Version 1.0

Invasive Pneumococcal Disease in Ireland

A bi-annual report by the Health Protection Surveillance Centre
and the Irish Pneumococcal Reference Laboratory at the Department of Clinical Microbiology,
Royal College of Surgeons in Ireland, Education and Research Centre,
Beaumont Hospital and the Children's University Hospital, Dublin

Quarters 3-4, 2018 & Annual Data provisional

17th May 2019

Key Facts

- In Q3-Q4 2018, 198 cases were notified, the highest number of cases reported for this period since 2008
- In 2018, 510 IPD notifications in total were made, exceeding for the second year in a row the number of cases notified in 2008
- The number of IPD cases due to PCV13 serotypes in patients aged <5 years declined by 93% in 2018 compared with 2008
- Emergence of serotypes not included in the pneumococcal conjugate vaccines continues, predominantly in older age groups

ACKNOWLEDGEMENTS

Sincere thanks to all for providing data for this report and for contributing to the surveillance of IPD in Ireland.

BACKGROUND

Streptococcus pneumoniae (S. pneumoniae), the causative organism for invasive pneumococcal disease (IPD) is a notifiable disease in Ireland. IPD notification data are collated on the Computerised Infectious Disease Surveillance (CIDR) system. Enhanced surveillance of IPD notifications is undertaken by Departments of Public Health.

Surveillance of *S. pneumoniae*, from the perspective of antimicrobial resistance, is undertaken by the European Antimicrobial Resistance Surveillance Network (EARS-Net), a collaboration involving microbiology laboratories and HPSC. Some participating laboratories also collect additional information as part of the enhanced surveillance of bloodstream infections, which is reported to HPSC. Quarterly EARS-Net reports by HPSC are available at http://www.hpsc.ie

Since August 2012 Ireland (HPSC) is participating in a European Centre for Disease Prevention and Control (ECDC) and European Commission projects called SpID-Net and I-Move+ respectively. One of the aims of these networks is strengthening or setting up long term active population-based IPD surveillance to estimate the impact of the pneumococcal conjugate vaccines in children less than five years and in older populations (those aged 65 and over) in Europe. In 2019 HPSC has been invited to participate in a collaborative project between the World Health Organization (WHO) and International Vaccine Access Centre (IVAC) at Johns Hopkins Blomberg School of Public Health (JHSPH) in the USA called PSERENADE (Pneumococcal Serotype Replacement and Distribution Estimation). This project aims to assess the impact of pneumococcal conjugate vaccine (PCV) on IPD incidence and serotype distribution in the setting of mature PCV10/PCV13 programmes on a global level.

Since April 2007, the National Pneumococcal Typing Project, (now referred to as the Irish Pneumococcal Reference Laboratory), has been offering a typing service to Irish laboratories for all invasive *S. pneumoniae* isolates submitted. This is a collaborative project involving the Royal College of Surgeons in Ireland Education and Research Centre, Beaumont Hospital, Children's Health Ireland (CHI) at Temple Street and the Health Protection Surveillance Centre.

In September 2008, the 7-valent pneumococcal conjugate vaccine (PCV7) was introduced in Ireland to the infant schedule at 2, 6 and 12 months of age. A catch-up programme was also implemented at the time for children <2 years of age. In December 2010, PCV13 replaced PCV7 in the infant immunisation schedule. In December 2016, after the introduction of the Men B vaccine to the routine immunisation schedule, the third dose of PCV13 is given at 13 months of age. PCV7 vaccine covers the following serotypes: 4, 6B, 9V, 14, 18C, 19F, 23F. The additional six serotypes included in PCV13 are: 1, 3, 5, 6A, 7F and 19A.

The case definition was changed in July 1st, 2015 and since that date possible cases, confirmed by urinary antigen (Ag) testing, are no longer notifiable.

This report focuses on the epidemiology of IPD based on notification data for 2018, especially Q3-Q4 2018 data. These data were extracted from CIDR on 17th May 2019. Data from the Irish Pneumococcal reference Laboratory are also presented.

