

Invasive meningococcal disease

Annual Epidemiological Report for 2018

Key facts

- In 2018, 3 233 confirmed cases of invasive meningococcal disease (IMD), including 324 deaths, were reported in 30 European Union/European Economic Area (EU/EEA) Member States.
- France, Germany, Spain, and the United Kingdom accounted for 59% of all confirmed cases in 2018.
- The notification rate of IMD was 0.6 cases per 100 000 population, similar to the 2015-2017 period.
- Age-specific rates were highest in infants, followed by 1-4-year-olds, with a second peak in 15-24-year-olds.
- Serogroup B remains the major cause of IMD. It caused 51% of cases overall and was the dominating serogroup in all age groups below 65 years. Incidence remained stable between 2014 and 2018.
- The incidence of serogroups W and Y has been increasing. Serogroup W is now the second cause of IMD reported in 18% of cases.
- The 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 2018 retrieved from The European Surveillance System (TESSy) on 11 March 2020. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, 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 2018.

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Epidemiology

In 2018, 3 316 confirmed cases of IMD were reported in 30 EU/EEA countries (Table 1). The overall notification rate was 0.6 cases per 100 000 population, similar to the notification rate in previous years but a slight increase compared to 2015. The highest notification rates were observed in Ireland (1.8), the Netherlands (1.2), the United Kingdom (1.2), Lithuania (1.1), and Belgium (1.0; Table 1, Figure 1). The incidence decreased significantly in Lithuania compared to 2017, while it increased in Belgium, Ireland, and the Netherlands. Four countries (France, Germany, Spain, and the United Kingdom) accounted for 59% of all confirmed cases. There was a marked increase in the incidence in Spain over the period 2014–2018.

Table 1. Distribution of confirmed invasive meningococcal disease cases and rates per 100 000 population by country, EU/EEA, 2014–2018

