccine-derived polioviruses
WHO	World Health Organization
WPV	Wild poliovirus

Introduction

A note to the reader

The Annual Epidemiological Report 2014 gives an overview of the epidemiology of communicable diseases of public health significance in Europe, drawn from surveillance information on the 52 communicable diseases and health issues for which surveillance is mandatory in the European Union (EU) and European Economic Area (EEA) countries[1,2,3,4].

In order to facilitate more timely publication, this year's edition of the Annual Epidemiological Report is being first published a disease group at a time and will later be compiled into one comprehensive report. This report presents the epidemiological situation for vaccine-preventable diseases as of 2012 and describes the statistical and epidemiological methods used.

Produced annually, the report is intended for policymakers and health sector leaders, epidemiologists, scientists and the wider public. It is hoped that readers will find it a useful overview and reference to better understand the present situation in relation to communicable diseases in Europe. It should also usefully assist policymakers and health leaders in making evidence-based decisions to plan and improve programmes, services and interventions for preventing, managing and treating these diseases.

This year's edition of the report draws on surveillance data for 2012, submitted by Member States to the European Surveillance System. The report gives an outline description of the epidemiology for each disease, in a standard format, covering the years 2008–2012. In addition, updates from epidemic intelligence in relation to emerging public health threats for 2013 are given, by disease as relevant. Information on these is either directly reported to ECDC through Member State notifications on the Early Warning and Response System (EWRS), according to defined criteria[5], or found through active screening of various sources, including national epidemiological bulletins and international networks, and various additional formal and informal sources. In-depth reviews of the epidemiology of particular diseases (e.g. tuberculosis, HIV) or disease groups (e.g. vaccine-preventable diseases) are published separately, sometimes in collaboration with other European agencies or the World Health Organization's Regional Office for Europe. These are referenced, for convenience, with the description of each disease. In addition, further information relating to most of the diseases reported here is available on the ECDC website health topics pages at http://ecdc.europa.eu/en/healthtopics.

The reader will appreciate that most surveillance systems capture only a proportion of the cases occurring in their countries. Some cases of disease remain undiagnosed ('under-ascertainment'), and some are diagnosed but not reported to public health authorities ('underreporting'). The pattern of this under-ascertainment and underreporting varies by disease and country, involving a complex mix of healthcare-seeking behaviour, access to health services, availability of diagnostic tests, reporting practices by doctors and others, and the operation of the surveillance system itself.

The direct comparison of disease rates between countries should therefore be undertaken with caution. The reader should be aware that in most cases, differences in case rates reflect not only differences in the occurrence of the disease, but also in systematic differences in health and surveillance systems as described here.

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[1] 2000/96/EC: Commission Decision of 22 December 1999 on the communicable diseases to be progressively covered by the Community network under Decision No 2119/98/EC of the European Parliament and of the Council. Official Journal, OJ L 28, 03.02.2000, p. 50–53.

[2] 2003/534/EC: Commission Decision of 17 July 2003 amending Decision No 2119/98/EC of the European Parliament and of the Council and Decision 2000/96/EC as regards communicable diseases listed in those decisions and amending Decision 2002/253/EC as regards the case definitions for communicable diseases. Official Journal, OJ L 184, 23.07.2003, p. 35–39.

[3] 2007/875/EC: Commission Decision of 18 December 2007 amending Decision No 2119/98/EC of the European Parliament and of the Council and Decision 2000/96/EC as regards communicable diseases listed in those decisions. Official Journal, OJ L 344, 28.12.2007, p. 48–49.

[4] Commission Decision 2119/98/EC of the Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community. Official Journal, OJ L 268, 03/10/1998 p. 1-7.

[5] 2009/547/EC: Commission Decision of 10 July 2009 amending Decision No 2000/57/EC on the early warning and response system for the prevention and control of communicable diseases under the Decision No 2119/98/EC of the European Parliament and of the Council. Official Journal, OJ L 181, 14.07.2009 p. 57-60.

Each year, we observe improvements in the harmonisation of systems, definitions, protocols and data at Member State and EU levels. Nevertheless, data provided by the Member States continue to show a number of inconsistencies. In several situations, the quality and comparability of the data are not optimal, and more work is planned, in conjunction with Member States, to see how best to improve this situation.

This report aims to be consistent with previously published ECDC surveillance reports for 2012 relating to specific diseases and disease groups. However, Member States update their data continually and a number have made specific corrections for this report, including corrections to data reported for earlier years. Accordingly, some minor differences will be seen when comparing the data in this report to previous Annual Epidemiological and disease-specific reports.

Description of methods

Data sources: indicator-based surveillance (disease cases)

All EU Member States and three EEA countries (Iceland, Liechtenstein and Norway) send information at least annually from their surveillance systems to ECDC relating to occurrences of cases of the 52 communicable diseases and health issues under mandatory EU-wide surveillance. Reports are sent according to case definitions established by the EU[6].

Data upload by Member States occurs continually throughout the year. In conjunction with annual ECDC reports for particular diseases or disease groups, and the consolidated annual report, ECDC issues 'data calls,' with specified end dates, to facilitate accurate and up-to-date submission of data for the previous calendar year.

The information submitted by Member States to ECDC is defined through a 'metadataset' for each disease under surveillance. The metadataset includes the case classification for the disease (particularly whether the case is confirmed or probable) according to official case definitions as determined by the European Commission. It also defines the information to be included with each case report. Most data are submitted as anonymised individual case data, but aggregated data are reported by some Member States for some diseases. Countries actively report zero cases for particular diseases, as applicable.

Data are uploaded and validated by the Member States using ECDC's online system for the collection of surveillance data, the European Surveillance System (TESSy). Member States' information specialists transform the data in their surveillance systems into an appropriate format before uploading to TESSy. System reports generated by TESSy allow Member States to review uploaded data and to make modifications where necessary. TESSy performs automatic validation and additional data validation is conducted by ECDC staff, in liaison with designated disease experts and epidemiologists in the Member States. Once the draft report is produced, it is sent to Member States' National Surveillance Coordinators for final validation. Any final corrections are uploaded to TESSy.

For each disease under surveillance, TESSy also holds a description of the key attributes of the surveillance systems for that disease in each Member State. This information is included in the report to aid the interpretation of surveillance data for each reported disease. Member States are asked to verify and update this information each year.

Data sources: event-based surveillance

The report also presents information relating to health threats identified by ECDC through epidemic intelligence activities, from formal and validated informal sources. These threats are documented and monitored by using a dedicated database, called the Threat Tracking Tool (TTT). Data analysed in this report are extracted from the TTT and the EWRS database. The analysis of monitored threats covers the period from the activation of the TTT in June 2005 until the end of 2013; EWRS entries are covered from January 2005 to the end of 2013.

[6] 2002/253/EC: Commission Decision of 19 March 2002 laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council. Official Journal, OJ L 86, 03.04.2002, p. 44–62.

The expression 'opening a threat' refers to the way ECDC assesses threats during its daily threat review meetings. ECDC experts evaluate potential threats and validate events that require further attention or action from ECDC, based on their relevance to public health or the safety of EU citizens. The following criteria are used to open a threat and further monitor an event:

- more than one Member State is affected
- a disease is new or unknown, even if there are no cases in the EU
- there is a request from a Member State or from a third party for ECDC to deploy a response team
- there is a request for ECDC to prepare a risk assessment of the situation
- there is a documented failure in an effective control measure (vaccination, treatment or diagnosis)
- there is a documented change in the clinical/epidemiological pattern of the disease, including changes in disease severity, the mode of transmission, etc.
- the event matches any of the criteria under the International Health Regulations (IHR) or EWRS.

Events are considered relevant to be reported to the EWRS if one or more of the criteria below are met. After the revised International Health Regulations (IHR) entered into force on 15 June 2007, the decision was amended, and criteria now include both IHR notifications and the need to exchange details following contact tracing[7].

The Commission Decision on serious cross-border threats to health[8]; 'lays down rules on epidemiological surveillance, monitoring, early warning of, and combating serious cross border threats to health, including preparedness and response planning related to those activities, in order to coordinate and complement national policies'.

With reference to this Decision, the following criteria are applied for reporting to the EWRS:

- outbreaks of communicable diseases extending to more than one EU Member State
- spatial or temporal clustering of cases of a disease of a similar type if pathogenic agents are a possible cause and there is a risk of propagation between Member States within the Union
- spatial or temporal clustering of cases of disease of a similar type outside the EU if pathogenic agents are a possible cause and there is a risk of propagation to the Union
- the appearance or resurgence of a communicable disease or an infectious agent which may require timely coordinated EU action to contain it
- any IHR notification (also reported through EWRS)
- any event related to communicable diseases with a potential EU dimension necessitating contact tracing to identify infected persons or persons potentially in danger, which may involve the exchange of sensitive personal data of confirmed or suspected cases between concerned Member States.

Data analysis

General principles

All analyses are based on confirmed cases where possible. For some diseases, some Member States do not distinguish confirmed from other cases; in these situations, total case reports from these countries are used in the analyses and the country concerned is identified in a footnote to the summary table. For some diseases (e.g. tuberculosis, Legionnaires' disease), confirmed cases are defined on a specific basis, described in the relevant sections. For other diseases the reporting of only confirmed cases would result in a severe underestimation of the true disease burden, hence both probable and confirmed cases are reported. The 'month' variable used in the seasonality analyses is based on the date that the country chooses as its preferred date for reporting. This could be either date of onset of disease, date of diagnosis, date of notification, or some other date at the country's discretion.

Population data

Population data for the calculation of rates are obtained from Eurostat, the statistical office of the EU. Data for overall calculations are extracted from the Eurostat database 'Demographic balance and crude rates' (DEMO_PJAN). The population as of 1 January of each year is used. Totals per year and per country are available for all countries for 2012. For calculation of age- and gender-specific rates, the data are aggregated into the following age groups for the analyses: 0–4, 5–14, 15–24, 25–44, 45–64 and ≥65 years.

[7] Commission Decision of 10 July 2009 amending Decision No 2000/57/EC on the early warning and response system for the prevention and control of communicable diseases under the Decision No 2119/98/EC of the European Parliament and of the Council, in Official Journal of the European Union. 2009. p. L 181: 57-9.

[8] Commission Decision 1082/2013/EU, of 5th November 2013 of the European Parliament and the Council of 22 October 2013 on serious cross-border threats to health.in Official Journal of the European Union 2013.p.L293:1-15.

Presentation of analyses

The descriptive epidemiology for each disease is set out as a summary table by country and supplementary figures describing overall epidemiology at EU/EEA level. These include the trend for reported confirmed cases from 2007–12, age- and gender-specific rates, and occurrence by month ('seasonality'), if relevant. Additional graphs, figures and maps are used where necessary to illustrate other important aspects of the disease epidemiology in the EU and EEA.

Summary table

The summary table for each disease indicates whether the country data were reported from a surveillance system with national or lesser geographical area of coverage. The table also indicates what type of data the country submitted: case based ('C'), aggregated ('A') data or data submitted to a disease-specific network ('D').

This table presents an overview of the number and rates (including age-standardised rates) of confirmed cases or total cases depending on the disease reported by the Member States surveillance systems for the period 2008–12. The total number of reported cases (independent of case classification) for 2012 is also shown.

Confirmed case rates are given per 100 000 persons (the number of reported confirmed cases divided by the official Eurostat estimate of the population for that year multiplied by 100 000). Countries that made no report for a disease are excluded from the calculation for overall European rates for that disease. Country reports from systems with less than national coverage (e.g. where only some regions of the country report nationally) are also excluded from calculation of overall EU case rates.

Age-standardised rates (ASR) are calculated to facilitate comparisons between countries by adjusting for differences with respect to certain underlying population characteristics such as age. ASRs were calculated when the EU/EEA rate exceeds 1 per 100 000 population and are given per 100 000 persons.

ASRs were calculated using the direct method according to the following formula:

$$ASR = \frac{\sum_{i=1}^{6} \left(r_i \, p_i \right)}{\sum_{i=1}^{6} p_i}$$

where r_i is the specific rate for the age group i in the population being studied, and p_i is the population of age group i in the standard population.

The standard population considered in this report was based on the average population of the EU27 Member States for the period 2001–2010 (Table). This standard population was defined to reflect the current age structure of Europe.

Age group	Standard population
0–4	25 506 062
5–14	54 043 285
15–24	62 075 051
25–44	143 411 393
45–64	124 427 054
65+	81 889 316
Total	**491 352 161**

Aspects of descriptive epidemiology at EU/EEA level

The descriptive epidemiology for each disease for the EU and EEA region overall is described as follows:

Trends in reported number of confirmed cases. The number of confirmed cases by month, 2008–12, for the EU/EEA is presented as a figure. Countries with consistent reporting of cases or zero cases for the whole five-year period are included. The figure also shows a centred 12-month moving average to show the overall trend by smoothing seasonal and random variations.

Age- and gender-specific rates for confirmed cases. Age- and gender-specific rates for the EU/EEA Member States are presented and given per 100 000 persons. It should be noted that these analyses are based only on cases for which both age and gender were reported. For some diseases this can result in exclusion of a significant proportion of cases, and the overall EU and EEA rate will be underestimated. The denominator includes the sum of the populations within the respective age–gender groups, including countries which actively reported zero cases.

Seasonal distribution of cases. For diseases where reported occurrence varies by month, a figure showing the seasonality is presented. This shows the total number of confirmed cases reported for each month in 2012, compared with the maximum, minimum and average number of cases observed for each month for the period 2008–12. These analyses include only cases for which the month of reporting is given; for some diseases this can result in exclusion of significant numbers of cases.

It will be noted that for some diseases reported numbers are too small for some or all of the above analyses to be presented.

Data protection

The data received in TESSy from Member States are subject to Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000, providing for 'the protection of individuals with regard to the processing of personal data by the Community institutions and bodies, and on the free movement of such data.' High standards of data protection consistent with these requirements are applied, supervised by the ECDC Data Protection Officer. ECDC data protection arrangements are also under the review of the European Data Protection Supervisor.

Data are made available on request to other European Agencies, Institutions and approved researchers, under procedures in accordance with the above requirements, approved by the ECDC Management Board.

Vaccine-preventable diseases

Diphtheria

- Diphtheria is largely under control in Europe.
- In 2012, 27 cases of diphtheria were reported across EU/EEA countries, with a notification rate of 0.01 per 100 000 population.
- The majority of *C. diphtheria* cases occurred in 45–64 year-olds (n=5), while the most affected age group among cases caused by *C. ulcerans* cases was the ≥ 65 year-olds.
- High vaccination coverage must be sustained, adult booster coverage increased, and epidemiological surveillance and laboratory capacity maintained.

