

Annual Epidemiological Report

August 2019

Invasive Meningococcal Disease, in Ireland, 2018

Key Facts

In 2018, 89 cases of invasive meningococcal disease (IMD) notified (1.9/100,000 population) compared to 76 (1.6/100,000) in 2017

Of the 89 cases, 86 (96.6%) were case classified as confirmed and three (3.4%) as possible

Male cases (n=41) were fewer than female cases (n=48), a male to female ratio of 0.85:1, similar to what was observed in 2017, but a change from the annual pattern observed between 2001 to 2016

The median age of cases was 15.8 years (range one month to 89 years)

Age specific incidence rate (ASIR) was highest among infants <1 year of age (17.7/100,000; n=11), followed by children aged 1 to 4 years (7.1/100,000; n=19), and those aged 15 to 19 years (5.0/100,000; n=15)

Serogroup B (SgB) was most commonly associated with IMD accounting for 46 (51.7%) notifications, but elevated numbers in recent years of SgC, SgW and SgY, serogroups which are vaccine preventable, remain a concern

Thirteen IMD deaths were reported (case fatality ratio of 14.6%) (age range three months to 89 years), the highest annual % CFR ever recorded for IMD on CIDR; five were associated with SgW, three each with SgB and SgC and two with SgY

Two incomplete meningococcal B vaccine failures (age appropriately vaccinated) and four incomplete and two complete meningococcal C vaccine failures were reported

Epidemiology

Between 1999 and 2012, a decline in invasive meningococcal disease (IMD) incidence occurred: in 1999 there were 536 cases (14.8/100,000) and in 2012 there were 66 cases (1.4/100,000), a decrease of almost 88%. In 2018, however, the number of cases increased to 89 (1.9/100,000), 13 more than in the previous year (n=76) (1.6/100,000).

Most cases in 2018 were diagnosed by blood/CSF culture testing, blood/CSF PCR testing or by detection of Gram negative diplococci in skin lesions/culture or in CSF specimens. Isolation of the organism from non-sterile sites (such as the eye, nose or throat) in clinically compatible, invasive cases is considered a possible case.

Of the 89 cases notified in 2018, 86 (96.6%) were case classified as confirmed, and three (3.4%) as possible. Of the 86 confirmed cases, 41 (47.7%) were confirmed by PCR testing alone and another five confirmed cases (5.8%) were diagnosed by culture of sterile specimens alone. Of the remaining 40 (46.5%) confirmed cases, all were diagnosed by both culture and PCR testing of sterile specimens. Six confirmed cases had additional positive laboratory tests undertaken, three had positive CSF microscopy, two had positive serology and one had a positive skin lesion microscopy. Of the three possible cases, none had a positive test reported.

In 2018, fewer male (n=41) than female (n=48) cases were notified (male to female ratio of 0.85:1), similar to 2017, but a change from the annual pattern observed between 2001 and 2016. The median age of IMD cases in 2018 was 15.8 years (range one month to 89 years)

Age specific incidence rate (ASIR) was highest among age groups <1 year (17.7/100,000; n=11), 1 to 4 years (7.1/100,000; n=19), and 15 to 19 years (5.0/100,000; n=15) (Table 1, Figure 1).

Figure 2 presents the number of IMD cases by gender and age group between 1999 and 2018. The decline in numbers across all of the age groups, with the steepest declines observed in the <1, 5-9 and 10-24 year age groups following the introduction of the meningococcal C conjugate (MCC) vaccine in late 2000 is seen. In recent years, in the 25+ age group, females outnumber males (Figure 2).

At regional level, incidence was highest in the HSE NW area (2.7/100,000) and lowest in the HSE SE area (1.0/100,000) (Table 2). No area had an incidence rate that was significantly below the national rate (Figure 3).

One imported case (SgB) from another European country was identified in 2018, was aged <1 year. This case died; a coroner's report is still awaited at the time of writing.

In March 2018, a family cluster involving two cases was reported. Both children were aged 10 years had a SgB infection; one of whom died.

In 2018, the peak incidence of IMD was in the first quarter of the year. This is a phenomenon observed in most years (Figure 4).