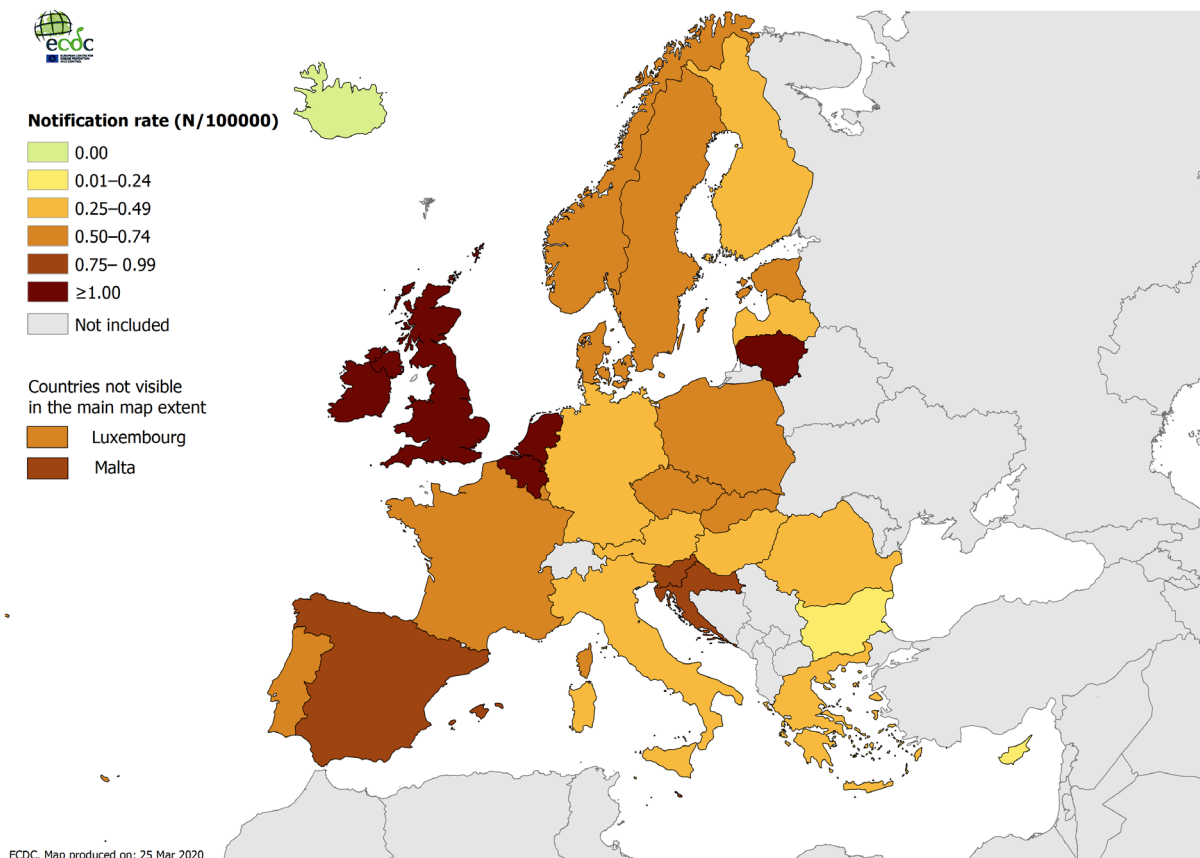
Country	2014		2015		2016		2017		2018			
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Confirmed cases	Rate	ASR	Reported cases
Austria	35	0.4	26	0.3	37	0.4	20	0.2	30	0.3	0.4	30
Belgium	87	0.8	99	0.9	107	0.9	96	0.8	116	1.0	1.0	116
Bulgaria	13	0.2	9	0.1	9	0.1	7	0.1	5	0.1	0.1	5
Croatia	33	0.8	42	1.0	30	0.7	37	0.9	31	0.8	0.8	31
Cyprus	4	0.5	4	0.5	6	0.7	4	0.5	1	0.1	0.1	2
Czechia	42	0.4	48	0.5	43	0.4	67	0.6	56	0.5	0.5	56
Denmark	45	0.8	22	0.4	38	0.7	39	0.7	36	0.6	0.6	37
Estonia	3	0.2	4	0.3	3	0.2	4	0.3	8	0.6	0.6	8
Finland	21	0.4	22	0.4	19	0.3	16	0.3	16	0.3	0.3	16
France	420	0.6	462	0.7	512	0.8	545	0.8	439	0.7	0.6	442
Germany	276	0.3	287	0.4	330	0.4	285	0.3	289	0.3	0.4	295
Greece	60	0.5	54	0.5	52	0.5	42	0.4	34	0.3	0.4	34
Hungary	33	0.3	35	0.4	47	0.5	39	0.4	40	0.4	0.4	43
Iceland	1	0.3	4	1.2	0	0.0	3	0.9	0	0.0	0.0	0
Ireland	76	1.6	68	1.5	85	1.8	71	1.5	88	1.8	1.7	91
Italy	156	0.3	187	0.3	228	0.4	197	0.3	170	0.3	0.3	170
Latvia	7	0.3	9	0.5	4	0.2	7	0.4	5	0.3	0.2	8
Liechtenstein	.	.	.	.	.	.	.	.	.	.	.	.
Lithuania	53	1.8	55	1.9	68	2.4	68	2.4	31	1.1	1.1	40
Luxembourg	3	0.5	1	0.2	1	0.2	0	0.0	3	0.5	0.5	3
Malta	13	3.0	5	1.1	6	1.3	2	0.4	4	0.8	0.9	4
Netherlands	83	0.5	90	0.5	152	0.9	198	1.2	206	1.2	1.2	206
Norway	18	0.4	19	0.4	24	0.5	18	0.3	26	0.5	0.5	26
Poland	187	0.5	219	0.6	167	0.4	226	0.6	199	0.5	0.5	200
Portugal	52	0.5	65	0.6	38	0.4	49	0.5	57	0.6	0.6	59
Romania	67	0.3	50	0.3	55	0.3	50	0.3	64	0.3	0.3	73
Slovakia	23	0.4	24	0.4	23	0.4	37	0.7	36	0.7	0.7	37
Slovenia	8	0.4	16	0.8	7	0.3	9	0.4	18	0.9	0.9	19
Spain	146	0.3	210	0.5	262	0.6	268	0.6	392	0.8	0.9	417
Sweden	48	0.5	52	0.5	62	0.6	49	0.5	56	0.6	0.5	56
United Kingdom	750	1.2	935	1.4	859	1.3	773	1.2	777	1.2	1.1	792
EU/EEA	2763	0.5	3123	0.6	3274	0.6	3226	0.6	3233	0.6	0.6	3316

