Annual Epidemiological Report 2013

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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Introduction

As always, it is a pleasure to present the Health Protection Surveillance Centre epidemiological report which provides an analysis of the most important infectious diseases affecting Ireland during 2013.

The publication of this report has been slightly delayed due to the prioritisation of work to develop guidance in response to the Ebola epidemic in West Africa. At the time of writing the outbreak continues in West Africa, highlighting the continued need for vigilance related to emerging infectious diseases.

During 2013, measles continues to decline thanks to the continued improvement in uptake of the MMR vaccine and to the prompt investigation and control measures enacted by Departments of Public Health throughout the country. Four measles outbreaks were notified in 2013 with 20 cases occurring in a school outbreak in the South-East. 2013 was the first year in which we had no cases of rubella in Ireland. While the World Health Organization (WHO) requires full laboratory investigation of all suspected rubella cases to confirm elimination of rubella in Ireland, this is, nonetheless, an important milestone in the fight against infectious diseases.

In 2013 meningococcal disease increased by almost a quarter (23%) compared to levels reported in 2012. However, the numbers of cases have declined dramatically in comparison to those seen at the peak of meningococcal disease during the late 1990s. The new Men B vaccine was used in Ireland for the first time in 2013, to control an outbreak of meningitis in an extended Irish traveller family. There was no change in the incidence of confirmed cases of invasive pneumococcal disease (IPD) in 2013. Despite reductions in the IPD burden in childhood, increases in non PCV7 serotypes in other age groups continued. It is important that all IPD isolates are sent for typing to enable informed national decisions on pneumococcal vaccine selection.

1,835 cases of *Clostridium difficile* infection (CDI) were notified during 2013. This represents a national crude incidence rate of 41.3 cases per 100,000 population, which is similar to the rate reported in 2012 (41.1). The updated National Clinical Guidelines on the Surveillance, Diagnosis and Management of CDI in Ireland were published in 2013 and endorsed by the National Clinical Effectiveness Committee. The updated guidelines may be accessed on the HPSC website at: www.hpsc.ie/A-Z/Gastroenteric/Clostridiumdifficile/Guidelines/

Acute hospital use of alcohol-based hand rub increased by 10% in 2013 and biannual results of hand hygiene compliance audits continued to improve, although falling slightly short of a 90% compliance target set by HSE for 2013.

Data on antimicrobial consumption is mixed, with a reduction in hospital but an increase in the community and Ireland ranked seventh highest for outpatient consumption of 27 European countries with reliable data.

It is welcome to see that for the seventh consecutive year, the proportion of *S. aureus* blood stream infections attributable to MRSA further declined to 20.3%. Unfortunately, antimicrobial resistance in other pathogens, such as *Enterobacteriaceae* (e.g., *Escherichia coli* and *Klebsiella pneumoniae*) and *Enterococcus faecium* has increased. In 2013, the Antimicrobial Resistance and Microbial Ecology group at NUI Galway alerted the Health Protection Surveillance Centre (HPSC) to the detection of two multi-drug resistant *K. pneumoniae* clones causing both infection and colonisation in patients attending a number of Irish hospitals and a national outbreak control team was established in October 2013 to evaluate this emerging threat. In response to the changing epidemiology of these multi-drug resistant organisms, the guidelines for the prevention and control of multi-drug resistant organisms developed under the auspices of the Royal College of Physicians of Ireland were further updated in July 2014.

The report on influenza during the 2013/2014 season highlights once again the number of patients with underlying risk conditions who were admitted to hospital without a history of influenza vaccination and who were not treated with antivirals. This report also includes information on influenza vaccine uptake in hospitals and long term care facilities (LTCF). There was a seven percent increase in uptake in hospital staff to 24.4% and an 8.4% increased uptake in staff working in LTCF to 22.8%. These figures remain well below the target of 40% set by the Health Service Executive (HSE). However some individual hospitals and LTCF have exceeded the target demonstrating that with strong local leadership significant improvements are possible. Influenza continues to place a considerable burden on the health services each year and we need to improve on the uptake of influenza vaccine and the use of anti–viral agents in order to reduce influenza-related morbidity and mortality.

Most group A streptococcal infections cause relatively mild illnesses, such as acute sore throat, scarlet fever and impetigo. However, they can also cause severe illness. The increase in the number of cases of invasive group A streptococcal infection (iGAS) first noted in 2012 was maintained in 2013 and is noted in all parts of the country. Of the 168 patients with iGAS in 2013, 44 required ICU admission and 39 required surgery. There were 16 deaths where iGAS was considered either a main or contributory cause of death. Worldwide, increases in the severity of iGAS disease have been associated with increases in prevalence of emm types 1 and 3. These types now account for 53% of GAS isolates typed in Ireland in 2013. Ongoing surveillance is essential to enable early interventions for contacts and early detection of clusters.

The national rate of tuberculosis remained stable at 8.2 per 100,000 and the rate in the indigenous Irish population was also stable at 5.5 per 100,000. However outbreaks continue to occur with seven reported in 2012 and 12 in 2013, placing considerable pressure on public health departments.

Campylobacter is the commonest bacterial cause of gastroenteritis in Ireland and Europe. The high rate of broiler contamination with campylobacter continues to be a cause of concern. Ireland has the highest rate of cryptosporidiosis in Europe. Cryptosporidiosis is a disease of rural areas with animal contact and the use of non-public water supplies featuring among cases. This is similar to the epidemiology of verotoxigenic *E.Coli*, where we also, unfortunately, continue to have the highest reported rate in Europe.

Consumption of frozen berries was implicated as the source of a large multinational outbreak of hepatitis A in 2013 that affected Ireland as well as other countries in Europe. The Food Safety Authority of Ireland has issued advice to boil all imported frozen berries for at least one minute prior to consumption. More rare causes of food poisoning included a case of botulism associated with exposure to pet turtles/ turtle feed.

During 2013, 13 cases of Lyme neuroborreliosis were notified in Ireland. As it is estimated that 10% of cases of Lyme disease are complicated by neuroborreliosis it is estimated that around 130 cases of Lyme disease occurred in that year. There continues to be considerable controversy in many countries including Ireland around the diagnosis and management of Lyme disease. There is further information for both the public and professionals on the HPSC website www.hpsc.ie/A-Z/Vectorborne/LymeDisease/

Hepatitis C is a major cause of liver disease worldwide. The overall prevalence of chronic hepatitis C in Ireland is comparable to other Northern European countries, and is estimated to be between 0.5 and 1.2%. Recently new combination therapies have achieved high success rates in clearing the virus. This, combined with data showing the declining incidence of hepatitis C in Ireland, indicates there may be grounds for optimism in relation to tackling hepatitis C.

The overall trend in HIV cases has been relatively stable at 7.5 per 100,000 population. Sex between men remains the commonest mode of transmission (46%), followed by heterosexual transmission (38%). People who inject drugs now only account for 5% of newly diagnosed cases. However in 2013, 50% of new HIV diagnoses were late. More emphasis on the benefits of early testing and ready access to testing are needed to reduce these numbers thereby benefiting not only the individuals affected but also reducing the likelihood of transmission to others.

Once again I would like to express my gratitude to all those who provide data and participate in committees and to staff in HPSC and elsewhere in the HSE. This report is a testament to all of those who are managing to do more with less and continue to support the prevention and control of infectious disease in Ireland.

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01

Vaccine Preventable Diseases

1.1 *Haemophilus influenzae* (invasive)

Summary

Number of cases, 2013: 41
Number of cases, 2012: 41
Number of cases, 2011: 44
Crude incidence rate, 2012:0.9/100,000

In 2013, 41 cases of invasive *Haemophilus influenzae* disease were notified in Ireland (0.9/100,000 total population). This is identical to the number reported in the previous year, but still considerably higher than the 28 cases reported in 2010 (figure 1). No imported cases were reported in 2013.

The main change in 2013, when compared to 2012, is the increase in the number of non-typeable/non-capsular strains from 26 to 32 (figure 1). No other noteworthy change in the overall number of cases due to other serotypes has been observed since 2004 apart from the decline in the proportion of type b cases and the corresponding rise of non-typeable/non-capsular strains (figure 1).

Non-typeable/non-capsular cases accounted for the majority of the invasive *H. influenzae* cases notified in 2013 (78.0%, n=32/41). The remaining cases were due to *H. influenzae* type f (7.3%; n=3), type b (4.9%; n=2), type e (2.4%; n=1), not type b (2.4%; n=1) and isolates that were not typed (4.9%; n=2), with the latter two cases being diagnosed by PCR testing only. The cases ranged in age from three months to 99 years (median 59 years). The incidence rates were highest in infants <1 year (4.1/100,000) and those aged 1 to 4 years (2.2/100,000) (table 1).

Cases occurring in children <10 years of age (n=11) and in elderly adults 65+ years of age (n=15) accounted for 63.4% of all invasive *H. influenzae* notifications in 2013 (table 1). One notable trend since 2004 is the increase in the overall proportion of cases 65+ years of age from 26.3% to 36.6% in 2013 compared to the decline in those aged between 5 and 64 years from 47.4% to 39.0% (figure 2).

The highest frequency of cases tend to occur in the 1 to 4 year age group, after which it falls sharply before rising steadily again across all 5-year age groups >=55 years (figure 3). One consistent finding over the 2004 to 2013 period has been the predominance of non-typeable cases in most age groups (figure 3).

In 2013, the number of male cases (n=11) was just over a third of that of females (n=30), resulting in a male to female ratio of 0.37:1.0, considerably less than the 1.13:1.0 ratio for the 2004 to 2013 period (figure 4).

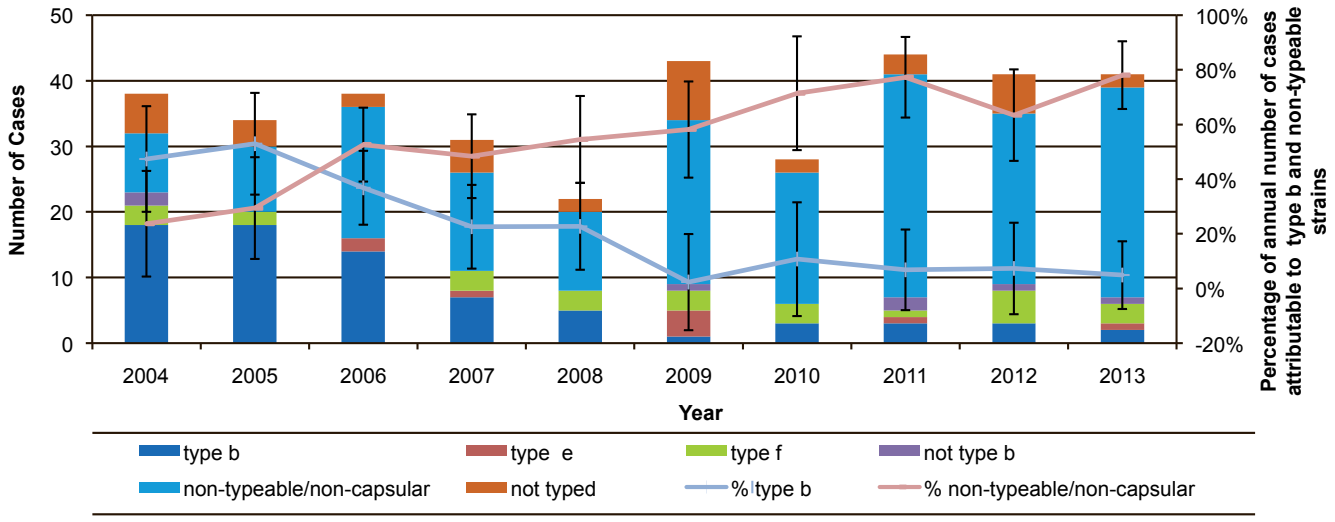

Figure 1. Number of invasive H. influenzae cases and proportion of cases attributable to type b and non-typeable strains with 95% confidence intervals, Ireland, 2004-2013

Incidence of disease in 2013 was highest in the HSE M area (1.42/100,000) with the lowest in the HSE E area (0.62/100,000) (table 2). No HSE area had an incidence rate that was significantly different from the national rate (figure 5) and no imported cases were reported in 2013.

Apart from the years 2004, 2007, 2008 and 2011, *H. influenzae* cases have tended to occur most often in the first quarter of each calendar year (figure 6).

Figure 7 shows how over the period 2009 to 2013 the proportion of non-typeable cases with septicaemia tends to fall between the age groups 5 to 24 and 65+ years. A breakdown by clinical diagnosis for all cases by age group between 2004 and 2013 is presented in Table 2.

Five deaths were reported in 2013. The age range was 3 months to 99 years. A non-typeable infection was recorded with each death, but only one was reported to have been caused directly by the infection.
In 2013, two cases of *H. influenzae* type b (Hib) occurred, both were two years of age and both were unvaccinated. In the previous year, three cases of Hib occurred, two of whom were <5 years of age: one was unvaccinated and the other was incompletely vaccinated having received only three doses of the Hib vaccine; the remaining third case occurred in an adult aged 45 to 49 years and was unvaccinated.

Between Q3-2007 and Q4-2013, only one true Hib vaccine failure was reported, highlighting the continuing positive impact that the Hib booster catch up campaign has had in Ireland.

Since September 2008, the Hib booster dose has been administered at 13 months of age as part of the routine childhood immunisation schedule in addition to the three doses given during infancy (at 2, 4 and 6

Table 1. Number and incidence rates of invasive H. influenzae cases by serotype, Ireland, 2013

Age Group	Type b	Type e	Type f	Not type b	Non-typeable/ non-capsular	Not Typed*	Total	ASIR of Hib	ASIR of all *H. influenzae*
<1	0	0	0	0	3	0	3	0.00	4.14
1-4	2	0	0	0	4	1	7	0.62	2.18
5-9	0	0	0	0	1	0	1	0.00	0.33
10-14	0	0	0	0	0	0	0	0.00	0.00
15-19	0	0	0	0	0	0	0	0.00	0.00
20-24	0	0	0	0	0	1	1	0.00	0.13
25-34	0	1	1	0	3	0	5	0.00	0.72
35-44	0	0	0	0	2	0	2	0.00	0.35
45-54	0	0	0	0	0	0	0	0.00	0.00
55-64	0	0	1	0	6	0	7	0.00	1.31
65+	0	0	1	1	13	0	15	0.00	0.33
All Ages	2	1	3	1	32	2	41	0.04	0.89
CIR	0.04	0.02	0.07	0.02	0.70	0.04	0.89	-	-

CIR, crude incidence rate per 100,000 total population
ASIR, age specific incidence rate per 100,000 population

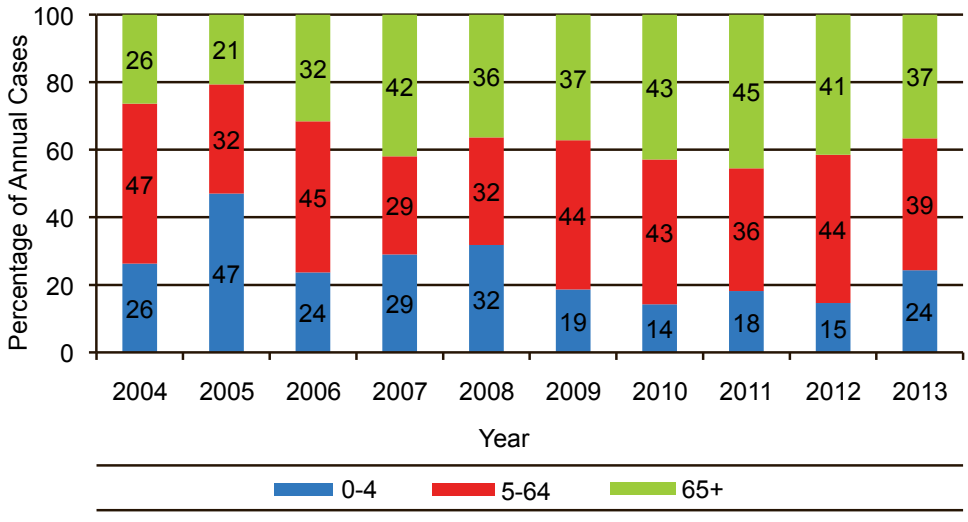

Figure 2. Percentage and number of cases of invasive H. influenzae cases by age group and year, Ireland, 2004-2013

Table 2. Number of invasive H. influenzae cases by clinical diagnosis, Ireland, 2004-2013

Clinical Diagnosis	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Septicaemia	8	14	13	6	3	9	9	11	11	14
Pneumonia	5	0	3	6	3	8	5	12	12	4
Meningitis	3	9	3	2	2	2	1	3	2	2
Meningitis & septicaemia	1	0	1	0	1	1	1	1	1	0
Bacteraemia (without focus)	1	0	1	1	2	0	0	3	5	6
Epiglottitis	1	3	3	1	1	0	2	0	0	3
Cellulitis	1	1	2	1	1	0	0	1	0	0
Septic arthritis	0	1	0	0	1	0	0	0	0	0
Osteomyelitis	1	0	0	0	0	0	0	0	0	0
Other	1	2	1	0	0	0	0	3	4	7
Not specified	16	4	11	14	8	23	10	10	6	5
Total	38	34	38	31	22	43	28	44	41	41
% Known Clinical Diagnosis	57.9%	88.2%	71.1%	54.8%	63.6%	46.5%	64.3%	77.3%	85.4%	87.8%

Table 3. Incidence rates per 100,000 population of invasive H. influenzae by HSE area, Ireland, 2004-2013

HSE Area	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
HSE E	1.07	1.00	0.87	0.80	0.53	0.74	0.56	1.11	1.11	0.62
HSE M	1.19	1.19	0.40	1.19	0.79	1.06	0.35	1.06	0.35	1.42
HSE MW	0.83	0.28	0.83	0.55	0.83	2.11	0.53	0.53	1.05	0.79
HSE NE	0.25	1.27	0.25	0.00	0.00	0.23	0.45	1.59	0.91	1.36
HSE NW	0.42	0.00	2.11	0.42	0.00	0.39	0.39	0.77	0.77	1.16
HSE SE	1.08	0.43	0.87	1.08	0.65	1.00	1.00	0.80	1.21	1.00
HSE S	1.13	0.32	1.29	0.32	0.64	1.20	1.05	0.30	0.60	0.90
HSE W	0.48	1.45	0.72	1.45	0.48	1.12	0.22	1.35	0.45	0.90
Ireland	0.90	0.80	0.90	0.73	0.52	0.94	0.61	0.96	0.89	0.89

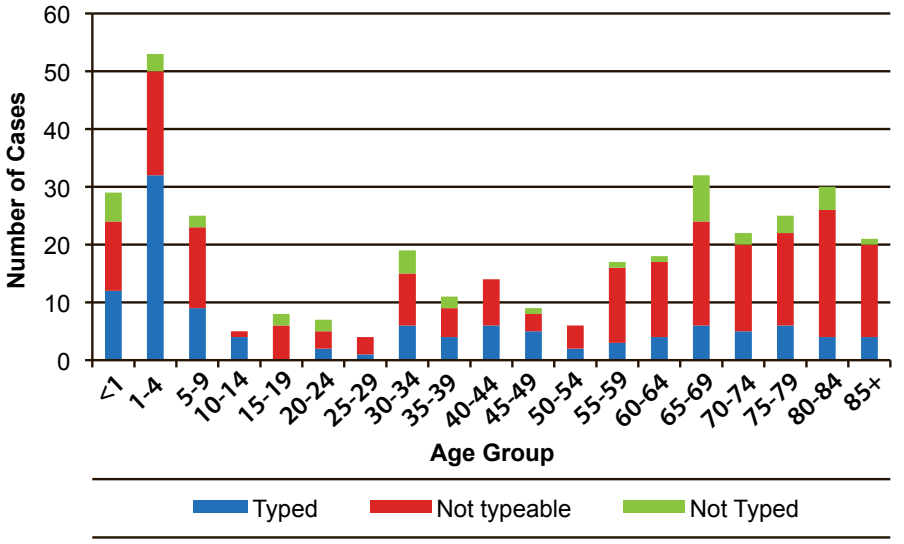

Figure 3. Number of H. influenzae cases by agegroup and type, Ireland, 2004-2013*
** Typed includes b, e, f, not-b types*

months of age). Furthermore, vaccination is routinely recommended for those at increased risk of Hib disease due to underlying medical conditions or treatments.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 27th August, 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

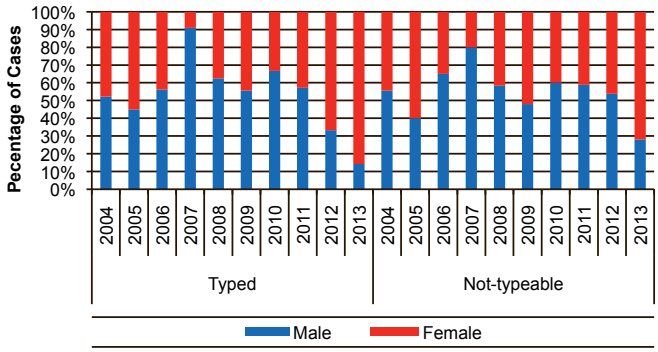

Figure 4. Percentage of H. influenzae cases by type and gender, Ireland, 2004-2013*
** Typed includes b, e, f, not-b types*

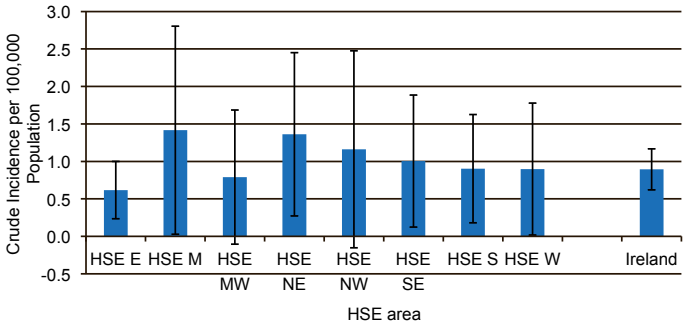

Figure 5. Crude incidence rates per 100,000 population with 95% confidence intervals for H. influenzae notifications by HSE area, Ireland, 2013

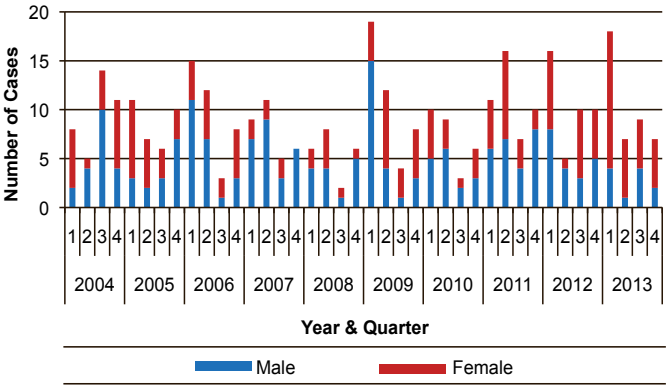

Figure 6. Number of H. influenzae cases by year/quarter and gender, Ireland, 2004-2013

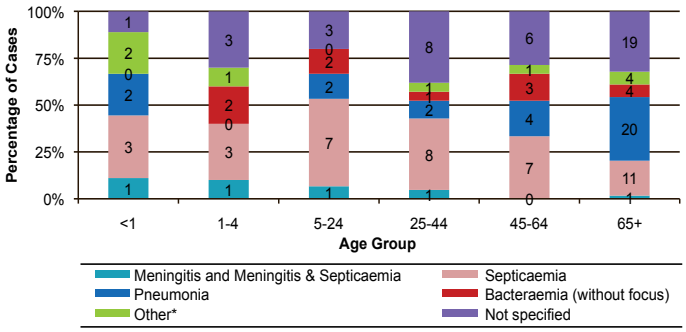

Figure 7. Percentage of H. influenzae non-typeable cases by age group and clinical diagnosis, Ireland, 2009-2013 (excludes two cases of unknown age)

**Other category includes cellulitis, epiglottitis, septic arthritis and osteomyelitis and other not specified*

1.2 Measles

Summary

Number of cases, 2013: 51
Number of confirmed cases, 2013: 33
Crude incidence rate, 2013: 1.1/100,000
Crude confirmed incidence rate, 2013: 0.7/100,000

There were 51 measles cases (1.1/100,000) in 2013. This is a decline compared to previous years (figure 1).

In 2013, the largest number of cases and the highest crude incidence rate was in the HSE SE (table 1). Twenty of the cases in the HSE SE were notified during October to mid November and were associated with a school outbreak. These 20 outbreak cases ranged in age from one year to five years with a mean age and a median age of four years. The majority (80%, n=16/20) of the cases were vaccinated with one dose of MMR. Measles positive samples from six of the 20 cases were genotyped by the NVRL and were genotype D8.

In 2013, the second highest number of cases and crude incidence rate was in the HSE E (table 1). Nine of the cases in the HSE E were notified in May and were associated with an outbreak in an extended family. The nine outbreak cases ranged in age from one year to 17 years with a mean age and median age of seven years. Five of the nine cases were unvaccinated; three were reported to have one dose of MMR while the vaccination status of one case was unknown. All three vaccinated with one dose of MMR were vaccinated between three and 10 days prior to onset. As the incubation period for measles ranges from seven to 21 days from exposure to onset of fever these three cases were probably incubating measles at the time of vaccination. The measles virus from one of the cases was genotyped by the NVRL and was genotype D4.

Two other localised measles outbreaks were notified during 2013. One of these was an outbreak in a private house with two ill; one of these cases was genotyped by the NVRL and was genotype D4. One was a travel related (United Kingdom) family outbreak with two ill; measles virus from both of these cases were genotyped by the NVRL and were genotype D8.

Of the 51 measles cases in 2013, 16% (n=8) were classified as possible, 20% (n=10) were classified as probable while 65% (n=33) were classified as confirmed, giving a crude confirmed incidence rate of 0.7 per 100,000 population.

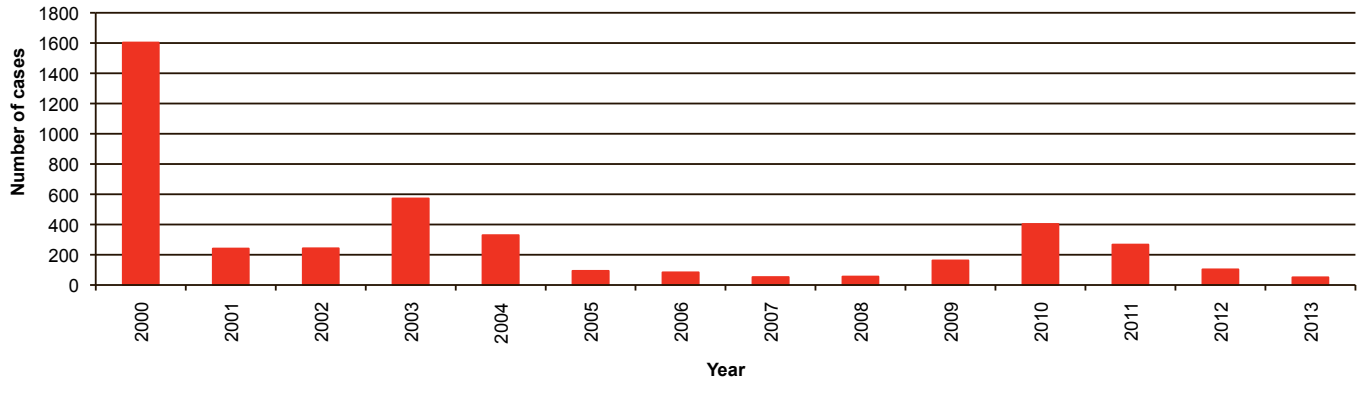

Figure 1. Number of measles cases by year, 2000-2013

The 51 measles cases ranged in age from six months to 35 years; the mean age was six years and the median age was four years. The largest number of cases and the highest age specific incidence rates were in those aged 3-4 years (figures 2 and 3). Of the 51 measles cases, 51% (n=26) were female and 49% (n=25) were male.

Laboratory results were provided for 37 cases in 2013. Sixty-five percent (n=33/51) of cases were laboratory test positive for measles. Four cases were laboratory negative for measles, however, for two of these the specimens were not taken at the optimal time following disease onset. Two of the cases that were laboratory negative for measles were known to have a specimen collected at the optimal time; both of these cases were recorded as epidemiologically linked to a laboratory confirmed case.

Isolates from 13 cases were genotyped by the NVRL. Eleven were genotype D8 and two were genotype D4.

The country of infection was recorded as Ireland for 43 cases, United Kingdom for three cases and was unknown or not reported for five cases.

Measles vaccine in Ireland is available as part of the combined measles mumps rubella (MMR) vaccine. In Ireland, vaccination with the first dose of MMR is routinely recommended at twelve months of age and the second dose at four to five years of age. A MMR catch up campaign started in October 2012 and continued during 2013. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to second level students and primary school children who had not completed (or were not sure they had) their two dose MMR vaccination schedule.

Vaccination data were reported for 90% (n=46/51) of measles cases in 2013. Twenty-nine percent (n=15/51) of cases were unvaccinated; of these only six percent (n=3/51) were less than 12 months of age.

Fifty-three percent (n=27/51) of cases were reported to have one dose of MMR vaccine; the majority (93%, n=25/27) of these were less than six years of age. Eighty one percent (n=22/27) of those reported to have one dose of MMR were classified as confirmed or probable. Ninety three percent (n=26/27) with one dose of MMR had a vaccination date reported. Fifteen percent (n=4/26) of these were vaccinated between one and 10 days prior to onset and were probably incubating measles at the time of vaccination.

Four cases (8%, n=4/51) were reported as having received two doses of MMR. Three of these cases had both vaccination dates reported; one of these was vaccinated with the second dose one day prior to onset. One of the cases with two MMR doses was classified as confirmed.

Five cases were reported as hospitalised, representing ten percent (n=5/51) of all cases. The mean age of hospitalised cases was 10 years while the median age was four years (range two to 35 years). All five cases were classified as confirmed. Length of hospitalisation was reported for all five cases with a median duration of stay of four days (range one to seven days). One hospitalised case had no MMR details reported, one was unvaccinated, two cases had one dose of MMR and one case had two doses of MMR.

Reported complications of measles included pneumonia (2%, n=1/43) and ear infection (n=2).

Of the 51 cases, the setting where the case most likely acquired measles was reported as home (29%, n=15), primary school (24%, n=12), overseas (6%, n=3), day-care or pre-school (2%, n=1), work (2% n=1), and was unreported for the remainder (37%, n=19).

The figures presented above are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 10th September 2014, however, this report excludes two cases that were laboratory negative for measles and were not

Table 1. Number of measles cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2013

HSE Area	Number	CIR
HSE E	19	1.2
HSE M	1	0.4
HSE MW	2	0.5
HSE NE	1	0.2
HSE NW	1	0.4
HSE SE	22	4.4
HSE S	2	0.3
HSE W	3	0.7
Total	**53**	**1.1**

epidemiologically linked to a confirmed measles case. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

WHO require information on discarded measles cases ie measles cases investigated and who were found not to meet the case definition. A method for capturing the number of these cases is in place since July 1st 2013. The HSE Areas reported the number of discarded CIDR cases to HPSC. For July to December 2013 41 cases were discarded from CIDR as following investigation they were not considered to be measles cases. Discarded cases are not available in CIDR for reporting and are therefore not included in the analysis above.