Ethnicity details were poorly collected, but most cases of IMD occurred in cases whose ethnic background was described as 'White' (22.5%; n=20/89), followed by 'Irish Traveller' (4.5%; n=4),

and one each of 'Chinese', 'Black African' and 'Roma' (1.1%; n=1 each) and 'not known'/not specified (69.7%; n=62).

Between 1999 and 2012, there was a marked decline in both SgC and SgB overall. IMD due to SgC had remained at low levels between 2003 and 2014 with an average of 3.4 cases occurring annually. However, since then, numbers have risen to 11 cases in 2015, 22 in 2016, peaking at 30 cases in 2017 and a more recent decline to 20 cases in 2018 (Table 3). In 2017 the annual number of SgC cases surpassed that of SgB cases for the first time ever. In that year SgC accounted for 30 of the 76 (39.4%) notifications, closely followed by SgB (29 cases, 38.2%), a SgC:SgB ratio of 1.03:1. After falling to its lowest level ever in 2017, SgB numbers increased in 2018 with 46 cases (Table 3) when SgB notifications once again exceeded SgC notifications, (a SgC:SgB ratio of 0.43:1) (Figure 5). 2018 also saw the emergence of a marked increase in the numbers of SgW (n=12) and SgY (n=5) cases (Table 3).

Figure 6 presents the distribution of serogroups by age group over the period 1999 to 2018: it shows the highest frequency of SgB and SgC cases in the <1, 1-4 and 15-19 year age groups. For SgW this frequency distribution is similar although a higher proportion of cases is seen in the older teenage/young adult and older age groups and, for SgY, the frequency was highest in the 15-19 and 65+ year age groups.

The crude incidence rates for each of the serogroups SgB, SgC, SgW and SgY between 1999 and 2018 are shown in Figure 7.

Figure 8 presents the proportion of IMD cases between 1999 and 2018 by final clinical diagnosis; septicaemia only is more common in the youngest and oldest age groups; the proportion of cases presenting with meningitis only increases with age, peaking in the 35-44 year age group before declining in the older age groups.

There were 13 IMD related notified deaths in 2018 (case fatality ratio of 14.6%) (age range three months to 89 years) (Tables 1, 3), the highest number since 2000 when 25 deaths were recorded. Five of the deaths were associated with SgW infection (41.7% case fatality ratio; four of whom died from their infection), three with SgC infection (15%CFR; two were caused by their infection), three with SgB infection (6.5 %CFR; one caused by their infection) and two with SgY infection (25%CFR; one caused by their infection) (Table 3).

In spite of the marked reduction in the overall incidence of IMD since 1999, it is clear that due to its associated virulence, high mortality rate and serious adverse sequelae, IMD remains a serious public health challenge. The best prevention for IMD is effective vaccination (1, 2).

Meningococcal B vaccination

In 2012, Bexsero®, a recombinant multicomponent vaccine (4CMenB) against SgB disease was approved by the European Medicines Agency. In Ireland, the primary childhood immunisation (PCI) schedule was updated in July 2016. and offered to all infants born on or after 1st October 2016 receive one dose given at two, four and 12 months of age in December 2016 (<https://www.hse.ie/eng/health/immunisation/infomaterials/newsletter/newsletter23.pdf>).

In 2018, two incomplete vaccine failures were reported in children aged 3 months, who received one dose of the vaccine each, one of whom died.

Meningococcal C and ACWY vaccinations

The meningococcal C conjugate (MCC) vaccination was introduced in Ireland in 2000 for all children and a catch up to the age of < 23 years. In October 2016, the PCI schedule changed to one dose MCC at six months of age and further doses at 13 months and 12-13 years of age. The introduction of the adolescent booster was done to address concerns of possible waning immunity to SgC disease as reported in studies undertaken in the United Kingdom (3-6). MCC vaccination has been shown to significantly reduce nasopharyngeal carriage of the SgC meningococcus, providing indirect protection through herd immunity (7-8).