Diphtheria is a very rare disease in the EU, caused by *Corynebacterium diphtheriae* and *Corynebacterium ulcerans*. It can cause respiratory symptoms or non-respiratory forms that affect other parts of the body, including the skin. Some strains are toxin-producing and can cause fatal illness.

Epidemiological situation in 2012

In 2012, 29 EU/EEA countries provided diphtheria surveillance data. There was no report from Liechtenstein. In total, 27 confirmed cases of diphtheria were reported by eight EU/EEA countries (Table 1). Of the 27 confirmed cases, 16 cases were caused by *C. diphtheriae* and 11 cases were caused by *C. ulcerans*. The overall notification rate was 0.01 per 100 000 population. The notification rate in Latvia has been the highest among the EU/EEA countries for the last five years, ranging between 0.09–1.28 per 100 000 population.

The interpretation of the overall trend is difficult as only few countries reported cases in the last five years; also, case detection is strongly influenced by availability of laboratory resources (techniques and supplies), expertise and surveillance systems. The total number of cases remained low in all EU Member States that consistently reported diphtheria cases over the last five years, with the lowest number of confirmed cases reported in 2010.

The majority of cases reported in 2012 were indigenous (N=17), whereas eight cases were imported. Importation status was unknown for two cases.

Vaccination status was reported for eleven cases out of 22; four of these cases were reported as vaccinated.

Information on the outcome was available for 25 cases of both pathogens. One death was reported by Latvia in a 60 years-old unvaccinated case caused by *C. diphtheriae*.

Five countries reported 16 cases caused by *C. diphtheriae,* and five countries reported 11 cases due to *C. ulcerans* (Table 2).

Table 1. Number and rates of confirmed diphtheria reported cases, EU/EEA, 2008–2012

Country	2012					2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Belgium	Y	C	1	0.01	0.01	0	0.00	0	0.00	0	0.00	0	0.00
Bulgaria	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Cyprus	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Denmark	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Estonia	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finland	Y	C	1	0.02	0.02	0	0.00	0	0.00	0	0.00	0	0.00
France	Y	C	4	0.01	0.01	5	0.01	2	0.00	1	0.00	5	0.01
Germany	Y	C	9	0.01	0.01	4	0.01	8	0.01	4	0.01	0	0.00
Greece	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Hungary	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Italy	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Latvia	Y	C	8	0.39	0.41	5	0.24	2	0.09	5	0.23	28	1.28
Lithuania	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	2	0.06
Luxembourg	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	Y	C	1	0.01	0.01	0	0.00	0	0.00	0	0.00	0	0.00

Country	2012					2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Poland	Y	A	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Portugal	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Romania	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Slovakia	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Slovenia	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Spain	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Sweden	Y	C	2	0.02	0.02	2	0.02	0	0.00	1	0.01	1	0.01
United Kingdom	Y	C	1	0.00	0.00	2	0.00	2	0.00	4	0.01	6	0.01
EU Total	**-**	**-**	**27**	**0.01**	**0.01**	**18**	**0.00**	**14**	**0.00**	**15**	**0.00**	**42**	**0.01**
Iceland	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	0	0.00	0.00	0	0.00	0	0.00	0	0.00	4	0.08
EU/EEA Total	**-**	**-**	**27**	**0.01**	**0.01**	**18**	**0.00**	**14**	**0.00**	**15**	**0.00**	**46**	**0.01**

ASR: Age-standardised rate

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Table 2. Number of confirmed diphtheria reported cases by country and pathogen, EU/EEA, 2012

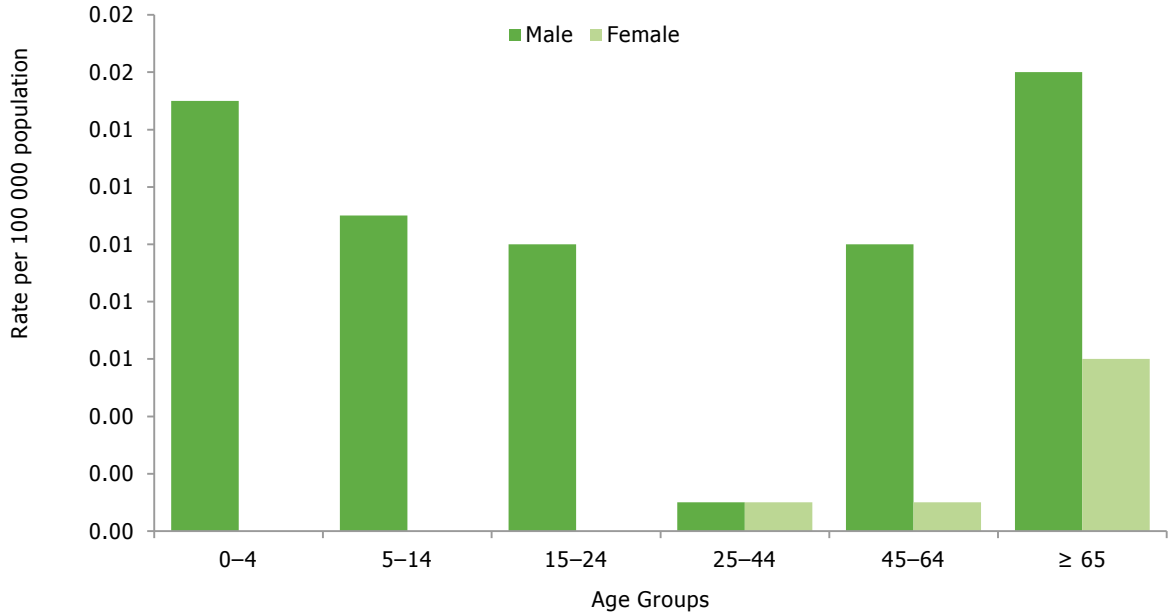
Country	*C. diphtheria*	*C. ulcerans*	Total
Belgium	0	1	1
Finland	0	1	1
France	2	2	4
Germany	3	6	9
Latvia	8	0	8
Netherlands	1	0	1
Sweden	2	0	2
United Kingdom	0	1	1
Total	**16**	**11**	**27**

Source: Country reports.

Age and gender distribution

The majority of *C. diphtheria* cases occurred in 45–64 year-olds (n=5), while the most affected age group among cases caused by *C. ulcerans* cases was the ≥ 65 year-olds (n=7). The most affected age group including both diseases was the ≥ 65 year-olds. The disease was not evenly distributed between males and females for both pathogens, with 22 male cases and five female cases. Female cases only occurred in the age groups 25–44 to ≥ 65 (Figure 1). The overall notification rate in females was lower than 0.001 per 100 000 and 0.01 per 100 000 in males.

Figure 1. Rates of confirmed diphtheria reported cases by age and gender, EU/EEA, 2008–2012



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

Seasonality

The low number of reported cases did not allow a detailed analysis of seasonal trends. Based on the available data, the number of cases was slightly higher during the colder months.

Discussion

In 2012, 27 cases of diphtheria were reported by eight EU/EEA countries. The data show that diphtheria is now a marginal problem in the EU/EEA. High vaccination coverage and high living standards have interrupted the circulation of Corynebacteria.

Since 2008, European diphtheria surveillance distinguishes between *C. diphtheriae* and *C. ulcerans* [1, 2] and pathogen-specific data have been available since 2010. Previously, these data were analysed together although the former pathogen is transmitted from human to human whereas the latter is zoonotic [3, 4]. *C. ulcerans* infections were reported by France, Germany, Finland, Belgium and the United Kingdom, perhaps suggesting a higher awareness of this pathogen in these countries.

The overrepresentation of reported cases in the elderly suggests either waning immunity in the absence of booster doses or lack of high vaccination coverage in the past [5]. In 2012, only four of 27 cases were reported as vaccinated. A recent study carried out in six European countries and Israel found increasing age to be associated with an increase of seronegative subjects in the absence of repeated boosters [6]. A study carried out in Catalonia revealed poor population immunity against diphtheria, with less than half of those born before 1975 properly immunised [7].

Regular seroprevalence studies are needed in the EU to identify and address gaps in population immunity against diphtheria. The disease is still prevalent in Belarus, Ukraine and Russia, and is endemic in Asia, Africa and South America. In 2012, eight cases were reported as imported. To prevent future outbreaks of diphtheria in Europe, efforts must therefore continue to maintain national capacities [8] in rapid identification of cases. Furthermore, immunisation programmes should be shielded from budgetary constraints to maintain high diphtheria routine and booster vaccination coverage.

Surveillance systems overview

country	Data source	Compulsory (Cp)/Voluntary (V) / Other(O)	Comprehensive (Co)/Sentinel (Se) / Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Belgium	BE-REFLAB	V	Co	A	C	Y	N	N	N	Y	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-ANTH/CHOL/DIPH/MALA/SPOX/TRIC/TULA/TYPH	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Germany	DE-SURVNET@RKI-7.1/6	Cp	Co	P	C	Y	Y	Y	Y	Y	Other
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Portugal	PT-DIPHTERIA	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	Y	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-DIPHTHERIA	O	Co	P	C	Y	N	Y	Y	Y	EU-2012

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Measles

- 11 316 cases were reported in 2012, with an overall rate of 2.23 cases per 100 000 population.
- In 2012 6 951 cases were classified as confirmed (61.5%, as compared to 43% in 2011). The overall rate of confirmed cases was 1.37 per 100 000.
- Romania reported 54% (6 166) of all cases in 2012 and had a notification rate of 30.68 per 100 000 population.
- The number of cases reported is lower than in 2010 and 2011, similar to the number of cases seen in 2008. This is likely to be attributable to the dynamics of the transmission of infection in the population rather than a stable decline in the burden of the disease.
- If the number of susceptible persons increases, disease incidence is likely to follow, unless immediate public health action is taken. To interrupt the circulation of the virus, vaccination coverage of at least 95% must be reached, with two doses of measles-containing vaccine (MCV) through routine vaccination.
- Measles elimination remains a public health challenge in the European Region despite several countries having renewed their commitment to the elimination of indigenous transmission of measles by 2015.
- Public health priorities include strengthening immunisation programmes, improving surveillance systems, and effective outbreak control.

Measles is a highly communicable disease caused by the measles virus. The disease is characterised by cough, coryza, fever, a maculopapular rash, and Koplik spots. Patients usually recover, but serious complications of the respiratory tract and central nervous system may occur. The infectious agent is the measles virus, which belongs to the genus *Morbillivirus* of the family Paramyxoviridae.

Epidemiological situation in 2012

In 2012, 29 EU/EEA countries provided measles surveillance data. There was no report from Liechtenstein. In total, 11 316 measles cases, including confirmed, possible and probable cases, were reported by 29 EU/EEA countries (Table 1). A notification rate 2.23 cases per 100 000 population was observed. The number of cases reported is notably lower than in 2010 and 2011, similar to the number of cases seen in 2008. A total of 6 951 cases were classified as confirmed (61.5%) (Table 1). Thirteen countries reported rates below one case per million population; the target for the elimination of the disease [1]. Romania reported 54% (6 166) of all cases in 2012 and had a notification rate of 30.68 per 100 000 population. This is higher than the rate observed in Romania in 2011 (20.9 per 100 000 population), although at least 30 times higher than the case rate observed in 2008–2010. The United Kingdom (1 902) and Spain (1 210) also reported a considerable number of cases. The notification rate in the United Kingdom was 3.00 per 100 000, and in Spain 2.59 per 100 000. France, who reported the highest notification rate in 2011 (23.04 per 100 000, n=14 966), had 1.32 cases per 100 000 in 2012 (n=859) (Table 1).

Table 1. Number and rates of measles reported cases, EU/EEA, 2008–2012

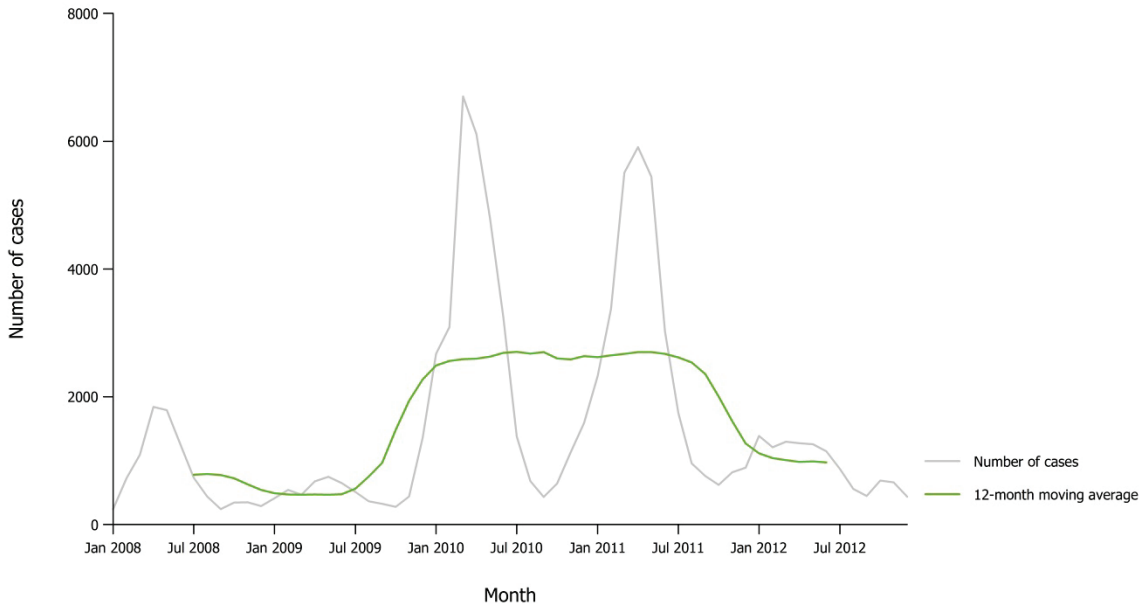
Country	2012						2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Confirmed cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	35	0.42	0.45	20	122	1.45	56	0.67	53	0.63	447	5.37
Belgium	Y	C	101	0.91	0.88	51	674	6.13	40	-	33	-	98	-
Bulgaria	Y	C	1	0.01	0.02	1	157	2.13	22 005	296.49	2 249	30.12	1	0.01
Cyprus	Y	C	1	0.12	0.11	1	0	0.00	18	2.20	0	0.00	1	0.13
Czech Republic	Y	C	22	0.21	0.21	22	17	0.16	0	0.00	5	0.05	2	0.02
Denmark	Y	C	2	0.04	0.04	2	84	1.51	5	0.09	8	0.15	12	0.22
Estonia	Y	C	4	0.30	0.31	4	7	0.53	0	0.00	0	0.00	0	0.00
Finland	Y	C	4	0.07	0.08	4	27	0.50	5	0.09	2	0.04	5	0.09
France	Y	C	859	1.32	1.27	396	14 966	23.04	5 019	7.77	1 544	2.40	604	0.94
Germany	Y	C	166	0.20	0.24	121	1607	1.97	780	0.96	573	0.70	915	1.12
Greece	Y	C	3	0.03	0.03	3	40	0.36	149	1.33	2	0.02	1	0.01
Hungary	Y	C	2	0.02	0.02	2	5	0.05	0	0.00	1	0.01	0	0.00
Ireland	Y	C	103	2.25	1.88	26	267	5.84	403	9.02	193	4.34	56	1.26
Italy	Y	C	604	1.02	1.10	216	5 097	8.59	3 064	5.08	759	1.26	5 311	8.91
Latvia	Y	C	3	0.15	0.15	3	1	0.05	0	0.00	0	0.00	3	0.14
Lithuania	Y	A+C	2	0.07	0.07	2	7	0.23	2	0.06	0	0.00	1	0.03
Luxembourg	Y	C	2	0.38	0.36	2	6	1.17	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0.00	0.00	0	6	1.45	0	0.00	1	0.24	1	0.25
Netherlands	Y	C	10	0.06	0.06	10	50	0.30	15	0.09	15	0.09	109	0.66
Poland	Y	C	70	0.18	0.18	50	38	0.10	13	0.03	115	0.30	100	0.26
Portugal	Y	C	7	0.07	0.07	5	2	0.02	5	0.05	3	0.03	1	0.01