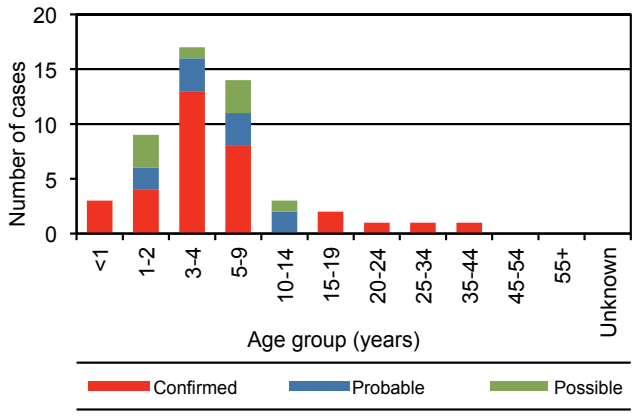

Figure 2. Number of measles cases in 2013 by age group and case classification

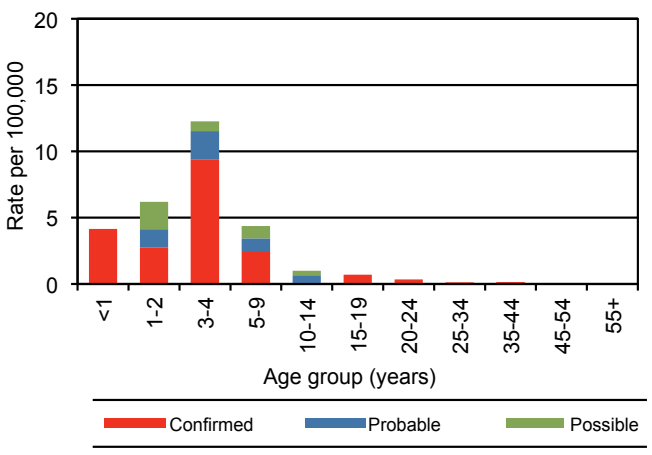

Figure 3. The age specific incidence rate (per 100,000) of measles cases in 2013 by case classification

1.3 Meningococcal Disease

Summary

Number of cases, 2013: 81
Number of cases, 2012: 66
Number of cases, 2011: 94
Crude incidence rate, 2013:1.8/100,000

In 2013, 81 cases (1.8/100,000) cases of invasive meningococcal disease (IMD) were notified in Ireland. This represents a 22.7% increase on the previous year when 66 cases (1.4/100,000) were reported. However, over the past decade the trend has been downward: in 1999 there were 536 cases (14.8/100,000). The number of cases reported in 2013 compared to 1999 reflects a decline in incidence of almost 85%.

Of the 81 cases notified in 2013, 74 (91.3%) were case classified as confirmed, one (1.2%) as probable and six (7.4%) as possible. Confirmation of diagnosis by laboratory testing of cases has improved with time. In 2013, 93.8% (n=76/81) of cases were confirmed by laboratory testing in comparison to 83.0% (n=445/536) in 1999.

Typically, most cases in 2013 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.

In 2013, 39 of the 74 confirmed cases (52.7%) were laboratory tested by PCR testing alone and another 11 confirmed cases (14.9%) were diagnosed by culture of sterile specimens alone. Among the remaining 24 (32.4%) confirmed cases, all were diagnosed by both culture and PCR testing of sterile specimens.

Of all the 81 cases in 2013, none had a positive skin lesion, throat or nose culture test result or a positive serology or skin lesion microscopy test result. There were however, two positive eye culture test results and four CSF positive microscopy test results.

In 2013, male cases (n=44) exceeded female cases (n=37), resulting in a male to female ratio of 1.2:1.0, following a consistent pattern observed since 2005. IMD cases in 2013 ranged in age from one month to 84 years (median age of 4 years). The incidence of IMD was highest in infants and young children. Age specific incidence rate (ASIR) was highest among infants <1 year of age (35.9/100,000; n=26), followed by children in the 1 to 4 year (7.4/100,000; n=21), and 15 to 19 year age groups (3.2/100,000; n=9) (table 1, figure 1).

Figure 2 presents the number of IMD cases by gender and age group between 1999 and 2013 and shows the decline in numbers across all of the age groups, with the steepest declines observed in the <1, 5 to 9 and 10 to 24 year age groups following the introduction of the meningococcal C conjugate (MCC) vaccine in late 2000.

The overall incidence of IMD in Ireland in 2013 was highest in the HSE SE area (2.4/100,000) with the lowest in the HSE S area (1.4/100,000) (table 2). No

Table 1. Number of cases, deaths, age-group specific incidence rates per 1000,000 population (calculated using Census 2011 denominator data) and case fatality ratios of IMD, Ireland, 2013

Age Group	No. Cases	ASIR	No. Deaths	%CFR
<1	26	35.9	1	3.8%
1-4	21	7.4	0	0.0%
5-9	8	2.5	0	0.0%
10-14	2	0.7	0	0.0%
15-19	9	3.2	0	0.0%
20-24	3	1.0	0	0.0%
25+	12	0.4	3	25.0%
All ages	81	1.8	4	4.9%

ASIR, age specific incidence rate per 100,000 population
%CFR, case fatality ratio

HSE area had an incidence rate that was significantly different from the national rate (figure 3). There was one imported case in 2013 from the United States.

Neisseria meningitidis serogroup B was the pathogen most commonly associated with IMD in 2013 and accounted for 68 of the 81 (84.0%) notifications (figure 4). Since 2003 serogroup B has consistently accounted for more than 80% of annual IMD notifications (figure 4).

Apart from the year 2003, IMD cases have tended to occur most frequently in the first quarter of each calendar year (figure 5).

When serogroup B cases since 2009 by clinical diagnosis are viewed, the proportion of cases with septicaemia only decreases between the 1 to 4 and 25+ year age groups, but the opposite trend occurs with meningitis only cases (figure 6).

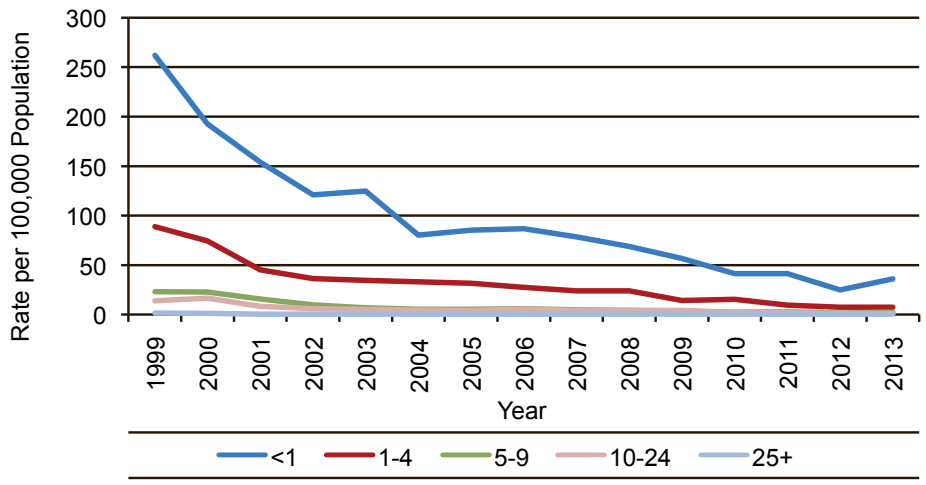

Figure 1. Age-specific rates per 100,000 population for invasive meningococcal disease (IMD), Ireland, 1999-2013

Table 2. Age specific incidence rates per 100,000 population (calculated using Census 2011 denominator data) of IMD by HSE area and age group, Ireland, 2013

HSE Area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
HSE E	26.9	10.2	0.9	1.0	2.1	0.8	0.6	1.7
HSE M	20.7	5.2	18.2	0.0	0.0	0.0	0.0	2.1
HSE MW	35.1	4.4	0.0	0.0	12.2	0.0	0.4	1.8
HSE NE	26.0	6.4	0.0	0.0	0.0	7.9	0.4	1.6
HSE NW	77.1	6.3	5.3	0.0	0.0	0.0	0.0	1.9
HSE SE	65.4	9.7	0.0	0.0	6.4	0.0	0.6	2.4
HSE S	29.9	2.5	2.2	0.0	4.9	0.0	0.5	1.4
HSE W	45.3	7.6	3.2	3.4	0.0	0.0	0.0	1.6
Ireland	35.9	7.4	2.5	0.7	3.2	1.0	0.4	1.8

Table 3. Number of cases, deaths and case fatality ratios (%CFR) by year for meningococcal B and C disease, Ireland, 1999-2013

	Meningococcal B			Meningococcal C		
Year	No. Cases	No. Deaths	%CFR	No. Cases	No. Deaths	%CFR
1999	292	12	4.1%	135	5	3.7%
2000	258	13	5.0%	139	11	7.9%
2001	245	8	3.3%	35	3	8.6%
2002	199	8	4.0%	14	0	0.0%
2003	206	11	5.3%	5	1	20.0%
2004	163	7	4.3%	5	1	20.0%
2005	169	5	3.0%	5	0	0.0%
2006	168	5	3.0%	4	0	0.0%
2007	157	6	3.8%	2	0	0.0%
2008	149	6	4.0%	4	1	25.0%
2009	119	6	5.0%	5	0	0.0%
2010	93	4	4.3%	4	0	0.0%
2011	84	2	2.4%	2	0	0.0%
2012	58	1	1.7%	0	0	0.0%
2013	68	4	5.9%	1	0	0.0%

%CFR, case fatality ratio

IMD due to serogroup C (MenC) has remained at very low levels over the last decade with five cases or less occurring annually. In 2013, only one meningococcal C case was notified (table 3); it occurred in an eight year old child with no risk factors reported and who had received three primary childhood doses of the MCC vaccine by the time she was eight months of age and was therefore considered a true vaccine failure for her age cohort. Before 2013, there had been no true vaccine failures since 2009 when three failures were reported. Between 2005 and 2008, one true vaccine failure was reported in each year.

The low numbers of MenC cases and the rarity of MCC vaccine failures over the past decade is a measure of the positive impact of the vaccination programme since first introduced in October 2000. Prior to the introduction of the MCC vaccine, serogroup C incidence rate in 1999 was 3.7/100,000 population.

There were four IMD related notified deaths in 2013 (case fatality ratio of 4.9%), double the number in the previous year (table 1). This compares to an annual average of 5.6 deaths between 2005 and 2011. In 2013, the %CFR was highest amongst cases 65+ years of age (40.0%) as a result of two deaths among five cases. The next highest %CFR was 33.1% (n=1/3) due to a death in an adult aged 40-44 years.

All of the IMD deaths in 2013 were due to serogroup B disease (age range 7 months to 81 years). This is in marked contrast to the 13 deaths due to serogroup B out of all 25 deaths reported in 2000. In the same year, 11 deaths were due to serogroup C disease. The decline in deaths associated with meningococcal disease since 2000 has been significant, partly due to the decrease in MenC cases as a result of the vaccination programme and also partly due to the decline in meningococcal B disease (table 3).

Despite a marked decline in the overall incidence over the past decade, IMD is still an important public health concern due to its associated severity, high mortality rate and serious adverse sequelae. Effective vaccination

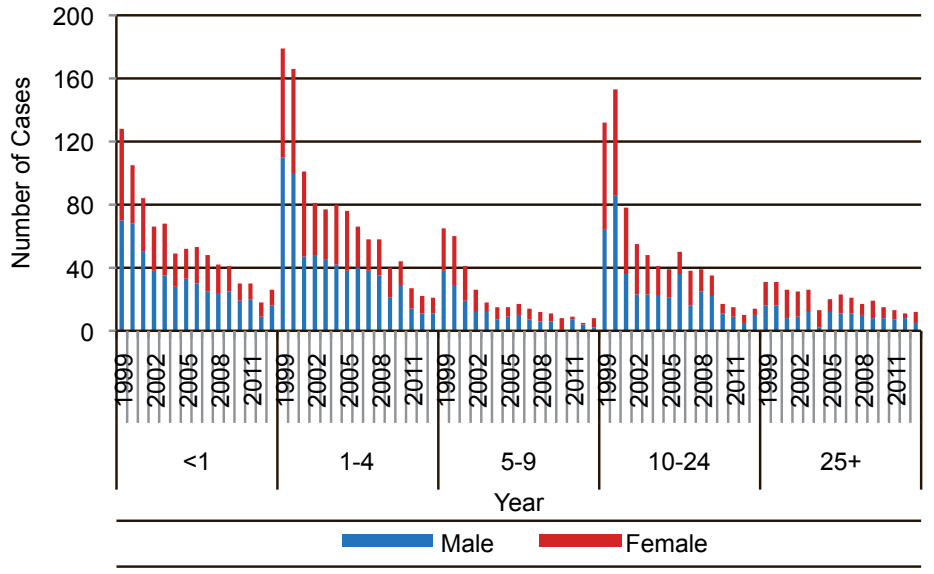

Figure 2. Number of IMD cases by gender and age group in Ireland, 1999-2013 (excludes one case with unknown gender details)

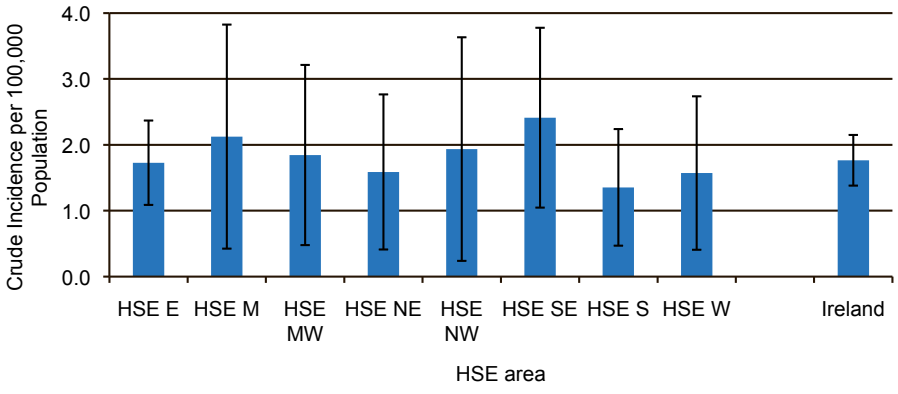

Figure 3. Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, Ireland, 2013

is necessary for the complete prevention and control of IMD. Effective vaccines are available against serogroups A, C, W135 and Y forms of the disease. In 2012, a recombinant multicomponent vaccine (4CMenB) against serogroup B disease was recommended for approval by the European Medicines Agency. Marketing authorisation for the vaccine was granted in January 2013 for both child and adult administration. The decision regarding introducing this vaccine into the national immunisation programme is still under consideration at the time of writing, but in August 2014, the National Immunisation Advisory Committee (NIAC) issued recommended guidelines relating to this vaccine, details of which are available at http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/

An outbreak of meningococcal disease in an extended Irish Traveller family across three HSE areas was reported in 2013. Eight cases of disease within this extended family group with epidemiological links were identified between March 2010 and November 2013. All eight cases survived and were aged between 5 and 46 months, and were either a cousin or sibling of another case. This outbreak was notable in that appropriate chemoprophylaxis had been given to the relevant nuclear family members and close contacts following each notification. *Neisseria meningitidis* isolates from six cases were highly related, belonging to the ST-41/44 clonal complex, and shared the porA designation 7-2,4. In November 2013, the outbreak control team (incorporating staff from public health departments, the Health Protection Surveillance Centre and the Irish Meningococcal and Meningitis Reference Laboratory) recommended that directly observed ciprofloxacin chemoprophylaxis be administered simultaneously to the extended family, and that the four component 4CMenB vaccine be administered to family members aged 2 months to 23 years inclusive in an effort to prevent further cases occurring among members of this family. At the time of writing, the combination of directly observed ciprofloxacin chemoprophylaxis and use of 4CMenB vaccine has controlled the outbreak with no further cases diagnosed.

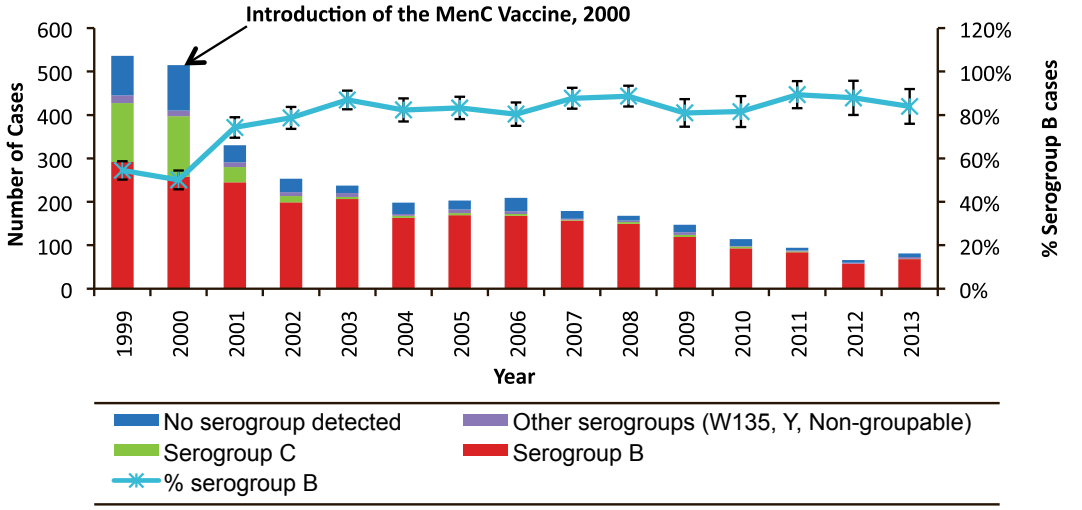

Figure 4. Number of IMD notifications in Ireland by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, Ireland, 1999-2013

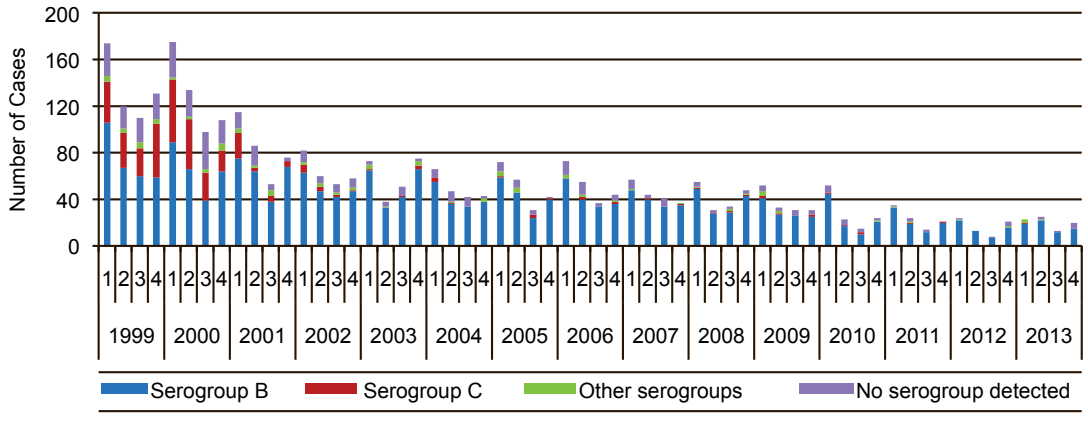

Figure 5. Number of IMD cases by quarter and serogroup, Ireland, 1999-2013

In 2014 (at the time of writing this report) new changes to the routine MenC vaccination programme are planned. Recent studies undertaken in the United Kingdom have identified waning immunity to serogroup C disease following infant vaccination in early childhood. Protection given by vaccination at 12 months also wanes by the teenage years, but vaccination later in childhood provides higher levels of antibody that persist for longer.[1-4] There is also evidence that shows that MCC vaccination significantly reduces nasopharyngeal carriage of the serogroup C meningococcus, providing indirect protection through herd immunity.[5-6] In recognition of waning immunity, NIAC has recommended a booster dose of the MCC vaccine for those considered at increased risk of MenC disease. Since 2011 the MCC vaccine booster has been recommended for close contacts of cases if their last dose was more than one year before and since August 2014, NIAC now recommends an adolescent booster at 12-13 years (http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/). The adolescent booster will be introduced into the 2014/2015 school immunisation programme and will be provided to students in the first year of secondary level school.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 27th August, 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

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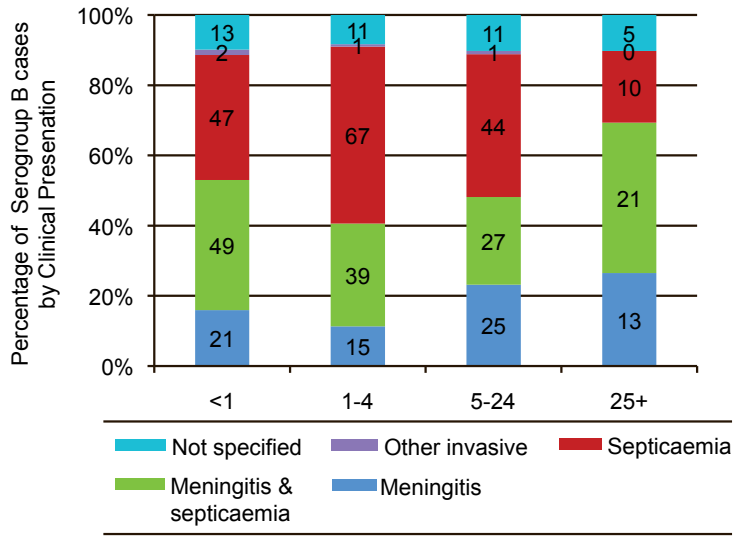

Figure 6. Percentage of serogroup B cases by age group and by clinical diagnosis, Ireland, 2009-2013

1.4 Mumps

Summary

Number of cases, 2013: 223
Number of cases, 2012: 163
Crude incidence rate, 2013: 4.9/100,000

There were 223 (4.9/100,000) mumps cases notified in 2013. This is higher than 2012 when 163 cases were notified and 2011 when 165 cases were notified but a decline compared to the years 2008/2009 and 2004/2005 when large outbreaks occurred (figure 1). The number of cases notified in 2013 is fivefold higher compared to the years 1998 to 2003 when there was an average of 43 cases notified each year.

In 2013, of the 223 mumps cases notified 36% (n=80) were classified as confirmed, three percent (n=6) as probable and 61% (n=137) were classified as possible.

The largest number of cases was notified in the HSE E while the highest crude incidence rate was in the HSE E and HSE SE (table 1).

In 2013, the median age of cases was 20 years and the mean age was 23 years with cases ranging in age from one to 84 years. The number of cases by age group and the age specific incidence rates are shown in figures 2 and 3. The highest age specific incidence rates were in those 0-4 years and 20-24 years. Of the 223 mumps cases, 43% (n=97) were female and 57% (n=126) were male.

Mumps vaccine in Ireland is available as part of the combined measles mumps rubella (MMR) vaccine. In Ireland, vaccination with the first dose of MMR is routinely recommended at twelve months of age and the second dose at four to five years of age. A MMR catch up campaign started in October 2012 and continued during 2013. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to second level students and primary school children who had not completed (or were not sure they had) their two dose MMR vaccination schedule.

Of the 223 mumps cases, 17% (n=37) were unvaccinated, 24% (n=53) had one dose of the measles-mumps-rubella vaccine (MMR), 24% (n=54)

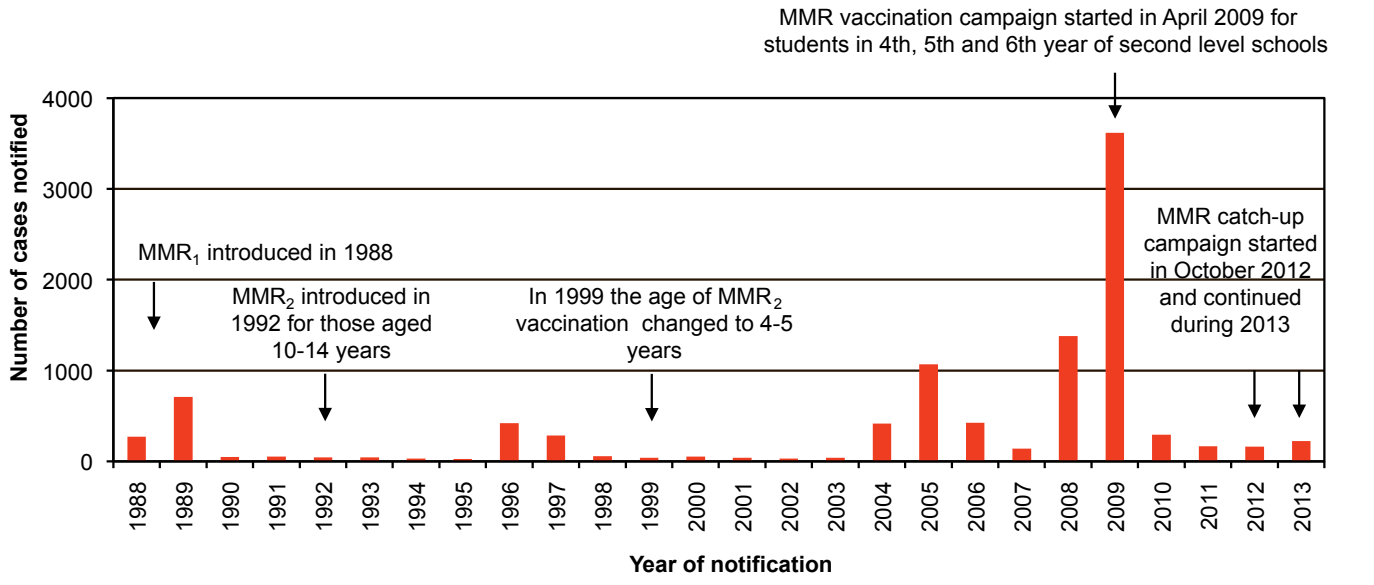

Figure 1. Number of mumps notifications by year
MMR_1- first dose of MMR
MMR_2- second dose of MMR
1988-June 2000 data collated by DoHC
July 2000-2013 data collated by HPSC

were reported to have received two doses of MMR, one percent (n=2) were reported to have three doses of MMR while for 35% (n=77) of cases the number of doses of MMR was not reported. The vaccination date was reported for 75% (n=40/53) of cases reported to have received one dose of MMR. Both vaccination dates were reported for 37% (n=20/54) of cases vaccinated with two doses of MMR; one of these was vaccinated one day prior to onset. The vaccination dates were available for one of the cases given three doses of MMR. Thirty-one percent (n=17/54) of the cases reported to have received two doses of MMR were classified as confirmed; 35% (n=6/17) of these cases had both MMR vaccination dates reported. Both cases reported to have received three MMR doses were classified as possible cases.

Ten cases were hospitalised, representing four percent (n=10/223) of all cases and six percent (n=10/168) of cases where hospitalisation data were provided. The number of days hospitalised was reported for six of the hospitalised cases; the median number of days hospitalised was three days (range one to 12 days).

Reported complications of mumps included orchitis (8%, n=6/75), mastitis (1%, n=1/130), pancreatitis (1%, n=1/132), deafness (1%, n=1/134), aggravated adenoids (n=1), back pain (n=1), dehydration (n=1) and painful ear (n=1).

The setting where the case most likely acquired mumps was reported for 27% (n=61/223) of cases. The identified settings for these cases were: social setting for 14% (n=31/223) of cases; family/household for four percent (n=10/223); work for four percent (n=9/223); day-care/preschool for two percent (n=4/223); primary school for one percent (n=3/223); university/college for one percent (n=2/223); international travel for 0.4% (n=1/223); and secondary school for 0.4% (n=1/223) of cases.

Table 1. Number of mumps cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2013

HSE Area	Number	CIR
HSE E	101	6.2
HSE M	13	4.6
HSE MW	17	4.5
HSE NE	13	2.9
HSE NW	10	3.9
HSE SE	30	6.0
HSE S	20	3.0
HSE W	19	4.3
Total	**223**	**4.9**

The country of infection was recorded as Ireland for 112 cases, Brazil for one case, Malta for one case, Sudan for one case, United Kingdom for two cases and was unknown/not specified for 106 cases.

Five localised outbreaks of mumps were notified during 2013 with a total of 11 associated cases of illness. The outbreak locations included a school (with three ill), a university/college (with two ill), a community outbreak (with two ill) and two of the outbreaks were associated with a private house (with two ill in each outbreak).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 4th September 2014. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

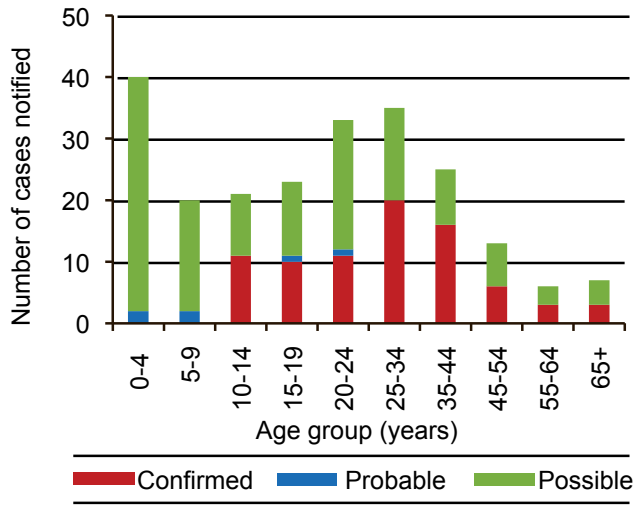

Figure 2. Number of notified mumps cases in 2013 by age group and case classification

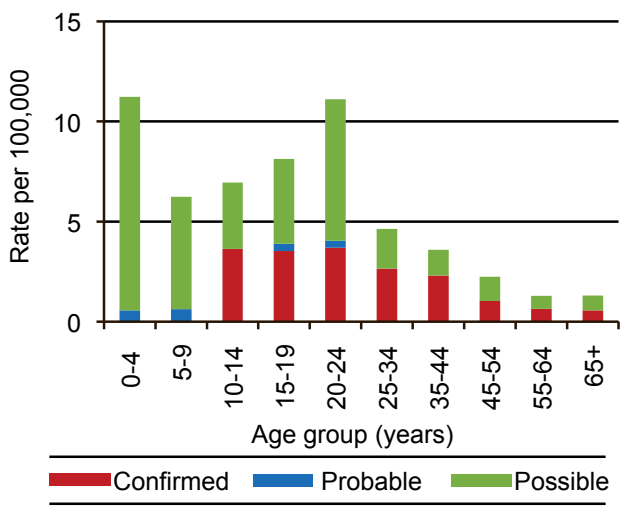

Figure 3. The age specific incidence rates (per 100,000) of notified mumps cases in 2013

1.5 Other Forms of Bacterial Meningitis*
(*excluding meningococcal disease)

Summary

Bacterial meningitis, not otherwise specified (NOS)
Number of cases, 2013: 21
Number of cases, 2012: 29
Number of cases, 2011: 35
Crude incidence rate, 2013: 0.5/100,000

Apart from *Neisseria meningitidis*, which is the most common cause of bacterial meningitis in Ireland, other pathogens cause this disease, including those caused by non-notifiable organisms. For information on invasive meningococcal disease (*Neisseria meningitidis*), see that chapter within this report. Information on bacterial meningitis caused by specified notifiable diseases is summarised below and further pathogen-specific data are available in the relevant chapter. The figures presented in this chapter are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 27th August, 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

Bacterial meningitis caused by diseases not otherwise specified (NOS):
In total, 21 cases of meningitis under this disease category were notified in 2013, none of whom died. Six of the 21 (28.6%) cases were case classified as confirmed, five as probable (23.8%) and ten as possible (47.6%) (table 1). The causative pathogens were identified in 28.6% (n=6/21) of cases, which is considerably less than the annual average observed between 2008 and 2012 at 48% (table 2).

Prior to 1st January 2012, all cases of Group B streptococcus, also known as *S. agalactiae*, were notifiable under the 'Bacterial Meningitis (NOS)' disease category. In 2012, this changed when *Streptococcus agalactiae* in children < 90 days of age was notifiable in its own right, including those which were meningitis-related. This has meant that the overall number of bacterial meningitis (NOS) cases has, as a result, fallen in both 2013 and 2012 compared to previous years. In other words, without this change there would have been five and 11 extra cases reported under the Bacterial meningitis (NOS) category in 2013 and 2012, respectively (table 2). Furthermore, there is evidence of an additional 23 possible meningitis-related cases of this disease in this same age group during 2012 and 2013 where *Streptococcus agalactiae* was either isolated from or detected in CSF specimens from patients that were not clinically categorised as having 'meningitis'. These 23 cases have been excluded from Table 3, which is a summary breakdown of all bacterial meningitis cases by their causative pathogen (both specified and not specified types except for meningococcal disease) between 2008 and 2013.