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, 2018



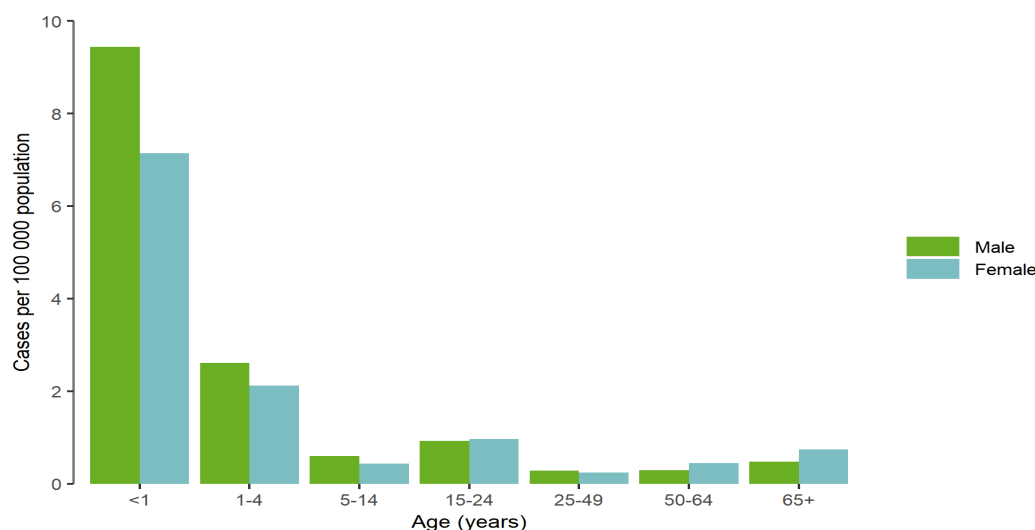
Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the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

Age and sex

In 2018, IMD incidence was highest in the youngest age groups, with a notification rate of 8.3 confirmed cases per 100 000 population in children under one year of age, and 2.4 confirmed cases per 100 000 population in 1-4-year-olds (Figure 2), as similarly observed in previous years. There was a second peak in 15-24-year-olds, with a rate of 0.9 per 100 000. Infants were the most affected age group in the majority of Member States, with country-specific rates varying from 0–22.4 cases per 100 000.

The overall male-to-female ratio was 1:1. Rates were higher among males in children younger than 15 years, while the rate was higher among women among adults aged 50 years and above.

Figure 2. Distribution of confirmed invasive meningococcal disease cases per 100 000 population, by age and sex, EU/EEA, 2018