From September 2019, students in their first year of secondary school will be offered a meningococcal ACWY booster (MenACWY) vaccination. The introduction of this vaccine will provide additional protection against the serogroups W and Y which have emerged in recent years (Table 3).

For information on uptake of meningococcal vaccines please refer to the National Immunisation Advisory Committee guidelines on meningococcal disease available at <https://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/chapter13.pdf>

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 15th July, 2019. These figures may differ from those published previously due to on-going updating of notification data on CIDR.

Further information available on HPSC website:

<https://www.hpsc.ie/a-z/vaccinepreventable/invasivemeningococcaldisease/>

Acknowledgements

HPSC wishes to thank all who provided data for this report: Departments of Public Health, Irish Meningitis & Sepsis Reference Laboratory and other Microbiology Laboratories.

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Figure 1. Age-specific rates per 100,000 population for invasive meningococcal disease (IMD), Ireland, 1999-2018



Figure 2. Number of IMD cases by gender and age group in Ireland, 1999-2018 (excludes one IMD case with unknown gender in 2009)

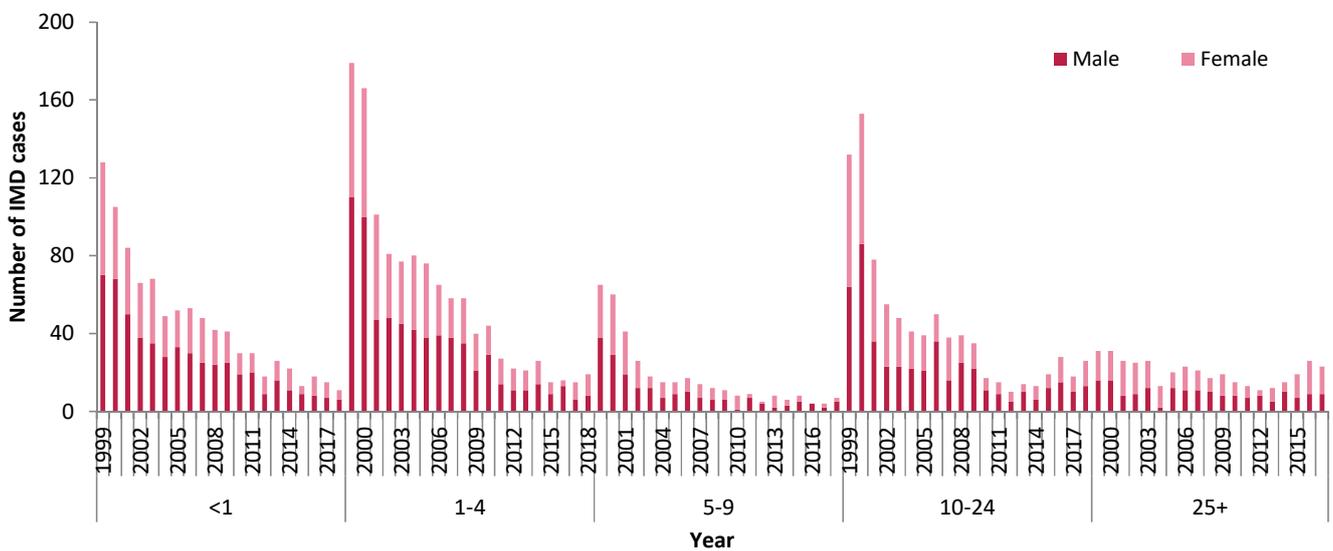


Figure 3. Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, Ireland, 2018

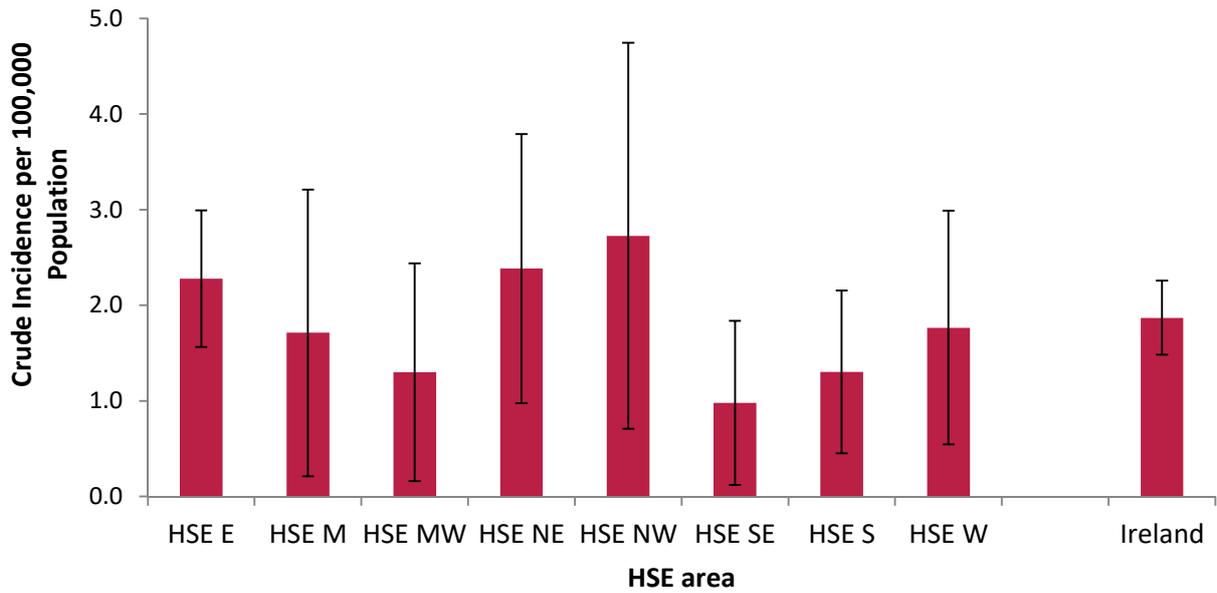


Figure 4. Number of IMD cases by quarter and serogroup, Ireland, 1999-2018

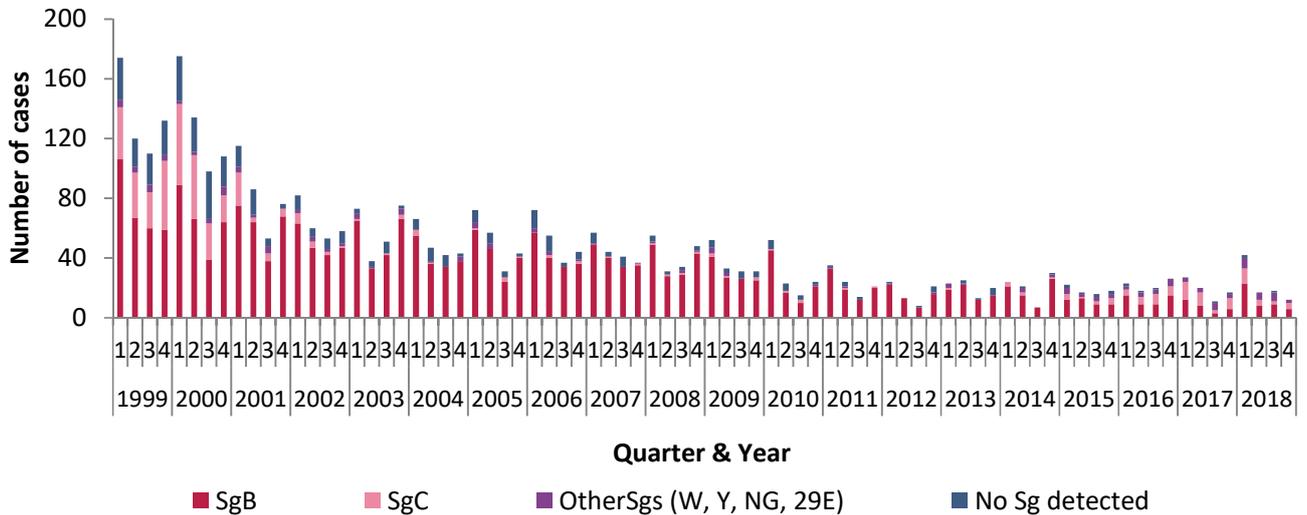


Figure 5. Number of IMD notifications by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, Ireland, 1999-2018