Country	2012						2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Confirmed cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Romania	Y	C	6 166	30.68	31.54	3 262	4 165	20.90	188	0.94	8	0.04	14	0.07
Slovakia	Y	C	1	0.02	0.02	1	2	0.04	0	0.00	0	0.00	0	0.00
Slovenia	Y	C	2	0.10	0.10	2	22	1.07	2	0.10	0	0.00	0	0.00
Spain	Y	C	1 210	2.59	2.66	821	3 515	7.53	305	0.66	41	0.09	296	0.65
Sweden	Y	C	30	0.32	0.31	18	26	0.28	6	0.06	3	0.03	25	0.27
United Kingdom	Y	C	1 902	3.00	2.82	1 902	1 083	1.73	397	0.64	1 166	1.89	1 406	2.30
EU Total	**-**	**-**	**11 312**	**2.26**	**2.31**	**6 947**	**31 993**	**6.41**	**32 477**	**6.65**	**6 774**	**1.38**	**9 409**	**1.92**
Iceland	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	4	0.08	0.08	4	40	0.81	3	0.06	2	0.04	4	0.08
EU/EEA Total	**-**	**-**	**11 316**	**2.23**	**2.28**	**6 951**	**32 033**	**6.35**	**32 480**	**6.58**	**6 776**	**1.37**	**9 413**	**1.90**

ASR: Age-standardised rate

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Figure 1. Distribution of measles reported cases by month, EU/EEA, 2008–2012

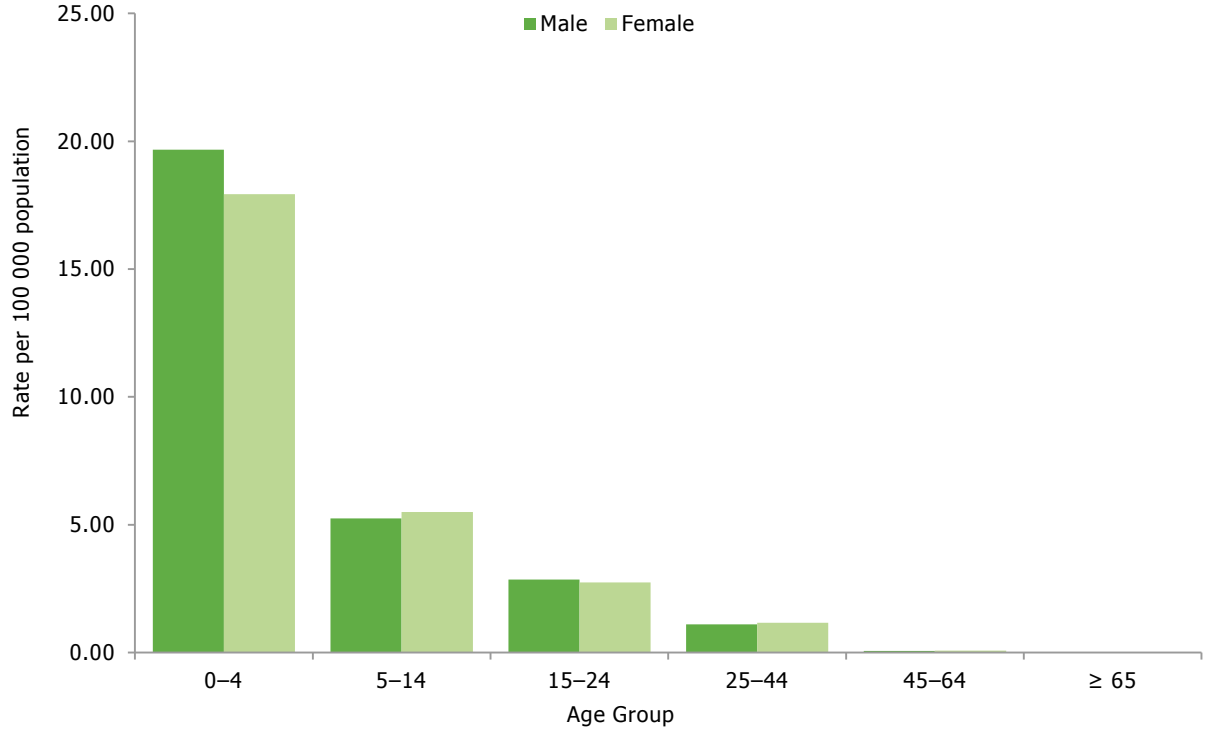


Source: Country reports from Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Age and gender distribution

The notification rate of confirmed cases decreased with increasing age. The most affected age group was 0–4 year-olds (18.81 cases per 100 000), followed by 5–14 year-olds (5.39 per 100 000). In each age group, there were no important differences as regards to gender (Figure 2).

Figure 2. Rates of measles reported cases by age and gender, EU/EEA, 2012



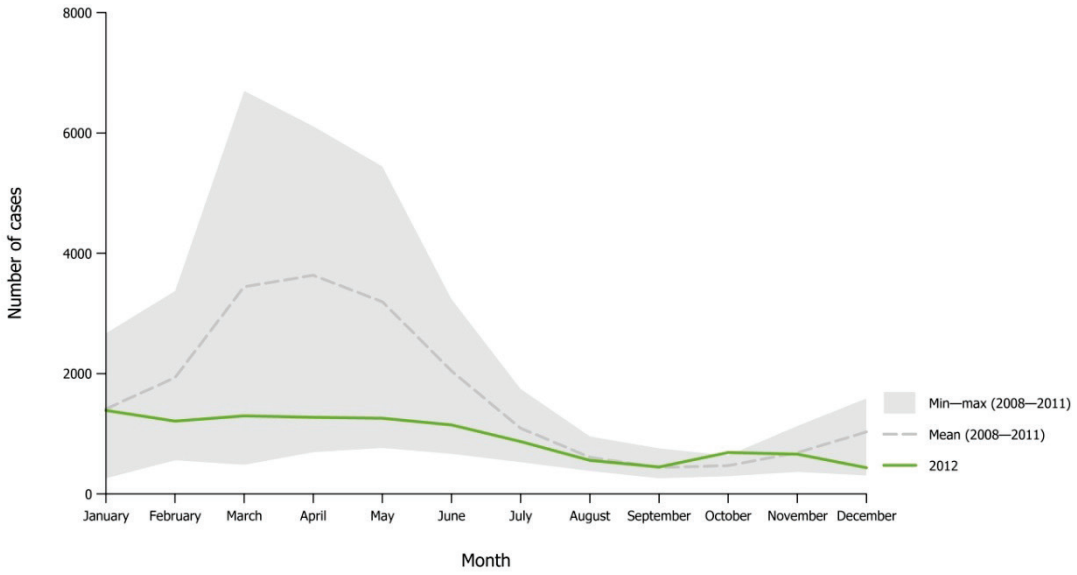
Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Seasonality

In 2012, no distinctive seasonal pattern was observed. In previous years, infection occurred primarily in late winter and early spring (Figure 3); which is the typical occurrence of the disease in temperate climates.

The monthly distribution of cases from 2008 to 2012 is presented in Figure 3.

Figure 3. Distribution of measles reported cases by month in 2012 compared with 2008–2011 data, EU/EEA



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

Enhanced surveillance in 2012

Of all cases with known importation status 2.3% (n=211) were reported as imported and 97.7% (n=8 870) as not imported. Vaccination status was known for 96.5% of cases and of these, 75.5% (n=8 243) were unvaccinated.

One measles-related death was reported by Spain. Eight cases were complicated by acute encephalitis following measles infection.

Discussion

The number of cases reported in 2012 is notably lower than in 2011 and 2010, and similar to the rates observed in 2008. This is most likely attributable to the dynamics of the transmission of infection in the population. To interrupt the circulation of the virus, vaccination coverage of at least 95% must be reached, with two doses of measles-containing vaccine through routine vaccination.

Measles elimination remains a challenge in the European Region. In September 2010, WHO European Region countries renewed their commitment to the elimination of indigenous transmission of measles by 2015 [2]. In addition to improving vaccination coverage (≥95% with two doses of vaccine), public health priorities include strengthened surveillance systems and effective outbreak control [3-5].

Surveillance systems overview

Country	Data source	Compulsory (Cp) / Voluntary (V)/ Other(O)	Comprehensive (Co) / Sentinel (Se)/ Other(O)	Active (A)/ Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Belgium	BE-PEDI_NRC_FLA_FRA	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2008
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-MEASLES_POLIO	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Germany	DE-SURVNET@RKI-7.1/6	Cp	Co	P	C	Y	Y	Y	Y	Y	Other
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-MEASLES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008

Country	Data source	Compulsory (Cp) / Voluntary (V)/ Other(O)	Comprehensive (Co) / Sentinel (Se)/ Other(O)	Active (A)/ Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Portugal	PT-MEASLES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-MEASLES	O	Co	P	C	Y	N	Y	Y	Y	EU-2012

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Mumps

- Mumps is one of the vaccine-preventable diseases that continue to occur across Europe.
- The number of mumps cases reported in EU/EEA countries in 2012 was 19 061, of these 55% were laboratory confirmed. The notification rate of confirmed cases was 2.91 per 100 000 population.
- As in previous years, the age group most affected were between 15 and 24 years old.
- The highest rates were reported from Belgium, Czech Republic, Spain and United Kingdom.
- Larger outbreaks were mainly noted in Spain, Czech Republic and Belgium.
- The current epidemiology of mumps in Europe may be largely explained by waning immunity and a growing susceptible population. Booster vaccination strategies among adolescents and young adults could be considered.

Mumps is an infection caused by the mumps virus of the genus *Paramyxovirus* and characterised by fever and parotitis. Common complications are meningitis, pancreatitis and, in adolescent males, orchitis. Rarely, neurological symptoms and residual hearing loss may occur. Mumps outbreaks are still relatively frequent, although the disease is vaccine-preventable and the vaccine is included in the primary vaccination schedule of all EU/EEA Member States.

Epidemiological situation in 2012

In 2012, 27 EU/EEA countries provided mumps surveillance data. In total, 19 061 cases of mumps were reported in 2012 by 25 EU/EEA countries, of these 10 474 (55%) were confirmed cases. Iceland and Luxembourg reported zero cases, while France, Germany and Lichtenstein did not report any data. The overall notification rate of confirmed cases was 2.91 per 100 000 population (2011: 1.81 per 100 000). The overall trend in notifications increased slightly from 2.14 to 2.91 cases per 100 000 population between 2008 and 2012.

Belgium (24.19 cases per 100 000), Czech Republic (13.38 cases per 100 000 population), Spain (5.38 cases per 100 000), United Kingdom (4.29 cases per 100 000), Netherlands (2.07 cases per 100 000) and Lithuania (2.06 cases per 100 000) reported the highest rates of notified cases and accounted for 92.7% of all confirmed cases (Table 1).

Notable increases in notification rate were observed in the Czech Republic (9.93 cases per 100 000 in 2011 to 13.38 cases per 100 000 in 2012), in Spain (1.70 in 2011 to 5.38 in 2012), Latvia (0.24 in 2011 to 1.52 in 2012) and Romania (0.03 in 2011 to 0.81 in 2012). A decrease in notification rate was reported by the Netherlands (3.18 in 2011 to 2.07 in 2012), Italy (1.59 in 2011 to 0.66 in 2012) and Ireland (1.53 in 2011 to 0.96 in 2012) (Table1). Although Belgium had the highest notification rate, comparison with previous years is not possible as national surveillance of mumps was only introduced in 2012.