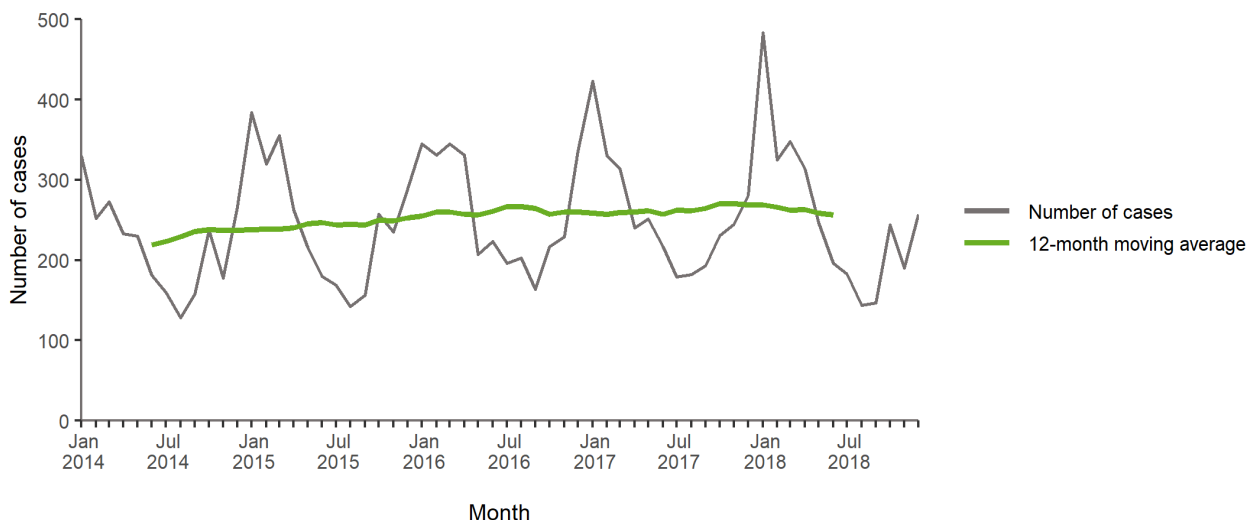
Source: Country reports from Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

Seasonality and trend

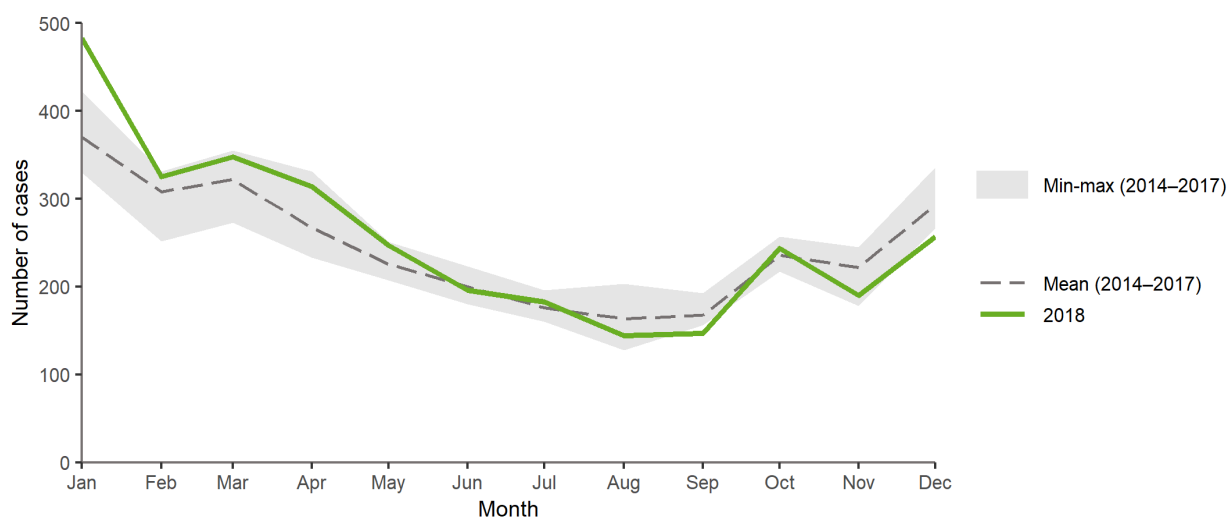
In 2018, the seasonality of IMD followed a pattern similar to previous years. IMD occurred primarily in the winter months, while the number of cases was lowest in summer (Figure 3). The number of reported confirmed cases has slightly increased over the study period 2014-2018, after being quite stable in 2016-2017 (Figure 4).

Between 2014 and 2018, notification rates decreased in all age groups below 15 years, remained more or less stable in those 15–64 years (slight increase in 15-24-year-olds) and increased in those aged 65 years and over.