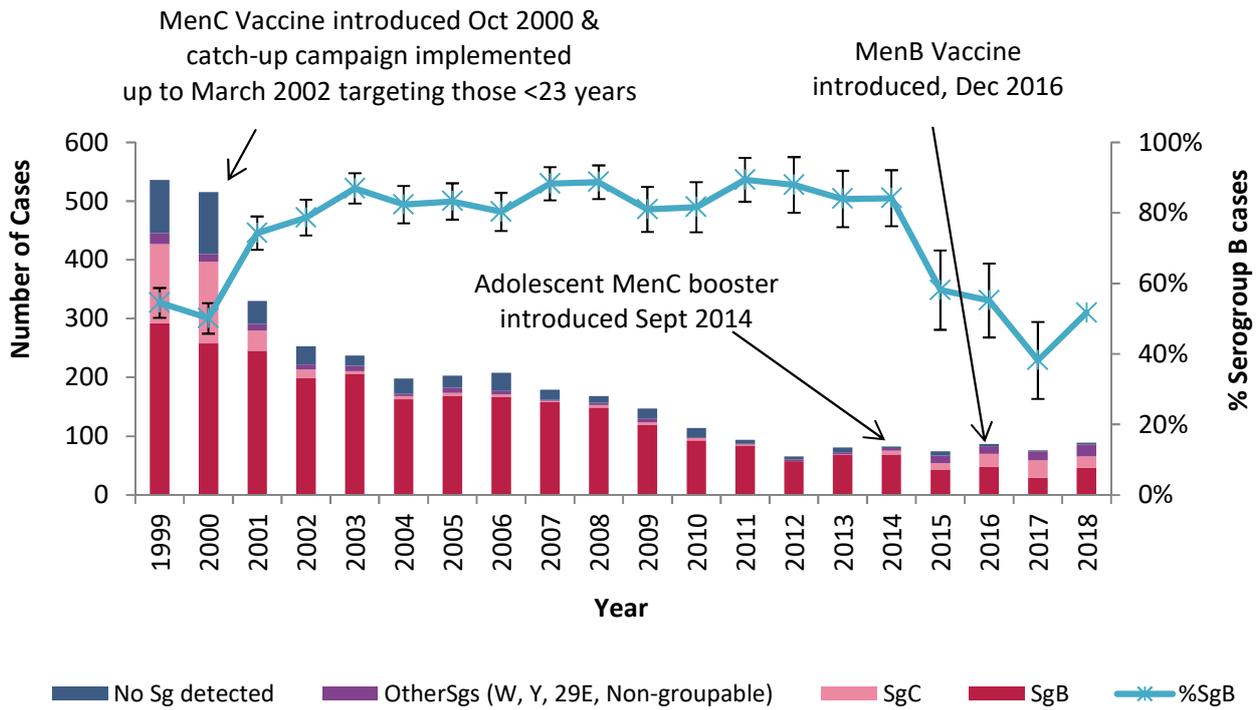


Figure 6. Distribution of IMD notifications by serogroup and age group in Ireland, 1999-2018

