

Invasive meningococcal disease

Annual Epidemiological Report for 2017

Key facts

- In 2017, 3 221 confirmed cases of invasive meningococcal disease (IMD), including 282 deaths, were reported in 30 EU/EEA Member States.
- France, Germany, Spain and the United Kingdom accounted for 58% of all confirmed cases in 2017.
- The notification rate of IMD was 0.6 cases per 100 000 population, the same as in 2016 and 2015.
- Age-specific rates were highest in infants, followed by 1–4-year-olds, with a second peak in 15–24-year-olds.
- Serogroup B caused 51% of cases overall and was the dominating serogroup in all age groups below 65 years.
- A threefold increase of serogroup W IMD incidence was observed between 2013–2017, primarily due to increases in children <5 years of age and adults 50 years or older.
- Continued strengthening of disease surveillance for IMD is essential to evaluate the impact of ongoing immunisation programmes and support decision makers concerning vaccination strategies.

Methods

This report is based on data for 2017 retrieved from The European Surveillance System (TESSy) on 31 January 2019. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. EU Member States and EEA countries contribute to the system by uploading their infectious disease surveillance data at regular intervals.

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

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

Additional data on this disease are accessible from ECDC's online *Surveillance atlas of infectious diseases* [3].

Thirty EU/EEA Member States reported data on invasive meningococcal disease (IMD) to ECDC. The majority of Member States used the EU case definition (Commission Implementing Decision 2012/506/EU of 8 August 2012 of the European Parliament and of the Council) or a case definition compatible with the EU case definition for confirmed cases [2]. The majority of Member States reported data from comprehensive, passive surveillance systems with national coverage. Belgium reported data from a sentinel surveillance system. Bulgaria and Croatia reported aggregate data in 2017.

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Epidemiology

In 2017, 3 221 confirmed cases of IMD were reported in 30 EU/EEA countries (Table 1). Four countries (France, Germany, Spain and the United Kingdom) accounted for 58% of all confirmed cases. The overall notification rate was 0.6 cases per 100 000 population, similar to the notification rate for previous years. The highest notification rates were observed in Lithuania (2.4 per 100 000 population), Ireland (1.5), the Netherlands (1.2) and the United Kingdom (1.2; Table 1, Figure 1).

Table 1. Distribution of confirmed invasive meningococcal disease cases and rates per 100 000 population by country and year, EU/EEA, 2013–2017