RESULTS

Notification Data – Q3-Q4, 2018

There was an increase in the number of IPD cases notified in Q3-Q4, 2018 compared with the same period for 2017. One hundred ninety-eight cases were notified in 2018 compared with 170 for same period in 2017 (fig. 1). In Q3-Q4, 2018 all notified cases were classified as confirmed; 100%, n=198 (figure 1). More cases occurred in males (n=103) than in females (n=95). Cases ranged in age from 6 months to 93 years, with a median age of 63 years. Twenty-six of the IPD cases notified had an outcome reported as 'died': the cause of death was reported as due to IPD (n=10), not due to IPD (n=4) and for the remaining twelve deaths, it was either unknown, or not recorded. All reported deaths due to IPD occurred in adults.

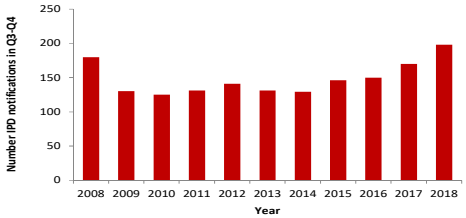


Figure 1. Number of confirmed IPD cases in Ireland in Q3-Q4, 2008-2018

Annual Notification Data – 2018

Key stats on IPD notifications in 2018

Number of confirmed cases notified:	510
Incidence per 100,000	10.7
Number of males:	245
Number of females:	265
Male: Female ratio:	0.9
Age range:	1month – 95 years
Median age:	66 years
Highest age-specific incidence rate:	≥65-year olds (41.6/100,000)
Number of IPD related deaths:	73*

* includes 45 who died due to IPD and 28 potential IPD related deaths (cause of death was not specified).

Trends in IPD notifications

There was an increase in the number of IPD cases in 2018 compared with 2017 (510 versus 415 cases). The number of notifications also increased in 2018 compared with 2008 (26.2%) (Table 1). This increase is related to an increase in the number of cases with non PCV serotypes due to serotype replacement.

Compared with 2017, there was an increase in the number of IPD cases in all quarters, except Q3, of 2018. The number of cases increased by 24.6%, 31.1%, 25.2% in Q1, Q2 and Q4, respectively (Table 1). The highest increase in number of IPD cases was observed in Q1, Q2 and Q4 and coincided with the period of high influenza incidence during the 2017-18 influenza season. In Q3, the number of cases did not change in 2018 when compared to 2017.

Table 1. Number of confirmed cases by quarter, 2008-2018

	Q1	Q2	Q3	Q4	Total
2008	113	111	75	105	**404**
2009	133	93	47	82	**355**
2010	95	83	39	84	**301**
2011	112	110	58	69	**349**
2012	118	88	49	92	**347**
2013	118	95	52	79	**344**
2014	118	104	39	88	**349**
2015	118	105	65	80	**368**
2016	133	98	53	97	**381**
2017	142	103	55	115	**415**
2018	177	135	54	144	**510**

An increase in the number of IPD cases was seen in all age groups in 2018 compared with 2017, except the 5-14, and 25-44 year age groups (Table 2). The greatest decline has been seen in the 0-4 and 25-44 year age groups, where the burden of illness fell by 32.4% and 29.2% respectively, in 2018 compared with 2008 (Table 2).

Further details according to year, age groups and HSE area are provided in the Appendix (Tables A1.1-4).

Table 2. Number of IPD cases by age group, 2008-2018

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	% Decrease*
0-4	71	52	35	41	43	38	37	35	42	41	48	17.1
5-14	7	15	3	12	12	8	16	18	14	13	12	-7.7
15-24	11	13	8	6	8	7	5	4	6	8	14	75
25-44	72	44	36	50	38	39	40	41	49	52	51	-1.9
45-64	83	75	72	80	70	81	84	81	83	94	120	27.6
65+	160	156	147	160	176	171	167	189	187	207	265	28
Total	**404**	**355**	**301**	**349**	**347**	**344**	**349**	**368**	**381**	**415**	**510**	**22.9**

*2018 compared with 2017

Notifications with typing data

Of the 510 confirmed IPD notifications reported to CIDR in 2018, 23 cases were confirmed by PCR only. Overall 422 isolates were sent for typing (86.6%). In the 0-4 years age group, 91.2% (31/34) of confirmed cases had an isolate sent for typing. Overall, for 14 cases (14/48) in this age group an isolate was unavailable, and the diagnosis was confirmed by PCR alone.