Table 1. Number and rates of confirmed mumps reported cases, EU/EEA, 2008–2012

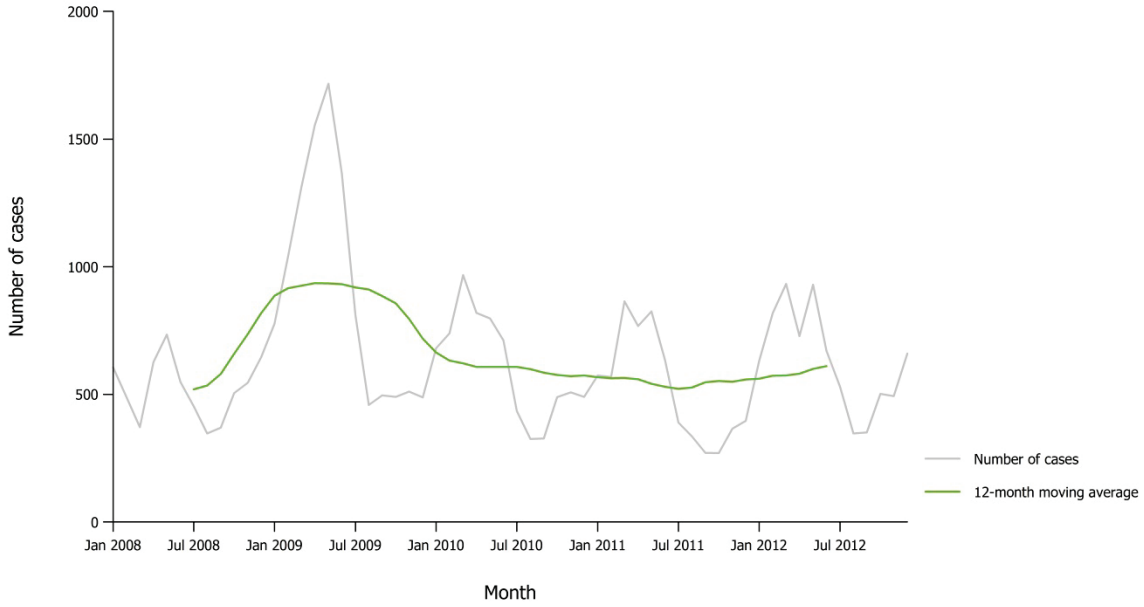
Country	2012						2011		2010		2009		2008	
	National data	Report type	Total cases	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	17	17	0.20	0.21	25	0.30	15	0.18	14	0.17	22	0.26
Belgium	Y	A	2 684	2 684	24.19	0.00	15	-	30	-	43	-	50	-
Bulgaria	Y	C	58	11	0.15	0.18	20	0.27	26	0.35	185	2.48	1 155	15.36
Cyprus	Y	C	3	3	0.35	0.35	0	0.00	2	0.24	3	0.38	3	0.39
Czech Republic	Y	C	3 902	1 406	13.38	14.58	1041	9.93	993	9.49	279	2.68	260	2.51
Denmark	Y	C	15	15	0.27	0.28	13	0.23	32	0.58	17	0.31	24	0.44
Estonia	Y	C	4	1	0.08	0.09	2	0.15	0	0.00	11	0.82	14	1.04
Finland	Y	C	3	3	0.06	0.06	2	0.04	4	0.08	1	0.02	5	0.09
France	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	Y	C	2	1	0.01	0.01	0	0.00	0	0.00	3	0.03	1	0.01
Hungary	Y	C	4	4	0.04	0.04	5	0.05	0	0.00	5	0.05	11	0.11
Ireland	Y	C	44	44	0.96	0.99	70	1.53	109	2.44	1 381	31.03	698	15.66
Italy	Y	C	389	389	0.66	0.75	965	1.59	909	1.51	1 103	1.84	1 387	2.33
Latvia	Y	C	41	31	1.52	1.57	5	0.24	0	0.00	1	0.05	2	0.09
Lithuania	Y	C	62	62	2.06	2.18	64	2.10	0	0.00	0	0.00	0	0.00
Luxembourg	Y	C	0	0	0.00	0.00	0	0.00	-	-	25	5.07	26	5.38
Malta	Y	C	2	0	0.00	0.53	0	0.00	2	0.48	0	0.00	0	0.00
Netherlands	Y	C	408	346	2.07	2.16	530	3.18	424	2.56	31	0.19	7	0.04
Poland	Y	A	2 773	2	0.01	-	0	0.00	3	0.01	1	0.00	0	0.00
Portugal	Y	C	160	8	0.08	0.09	7	0.07	11	0.11	9	0.09	15	0.15

Country	2012						2011		2010		2009		2008	
	National data	Report type	Total cases	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Romania	Y	A	163	163	0.81	0.84	5	0.03	0	0.00	0	0.00	0	0.00
Slovakia	Y	C	5	4	0.07	0.08	2	0.04	1	0.02	5	0.09	5	0.09
Slovenia	Y	C	8	5	0.24	0.25	2	0.10	2	0.10	3	0.15	13	0.65
Spain	Y	C	5 551	2 518	5.38	6.14	794	1.70	315	0.68	185	0.40	1012	2.22
Sweden	Y	C	33	28	0.30	0.30	30	0.32	16	0.17	21	0.23	51	0.56
United Kingdom	Y	C	2 700	2 700	4.29	4.24	2 714	4.34	4 383	7.06	7 946	12.89	2 644	4.32
EU Total	**-**	**-**	**19 031**	**10 445**	**2.95**	**2.70**	**6 311**	**1.84**	**7 277**	**2.12**	**11 272**	**3.30**	**7 405**	**2.17**
Iceland	Y	C	0	0	0.00	0.00	0	0.00	2	0.63	4	1.25	0	0.00
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	30	29	0.58	0.58	16	0.33	12	0.25	12	0.25	16	0.34
EU/EEA Total	**-**	**-**	**19 061**	**10 474**	**2.91**	**2.66**	**6 327**	**1.81**	**7 291**	**2.10**	**11 288**	**3.25**	**7 421**	**2.14**

ASR: Age-standardised rate

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Figure 1. Distribution of confirmed mumps reported cases by month, EU/EEA, 2008–2012



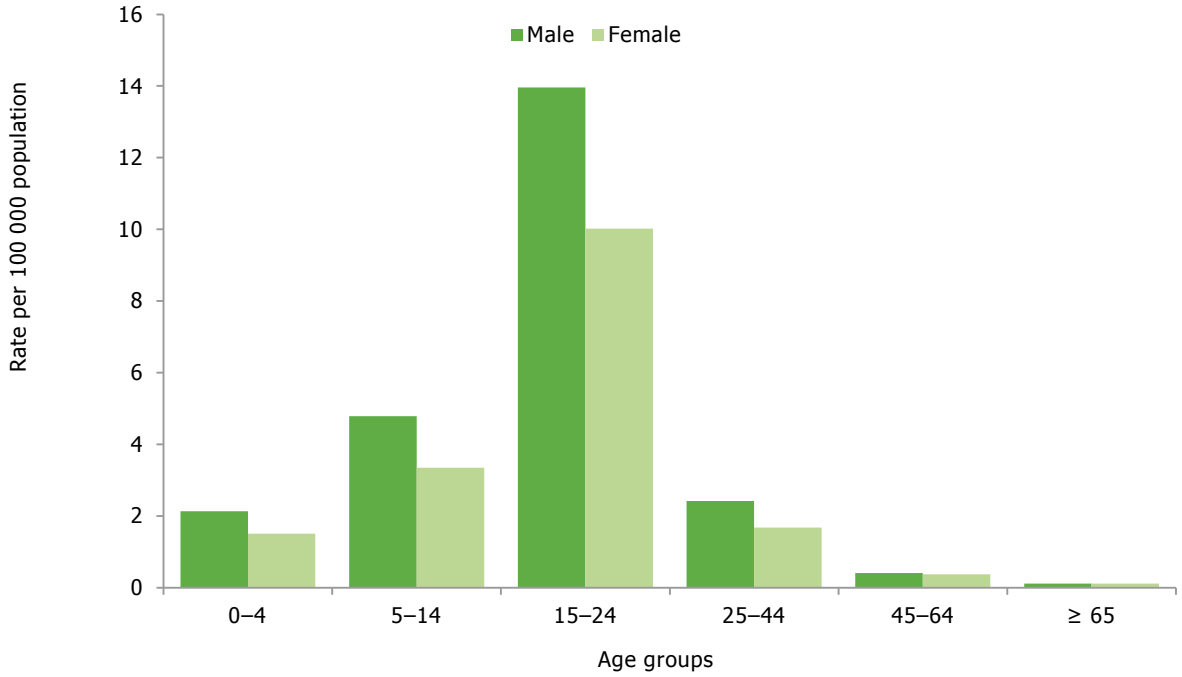
Source: Country reports from Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Age and gender distribution

Data on age was available for 7 781 cases (74%). Mumps occurred in all age groups, but the most affected were 15–24 year-olds (11.30 per 100 000 population, all genders), followed by 5–14-year-olds (4.01 per 100 000 all genders), 0–4-year-olds (1.97 per 100 000 all genders) and 25–44 year-olds (1.94 per 100 000 all genders). This is in line with findings from previous years.

Of the 7 593 cases for which gender was reported, 4 482 cases (59%) were male and 3 111 cases (41%) were female. The male-to-female ratio was 1.44:1 (Figure 2).

Figure 2. Rates of confirmed mumps reported cases by age and gender, EU/EEA, 2011

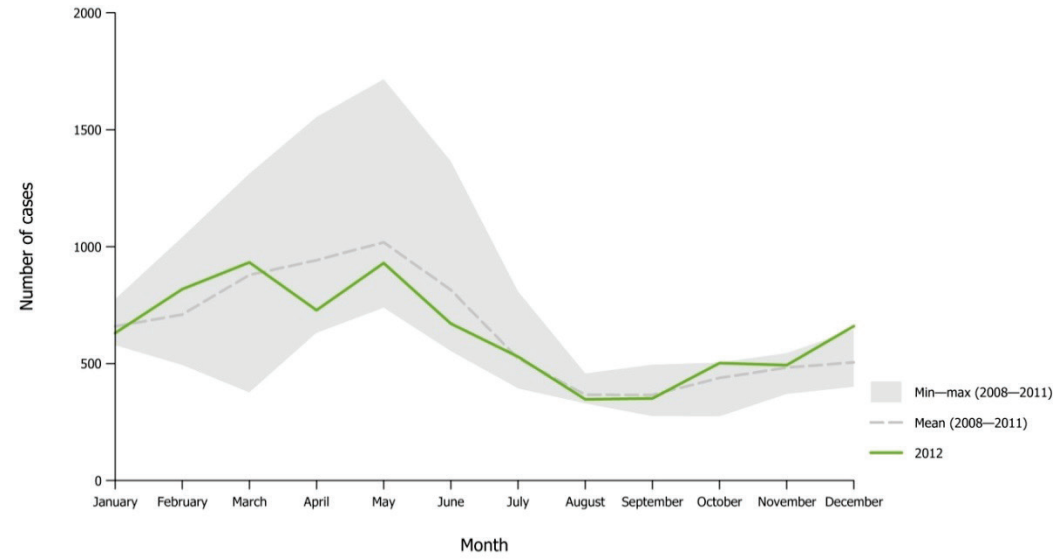


Source: Country reports from Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Seasonality

The month of reporting was available for 7 610 cases (72.6%). The highest number of reported cases was reported in March and May, whereas the lowest numbers were reported during summer and early autumn (Figure 3). In previous years a peak of reported mumps cases was usually seen in May. These pictures are compatible with the known epidemiology of mumps, which is known to peak during winter and spring. The additional peak in March 2012 can be explained by mumps outbreaks in several EU/EEA countries. Spain (3 600 cases), the Czech Republic (3 052 cases), Belgium (350 cases) and Ireland (93 cases) reported in the Epidemic intelligence Information System (EPIS), and in the Early Warning and Response System an increased number of cases due to outbreaks in the first six months of 2012, compared with the same period in 2011.

Figure 3. Distribution of confirmed mumps reported cases by month in 2012 compared with 2008-2012 data, EU/EEA



Source: Country reports from Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Enhanced surveillance in 2012

Data on vaccination status was available for 6 673 cases (63.7%). Of these, 4 292 cases (64.3%) were vaccinated with at least one dose, while 2 381 (35.7%) had not received any vaccination.

Outcome was known in 7 423 cases, and no case died in 2012. Of 6 087 cases with known hospitalisation status, 563 (9%) were hospitalised. Among the hospitalised cases, 381 (62.6%) developed complications, with orchitis being the most common one (244 cases). Other reported complications were meningitis (67 cases), pancreatitis (15 cases) and encephalitis (7 cases). Complications were more frequently reported in young adults than in children.

Discussion

Based on the available data, the overall trend in notifications increased in the past three years from 2.10 in 2010 to 2.91 cases per 100 000 population in 2012. High notification rates were reported by Belgium, Czech Republic, Spain, United Kingdom, Netherlands and Lithuania.

The highest notification rates were observed in the age groups of 15–24-year-olds. Waning immunity and low vaccine coverage have been suggested as reasons for this shift [1].

Of specific interest is the high number of individuals with breakthrough infections after one or more doses of mumps-containing vaccine. A mismatch between the circulation wild-type mumps virus genotype and the genotype of the vaccine strain is unlikely to be the cause, but rather waning immunity in combination with close contact. Thus, revaccination during adolescence to combat waning immunity and to prevent outbreaks might be the most effective measure [1, 2].

According to ECDC data and the literature on the age distribution of complications, they are more frequently reported in young adults than in children. In general, the clinical severity of the disease in previously vaccinated persons is lower than in non-vaccinated individuals [3].

The protective effect of vaccination on disease severity is critical and should be considered in the current and future mumps prevention and control strategies [4].

Further research into waning immunity to mumps virus is needed in order to improve future immunisation programmes. Meanwhile, maintaining a high coverage with two doses of measles, mumps and rubella (MMR) vaccine should be a priority. Since all European countries use MMR vaccines in their national childhood immunisation programmes, mumps prevention benefits indirectly from the efforts made to reach the WHO measles elimination goal by 2015.

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/ Sentinel (Se) / Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Reflab	V	O	P	C	Y	N	N	N	Y	EU-2008
Belgium	BE-FLA_FRA	-	-	P	-	-	-	-	-	-	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-MUMPS	Cp	Co	P	C	N	Y	Y	Y	Y	EU case definition (legacy/deprecated)
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/ Sentinel (Se) / Other(O)	Active (A)/Passive (P)	Case-based (C)/ Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2002
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	N	Y	Y	N	Y	Other
Portugal	PT-MUMPS	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	A	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-MUMPS	O	Co	A	C	Y	N	Y	Y	Y	EU-2012

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Pertussis

- In 2012, the notification rate of pertussis cases was more than twice as high as in previous years. The overall rate of confirmed cases in 2012 was 10.93 cases per 100 000 population.
- Young children and adolescents were the most affected age groups.
- The clinical presentation of pertussis in adolescents and adults can be mild and is often not recognised. This poses a transmission risk to infants who are too young to have completed the primary pertussis vaccination series and who at risk of dying.
- Vaccination strategies should be revisited in order to ensure protections of infants; possible approaches include vaccination of pregnant women and adolescent and adult boosters.

Pertussis (whooping cough) is a highly contagious acute respiratory infection caused by the bacterium *Bordetella pertussis*. The incubation period is 9–10 days (range 6–20 days). Patients develop catarrhal symptoms including cough. In the course of 1–2 weeks, coughing paroxysms ending in the characteristic whoop may occur, especially in unvaccinated children. Complications of pertussis include pneumonia, atelectasis, seizures, encephalopathy, weight loss, hernias and death. While pertussis was once primarily a disease of childhood, increasing frequency is seen in adolescents and adults. The classical severe clinical manifestations of pertussis are seen in infants older than six months and children; pertussis in infants younger than three months, adolescents and adults often goes unrecognised. Deaths mostly occur in infants younger than 6 months of age, who often are too young to have completed the primary vaccination series. Pertussis is an endemic disease, with sporadic outbreaks and epidemic peaks every 2–5 years.

Epidemiological situation in 2012

In 2012, 42 525 (38 840 confirmed) cases were reported by 28 EU/EEA countries, 26 of which have national surveillance systems. Germany and Liechtenstein did not report any data. Belgium and France reported data from sentinel surveillance. As these two systems are not covering the national population, they were not included in the notification rates analysis. The overall total case rate was 10.93 per 100 000 population, twice as high as in previous years (Table1 and Figure 1).

Norway reported the highest notification rate, with 85.18 cases per 100 000 population. The Netherlands, Denmark, United Kingdom and Slovakia followed with 76.91, 20.36, 19.04 and 16.97 cases per 100 000, respectively.