Among the bacterial meningitis (NOS) cases notified in 2013 were four caused by *Escherichia coli* (age range 1 week to 63 years; none of which had serotype details), one caused by *Streptococcus salivarius* in a one year old and another by *Streptococcus agalactiae* in an elderly adult. There were 15 other cases whose causative organism was not identified. No deaths were reported.

Bacterial meningitis caused by specified notifiable diseases:
Haemophilus influenzae
Two cases of meningitis due to *H. influenzae* were notified in 2013, one of which was attributable to a non-typeable/non-capsulated strain and another that was not typed. The age range was 22 to 32 years. One death was reported, but the actual cause was not known. See Table 3 and the chapter on invasive *H. influenzae* disease for further details.

Listeria species
Two cases of listeriosis meningitis were notified in 2013: both had a serotype 4b infection, one was aged 60 to 64 years with an underlying medical condition and the other was a two week old infant. See Table 3 and the chapter on listeriosis disease for further details.

Streptococcus pneumoniae
In 2013, 32 cases of pneumococcal meningitis were notified, compared to 37 in the previous year. The age range of the 32 cases was one month to 85 years (median 52 years). Four (12.5%) pneumococcal meningitis related deaths were reported in 2013 with an age range of 4 to 85 years (median 50 years) and all caused by the infection itself.
Of the 32 cases in 2013, five were vaccinated with the

Table 1. Number and percentage of bacterial meningitis (NOS) cases reported by cases classification, Ireland, 2008-2013

Case Classification	2008	2009	2010	2011	2012	2013	2008-2013
Confirmed	22	17	21	18	12	6	133
Probable	12	8	7	4	5	5	72
Possible	6	15	14	13	12	10	146
Total	40	40	42	35	29	21	351
% Confirmed	55.0%	42.5%	50.0%	51.4%	41.4%	28.6%	37.9%

Note: *Streptococcus agalactiae* < 90 days of age excluded from 2012, 2013 figures

Table 2. Number and percentage of bacterial meningitis (NOS) cases reported with and without an identified causative organism, Ireland, 2008-2013

Causative Organism	2008	2009	2010	2011	2012	2013	2008-2013
Known	23	15	21	20	11	6	133
Unknown/Not specified	17	25	21	15	18	15	218
Total	40	40	42	35	29	21	351
% Known	57.5%	37.5%	50.0%	57.1%	37.9%	28.6%	37.9%

Note: *Streptococcus agalactiae* < 90 days of age excluded from 2012, 2013 figures

Table 3. Annual notifications of bacterial meningitis (specified and NOS) except meningococcal disease, Ireland, 2008-2013

Notified under	Causative organism	2008	2009	2010	2011	2012	2013	2008-2013
Haemophilus influenzae disease (invasive)	*Haemophilus influenzae*	3	3	2	4	3	2	17
Leptospirosis	*Leptospira* spp.	2	1	0	1	1	0	5
Listerosis	*Listeria* spp.	3	1	3	2	2	2	13
Salmonellosis	*Salmonella enteritidis*	0	1	0	0	0	0	1
Streptococcus pneumoniae infection (invasive)	*Streptococcus pneumoniae*	27	22	16	23	37	32	157
Streptococcus Group A infection (invasive) (iGAS)	*Streptococcus pyogenes*	2	0	2	0	1	3	8
Streptococcus Group B infection (invasive) (Group B Strep) < 90 days of age	*Streptococcus agalactiae†*	NA	NA	NA	NA	11	5	16
Tuberculosis*	*Mycobacterium* spp.*	6	8	9	2	3	2	30
Total Bacterial Meningitis, specified		43	36	32	32	58	46	247
Bacterial Meningitis, not otherwise specified	*Streptococcus agalactiae***	6	7	11	16	0	1	41
	Escherichia coli	11	3	2	1	7	4	28
	Staphylococcus aureus	3	2	6	2	1	0	14
	Enterococcus faecalis	1	1	0	0	0	0	2
	Streptococcus bovis biotype II/2	0	2	0	0	0	0	2
	Citrobacter koseri	1	0	0	0	0	0	1
	Enterococcus faecium	0	0	0	0	1	0	1
	Group C Streptococcus	0	0	0	0	1	0	1
	Klebsiella oxytoca	0	0	0	1	0	0	1
	Mycoplasma pneumoniae	0	0	1	0	0	0	1
	Serratia liquefaciens	1	0	0	0	0	0	1
	Staphylococcus aureus & Staphylococcus capitis	0	0	0	0	1	0	1
	Staphylococcus capitis	0	0	1	0	0	0	1
	Streptococcus salivarius	0	0	0	0	0	1	1
	Unknown	2	1	1	1	2	1	8
	Not specified	15	24	20	14	16	14	103
Total Bacterial Meningitis, not otherwise specified		40	40	42	35	29	21	207
Total Bacterial Meningitis, specified and not otherwise specified		83	76	74	67	87	67	454

*Tuberculosis meningitis figure for 2013 is provisional

***Streptococcus agalactiae* for all ages between 2008 and 2011 and for cases > 90 days of age only in 2012 and 2013

†*Streptococcus agalactiae* < 90 days of age in 2012 and 2013 figures do not include 23 meningitis-related cases where the causative organism was isolated from or detected in CSF specimens from patients that were not clinically categorised as having 'meningitis'

NA not applicable

PCV7, PCV13 or PPV23 vaccines only or a combination of them, two were incompletely vaccinated with PCV13, 24 were unvaccinated and the vaccination status of one case was not reported. Two deaths were reported among these 32 cases: one was aged 65+ years, had a type 6B infection and had received one dose of the PPV23 vaccine and had been on immunosuppressive therapy; the other was aged 1 to 4 years, had received three doses of the PCV7 vaccine plus one dose of the PPV23 vaccine, had no risk factors reported and had a type 3 infection (which is covered by the PPV23 vaccine). Four cases could not have been prevented by vaccination as the serotypes involved were not covered by any vaccine, but there were 12 others that could have potentially been prevented. Additional details are presented in Table 4. See also a separate chapter on invasive pneumococcal disease for further details.

Streptococcus agalactiae < 90 days of age (*also known as Group B streptococcus)*
Five cases of meningitis causing Group B streptococcus infection were notified in 2013; their age range was one day to one month with no deaths reported. See Table 3 and the chapter on invasive Group B streptococcal infections disease for further details.

Mycobacterium species
In 2013, two tuberculosis meningitis cases were notified (provisional at the time of writing). Cases ranged in age from 35 to 49 years. See the chapter on tuberculosis for further details.

Table 4. Details of the 32 pneumococcal meningitis cases reported, Ireland, 2013

Age Group (years)	Died	Vaccinated	No. of Vaccine Doses Received	No. of PCV7 / Prevenar 7 Doses	No. of PCV13 / Prevenar 13 Doses	No. of PPV23 / Pneumovax 23 Doses	Serotype of Infection	Potentially Vaccine Preventable	Serotype Covered by Vaccine Type
<1		Y	3		3		NA		NA
		I	1		1		NA		NA
		I	1		1		7F		PCV7, PCV13, PPV23
		N	0				7F	Y	PCV7, PCV13, PPV23
1-4		Y	3	2	1		NA		NA
	Y	Y	4	3		1	3		PCV13, PPV23
5-9		Y	3	3			NA		NA
15-19		N	0				3	Y	PCV13, PPV23
		N	0				10A	Y	PPV23
30-34		N	0				35F		No
		N	0				NA		NA
	Y	N	0				NA		NA
35-39		N	0				7F	Y	PCV7, PCV13, PPV23
		N	0				6C		No
40-44		N	0				14	Y	PCV7, PCV13, PPV23
45-49		N	0				7F	Y	PCV7, PCV13, PPV23
55-59		N	0				7F	Y	PCV13, PPV23
		N	0				NA		NA
		N	0				NA		NA
		N	0				14	Y	PCV7, PCV13, PPV23
		N	0				22F	Y	PPV23
60-64		N	0				23A		No
		N	0				NA		NA
		N	0				22F	Y	PPV23
65+	Y	Y	1			1	6B		PCV7, PCV13, PPV23
		N	0				NA		NA
		N	0				31		No
	Y	N	0				NA		NA
		N	0				19F	Y	PCV7, PCV13, PPV23
		N	0				NA		NA
		N	0				18C	Y	PCV7, PCV13, PPV23
		U	NA				23B		No

NA=not applicable or not available; Vaccinated: Y=Yes, N=No, U=Unknown, I=Incompletely vaccinated

1.6 Pertussis

Summary

Number of cases, 2013: 174
Number of cases, 2012: 458
Crude incidence rate, 2013: 3.8/100,000

Following an increase in pertussis in 2012 with 458 notifications, pertussis declined in 2013 with 174 cases (3.8/100,000) notified (figures 1 and 2). The majority (62%) of cases were notified in the first five months of 2013 (figure 3).

Of the 174 cases in 2013, 64% (n=112) were classified as confirmed, five percent (n=9) were classified as probable and 30% (n=53) were classified as possible.

The largest number of cases was notified in the HSE E while the highest crude incidence rate was in the HSE SE (table 1).

In 2013, the largest number of cases (n=51/174, 29%) and the highest age-specific incidence rate (70/100,000) were in children aged less than one year with a quarter (n=43/174, 25%) of all cases aged less than six months (figures 4 and 5). Fifty-two percent of cases (n=90) were female and 48% (n=84) were male.

One death occurred in a child aged less than one year; this child was reported to have several underlying conditions.

In Ireland it is recommended that children be vaccinated with an acellular pertussis containing vaccine at two, four and six months of age and a booster dose at four to five years of age. In 2008, the National Immunisation Advisory

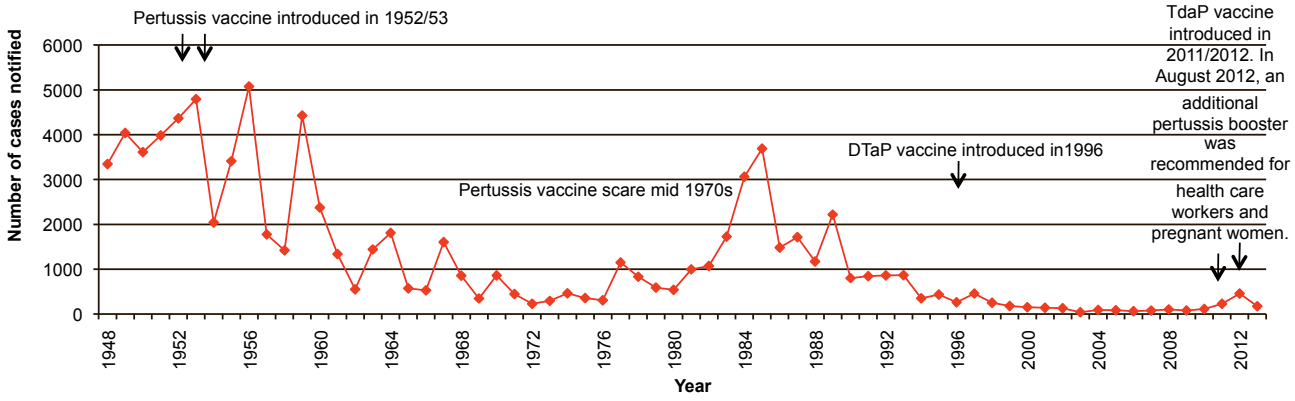

Figure 1. Number of notified pertussis cases in Ireland by year, 1948-2013
1948-June 2000 data collated by DoHC
July 2000-2013 data collated by HPSC

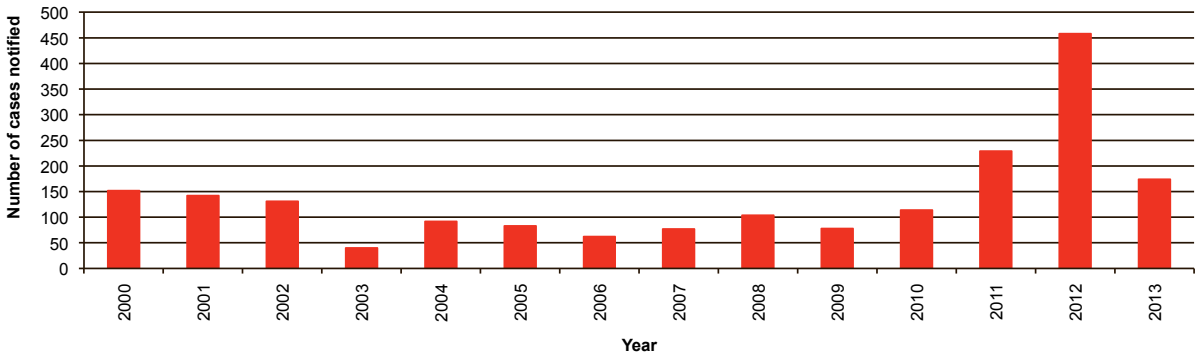

Figure 2. Number of notified pertussis cases in Ireland by year, 2000-2013

Committee (NIAC) recommended a booster with low dose acellular pertussis vaccine for children aged 11-14 years. The adolescent pertussis booster was introduced into the school programme, in 19 LHOs, in 2011 and to all schools in 2012. In August 2012, an additional pertussis booster was recommended for health care workers and pregnant women; please see www.immunisation.ie for additional information on pertussis vaccination recommendations.

In 2013, the vaccination status was reported for nearly two thirds (n=111/174, 64%) of pertussis cases. Twenty eight percent of cases (n=49/174) were unvaccinated; these cases ranged in age from three weeks to 62 years, with 63% (n=31/49) of these cases aged less than six months. Twenty-seven percent of the unvaccinated cases (n=13/49) were less than two months of age and were therefore not eligible for pertussis vaccine in the Irish schedule.

Fourteen percent (n=25/174) of cases were reported as incompletely vaccinated, with 40% (n=10/25) of these less than six months of age and were therefore not eligible for three doses of pertussis vaccine in the Irish schedule.

Twenty-one percent (n=37/174) of cases were reported as completely vaccinated for their age; 54% (n=20/37) of these were reported to have had three doses of pertussis vaccine, 27% (n=10/37) were reported as having four doses while the number of doses was not specified for the remainder.

Ten localised pertussis outbreaks were notified during 2013, with 28 associated cases of illness. Nine were family outbreaks (with 25 ill) and one was a school outbreak (with three ill).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 5th September 2014. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Table 1. Number of pertussis cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2013

HSE Area	Number	CIR
HSE E	68	4.2
HSE M	4	1.4
HSE MW	11	2.9
HSE NE	8	1.8
HSE NW	8	3.1
HSE SE	39	7.8
HSE S	23	3.5
HSE W	13	2.9
Total	**174**	**3.8**

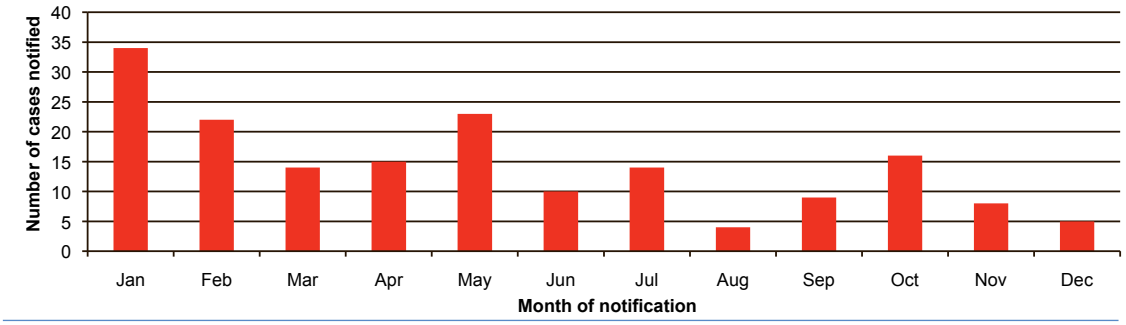

Figure 3. Number of notified pertussis cases in 2013 by month of notification

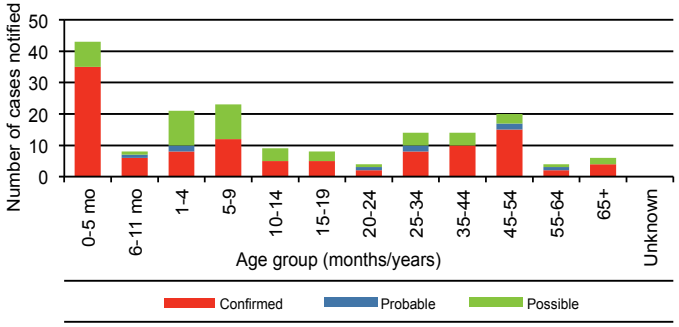

Figure 4. Number of notified pertussis cases in 2013 by age group and case classification.
'Mo' in graph indicates months i.e. 0-5 months and 6-11 months, the remaining age groups are in years

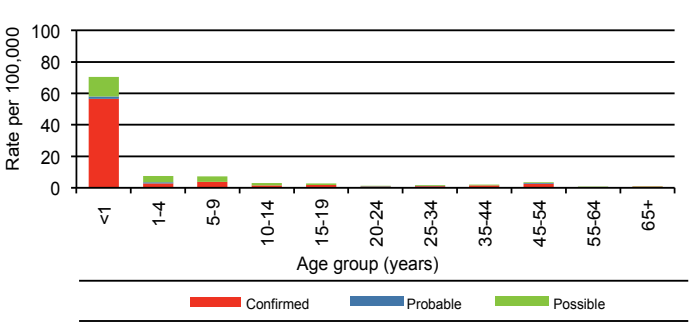

Figure 5. The age specific incidence rate (per 100,000 population) of notified pertussis cases in 2013 by case classification

1.7 Rubella

Summary

Number of cases, 2013: 0
Number of cases, 2012: 9

During 2013, there was interrupted endemic transmission of rubella in Ireland with zero cases of rubella identified in 2013. In 2012 there was also interrupted endemic transmission of rubella. Of the nine cases notified in 2012, none were confirmed, eight were possible and the one probable case had country of infection recorded as United Kingdom.

All rubella cases, including suspected cases, should be notified to the local Department of Public Health. Accurate and detailed information on all notified rubella cases is needed to monitor progress towards the WHO European Measles and Rubella Elimination Strategy (for 2015). During 2013 enhanced surveillance of rubella using the Computerised Infectious Disease Reporting (CIDR) system was implemented.

The diagnosis of rubella based solely on clinical signs and symptoms is often unreliable because there are many other causes of fever and rash illness which may resemble rubella infection. Therefore, diagnostic samples (serum, oral fluid, urine) should always be obtained from patients in order to accurately diagnose rubella. Since 2012 the laboratory criteria for case confirmation of rubella requires the identification of rubella virus specific IgG antibody response in serum or saliva or detection of rubella virus nucleic acid in a clinical specimen or isolation of rubella virus from a clinical specimen. Isolation of rubella virus is not routinely performed in Ireland but can be done following consultation with the laboratory. Laboratory results always need to be interpreted according to the vaccination status and history of recent vaccination. Since 2012 the laboratory criteria for a probable case requires the identification of rubella virus specific IgM antibody response; again laboratory results need to be interpreted according to the vaccination status. (For a case to meet the probable case classification they must meet the clinical criteria and be either epidemiologically linked to a confirmed case or meet the laboratory criteria for a probable case.) When rubella in pregnancy is suspected, further confirmation of a positive rubella IgM result is required (e.g. a rubella specific IgG avidity test showing a low avidity). In certain situations, such as confirmed rubella outbreaks detection of rubella virus IgM can be considered confirmatory in non-pregnant cases.

The figures presented in this summary are based on data extracted from the CIDR system on 18th September 2014. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

WHO require information on discarded rubella cases ie rubella cases investigated and who were found not to meet the case definition. A method for capturing the number of discarded cases is in place since July 1st 2013. The HSE Areas reported the number of discarded CIDR cases to HPSC. For July to December 2013 nine cases were discarded from CIDR as following investigation they were not considered to be rubella cases.

1.8 *Streptococcus pneumoniae* (invasive)

Summary

Number of confirmed cases in 2013: 345
Number of confirmed cases in 2012: 347
Number of deaths in 2013: 24
Number of deaths in 2012: 37
Crude incidence rate of confirmed cases in 2013: 7.5/100,000

Background

Invasive *Streptococcus pneumoniae* infection is a notifiable disease in Ireland; clinicians and laboratories are legally obliged to notify this infection. For the purposes of this report the term invasive pneumococcal disease (IPD) will be used to describe these infections. IPD includes meningitis and bloodstream infection (BSI) with and without pneumonia.

A number of different initiatives are in place in Ireland for the surveillance of IPD. Data on IPD notifications are collated in the Computerised Infectious Disease Reporting (CIDR) system. Enhanced surveillance of IPD notifications is undertaken by Departments of Public Health, particularly of children and adolescents <15 years, and these data are also collated in CIDR. A separate surveillance strand (EARS-Net project) involving the microbiology laboratories and the HPSC is used to monitor in detail the antimicrobial resistance profiles of invasive *S. pneumoniae* isolates from blood and/ or CSF. Since April 2007, the National Pneumococcal Typing Laboratory has provided a typing service to Irish laboratories for all invasive *S. pneumoniae* isolates. This is a collaborative project involving the Royal College of Surgeons in Ireland/Beaumont Hospital, the Children's University Hospital, Temple Street and the HPSC. In addition, since August 2012 HPSC is participating in a European Centre for Disease Prevention and Control (ECDC) project called SpID-net. The project aims to strengthen or set up long term active population based IPD surveillance in order to estimate the impact of the pneumococcal conjugate vaccines in children less than five years of age in Europe.

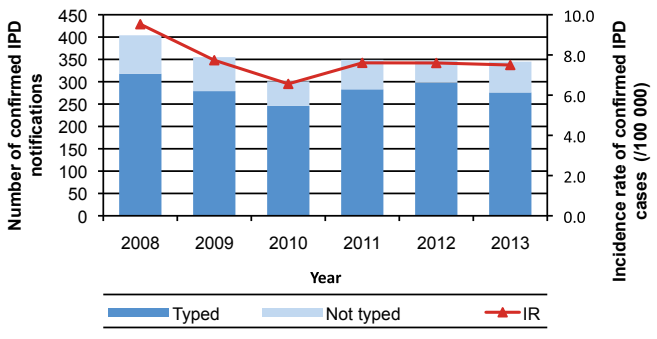

Figure 1. Number of confirmed invasive pneumococcal disease (IPD) notifications by typing status and the incidence rate (IR) of confirmed IPD with 95% confidence intervals, 2008-2013
Data source: CIDR

In September 2008, the 7-valent pneumococcal conjugate vaccine (PCV7) was introduced into the Irish infant immunisation schedule at 2, 6 and 12 months of age. A catch-up campaign was also implemented at that time, targeting children <2 years of age. In December 2010, PCV13 replaced PCV7 in the infant schedule. Uptake of three doses of PCV by 24 months of age for 2013 was 91%.

Notification data for IPD was extracted from CIDR on 30th June 2014. These figures may differ slightly from those previously published due to ongoing updating of notification data on CIDR. For the 2012 and 2013 notifications, the 2012 HPSC case definition for IPD was used. In brief, isolation or detection of *S. pneumoniae* from a normally sterile site was classified as confirmed; detection of *S. pneumoniae* antigen from urine was classified as possible case. Since 2012 the previously used probable case definition is no longer applicable and any case in which *S. pneumonia* antigen is detected from urine (previously defined as a probable case) is now classified as possible, and antigen detection from a sterile site is now categorized as confirmed.

Results

All IPD notifications

In 2013, 638 cases of IPD (13.9/100,000) were notified in Ireland, a significant increase compared with 2012 (427 cases; 9.3/100000). This increase is related to an increase in the number of possible cases notified in comparison to 2012 (239 possible cases in 2013 versus 80 possible cases in 2012).

In 2013, 54% (n=345) of notifications were classified as confirmed and 46% (n=293) as possible. The majority

of possible cases (91%) were notified by HSE-SE, HSE E and HSE MW (n=128/293; n=81/293 and n=59/293, respectively). These figures do not necessarily indicate a higher burden of IPD in these areas relative to other areas, but more likely reflects an increase in the use of urinary antigen tests being used and therefore more reports of positive urinary antigen cases from these areas.

Confirmed IPD notifications

Focusing specifically on the confirmed IPD notifications, 345 cases were notified in 2013 (7.5/100,000; 95% CI 6.8 - 8.3/100,000),unchanged compared with 2012 (7.6/100,000; 95% CI 6.8 - 8.4/100,000; 347 cases) (Figure 1). In 2013, the incidence of confirmed IPD in 2013 declined by 21% compared with 2008 (9.5/100,000; 95% CI 8.6 – 10.5/100,000; 404 cases; p<0.05) (Figure 1).

In 2013, 80% of the confirmed IPD notifications had an isolate submitted for serotyping, somewhat less than the proportion of cases in 2012 (85%) but the same as the proportion in both 2008 and 2009 when 79% of notifications had an isolate typed (Figure 1). In 2013 however, 36% of notifications (14/39) relating to children <5 years of age did not have an isolate submitted for serotyping. For seven of the 14 the cases were confirmed by PCR only and no isolate was available. For the remaining seven isolates from a sterile site, no sample was available for typing.

Incidence rates by HSE area ranged from 3.9 per 100,000 in HSE-M to 10.5 per 100,000 in HSE-NW, with the high incidence in the HSE MW, HSE NE and HSE-SE (Figure 2). However, the incidence rates in each of the eight HSE areas were not statistically different from the national one.

A clinical diagnosis was reported for 146 of the 345 confirmed cases (42%), which included BSI with pneumonia (n=93), meningitis (n=32), and other BSI for the remainder (n=21).

More cases occurred in males (n=179,52%) than in females. . Cases ranged in age from 1 month to 100 years, with an average age of 56.7 years (median age 64 years). Those aged 65 years and older accounted for half of the cases (50%, n=171). The age specific incidence rate (ASIR) was highest in those 85 years of age and older (61.6/100,000; n=36), followed by those in the 75-84 years age group (42.4/100,000; n=73) and the 65-74 year age group (20.3/100,000; n=62) (Figure 3). In children < 2 years of age the ASIR was 11.7 cases per 100,000 population (n=17). A statistically significant decline (72%) in IPD incidence was seen in this age group when compared with 2008 (42/100,000; n=52; p<0.0001), highlighting the positive impact of the introduction of PCV7 in September 2008 to the infant schedule followed by PCV13 in December 2010(Figure 3).

The medical risk factor field was completed for 98 (28%) confirmed cases; 38 cases (11%) did not have an identified risk factor; for the remainder this information was either unknown or not specified. Based on the 98 cases for whom this information was reported, 85 (69%) had an underlying medical risk factor, with some patients having multiple risk factors. The main risk factors reported included immunosuppressive condition or therapies (n=29), chronic lung disease (n=32), chronic heart disease (n=26), chronic liver disease (n=5) and renal diseases (n=10). It should also be noted that being aged 65 years and older was also a recognised IPD risk factor; 171 cases in 2013 were in this age group. Apart from their age, 51 cases in this age group also had a reported medical risk factor.

IPD death notifications

Outcome was reported in 30% (n=194) of the IPD notifications in 2013 versus 47% in 2012. Therefore, these figures may not accurately estimate the burden of IPD in terms of mortality. Based on the data available, 31 deaths in individuals with IPD in 2013 were reported. In 2013 the cause of death was reported as directly due to IPD in eight cases, not due to IPD in five cases and for

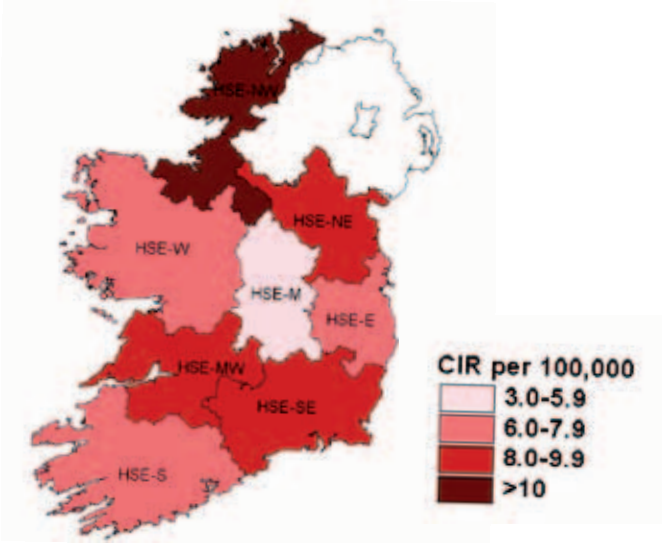

Figure 2. Incidence rate of confirmed invasive pneumococcal disease notifications by HSE area, 2013
Data source: CIDR

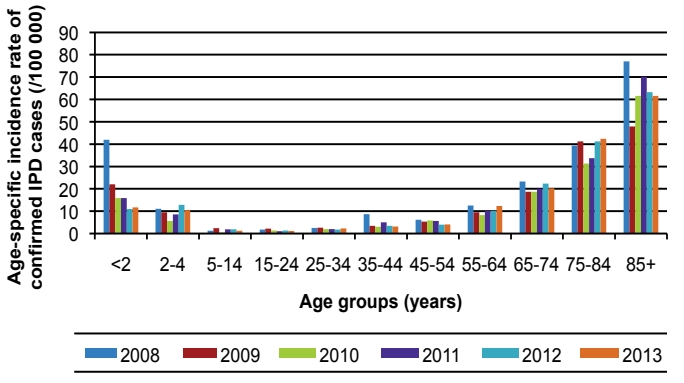

Figure 3. Age specific incidence rate of confirmed invasive pneumococcal disease notifications by age group, 2008-2013
Data source: CIDR

the remaining 16, the cause of death was not specified or was unknown. Twenty four deaths occurred in adults, ranging in age from 32-100 years and one death occurred in a four year age child. All twenty four deaths were in confirmed cases.

The apparent increase in IPD death notifications in 2013 and 2012 (24 cases in 2013 and 37 cases in 2012 versus 11 cases in 2011) is most likely related to the additional information that was available by linking CIDR data to the Enhanced Surveillance of Blood Stream Infections (ESBI) database. Using BSI data it was possible to identify missing information on outcome in CIDR and then the CIDR database was updated by HSE areas.

Impact of pneumococcal conjugate vaccines (PCV)

Data from the National Pneumococcal Typing Laboratory were used to assess the impact of introducing PCV on the distribution of *S. pneumoniae* serotypes associated with IPD and on the burden of IPD in Ireland. In 2013, of the 345 confirmed IPD notifications reported in CIDR, 276 had isolates sent for typing (80%). Twelve percent of IPD infections were due to serotypes covered by PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F), 39% were associated with the six additional serotypes included in PCV13 (1, 3, 5, 6A, 7F and 19A) and the remaining 49% of infections were due to non-vaccine types (NVTs).

Since introducing PCV7 to the Irish childhood immunisation schedule towards the end of 2008, there has been a 20% reduction in the overall burden of IPD disease. Reductions in the incidence of IPD due to PCV7 serotypes have been seen in all age groups (Figure 4a). Overall, the incidence of IPD due to PCV7 serotype has significantly declined in 2013 compared with 2008 (80% decline, $p<0.001$). The greatest impact has been seen in children <2 years of age where the incidence due to PCV7 serotypes has declined by 97% ($p<0.001$) (Figure 4a). In 2013 the incidence of disease due to the additional six serotypes covered by the PCV13 declined by 64% in children <2 years of age compared with 2008 (Figure 4b). This decline was not observed in any of the other age groups, but rather the incidence of disease associated with these additional six serotypes increased compared with previous years (Figure 4b). An increase in incidence due to the non vaccine types (NVTs) was also seen in 2013 compared with 2008. However, in those aged 65 years and greater, a decrease in incidence was observed in 2013 compared with 2012. There has been little change in the incidence of NVTs among other age groups (Figure 4c).