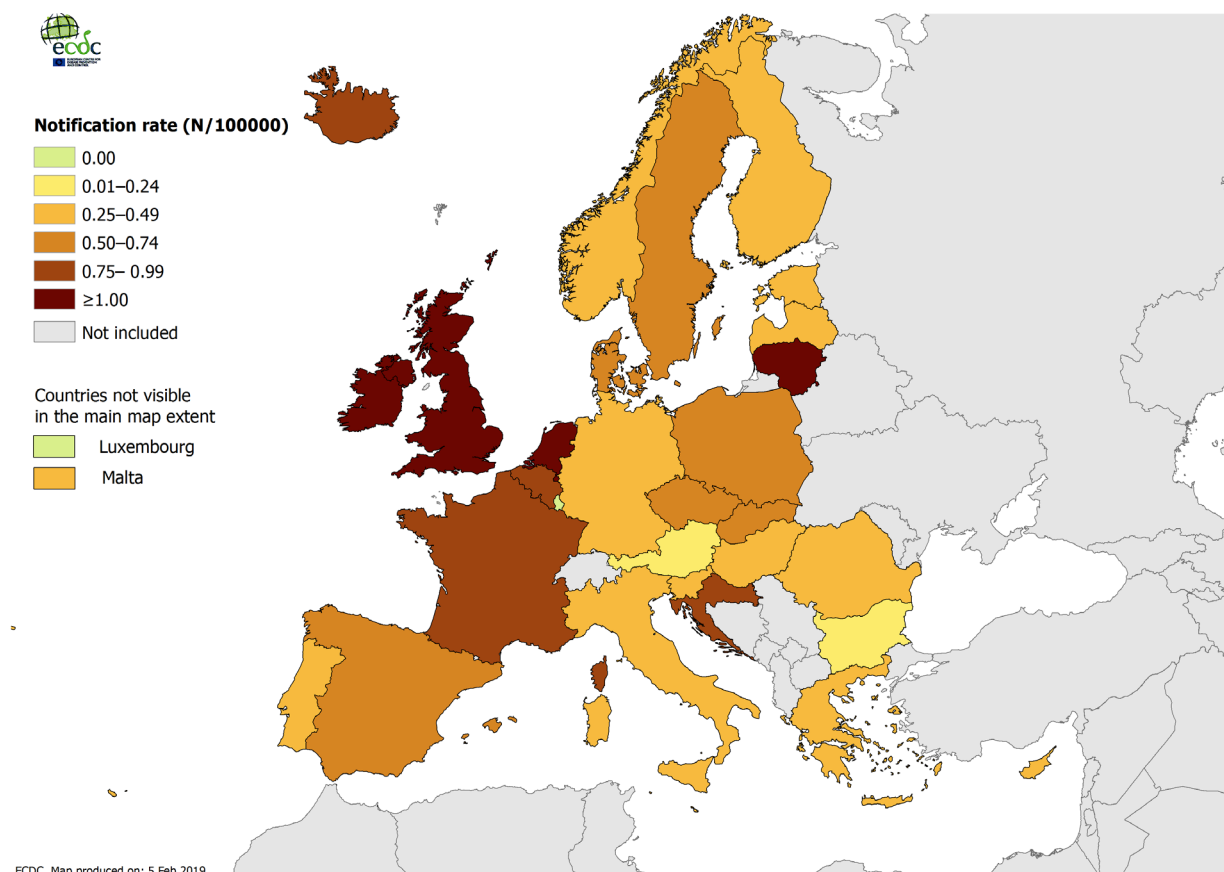
Country	2013		2014		2015		2016		2017			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Confirmed cases	Rate	ASR	Reported cases
Austria	56	0.7	35	0.4	26	0.3	37	0.4	20	0.2	0.2	20
Belgium	134	1.2	87	0.8	99	0.9	107	0.9	96	0.8	0.8	96
Bulgaria	12	0.2	13	0.2	9	0.1	9	0.1	7	0.1	0.1	8
Croatia	26	0.6	33	0.8	42	1.0	30	0.7	37	0.9	1.0	37
Cyprus	2	0.2	4	0.5	4	0.5	6	0.7	4	0.5	0.5	4
Czech Republic	59	0.6	42	0.4	48	0.5	43	0.4	67	0.6	0.7	68
Denmark	55	1.0	45	0.8	22	0.4	38	0.7	39	0.7	0.6	39
Estonia	6	0.5	3	0.2	4	0.3	3	0.2	4	0.3	0.3	4
Finland	20	0.4	21	0.4	22	0.4	19	0.3	16	0.3	0.3	16
France	575	0.9	420	0.6	462	0.7	512	0.8	545	0.8	0.8	546
Germany	345	0.4	276	0.3	284	0.3	330	0.4	281	0.3	0.4	283
Greece	59	0.5	60	0.5	54	0.5	52	0.5	42	0.4	0.4	42
Hungary	47	0.5	33	0.3	35	0.4	47	0.5	39	0.4	0.4	41
Iceland	1	0.3	1	0.3	4	1.2	0	0.0	3	0.9	0.8	3
Ireland	77	1.7	76	1.6	68	1.5	85	1.8	71	1.5	1.4	77
Italy	162	0.3	156	0.3	187	0.3	228	0.4	197	0.3	0.4	197
Latvia	6	0.3	7	0.3	9	0.5	4	0.2	7	0.4	0.4	8
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	76	2.6	53	1.8	55	1.9	68	2.4	68	2.4	2.5	81
Luxembourg	3	0.6	3	0.5	1	0.2	1	0.2	0	0.0	0.0	0
Malta	12	2.8	13	3.0	5	1.1	6	1.3	2	0.4	0.5	2
Netherlands	108	0.6	83	0.5	90	0.5	152	0.9	198	1.2	1.1	198
Norway	27	0.5	18	0.4	19	0.4	24	0.5	18	0.3	0.3	18
Poland	250	0.7	187	0.5	219	0.6	167	0.4	226	0.6	0.6	228
Portugal	61	0.6	52	0.5	65	0.6	38	0.4	49	0.5	0.5	51
Romania	52	0.3	67	0.3	50	0.3	55	0.3	50	0.3	0.3	63
Slovakia	18	0.3	23	0.4	24	0.4	23	0.4	37	0.7	0.7	42
Slovenia	11	0.5	8	0.4	16	0.8	7	0.3	9	0.4	0.5	11
Spain	262	0.6	146	0.3	210	0.5	262	0.6	268	0.6	0.6	304
Sweden	74	0.8	48	0.5	52	0.5	62	0.6	49	0.5	0.5	49
United Kingdom	852	1.3	750	1.2	935	1.4	859	1.3	772	1.2	1.1	775
EU/EEA	3 448	0.7	2 763	0.5	3 120	0.6	3 274	0.6	3 221	0.6	0.6	3 311