Notable increases in the notification rate were observed in the Netherlands (32.69 cases per 100 000 in 2011 to 76.91 cases per 100 000 in 2012), the United Kingdom (2.01 in 2011 to 19.04 in 2012), Denmark (7.97 in 2011 to 20.36 in 2012), Latvia (0.10 in 2011 to 9.10 in 2012), Czech Republic (2.96 in 2011 to 6.73 in 2012), Austria (1.30 in 2011 to 5.06 in 2012), Lithuania (0.79 in 2011 to 4.40 in 2012), Ireland (2.47 in 2011 to 5.76 in 2012), Poland (1.76 in 2011 to 4.73 in 2012) and Portugal (0.31 in 2011 to 2.18 in 2012). A substantial decrease in the notification rate was reported by Estonia (35.25 in 2011 to 11.17 in 2012) (Table1).

The Netherlands reported the highest total number of cases (N=12 868), more than twice the number than in 2011, representing 30% of the total EU/EEA reported number of cases. The United Kingdom reported nearly ten times more cases than in 2011 (1 256 cases in 2011 to 11 993 cases in 2012), representing 28% of the total EU/EEA reported number of cases (Table 1).

Table 1. Number and rates of confirmed pertussis reported cases, EU/EEA, 2008–2012

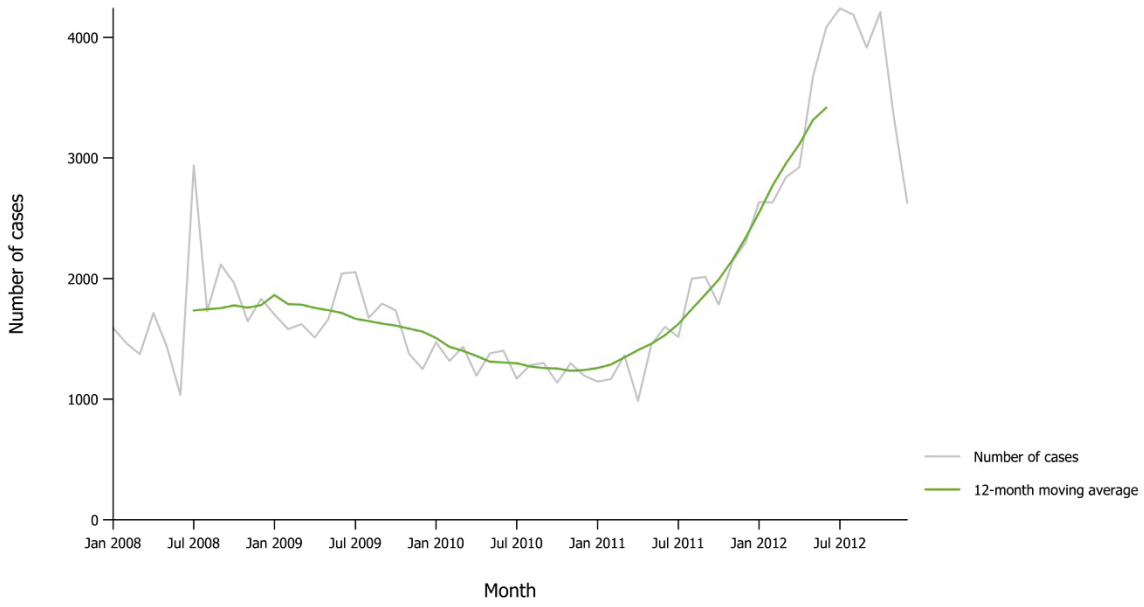
Country	2012						2011		2010		2009		2008	
	National data	Report type	Total cases	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	571	425	5.06	5.17	109	1.30	236	2.82	2	0.02	175	2.10
Belgium	N	C	500	500	-	-	233	-	100	-	160	-	174	-
Bulgaria	Y	A	102	91	1.24	1.39	35	0.48	22	0.30	133	1.78	130	1.73
Cyprus	Y	C	16	12	1.39	1.33	1	0.12	0	0.00	5	0.63	3	0.39
Czech Republic	Y	C	737	707	6.73	7.24	310	2.96	656	6.27	953	9.14	763	7.38
Denmark	Y	C	1 136	1 136	20.36	19.61	443	7.97	450	8.13	632	11.47	619	11.30
Estonia	Y	C	149	149	11.17	11.27	471	35.42	1 279	95.93	629	46.96	485	36.16
Finland	Y	C	541	541	10.02	10.14	555	10.33	343	6.41	267	5.01	1 022	19.28
France	N	C	198	197	-	-	71	-	50	-	82	-	55	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	Y	C	56	40	0.36	0.38	2	0.02	55	0.49	16	0.14	10	0.09
Hungary	Y	C	5	5	0.05	0.05	9	0.09	25	0.25	31	0.31	33	0.33
Ireland	Y	C	458	264	5.76	4.36	113	2.47	45	0.99	61	1.37	71	1.59
Italy	Y	C	262	262	0.44	0.51	516	0.85	463	0.78	638	1.06	339	0.57
Latvia	Y	C	257	186	9.10	10.05	2	0.10	6	0.28	1	0.05	7	0.32

Country	2012						2011		2010		2009		2008	
	National data	Report type	Total cases	Cases	Rate	ASR	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Lithuania	Y	C	154	132	4.40	4.62	24	0.79	16	0.51	233	7.32	51	1.59
Luxembourg	Y	C	11	11	2.10	2.00	4	0.78	0	0.00	1	0.20	2	0.41
Malta	Y	C	3	0	0.00	0.52	20	4.82	2	0.48	0	0.00	0	0.00
Netherlands	Y	C	12 868	12 868	76.91	76.24	5 444	32.69	3733	22.52	5 751	34.89	8 557	52.16
Poland	Y	A	4 684	1 824	4.73	0.00	678	1.76	573	1.50	1 056	2.77	1 272	3.34
Portugal	Y	C	237	230	2.18	2.43	32	0.31	13	0.13	63	0.61	68	0.66
Romania	Y	C	83	70	0.35	0.36	75	0.38	29	0.15	10	0.05	46	0.23
Slovakia	Y	C	950	917	16.97	16.64	936	17.36	1376	25.53	288	5.35	99	1.84
Slovenia	Y	C	178	153	7.44	8.51	176	8.59	371	18.12	351	17.27	162	8.06
Spain	Y	C	1 804	1 565	3.34	3.15	1 013	2.17	305	0.66	126	0.27	200	0.44
Sweden	Y	C	289	279	2.94	2.87	172	1.83	263	2.82	279	3.01	459	5.00
United Kingdom	Y	C	11 993	11 993	19.04	18.89	1 256	2.01	366	0.59	852	1.38	1 051	1.72
EU Total	**-**	**-**	**38 242**	**34 557**	**9.86**	**10.64**	**12 700**	**3.61**	**10777**	**3.11**	**12 620**	**3.63**	**15 853**	**4.61**
Iceland	Y	C	36	36	11.27	9.43	0	0.00	0	0.00	0	0.00	1	0.32
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	4247	4247	85.18	82.98	4368	88.78	3560	73.28	5544	115.52	3887	82.05
EU/EEA Total	**-**	**-**	**42 525**	**38 840**	**10.93**	**11.87**	**17 068**	**4.83**	**14337**	**4.10**	**18 164**	**5.18**	**19 741**	**5.67**

ASR: Age-standardised rate

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Figure 1. Distribution of confirmed pertussis reported cases by month, EU/EEA, 2008–2012

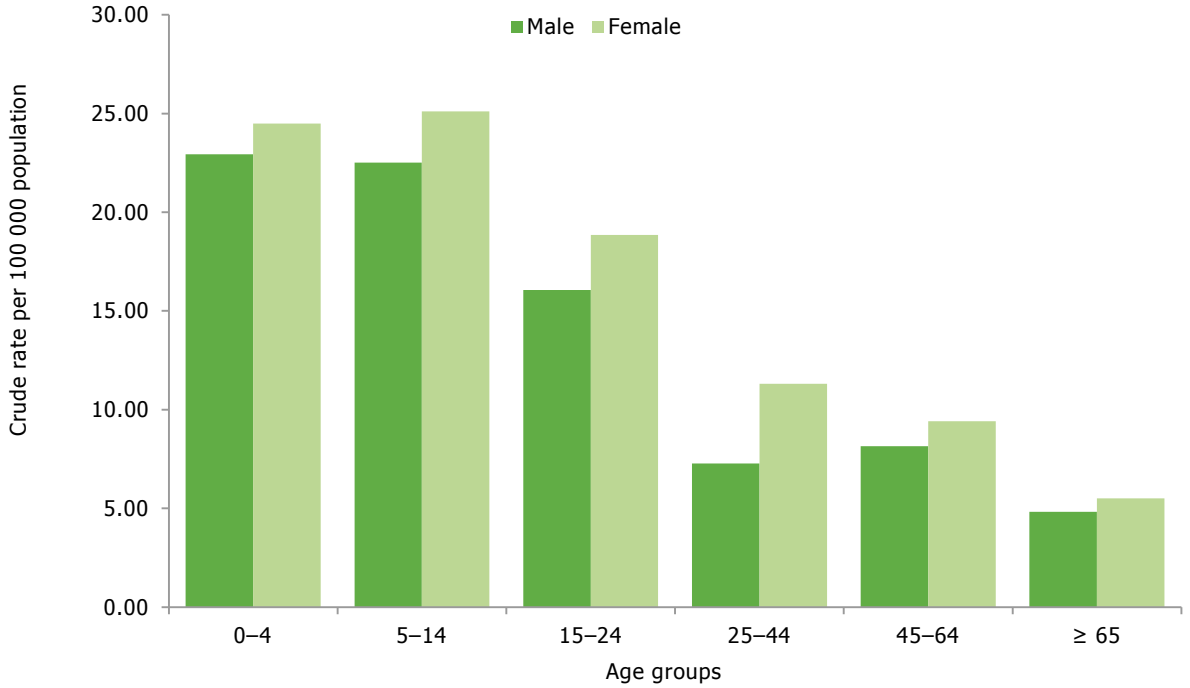


Source: Country reports from Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, Norway, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Age and gender distribution

Information on age was available for 95% of the confirmed cases. In 2012, the most affected age group was 5–14 year-olds with a notification rate of 23.72 per 100 000 population. This is mainly because this group was the most affected age group in countries reporting the highest overall notification rate (Norway and the Netherlands). For many of the remaining countries, the most affected group was young children under five years old, with a notification rate of 23.61 per 100 000. Overall, females (12.56 cases per 100 000 population) were more often affected than males (10.77 per 100 000) for all the age groups, with a male-to-female ratio of 0.86:1 (Figure 2).

Figure 2. Rates of confirmed pertussis reported cases by age and gender, EU/EEA, 2012

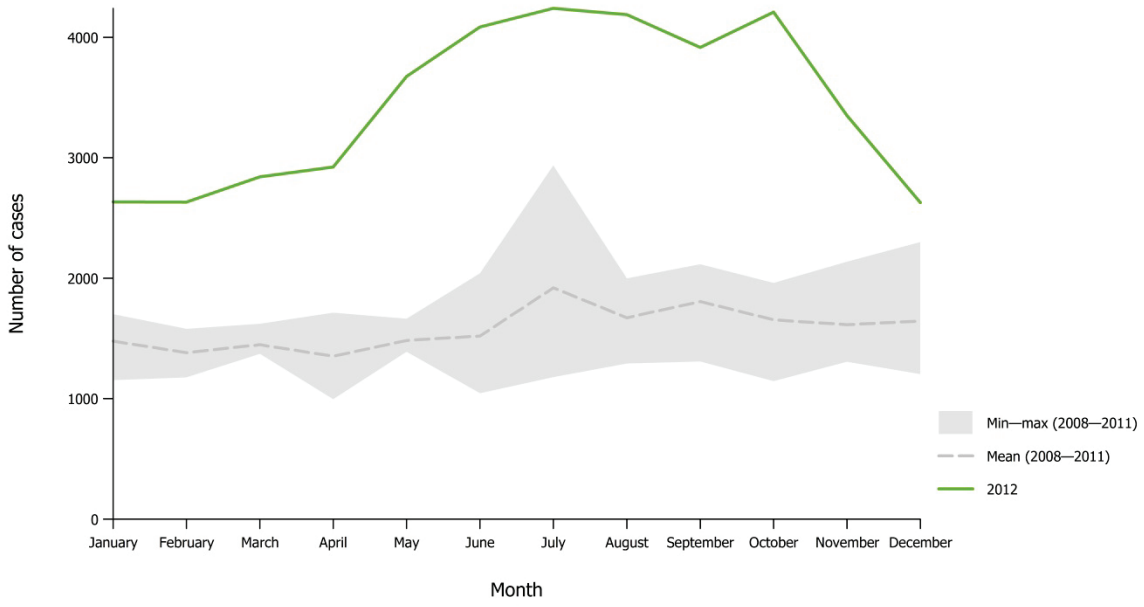


Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Seasonality

Typically, pertussis activity has no distinct seasonal pattern but it may increase in the summer and in the fall. In 2012, the lowest number of cases were reported in January-February; numbers then gradually increased, reaching a high in October. The pattern seen in 2012 is different from the pattern seen in 2008–2011, when not a normal seasonal pattern was observed, except for a peak of cases in July.

Figure 3. Distribution of confirmed pertussis reported cases by month in 2012 compared with 2008–2011 data, EU/EEA



Source: Country reports from Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, Norway, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Discussion

In 2012, the notification rate of pertussis cases was more than twice as high as in previous years. The overall total case rate in 2012 was 10.93 cases per 100 000 population.

Notable increases in the notification rate were observed in the Netherlands, the United Kingdom, Denmark, Latvia, Czech Republic, Austria, Lithuania, Ireland, Poland and Portugal. Norway reported a stable notification rate as compared with previous years and continues to be the country with the highest notification rate of EU/EEA countries. A substantial decrease in notification rate was reported by Estonia.

Comparisons between countries should be made with caution because of variations between surveillance systems and different degrees of awareness in the reporting of the disease.

The most affected age group was 5–14 year-olds, which is mainly due to this group having been the most affected age group in countries reporting the highest overall notification rate (Norway and the Netherlands). For most of the remaining countries, the most affected group were young children under five years old.

The increase in the total number of cases seen at the European level could be explained by a real increase in the disease epidemiology, also compatible with the 2–5 year cyclical nature of pertussis in the community, as well as better ascertainment of the disease/improved surveillance systems. The use of serology in some countries has contributed to diagnosis of the disease in adults and adolescents: in those populations-presenting to the physician after weeks because of milder symptoms- culture and PCR are often negative but the diagnosis may be done by ELISA serology. Nevertheless serology may yield false-positive results in individuals recently vaccinated and there needs to be further dissemination and implementation of standard approaches across European laboratories [1]. Information on the laboratory confirmation and methodologies used are essential for correct data interpretation and contribute to improved surveillance at EU/EEA level.