The predominant serotypes in circulation in 2013, were 7F and 19A (both included in PCV13), followed by serotypes 22F (NVT), 3 (included in PCV13) and 14 (included in PCV7 and PCV13). In children <2 years of age, the predominant serotypes were 7F (included in PCV13), 22F and 10A (both NVTs) accounting for a half of the isolates serotyped in this age group (Figure 5).

For ongoing updates, see "Slides – Impact of PCV in Ireland" at http://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/PneumococcalDisease/PostersPresentations/

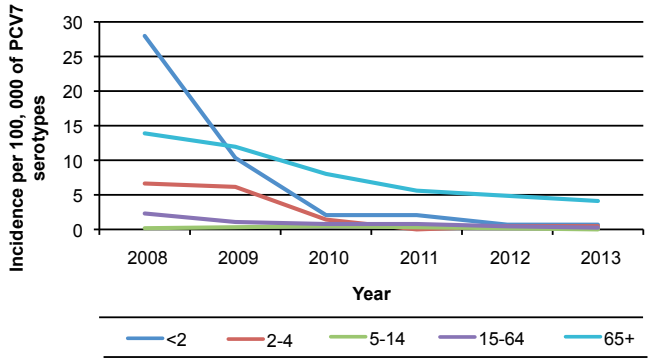

Figure 4a

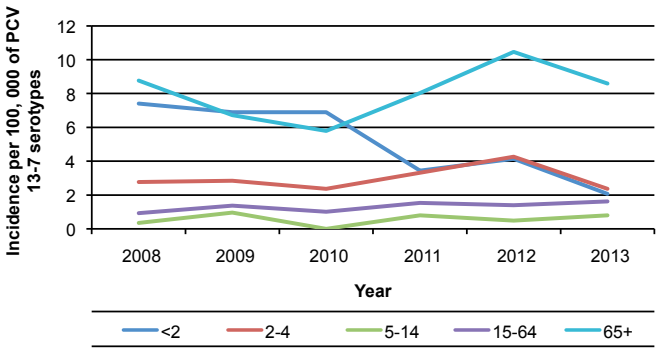

Figure 4b

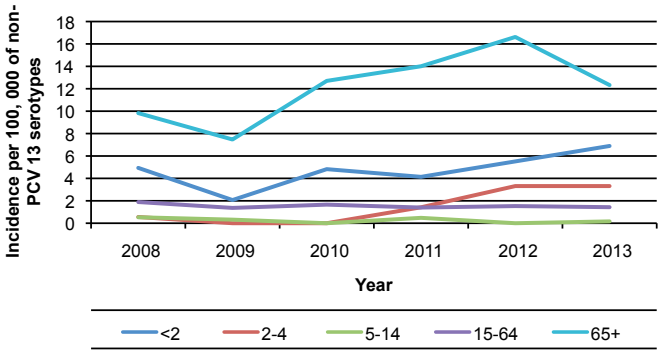

Figure 4c

Figure 4. Age specific incidence rate by age group of confirmed invasive pneumococcal disease cases due to (a) PCV7 serotypes, (b) the additional six serotypes covered by PCV13 and (c) non-vaccine types , 2008-2013

Data source: National Pneumococcal Typing Laboratory

PCV vaccine failures
Based on data obtained through the IPD enhanced surveillance system, three PCV vaccine failures were reported in 2013, all due to serotype 19A (PCV 13). Since 2008, a total of seven vaccine failures have been reported in addition to the three reported in 2013, two in 2010 (19F and 14) and two in 2012 (19F and 19A.

Penicillin non-susceptible *S. pneumoniae* (PNSP)
In 2013, the proportion of penicillin non-susceptible invasive *S. pneumoniae* (PNSP) was 20.7%, (2.3% and 18.3% with high and intermediate level resistance, respectively) while 17.9% of isolates were resistant to erythromycin (Data source: HPSC/EARS-Net Ireland). This compares to 19.6% and 16.9% in 2012 respectively. In the UK, the PNSP proportion in 2013 was 4.9% (0.5% and 4.4%, with high and intermediate level resistance, respectively).

In 2013, Ireland had one of the highest proportions of PNSP in Europe, ranking 10th out of 29 countries overall. Although, 35 different serotypes were identified in 2013, only 13 serotypes were associated with penicillin non-susceptiblity. The predominant PNSP serotypes in 2013 were 19A, 14 and 35B whereas in 2008 serotypes 9V and 14 were the leading ones. For details on the antimicrobial resistance patterns of *S. pneumoniae*, please see the chapter on Antimicrobial Resistance within this report.

Discussion
Although there was no significant changes in the incidence of confirmed cases of IPD in Ireland in 2013 compared with 2012, since its introduction in 2008, PCV7 has had a significant impact in reducing the overall burden of the disease in the total population. There has been a decline in IPD in all age groups due to serotypes covered by PCV7, indicating the indirect/herd immunity effect the vaccine confers on the population. The greatest impact has been in children <2 years of age where disease incidence due to PCV7 serotypes has fallen by 97%. The impact due to additional six serotypes covered by PCV13 vaccine was observed in children <2 years of age, amongst whom the reduction in the incidence of disease was 64%.

However, despite reductions in the IPD burden during childhood, the incidence of disease due to non-PCV7 serotypes has increased in other age groups. There has been a shift in the prevalent serotypes associated with invasive disease. Serotypes 7F, 19A, and 22F were the predominant serotypes identified in 2013.

To accurately assess the impact of PCV on immunisation programmes and to monitor for vaccine failures in Ireland, it is crucial that laboratories continue to send all invasive *S. pneumoniae* isolates for typing to the National Pneumococcal Typing Laboratory. Although 80% of confirmed notifications had an isolate submitted for serotyping in 2013, 20% (n=69) did not, including 14 cases in children <5 years of age. In seven of these 14 cases an isolate was not available for typing and confirmation was by PCR only. Serotype information is unavailable for 36% of confirmed notifications in this age group and the absence of this data is of concern.

Continued good quality IPD surveillance including the monitoring of invasive *S. pneumoniae* serotypes is crucial in identifying any epidemiological changes in the disease, in assessing the impact of PCV13 on public health and in guiding further vaccination strategies, as newer expanded valency vaccines become available. For example, due to the incomplete data we do not know the impact of IPD on mortality and this is a key metric in assessing the true impact of this disease and the effectiveness of interventions, including new vaccines.

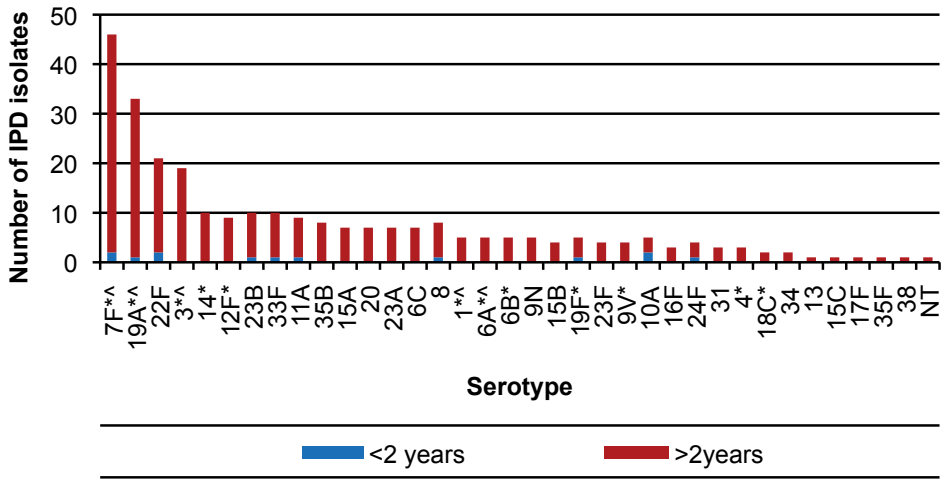

Figure 5. Serotype distribution of invasive Streptococcus pneumoniae isolates by age group (years) in Ireland, 2013

** Denotes serotypes included in PCV7*
**^ Denotes additional six serotypes included in PCV13 (PCV13-7)*
Data source: National Pneumococcal Typing Laboratory

02

Respiratory and Direct Contact Diseases

2.1 Influenza and Other Respiratory Viruses

Summary

2013/2014 influenza season summary:
Peak influenza-like illness rate: 54.1 / 100,000 population
Total confirmed influenza cases hospitalised: 693
Total confirmed influenza cases admitted to ICU: 83
Total influenza-associated deaths: 43

HPSC has worked in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on the influenza sentinel surveillance project since 2000. During the 2013/2014 influenza season, 60 general practices (located in all HSE-Areas) were recruited to report electronically, on a weekly basis, the number of patients who consulted with influenza-like illness (ILI). Sentinel GPs were requested to send a combined nose and throat swab to the NVRL on one ILI patient per week. The NVRL also tested respiratory non-sentinel specimens, referred mainly from hospitals.

Other surveillance systems set up to monitor ILI/ influenza activity include:

- Surveillance of all calls to GP out-of-hours (OOHs) centres, monitored for self-reported influenza. These data were provided by HSE-NE.
- Surveillance of all confirmed influenza notifications, including hospitalisation status reported to the Computerised Infectious Disease Reporting System (CIDR) in Ireland.
- Enhanced surveillance of hospitalised influenza cases aged 0-14 years.
- Intensive Care Society of Ireland (ICSI) enhanced surveillance of all critical care patients with confirmed influenza
- Surveillance of all reported influenza-associated deaths.
- A network of sentinel hospitals reporting admissions data.

The data presented in this summary were based on all data reported to HPSC by the 28th November 2014.

Due to the current legislation regarding the registration of deaths in Ireland; there can be significant delays between the date of death and the registration of deaths and subsequent reporting to HPSC. Further information on the registration of deaths in Ireland is available on the General Register Office website.

Sentinel GP Clinical Data
Influenza activity in Ireland was moderate during the 2013/2014-influenza season, with sentinel GP ILI consultation rates peaking at 54.1 per 100,000 population during week 9 2014 (late February/ early March) (figure 1). ILI rates first increased above baseline levels (21.0/100,000) during week 6 2014 and remained there for eight consecutive weeks, a shorter period than for the previous season (2012/2013). The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 71.6/100,000), followed by those aged 15-64 years (59.3/100,000), 0-4 years (56.6/100,000) and those aged 65 years or older (46.8/100,000).

Virological Data - Influenza
The NVRL tested 581 sentinel specimens for influenza virus during the 2013/2014 season. Two hundred and seventy-five (47.3%) sentinel specimens were positive for influenza: 264 influenza A (160 A(H3), 98 A(H1) pdm09 and 6 A not subtyped) and 11 influenza B. Data on underlying medical conditions and vaccination status were reported from the sentinel GP network for 54 confirmed influenza cases. Of these 54 cases reported with underlying medical conditions and known vaccination status, 82% were not vaccinated.

The NVRL tested 8391 non-sentinel respiratory specimens during the 2013/2014 season, 1283 (15.3%) of which were positive for influenza: 1269 influenza A (797 A(H3), 369 A(H1)pdm09 and 103 A (not subtyped)) and 14 influenza B.

Influenza A(H3) was the predominant influenza virus circulating during the 2013/2014 season, co-circulating with influenza A(H1)pdm09. Influenza A accounted for 98.4% of all influenza positive specimens and influenza B for 1.6%. Of the 1424 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 67.2% and influenza A(H1)pdm09 for 32.8%.

For the 2013/2014 influenza season, the National Virus Reference Laboratory (NVRL) genetically and/or antigenically characterised 156 influenza specimens (87 A(H3), 61 A(H1)pdm09 and 8 B). Further confirmatory testing was conducted on specimens by the WHO Collaborating Centre for Reference and Research on Influenza, Mill Hill. All influenza A(H1)pdm09 specimens sequenced clustered closely with the Group 6 strain A/St. Petersburg/27/2011. Viruses in this genetic clade remain antigenically similar to the clade representative vaccine strain A/California/7/2009. All influenza A(H1) pdm09 viruses successfully isolated and antigenically characterised by the NVRL during the 2013/2014 season were similar to the A/California/07/2009 vaccine strain. Influenza A(H3) viruses sequenced by the NVRL all clustered with the A/Texas/50/2012 subgroup 3C. Antigenic characterisation determined that the majority of viruses characterised throughout the season were antigenically similar to the A/Texas/50/2012 H3N2 2013/2014 vaccine strain. Of the few influenza B viruses characterised, seven belonged to the B/Yamagata lineage (the same lineage as the influenza B virus included in the 2013/2014 vaccine) and one belonged to the B/Victoria lineage (clustering closely with B/Brisbane/60/2008).

Virological Data - Other respiratory viruses
During the 2013/2014 season, of 8391 non-sentinel specimens tested by the NVRL, 675 (8.0%) positive detections of respiratory syncytial virus (RSV) were reported, peaking (at 32.7% positivity) during week 1 2014. A total of 114 (1.4%) positive detections of human metapneumovirus (hMPV) were reported, with the majority of these detected in January and February 2014. Seventy-seven (0.9%) positive detections of adenovirus were reported, 47 (0.6%) parainfluenza virus type 1 (PIV-1), 28 (0.3%) PIV-2, 24 (0.3%) PIV-3 and 1 (0.01%) PIV-4, during the 2013/2014 season.

Of the 581 sentinel specimens tested during the 2013/2014 season, 7 (1.2%) were positive for RSV, 6 (1.0%) were positive for hMPV, 2 (0.3%) adenovirus, 3 (0.5%) for PIV-1, 3 (0.5%) for PIV-2 and one (0.2%) for PIV-3.

Outbreaks, GP OOHs & Sentinel hospital data
Fifty-nine influenza outbreaks were reported during the 2013/2014 influenza season; all were associated with influenza A (53 A(H3), 1 A(H1)pdm09 and 5 A - not subtyped). Over 40% of all influenza outbreaks were reported from HSE-E (table 1). The majority of outbreaks were associated with the elderly/those with intellectual disabilities, in health care facilities/residential institutions. In total 28 deaths were recorded associated with these 59 outbreaks, 13 deaths linked with these outbreaks were officially reported as influenza-associated deaths. It is probable that the actual number of influenza-associated deaths linked with these outbreaks exceeds this number. Vaccination status was reported for patients from 26 healthcare facilities/residential institutions, with over 90% (1020/1126) of patients vaccinated prior to these outbreaks. Vaccination status was reported for staff from 17 healthcare facilities/residential institutions, with only 28.7% (316/1101) of staff reported as vaccinated prior to these outbreaks.

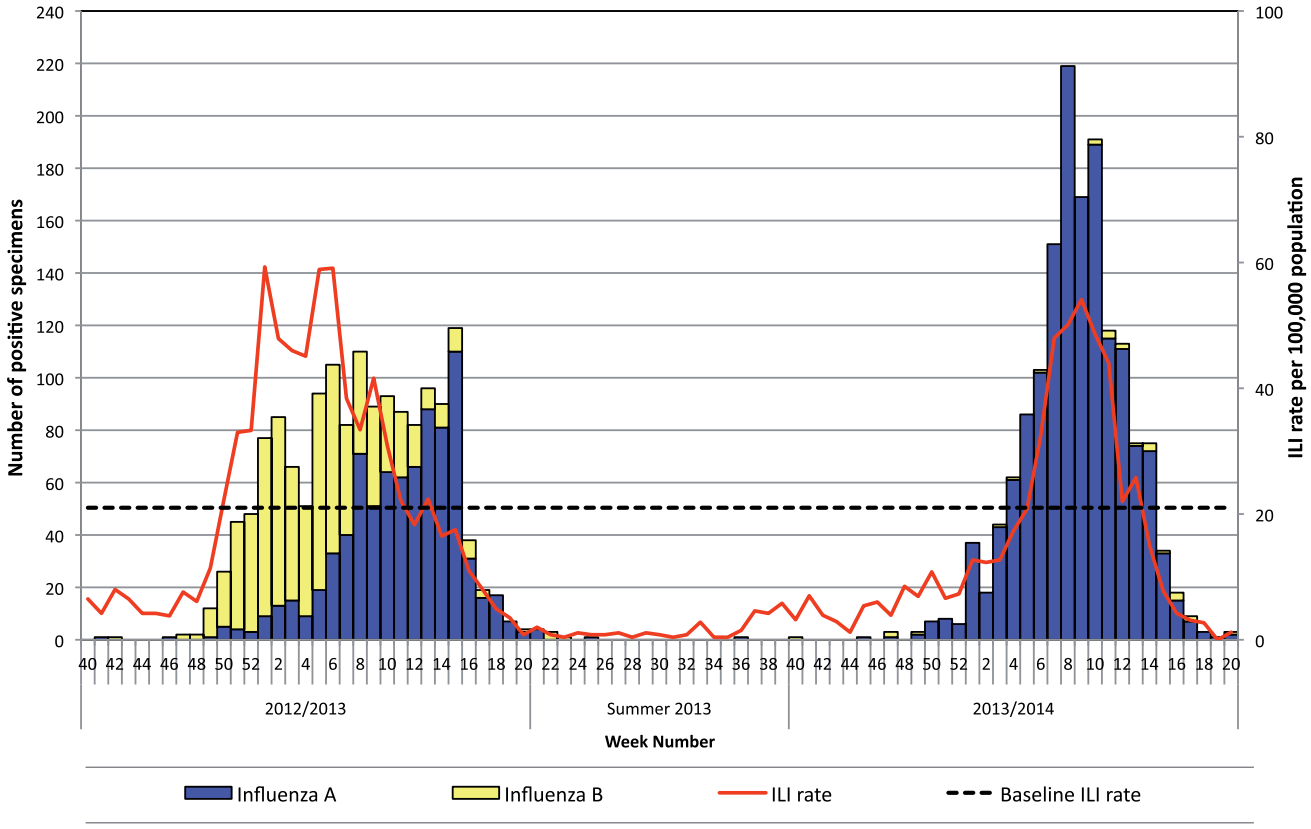

Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season.
Source: Clinical ILI data from ICGP and virological data from the NVRL.

A further 19 acute respiratory infection (ARI) general outbreaks (the majority reported as negative for influenza) were reported during the 2013/2014 influenza season, two associated with hMPV, four with RSV and 13 associated with unidentified pathogens.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 8 2014 at 4.3% (one week prior to the peak in sentinel GP ILI consultation rates). During the peak of activity, each service received on average, one call per hour relating to influenza.

Hospital respiratory admissions in sentinel hospitals were at elevated levels for eight weeks, between weeks 52 2013 and 7 2014, coinciding with increased RSV and influenza activity. Respiratory admissions peaked during week 7 2014, with 386 respiratory admissions reported. Total emergency admissions reported from sentinel hospitals were also elevated during the period of peak influenza activity, peaking at 2946.

Influenza and RSV notifications
A total of 1718 confirmed influenza notifications were reported on CIDR during the 2013/2014 influenza season. Of the 1718 notifications, 909 (52.9%) were influenza A(H3), 467 (27.2%) were influenza A (H1) pdm2009, 306 (17.8%) were influenza A (not subtyped) and 36 (2.1%) were influenza B. A total of 1770 RSV notifications were reported on CIDR during the 2013/2014 season, peaking at 264 during week 1 2014.

Confirmed influenza cases hospitalised
Six hundred and ninety-three cases with confirmed influenza were reported as hospitalised during the 2013/2014 influenza season. The highest age specific rate in hospitalised cases for the 2013/2014 season was in those less than one year of age (58.0 per 100,000 population), followed by those aged 65 years and older (48.6 per 100,000) (table 2). Of the 693 hospitalised cases, 349 (50.4%) were influenza A(H3), 191 (27.6%) were influenza A(H1)pdm09, 142 (20.5%) were influenza A (not subtyped) and 11 (1.6%) were influenza B.

Enhanced surveillance hospital data on 0-14 year age group
A total of 247 confirmed influenza cases aged between 0 and 14 years were notified on CIDR for the 2013/2014 influenza season, 169 (68.4%) of these cases were hospitalised. One hundred and sixty-six cases (98.2%) were positive for influenza A [83 A(H3), 46 A(H1) pdm09 and 37 A (not subtyped)] and three (1.8%) was positive for influenza B. The median age of cases was 2 years. Over 67% of cases were aged between 0 and 4 years, with one quarter of cases aged less than one year. Enhanced surveillance data was available for 129 (76.3%) cases. The most frequently reported symptoms included: fever (80.6%), cough (76.0%), gastroenteric manifestations (30.2%) and fatigue (31.0%). Complications were reported for 43.4% of cases; of these cases more than one complication was reported for 30.4% of cases. The most frequently reported complications included secondary bacterial pneumonia, primary influenza viral pneumonia and other respiratory complications. The median length of stay in hospital was 3 days (ranging from 1 - 50 days). Approximately, 36% of cases were reported as having an underlying medical condition, with chronic respiratory disease (including asthma), immunosuppression, conditions that can compromise respiratory function and other medical conditions being the most frequently reported. In addition, three cases were reported as being premature. Of the 39 cases with reported underlying medical conditions and known vaccination status, 95% were not vaccinated. Approximately, 22.5% of cases (25/111) commenced antiviral treatment and 77.5% (86/111) of cases did not. Nineteen cases were admitted to critical care units (for further details, see below).

Confirmed influenza cases admitted to ICU
Of the 693 hospitalised confirmed influenza cases, 83 (12.0%) were admitted to critical care (64 adults and 19 paediatric cases). Nineteen cases aged between 0 and 15 years were reported from paediatric hospitals. Of the 83 critical care cases, 31 (37.3%) were infected with influenza A(H3), 42 (50.6%) with influenza A(H1)pdm09, 8 (9.6%) influenza A (not subtyped) and 2 (2.4%) with influenza B. Age specific rates for patients admitted to critical care units were highest in those aged less than 1 year of age (8.3 per 100,000 population) followed by those aged 65 years and over (4.5 per 100,000 population) (table 2). The median age in years for paediatric cases was 4, and 59 years for adult cases. Fifty-five (55/62, 88.7%) adults and 14 (14/19, 73.7%) paediatric cases had pre-existing medical conditions. Pre-existing medical conditions were unknown for two adults. The most frequently reported underlying medical conditions for adults were chronic respiratory disease

*Table 1: Number of influenza outbreaks by HSE-Area for the 2013/2014 influenza season (n=59).**

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed
HSE-E	24	514	121	13	146
HSE-M	2	10	0	1	5
HSE-MW	4	41	23	0	13
HSE-NE	6	90	12	0	18
HSE-NW	4	30	11	0	14
HSE-SE	7	154	11	6	26
HSE-S	9	110	18	7	2
HSE-W	3	40	2	1	12
Total	**59**	**989**	**198**	**28**	**236**

**It should be noted that only 13/28 of the deaths reported in these outbreaks were officially reported as influenza-associated deaths.*

(34/55, 61.8%), followed by chronic heart disease (18/55, 32.7%), and chronic neurological disease (12/55, 21.8%). Four adult cases were pregnant. Twenty-four (37.5%) adult cases were reported as current/former smokers and five (7.8%) adult cases were reported to have alcohol related disease. The most frequently reported underlying medical conditions for paediatric cases were respiratory disease (7/14; 50%) and neurological/neuromuscular conditions (7/14, 50%). Fifty-seven (57/60, 95.0%) adults and four (4/5, 80.0%) paediatric cases were ventilated during their stay in critical care units. Ventilation status was unknown for four adult cases and 14 paediatric cases. The median length of stay in critical care for adult cases was 9 days (ranging from 1 - 55 days) and for paediatric cases 8.0 days (ranging from 1 - 61 days). Of the 55 cases with underlying medical conditions and known vaccination status, 63.6% were not vaccinated. Vaccination status was known for 11 paediatric cases with underlying medical conditions, none of these cases were vaccinated. Twenty-seven (27/83, 32.5%) confirmed influenza cases admitted to critical care units died, 22 of these deaths were reported as due to influenza.

Mortality data

During the 2013/2014 influenza season, of the 1718 confirmed influenza cases notified, 54 (3.2%) cases died. Influenza was reported as a cause of death for 43 cases[†]. The case classification of influenza was confirmed for 40 of these cases, probable for two and possible for one. Of the 40 cases with known virology, 20 were associated with influenza A(H3), 13 with influenza A(H1)pdm09, six influenza A (not subtyped) and one with influenza B. The median age of cases who died during the 2013/2014 influenza season was 75 years, ranging from 0-95 years. Almost one third of these influenza-associated deaths were linked to influenza outbreaks. Cumulative excess all-cause mortality was high in those aged 65 years and older, between weeks 6 and 9 2014 and again during weeks 15 and 16 2014.

Summary tables of confirmed influenza hospitalised and critical care cases and influenza-associated deaths for all ages are detailed in tables 2, 3 & 4.

Overview of the 2013/2014 season

During the 2013/2014 influenza season, overall influenza activity was at moderate levels. Sentinel GP ILI consultation rates were above baseline levels for eight consecutive weeks, a shorter period than the previous season. The predominant circulating influenza virus was influenza A(H3), which was co-circulating with influenza A(H1)pdm09. Higher influenza positivity levels were reported during the period of peak activity, compared to recent seasons. An increase in influenza severity was also observed relative to recent influenza seasons with a higher number of hospitalisations, critical care admissions and influenza-associated deaths reported. The highest age specific rates in hospitalised cases were in those aged less than 1 year and those aged 65 years and over. There was a significant increase in hospitalisation rates for those aged 65 years and over, at 48.6/100,000, compared to 19.1/100,000 in 2012/2013 and 6.7/100,000 in 2011/2012. As with previous seasons, the majority of cases with underlying medical conditions and known vaccination status admitted to hospital (data only available for paediatric cases) and/or critical care units (adult and paediatric cases) were not vaccinated. This highlights the importance of promoting influenza vaccination for those in risk groups to prevent influenza-related morbidity and mortality.[1]

The number of acute respiratory outbreaks reported during the 2013/2014 influenza season remained at high levels, similar to the 2012/2013 season. The majority of these outbreaks were caused by influenza. These outbreaks mainly affected the elderly and those with intellectual disabilities in residential care facilities. Cumulative excess all-cause mortality was high in the elderly during the 2013/2014 season, coinciding with increased reporting of confirmed influenza A(H3) outbreaks. Reported influenza vaccination status of patients/clients in these outbreaks was high, whilst

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2013/2014 influenza season. Age specific rates are based on the 2011 CSO census.

	Hospitalised		Admitted to ICU	
Age (years)	Number	Age specific rate per 100,000 pop.	Number	Age specific rate per 100,000 pop.
<1	42	58.0	6	8.3
1-4	67	23.6	6	2.1
5-14	52	8.3	6	1.0
15-24	25	4.3	1	0.2
25-34	70	9.3	4	0.5
35-44	68	9.0	13	1.9
45-54	38	6.6	9	1.6
55-64	71	15.3	14	3.0
65+	260	48.6	24	4.5
Total	**693**	**15.1**	**83**	**1.8**

[†] Influenza-associated deaths include all deaths where influenza is reported as the primary/main cause of death by the physician or if influenza is listed anywhere on the death certificate as the cause of death.

vaccination status of staff was low, further highlighting the need to improve influenza vaccine uptake amongst health-care workers in order to reduce influenza-related morbidity and mortality. Further information on seasonal influenza vaccine uptake in hospitals and long term care facilities is available in the Immunisation uptake chapter of the HPSC Annual Epidemiological Report, 2013.

Globally, as reported by the WHO, the majority of influenza A viruses characterised during the 2013/2014 influenza season were antigenically similar to those contained in the WHO recommended 2013/2014 trivalent influenza vaccine. Of the influenza B viruses characterised globally, both the B/Yamagata and B/Victoria lineages circulated. For the 2014/2015 influenza season in the northern hemisphere, WHO have recommended trivalent influenza vaccines contain the following strains: an A/California/7/2009(H1N1)pdm09-like virus; an A/Texas/50/2012 (H3N2)-like virus; a B/Massachusetts/2/2012-like virus.[2]

HPSC will continue ongoing collaborative work with the National Virus Reference Laboratory (NVRL) for the early detection of novel respiratory viruses, such as Middle East Respiratory Syndrome coronavirus (MERS-CoV), avian-origin influenza A(H7N9) and enterovirus EV-D68. Surveillance procedures for these viruses will remain in place while the risk remains. Further information on these novel viruses is available on the HPSC and ECDC websites.

For the 2014/2015 influenza season, existing surveillance systems in Ireland have been strengthened. A number of additional measures have been put in place to improve the surveillance of influenza/ILI outbreaks, including the inclusion of a category for Acute Respiratory outbreaks on Ireland's Computerised Infectious Disease Reporting System (CIDR). HPSC are focusing on improving influenza vaccine uptake data on severe influenza cases, outbreaks, health care workers and those in risk groups for influenza. Additional projects not detailed in this report include an all-cause mortality monitoring project associated with the European mortality monitoring group (EuroMOMO) and the European influenza vaccine effectiveness study (I-MOVE project). Efforts have been made to increase patient participation in the I-MOVE project in order to improve Irish and international estimates on influenza vaccine effectiveness. Data from all of these surveillance systems will assist in guiding the management and control of influenza and any future epidemics or pandemics. www.hpsc.ie

References

1. The Immunisation Guidelines for Ireland, 2013. http://www.hse.ie/portal/eng/health/immunisation/hcpinfo/guidelines/immunisationguidelines.html
2. WHO recommendations on the composition of influenza virus vaccines http://www.who.int/influenza/vaccines/virus/recommendations/en/

Acknowledgements

HPSC would like to thank the sentinel GPs, ICGP, NVRL, Departments of Public Health, sentinel hospitals, ICSI and HSE-NE for their contributions towards influenza surveillance throughout the influenza season.

Table 3: Summary table of confirmed influenza cases hospitalised and admitted to critical care units for all ages by influenza season: 2009-2014. It should be noted that risk factor data were not available for hospitalised cases in all age groups (with the exception of the pandemic period). Rates are based on the 2011 CSO census.

	Hospitalised					Admitted to ICU				
	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014
Total cases	1059	968	147	469	693	100	121	15	39	83
Crude rate /100,000 pop.	23.1	21.1	3.2	10.2	15.1	2.2	2.6	0.3	0.8	1.8
Age range (years)	0-84	0-97	0-92	0-99	0-98	0-79	0-80	0-80	0-88	0-88
Median age (years)	17	29	27	32	51	34	49	60	39	50
Females	533	529	83	267	398	50	64	12	19	34
	50.3%	54.6%	56.5%	56.9%	57.4%	50.0%	52.9%	80.0%	48.7%	41.0%
Cases with risk factor	507	No data	No data	No data	No data	81	90	13	35	69
	47.9%					81.0%	74.4%	86.7%	89.7%	83.1%

Table 4: Summary table of influenza-associated deaths for all ages by influenza season: 2009-2014. Rates are based on the 2011 CSO census.

	Influenza-associated deaths				
	Pandemic period	2010/2011	2011/2012	2012/2013	2013/2014
Total cases	29	38	13	32	43
Crude rate /100,000 pop.	0.6	0.8	0.3	0.7	0.9
Age range (years)	8-83	2-83	81-98	0-95	0-97
Median age (years)	54	57	88	86	80
Females	15	18	5	16	22
	51.7%	47.4%	38.5%	50.0%	51.2%

2.2 Legionellosis

Summary

Number of cases in 2013: 14
Crude incidence rate: 3.1 per million

In 2013, there were 14 cases of Legionnaires' disease notified in Ireland, a rate of 3.1 per million population, a slight decrease from the rate of 3.3 per million seen in 2012. One death was reported but was not directly attributed to Legionnaires' disease.

Ten cases were reported from HSE East, two from HSE South East and one each from HSE Midlands and HSE Mid-Western areas.

The majority of the cases were male (64.3%). The median age was 56 years with a range from 38 to 78 years.

All fourteen cases were classified as confirmed. The diagnosis of all fourteen cases was made by urinary antigen test (UAT) and two had the organism cultured. The organism involved in the 14 cases confirmed by UAT and cultured in the two cases was *Legionella pneumophila* serogroup 1. Monocloncal subtyping information was not available.

Nine cases were travel-associated. Countries of travel included Ireland (1), Italy (1), Spain (4), the UK (2) and the USA (1). Two of these cases were linked to travel related clusters. The remaining five cases were assumed to be community acquired.