Based on the 422 confirmed IPD notifications where typing data are available, the eight most common serotypes were 8, 19A, 12F, 9N, 22F, 3, 23B and 35B, accounting for 68.5% (n=289/422) of the typed isolates (figure 2). An increase in all these serotypes was observed in 2018 compared with 2008. An almost two-fold increase was seen in serotype 3, a three-fold increase in serotypes 22F, 19A and 9N, four-fold increase in serotypes 8 and 12F and five-fold increase in serotype 35B. The number of cases of serotype 14 decreased by 97.6% (42 to 1 cases) compared to 2008. Compared with 2017, the number of cases for all these serotypes increased from 244 (2017) to 289 (2018). A major increase was seen in serotypes 8, 19A, 12F, 23B, 22F and 35B; a small increase up to 10% in serotype 9N and 3 was observed (figure 2).

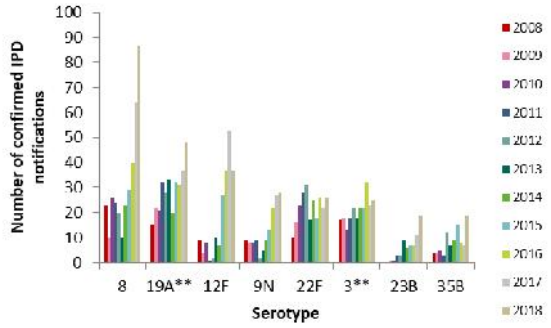


Figure 2. Number of confirmed IPD notifications by serotype, 2008-2018, based on the eight most common serotypes notified in 2018

* Denotes serotypes in PCV7 and PCV13

** Denotes serotypes in PCV13

The number of confirmed cases in children under five years of age in 2018 was low, i.e. just 29 of the 422 typed cases, the predominant serotypes were 23B (n=6), 15B/C and 19A (n=3 each serotype), 10A, 12F, 22F, 24F and 33F (n=2 each serotype). This was followed by 15A, 16F, 23A, 3, 8, 9N, NT- each of which accounted for just one case. Serotype 19A is included in the PCV13 vaccine (figure 3). There were few of these serotypes in the age group 5 to 24 years. Prior to the introduction of PCV7, serotypes 4, 14, 23F and 18C were the predominant serotypes in this age group, but these serotypes no longer feature in the most commonly reported serotypes. In the elderly (65 years of age and older) the predominant serotypes in 2018 were 19A (n=36), 8 (n=34), 12F and 3 (n=19 each serotype), 9N (n=16) followed by 35B (n=14), 22F (n=11) and 15A (n=10) (figure 3).

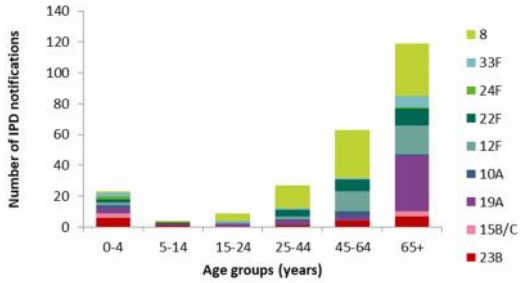
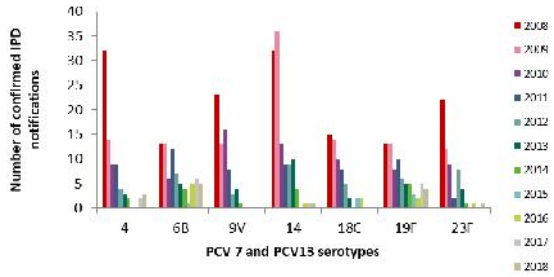


