Annual Epidemiological Report

October 2018

Invasive Meningococcal Disease, in Ireland, 2017

Key Facts

In 2017, 76 cases of invasive meningococcal disease (IMD) notified (1.6/100,000 population) compared to 87 (1.8/100,000) in 2016

Of the 76 cases, 70 (92.1%) were case classified as confirmed, two as probable (2.6%) and four (5.3%) as possible

Male cases (n=31) were fewer than female cases (n=39), a male to female ratio of 0.79:1, a change from the pattern observed every year since 2001

Age range of one month to 88 years (median age of 13.4 years)

Age specific incidence rate (ASIR) was highest among infants <1 year of age (24.1/100,000; n=15), followed by children aged 1 to 4 years (5.6/100,000; n=15), and those aged 15 to 19 years (3.3/100,000; n=10)

Incidence was highest in the HSE MW area (3.6/100,000) and lowest in the HSE NW area (0.8/100,000); incidence rate in HSE E was significantly below national rate

Serogroup C was most commonly associated with IMD accounting for 30 (39.4%) notifications and exceeded that of serogroup B with 29 cases (38.2%), the first year that this has been observed

Seven IMD deaths were reported (case fatality ratio of 9.2%) (age range 3 months to 91 years): four attributable to serogroup C infection, two to serogroup B infection and one to serogroup W135

Four complete and one incomplete meningococcal C vaccine failures and one incomplete meningococcal B vaccine failure were reported

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Epidemiology

Between 1999 and 2012, a marked downward trend in invasive meningococcal disease (IMD) incidence was observed: in 1999 there were 536 cases (14.8/100,000) and in 2012 there were 66 cases (1.4/100,000), a decline of almost 88%. In 2017, however, the number of cases increased to 76 (1.6/100,000), 11 fewer than in the previous year (n=87) (1.8/100,000).

Most cases in 2017 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 cases is considered a possible case.

Of the 76 cases notified in 2017, 70 (92.1%) were case classified as confirmed, two as probable (2.6%) and four (5.3%) as possible. Of the 70 confirmed cases, 38 (54.3%) were confirmed by PCR testing alone and another 15 confirmed cases (21.4%) were diagnosed by culture of sterile specimens alone. Of the remaining 17 (24.2%) confirmed cases, all were diagnosed by both culture and PCR testing of sterile specimens. Three confirmed cases had additional laboratory tests undertaken resulting in positive CSF microscopy test results. Of the two probable cases reported, both of whom met the clinical criteria, one had a positive eye culture result, the other a positive CSF microscopy test result. Of the four possible cases, three with conjunctivitis had positive eye culture results and the remaining case with septicaemia had no positive test reported.

In 2017, male cases (n=31) were fewer in number than female cases (n=39), resulting in a male to female ratio of 0.79:1, a change from the annual pattern observed since 2001. IMD cases in 2017 ranged in age from one month to 88 years (median age of 13.4 years).

Age specific incidence rate (ASIR) was highest among infants <1 year of age (24.1/100,000; n=15), followed by children in the 1 to 4 years (5.6/100,000; n=15), and 15 to 19 year (3.3/100,000; n=10) age groups (Table 1, Figure 1).

Figure 2 presents the number of IMD cases by gender and age group between 1999 and 2017 and shows 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. There is however, some evidence in recent years of an increase, albeit relatively small, in the number of female cases in the 25+ age group (Figure 2).

At regional level, incidence was highest in the HSE MW area (3.6/100,000) and lowest in the HSE NW area (0.8/100,000) (Table 2). HSE E had an incidence rate that was significantly below the national rate (Figure 3).

There were three imported cases identified in 2017, (one each from Spain (aged 1-4 years, serogroup B), United States (aged 10-14 years, serogroup C) and United Kingdom (aged 85+ years, serogroup C)).

In January 2017, a cluster of two cases was reported in HSE South, both aged <10 years with a serogroup B infection; both siblings recovered.

Peak incidence of IMD is typically in the winter months. Apart from the years 2003, 2013, 2014 and 2016, IMD cases have tended to occur most frequently in the first quarter of each calendar year, including 2017 (Figure 4).