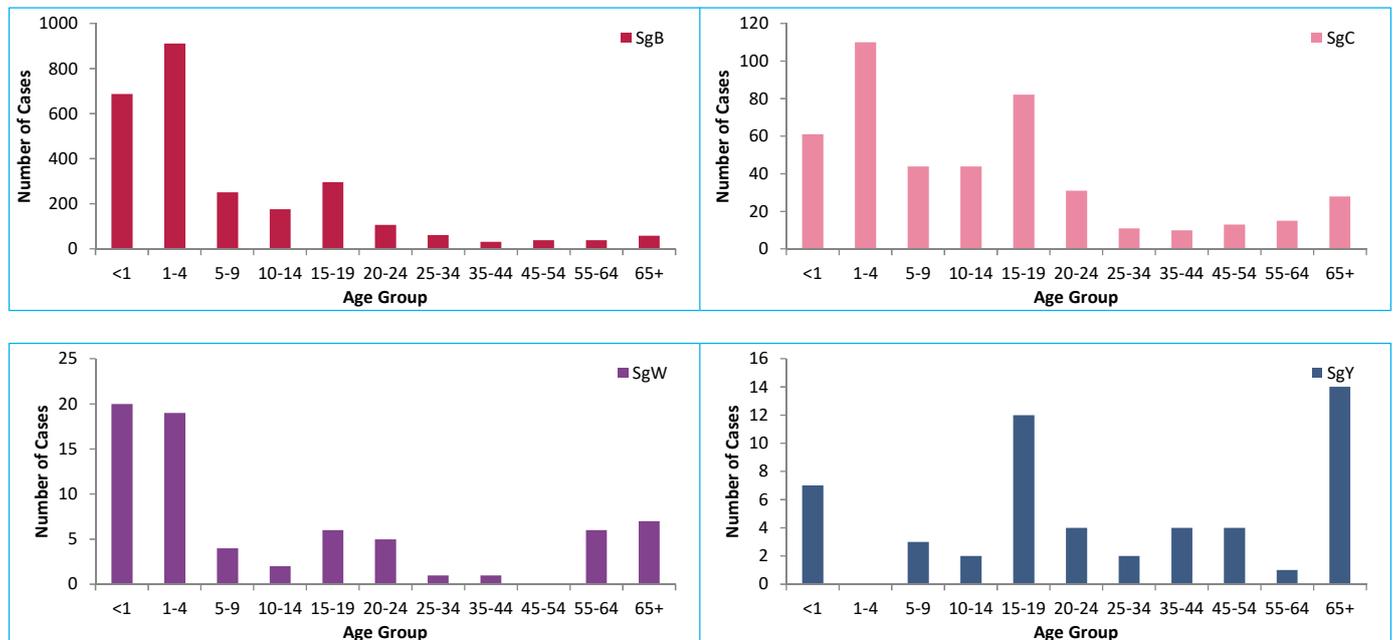


Figure 7. Crude incidence rates per 100,000 for serogroups B, C, W and Y in Ireland, 1999-2018