Figure 3. Distribution of confirmed invasive meningococcal disease cases by month, EU/EEA, 2014–2018



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

Figure 4. Distribution of confirmed invasive meningococcal disease cases by month, EU/EEA, 2018 and 2014–2017

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

Serogroup

Of the 3 233 confirmed IMD cases reported in 2018, 3 025 (93%) had a known serogroup. The majority belonged to serogroup B (51%), followed by serogroups W and C (18% and 15% respectively; Table 2).

Serogroup B caused the highest proportion of cases in all age groups below 65 years and accounted for 71% of IMD in children under the age of five years, but only 25% of cases aged 65 years and above (Figure 5). Serogroup C was most prominent in 25–49-year-olds, accounting for 24% of cases in this age group. Serogroups W and Y were most prominent in those aged 65 years and above, causing 33% and 25% of IMD cases respectively in this age group.

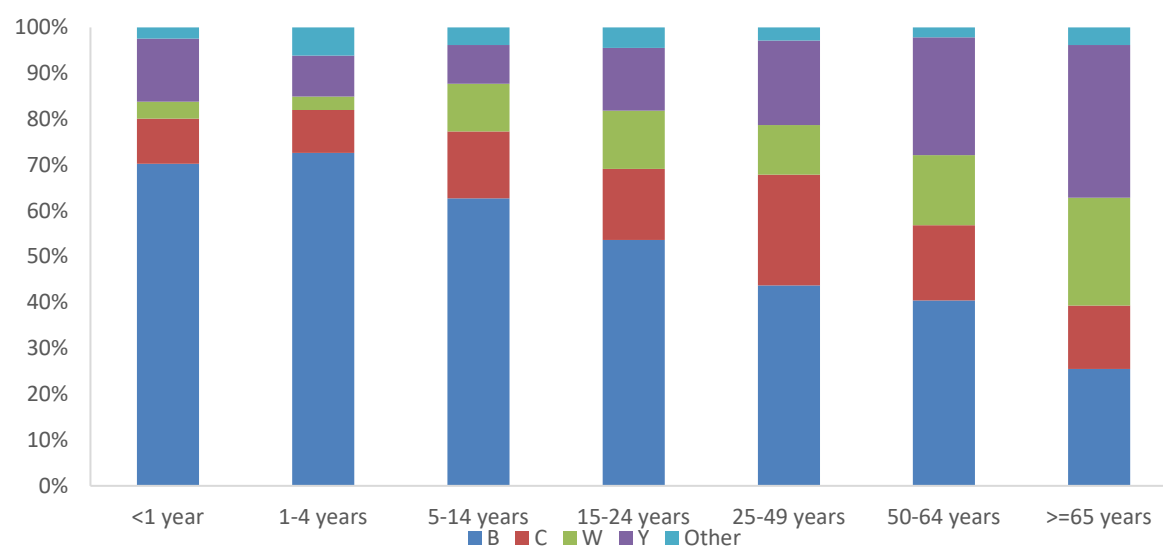
Table 2. Serogroup distribution of confirmed cases of invasive meningococcal disease, EU/EEA, 2018

Serogroup	Cases	%
B	1543	51
W	561	18
C	444	15
Y	363	12
Other	114	4
Total	3025	100

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

Source: Country reports from Austria, Belgium, Cyprus, Czechia, 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, 2018