Ethnicity details were poorly collected, but most cases of IMD occurred in cases whose ethnic background was described as 'White' (27.6%; n=21/76) followed by 'Irish Traveller' (2.6%; n=2), 'Roma' (1.3%; n=1) and 'not known'/not specified (68.4%; n=52).

Neisseria meningitidis serogroup C was the pathogen most commonly associated with IMD in 2017 and accounted for 30 of the 76 (39.4%) notifications, followed very closely by serogroup B with 29 cases (38.2%), the first year that this has been observed. The reduced numbers of serogroup B in 2017 represents a continuation of the steady downward trend since 1999 and is in marked contrast to the period between 2002 and 2016 when serogroup B accounted for more than 80% (n=1793/2191) of all IMD notifications (Figure 5).

Figure 5 presents the distribution of serogroups by age group over the period 1999 to 2017: it shows the highest frequency of serogroup B and C cases in the <1, 1-4 and 15-19 year age groups. For MenW135 this frequency distribution is similar except for the 15-19 year age group and for serogroup Y the frequency was highest in the 15-19 and 65+ year age groups.

There were seven IMD related notified deaths in 2017 (case fatality ratio of 9.2%) (age range 3 months to 91 years) (Table 1). Four of the deaths were attributable to a serogroup C infection (all of whom died from their infection and were unvaccinated), two to a serogroup B infection (cause of death was either not specified or is pending) and one case with a serogroup W infection and is awaiting a coroner's report at the time of writing.

IMD due to serogroup C 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 and 30 in 2017 (Table 3). Of the cases in 2017, 23 (76.7%) were unvaccinated (aged between 1 month and 91 years), four were complete vaccine failures (two aged 2-11 years with three doses received and two aged 18-19 years with one dose received after the age of 12 months), one was an incomplete vaccine failure (aged 13 months, two doses received at 4 and 12 months of age) and the vaccination status of the remaining two cases were unknown (aged 16-19 years) (Table 4).

In spite of the marked reduction in the overall incidence in the past decade, it is clear that due to its associated severity, high mortality rate and serious adverse sequelae, IMD still poses a serious public health concern. The best prevention for IMD is effective vaccination (1, 2).

Waning immunity to serogroup C disease was reported in studies undertaken in the United Kingdom following infant vaccination in early childhood. In addition, protection given by vaccination at 12 months was found to wane by the teenage years, but vaccination later in childhood provides higher levels of antibody that persist for longer (3-6). Meningococcal C conjugate (MCC) vaccination has been shown to significantly reduce nasopharyngeal carriage of the serogroup C meningococcus, providing indirect protection through herd immunity (7-8). The upward trend in serogroup C numbers started back in 2014 may reflect a decline in this herd immunity.

An adolescent booster MCC dose was introduced in Ireland in September 2014. Since October 2016, the primary childhood immunisation (PCI) schedule consists of one dose at six months of age and booster vaccines are recommended at 13 months and 12-13 years of age. A child who has had MCC (or MenACWY) vaccine at 10 years or older does not need an adolescent booster because adequate levels of antibody should persist until adulthood (http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/chapter13.pdf).

In 2012, Bexsero®, a recombinant multicomponent vaccine (4CMenB) against serogroup B disease was approved by the European Medicines Agency. In Ireland, the PCI schedule were updated in July 2016 so that all infants born on or after 1st October 2016 receive one dose given at two, four and 12 months of age (https://www.hse.ie/eng/health/immunisation/infomaterials/newsletter/newsletter23.pdf). In 2017, one incomplete vaccine failure was reported in a three month old who received one dose of the vaccine, the patient recovered.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 2nd October, 2018. 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/