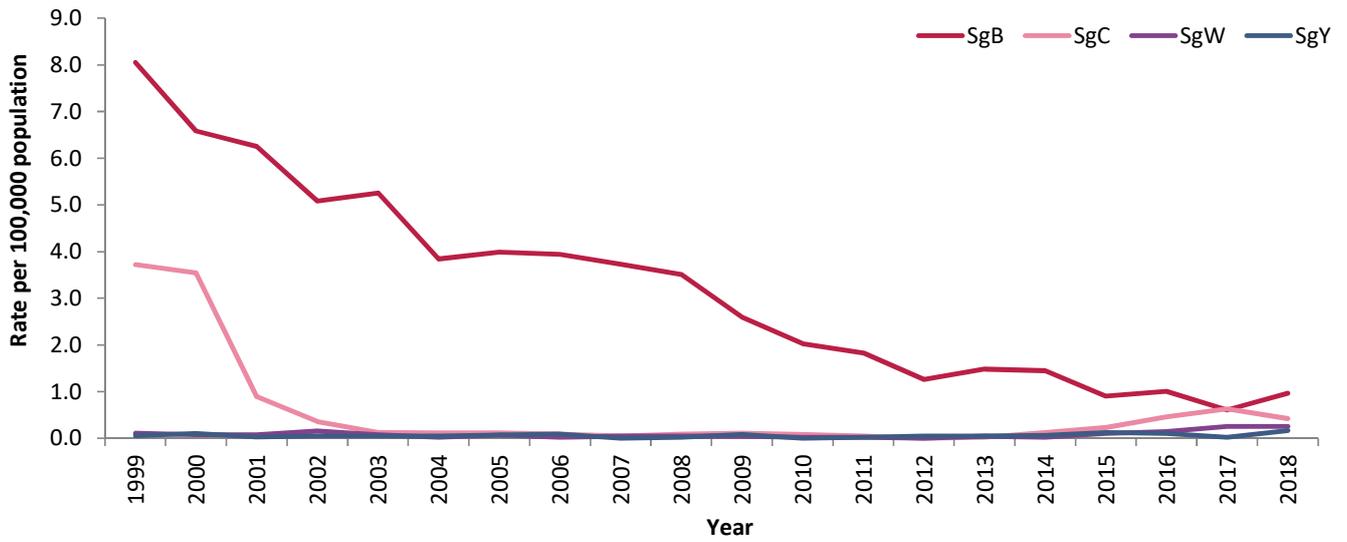


Figure 8. Percentage of IMD notifications by clinical diagnosis and age group in Ireland, 1999-2018

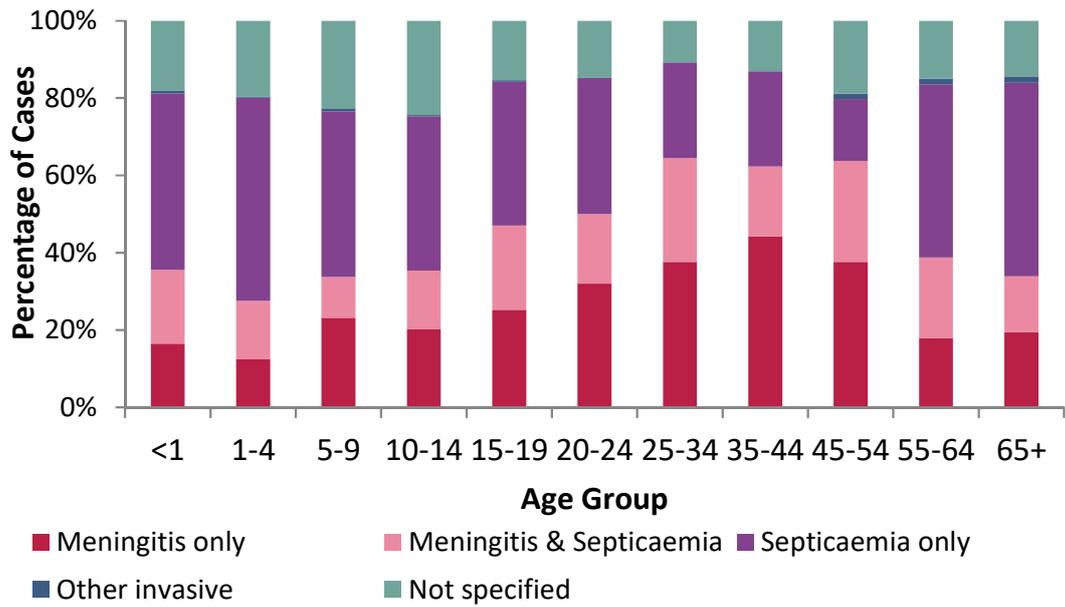


Table 1. Number of cases, deaths, age-group specific incidence rates per 100,000 population and case fatality ratios of IMD, Ireland, 2018

Age Group	Total No. Cases	ASIR	Total No. Deaths	Total %CFR
<1	11	17.7	2	18.2%
1-4	19	7.1	1	5.3%
5-9	7	2.0	1	14.3%
10-14	7	2.2	0	0.0%
15-19	15	5.0	3	20.0%
20-24	4	1.5	1	25.0%
25+	26	0.8	5	19.2%
All ages	89	1.9	13	14.6%

ASIR, age specific incidence rate per 100,000 population calculated using Census 2016 data; %CFR, case fatality ratio

Table 2. Age specific incidence rates per 100,000 population of IMD by HSE area and age group, Ireland, 2018