Source: Country reports.

ASR: age-standardised rate.

..: no data reported.

Figure 1. Distribution of confirmed invasive meningococcal disease cases per 100 000 population by country, EU/EEA, 2017



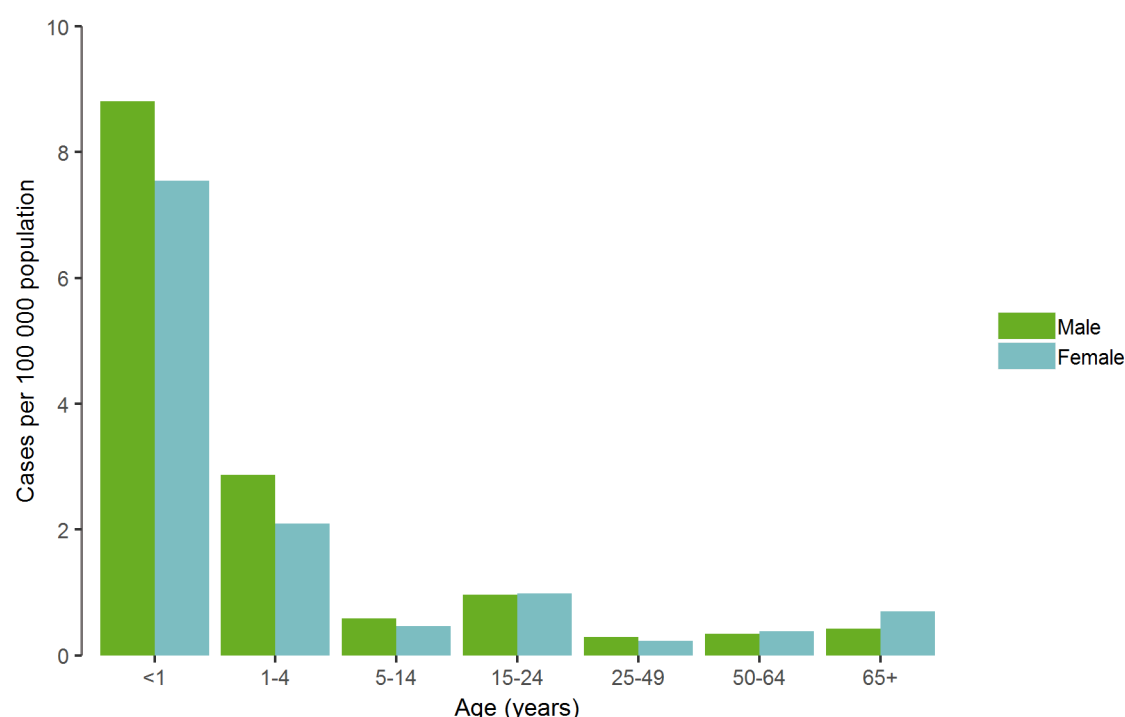
Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden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