Specific outbreaks of pertussis were recognised during 2012 in England and in the Netherlands. In England, since October 2012, pertussis immunisation has been offered to all pregnant women to protect infants from birth [11]. In the Netherlands efforts were made to improve timeliness of first vaccination in infants, and other programmatic measures are currently under discussion [3].

The presented results show that pertussis is no longer solely a paediatric infection. Incidence is increasing in adolescents and adults and gives reasons for concern as these age groups are a source of transmission to infants too young to be vaccinated, especially because of mild and asymptomatic symptoms in adolescents and adults which are often not recognised as pertussis [4-6]. As most severe cases and deaths occur in infants, policy makers need to reconsider regular pertussis booster vaccinations in adolescents and adults to reduce the overall incidence and indirectly protect susceptible infants [4, 5, 7].

Vaccine strategies should be revisited and consideration given to adolescent and adult boosters, as well as to vaccinations for healthcare workers and pregnant women, as these measures are essential for prevention [8, 9]. Several countries have already incorporated adolescent boosters to their vaccination strategy (e.g. Austria, Belgium, Finland, France, Germany, and Italy, Czech Republic, Hungary) [4, 10], with Sweden to follow in 2016. Germany and France have already introduced booster doses for adults [4].

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Belgium	BE-REFLAB	V	Se	A	C	Y	N	N	N	Y	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-LAB	Cp	Co	P	C	Y	N	N	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-PERTUSSIS/SHIGELLOSIS/SYPHILIS	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Finland	FI-NIDR	Cp	Co	P	C	Y	N	N	N	Y	Not specified/unknown
France	FR-RENACOQ	V	Se	A	C	Y	Y	Y	N	N	Not specified/unknown
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Portugal	PT-PERTUSSIS	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-PERTUSSIS	O	Co	P	C	Y	N	Y	Y	Y	EU-2012

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Polio

- The WHO European Region was declared polio-free in 2002; neither wild-type nor vaccine-type associated poliomyelitis cases were reported in EU/EEA countries in 2012.
- Inactivated poliovirus vaccines are used in all EU/EEA countries, except Poland where live oral poliovirus vaccine (OPV) is still used for the fourth dose. Besides the wild-type polioviruses causing natural disease, live attenuated vaccine viruses may cause vaccine-associated polio paralysis (VAPP), although the risk is very low.
- Polio remains endemic in three countries – Afghanistan, Nigeria and Pakistan.
- Imported wild-type and vaccine-type polioviruses still remain a threat to unvaccinated European populations. Maintaining high coverage in all population groups and continued clinical and/or environmental surveillance remain the most important tools for keeping Europe polio-free.

Poliomyelitis is an acute viral infection of the nervous system, caused by poliovirus types 1, 2 and 3; humans are the only reservoir of infection. Prior to vaccination, poliomyelitis was a common childhood disease, able to cause permanent paralysis and sometimes death. The WHO European Region was declared polio-free in 2002.

All vaccination schedules in EU/EEA countries specify the use of inactivated poliovirus vaccines containing all three serotypes, with the exception of Poland, where the forth dose of vaccination is offered as OPV.

Polio disease may result from infection with wild poliovirus (WPV) or vaccine-derived polioviruses (VDPV). The latter originate from the viruses contained in the OPV vaccine, which have acquired neurovirulence and transmissibility characteristics of WPV by mutation. Vaccine-associated polio paralysis (VAPP) is a very rare event following immunisation with the attenuated formulation. Disease resulting from WPV, VDPV or VAPP is reportable at the European level.

Epidemiological situation in 2012

No cases of poliomyelitis disease were reported in any of the 29 reporting EU/EEA countries in 2012. There was no report from Liechtenstein. The last outbreak in the EU/EEA was in 1992 in the Netherlands, in a religious community opposed to vaccinations [1]. Another smaller outbreak occurred in Finland 1984 with ten individuals developing clinical disease due to WPV3; at least 100 000 persons were estimated to have been poliovirus excretors [2].

Enhanced surveillance in 2012

The European Regional Commission for the Certification of Poliomyelitis Eradication (RCC) reviews the annual reports from all countries in the WHO European Region. The following risk factors for reintroduction and transmission after importation are assessed: health system, routine immunisation coverage, presence of high risk groups or pockets of susceptible individuals, surveillance indicators, and existence of a preparedness plan.

While clinical surveillance is considered the gold standard for certification purposes, other surveillance strategies may complement it, especially in countries that have been non-endemic for a long time. Ten EU/EEA countries do not report acute flaccid paralysis, and instead rely on high-quality enterovirus and/or environmental surveillance (e.g. screening of sewage water samples) to detect poliovirus.

On the basis of evidence provided by the Member States in the WHO European Region, the RCC reaffirmed the Region's polio-free status at its 27th annual meeting in Copenhagen, Denmark on 30–31 May 2013. There was no evidence of wild poliovirus transmission in the WHO European Region in 2012 [4].

The Global Polio Laboratory Network (GPLN), comprising 145 laboratories and operating in all EU/EEA countries and all WHO Regions, performs laboratory surveillance for wild-type and vaccine-type polioviruses, with samples from patients with acute flaccid paralysis and from sewage water. The GPLN evaluates progress towards polio eradication [2].

Updates from epidemic intelligence in 2013

During 2013 and as of 27 September 2013, wild polio virus type 1 (WPV1) was isolated in sewage in the West Bank and Gaza and in sewage and in the faeces of asymptomatic carriers in Israel, in samples collected from 3 February to 25 August 2013.

Israel has been free of indigenous WPV transmission since 1988. In the past, WPV has been detected in environmental samples collected in this region between 1991 and 2002 without occurrence of cases of paralytic polio in the area.

The strain is related to strains circulating in Pakistan and also to the strain detected in sewage from Cairo in December 2012. It is unrelated to the polioviruses circulating in the Horn of Africa.

As of 4 March 2014, no case of paralytic polio has been reported in either Israel or Palestine.

Nationwide measures to prevent cases of poliomyelitis and stop the environmental spread of the virus have been adopted in Israel, including a supplementary immunisation activity with bivalent oral polio vaccine (OPV1 and 3) with the aim of boosting mucosal immunity levels in cohorts of children naive to OPV in order to rapidly interrupt virus circulation.

In early October 2013 a cluster of poliomyelitis was identified in the Syrian Arabic Republic. As of 4 March 2014, there have been 24 cases identified. The strain is also related to strains circulating in Pakistan and to a strain identified in the sewage in Cairo. There is some evidence that this strain had been circulating undetected for several years before the recent outbreak. WHO and UNICEF are coordinating a vaccine campaign, using OPV, in Syria and adjoining countries. The goal is to fully vaccinate 22 million children in the area.

Discussion

Europe remains polio free since 2002 and the latest assessment by the European Regional Commission for the Certification of Poliomyelitis Eradication concludes that in 2012 there was no evidence of circulation of wild-type or vaccine-derived polio viruses in the region.

Polio remains endemic in three countries – Afghanistan, Nigeria and Pakistan and several non-endemic countries reported outbreaks in 2013 (Somalia, Kenya, Ethiopia, Cameroon, and Syria).

The importation of poliovirus to polio-free regions cannot be ruled out while poliovirus is still circulating, and importation of polioviruses through individuals excreting polioviruses in their stools remains a potential threat.

In previous years, several EU countries have identified vaccine-derived poliovirus strains in their sewage water, either from newly vaccinated visitors, immigrants, or chronic carriers in countries that have shifted to IPV [4]. However these findings had been isolated and were not associated as related to re-establishment of the virus.

The recent detection of wild-type polio virus 1 (WPV1) in sewage and asymptomatic carriers in Israel, in sewage in the Palestine, and the occurrence of an outbreak of poliomyelitis due to WPV1 in Syria raises new questions on the potential for the importation and re-establishment of WPV into polio-free areas like the European Union. Transmission after re-introduction may occur if pockets of susceptible people exist. It is estimated that 12 million people in the EU under the age of 29 have not been vaccinated or completed the recommended national primary vaccination schedule for polio. Unvaccinated pockets should to be identified, and targeted actions to increase vaccination coverage in these populations should to be addressed urgently [5]. High immunisation coverage in all population groups is essential and will also provide herd immunity to still susceptible individuals.

Vaccination coverage levels in the EU/EEA can be considered satisfactory as a whole (>90% for three doses of either IPV or OPV) and can explain the absence of confirmed poliomyelitis cases in the region so far; however attention needs to remain high. Maintaining high coverage and continued clinical, enterovirus and environmental surveillance remain the most important tools for keeping Europe polio-free.

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Belgium	BE-PEDISURV	V	Co	A	C	Y	Y	Y	Y	Y	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-MEASLES_POLIO	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Germany	DE-SURVNET@RKI-7.1/6	Cp	Co	P	C	Y	Y	Y	Y	Y	Other
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2008
Portugal	PT-POLIMYELITIS	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-POLIMYELITIS	O	Co	P	C	Y	N	Y	Y	Y	EU case definition (legacy/deprecated)

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Rabies

- In 2012, Romania notified one locally-acquired case.
- One imported human rabies cases was reported by the United Kingdom.
- Terrestrial rabies remains endemic in wild and domestic animals in some areas in the EU and neighbouring countries: Albania, Bosnia-Herzegovina, Croatia, Poland, Romania, Serbia, Slovenia, the former Yugoslav Republic of Macedonia and Turkey.
- Rabies re-emerged in wildlife in Greece in 2012.

Rabies is a neurological disease caused by a Rhabdovirus of the genus *Lyssavirus*. This virus can infect all warm-blooded animals and is transmitted through contact with saliva from infected animals, in Europe typically from foxes and stray dogs but also raccoon dogs and bats, for example, via bites. The disease causes swelling in the central nervous system of the host and is normally fatal.

Preventive measures include vaccination of domestic carnivores and oral vaccination of wildlife. Timely prophylaxis in case of exposure to a potentially infected animal is of utmost importance, and knowledge of the epidemiological situation is vital to make decisions with regards to appropriate post-exposure measures [1]. Treatment consists of local wound care, vaccination and, if indicated, passive immunisation with immunoglobulin. To be effective, treatment has to occur as soon as possible after exposure.

Epidemiological situation in 2012

Rabies surveillance is mandatory in all Member States and surveillance is comprehensive. In 2012, twenty-nine EU/EEA countries reported to the European Surveillance System (TESSy); Liechtenstein did not report. All countries reported no cases apart from Romania and the United Kingdom. One confirmed human case of rabies was reported from Romania and one imported case was reported from the United Kingdom. Romania reported one domestically-acquired case in a five-year-old girl. The girl had been bitten by a stray dog in a village in Eastern Romania. She was initially misdiagnosed and died in February 2012 [2]. In addition, in May 2012, one travel-associated case of rabies was reported in the EU, from the United Kingdom. The patient was a woman, resident in the United Kingdom, who visited her country of origin, India, where she was bitten by a dog [3].

Updates from epidemic intelligence in 2013

In June 2013, the Netherlands reported an imported case of rabies in a man who was bitten by a dog in Haiti. He had not been vaccinated before the exposure, and presented to a general practitioner 46 days after the exposure, when already showing rabies symptoms. He was treated in hospital but eventually died from the consequences of the infection [4].

Discussion

Human rabies

Generally, very few cases of rabies in humans are reported in the EU, and most Member States have not had any indigenous cases for decades. Every year however, one or two human cases are reported in European citizens, either travel related or indigenous. A recent review of data collected through TESSy, WHO Centralized Information System for Infectious Diseases and WHO Rabies bulletin [5] yielded 23 human rabies cases in the last 10 years in Europe, of which 9 were locally acquired (in Lithuania and Romania), 11 were acquired through travelling (to Asia, 5 cases and Africa, 6 cases) and three through organ transplantation (originating from an unrecognised case is a traveller). Another imported case was reported from Switzerland: a USA citizen, who probably contracted the disease in July 2012, after previous exposure to a bat in the USA [6].

The epidemiological situation in Europe highlights the importance of public information and education about the risk of contracting rabies if bitten by animals while travelling to rabies-endemic countries or in Member States which have not eradicated the disease in their animal population. Romania has reported indigenous human cases for five years in a row.

Animal rabies

In 2012, with only one exception, classic rabies was not reported in domestic animals in Central and Western EU Member States, but this disease still occurred in wildlife and, although less frequently, in domestic animals of the Baltic Member States and some Eastern and Southern Member States [7]. In some of these Member States, cases occurred mostly in regions bordering eastern European non-EU countries affected by rabies epidemics. Most of the latter Member States are now carrying out rabies eradication plans which are co-financed by the EU (Decision 2011/807/EU).

The general decreasing trend in the total number of rabies cases in animals observed in previous years did not continue in 2012. In the EU, the number of cases reported in farm animals and foxes increased. The majority of domestic and/or wild animal cases were reported from Romania and Poland, while bat cases were most often found in France, Germany, Hungary, the Netherlands, Poland and Spain. Norway also reported one positive polar

fox in the Svalbard archipelago [8]. In 2012, Greece detected rabies in domestic and wild animals after 25 years of negative test results; the two initially affected provinces bordered Albania on the west and the former Yugoslav Republic of Macedonia on the north, both regarded as rabies-endemic territories, but the disease then spread to Central Macedonia [9, 10].

In addition, one case of a puppy dog imported into the Netherlands from Morocco was reported in February 2012 [11]; also Spain detected a rabid dog in Toledo, imported from Morocco [12] and France an imported rabid kitten from Morocco [13].

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se) / Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Belgium	BE-REFLAB	V	Co	P	C	-	-	-	-	Y	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-RABIES	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Germany	DE-SURVNET@RKI-7.1/6	Cp	Co	P	C	Y	Y	Y	Y	Y	Other
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-Zoonoses	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Portugal	PT-RABIES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	Y	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-RABIES	O	Co	A	C	Y	N	Y	Y	Y	EU-2012

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Rubella

- In 2012, 27 540 cases of rubella were reported but only 6 117 cases were confirmed (22.2%).
- The proportion of laboratory-confirmed cases remains too low to benefit the planned rubella elimination.
- Romania and Poland reported 98% of all cases in Europe.
- Suboptimal coverage with the measles-mumps-rubella vaccine can lead to pockets of susceptible individuals and an increased number of cases, including congenital rubella infection.