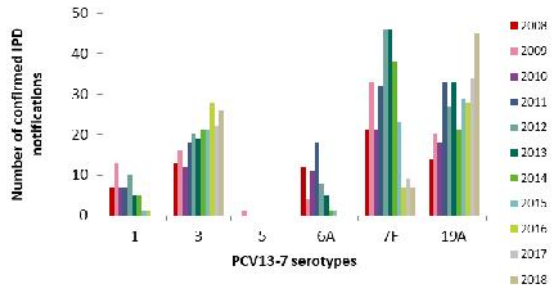
Figure 3. Number of confirmed IPD notifications by age group in 2018, for the nine most common serotypes.

Since the introduction of PCV7 in late 2008, the overall number of cases of IPD notifications due to each of the seven serotypes in the vaccine has declined. The most notable reductions have been seen with serotypes 9V, 14, 18C and 23F. The number of notified cases caused by 19F serotype in 2016 decreased gradually compared with 2008 but increased in 2017 and similarly in 2018 (figure 4a).

Compared with 2017, a decrease in three of the serotypes covered by PCV13-7 was seen in 2018, i.e. 7F, 1 and 6A. However, an increase in serotypes 3 and 19A was observed (figure 4b).



4a.



4b.

Figure 4. Number of confirmed IPD notifications by serotype, 2008-2018, based on the seven serotypes covered by PCV7 and PCV13 (4a) and the six additional serotypes covered by PCV13 (4b)

Impact of PCV13 in ≤ 5 years olds

Based on typing data obtained from the Irish Pneumococcal Reference Laboratory, the cumulative number of IPD isolates due to PCV13 serotypes from patients <5 years of age declined by 93% in 2018 compared with 2008 (figure 5). The number of IPD cases due to PCV13 serotypes has declined in all age groups, except those aged 5 years and older; an overall decrease of 4% in infections associated with the six additional serotypes in PCV13 was also observed. However, an increase in non-PCV13 serotypes has been seen in all ages, including those < 5 years (Table 4). Further information on the impact of PCV on IPD can be found on the HPSC website at www.hpsc.ie.

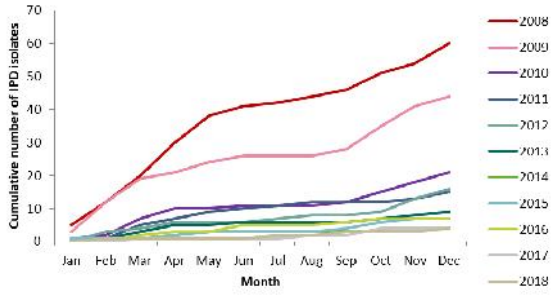


Figure 5. Cumulative number of IPD isolates due to serotypes covered by PCV13 among children <5 years of age, by month and by year, 2008-2018
Data Source: CIDR and IPRL database

Enhanced Surveillance

Since 2014 enhanced IPD surveillance in all IPD cases has been undertaken and the data in this section focuses on all age groups in 2018 (n=510 cases).

Bloodstream infection was the most common clinical presentation (n=397), 325 (81.9%) of these also presented with pneumonia. Twenty-four cases presented only with meningitis. Seventeen cases had both meningitis and bloodstream infection.

Three hundred and fifty-five (n=355/510; 69.6%) cases were reported as having an underlying medical risk factor predisposing them to IPD infection; with chronic lung, heart disease and immunosuppression being the most common (n=136, n=118 and n=82, respectively). For 86 cases there was no recognised risk factor; information on risk factors was unknown or not reported for 37 cases.

Based on currently available data, two potential vaccine failures due to serotypes 3 and 19A (both included to PCV13) occurred in vaccinated children in 2018. (Table 3).

Table 3. Number of vaccine failures by serotype, 2009-2018

	Vaccine failures	Serotype
2009	0	-
2010	2	14, 19F
2011	0	-
2012	2	19A,19F
2013	3	19A
2014	2	19A
2015	2	19A
2016	2	19A, 7F
2017	2	6B,3
2018	2	3,19A

DISCUSSION

There was an increase in the number of IPD notifications in 2018 compared with 2017. The number of confirmed IPD cases increased in 2018 compared (510 vs. 415) to 2017. Increases in the number of IPD notifications were seen in all age groups, except age groups 5-14 and 25-44 years.