HSE Area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
HSE E	22.0	7.3	1.6	2.8	8.7	0.0	1.1	2.3
HSE M	25.6	5.6	0.0	0.0	10.4	6.7	0.0	1.7
HSE MW	20.3	4.8	3.5	0.0	0.0	4.6	0.4	1.3
HSE NE	15.4	10.3	2.5	2.9	0.0	4.4	1.3	2.4
HSE NW	31.5	7.1	5.1	5.4	5.8	0.0	1.2	2.7
HSE SE	30.9	3.5	0.0	0.0	3.0	3.9	0.0	1.0
HSE S	0.0	7.9	2.0	2.2	2.3	0.0	0.6	1.3
HSE W	0.0	8.1	3.0	3.3	3.5	0.0	1.0	1.8
Ireland	17.7	7.1	2.0	2.2	5.0	1.5	0.8	1.9

ASIR, age specific incidence rate per 100,000 population calculated using Census 2016 data

Table 3. Number of cases, deaths, percentage of total cases and case fatality ratios (%CFR) by year for meningococcal B, C, W and Y diseases, Ireland, 1999-2018

Year	Serogroup B				Serogroup C				Serogroup W				Serogroup Y				Total Cases	Total Deaths	Total % CFR
	No. Cases	No. Deaths	%Total Cases	% CFR	No. Cases	No. Deaths	%Total Cases	% CFR	No. Cases	No. Deaths	%Total Cases	% CFR	No. Cases	No. Deaths	%Total Cases	% CFR			
1999	292	12	54.5	4.1	135	5	25.2	3.7	4	0	0.7	0.0	2	0	0.4	0.0	536	17	3.2
2000	258	13	50.1	5.0	139	11	27.0	7.9	3	0	0.6	0.0	4	1	0.8	25.0	515	25	4.9
2001	245	8	74.2	3.3	35	3	10.6	8.6	3	1	0.9	33.3	1	0	0.3	0.0	330	12	3.6
2002	199	8	78.7	4.0	14	0	5.5	0.0	6	0	2.4	0.0	2	0	0.8	0.0	253	8	3.2
2003	206	11	86.9	5.3	5	1	2.1	20.0	3	0	1.3	0.0	2	0	0.8	0.0	237	12	5.1
2004	163	7	82.3	4.3	5	1	2.5	20.0	1	0	0.5	0.0	2	0	1.0	0.0	198	10	5.1
2005	169	5	83.3	3.0	5	0	2.5	0.0	3	0	1.5	0.0	3	1	1.5	33.3	203	6	3.0
2006	167	5	80.3	3.0	4	0	1.9	0.0	1	0	0.5	0.0	4	0	1.9	0.0	208	5	2.4
2007	158	6	88.3	3.8	2	0	1.1	0.0	2	0	1.1	0.0	0	0	0.0	-	179	7	3.9
2008	149	6	88.7	4.0	4	1	2.4	25.0	2	1	1.2	50.0	1	0	0.6	0.0	168	8	4.8
2009	119	6	81.0	5.0	5	0	3.4	0.0	2	0	1.4	0.0	4	0	2.7	0.0	147	6	4.1
2010	93	4	81.6	4.3	4	0	3.5	0.0	1	0	0.9	0.0	0	0	0.0	-	114	5	4.4
2011	84	2	89.4	2.4	2	0	2.1	0.0	1	0	1.1	0.0	1	0	1.1	0.0	94	2	2.1
2012	58	1	87.9	1.7	0	0	0.0	-	0	0	0.0	-	2	1	3.0	50.0	66	2	3.0
2013	68	4	84.0	5.9	1	0	1.2	0.0	2	0	2.5	0.0	2	0	2.5	0.0	81	4	4.9
2014	69	3	84.1	4.3	6	1	7.3	16.7	1	0	1.2	0.0	3	0	3.7	0.0	82	4	4.9
2015	43	2	58.1	4.7	11	0	14.9	0.0	5	0	6.8	0.0	6	0	8.1	0.0	74	3	4.1
2016	48	2	55.2	4.2	22	1	25.3	4.5	7	1	8.0	14.3	5	0	5.7	0.0	87	5	5.7
2017	29	2	38.2	6.9	30	4	39.5	13.3	12	1	15.8	8.3	1	0	1.3	0.0	76	7	9.2
2018	46	3	51.7	6.5	20	3	22.5	15.0	12	5	13.5	41.7	8	2	9.0	25.0	89	13	14.6

%CFR, case fatality ratio