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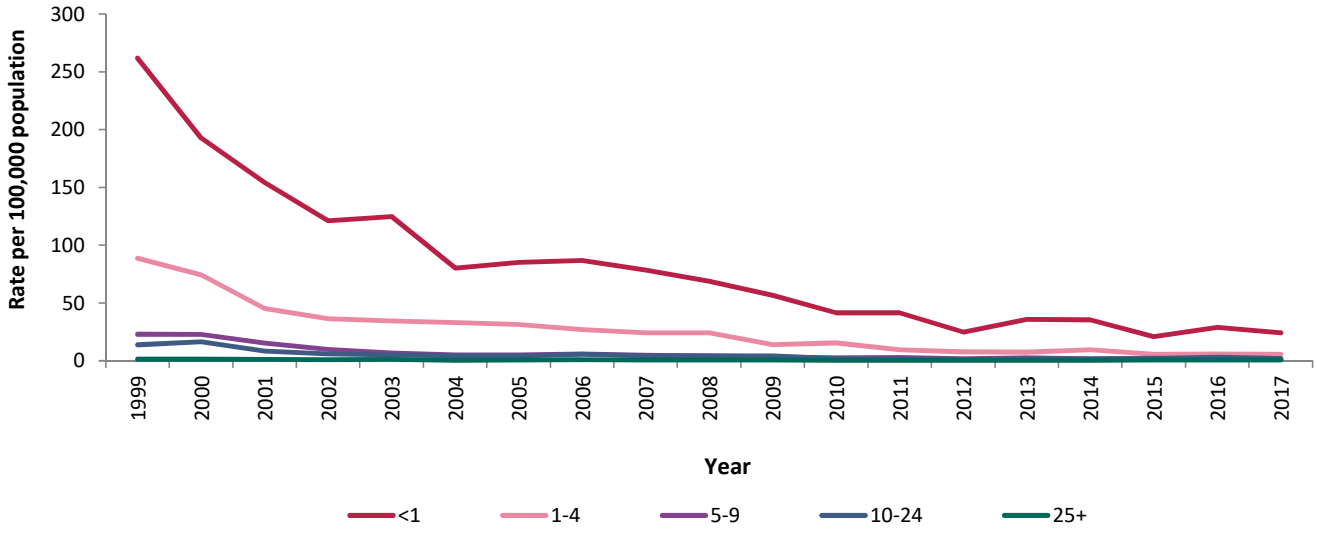

Figure 1. Age-specific rates per 100,000 population for invasive meningococcal disease (IMD), Ireland, 1999-2017

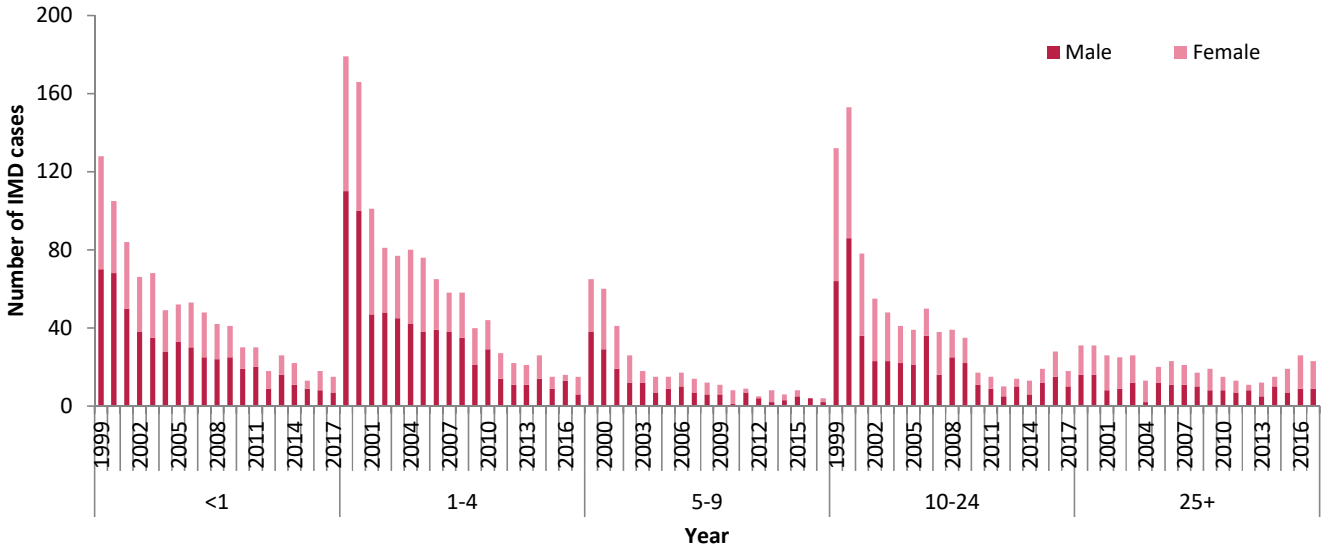

Figure 2. Number of IMD cases by gender and age group in Ireland, 1999-2017 (excludes one IMD case with unknown gender in 2009)