No real seasonality was observed in 2013 as described in Figure 1.

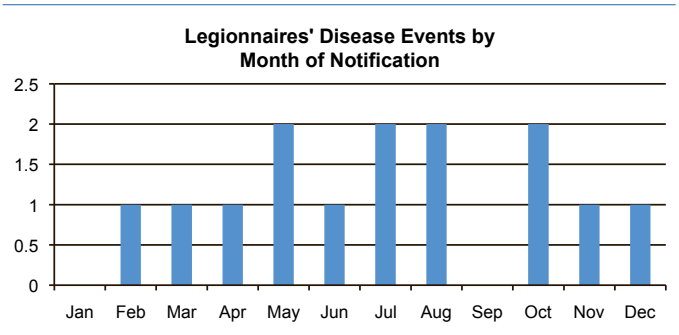

Figure 1. Number of Legionnaires' disease cases by month of notification in Ireland, 2013

Table 1. Number of Legionnaires' disease cases per million population in Ireland, 2006-2013

Age group (years)	2006	2007	2008	2009	2010	2011	2012	2013
<30	0	1	0	0	1	0	0	0
30-39	0	3	0	0	0	0	1	1
40-49	7	4	2	0	2	0	1	3
50-59	2	2	3	2	1	1	1	4
60-69	1	3	4	3	3	4	6	1
70+	2	2	2	2	4	2	6	5
Total	**12**	**15**	**11**	**7**	**11**	**7**	**15**	**14**
CIR	**2.8**	**3.5**	**2.6**	**1.5**	**2.4**	**1.5**	**3.3**	**3.1**

For details of denominator data used, please see Explanatory Notes section at the end of this document

2.3 Invasive Group A Streptococcal Disease

Summary

2013 total number of cases = 168
2013 crude incidence rate = 3.66 per 100,000 population

Notifications
In 2013, 168 cases of invasive group A streptococcal (iGAS) disease were notified, which corresponds with a rate of 3.66 iGAS cases per 100,000 population [95% confidence interval (CI): 3.13 – 4.26 per 100,000]. The 2013 iGAS rate was higher than in 2012 (3.66 versus 2.66 [95% CI: 2.21 – 3.17 per 100,000]). However, the increase is not considered to be statistically significant as the confidence intervals overlap.

The majority (n = 158; 94%) were classified as confirmed cases: patients with group A streptococcus (GAS; *Streptococcus pyogenes*), isolated from a sterile site. The remaining ten were classified as probable cases: patients with streptococcal toxic shock syndrome (STSS) or necrotising fasciitis and GAS isolated from a non-sterile site (e.g. throat, sputum, vagina).

Patient demographics
Of the 168 cases, 95 (57%) were male. The mean age of patients with iGAS was 41 years (range = 1 month – 93 years) and iGAS was more common in young children and older adults (Figure 1).

Geographic spread and seasonal variation
Table 1 displays the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2009 to 2013. While HSE East accounted for the highest number of reported cases in 2013 (n=67), HSE West had the highest CIR (4.27 per 100,000 population). In all HSE areas except the Midlands, both numbers of cases and CIRs increased. HSE Mid-West reported the largest annual increase (two-fold on 2012).

In 2013, the peak months were April (17 cases), May (26 cases) and July (18 cases). As in previous years, the peak period occurred during the first half of the year (Figure 2). Upon annual review of cumulative monthly data, the increase in notifications was first noted from April 2012 (Figure 3). Data presented here are based on the date the case was notified to public health, not on the date the case was first detected.

Isolate details
Of confirmed cases, GAS was isolated from a sterile site in 147, with a source site not reported for the remaining 11. GAS was isolated primarily from blood cultures (n=107; 73%), abscesses (n=15), deep tissue (n=9), joints

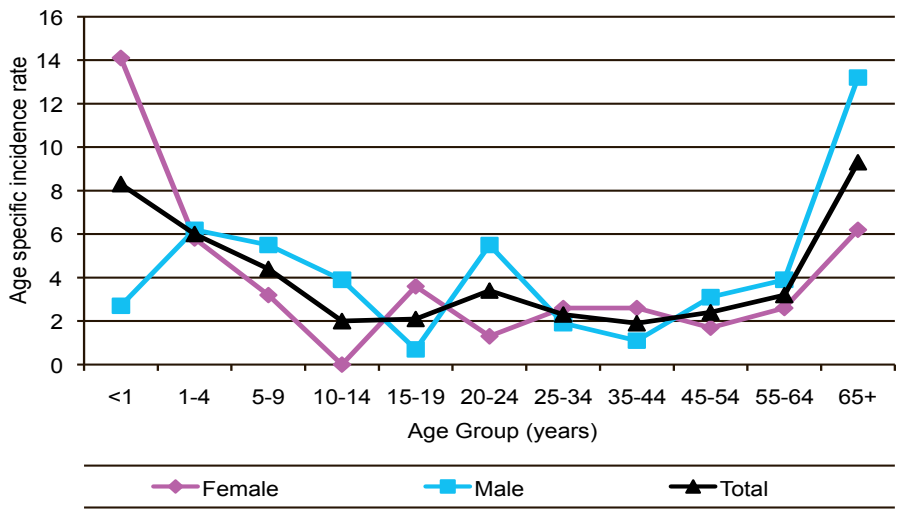

Figure 1. Age and sex specific rates of iGAS disease in 2013

(n=10), pleural fluid (n=3), peritoneal fluid (n=2) and cerebrospinal fluid (CSF) (n=1). For four cases, GAS was isolated from another sterile site in addition to blood: deep tissue (n=3) and joint (n=1).

For the 10 probable cases, GAS was isolated from non-sterile sites, including sputum, swabs and wound tissue.

Typing data, based on sequencing of the *emm* genes that encode the M protein (the major virulence factor), were available on 140 isolates submitted from 30 laboratories: *emm*-types 1 (n=41; 29%), 3 (n=33; 24%), 89 (n=13; 9%) and 28 (n=8; 6%) comprised 69% of all the isolates typed. Twenty-one other *emm*-types (each represented by four isolates or less) were also detected. Of the 28 patients with STSS for whom *emm*-typing was undertaken, nine GAS isolates belonged to *emm*1 (32%) and nine to *emm*3 (32%).

Enhanced surveillance data

Enhanced data were provided for 155 (92%) of the 168 iGAS cases, which is higher than in 2012 (87%, 106 of 122 cases). The source laboratory could be ascertained for all cases. As in previous years, there was wide variation in completeness of enhanced data reporting. Table 2 summarises characteristics of iGAS cases in Ireland from 2008 to 2013.

Clinical details

Clinical presentation data were provided for 141 cases (84%). As in previous years, bacteraemia (n=111 cases, including cases where bacteraemia was not specifically stated but GAS was isolated from blood) and cellulitis (n=45) were the commonest presentations, followed by STSS (n=32; eight of which were implied based on the information provided on the clinical presentation), pneumonia (n=24), necrotising fasciitis (n=10), septic arthritis (n=10), puerperal sepsis (n=6), peritonitis (n=4), myositis (n=3), erysipelas (n=3) and meningitis (n=3). Note that an iGAS case could have more than one clinical manifestation of infection.

Risk factors

Risk factor data were provided for 140 iGAS cases (83%). Risk factors included; presence of skin or wound lesions (n=55), age ≥65 years (n=50), malignancy (n=23), diabetes mellitus (n=16), steroid use (n=11), alcoholism (n=6), childbirth (n=6), injecting drug use

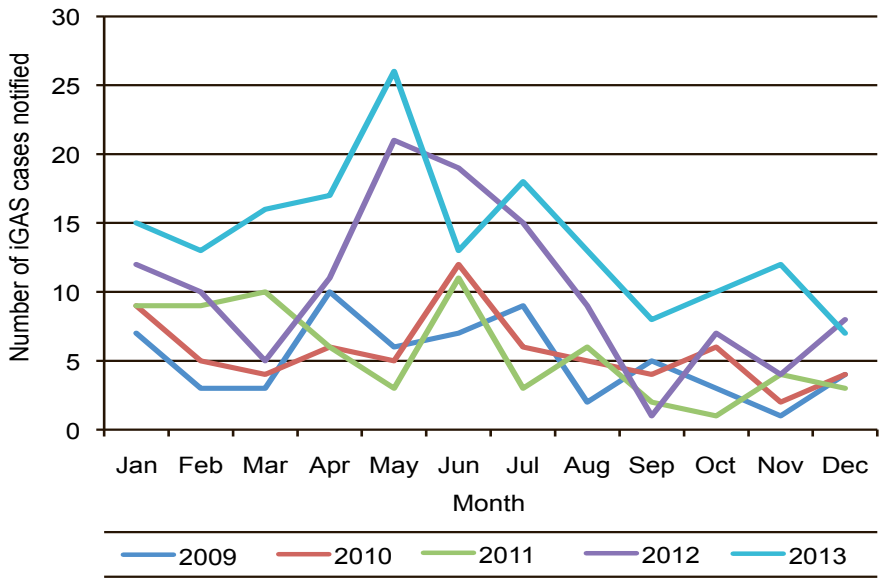

Figure 2. Monthly distribution of iGAS cases, 2009-2013

Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area (2009-2013)

HSE Area	2009		2010		2011		2012		2013	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE-E	32	1.98	22	1.36	29	1.79	51	3.15	67	4.14
HSE-M	2	0.71	2	0.71	5	1.77	7	2.48	7	2.48
HSE-MW	5	1.32	6	1.58	6	1.58	8	2.11	16	4.22
HSE-NE	3	0.68	7	1.59	1	0.23	11	2.50	14	3.18
HSE-NW	1	0.39	8	3.10	2	0.77	5	1.94	6	2.32
HSE-SE	8	1.20	5	1.00	7	1.41	16	3.22	21	4.22
HSE-S	5	1.00	12	1.81	12	1.81	14	2.11	18	2.71
HSE-W	4	0.90	6	1.35	5	1.12	10	2.25	19	4.27
IRELAND	60	1.31	68	1.48	67	1.46	122	2.66	168	3.66

CIR for 2009 calculated using the 2006 census; CIRs for 2010-2013 calculated using the 2011 census

Change from previous reports: error in calculation of rates for HSE-SE and HSE-S for 2010-2012, corrected rates are highlighted in red

(IDU) (n=5), varicella infection (n=5) and non-steroidal anti-inflammatory drug (NSAID) use (n=4). Note that an iGAS case could have more than one risk factor. No risk factors were identified for 37 cases.

Among the patients with STSS, risk factor data were provided for 28 cases. Risk factors associated with iGAS disease and STSS included age ≥65 years (n=12), presence of skin or wound lesions (n=10), steroid use (n=7), alcoholism (n=4), diabetes mellitus (n=4), malignancy (n=4), IDU (n=3) and NSAID use (n=3). Note that cases could have one or more associated risk factors. No risk factors were identified for eight STSS cases.

Clinical management/Severity
Surgical intervention was required for 39 patients (aged 10 months – 86 years), which reflects an increase compared to 26 in 2012. This included six patients with STSS, three patients with necrotising fasciitis and three patients with both STSS and necrotising fasciitis.

Among patients requiring surgical intervention, risk factor data were provided for 36 cases. Risk factors included; skin and wound lesions (n=20), age ≥65 years (n=5), diabetes mellitus (n=3), malignancy (n=2), steroid use (n=2), IDU (n=1) and varicella (n=1). Note that an iGAS case requiring surgery could have more than one risk factor. No risk factors were identified for 14 patients.

Forty-four patients (aged 1 – 86 years) required intensive care unit (ICU) admission, which reflects an increase compared to 40 in 2012. This included 20 patients with STSS, four patients with necrotising fasciitis and three patients with both STSS and necrotising fasciitis.

Among patients admitted to an ICU, risk factor data were provided for 39. Risk factors included; age ≥65 years (n=16), skin and wound lesions (n=15), diabetes mellitus (n=4), malignancy (n=4), steroid use (n=4), childbirth (n=3), alcoholism (n=2), IDU (n=2) and NSAID use (n=1). Note that an iGAS case requiring ICU admission could have more than one risk factor. No risk factors were identified for ten patients. Length of ICU stay was provided for 27 cases. The median length of ICU stay was four days (range = 1 – 8).

Other epidemiological information
Five cases (including three with STSS) were reported as hospital-acquired (compared to three in 2012).

In 2013, two iGAS outbreaks were notified: one family outbreak and one hospital outbreak, both with two people ill (compared to just one family outbreak in 2012). There was one additional hospital GAS outbreak (non-invasive) reported in 2013.

Outcome
Outcome at seven-days following GAS isolation was reported for 107 cases:

- 89 were still alive
- 16 patients had died, where GAS was the main or contributory cause of death
- One additional patient had died, but GAS was not a cause of death

The seven-day case fatality rate (CFR) for iGAS disease was 15% in 2013, which is higher than in 2012 (12%). Of 32 STSS cases, outcome at seven-days was reported for 26. Of those, there were ten deaths due to GAS (CFR = 38%).

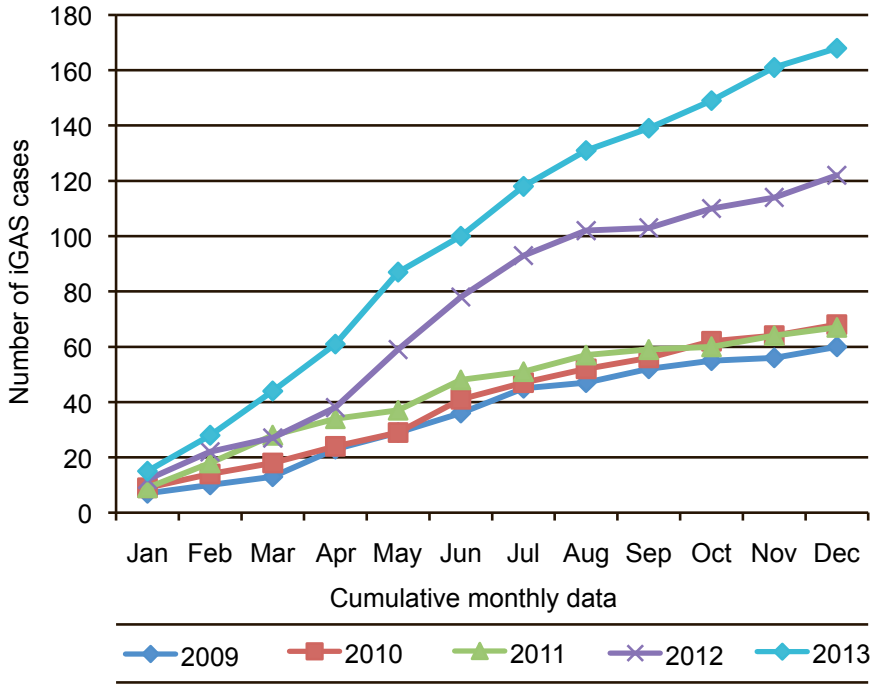

Figure 3. Cumulative monthly numbers of iGAS cases, 2009-2013.

Table 2. Characteristics of iGAS cases in Ireland (2008-2013).

	YEAR					
	2008	2009	2010	2011	2012	2013
Notifications						
Total iGAS cases notified	70	60	68	67	122	168
iGAS incidence rate per 100,000 population	1.65	1.31	1.48	1.46	2.66	3.66
Cases for which Enhanced data provided (%)*	*44 (63%)*	*44 (73%)*	*61 (90%)*	*60 (90%)*	*106 (87%)*	*155 (92%)*
Patient Demographics						
Male (%)	37 (53%)	34 (57%)	36 (53%)	28 (42%)	59 (48%)	95 (57%)
M:F ratio	1.12:1	1.31:1	1.13:1	0.72:1	0.94:1	1.31:1
Mean age	45	47	49	43	44	41
Median age	47	48	39	49	42	41
Age range	0-89	0-95	0-97	0-97	0-92	0-93
Paediatric cases (aged <18 years) (%)	16 (23%)	13 (22%)	10 (15%)	15 (22%)	28 (23%)	45 (27%)
Older cases (aged 65+ years) (%)	18 (26%)	21 (35%)	22 (32%)	22 (33%)	42 (34%)	50 (30%)
Clinical Presentation†						
Data on Clinical Presentation (%)	39 (56%)	42 (70%)	59 (87%)	58 (87%)	103 (84%)	141 (84%)
Streptococcal Toxic Shock-like Syndrome (STSS) without NF (%)	6 (15%)	3 (7%)	7 (12%)	4 (7%)	22 (21%)	28 (20%)
Necrotising fasciitis (NF) without STSS (%)	3 (8%)	1 (2%)	2 (3%)	1 (2%)	2 (2%)	6 (4%)
STSS and NF (%)	1 (3%)	4 (10%)	2 (3%)	2 (3%)	4 (4%)	4 (3%)
Bacteraemia with focal presentations (%)	23 (59%)	14 (33%)	27 (46%)	30 (52%)	42 (41%)	45 (32%)
Bacteraemia with no focal presentations (%)	3 (8%)	18 (43%)	20 (34%)	15 (26%)	21 (20%)	35 (25%)
Other focal presentations with no bacteraemia (%)	3 (8%)	2 (5%)	1 (2%)	6 (10%)	12 (12%)	23 (16%)
Bacteraemia (%)	33 (85%)	39 (93%)	55 (93%)	52 (90%)	80 (78%)	111 (75%)
Other focal presentations:						
Cellulitis (%)	17 (44%)	13 (31%)	22 (37%)	24 (41%)	41 (40%)	45 (32%)
STSS (%)	7 (18%)	7 (17%)	9 (15%)	6 (10%)	26 (25%)	32 (23%)
Pneumonia (%)	6 (15%)	2 (5%)	10 (17%)	8 (14%)	17 (17%)	24 (17%)
Septic arthritis (%)	6 (15%)	2 (5%)	2 (3%)	2 (3%)	7 (7%)	10 (7%)
Myositis (%)	2 (5%)	2 (5%)	2 (3%)	0 (0%)	4 (4%)	3 (2%)
Necrotising fasciitis (%)	4 (10%)	5 (12%)	4 (7%)	3 (5%)	6 (6%)	10 (7%)
Puerperal sepsis (%)	5 (13%)	2 (5%)	4 (7%)	5 (9%)	6 (4%)	6 (4%)
Peritonitis (%)	0 (0%)	0 (0%)	1 (2%)	3 (5%)	1 (1%)	4 (3%)
Erysipelas (%)	0 (0%)	1 (2%)	0 (0%)	0 (0%)	3 (3%)	3 (2%)
Meninigtis (%)	2 (5%)	0 (0%)	2 (3%)	1 (2%)	3 (3%)	3 (2%)
Risk Factors†						
Data on Risk Factors (%)	37 (53%)	36 (60%)	49 (72%)	49 (73%)	98 (80%)	140 (83%)
Skin lesions/wounds (%)	15 (41%)	16 (44%)	16 (33%)	20 (41%)	34 (35%)	55 (39%)
Diabetes (%)	5 (14%)	3 (8%)	8 (16%)	7 (14%)	5 (5%)	16 (11%)
Varicella (%)	2 (5%)	2 (6%)	2 (4%)	2 (4%)	9 (9%)	5 (4%)
Malignancy (%)	3 (8%)	6 (17%)	6 (12%)	6 (12%)	10 (10%)	23 (16%)
Alcoholism (%)	1 (3%)	0 (0%)	3 (6%)	1 (2%)	5 (5%)	6 (4%)
Injecting drug user (%)	2 (5%)	3 (8%)	6 (12%)	3 (6%)	6 (6%)	5 (4%)
Steroid use (%)	4 (11%)	1 (3%)	2 (4%)	1 (2%)	8 (8%)	11 (8%)
Childbirth (%)	5 (14%)	2 (6%)	4 (8%)	5 (10%)	6 (6%)	6 (4%)
Non-steroid anti-inflammatory drug use (%)	3 (8%)	0 (0%)	6 (12%)	1 (2%)	2 (2%)	4 (3%)
No identified risk factor (%)	11 (30%)	10 (28%)	12 (24%)	12 (24%)	25 (26%)	47 (34%)
Outcome at 7 days						
Data on outcome at 7 days (%)	27 (39%)	30 (50%)	43 (63%)	43 (64%)	65 (53%)	107 (64%)
RIP/GAS main cause or contributory (%)	1 (4%)	2 (7%)	4 (9%)	5 (12%)	8 (12%)	16 (15%)
STSS cases: Data on outcome at 7 days (%)	6 (86%)	6 (86%)	8 (89%)	5 (83%)	17 (65%)	26 (81%)
STSS cases: RIP/GAS main cause or contributory (%)	1 (17%)	1 (17%)	2 (25%)	1 (20%)	6 (35%)	10 (38%)
Severity						
Data on Admission to ITU (%)	39 (56%)	40 (67%)	57 (84%)	57 (85%)	99 (81%)	152 (90%)
Admitted to ITU (%)	7 (18%)	16 (40%)	14 (25%)	11 (19%)	40 (40%)	44 (29%)
Data on Surgical Intervention (%)	32 (46%)	28 (47%)	49 (72%)	45 (67%)	86 (70%)	135 (80%)
Surgical Intervention Required (%)	9 (28%)	8 (29%)	12 (24%)	8 (18%)	26 (30%)	39 (29%)
Typing						
iGAS isolates that were typed (%)					109 (89%)	140 (83%)
*emm*1 (%)					53 (49%)	41 (29%)
*emm*3 (%)					4 (4%)	33 (24%)
*emm*12 (%)					10 (10%)	3 (3%)
*emm*28 (%)					8 (7%)	8 (6%)
*emm*89 (%)					4 (4%)	13 (9%)
Other*emm*-types (%)					30 (27%)	42 (29%)

* Degree of completion of enhanced surveillance forms varies from case to case: information may not be available on all variables/categories, thus calculations of percentages take into account only those cases for which data are provided

†Note: A patient may have more than one clinical presentation or risk factor

Of 39 cases requiring surgical intervention, outcome at seven-days was reported for 27. Of those, there were four deaths due to GAS (CFR = 15%).

Of 44 cases admitted to ICU, outcome at seven-days was reported for 32. Of those, there were ten deaths due to GAS (CFR = 31%). One additional patient died, but GAS was not a cause of death.

Antimicrobial susceptibility
In 2013, antimicrobial susceptibility data were reported on 126 GAS isolates (103 from blood and 23 from other specimens) by 20 laboratories via the European Antimicrobial Resistance Surveillance Network (EARS-Net). All isolates tested were susceptible to penicillin (n=110) and vancomycin (n=88). Resistance to erythromycin was reported in five (5%) of 104 isolates, to clindamycin in one (2%) of 51 isolates and to tetracycline in three (7%) of 43 isolates.

CONCLUSION

In 2013, 168 cases of iGAS infection were notified in Ireland, the highest annual number reported to date, representing an increase of 38% on 2012 (n=122). The CIR increased from 2.66 (2012) to 3.66 per 100,000 (2013), but this was not found to be statistically significant.

iGAS is a potentially life-threatening disease. In 2013, the CFR was 15% for all iGAS infections and even higher for patients admitted to ICU (31%) or presenting with STSS (38%). In 2012 and 2013, more patients presented with STSS than in previous years: 26 and 32 cases, respectively, compared with 6-9 cases in each of the previous four years.

emm-typing was undertaken on a national basis for the first time in 2012, with the establishment of a GAS typing service by the Epidemiology and Molecular Biology Unit (EMBU) at the Children's University Hospital, Temple St. In 2013, two *emm* types, *emm*1 and *emm*3 (together representing 74 of 140 isolates), comprised 53% of all isolates typed, compared with just one *emm* type, *emm*1 (53 of 109 isolates), which comprised 49% of all isolates in 2012. Certain *emm* types, including *emm*1 and *emm*3, are associated with STSS, and STSS in turn is strongly associated with increased mortality. The changes observed in the predominant *emm* types in circulation in just one year and in the clinical presentations over the last couple of years highlight the dynamic nature of iGAS infection.

Ongoing surveillance is essential, specifically completion of the enhanced data questionnaire, to gain a greater understanding of iGAS, to enable early detection of clusters/outbreaks, to ensure prompt implementation of infection prevention and control precautions and appropriate management of contacts. Epidemiological typing as provided by EMBU is another vital element to increase insight into GAS infection in Ireland, as certain *emm* types are associated with greater morbidity and mortality.

Antimicrobial susceptibility data confirm that iGAS remains susceptible to penicillin and that penicillin should continue to be the treatment of choice for iGAS.

HPSC thanks participating microbiology laboratories and public health departments for their ongoing contribution to the iGAS enhanced surveillance scheme.

All microbiology laboratories are encouraged:

- to return enhanced iGAS surveillance forms for every patient with iGAS
- to submit all iGAS isolates to the Epidemiology and Molecular Biology Unit (EMBU), Children's University Hospital, Temple St for *emm*-typing
- to submit antimicrobial susceptibility data on all iGAS cases along with EARS-Net quarterly returns

The enhanced surveillance form can be downloaded from the HPSC web site at:
http://www.hpsc.ie/hpsc/A-Z/Other/GroupAStreptococcalDiseaseGAS/SurveillanceForms/

Further information on iGAS disease in Ireland, including factsheets for patients and contacts, national guidelines and a new quarterly report, is available at: http://www.ndsc.ie/hpsc/A-Z/Other/GroupAStreptococcalDiseaseGAS/

The figures presented in this summary are based on data extracted from the Computerised Infectious Diseases Reporting (CIDR) System on **21st July 2014.**

2.4 Invasive Group B Streptococcal Infections

Summary

2013 total number of cases = 66
- 42 cases of early-onset disease (EOD)
- 24 cases of late-onset disease (LOD)

2013 EOD rate per 1,000 live births = 0.61

2013 LOD rate per 1,000 live births = 0.35

Background

Invasive group B streptococcal (iGBS; *Streptococcus agalactiae*) infections in infants <90 days old or stillborn infants have been notifiable in Ireland via the Computerised Infectious Diseases Reporting (CIDR) system since January 2012.

In neonates two syndromes exist:
- Early-onset disease (EOD; age at onset/diagnosis <7 days old)
- Late-onset disease (LOD; age at onset/diagnosis 7-89 days old)

Both include sepsis, pneumonia and meningitis. Stillbirth associated with isolation/detection of *Streptococcus agalactiae* from the placenta or amniotic fluid is also notifiable.

Notifications

In 2013, there were 66 iGBS cases, of which 42 and 24 cases represented EOD and LOD, respectively (Figure 1 and Table 1). The EOD and LOD rates were 0.61 and 0.35 per 1,000 live births, respectively (68,930 live births, CSO 2013 data obtained from http://www.cso.ie/en/media/csoie/releasespublications/documents/vitalstats/2013/vstats_q42013.pdf)

Twenty cases presented with meningitis (meningitis was specifically mentioned as a case presentation for five cases and inferred from 15 cases where the specimen type tested included CSF).

Three of the reported cases in 2013 were associated with stillbirth.

The figures presented in this summary are based on data extracted from CIDR on **17th July 2014**.

Table 1. Annual breakdown, including rates, of iGBS cases by disease syndrome

	Year			
	2012		2013	
Disease syndrome	n (%)	Rate*	n (%)	Rate*
EOD	58 (75%)	0.80	42 (64%)	0.61
LOD	19 (25%)	0.26	24 (36%)	0.35
Total	**77**	**1.07**	**66**	**0.96**

* Incidence rate per 1,000 live births
[Live births in the Republic of Ireland (source: www.cso.ie): 2012, 72,225; 2013, 68,930

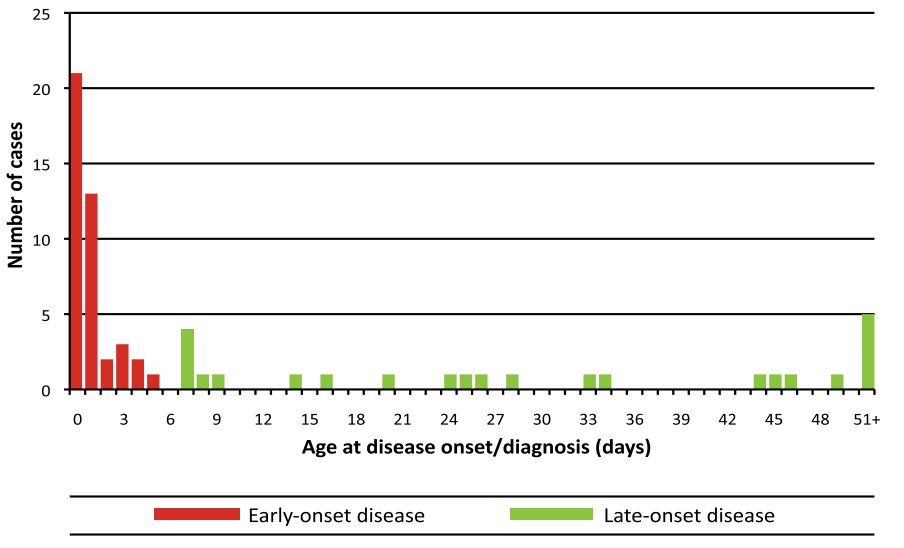

Figure 1. Distribution of cases of invasive Group B streptococcal infection by age (in days) at time of onset/diagnosis in 2013: early-onset disease (<7 days) and late-onset disease (7-89 days)

2.5 Tuberculosis, 2012

Summary

Number of cases in 2012: 359
Crude incidence rate in 2012: 7.8/100,000
Number of cases in 2013*: 381
Crude incidence rate in 2013*:8.3/100,000

In 2012, 359 cases of tuberculosis (TB) were notified in Ireland, corresponding to a crude notification rate of 7.8 per 100,000 population, a decrease compared to 2011 (9.0/100,000 population). A summary of the epidemiology of TB in Ireland during 2012 is shown in table 1 while the number of cases and crude incidence rates from 1991 to 2013* with three-year moving averages are shown in figure 1.

The highest crude incidence rate was reported by HSE-S (10.2/100,000 population) while the lowest rate was reported by HSE-SE (5.0/100,000 population). Cases ranged in age from 4 months to 90 years of age, with a median age of 40 years. The highest age-specific rate in 2012 occurred among those aged 25-34 years (10.5/100,000 population) followed by those aged 65 years and over (10.3/100,000 population). The rate among males (9.5/100,000 population) was higher than that among females (6.1/100,000 population). Rates among males were higher than females for all age groups except in the 15-24 year age group (8.6/100,000 population in females compared to 7.6/100,000 population in males). The highest rate among males (15.1/100,000 population) was in the group aged 55-64 years while the highest rate in females (10.1/100,000 population) was in the 25-34 year age group. The male to female ratio (1.5:1) reported in 2012 was consistent with the ratio reported in previous years.

Geographic origin

During 2012, 44.6% (160 cases) of TB cases were born outside Ireland, a slight decrease from the proportion reported in 2011 (46.7%). The crude rate in the foreign-born population decreased from 25.2 per 100,000 population in 2011 to 20.9 per 100,000 population in 2012. The crude rate in the indigenous population was 5.2 per 100,000 population in 2012, which decreased slightly compared to 5.7 per 100,000 population reported in 2011. There was a notable difference in age

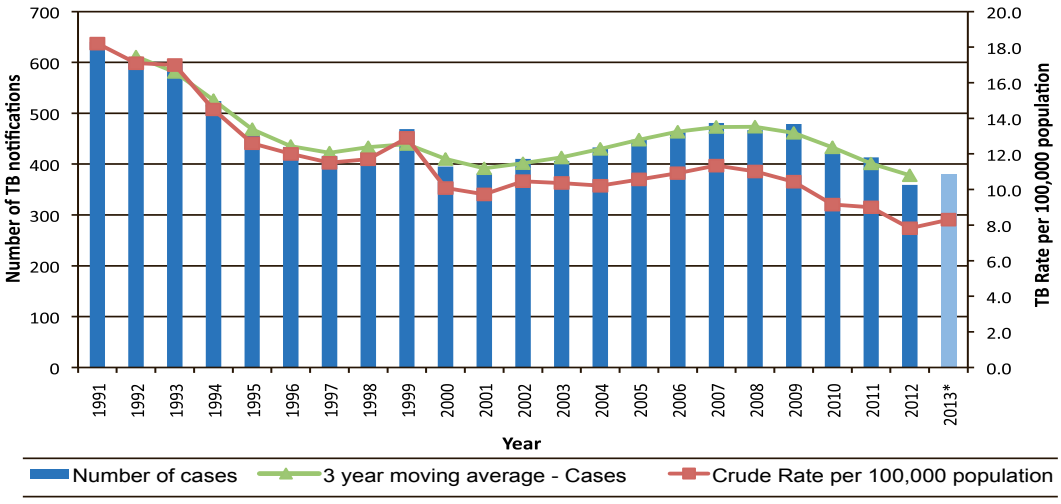

Figure 1: Notified cases of TB in Ireland with crude rates per 100,000 population, 1991 to 2013 and 3-year moving averages, 1992-2012*

Data for 2013 are provisional data which may change significantly following validation

between those born in Ireland and those born outside Ireland, with a median age of 51 years and 33 years respectively.