During 2018 increases in the number of cases of IPD infections due to serotypes 8, 19A, 12F, 23B, 22F and 35B were observed.

The number of IPD cases due to the serotypes covered by PCV7 has declined since introducing PCV7 in 2008 with the most marked reduction seen in children <5 years of age, where the number of IPD cases has declined by 100%.

PCV13 was introduced to the infant schedule at the end of 2010. The impact of this vaccine is evident but the reduction in IPD cases due to the additional six serotypes is currently less (71%) than that due to PCV7 in children <5 years of age. It is anticipated that as each new birth cohort avails of PCV13, the incidence of IPD due to the additional six serotypes covered by the vaccine will decline. PCV13 includes serotype 19A, which has emerged as a leading cause of IPD in Ireland, particularly in older adults.

The proportion of IPD notifications for which isolates were sent to the Irish Pneumococcal Reference Laboratory for typing is higher in 2018 (86.6%) to the proportion sent in 2017 (85.0%), however, in view of the increased number of IPD cases in 2018 more isolates were sent to the laboratory.

It is important to continue to accurately monitor the impact these vaccines have on invasive pneumococcal disease and the serotype distribution of cases in Ireland. It is especially important that laboratories continue to seek to culture all sterile site samples and send all invasive isolates for typing to the Irish Pneumococcal Reference Laboratory.

Since January 2014 the National Immunisation Advisory Committee (NIAC) of the Royal College of Physicians has recommended that individuals of all ages at high risk of invasive pneumococcal disease (including those with asplenia and related conditions, immunosuppressive conditions, solid organ transplant recipients and post haemopoietic stem cell, and cochlear implant patients) should receive PCV in addition to PPV (pneumococcal polysaccharide vaccine). Further detail is available at www.immunisation.ie. Enhanced data collection on adults, to identify risk factors for IPD is actively encouraged to determine how much IPD occurring in adults could be averted if all individuals with high-risk conditions were vaccinated.

Table 4. Total number of IPD isolates typed in 2008 and 2018 and percentage changed in burden of IPD since introducing PCV7
Data Source: Irish Pneumococcal Reference Laboratory
PCV7 serotypes: 4, 6B, 9V, 14, 18C, 19F and 23F; **PCV13-7 serotypes**: 1, 3, 5, 6A, 7F, 19A

	PCV 7 serotypes			PCV 13-7 serotypes			non-PCV13 serotypes			All serotypes		
	<5yrs	≥5yrs	All ages	<5yrs	≥5yrs	All ages	<5yrs	≥ 5yrs	All ages	<5yrs	≥ 5yrs	All ages
2008 Jan-Dec	46	133	179	14	70	84	7	105	112	67	308	375
2018 Jan -Dec	0	16	16	4	76	81	22	291	315	26	383	412
%change	**-100**	**-88**	**-91**	**-71**	**9**	**-4**	**214**	**177**	**181**	**-61**	**24**	**10**

Notes regarding the Surveillance of Invasive Pneumococcal Disease

Laboratories

1. All cases of IPD diagnosed are notified in a timely manner to the relevant Department of Public Health.
2. All invasive *S. pneumoniae* isolates are submitted to Dr Mary Corcoran, Irish Meningitis & Sepsis Reference Laboratory, Children's Health Ireland (CHI) at Temple Street, Temple Street, Dublin, D01 YC67 for typing.
3. Data on antimicrobial resistance profiles of invasive *S. pneumoniae* isolates are reported via the EARS-Net project.