Age and gender

In 2017, IMD incidence was highest in infants and young children, with a notification rate of 8.2 confirmed cases per 100 000 population in children under one year of age, and 2.5 confirmed cases per 100 000 population in 1–4-year-olds (Figure 2). There was a second peak in 15–24 year olds, with a rate of 1.0 per 100 000. Infants were the most affected age group in the majority of Member States, with county-specific rates varying from 0–36.2 cases per 100 000.

Rates were higher among males in children under 5 years of age, while the rate was higher among women among adults aged 65 years and above. The overall male-to-female ratio was 1:1.

Figure 2. Distribution of confirmed invasive meningococcal disease cases per 100 000 population by age and gender, EU/EEA, 2017

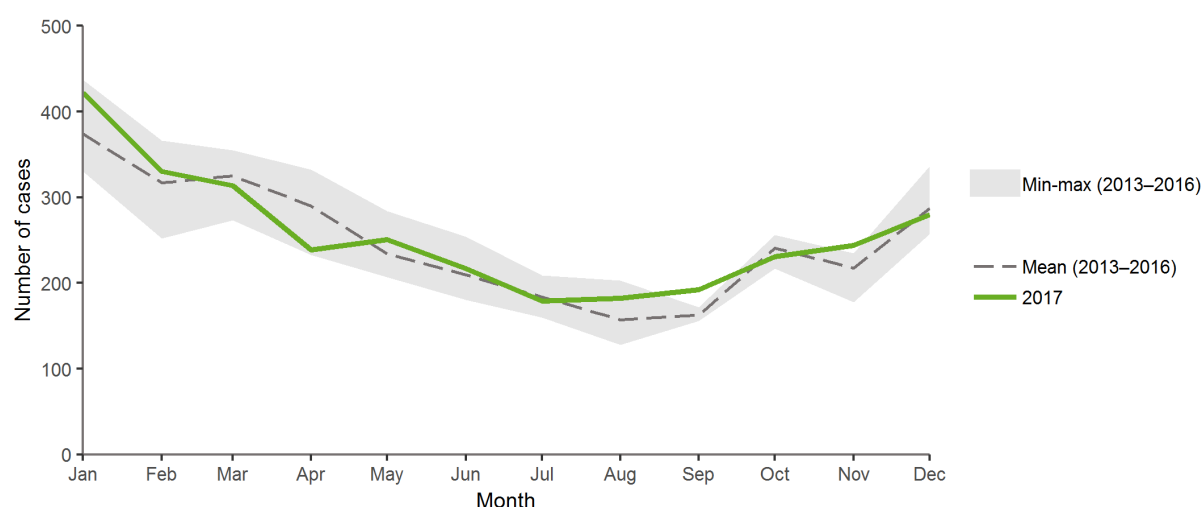


Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the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