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

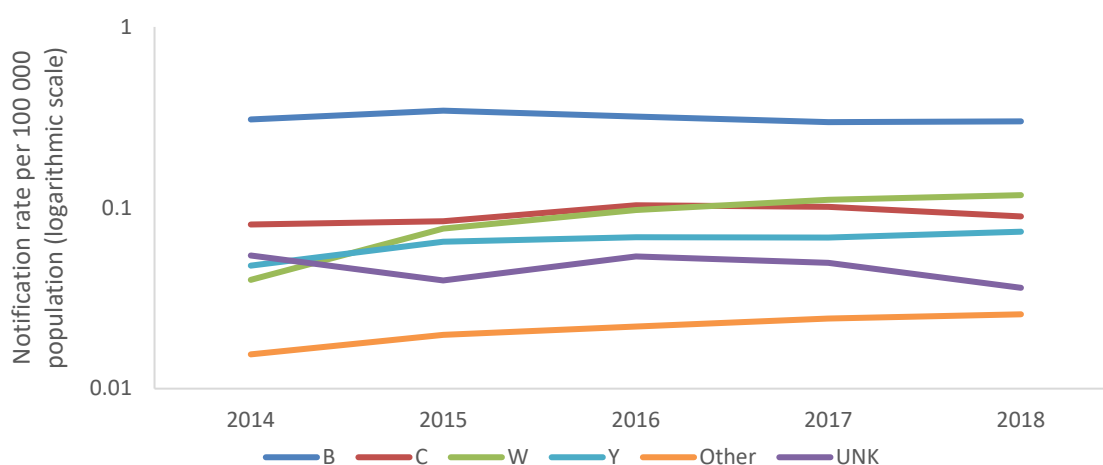
Source: Country reports from Austria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

Among 25 Member States that consistently reported serogroup data from 2014 to 2018, the overall notification rates of serogroup B fluctuated between 0.30–0.34 per 100 000 during the last five years (Figure 6). There was a decrease observed in children <1 year of age from 7.8 to 6.0 per 100 000. It fluctuated between 1.7 and 2.1 very per 100 000 in 1-4-year-olds, between 2014 and 2017.

The incidence of serogroup W continuously increased (from 0.04 to 0.12 per 100 000) between 2014 and 2018. The increase was observed in all age groups (Figure 7) but was more pronounced in extreme age groups. The incidence per 100 000 in 2014 and 2018 were 1.2 and 1.6 in children <1 year, 0.11 and 0.24 in children 1–4 years, 0.03 and 0.10 in adults 50–64 years and 0.1 and 0.25 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. An increased trend was observed for serogroup Y.

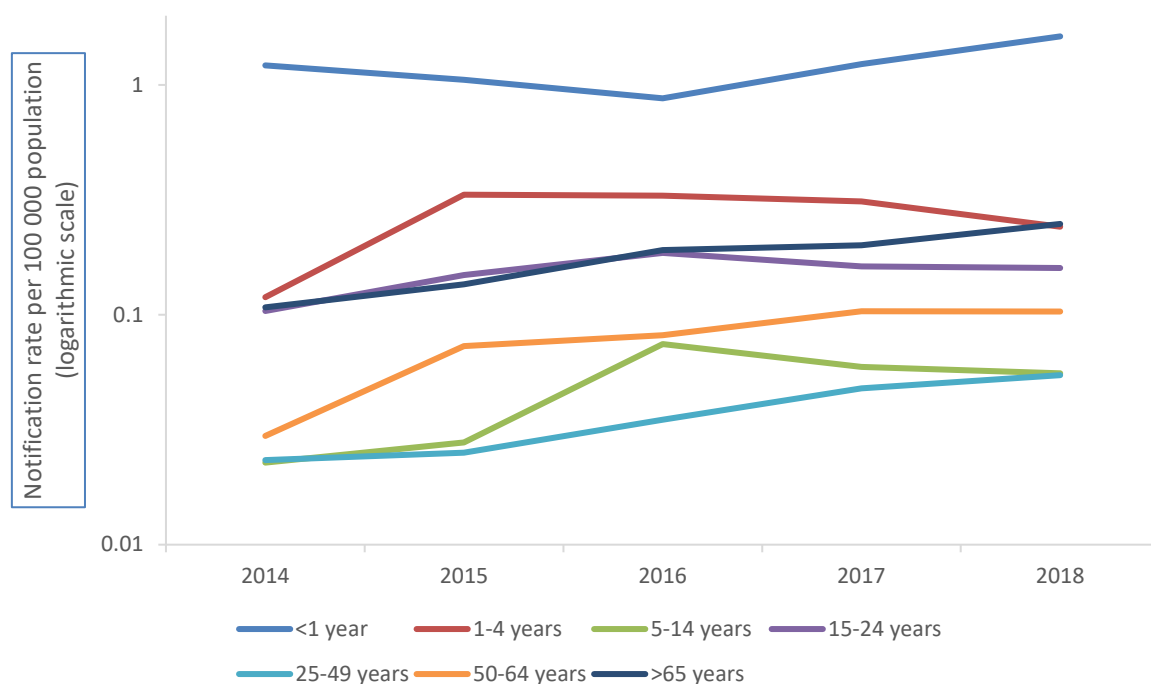
Figure 6. Notification rate of confirmed cases of invasive meningococcal disease by serogroup and year, EU/EEA, 2014–2018