Departments of Public Health

1. All IPD cases notified are inputted to CIDR.
2. An enhanced surveillance form is completed for each notification of IPD in children born in or since 2000. Enhanced surveillance in older cases is also encouraged. The latest version of this form is available at http://www.hpsc.ie/A-Z/VaccinePreventable/PneumococcalDisease/SurveillanceForms/File,3206,en.pdf.
3. Enhanced data should be inputted to CIDR for all IPD events where information is available.
4. The vaccination status of IPD cases in children born since September 2006 (the age group targeted by catch-up or infant schedule) is ascertained and details entered on CIDR. Determining vaccination status is essential for cases where infection is due to a serotype covered by PCV13 (i.e. 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F), so that any potential PCV vaccine failures can be identified.

Appendix 1

Table A1.1. Number of IPD events by year, quarter and age group (years), Q1-2008 to Q4-2018

Age groups	2008				2009				2010				2011				2012				2013				2014				2015				2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
0-4	23	23	8	17	22	11	2	17	8	13	2	12	12	11	3	15	13	9	8	13	7	16	5	10	12	13	1	11	10	5	6	14	6	11	13	12	8	9	6	18	15	9	9	15
5-9	1	0	1	0	2	0	1	7	0	0	0	2	4	1	1	4	2	2	1	4	4	3	0	1	3	2	1	8	4	7	0	3	4	3	0	3	4	3	3	0	4	0	2	1
10-14	1	0	2	2	1	0	2	2	1	0	0	0	0	1	1	0	1	0	0	2	0	0	0	0	1	0	1	0	1	1	1	1	1	1	0	2	1	2	0	0	3	2	0	0
15-24	3	4	0	4	4	1	1	7	4	1	1	2	1	2	2	1	4	2	0	2	1	4	1	1	1	2	1	1	3	1	0	0	2	1	3	0	1	4	0	3	4	4	1	5
25-34	5	8	1	4	7	7	5	1	5	6	0	4	6	3	1	5	8	4	1	1	6	5	2	4	7	3	0	5	2	4	2	5	4	3	0	2	9	2	3	4	6	11	3	5
35-44	17	10	12	15	9	5	2	8	3	10	3	5	19	9	4	3	6	8	4	6	9	6	6	1	8	7	3	7	8	6	8	6	17	7	8	8	11	9	3	11	10	5	4	7
45-54	10	13	3	6	10	9	4	8	11	7	8	8	11	13	5	4	8	7	2	6	6	8	5	5	10	13	3	6	9	8	3	5	6	6	3	9	13	4	7	7	8	13	8	13
55-64	13	11	12	15	16	15	4	9	13	9	4	12	13	18	10	6	19	8	7	13	21	7	14	15	20	15	4	13	18	17	12	9	21	19	5	14	17	16	10	20	25	26	4	23
65+	40	42	36	42	62	45	26	23	50	37	21	39	46	52	31	31	57	48	26	45	64	46	19	42	56	49	25	37	63	56	33	37	72	47	21	47	78	54	23	52	102	65	23	75
All ages	**113**	**111**	**75**	**105**	**133**	**93**	**47**	**82**	**95**	**83**	**39**	**84**	**112**	**110**	**58**	**69**	**118**	**88**	**49**	**92**	**118**	**95**	**52**	**79**	**118**	**104**	**39**	**88**	**118**	**105**	**65**	**80**	**133**	**98**	**53**	**97**	**142**	**103**	**55**	**115**	**177**	**135**	**54**	**144**

Table A1.2. Number of IPD events by year, quarter and gender, Q1-2008 to Q4-2018

Gender	2008				2009				2010				2011				2012				2013				2014				2015				2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Male	66	70	44	58	83	46	31	42	57	49	24	36	60	67	30	36	59	50	28	45	68	50	23	38	53	55	27	47	58	54	39	43	72	55	31	49	65	59	31	52	74	68	32	71
Female	47	41	31	47	50	47	16	40	38	34	15	48	52	43	28	33	59	38	21	47	50	45	29	41	65	49	12	41	60	51	26	37	61	43	22	48	77	44	24	62	103	67	22	73
Total	**113**	**111**	**75**	**105**	**133**	**93**	**47**	**82**	**95**	**83**	**39**	**84**	**112**	**110**	**58**	**69**	**118**	**88**	**49**	**92**	**118**	**95**	**52**	**79**	**118**	**104**	**39**	**88**	**118**	**105**	**65**	**80**	**133**	**98**	**53**	**97**	**142**	**103**	**55**	**115**	**177**	**135**	**54**	**144**