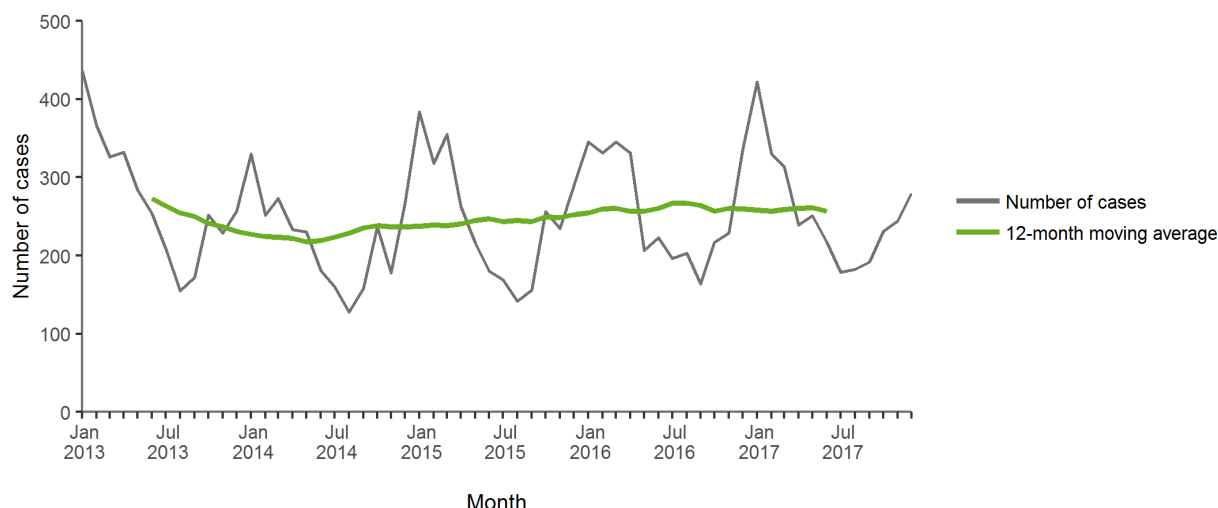
Seasonality and trend

In 2017, the seasonality of IMD followed a pattern similar to previous years. IMD occurred primarily in the winter months, while the number of cases was lowest in summer (Figure 3). The number of reported confirmed cases decreased until mid-2014, increased thereafter until 2016 and remained stable between 2016–2017 (Figure 4). Since 2013, notification rates decreased in all age groups below 15 years, remained stable in the age group 15–64 years and increased in those aged 65 years and over.

Figure 3. Distribution of confirmed invasive meningococcal disease cases by month, EU/EEA, 2013–2016 and 2017



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

Figure 4. Distribution of confirmed invasive meningococcal disease cases by month, EU/EEA, 2013–2017

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

Serogroup

Of the 3 221 IMD cases reported in 2017, 2 979 (92%) had a known serogrouping result. The majority belonged to serogroup B (51%), followed by W and C (17% and 16% respectively; Table 2). Serogroup B caused the highest proportion of cases in all age groups below 65 years and accounted for 70% of IMD in children under the age of five years, but only 24% of cases aged 65 years and above (Figure 5). Serogroup C was most prominent in 25–49-year-olds, accounting for 27% of cases in this age group. Serogroups W and Y were most prominent in those aged 65 years and above, causing 30% and 26% of IMD cases respectively in this age group. Notifications of serogroup B decreased from 0.42 cases per 100 000 in 2013 to 0.30 cases in 2017 (Figure 6). The decrease was most pronounced in children, where rates diminished from 10.4 to 5.4 per 100 000 in children <1 year of age, and from 2.6 to 1.7 per 100 000 in children 1–4 years of age, from 2013 to 2017. A threefold increase of serogroup W was observed between 2013–2017 (from 0.03 to 0.10 per 100 000). The increase was most pronounced among young children and adults above 50 years of age (Figure 7). The incidence per 100 000 in 2013 and 2017 were 0.6 and 1.2 in children <1 year, 0.09 and 0.31 in children 1–4 years, 0.03 and 0.10 in adults 50–64 years and 0.06 and 0.20 in adults 65 years or above respectively. The notification rates of serogroups C and Y have fluctuated between 0.08–0.10 and 0.05–0.07 per 100 000 respectively during the last 5 years.