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

Source: Country reports from Austria, Czechia, 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, 2014–2018



Source: Country reports from Austria, Czechia, 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.

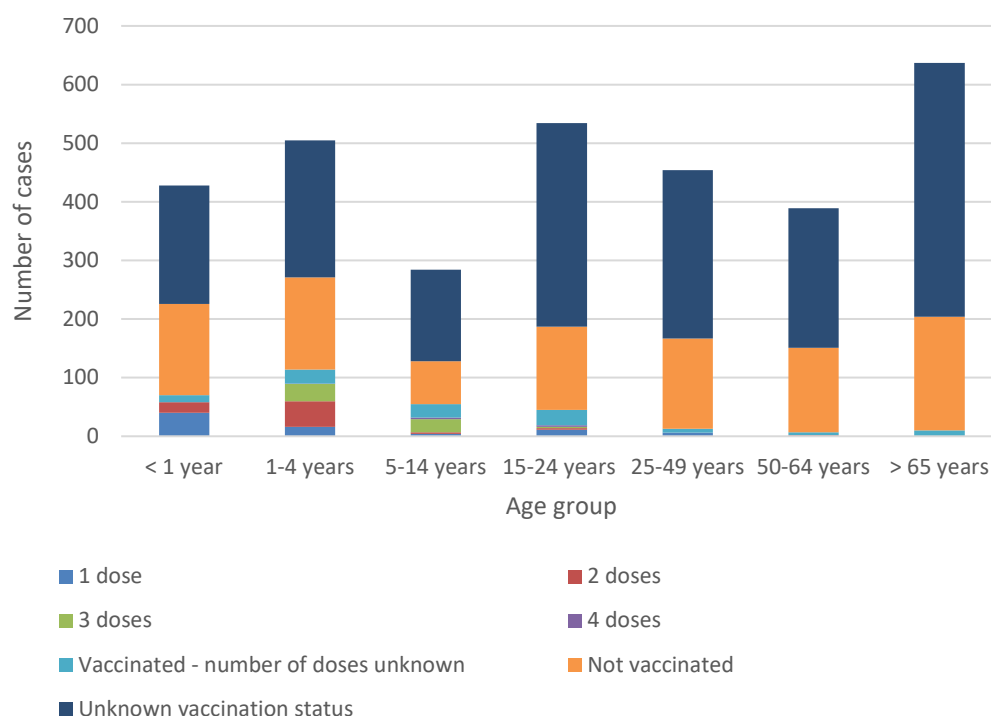
Clinical presentation and outcome

Clinical presentation was reported for 1 908 cases (51%). Meningitis or both meningitis and septicaemia was reported in 1 015 cases (53%), septicaemia only in 694 (37%), pneumonia in 25 (1%) and 'other' in 174 cases (9%).

The outcome was reported for 2 791 cases (84%). There were 324 fatal cases reported, a case fatality of 12% among cases with known outcome. Of the four most common serogroups, case fatality was high among cases of serogroup W (19%) and C (16%), followed by Y (8%) and B (8%). Case fatality was highest in cases aged 65 years and over (18%), followed by the age group of 50-64-year-olds (15%).

Vaccination status

The vaccination status was reported for 1 227 cases (38%). However, the surveillance system does not include information on the type of vaccine received. Some cases among those vaccinated are reported in the youngest age groups.