Site of infection

Pulmonary TB was reported in 255 (71.0%) cases and 104 (29.0%) had exclusively extrapulmonary disease. Of the extrapulmonary cases reported in 2012, there were three cases of TB meningitis corresponding to a rate of 0.07 per100,000 population (0.7 per million population).

Microbiology

Of the 359 cases reported in 2012, 79.1% (284 cases) were culture confirmed. Of the 284 culture confirmed cases, species identification showed *M. tuberculosis* in 96.1% (272 cases), M. tuberculosis complex‡ in 1.1% (3 cases) *M. africanum* in 1.4% (4 cases), *M. bovis* in 1.4% (4 cases) and *M. canettii* in 0.4% (1 case). Of the 255 cases with a pulmonary component, 217 (85.1%) were reported as culture confirmed, and 118 (46.3%) were reported as smear positive.

Drug sensitivity

Information on antibiotic sensitivity testing was available for 278 (97.9%) of the 284 culture confirmed cases. Of these, resistance was documented in 22 (7.9%) cases, five (1.4% of total cases) of which were MDR-TB cases. Mono-resistance to isoniazid was recorded in 10 cases and to streptomycin in five. Further details on the resistance profiles of TB cases reported in 2012 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2012 (www.hpsc.ie).

Outcome

In 2012, information on treatment outcome was provided for 77.7% (279) of cases, a slight increase compared to 75.1% in 2011. Treatment outcome was reported as completed for 218 (60.7%) cases, 17 were still on treatment (4.7%), 17 (4.7%) cases died, 16 (4.5%) were lost to follow up, seven cases transferred out (1.9%), four (1.1%) had treatment interrupted. Four (1.1%) of the 17 deaths were reported as attributable to TB. During 2012, the reported treatment success rate was 67.9% for new culture confirmed pulmonary TB cases and 67.1% for new smear-positive pulmonary TB cases.

Outbreaks

The introduction of the amendment to the Infectious Disease Regulations 1981 on January 1st 2004, made outbreaks, unusual clusters or changing patterns of illness statutorily notifiable by medical practitioners and clinical directors of laboratories to the medical officer of health. Standard reporting procedures for surveillance of TB outbreaks were formally agreed in 2007.

During 2012, seven outbreaks of TB were reported to HSPC, with 25 reported cases of active TB, four with latent TB infection (LTBI) and six hospitalisations. Two outbreaks each were reported by HSE-M and HSE-S and one outbreak each was reported by HSE-MW, -SE and -W. There were three general outbreaks, one of which occurred in an extended family, one in a community setting and the remaining general outbreak involved more than one location. There were also four family outbreaks, all of which occurred in private houses. The number of outbreaks reported during 2012 remained stable in comparison to 2011, however the number of cases of LTBI reported as associated with the outbreaks decreased. Figure 2 shows a summary of reported TB outbreaks from 2004 to 2013 by year of outbreak, number of active TB cases and number of persons with LTBI. Please note that numbers of LTBI for outbreaks reported during 2012 are provisional and may increase as outbreak investigations continue.

Provisional 2013 data

There were 381 cases of TB provisionally notified in 2013, corresponding to a crude rate of 8.3 per 100,000 population. It is important to note that these data are

Table 1: Summary of the epidemiology of TB in Ireland, 2012

Parameter	Number	% of Total cases
Total number of cases	359	
Crude notification rate per 100,000	7.8	
Cases in indigenous population†	196	*54.6*
Cases in foreign-born persons†	160	*44.6*
Culture positive cases	284	*79.1*
Pulmonary cases	255	*71.0*
Smear positive pulmonary cases	118	*46.3*
Multi-drug resistant cases	5	*1.4*
Mono-resistant to isoniazid	10	*2.8*
Deaths attributable to TB	4	*1.1*
Outcomes reported in cases	279	*77.7*
TB meningitis cases	3	*0.8*

‡Species of mycobacteria not specified when reported
†Country of birth was unknown for 3 cases

provisional and **may change significantly following validation**.

Of the 381 cases provisionally notified in 2013,

- Pulmonary TB was diagnosed in 229 cases (60.1%), extrapulmonary TB in 128 cases (33.6%) and pulmonary and extrapulmonary TB in 24 cases (6.3%)
- Of the 253 cases with a pulmonary disease component, 203 (80.3%) were culture positive and 130 (51.4%) were smear positive
- There were two cases of TB meningitis provisionally notified corresponding to a rate of 0.04 per 100,000 population (0.44 permillion population)
- There were 205 (53.8%) cases born in Ireland, 169 (44.4%) were foreign-born and country of birth was not reported for 7 (1.8%) cases
- There were 139 cases (36.5%) notified in females, 240 cases (63.0%) in males while sex was unknown for the remaining two cases (0.5%)
- The mean age of cases was 42.4 years (range: 0 to 88 years)
- Resistance was reported in 27 cases, 19 of which were mono-resistant to isoniazid
- Four cases of MDR-TB were reported during 2013
- Twenty (74.0%) of the 27 resistant cases (including all four MDR cases) were born outside Ireland
- There were 12 TB outbreaks reported to HPSC during 2013, with 42 active TB cases, 174 cases of latent TB infection and 17 hospitalisations. No deaths were reported from these outbreaks. Please note that numbers of LTBI for outbreaks reported during 2013 are provisional and may increase as outbreak investigations continue.

Further details on the epidemiology of TB cases reported in 2012 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2012 (www.hpsc.ie).

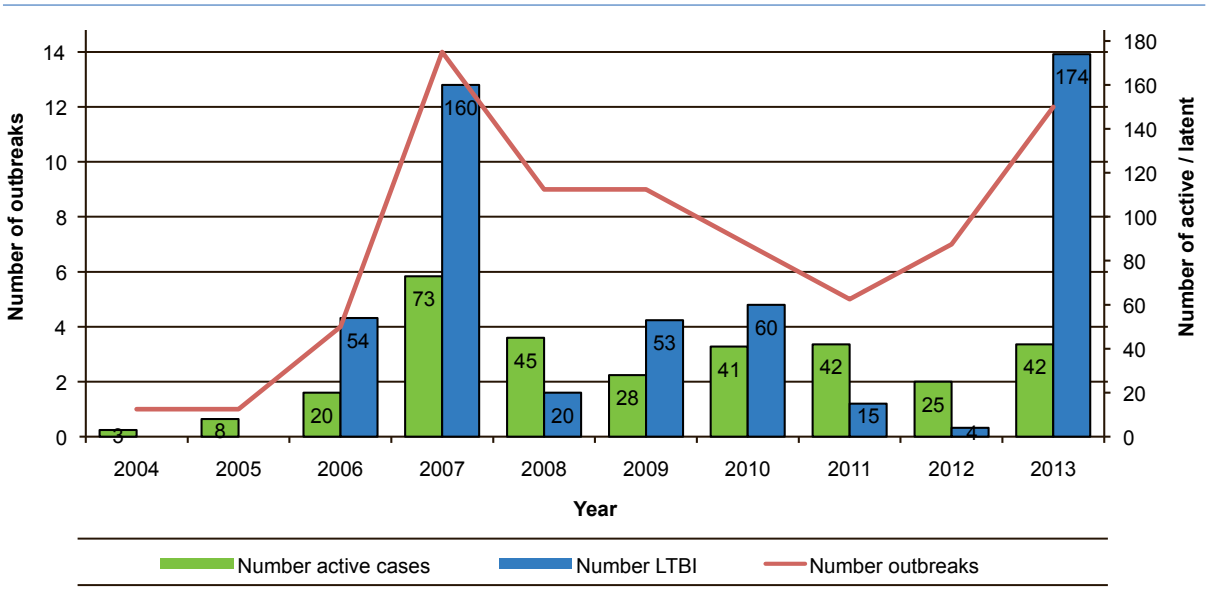

*Figure 2: TB outbreak summary by year, 2004-2013**

** Data for 2013 are provisional data which may change significantly following validation*

2.6 Chickenpox-hospitalised cases

Summary

Number of cases, 2013: 53
Crude incidence rate, 2013: 1.2/100,000

Chickenpox-hospitalised cases

The Health Act, 1947 entitles the Minister for Health to declare by regulation diseases that are infectious, covered by legislation and that require notification to a Medical Officer of Health. The infectious diseases notifiable in Ireland are regulated in the 1981 Infectious Diseases Regulations. The amendment S.I. No. 452 of 2011 to these regulations specified for the first time the disease chickenpox, hospitalised cases only, as notifiable. Chickenpox is caused by varicella-zoster virus. The case definition is available at www.hpsc.ie.

In 2013, 53 (1.2/100,000) hospitalised chickenpox cases were notified in Ireland compared to 80 (1.7/100,000) in 2012. The largest number of cases and largest crude incidence rate was in the HSE E (table 1). Of the 53 cases, 37 (70%) were classified as confirmed, three (6%) as probable and 13 (25%) as possible. The largest number of cases was in the age group 3-4 years followed by those <1 year (figure 1). The highest age specific incidence rate was in the age group <1 year followed by 3-4 years (figure 2). Of the 53 cases, 28 (53%) were male, 24 (45%) were female while gender was not reported for one case (2%).

Chickenpox/varicella outbreaks

The amendment S.I. No. 707 of 2003 to the infectious disease regulations specified that unusual clusters or changing patterns of illness that may be of public health concern must be reported. Therefore, outbreaks of chickenpox must be notified regardless of hospitalisation status. One outbreak of chickenpox was notified in 2013. This outbreak occurred in a crèche with eight ill.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 30th July 2014. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Table 1. Number of notified hospitalised chickenpox cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2013

HSE Area	Number	CIR
HSE E	32	2.0
HSE M	2	0.7
HSE MW	6	1.6
HSE NE	2	0.5
HSE NW	1	0.4
HSE SE	1	0.2
HSE S	7	1.1
HSE W	2	0.4
Total	**53**	**1.2**

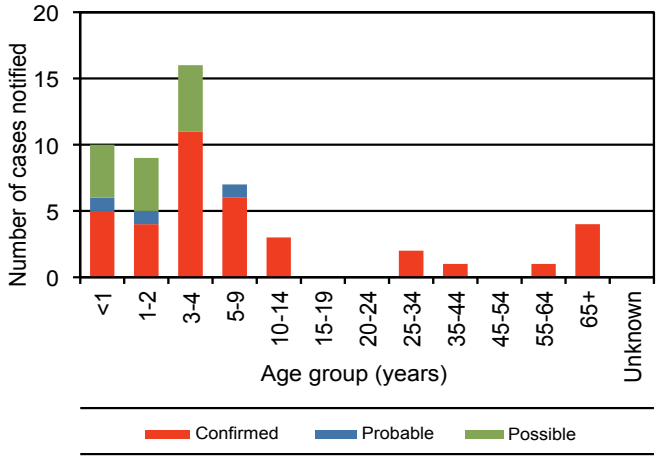

Figure 1. Number of notified hospitalised chickenpox cases in 2013 by age group and case classification

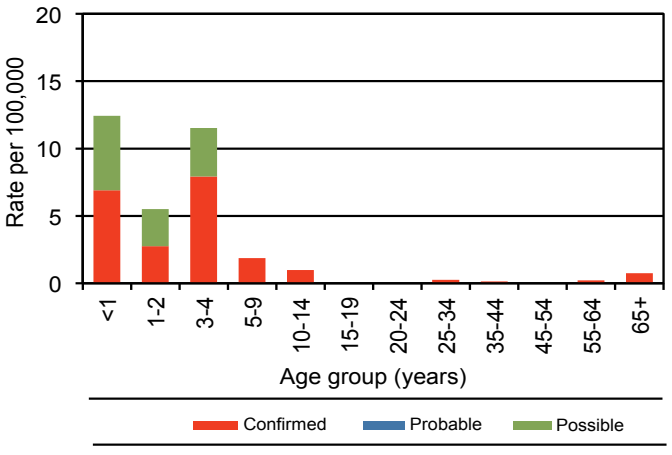

Figure 2. The age specific incidence rate (per 100,000 population) of notified hospitalised chickenpox cases in 2013 by case classification

03

Infectious Intestinal Diseases

3.1 Campylobacter

Summary

Number of cases: 2,275
Crude incidence rate: 49.6/100,000

Campylobacteriosis became a notifiable disease in Ireland in 2004 under the Infectious Diseases regulations. Prior to this, data on laboratory-confirmed cases of *Campylobacter* infection in humans were collected nationally as part of the EU Zoonoses Regulations (while some cases were included in the former category of "Food Poisoning

(bacterial other than *Salmonella*)"). It is an acute zoonotic bacterial disease characterised by diarrhoea, abdominal pain, malaise, fever, nausea and vomiting. Symptoms generally last for only a few days. Campylobacteriosis is the commonest bacterial cause of gastroenteritis in Ireland and Europe. In the EU it is estimated that 9.2 million cases occur annually, resulting in a public health impact of 0.35 million disability adjusted life years (DALYs) per year and an annual cost of approximately €2.4 billion.[1]

During 2008, a European Union-wide baseline survey of *Campylobacter* in broiler batches and broiler carcasses was carried out by The European Food Safety Authority (EFSA). This survey found that 75.8% of broiler carcasses sampled were contaminated with *Campylobacter* while 98% of Irish broiler carcasses sampled were positive for *Campylobacter*.[2] EFSA currently estimates that handling, preparation and consumption of broiler meat may account for 20-30% of human campylobacteriosis while 50-80% of cases may be attributed to the broiler reservoir as a whole.[3] The importance of poultry meat as a source of human *Campylobacter* infection was supported by the food-borne outbreak data reported to EFSA during 2012, where 44.0% of food-borne outbreaks of campylobacteriosis (with strong evidence and a specified food item) were poultry related.[4] In response to such evidence, the food Safety Authority of Ireland (FSAI) published "Recommendations for a Practical Control Programme for *Campylobacter* in the Poultry Production and Slaughter Chain" during 2011.[5]

Findings of an all-Ireland case control study that investigated risk factors for sporadic *Campylobacter* infections showed that consuming chicken and lettuce, and eating in takeaways were important risk factors for contracting the disease in Ireland. Contact with sheep,

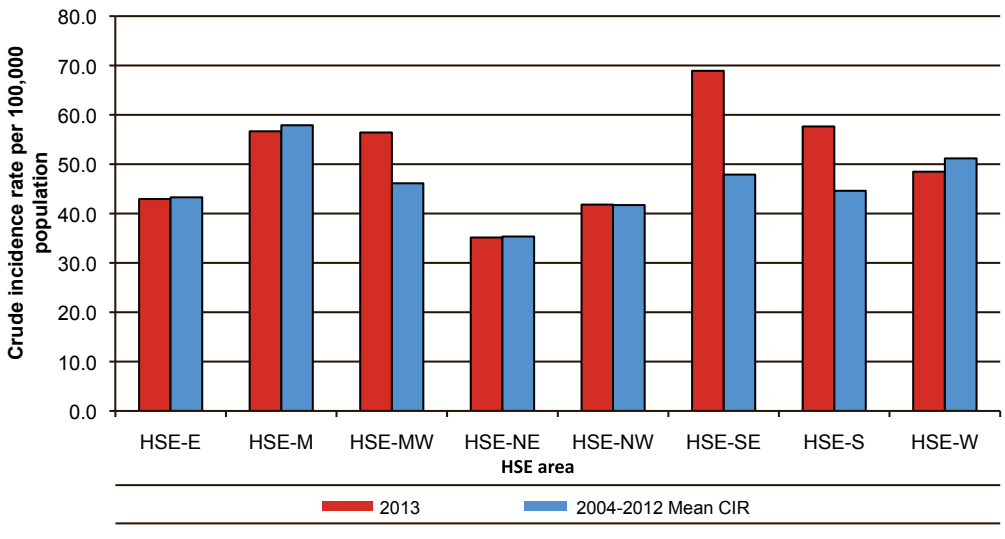

Figure 1: Campylobacteriosis 2013 CIR compared to 2004-2012 mean CIR by HSE area (CIDR)

peptic ulcer, hiatus hernia and lower bowel problems were also independently associated with infection. However, mains water supply showed protective effect from contracting the illness.[6]

During 2013, levels of campylobacteriosis remained elevated with 2,275 notifications reported to HPSC. This corresponded to a crude incidence rate of 49.6/100,000 population, which is comparable with the 2012 European crude incidence rate of 55.5 per 100,000 population.[7]

Historically, variation in campylobacteriosis crude incidence rates (CIRs) has been reported between HSE areas. During 2013, the highest CIRs occurred in HSE-SE (68.9/100,000 population) and HSE-S (57.6/100,000 population). The lowest CIR was reported by HSE-NE (35.2/100,000 population). Figure 1 compares the campylobacteriosis CIRs in 2013 with the mean campylobacteriosis incidence rates for 2004 to 2012 by HSE area.

Campylobacteriosis occurs in all age groups with the highest rate of notification reported in the 0-4 year age group. This preponderance in younger children is a well described characteristic of the disease and is also observed at European level. The highest European notification rate during 2012 was reported in males in the 0-4 year age group (157.5/100,000 population).[7]

In Ireland between 2004 and 2012, the highest mean ASIR occurred in the 0-4 year age group (159.0/100,000 population) followed by the 25-34 year age group (41.4/100,000 population) and the 15-24 year age group (40.1/100,000 population). A comparison of the mean age-specific incidence rate between 2004-2012 and the age-specific rate in 2013 showed an increase of >40% in the 55-64 year age group (43.1%) and those aged 65 years and older (50.8%). Figure 2 compares the campylobacteriosis age specific rates (ASIR) for 2013 with the mean campylobacteriosis ASIR for 2004 to 2012.

During 2013, 47.1% of all cases were female, 52.5% of cases were male and sex was not reported for 0.4% of cases. Further analysis of the age-sex distribution of campylobacteriosis cases shows that the highest ASIRs for both males and females were observed in the 0-4 year and 65 years and older age groups.

Campylobacteriosis has a well-documented seasonal distribution with a peak in summer. In Ireland, campylobacteriosis notifications typically peak during May to August. While there was the usual warm-season peak in campylobacteriosis notifications in 2013, a smaller secondary peak also occurred during October. This represented an increase of 27.7% compared to the mean number of notifications during the same period in 2004-2013. Figure 3 compares the monthly number of campylobacteriosis notifications for 2013 to the mean monthly number of campylobacteriosis notifications between 2004 and 2013.

All of the cases notified in Ireland during 2013 were laboratory confirmed. However, as there is currently no national reference facility for routine typing of *Campylobacter* isolates, information on *Campylobacter* species is strikingly incomplete. In 2013, 31.7% (n=721) of isolates were speciated. Of the 721 speciated isolates, 90.7% of isolates were *C. jejuni*, 8.7% were *C. coli*, 0.3% were *C. upsaliensis* while *C. lari* and *C. laridis* each accounted for 0.1%. The remaining 68.3% (n=1,554) of *Campylobacter* isolates identified were not further speciated.

During 2013, there were seven outbreaks of campylobacteriosis reported to HPSC with 16 associated cases of illness. Six outbreaks were family outbreaks occurring in private houses, as is typical of

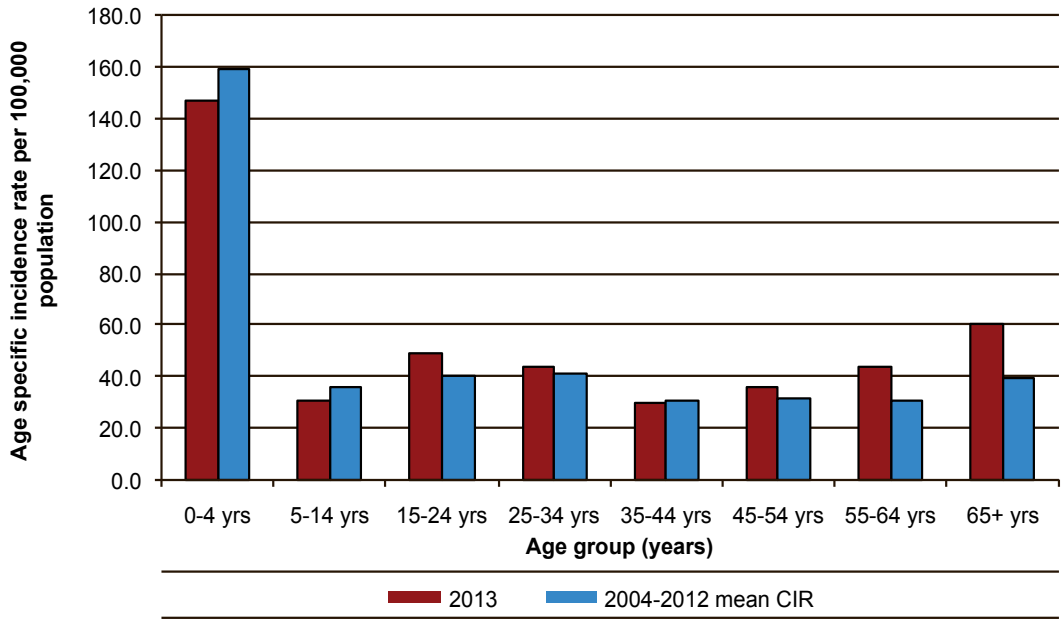

Figure 2: Campylobacteriosis ASIR 2013 compared to 2004-2012 mean ASIR (CIDR)

previous years. Three reported mode of transmission as person to person, one reported mode of transmission as other, while mode of transmission was unknown for the remaining two outbreaks. One general outbreak was also reported in a community hospital/long stay facility and mode of transmission was unknown. During 2012, 19 European countries reported 501 food-borne outbreaks of campylobacteriosis which accounted for 9.3% of the total food-borne outbreaks reported to EFSA. These outbreaks comprised 1,801 associated cases of illness and 197 hospitalisations.[4]

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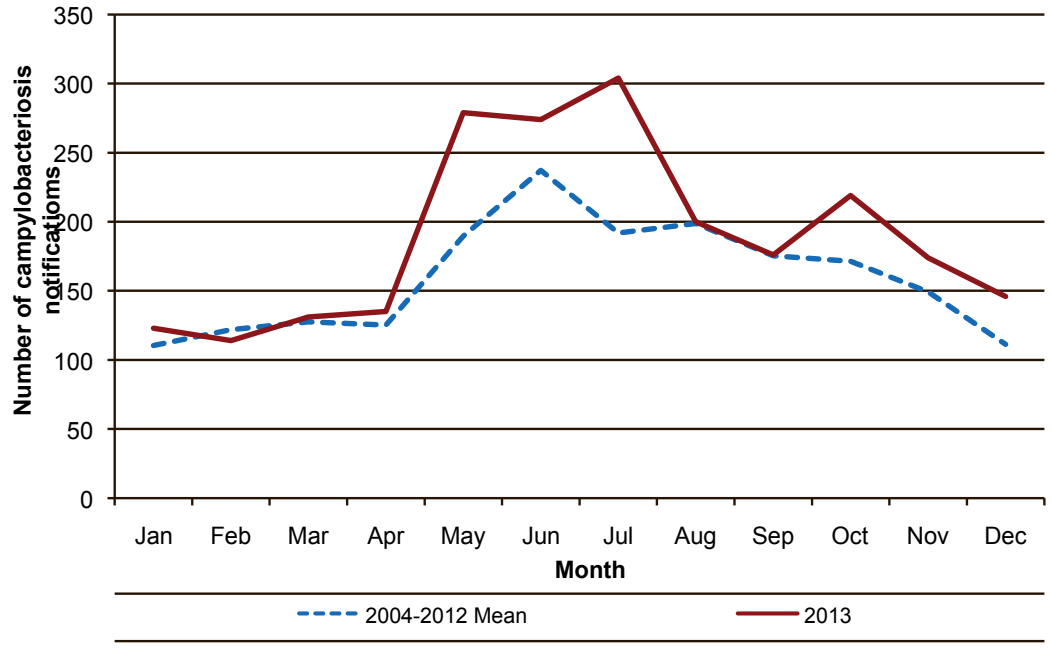

Figure 3: Campylobacteriosis notifications by month during 2013 compared to mean monthly notifications 2004-2012 (CIDR)

Table 1: Campylobacteriosis outbreaks summary, 2013 (CIDR)

Outbreak location	Mode of transmission	Number outbreaks	Number ill	Number hospitalised	Number dead
Comm. hosp. /long-stay unit	Unknown	1	2	0	0
Private house	Person to person	3	7	0	0
Private house	Other	1	2	0	0
Private house	Unknown	2	5	0	0
Total		7	16	0	0

3.2 Cryptosporidiosis

Summary

Number of cases, 2013: 514
Number of cases, 2012: 556
Crude incidence rate, 2013: 11.2/100,000

Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness in humans known as cryptosporidiosis. It is transmitted by the faecal-oral route, with both animals and humans serving as potential reservoirs. Human cryptosporidiosis became a notifiable disease in Ireland in 2004, and the case definition in use is published on the HPSC website.

In 2013, 514 cases of cryptosporidiosis were notified in Ireland, a crude incidence rate (CIR) of 11.2 per 100,000 population (95% CI 10.2-12.2), with 38.4% of notified cases reported as hospitalised for their illness. There were no reported deaths.

This was a 7% decrease on the number of cases notified in 2012 (Figure 1), being the fourth highest annual crude incidence rate since the disease became notifiable in 2004. In 2011 (the most recent year for which data are available), the ECDC reported an incidence rate overall of 2.31 per 100,000 population in the European Union, with Ireland reporting the highest rate among those countries reporting on this disease at the time.[1] Other countries with relatively high incidence rates among EU Member States in 2011 were the United Kingdom at 5.4 per 100,000 and Sweden at 4.1 per 100,000.

Consistent with previous years, the highest reported incidence was in children under 5 years, with around 80 cases per 100,000 population in this age group (Figure 2). While there is likely to be a bias towards testing of diarrhoeal stool specimens from children (as opposed to adults) for *Cryptosporidium*, it is also likely that this distribution reflects to some extent a true difference in risk between adults and children.

The crude incidence (CIR) rates by HSE area for 2013 are reported in Figure 3. As in previous years, there was a strong urban-rural divide, with the HSE E having a much lower reported incidence rate (1.5 per 100,000) than all other HSE areas. The HSE NW and HSE W reported the highest crude incidence rates this year (23.2 and 23.4 per 100,000 respectively). Compared to 2012, five areas reported decreased incidence rates, but any differences compared to 2012 were not statistically significant.

As in previous years, the highest number of cases was recorded in spring (Figure 4).

Risk factors

Reviewing case-based enhanced surveillance data,

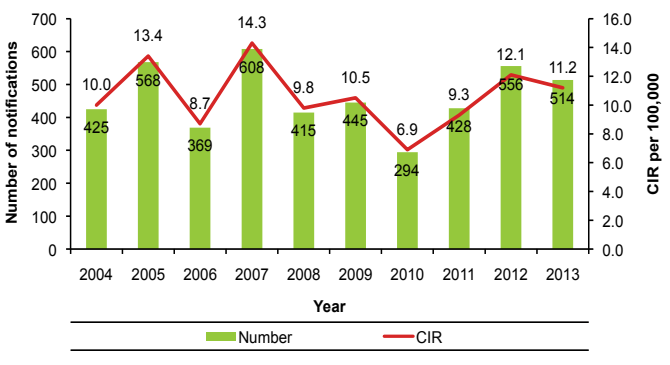

Figure 1: Annual number and crude incidence rate cryptosporidiosis, Ireland 2004-2013

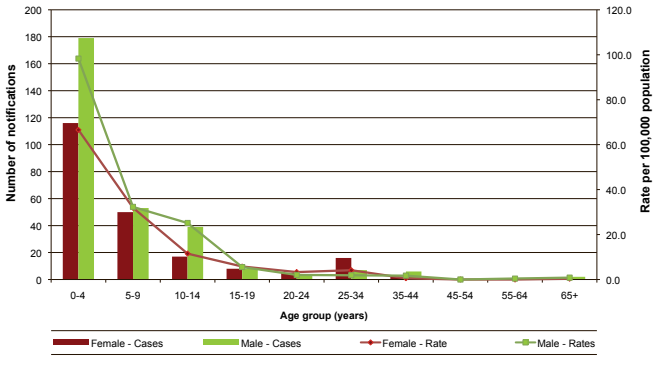

Figure 2: Age-specific incidence rate cryptosporidiosis, Ireland 2013

exposure to farm animals or their faeces either by virtue of residence on a farm or by visiting a farm during the potential incubation period was common among cases; 61.2% of cases reported either or both of these exposures (Table 1). This is consistent with the low incidence of cryptosporidiosis among residents in the largely urban HSE E population and the higher incidence recorded in more rural parts of the country.

Unlike salmonellosis, foreign travel plays only a minor role in cryptosporidiosis in Ireland (Table 1), with the majority of infections acquired indigenously (96.6%). Although, like the United Kingdom, a higher proportion of cases from late summer/early autumn were reported as being acquired abroad (Figure 5).

The proportion of cases reporting other exposures such as swimming pool visits and exposure to pets were similar to last year.

Table 2 shows the distribution of notified cases by home water supply type. It appears that persons who are not served by public water supplies have an increased risk of cryptosporidiosis as they are over-represented among the cases relative to the distribution of households by water supply type nationally; this was particularly noticeable for private well users. However, it should be borne in mind that persons whose household drinking water is not from a public supply are more likely to be rural dwellers who may also have a higher likelihood of exposure to farm animals and rural environments which is also likely to increase their risk.

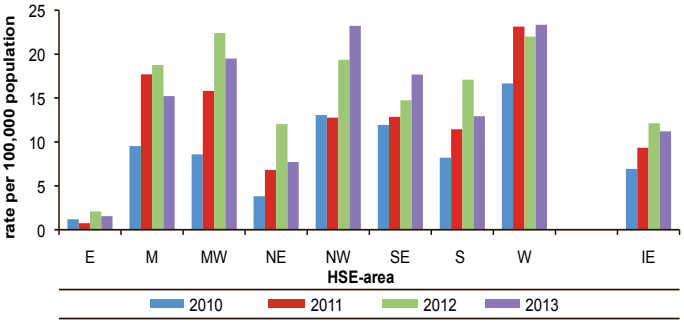

Figure 3: Regional crude incidence rates cryptosporidiosis, Ireland 2010-2013.