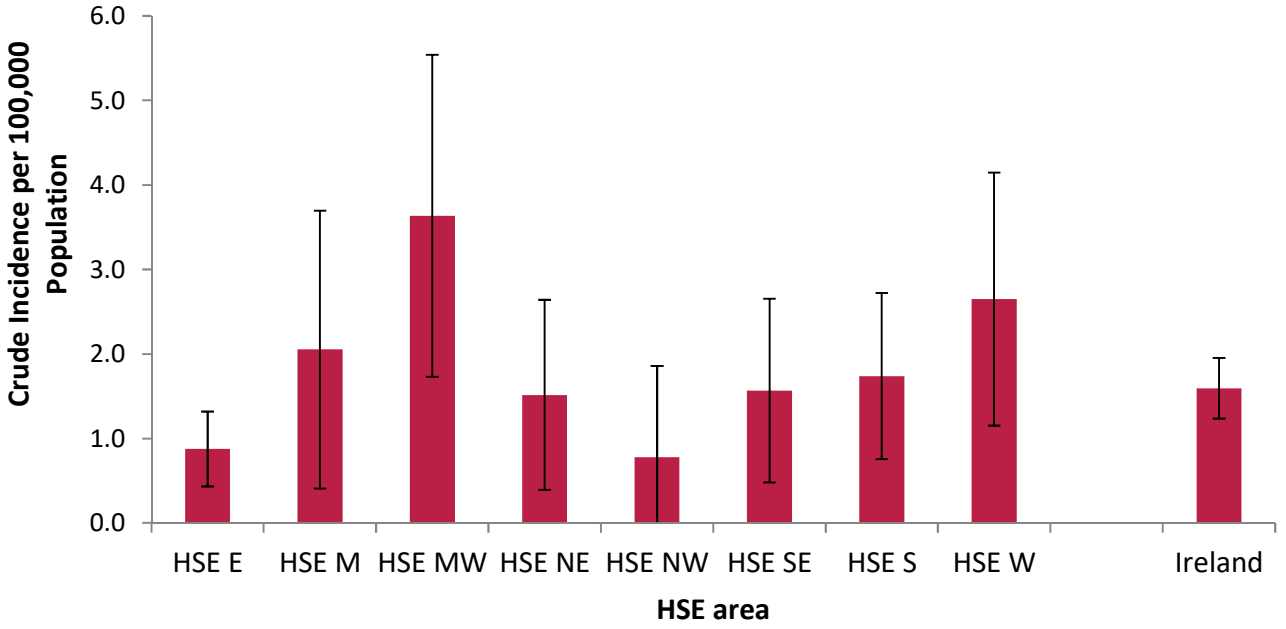

Figure 3. **Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, Ireland, 2017**