Table A1.3. Number of IPD events by year, quarter and case classification, Q1-2008 to Q4-2018

Case classification	2008				2009				2010				2011				2012*				2013				2014				2015**				2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Confirmed	113	111	75	105	133	93	47	82	95	83	39	84	112	110	58	69	118	88	49	92	118	95	52	79	118	104	39	88	118	105	65	80	133	98	53	97	142	103	55	115	177	135	54	144
Probable	1	0	0	0	1	0	1	0	1	0	0	2	1	1	3	3	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*
Possible	13	19	7	20	34	12	8	21	23	28	13	23	21	17	12	18	26	17	14	23	81	113	41	58	124	102	46	59	110	70	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*
Total	**113**	**111**	**75**	**105**	**133**	**93**	**47**	**82**	**95**	**83**	**39**	**84**	**112**	**110**	**58**	**69**	**118**	**88**	**49**	**92**	**118**	**95**	**52**	**79**	**118**	**104**	**39**	**88**	**118**	**105**	**65**	**80**	**133**	**98**	**53**	**97**	**142**	**103**	**55**	**115**	**177**	**135**	**54**	**144**

*Note: From January 2012, the IPD case definition was revised and cases diagnosed on the basis of the detection of *S. pneumoniae* antigen from a normally sterile site and, previously classified as probable cases, were now included under the confirmed case classification. Since July 2015 possible cases are not notifiable.

Table A1.4. Number of IPD events by year, quarter and HSE area, Q1-2008 to Q4-2018

HSE area	2008				2009				2010				2011				2012				2013				2014				2015				2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
E	42	49	22	39	49	35	21	40	30	31	14	31	41	34	23	31	36	21	18	34	43	21	22	32	45	33	20	26	44	40	32	27	55	41	25	32	56	37	23	41	69	57	23	37
M	3	4	3	4	8	3	3	1	9	7	0	5	5	5	1	3	7	5	2	6	7	3	0	1	8	7	2	9	5	8	4	4	7	9	1	4	10	14	3	8	13	12	2	11
MW	14	8	6	12	11	9	1	5	8	8	5	11	11	11	4	8	12	8	9	11	12	8	6	6	10	9	4	7	8	12	4	7	14	5	4	8	12	8	2	11	15	12	4	9
NE	14	7	2	4	7	4	1	7	7	2	1	6	10	7	5	2	8	12	4	4	15	11	4	6	11	15	1	9	11	9	4	6	10	6	6	7	9	9	7	15	15	13	8	9
NW	10	5	5	6	5	8	4	0	6	3	1	2	2	10	5	6	8	6	4	5	8	8	4	7	6	8	0	6	7	3	2	7	2	5	1	9	12	4	2	10	6	6	4	5
SE	12	15	11	13	15	12	5	11	14	12	4	11	8	12	4	5	20	17	6	12	13	11	7	10	15	10	5	9	13	9	5	14	18	14	7	12	18	6	6	9	22	7	1	19
S	13	12	6	14	20	12	6	13	9	14	11	12	24	17	12	7	13	12	4	10	10	24	5	7	14	14	4	10	19	16	11	11	20	11	6	15	21	15	7	13	20	18	8	30
W	5	11	20	13	18	10	6	5	12	6	3	6	11	14	4	7	14	7	2	10	10	9	4	10	9	8	3	12	11	8	3	4	7	7	3	10	4	10	5	8	17	10	4	24
Total	**113**	**111**	**75**	**105**	**133**	**93**	**47**	**82**	**95**	**83**	**39**	**84**	**112**	**110**	**58**	**69**	**118**	**88**	**49**	**92**	**118**	**95**	**52**	**79**	**118**	**104**	**39**	**88**	**118**	**105**	**65**	**80**	**133**	**98**	**53**	**97**	**142**	**103**	**55**	**115**	**177**	**135**	**54**	**144**