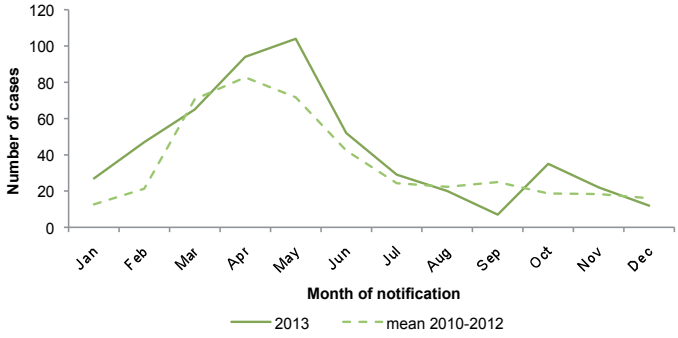

Figure 4. Seasonal distribution of cryptosporidiosis cases, Ireland 2013 compared to the mean for 2010-2012

Table 1: Number of cases (and percentage of cases where information available) where selected risk factors were reported for cryptosporidiosis cases, Ireland 2013

Risk factor	Yes (% of known)	No	Unknown/Not Specified	Total
Travel	15 (3.4%)	430	69	514
Lives/cared for on farm	166 (37.9%)	272	76	514
Visited farm	106 (27.7%)	276	132	514
Lives/works on or visited farm[a]	*249 (61.2%)*	*158*	*107*	*514*
Swimming pool visit	93 (22.6%)	319	102	514
Pets	260 (65.0%)	140	114	514
Other water based activities	25 (6.9%)	336	153	514

[a]*Composite of 2 previous variables*

Table 2: Number of cases (and percentage of cases where information available) by home water supply type compared to the number and percentage of households in Ireland by water supply type, Ireland 2013

Home water supply of notified cases	Number of cases	% of known	No. households served by these water supply types in the general population 2011 (Census 2011)	% of known	Fishers exact P value
Group water scheme (private)	27	6.2%	45,774	2.9%	<0.001
Group water scheme (public)	41	9.4%	144,428	9.0%	
Other	2	0.5%	2,080	0.1%	
Private well	119	27.2%	161,532	10.1%	
Public water supply	248	56.8%	1,247,185	77.9%	
Unknown	11				
Not specified	66		48,409		
Total	514		1,649,408	100%	

Comparing the proportion of cases and households served by public water supplies versus all other supply types: X^2=113.5, P<0.001

Outbreaks

In 2013, there were six general and 22 family outbreaks in total (Figure 6). The increase in the number of outbreaks since 2011 is most likely due to increased recognition of small family outbreaks following the introduction of enhanced surveillance for cryptosporidiosis cases late in 2010.

Among the six general outbreaks were three drinking water mediated outbreaks (Figure 7). This is a reversal of the trend which saw fewer waterborne general outbreaks reported since 2008. All three outbreaks were reported by HSE W. There were 29 ill in total, with 4 persons admitted to hospital.

Two additional general outbreaks were reported associated with swimming pools; these are the first swimming pool related cryptosporidiosis outbreaks reported in Ireland since outbreaks became notifiable in 2004. Both were small in size; a total of five cases were reported and none were hospitalised.

All 22 family outbreaks in 2013 occurred in private homes. The most common mode of transmission reported was person-to-person spread; six family outbreaks resulted in 12 illnesses. The second most common transmission route reported in family outbreaks was animal contact with three outbreaks (13 persons ill); contact with diarrhoeal cattle was the suspected for one of these outbreaks. The transmission route was unknown for the remaining 13 family outbreaks (Table 3 and Figure 8).

Summary

The crude incidence of cryptosporidiosis in Ireland in 2013 was marginally lower than the rate in 2012, but remains high relative to most other EU countries.The seasonal, age and regional distribution in incidence reported in 2013 was also typical of previous years; consistently there has been a higher incidence in springtime, in young children and in non HSE E areas.

Person-to-person spread appears to be an important mode of transmission within family outbreaks, while both enhanced surveillance data and outbreak surveillance data are consistent with animal contact being an important risk factor for cryptosporidiosis in Ireland. Unlike in the United Kingdom, travel-associated disease is reported infrequently, and is likely to be a minor contributor to transmission, as is transmission associated with food.

From the enhanced information on CIDR, exposure to water from non-public supplies appears to present a higher risk of cryptosporidiosis; persons who are not served by public water supplies were over-represented among the cases relative to the distribution of households by water supply type nationally. However, while there were fewer general waterborne outbreaks reported between 2008 and 2012 relative to earlier years, three general waterborne outbreaks occurred in 2013.The EPA drinking water reports provide information on improvements in the public water supply sector in relation to *Cryptosporidium*.[2]

Table 3: Number of outbreaks and number ill by transmission route and location, Ireland 2013

Outbreak location	Person-to-person		Waterborne		Animal contact		UNK/Not specified		Total	
	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill
Private house	6	12			3	13	13	30	**22**	**55**
Community outbreak			3	29					**3**	**29**
Swimming pool			2	5					**2**	**5**
Creche	1	4							**1**	**4**
Total	**7**	**16**	**5**	**34**	**3**	**13**	**13**	**30**	**28**	**93**

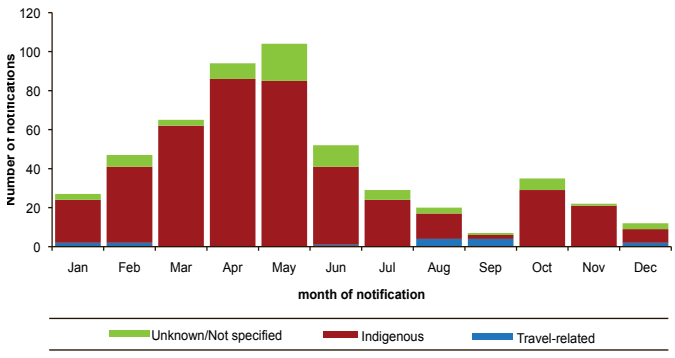

Figure 5. Seasonal distribution of cryptosporidiosis cases by Country of Infection, Ireland 2013

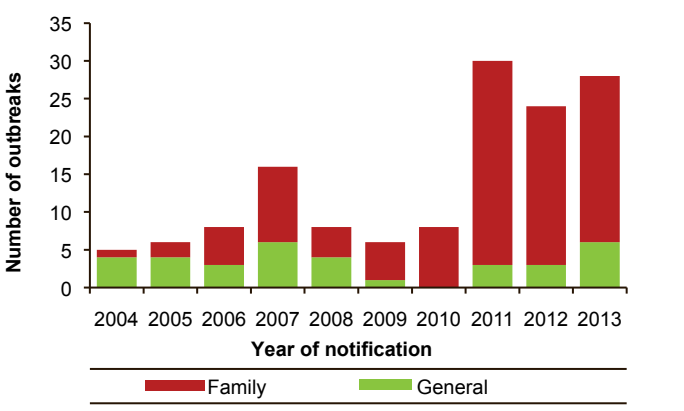

Figure 6: Number of cryptosporidiosis outbreaks notified by type, Ireland 2004-2013

1. ECDC. 2013. Annual epidemiological report; Reporting on 2011 surveillance data and 2012 epidemic intelligence data. Available at http://ecdc.europa.eu/en/publications/Publications/Annual-Epidemiological-Report-2013.pdf

2. EPA. 2012. The Provision and Quality of Drinking Water in Ireland A Report for the Year 2012. available at http://www.epa.ie/pubs/reports/water/drinking/

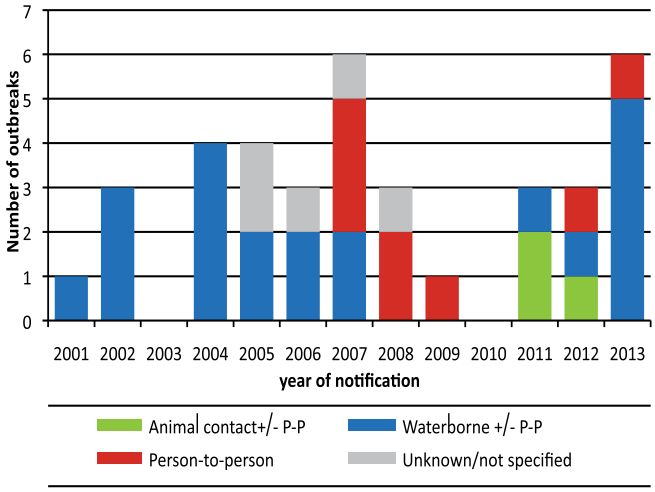

Figure 7: Number of general cryptosporidiosis outbreaks by transmission route and year, Ireland 2004-2013

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any outbreak where animal contact contributed was reported as Animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission. Note: two waterborne outbreaks in 2013 were reported as recreational waterborne outbreaks rather than drinking waterborne outbreaks

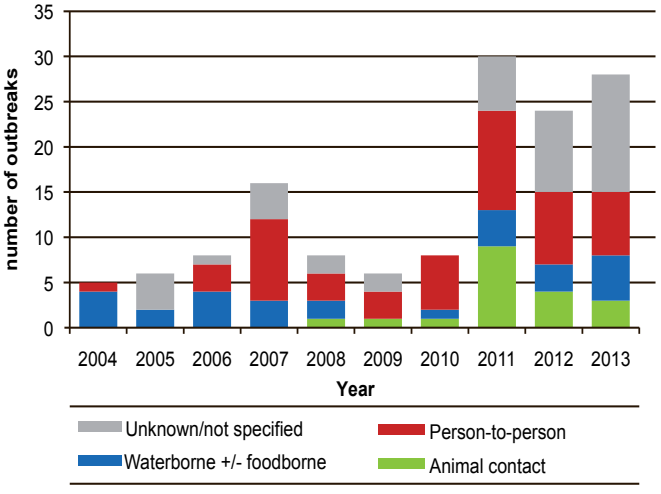

Figure 8: Number of cryptosporidiosis outbreaks notified by reported transmission route, Ireland 2004-2013

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any outbreak where animal contact contributed was reported as Animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission.

3.3 Verotoxigenic *E. coli*

Summary

Number of VTEC cases, 2013: 702
Crude incidence rate, 2013: 15.3/100,000
Number of VTEC-associated HUS 2013: 31
Number of VTEC cases, 2012: 554

Introduction

The reported verotoxigenic *E. coli* (VTEC) incidence rate in Ireland is generally high relative to other European countries. In 2012 (the latest year for which data are published), the overall VTEC incidence rate in the European Union was 1.15 per 100,000.[1] For many years, Ireland has reported the highest VTEC incidence rate of any Member State in the EU, except in 2011 Germany reported the highest rate due to a large VTEC O104 outbreak linked with fenugreek seeds.[2-3]

The dominant transmission routes reported for VTEC infection in Ireland have been person-to-person spread, especially in childcare facilities and among families with young children, and waterborne transmission associated with exposure to water from untreated or poorly treated private water sources. [4-7] Other important transmission routes identified internationally include food (often minced beef products or fresh produce such as lettuce and spinach), and contact with infected animals or contaminated environments.[3, 8-9]

Materials and Methods

Infection with verotoxigenic *E. coli* became a notifiable disease in 2012; prior to that VTEC were notifiable under the category Enterohaemorrhagic *E. coli* (EHEC) since 2004. Enhanced epidemiological information was supplied as in previous years by HSE personnel, and the VTEC National Reference Laboratory at the Public Health Laboratory HSE Dublin Mid Leinster (VTEC-NRL at PHL HSE DML) provided VTEC confirmation and typing data. Data from all sources are maintained in the Computerised Infectious Disease Reporting (CIDR) system. Outbreaks of VTEC are notifiable since 2004 and data are provided to CIDR by regional public health departments. The data used in this report were extracted from CIDR on 7th July 2014.

Data from the Central Statistics Office (CSO) 2011 census were used to provide denominators for the calculation of national, regional and age-specific incidence rates in 2013.

Results

Incidence

In 2013, there were 702 notifications of VTEC, equating to a crude incidence rate (CIR) of 15.3 per 100,000 (95% CI 14.2-16.4). This compares to an overall rate of 12.1 per 100,000 in 2012, an increase of 27%. 569 notifications in 2013 were reported as confirmed cases (CIR 12.40 95% CI 11.38-13.42), 130 were probable and there were 3 cases reported in the possible case class. The criteria under which notified cases were reported in 2013 under the VTEC case definition is outlined in Table 1. As the classification of VTEC cases changed significantly upon the amendment of the Irish VTEC case definition in 2012, it is not valid to directly compare the number of notifications by case classification with the period before 2012.

Table 1. Number of VTEC notifications by criteria for notification, Ireland 2013

Notification criteria	Confirmed	Probable	Possible	Total
Culture confirmation[a]	471	111		582
Laboratory confirmation by PCR[b]	97	11		108
Serodiagnosis (valid for HUS only)	1			1
Reported solely on the basis of epidemiological link		8		8
Clinical HUS not meeting lab or epi criteria			3	3
Total	569	130	3	**702**

[a]Symptomatic culture confirmed cases are classified as confirmed cases, while asymptomatic culture confirmed cases are classified as probable cases

[b] Symptomatic PCR-confirmed cases are classified as confirmed cases, while asymptomatic PCR-confirmed cases are classified as probable cases

Of the 691 cases with laboratory evidence of infection, 215 cases were reported as being infected with *E. coli* O157 (4.7 per 100,000 (95% CI 4.1-5.3), 212 with *E. coli* O26 (4.6 per 100,000 (95% CI 4.0-5.2), 255 with other VTEC strains, and 9 cases had mixed VTEC infections, being infected with more than one VTEC strain. Of the 8 probable cases reported on the basis of an epidemiological link to a confirmed case, 4 were linked to *E. coli* O157 outbreaks, and 4 were linked to *E. coli* O26 outbreaks. Figure 1 illustrates the distribution of VTEC cases in Ireland by serogroup since 1999. The serogroup distribution this year represents a 6.6% decrease in O157 infections, a 2.4% increase in O26 infections, and a 180% increase in other non-O157 infections compared to 2012.

Severity of illness

Five hundred and seventy-nine of the 702 notified cases were symptomatic (82.5%), 234 (40.4%) of which developed bloody diarrhoea (43.8% when only cases with this variable completed are included). Thirty-one individuals (4.4%) developed HUS, a decrease of 3% on 2012. There was one death in a confirmed VTEC case and one death in a possible VTEC case; four other persons diagnosed in 2014 with VTEC infection died, but their deaths were not due to VTEC. Where reported (n=680), 242 (35.6%) of notified cases were hospitalised (42.0% of symptomatic cases).

Twelve HUS cases were infected with *E. coli* O157, with a further two HUS case infected with both VTEC O157 and VTEC O26. Five had laboratory evidence of VTEC O26 infection, two had VTEC O55 infections, and seven were infected with other VTEC strains (Table 2). The remaining three HUS cases were reported as possible VTEC notifications. HUS cases ranged in age from 10 months to 81 years, with 25 of the 31 cases being less than 10 years. Eighteen were sporadic cases, nine were part of family outbreaks (including two cases in one household), and four were part of general outbreaks (including two in one small community outbreak).

Seasonal distribution

Figure 2 shows the seasonal distribution of notifications

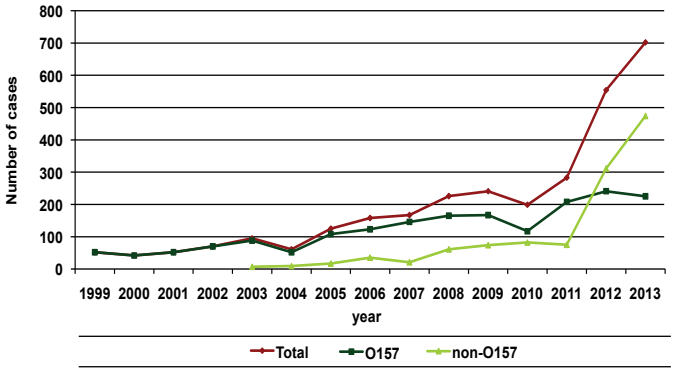

Figure 1. Annual number of confirmed and probable VTEC cases by serogroup, Ireland 1999-2013

Note: For simplicity in this figure, cases with mixed VTEC O157/other serogroup infections are included in the data for O157, as are probable cases linked to known E. coli O157 outbreaks. Non-O157 data includes cases with mixed non-O157 infections and probable cases linked to known O26 outbreaks

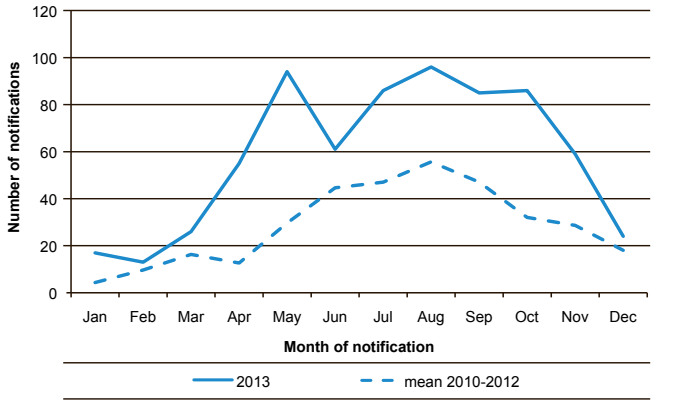

Figure 2. Seasonal distribution of VTEC notifications, Ireland 2013 compared to the mean number of notifications 2010-2012

Table 2. Number of VTEC notifications by infecting serogroup and verotoxin and HUS status, Ireland 2013

Serogroup[a]	HUS	non-HUS	Total
O157 VT1[b]	0	1	**1**
O157 VT2 or epi-linked to O157 VT2 outbreak	11	178	**189**
O157 VT1+VT2 or epi-linked to O157 VT1+VT2 outbreak	3	32	**35**
O26 VT1 or epi-linked to O26 VT1 outbreak	1	102	**103**
O26 VT2 or epi-linked to O26 VT2 outbreak	0	10	**10**
O26 VT1+VT2 or epi-linked to O26 VT1+VT2 outbreak	3	102	**105**
O26 serodiagnosed	1	0	**1**
Other VT1	1	114	**115**
Other VT2	7	80	**87**
Other VT1+ VT2	1	52	**53**
No organism	3	-	**3**
Total	**31**	**671**	**702**

[a]For simplicity mixed infections were recorded as O157 if at least one strain was O157, as O26 if at least one strain was O26 but not O157, and as Other if only non-O157 non-O26 strains were detected.
[b]One case was reported as positive for *vt1* and O157 by PCR; it is possible that these genes were not detected from the same strain

in 2013 relative to the mean monthly number of cases in the years 2010-2012. Despite the very large increase in the number of notifications, the typical summer seasonal peak was maintained, but was slightly higher than previously in the early part of the summer the peak months were May and August, followed by July, September and October.

Like 2012, there was variation in the seasonal distribution by serogroup, with VTEC O157 showing the typical peak in numbers in late summer; in contrast, VTEC O26 notifications peaked in May and July during 2013 (Figure 3). Other non-O157 serogroups were also more common in early summer in 2013.

Regional distribution

While the overall VTEC incidence rate nationally increased significantly compared to 2012, examining by VTEC serogroup showed that the increase was due to a large significant increase in the reported rate of non-O157 infections, while the reported rate for VTEC O157 actually decreased although not significantly.

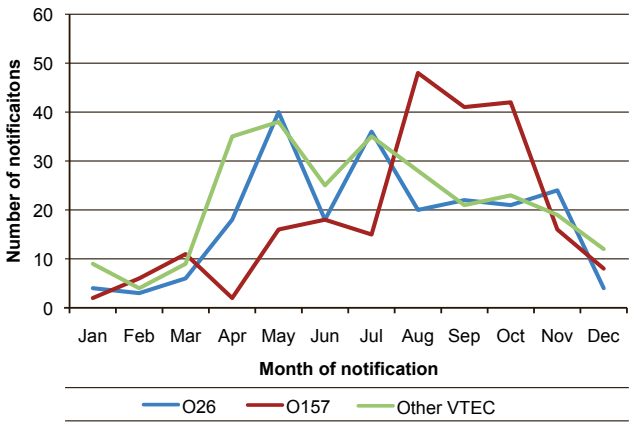

Figure 3: Seasonal distribution of VTEC notifications by serogroup, Ireland 2013

Reviewing at the regional incidence rates for VTEC O157, the reported incidence rates by area were not significantly different compared to 2012. The HSE E reported a rate significantly lower than all other areas in 2013, while the rate for the HSE NE was significantly lower than for four of the other HSE areas.

The crude rate for non-O157 infections was higher than for VTEC O157 in six HSE areas (Table 3; Figure 4). There were significant increases in the reported incidence of non-O157 for three HSE areas: the HSE E, HSE MW and HSE SE; this is likely to have been influenced at least in part by changes in local diagnostic practices.

The highest VTEC incidence rate overall were reported in the HSE MW followed by the HSE SE, where the rates were two to two and half times the national crude rate (Table 3). Atypically, the HSE NE reported the lowest overall crude incidence rate (Table 3), followed closely by the HSE E and HSE NW. The reported incidence rates in these three areas were significantly lower than the rates reported in the other five areas.

The relative ranking of HSE areas by overall VTEC incidence was fairly similar to the the ranking of areas by HUS incidence rate suggesting that the differences observed are likely to be a reasonable reflection of the true differences in risk between HSE areas.

Age-sex distribution

As in previous years, the highest reported age-specific incidence rate was in the 0-4 years age group (~ 80 per 100,000). Incidence rates were higher among females in all age groups over 25 years, and were slightly higher in males than females in the 0-4 year age group (Figure 5).

Laboratory typing

In 2013, the serogroup and verotoxin profiles of VTEC isolates/samples referred to the PHL HSE Dublin Mid Leinster, Cherry Orchard Hospital are displayed in Table 4. The most common serogroup reported was VTEC O157 (n=215), closely followed by VTEC O26 (n=213). Among the other serogroups listed by the World Health

Table 3. Number and crude incidence rate VTEC by serogroup and HSE area, and number and crude incidence rate VTEC-associated HUS by HSE area, Ireland 2013

HSE-area [a]	Number [CIR (95% CI)] VTEC O157 [b]	Number [CIR (95% CI)] non-O157 VTEC [c]	Number [CIR (95% CI)] all VTEC [d]	Number [CIR (95% CI)] VTEC-associated HUS
E	34 [2.1 (1.4-2.8)]	53 [3.3 (2.4-4.2)]	**89 [5.5 (4.4-6.6)]**	5 [0.3 (0.0-0.6]
M	20 [7.1 (4.0-10.2)]	50 [17.7 (12.8-22.6)]	**70 [24.8 (19.0-30.6)]**	2 [0.7 (-0.3-1.7)]
MW	29 [7.7 (4.9-10.4)]	122 [32.2 (26.5-37.9)]	**151 [39.8 (33.5-46.2)]**	4 [1.1 (0.0-2.1)]
NE	13 [3.0 (1.4-4.6)]	2 [0.5 (-0.2-1.1)]	**15 [3.4 (1.7-5.1)]**	2 [0.5 (-0.2-1.1)]
NW	12 [4.7 (2.0-7.3)]	4 [1.6 (0.0-3.1)]	**16 [6.2 (3.2-9.2)]**	0 [0.0 (0.0-0.0)]
SE	36 [7.2 (4.9-9.6)]	111 [22.3 (18.2-26.5)]	**148 [29.7 (25.0-34.5)]**	10 [2.0 0.8-3.3)]
S	45 [6.8 (4.8-8.8)]	66 [9.9 (7.54-12.3)]	**111 [16.7 (13.6-19.8)]**	4 [0.6 (0.0-1.2)]
W	36 [8.1 (5.4-10.7)]	66 [14.8 (11.2-18.4)]	**102 [22.9 (18.5-27.4)]**	4 [0.9 (0.0-1.8)]
IE	225 [4.9 (4.2-5.5)]	474 [10.4(9.4-11.3)]	**702 [15.3 (14.2-16.4**	31 {0.7 (0.4-0.9)]

[a]Rates per 100,000 calculated using CSO census 2011 for denominator data
[b] For simplicity, cases with mixed VTEC O157/other serogroup infections are included in the data for O157, as are probable cases linked to known E. coli O157 outbreaks.
[c] Non-O157 data includes cases with mixed non-O157 infections and probable cases linked to known O26 outbreaks.
[d] Possible cases (i.e. those with no associated organism are also included in this column), and therefore the total in this column will not always be the sum of the previous two columns.

Organisation as having the highest association with HUS internationally, there were eighteen VTEC O103 cases, seven VTEC O111, and seventeen VTEC O145. There was a large increase in the variety of other non-O157 serogroups reported, and in the number of cases infected with ungroupable strains (this included those cases diagnosed by PCR only).

As usual among VTEC O157 in Ireland, isolates containing the genes for verotoxin 2 (*vt2*) were more common (84%) than strains containing both *vt1* and *vt2*. VTEC O26 strains containing only *vt1* made up 47% of all VTEC O26 reported, with 48% of VTEC O26 containing the genes for both *vt1* and *vt2*, and those containing *vt2* making up the remaining 5% of VTEC O26. *vt2*-containing strains made up the majority of O145 strains (82%), *vt1*-containing strains made up the majority of O103 strains (89%), while VTEC O111 strains comprised both *vt1*-containing (57%) and *vt1+vt2*-containing (43%) strains.

Risk factors

Under enhanced surveillance for VTEC, risk factor information is routinely collected on VTEC notifications (Table 5).

Exposure to farm animals or their faeces and exposure to private well water were relatively common among cases; 36.7% and 35.0% reported these exposures respectively, although both were less commonly reported than in 2012. According to CSO data, in the general population, around 10.1% of households are served by private wells, indicating that, on a national basis, exposure to private wells appears to be more common among VTEC cases than among the general population.

Unlike salmonellosis, foreign travel plays only a minor role in VTEC infection in Ireland, with the overwhelming majority of infections acquired indigenously.

Where the information was available, around a quarter of VTEC cases in 2013 were reported to attend a Childcare Facility (CCF). When these analyses were restricted to notified VTEC under five years of age, over half reported attendance at a childcare facility. This is higher than the proportion of children in the general population who use non-parental childcare (42%) as reported by the Central Statistics Office.[10]

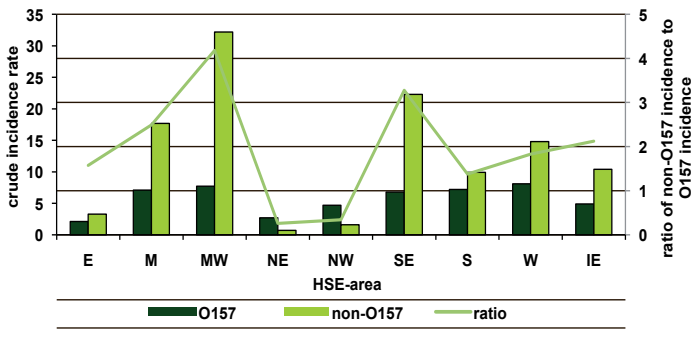

Figure 4: Crude incidence rate VTEC O157 and non-O157, Ireland 2013

Outbreak and environmental investigations

The outbreak surveillance system plays a key role in our understanding of VTEC transmission in Ireland. Ninety-six VTEC outbreaks were notified in 2013, which included 315 of the 702 VTEC notifications. 29 outbreaks were due to VTEC O157, 43 to VTEC O26, eight were mixed VTEC strain outbreaks, and 16 were caused by other VTEC strains.

The majority of outbreaks (83%) were family outbreaks, with sixteen general outbreaks notified. The 80 family outbreaks resulted in 133 persons becoming ill, an

Table 4. Serotype and verotoxin (vt) profiles associated with laboratory confirmed VTEC cases, as determined at the VTEC-NRL at PHL HSE DML in 2013

Sero-group	vt1	vt1+vt2	vt2	N/A	Total
O157	1[a]	34	180		**215**
O26	100	102	10	1[b]	**213**
O103	16	2			**18**
O145	2	1	14		**17**
O111	4	3			**7**
O55	1		5		**6**
O91	1	4	1		**6**
O146	4	1			**5**
O84	4				**4**
O5	3				**3**
O113			3		**3**
O182	3				**3**
O153			3		**3**
O105c			2		**2**
O104	1	1			**2**
O117	1		1		**2**
O130			2		**2**
O165		1	1		**2**
O178		1			**1**
O159			1		**1**
O78	1				**1**
O180			1		**1**
O98	1				**1**
O181	1				**1**
O76		1			**1**
O118			1		**1**
O8			1		**1**
O2			1		**1**
O73	1				**1**
O108	1				**1**
O101		1			**1**
O140		1			**1**
O74			1		**1**
O166		1			**1**
Un-group-able	70	34	49		**153**
Mixed in-fections	~	~	~		**9**
Total	**218**	**190**	**282**	**1**	**691**

[a]One case was reported as positive for *vt1* and O157 by PCR; it is possible that these genes were not detected from the same strain
[b]No vt type for one VTEC O26 case, as diagnosed by serodiagnosis

average of 1.7 (range 1-5) persons ill per outbreak, while the sixteen general outbreaks resulted in 88 persons becoming ill, an average of 5.5 (range 1 to 31) persons ill per outbreak.

Seventy-seven outbreaks occurred in private homes, seven involved childcare facilities, six were community outbreaks (note: two of these also involved childcare facilities), two involved extended families, one was travel-related, one was in a community hospital/long stay unit, and the locations for two outbreaks was not specified.

The suspected modes of transmission are listed in Table 6.

Person-to-person spread is consistently the most common mode of VTEC transmission reported in Ireland, particularly between young children, and was suspected to have played a role in 46 (48%) VTEC outbreaks in 2012 in which 105 persons were reported ill (Table 6 and Figure 5). Thirty seven of these outbreaks were reported as being solely due to person-to-person transmission, including five of the outbreaks which occurred in CCFs.

The second most common transmission route was Animal/Environmental contact, which was reported to have contributed to 10 outbreaks (10.4%) with 15 persons ill. All were family outbreaks in private houses. This is the largest annual number of VTEC outbreaks due to this transmission route since outbreaks became notifiable in 2004 (Figure 6). There are few details available, however, exposure to calves was mentioned in one outbreak, exposure to sheep in another, and exposure to farm manure in a third.

The third most common transmission route reported was waterborne transmission, which was reported to have contributed to 8 outbreaks (8.3%) with 16 persons ill. This is fewer than half the number of waterborne VTEC outbreaks reported in 2012. Two were general outbreaks and six were family outbreaks; these 8 outbreaks were linked to 7 domestic private wells, and one group water scheme. For one outbreak, VTEC other than that identified in the outbreak cases was detected in the implicated supply. Evidence was circumstantial for the water supplies suspected in the remaining outbreaks. For the six family outbreaks, the location was reported as private house. One general outbreak in a childcare facility was reported as waterborne plus person to person spread; initial transmission to the index case in the CCF was by waterborne transmission at home, with onward person-to-person transmission within the CCF. The second general outbreak was a small community outbreak associated with a group water scheme.

Five outbreaks (51 persons ill in total) were reported as being suspected to be foodborne, three general and two family outbreaks. In one small community outbreak in HSE MW with two persons ill, microbiological and descriptive epidemiological evidence implicated an

Table 5. Number of cases of VTEC (and percentage where known) for selected risk factors, Ireland 2013

Risk factor	Number 'Yes' and % where reported	Number 'No' and % where reported	Number where risk factor was unknown or not reported
Food suspected	42 (8.4%)	457 (91.6%)	203
Exposure to farm animals or their faeces	231 (36.7%)	398 (63.3%)	73
Exposure to private well water[a]	223 (35.0%)	413 (65.0%)	66
Travel-associated[b]	16 (2.4%)	651 (97.6%)	35
Attendance at a CCF[c]	155 (26.5%)	430 (73.5%)	117
Attendance at a CCF[c] (among <5 yrs)	146 (55.7%)	116 (44.3%)	41

[a]Composite variable recoded from two different water supply exposure enhanced variables in CIDR
[b]Inferred from CIDR core variable *Country of Infection*
[c] *CCF=Childcare Facility*

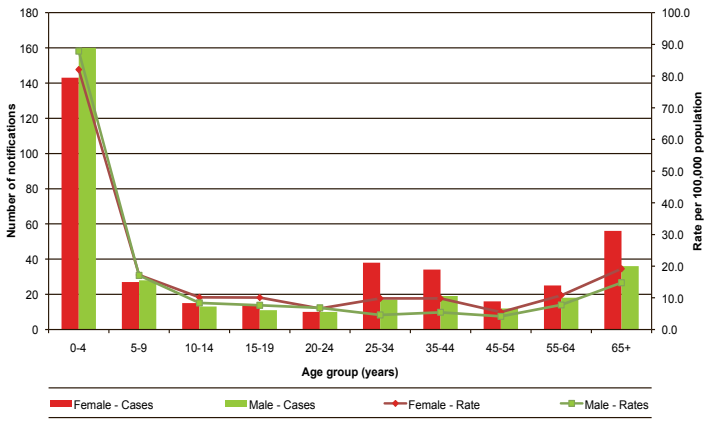

Figure 5. Age-sex distribution VTEC notifications, Ireland 2013

unpasteurised cheese. This is the first time in Ireland where there has been strong evidence implicating a raw milk cheese in a foodborne VTEC outbreak.