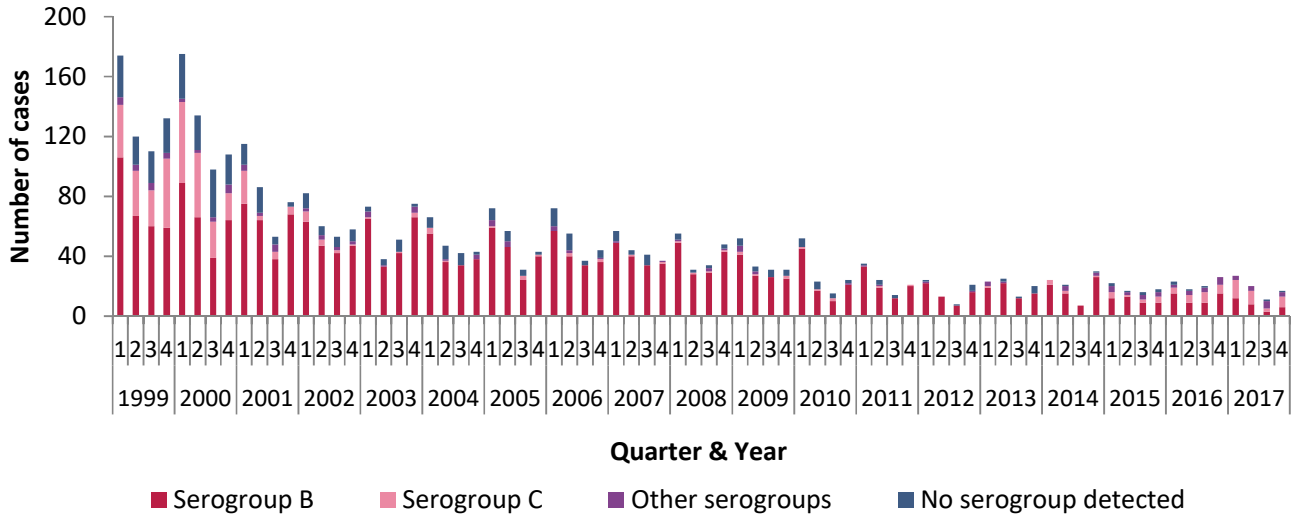

Figure 4. **Number of IMD cases by quarter and serogroup, Ireland, 1999-2017**

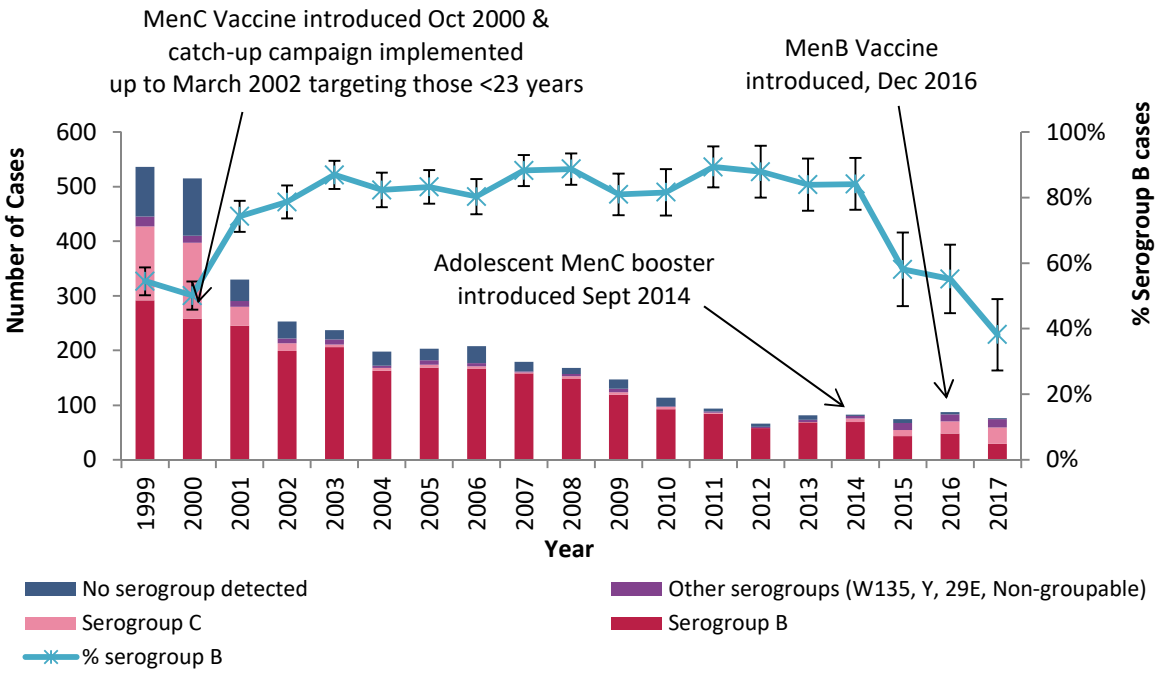

Figure 5. Number of IMD notifications by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, Ireland, 1999-2017