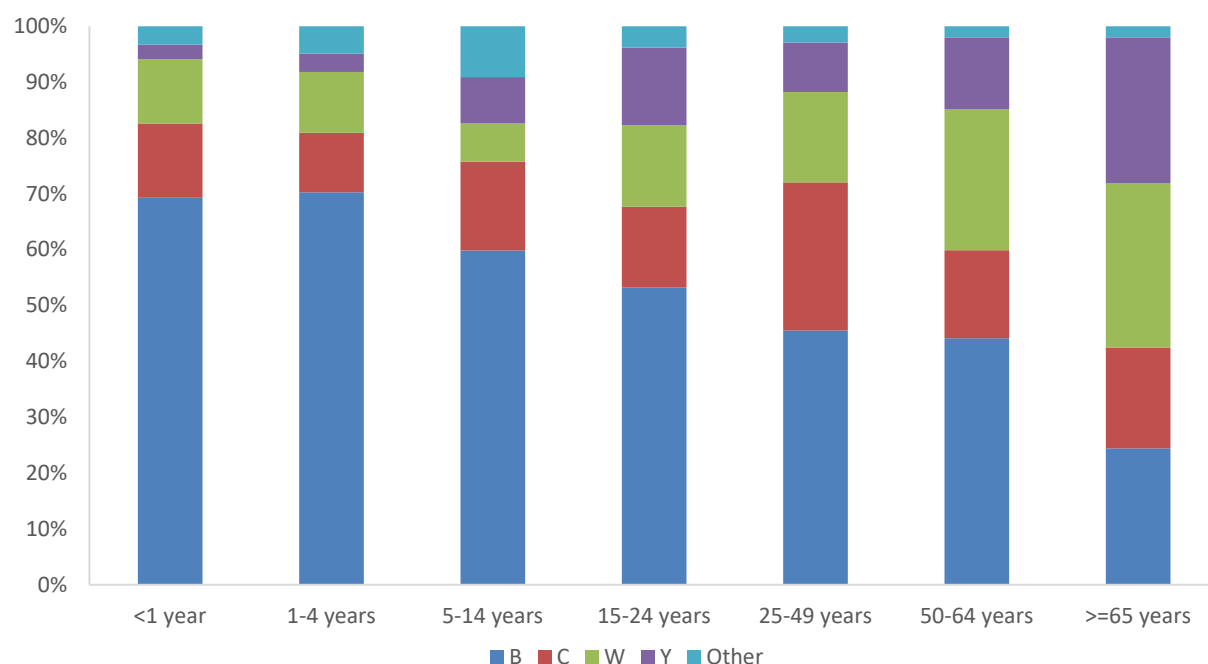
Table 2. Serogroup distribution of confirmed cases of invasive meningococcal disease, EU/EEA, 2017

Serogroup	Cases	%
B	1 527	51
C	485	16
Y	345	12
W	511	17
Other	111	4
Total	2 979	100

'Other' refers to all cases reported as serogroup A, X, Z, 29E, non-groupable or 'other'.