Rubella is a mild febrile rash illness caused by the rubella virus. It is transmitted from person to person via droplets and humans are the only reservoir for infection. It mainly affects children, and when pregnant women are infected it may result in congenital rubella syndrome. The disease is often mild and about 20–50% of rubella infections remain without symptoms. Rubella can be easily prevented through the use of a safe and effective vaccine that provides life-long protection. A single dose induces seroconversion in 95% of those vaccinated. All EU/EEA countries have included rubella vaccination as part of their childhood immunisation schedule with the use of the combined measles, mumps and rubella (MMR) vaccine. The main aim of rubella vaccination is the prevention of congenital rubella syndrome [1].

Epidemiological situation in 2012

In 2012, 26 EU/EEA countries provided rubella surveillance data. In total, 27 540 cases of rubella were reported from 16 EU/EEA countries. Only 6 117 cases (22.2%) were reported as confirmed in accordance with the EU case definition (Table 1). Liechtenstein did not report data. Belgium, France and Germany do not have a specific surveillance system for rubella. In Belgium, a network of sentinel laboratories reports on a voluntary basis to the Institute of Public Health. France has a long-established system for the surveillance of congenital rubella infection. A nationwide surveillance system for rubella and congenital rubella is currently being implemented in Germany, but no data were reported for 2012 (Table 1).

The number of reported rubella cases increased significantly from 2010 to 2012. The number of cases in 2012 is comparable with the number observed in 2008. Fifteen countries reported rates below one case per million population; the target for the elimination of the disease [2]. Romania and Poland together reported 98% of all cases of rubella in 2012. Romania reported 75.4% (n=20 772) of all cases and had a notification rate of 103.37 per 100 000 population. The number of cases in Romania has been rising since 2011 [3]. Poland reported 6 259 cases, with a notification rate of 16.24 per 100 000. This is similar to the notification rates observed in Poland in recent years (Table 1).

Table 1. Number and rates of rubella reported cases, EU/EEA, 2008–2012

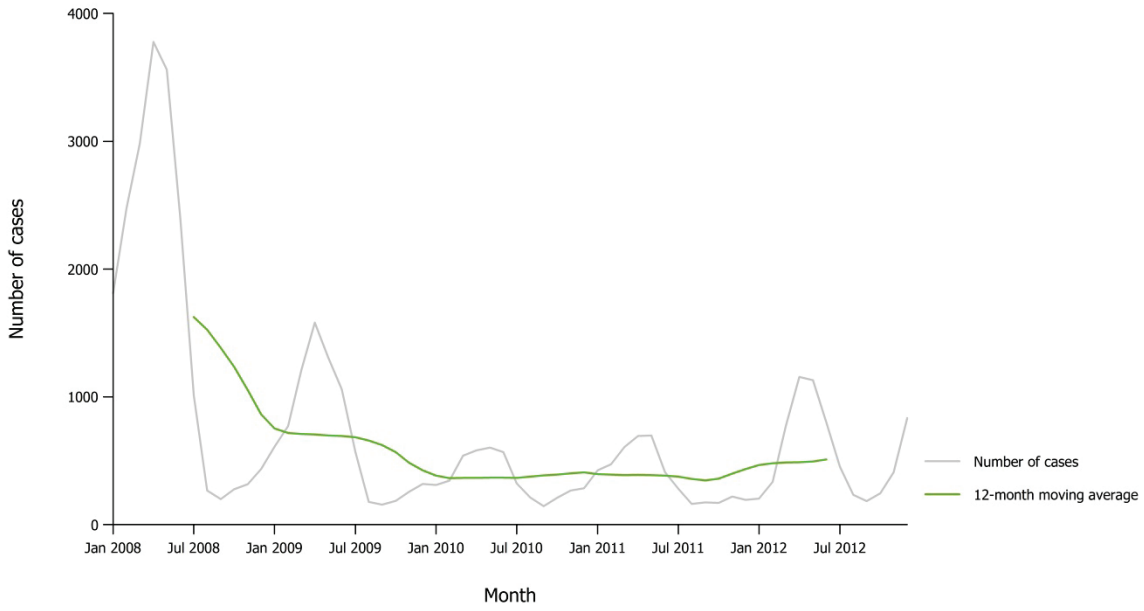
Country	2012						2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Confirmed cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	Y	C	23	0.27	0.29	15	2	0.02	2	0.02	308	3.69	12	0.14
Belgium	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bulgaria	Y	C	18	0.25	0.27	0	41	0.56	39	0.53	44	0.59	58	0.77
Cyprus	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	7	0.07	0.07	6	28	0.27	4	0.04	6	0.06	14	0.14
Denmark	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	4	0.07
Estonia	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	1	0.08	4	0.30
Finland	Y	C	0	0.00	0.00	0	3	0.06	0	0.00	0	0.00	0	0.00
France	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	4	0.04	0	0.00
Hungary	Y	C	7	0.07	0.07	7	3	0.03	0	0.00	0	0.00	0	0.00
Ireland	Y	C	9	0.20	0.16	0	4	0.09	23	0.51	20	0.45	39	0.88
Italy	Y	C	249	0.42	0.49	249	142	0.24	122	0.21	221	0.37	6 183	10.54
Latvia	Y	C	8	0.39	0.40	3	2	0.10	0	0.00	7	0.32	9	0.41
Lithuania	Y	A	0	0.00	0.00	0	0	0.00	2	0.06	0	0.00	0	0.00
Luxembourg	Y	C	1	0.19	0.18	1	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	1	0.24	0.22	1	4	0.96	0	0.00	0	0.00	3	0.74
Netherlands	Y	C	1	0.01	0.01	1	1	0.01	0	0.00	7	0.04	2	0.01
Poland	Y	A	6 259	16.24	15.17	13	4 290	11.14	4197	11.00	7 587	19.90	13 146	34.49
Portugal	Y	C	2	0.02	0.02	0	0	0.00	1	0.01	3	0.03	4	0.04
Romania	Y	C	20 772	103.37	107.28	5 658	3910	19.62	350	1.75	605	2.99	1 746	8.55
Slovakia	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00

Country	2012						2011		2010		2009		2008	
	National data	Report type	Cases	Rate	ASR	Confirmed cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Slovenia	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Spain	Y	C	63	0.14	0.15	55	10	0.02	9	0.02	20	0.04	46	0.10
Sweden	Y	C	50	0.53	0.54	38	5	0.05	3	0.03	1	0.01	0	0.00
United Kingdom	Y	C	69	0.11	0.11	69	6	0.01	12	0.02	10	0.02	36	0.06
EU Total	**-**	**-**	**27 539**	**8.02**	**8.40**	**6 116**	**8 451**	**2.47**	**4 764**	**1.40**	**8 844**	**2.60**	**21 306**	**6.30**
Iceland	Y	C	0	0.00	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	1	0.02	0.02	1	2	0.04	0	0.00	0	0.00	1	0.02
EU/EEA Total	**-**	**-**	**27 540**	**7.90**	**8.26**	**6 117**	**8 453**	**2.44**	**4 764**	**1.38**	**8 844**	**2.56**	**21 307**	**6.21**

ASR: Age-standardised rate

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Figure 1. Distribution of rubella reported cases by month, EU/EEA, 2008–2012



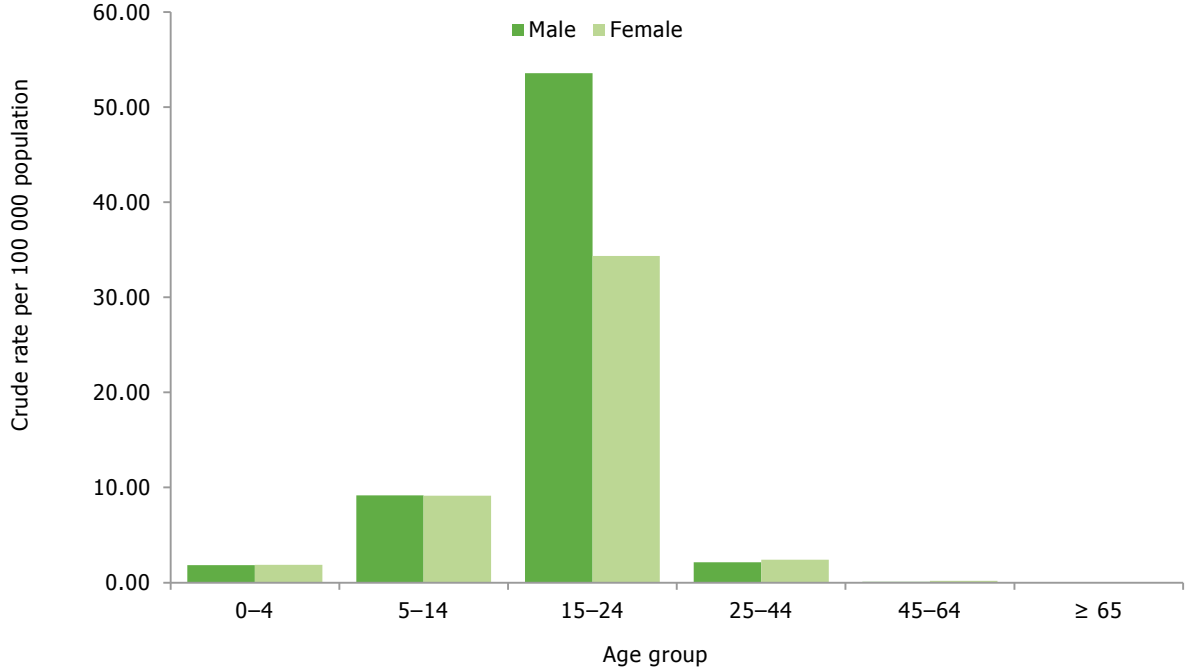
Source: Country reports from Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Age and gender distribution

The highest reported rates of rubella were seen in those aged 15–24 years (46.55 cases per 100 000 population), followed by those aged 5–14 years (11.84 per 100 000) and 0–4 year-old (8.76 per 100 000). Cases of rubella were more frequently reported in males than in females (overall notification rates of 10.15 and 5.75 per 100 000). It should be noted that most cases contributing to these rates were reported by Poland and Romania (Figure 2).

The analysis of rates by age and gender does not include data from Poland. In those other countries, the most commonly affected age group was the age group 15–24 years of age, both in males and females, with reported rates of 53.56 and 34.36 cases per 100 000 population, respectively (Figure 2).

Figure 2. Rates of rubella reported cases by age and gender, EU/EEA, 2012

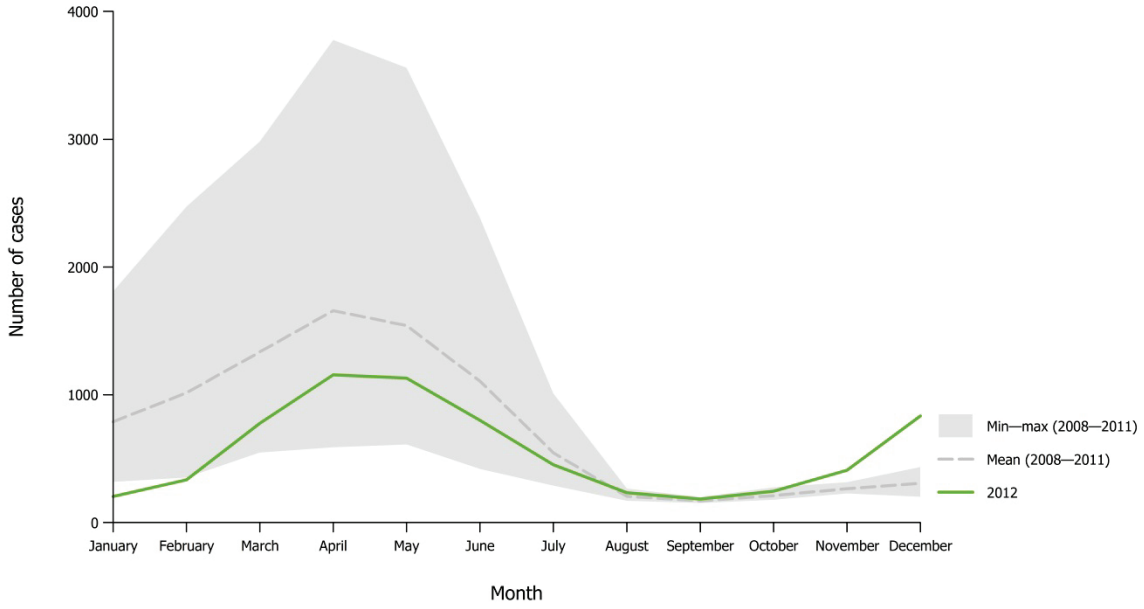


Source: Country reports from Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Seasonality

In 2012, as in previous years, a seasonal pattern was observed. Infection occurred primarily in late winter and early spring, with an increase in late autumn. The monthly distribution of cases from 2008 to 2012 is presented in Figure 3.

Figure 3. Distribution of rubella reported cases by month in 2012 compared with 2008–2011 data, EU/EEA



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

Enhanced surveillance in 2012

Information on importation status was available for 20 988 cases (76.2% of total reported cases). Of those, only 31 cases (0.1%) were reported as imported. Vaccination status was known for 93.6% of cases (n=25 774) and of these 91% (n=23 465) were unvaccinated. One rubella-related death was reported in the Czech Republic.

Discussion

Romania and Poland reported the highest rates of rubella infection in the EU in 2012, as in recent years. The rise in the number of cases from October 2011 in Romania was the start of a large epidemic [3] with high rates in adolescents. This corresponds to a cohort who was not targeted by rubella immunisation programmes when they were young children except sporadically in response to epidemics.

High rates in adolescents and young adults are of particular concern as it puts women of childbearing age at risk of infection during pregnancy and consequences from congenital rubella infections. Young men not previously targeted by vaccination campaigns are also at increased risk and may be a source of infection to others. This may support the need for targeting adolescents and young adults that may have missed vaccination or be left out of historical vaccination campaigns.

In Poland the highest rates were observed in infants, adolescents and young adults. Children aged 1–9 years have been targeted by rubella immunisation policies introduced since 2003 and national vaccination coverage data for the first dose of MMR in children aged three years from 2005 to 2008 ranged from 91% to 98% [4]. Thus, for 2012 it is not known as to whether it is truly rubella that is being reported particularly as the proportion of cases reported as confirmed in Poland is very low.

The overall proportion of cases reported as confirmed in 2012 (22.2%) was too low in the context of the current rubella elimination strategy. WHO recommends for >80% of cases to be laboratory confirmed to accurately document elimination.

Rubella elimination remains a challenge in the WHO European Region. In September 2010, WHO European Region countries renewed their commitment to the elimination of indigenous transmission of measles by 2015 [5]. In addition to improving vaccination coverage (≥95% with two doses of vaccine), public health priorities include strengthened surveillance systems and laboratory capacity, and effective outbreak control [6].