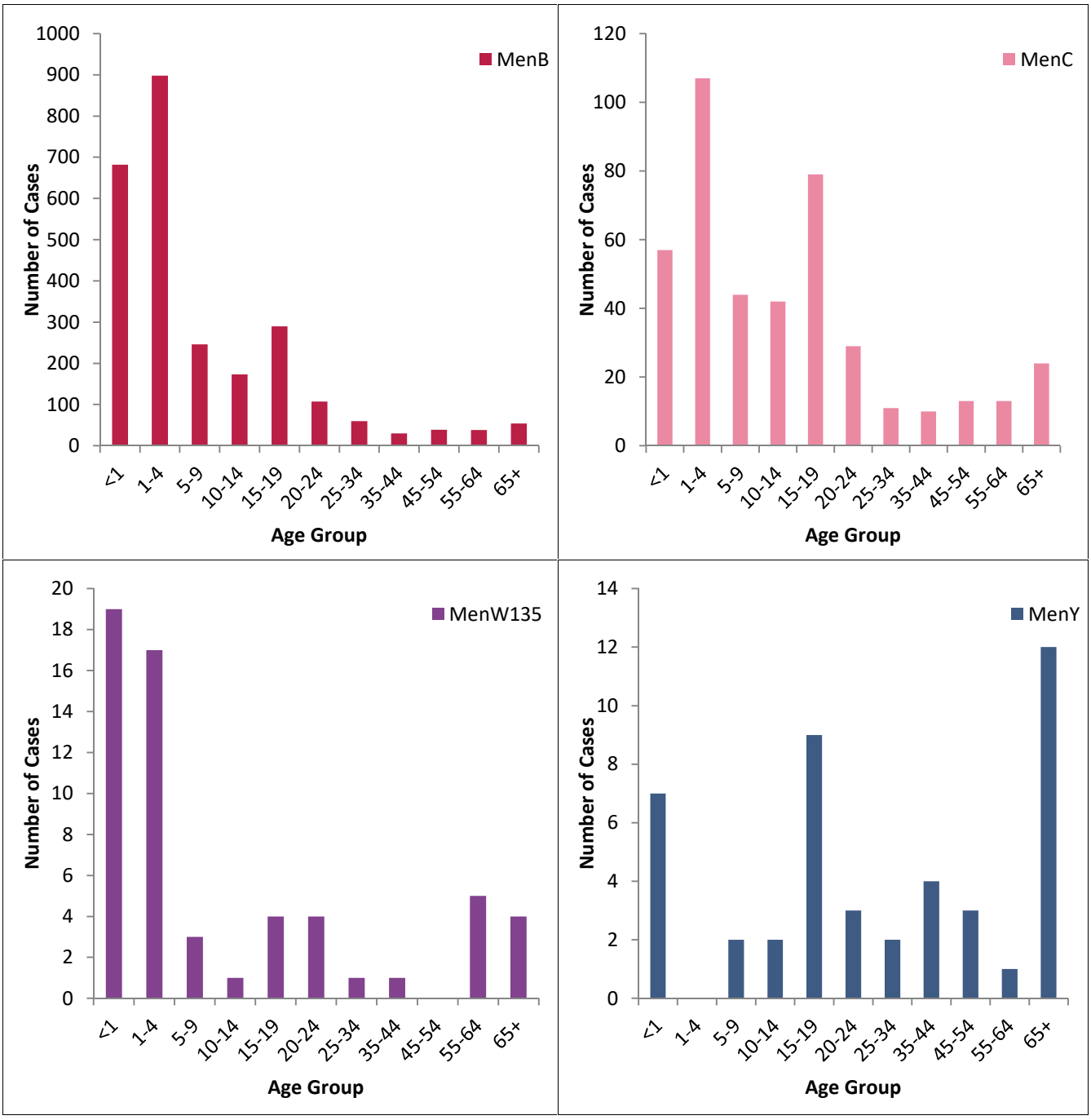

Figure 6. Distribution of IMD notifications by serogroup and age group in Ireland, 1999-2017

Table 1. Number of cases, deaths, age-group specific incidence rates per 100,000 population and case fatality ratios of IMD, Ireland, 2017

Age Group	No. Cases	ASIR	No. Deaths	%CFR
<1	15	24.1	0	0.0%
1-4	15	5.6	1	6.7%
5-9	4	1.1	1	25.0%
10-14	4	1.3	0	0.0%
15-19	10	3.3	0	0.0%
20-24	4	1.5	1	25.0%
25+	24	0.8	4	16.7%
All ages	**76**	**1.6**	**7**	**9.2%**