Figure 8. Number of meningococcal vaccine doses administered to cases by age-group, EU/EEA, 2014–2018

Discussion

Invasive meningococcal disease (IMD) remains rare in EU/EEA countries, but is a severe and life-threatening disease. In 2018, the total number of notified cases and the notification rate remained steady compared to 2015–2017. While the overall notification rate tends to decrease in the youngest, they still pay the highest burden. The incidence tends to increase in >65 year-olds, and part of it is due to the emergence of serogroup W. Overall, reported case fatality is relatively high (12%), and it is also documented that up to one fifth of all survivors suffer from long-term sequelae [4]. While the EU/EEA surveillance system captures the vaccination status, it remains unclear to which vaccine the information refers at this stage.

While 13 countries have no vaccination program in place, the other countries adopted different vaccination recommendations to reduce the burden of IMD. At ECDC, the monitoring of vaccination policies is performed through the scheduler, which is updated once a year. There is not yet a monitoring system for vaccination coverage data.

Serogroup B has been responsible for most cases in infants and young children, although the incidence has been declining since 2014. Four countries recommended and publicly funded the 4CMenB in under 24 months (Italy, Ireland, Lithuania, and the United Kingdom). Austria recommends the vaccine but does not publicly fund it. The immunisation strategy with 4CMenB aims to provide direct (individual) protection against IMD serogroup B in the vaccinees, as the vaccine does not have any effect on serogroup B meningococcal carriage [5]. Ireland, the United Kingdom, and Lithuania had been facing very high incidence rates at the time of the introduction of the vaccine. High levels of vaccination coverage have been obtained in the United Kingdom and Ireland, and the reduction in the number of cases is estimated to be 75% in the United Kingdom [6,7]. In 2018, Lithuania reported the lowest incidence rate of serogroup B to date. In particular, the country reported no cases in under five-year-olds in 2018. An assessment of their vaccination effectiveness program would be valuable in order to inform other countries.

The overall notification rate of serogroup C was stable between 2014 and 2018. Since 1999, 15 EU/EEA countries have introduced vaccination against serogroup C (Men C) in their national routine childhood immunisation programme [8]. Different vaccination schemes have been adopted and the impact of the vaccination has been well demonstrated [10–14] if the level of vaccination coverage is high enough to allow herd protection. In 2018, the incidence rate of serogroup W exceeded the incidence of serogroup C.

Changing trends in the incidence of IMD serogroup W and at a less extend serogroup Y have been reported for several years. The number of meningococcal W cases has been increasing with the circulation of strains belonging

to sequence type (ST) 11 as the most prevalent including in the Netherlands, in the United Kingdom, in Sweden and in France [15-18]. It is also notable that the epidemiology of serogroup W is changing quickly, with reports on the emergence of a distinct genotype from CC11 (ST-9316) [19]. These rapid changes in the epidemiology of IMD highlights the need to integrate microbiological data and data on whole genome sequencing [20]. It will improve the surveillance of emerging hypervirulent clones at EU level as well as the identification of cross-border cluster. This approach will be taken in the coming months at ECDC level.

The number of IMD cases caused by serogroup Y was the highest ever observed [10,21]. The incidence is increasing, and the proportion of IMD attributable to serogroup Y is also increasing.

In response to the increase of serogroup W, several countries have now introduced the quadrivalent vaccine (MenACWY) as a general booster in adolescents, including Austria, Greece, Ireland, Italy, the Netherlands, Spain, and the United Kingdom [8]. The immunisation of adolescents aims to boost the waning immunity against serogroup C, to reduce the disease due to serogroups A, C, Y and W, and to induce herd protection. Some countries introduced the vaccine quite recently and program effectiveness needs to be further documented.

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. The feasibility of a common vaccination approach should be further evaluated in countries facing similar epidemiological characteristics.

The information on case vaccination status should be upgraded with the collection of specific information for the different meningococcal vaccines.

The dynamic nature of meningococcal disease epidemiology, 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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