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A) / Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-RUBELLA	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N	Y	Not specified/unknown
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/Sentinel (Se)/ Other(O)	Active (A) /Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Portugal	PT-RUBELLA	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	A	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-RUBELLA	O	Co	P	C	Y	N	Y	Y	Y	EU-2012

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Tetanus

- Tetanus appears to be under control in all EU/EEA countries due to good general hygiene and effective universal vaccination.
- The total number of cases reported remains very low (0.03 cases per 100 000 population). The highest rate was reported by Italy (0.09 per 100 000).
- As in previous years, the most affected group was elderly women (65 years or older). Additional efforts should be made to improve the immunisation status of the adult and elderly population.

Tetanus is a sporadic and relatively uncommon infection in EU/EEA countries, caused by the bacterium *Clostridium tetani*. Contamination of wounds with tetanus spores in unimmunised persons can cause an illness with muscular spasms and sometimes death. Tetanus is included in the primary vaccination schedule of all EU/EEA countries, and periodic boosters in adulthood are required to maintain immunity.

Epidemiological situation in 2012

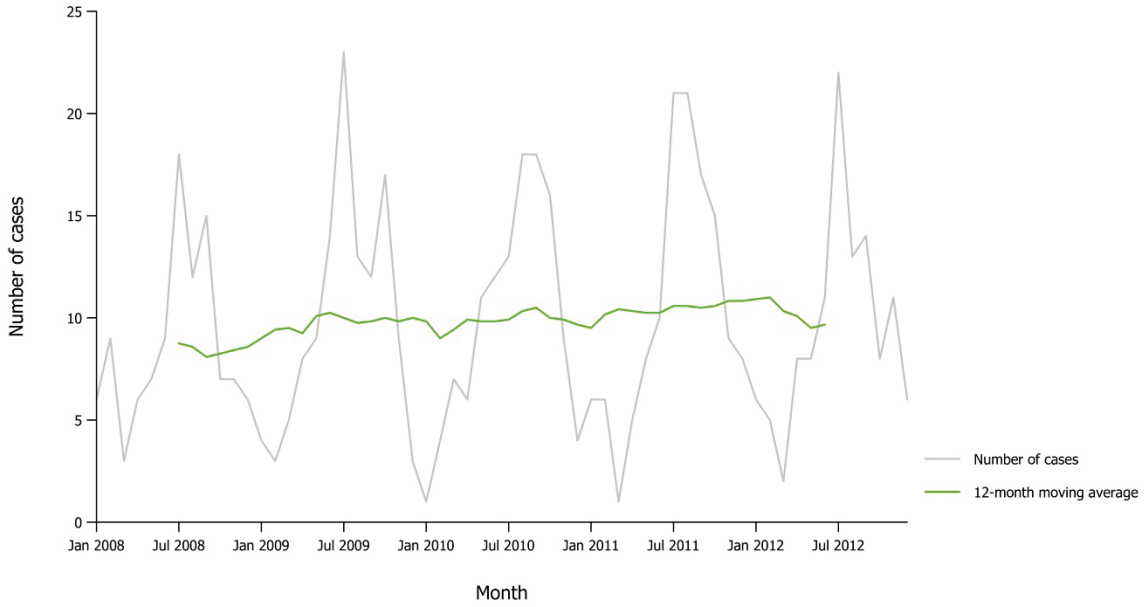
In 2012, 26 EU/EEA countries provided tetanus surveillance data. In total, 123 cases, including 72 confirmed cases (in accordance with the EU case definition), were reported by 15 EU/EEA countries (Table 1). Austria, Finland, Germany and Liechtenstein did not report. Italy and Poland reported 59% of the cases. The notification rate in EU/EEA remains very low at 0.03 cases per 100 000 population. The highest rate was reported by Italy (0.09 per 100 000). Italian cases account for 54 of the 72 confirmed European cases in 2012. Italy has been reporting the highest number of cases since 2008, with a range from 53 to 58 confirmed cases annually.

Table 1. Number and rates of tetanus reported cases, EU/EEA, 2008–2012

Country	2012					2011		2010		2009		2008	
	National data	Report type	Cases	Rate	Confirmed cases	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	-	-	-	-	-	0	0.00	-	-	-	-	0	0.00
Belgium	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	1	0.01
Bulgaria	Y	A	2	0.03	0	4	0.05	2	0.03	0	0.00	2	0.03
Cyprus	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Czech Republic	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Denmark	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	2	0.04
Estonia	Y	C	0	0.00	0	2	0.15	0	0.00	0	0.00	0	0.00
Finland	-	-	-	-	-	-	-	-	-	-	-	-	-
France	Y	C	5	0.01	5	9	0.01	15	0.02	9	0.01	3	0.01
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-
Greece	Y	C	7	0.06	0	11	0.10	5	0.05	2	0.02	7	0.06
Hungary	Y	C	5	0.05	0	4	0.04	0	0.00	6	0.06	4	0.04
Ireland	Y	C	1	0.02	0	0	0.00	0	0.00	0	0.00	2	0.05
Italy	Y	C	54	0.09	54	58	0.10	57	0.10	58	0.10	53	0.09
Latvia	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Lithuania	Y	C	2	0.07	0	2	0.07	2	0.06	0	0.00	1	0.03
Luxembourg	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Malta	Y	C	0	0.00	0	0	0.00	3	0.73	0	0.00	0	0.00
Netherlands	Y	C	2	0.01	0	6	0.04	1	0.01	1	0.01	0	0.00
Poland	Y	C	19	0.05	1	14	0.04	16	0.04	19	0.05	14	0.04
Portugal	Y	C	3	0.03	0	0	0.00	3	0.03	6	0.06	1	0.01
Romania	Y	C	7	0.04	6	20	0.10	9	0.05	9	0.05	11	0.05
Slovakia	Y	C	0	0.00	0	1	0.02	0	0.00	0	0.00	0	0.00
Slovenia	Y	C	1	0.05	0	2	0.10	0	0.00	0	0.00	1	0.05
Spain	Y	C	8	0.02	5	10	0.02	8	0.02	7	0.02	10	0.02
Sweden	Y	C	0	0.00	0	3	0.03	0	0.00	3	0.03	0	0.00
United Kingdom	Y	C	6	0.01	0	3	0.01	9	0.01	8	0.01	4	0.01
EU Total	**-**	**-**	**122**	**0.03**	**71**	**149**	**0.04**	**130**	**0.03**	**128**	**0.03**	**116**	**0.03**
Iceland	Y	C	0	0.00	0	0	0.00	0	0.00	0	0.00	0	0.00
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	Y	C	1	0.02	1	0	0.00	0	0.00	1	0.02	2	0.04
EU/EEA Total	**-**	**-**	**123**	**0.03**	**72**	**149**	**0.04**	**130**	**0.03**	**129**	**0.03**	**118**	**0.03**

Source: Country reports; Y: Yes; N: No; A: Aggregated data report; C: Case-based data report; –: No report; U: Unspecified.

Figure 1. Distribution of tetanus reported cases by month, EU/EEA, 2008–2012

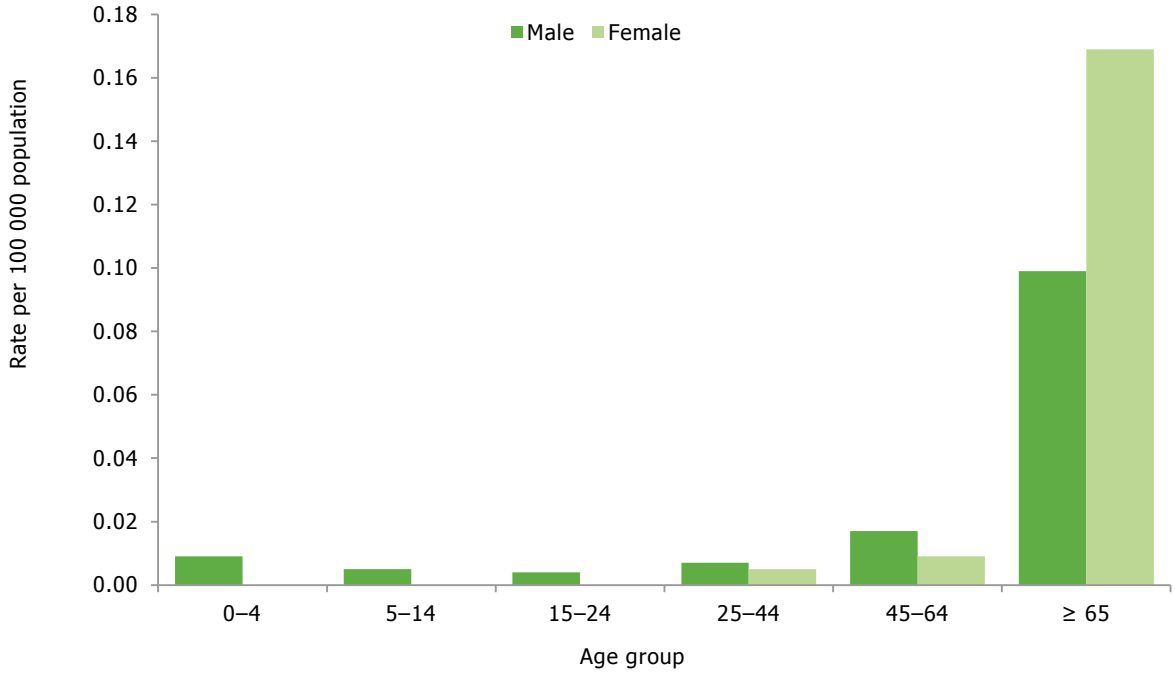


Source: Country reports from Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Age and gender distribution

The most affected group was the elderly (≥ 65 years) (0.14 cases per 100 000), which accounted for 80% of the total cases (n=98) reported, followed by 45–64 year olds (n=14). One case was reported in the age group 0–4 years, one case in the age group 5–14 years, one case in the age group 15–24 years, and eight cases in the age group 25–44 years. Females accounted for 62% (76 cases) of the reported cases, 68 of them aged ≥65 years. Vaccination status was reported as unknown in all cases.

Figure 2. Rates of tetanus reported cases by age and gender, EU/EEA, 2012

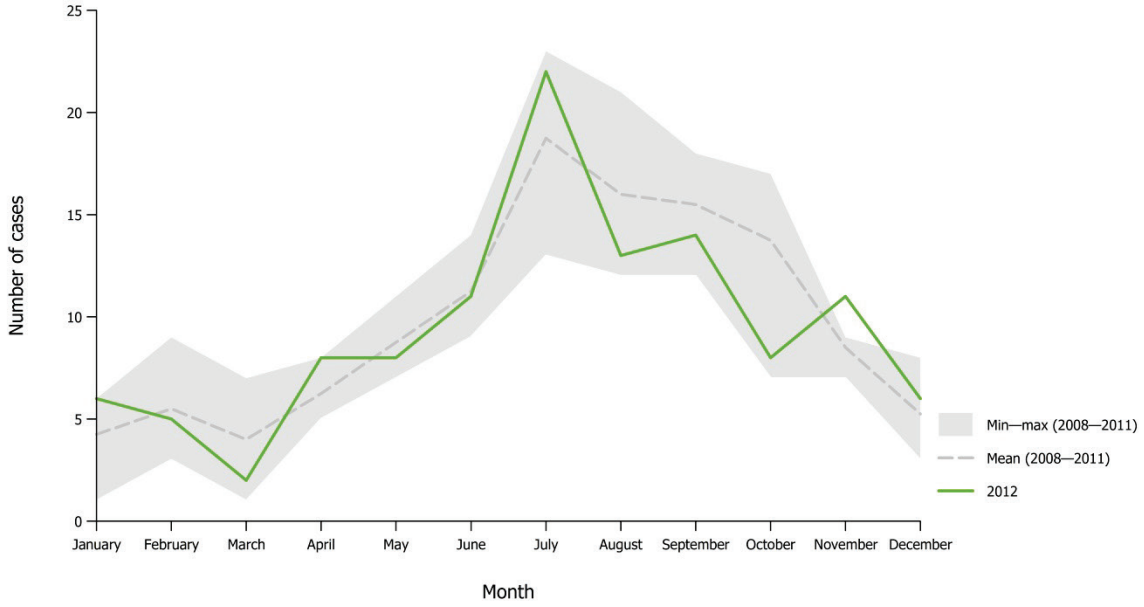


Source: Country reports from Belgium, Cyprus, Czech Republic, Denmark, Estonia, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Seasonality

A peak of number of total tetanus cases was observed from June to October (Figure 3). This is probably related to more outdoor activities in the summer and early autumn.

Figure 3. Distribution of tetanus reported cases by month in 2012 compared with 2008–2011 data, EU/EEA



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

Discussion

The total number of cases of tetanus observed in the EU remains very low thanks to the widespread use of tetanus vaccination in EU/EEA countries. The number of reported cases has not decreased significantly during the past years. The cases reported in the elderly were probably related to lower coverage or waning immunity in this population. The high proportion of women could be explained by different vaccination strategies during their youth, particularly in relation to vaccination on enrolment to military service for men [1].

According to the EU case definition, tetanus probable cases are cases responding to the clinical criteria, and confirmed cases are those confirmed in the laboratory. Hence there are only two levels of case classification for tetanus, as compared to most diseases where three levels are described. The analysis presented was performed on both probable and confirmed cases. The proportion of laboratory confirmed cases may be a reflection of laboratory and clinical management practices in the countries.

High vaccination coverage must be maintained in all age groups and catch-up/booster strategies implemented in countries with higher rates of disease.

Surveillance systems overview

Country	Data source	Compulsory (Cp)/Voluntary (V)/ Other(O)	Comprehensive (Co)/ Sentinel (Se)/ Other(O)	Active (A)/Passive (P)	Case-based (C)/Aggregated (A)	Data reported by				National coverage	Case definition used
						Laboratories	Physicians	Hospitals	Others		
Belgium	BE-FLA_FRA	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y	Y	EU-2008
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	N	Y	Y	N	Y	EU-2008
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N	Y	Other
Estonia	EE-TETANUS	Cp	Co	P	C	N	Y	Y	Y	Y	EU-2008
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y	Y	Not specified/unknown
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Italy	IT-NRS	Cp	Co	P	C	N	Y	Y	N	Y	Other
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2012
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N	Y	EU-2008
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	N	Y	N	N	Y	EU-2002
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y	Y	EU-2008
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y	Y	EU-2008
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2012
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Portugal	PT-TETANUS	Cp	Co	P	C	N	Y	N	N	Y	EU-2008
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N	Y	EU-2008
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N	Y	EU-2012
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N	Y	EU-2008
Spain	ES-STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N	Y	EU-2008
Sweden	SE-SMINET	Cp	Co	P	C	N	Y	N	N	Y	EU-2012
United Kingdom	UK-TETANUS	O	Co	P	C	Y	N	Y	Y	Y	EU-2012

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