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, 2017

HSE Area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
HSE E	17.6	1.0	0.8	0.9	2.9	0.0	0.4	0.9
HSE M	25.6	5.6	0.0	0.0	0.0	6.7	1.6	2.1
HSE MW	40.6	4.8	3.5	3.8	11.6	0.0	2.3	3.6
HSE NE	30.8	13.7	0.0	0.0	0.0	4.4	0.0	1.5
HSE NW	31.5	0.0	0.0	0.0	5.8	0.0	0.0	0.8
HSE SE	30.9	10.5	0.0	2.7	3.0	3.9	0.0	1.6
HSE S	22.7	7.9	4.0	0.0	2.3	2.6	0.6	1.7
HSE W	17.4	8.1	0.0	3.3	3.5	0.0	2.3	2.6
Ireland	24.1	5.6	1.1	1.3	3.3	1.5	0.8	1.6

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 and C diseases, Ireland, 1999-2017

	Meningococcal B				Meningococcal C				
Year	No. Cases	No. Deaths	%Total Cases	%CFR	No. Cases	No. Deaths	%Total Cases	%CFR	Total Cases
1999	292	12	54.5	4.1	135	5	25.2	3.7	536
2000	258	13	50.1	5.0	139	11	27.0	7.9	515
2001	245	8	74.2	3.3	35	3	10.6	8.6	330
2002	199	8	78.7	4.0	14	0	5.5	0.0	253
2003	206	11	86.9	5.3	5	1	2.1	20.0	237
2004	163	7	82.3	4.3	5	1	2.5	20.0	198
2005	169	5	83.3	3.0	5	0	2.5	0.0	203
2006	167	5	80.3	3.0	4	0	1.9	0.0	208
2007	158	6	88.3	3.8	2	0	1.1	0.0	179
2008	149	6	88.7	4.0	4	1	2.4	25.0	168
2009	119	6	81.0	5.0	5	0	3.4	0.0	147
2010	93	4	81.6	4.3	4	0	3.5	0.0	114
2011	84	2	89.4	2.4	2	0	2.1	0.0	94
2012	58	1	87.9	1.7	0	0	0.0	0.0	66
2013	68	4	84.0	5.9	1	0	1.2	0.0	81
2014	69	3	84.1	4.3	6	1	7.3	16.7	82
2015	43	2	58.1	4.7	11	0	14.9	0.0	74
2016	48	2	55.2	4.2	22	1	25.3	4.5	87
2017	29	2	38.2	6.9	30	4	39.5	13.3	76

%CFR, case fatality ratio

Table 4. Details of the Serogroup C cases notified in 2017 including age group, outcome and age at vaccination

Case No.	Age Grp	Outcome	Vaccination Status	No. doses given	Age (years) since last vaccination
1	<1	Recovering	Unvaccinated	0	.
2	<1	Not known	Unvaccinated	0	.
3	<1	Still ill	Unvaccinated	0	.
4	<1	Recovering	Unvaccinated	0	.
5	<1	Recovering	Unvaccinated	0	.
6	1-4	Died	Unvaccinated	0	.
7	1-4	Recovered	Incomplete	2	0.8
8	1-4	Recovering	Complete	3	2.3
9	10-14	Recovered	Complete	3	10.8
10	15-19	Recovering	Unvaccinated	0	.
11	15-19	Recovered	Complete	1	16.6
12	15-19	Recovering	Complete	1	16.3
13	15-19	Recovering	Unknown	.	.
14	15-19	Recovered	Unknown	.	.
15	20-24	Recovering	Unvaccinated	0	.
16	20-24	Died	Unvaccinated	0	.
17	40-44	Recovering	Unvaccinated	0	.
18	40-44	Died	Unvaccinated	0	.
19	45-49	Still ill	Unvaccinated	0	.
20	50-54	Not Specified	Unvaccinated	0	.
21	55-59	Recovering	Unvaccinated	0	.
22	60-64	Recovered	Unvaccinated	0	.
23	65-69	Recovering	Unvaccinated	0	.
24	70-74	Not known	Unvaccinated	0	.
25	70-74	Not known	Unvaccinated	0	.
26	75-79	Recovered	Unvaccinated	0	.
27	80-84	Recovering	Unvaccinated	0	.
28	85+	Recovering	Unvaccinated	0	.
29	85+	Recovering	Unvaccinated	0	.
30	85+	Died	Unvaccinated	0	.