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

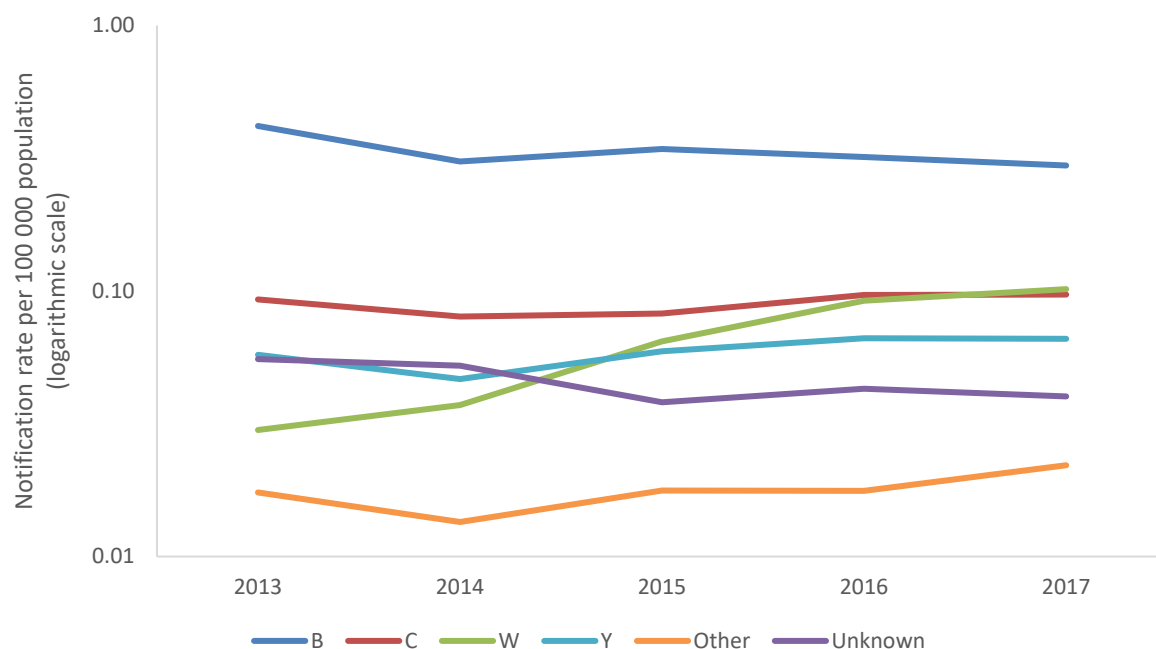
Figure 5. Percentage distribution of serogroup among confirmed cases of invasive meningococcal disease by age group, EU/EEA, 2017



'Other' refers to all cases reported as serogroup A, X, Z, 29E, non-groupable or 'other'.

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

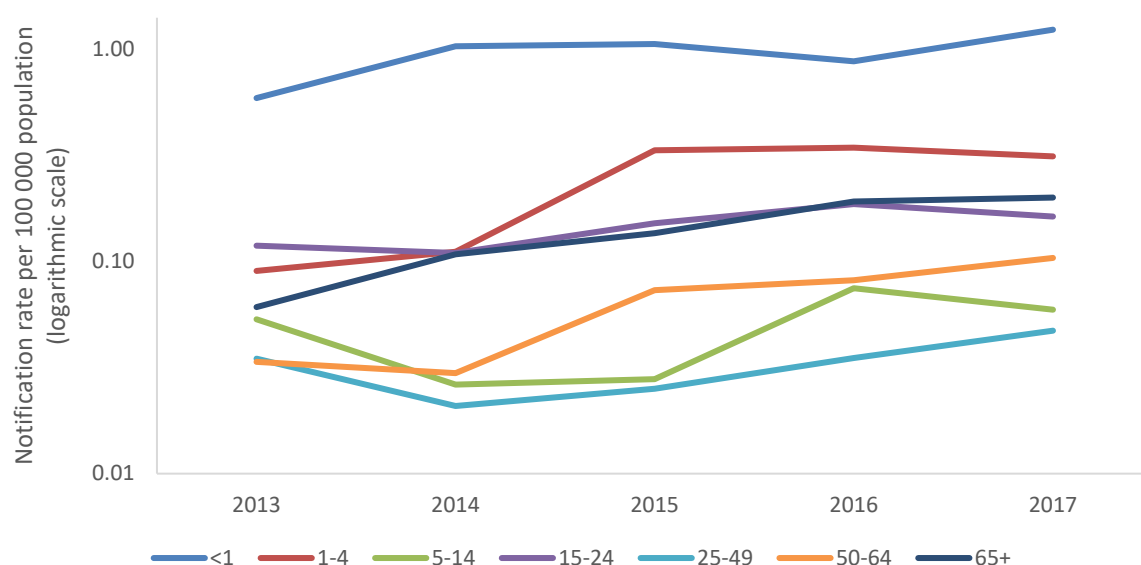
Figure 6. Notification rate of confirmed cases of invasive meningococcal disease by serogroup and year, EU/EEA, 2013–2017



'Other' refers to all cases reported as serogroup A, X, Z, 29E, non-groupable or 'other'.

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

Figure 7. Notification rate of confirmed cases of invasive meningococcal disease caused by serogroup W by age group and year, EU/EEA, 2013–2017



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

Clinical presentation and outcome

Clinical presentation was known for 1 641 cases (51%). Meningitis or both meningitis and septicaemia was reported in 937 cases (57%), septicaemia only in 604 (37%), pneumonia in 19 (1%) and 'other' in 81 cases (5%).

The outcome was reported for 2 912 cases, 90% of all confirmed IMD cases. There were 282 fatal cases reported, a case fatality of 10% among cases with known outcome. Of the four most common serogroups, case fatality was highest among cases of serogroup W (14%) and C (15%), followed by Y (8%) and B (7%). Case fatality was highest in cases aged 65 years and over (18%), followed by the age group of 50–64-year-olds (10%).

Discussion

IMD remains rare in EU/EEA countries, but is a severe and life-threatening disease. The greatest burden is in infants and young children: case fatality is relatively high and up to one fifth of all survivors suffer from long-term sequelae [4]. In 2017, the notification rate was 0.6 cases per 100 000 population, the same as in 2016 and 2015, and country-specific notification rates ranged from 0.0 to 2.4 cases per 100 000 population.

Despite the decreasing trend in serogroup B, it continues to cause the majority of cases of IMD, predominantly affecting younger age groups. In Europe, a recombinant protein vaccine including outer membrane vesicles against serogroup B (4CMenB) was licensed in 2013 and estimated to provide protection against 73% to 87% of circulating serogroup B strains depending on the country [5]. The United Kingdom introduced 4CMenB into its national routine childhood immunisation programme in 2015, which was followed by a reduction of cases in vaccine-eligible age groups [6,7]. Currently, 4CMenB is recommended for general immunisation in children in Austria, Greece, Italy, the Netherlands and the United Kingdom [8]. An ECDC expert opinion on the introduction of the 4CMenB vaccine in EU/EEA countries was published in December 2017 to support national decision-making concerning vaccine introduction into national immunisation programmes [9].

The overall notification rate of serogroup C was stable at the EU level from 2013–2017. Since 1999, 15 EU/EEA countries have introduced vaccination against serogroup C into their national routine childhood immunisation programme [8], and the impact of the vaccination has been well-demonstrated [10–14].

Serogroup W continues to increase in EU/EEA countries, predominantly due to increases in children <5 years of age and in adults above 50 years of age. A rapid epidemic expansion that started in 2009–2010 of a single clone, clonal complex 11 serogroup W, was observed in the United Kingdom [15]. Several other EU Member States have also experienced an increase in IMD caused by serogroup W during recent years [10,16,17]. Five countries (Austria, Greece, Italy, the Netherlands and the UK) have introduced the quadrivalent conjugate vaccine MenACYW into their routine child vaccination schedules [8]. As carriage rates of *Neisseria meningitidis* are highest in

adolescents and young adults [18], high levels of immunity in this age group are critical to ensure the protection of other vulnerable age groups [19].

Although the trend in serogroup Y was stable at the EU level during the time period presented in this report, several EU/EEA countries have reported increasing trends in serogroup Y in recent years [10,20].

Public health implications

Several vaccines targeting different serogroups are available for the prevention of IMD. The choice of introducing a vaccine into the national routine immunisation programme depends on multiple factors, such as vaccine efficacy and coverage, disease and serogroup burden, cost-effectiveness and feasibility.

Increasing trends in certain serogroups in some countries and the rapid expansion of hypervirulent clones highlight the need for continued high-quality surveillance, including molecular methods, to accurately detect and assess changes in the epidemiology of IMD, the effectiveness and impact of implemented vaccines and the need for future vaccines in the EU/EEA. ECDC is working towards enhancing surveillance of IMD using whole-genome sequencing, which will likely contribute to the understanding of outbreaks and inform vaccination strategies.

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