Two further general community foodborne outbreaks were notified with 45 persons ill (51 laboratory confirmed cases) between them. Both were national outbreaks, and evidence of the microbiological link between cases was based on detailed laboratory typing undertaken at the VTEC Reference Laboratory at Cherry Orchard Hospital. Cases were diffusely distributed; and although no evidence was obtained suggesting any particular food as the source, foodborne transmission was suspected given the geographical spread of the primary cases and the absence of other exposures common to all which might explain the outbreak. For one of these outbreaks, approximately half of cases in the outbreak appear to result from secondary spread in a childcare facility. A further small family outbreak was suspected to be due to the consumption of raw milk at home, while the remaining foodborne family outbreak was associated with exposure in Africa.

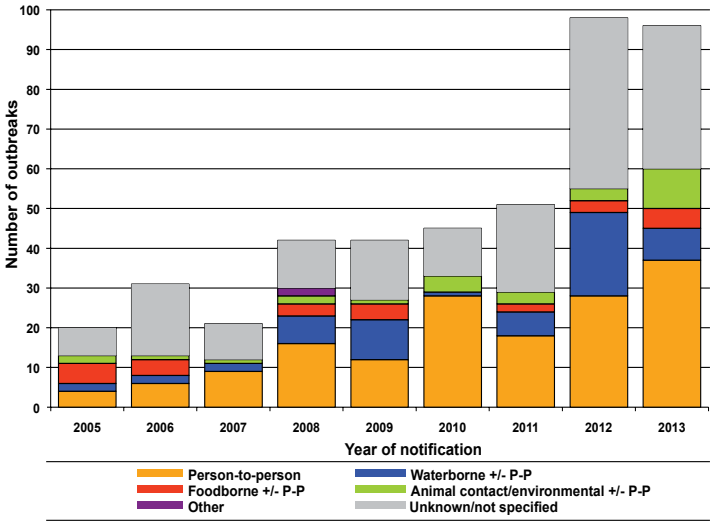

Figure 6. Number of VTEC outbreaks by suspected transmission route and year, Ireland 2004-2013

Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, any other outbreak where animal contact contributed was reported as Animal contact. Person-to-person outbreaks include only those outbreaks reported as being due only to person-to-person transmission.

For 38% (n=36) of VTEC outbreaks in 2013, the transmission route was reported as unknown or not specified (Table 6 and Figure 6).

In sporadic case investigations, a further seven private supplies investigated as possible sources were positive for VTEC either by culture or PCR. In two instances, the strains detected were similar to those identified in the associated human cases.

Summary

There was a statistically significant increase in the number of VTEC notifications in 2013 relative to 2012. The great majority of this increase was accounted for by non-O157 non-O26 VTEC cases, which increased by 180% relative to 2012, coinciding with continuing changes in diagnostics in primary hospital laboratories during this time. In contrast, the incidence of VTEC O157 actually decreased in 2013 although not significantly.

Guidance for Laboratory Diagnosis of Human Verotoxigenic *E. coli* Infection developed by The Laboratory Sub-Group of the VTEC Sub-Committee of the HPSC Scientific Advisory Committee was issued in September 2014. It is anticipated that this will further contribute to a coordinated approach to VTEC diagnosis in Ireland.[11]

Within the European Union, the latest available data shows that the overall incidence rate for confirmed VTEC cases in Europe in 2012 was 1.15 (range 0.0-8.99).[1] Ireland, Luxembourg, Sweden and Denmark reported the highest confirmed incidence rates at that time. It seems likely when the data are available across Europe for 2013, that Ireland will have one of the highest reported incidence rates in Europe again.

Foodborne transmission was the first recognised transmission route for VTEC infection historically, with minced beef, unpasteurised dairy products, and fresh produce consumed raw all having been implicated

Table 6. VTEC outbreaks by suspected mode of transmission, Ireland 2013

Transmission Route	Number of outbreaks	Number ill	Number of associated CIDR Events
Person-to-person	37	76	102
Foodborne	3	34	35
Person-to-person and Foodborne	1	14	19
Waterborne	7	12	19
Person-to-person and Animal Contact	7	11	17
Person-to-person and Waterborne	1	4	9
Animal contact	2	2	4
Environmental / Fomite	1	2	3
Foodborne and Animal Contact	1	3	2
Unknown	31	57	90
Not Specified	5	6	15
Total	**96**	**221**	**315**

in outbreaks across the world. Foodborne outbreaks typically comprise a small percentage of the total number of VTEC outbreaks in Ireland; in 2013, they made up 5% of outbreaks, however, they caused a disproportionately high proportion of VTEC outbreak cases (23%). This was largely due to the occurrence of two nationally distributed community outbreaks which were suspected to be foodborne but for which the source of infection was not established. Both outbreaks were caused by strains of VTEC O157 VT2 strains (the most common VTEC variant reported historically in Ireland), and molecular typing of VTEC isolates at the VTEC Reference Laboratory was key in determining which cases occurring around the country were included/excluded from each of the two outbreaks.

For the first time in Ireland, there was strong evidence implicating a food product in a VTEC outbreak; an unpasteurised cheese was implicated in a small outbreak with two persons ill in the HSE MW. A thorough investigation was undertaken, alerts were issued and the implicated product was withdrawn from sale. Also in 2013, a small family outbreak was suspected to be due to consumption of unpasteurised milk at home.

Unusually, animal/environmental contact was reported as the second most common route of transmission for VTEC outbreaks in 2013. This has long been recognised as a risk factor for VTEC infection[,8-9] and cases due to this transmission route are not unexpected in Ireland given the large cattle population, the high proportion of rural dwellers, and the large number of farming families. Fortunately, none of these animal contact outbreaks were associated with public venues such as open farms, and so the numbers of people affected were small. Advice is available on the HPSC website on how to minimise the risk of gastrointestinal infections following exposure to farm animals and environments, and for the safe recreational use of farmland.[12]

In 2013, contaminated drinking water contributed to fewer outbreaks that in 2012. As in previous years, all drinking water associated outbreaks reported were linked with private water supplies. Exposure to water from contaminated untreated or poorly treated private water supplies has historically been recognized as a strong risk factor for VTEC infection in Ireland.[6,7] This has been particularly pronounced following periods of heavy rainfall. The lower number of outbreaks in 2013 is likely to have been influenced by lower rainfall levels and less contamination of private water sources. The HSE and EPA have both developed resources for owners of private wells, providing advice on private well maintenance.[13-14]

Transmission by person-to-person spread, however, remained the most common transmission route reported in VTEC outbreaks (48% of outbreaks), as usual being most frequently associated with private house and childcare facility outbreaks. Handwashing and exclusion of cases in risk groups from high risk settings remains a key prevention measures for VTEC.[15]

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3.4 Hepatitis A

Summary

Number of cases, 2013: 50
Crude notification rate, 2013: 1.1/100,000 population
Number of cases, 2012: 30

Hepatitis A virus causes an acute, usually self-limiting disease of the liver. It is primarily transmitted from person to person via the faecal-oral route and is associated with poor hygiene and sanitation. Common source outbreaks due to contaminated food or water also occur.

The incidence of hepatitis A in Ireland has been low in recent years and remained low in 2013, with 50 cases notified (figure 1). This corresponds to a crude notification rate of 1.1/100,000 population. Although this rate was higher than in 2012, when 30 cases were notified, the increase was due to two large outbreaks, which accounted for two thirds of the 2013 cases. Case classification was reported for all cases. Forty seven were laboratory confirmed and three were classified as probable. The notification rates for each HSE area are shown in figure 2.

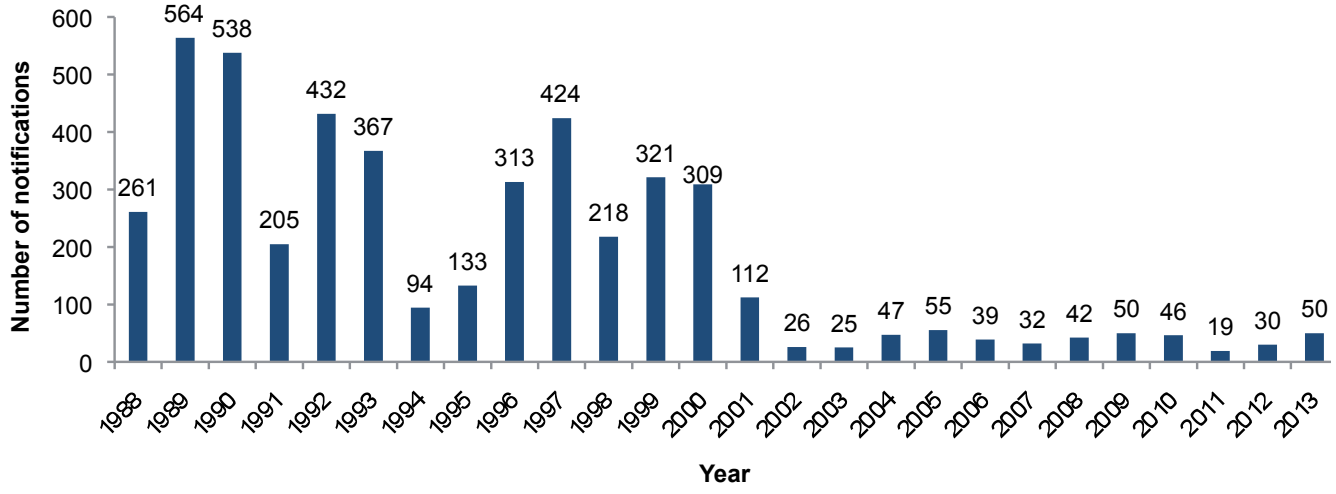

Figure 1. Number of hepatitis A notifications, 1998-2013

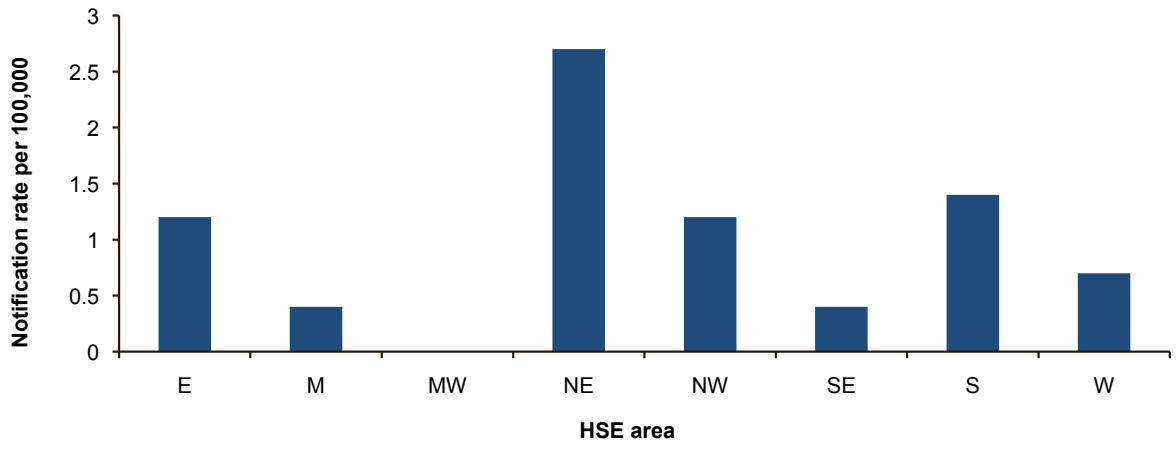

Figure 2. Hepatitis A notification rates/100,000 population, by HSE area, 2013

Fifty four percent of cases were female (n=27) and 46% were male (n=23). The highest notifications rates were in adults, with 76% of cases aged between 25 and 64 years (figure 3).

Thirty five cases were reported as infected in Ireland. Nine cases were linked to travel outside of Ireland and a further five had a history of recent travel outside of Ireland but could also have been infected in Ireland. Country of infection was not known for the remaining case.

Six hepatitis A outbreaks were reported in 2013. The largest involved 23 adult cases (15 confirmed primary, 4 confirmed secondary, 3 possible primary and 1 possible secondary) in multiple HSE areas. A case control study was undertaken and the outbreak was found to be associated with the consumption of frozen berries. The hepatitis A genotype (1A) and sequence were identical to that in a large multi-national European outbreak, which was also associated with frozen berries. In September 2014, the Food Safety Authority of Ireland reiterated earlier advice to boil all imported frozen berries for at least a minute prior to consumption (http://www.fsai.ie/news_centre/press_releases/hepatitis_a_frozen_berries_advice_08092014.html).

A further outbreak involving two adult cases was associated with frozen berries consumed in Italy. The genotype and sequence were also identical to that in the multi-national European outbreak described above.

An outbreak in HSE NE affected six adults and four children. The index case had travelled to Asia and was likely to have been infected there. The remaining cases were contacts infected through person-to-person transmission in Ireland.

A smaller outbreak in HSE NW affected two adults and one teenager. The index case had travelled to the United Kingdom within the exposure period but could also have been infected in Ireland. Another outbreak in HSE E involved one adult and one child. The country of infection was Ireland, but no source of infection was identified. The remaining outbreak involved two adults who had travelled to Egypt and was linked to an outbreak affecting people from several European countries.

In recent years, large hepatitis A outbreaks due to agricultural produce such as frozen berries[1], pomegranate seeds[2], and semi-dried tomatoes[3] have been reported internationally. This illustrates the importance of compliance with good hygiene, agricultural and manufacturing practices in all countries exporting agricultural products, particularly those that are usually consumed raw.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 15th September 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

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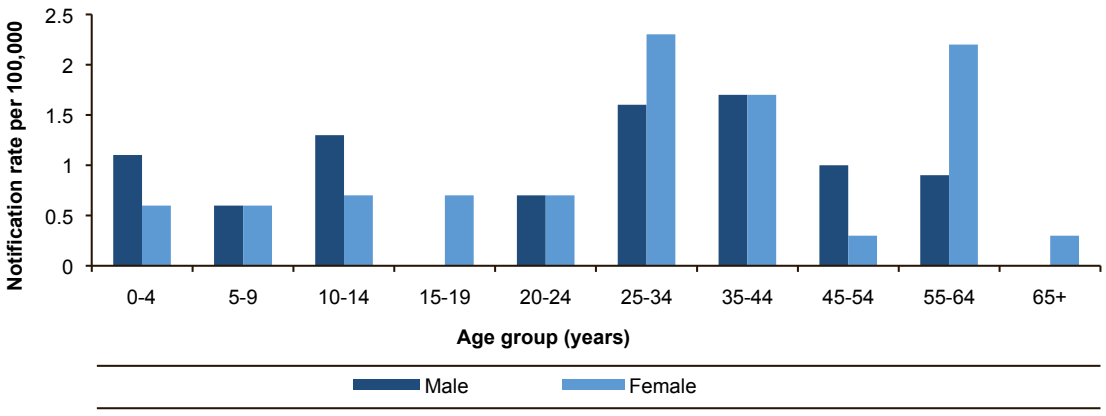

Figure 3. Hepatitis A age and sex-specific notification rates/100,000 population, 2013

3.5 Rotavirus

Summary

Number of cases: 2,514
Crude incidence rate: 54.8/100,000 population

Rotavirus is the commonest global cause of paediatric gastrointestinal infection and causes sporadic, seasonal and occasionally severe gastroenteritis of infants and young children, characterised by vomiting, fever and watery diarrhoea. Transmission is usually person-to-person, mainly via the faecal-oral route. Children less than two years of age are most susceptible to infection, although cases are often seen in elderly and immunocompromised adults, particularly in institutional settings. By the age of six years old, virtually all children will have had at least one episode of rotavirus infection. Symptoms usually last for only a few days but in severe cases hospitalisation may be required due to dehydration. In developed countries, mortality due to rotavirus is low; however, the morbidity and economic costs associated with infection are significant. Three primary serogroups of rotaviruses infect humans; A, B and C; A being the commonest infecting serogroup. Given the universal distribution of rotavirus, the numbers of notifications will always represent an underestimate of the true incidence and are likely to be more reflective of habits of presentation to medical practitioners and of styles of investigation, notification and testing.

Since 2004, rotavirus, although not specifically listed, has been a notifiable disease in Ireland under the Acute Infectious Gastroenteritis (AIG) disease category. Prior to 2004, rotavirus caress were notified in the former notification category of "Gastroenteritis in children under two years". In April 2008 the case definition of AIG was amended specifying definitions for both rotavirus and the newly notifiable C*lostridium difficile* associated disease. On 4th May 2008, these amended definitions formally replaced the previous

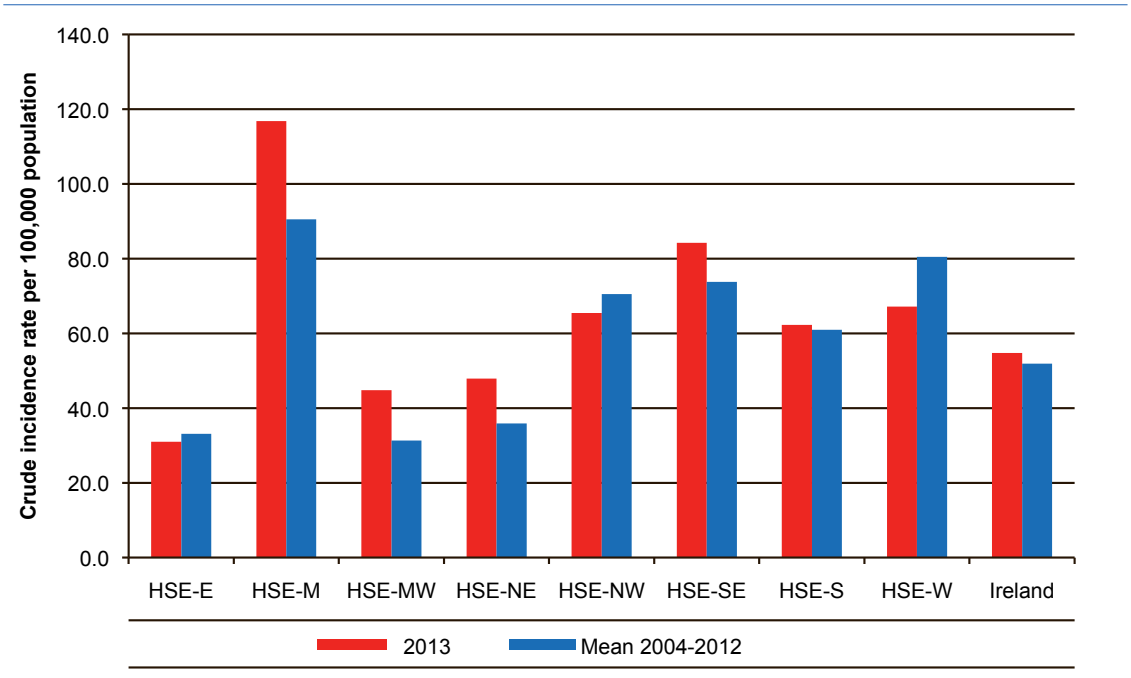

Figure 1: Rotavirus 2013 CIR compared to 2004-2012 mean CIR by HSE area (CIDR).

AIG case classification. Rotavirus became notifiable as a disease in its own right under the Infectious Diseases (Amendment) Regulations 2011 (S.I. No. 452 of 2011).

Rotavirus case definition:
A case of rotavirus infection is defined as a patient with acute onset of vomiting followed by watery diarrhoea with fever, which typically lasts between three and eight days, AND one of the following laboratory criteria for diagnosis:

- Detection of rotavirus by antigen assay
- Detection of rotavirus-specific RNA
- Detection of rotavirus by electron microscopy
- Isolation of rotavirus

During 2013, there were 2,514 cases of rotavirus notified in Ireland, corresponding to a national crude incidence rate (CIR) of 54.8 per 100,000 population and representing a decrease of 5.2% compared to 2012.

Significant geographical variation was observed in regional rotavirus CIR. The highest regional CIRs were observed in HSE-M (116.9/100,000 population) and HSE-SE (84.2/100,000 population). The lowest regional CIR was observed in HSE-E at 31.0 per 100,000 and

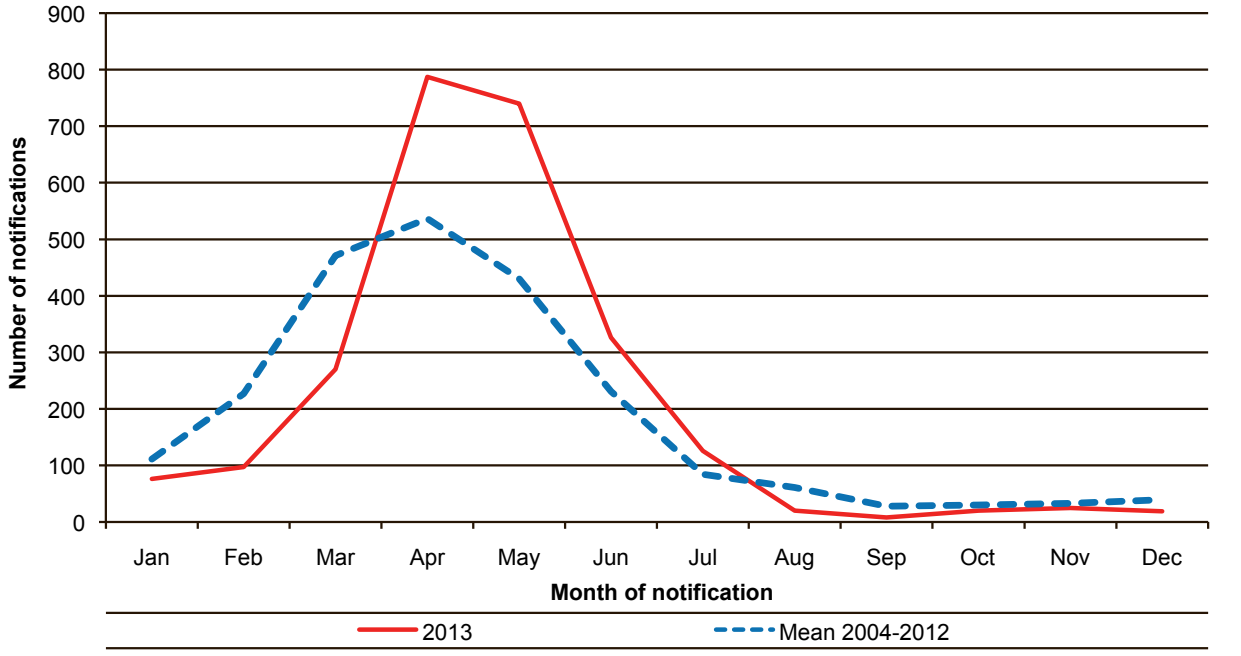

Figure 2: Rotavirus notifications by month during 2013 compared to mean monthly notifications, 2004-2012 (CIDR).

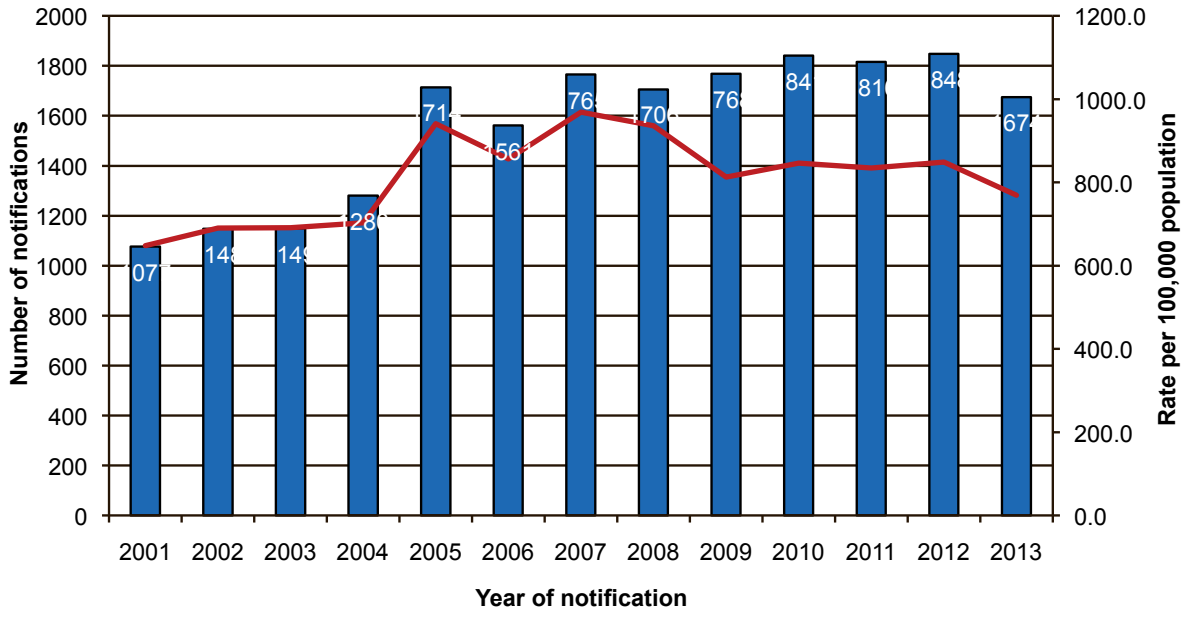

Figure 3: Number of cases of rotavirus in children less than two years of age by year, 2001 to 2013

HSE-MW at 44.8 per 100,000 population. Figure 1 illustrates the rotavirus CIR by HSE area for 2013 compared to the mean CIR during 2004-2012.

Rotavirus infection has a well-documented seasonal pattern in Ireland with the number of cases typically peaking during March to May. During 2013, rotavirus notifications peaked during April (n=787) and May (n=740). Figure 2 illustrates the seasonal variation in rotavirus cases by month of notification for 2013 compared to the mean monthly number of notifications reported during 2004 to 2012.

Rotavirus is the most common cause of acute gastroenteritis in children worldwide with children generally affected in the first 2-3 years of life. In 2013, 66.6% (n=1,674) of cases were aged two years or under. From 2004 to 2013, data shows that the peak incidence of clinical disease occurred in the 6-18 month age group, with 54.4% of total notifications in this age group. Figure 3 presents the number of cases of rotavirus in children less than two years of age by year, 2001 to 2013.

During 2013, 1,163 cases (46.3%) were female and 1,342 (53.4%) were male. Sex was not reported for 9 (0.4%) cases. This represented a ratio of females: males of 0.9:1.2, which was similar to the ratio observed in previous years.

One outbreak of rotavirus was notified during 2013 with two cases of associated illness, both of whom were hospitalised. This was a family outbreak that occurred in a private home with mode of transmission reported as person to person spread.

3.6 Salmonella

Summary

Number of confirmed cases: 324
Number of probable cases: 0
Crude incidence rate: 7.1/100,000

Salmonellosis

Salmonellosis typically presents clinically as an acute enterocolitis, with sudden onset of abdominal pain, diarrhoea, nausea, headache and occasionally vomiting. Fever is almost always present. Dehydration, especially amongst vulnerable populations such as infants, the immunocompromised and the elderly, may be severe. Invasive infection occurs in a proportion of cases. *S.* Typhi and *S.* Paratyphi can cause enteric fever, a severe systemic life threatening condition, but these are not common in Ireland and are almost invariably travel-associated.

The common reservoirs for non-typhoidal *Salmonella* are the intestinal tract of domestic and wild animals (including birds), which may result in a variety of foodstuffs, of both animal and plant origin, becoming contaminated with faecal organisms either directly or indirectly. The organism may also be transmitted through direct contact with infected animals or humans or faecally contaminated environments. Infected food handlers may also act as a source of contamination for foodstuffs.[1] Of particular concern is the number of cases of infection associated with direct contact with reptiles kept as companion animals.

Incidence and clinical features

There were 324 cases of salmonellosis notified in 2013, up 3% compared to 2012 (Figure 1). Among cases with information on symptoms, 96.8% were reported to have diarrhoea (274/283), 30.4% bloody diarrhoea (78/257), 52.5% vomiting (134/255), 65.7% nausea (140/213), 79.8% abdominal pain (194/243), 70.6% fever (156/221) and 38.0% headache (65/171). Almost 40% of cases required hospital admission (119/299), with no reported fatalities.

This equates to a national crude incidence rate (CIR) for salmonellosis of 7.1 per 100,000 population. The annual CIR has remained consistently low over the last five years (mean 7.2 per 100,000; range 6.8-7.8 per 100,000) compared to the previous five years (mean CIR 9.9 per 100,000 range 8.1-10.8).

Figure 2 illustrates the regional variation in CIR during 2013 compared to 2012. The highest CIR in 2013 occurred in HSE MW and the lowest in HSE E and HSE SE. However, the rates were not statistically significantly different either between HSE areas in 2013, or comparing between 2013 and 2012 by region.

The number of male cases was marginally higher than

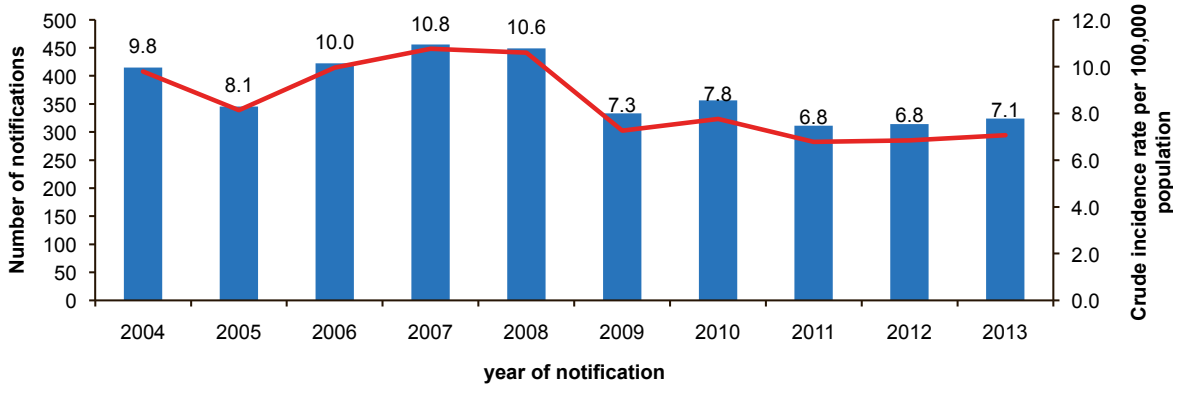

Figure 1: Salmonellosis notifications and crude incidence rate per 100,000 population by year of notification, Ireland 2004-2013. [Data source: CIDR]

for females in 2013 (male:female ratio=1.13:1.0); this is consistent with previous years.

Overall, the highest age-specific incidence rate was in children under 5 years of age; this is likely to be, at least in part, a reflection of clinicians more readily seeking clinical samples in that age group. Specifically, the incidence rates were higher in males than females in all age groups less than 15 years; among adults, age-specific incidence rates were comparable between the sexes except in the age group 25-34 years where females predominated.

NSSLRL data:
The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) based in Galway has been providing reference services nationally since 2000. In 2013, the NSSLRL analysed 332 human non-typhoidal *Salmonella* isolates referred for further typing. Table 1 lists the top 12 serotypes detected during 2013. *S.* Typhimurium* (n=129) was the most common serotype, followed by *S.* Enteritidis (n=49). *S.* Typhimurium has been the most common serotype since 2008.

Figure 4 shows the trend in referral of isolates to NSSLRL by organism over time. S Enteritidis case numbers have been in steep decline since 2008, and in 2013, these decreased by further 12% (Figure 4). In contrast, both S Typhimurium and Other serotypes increased by 6% and 20% respectively relative to 2012, although numbers of both have been relatively stable the last four years.

The NSSLRL conducted phage typing analysis on all 129 *S.* Typhimurium and all 53 *S.* Enteritidis isolates.

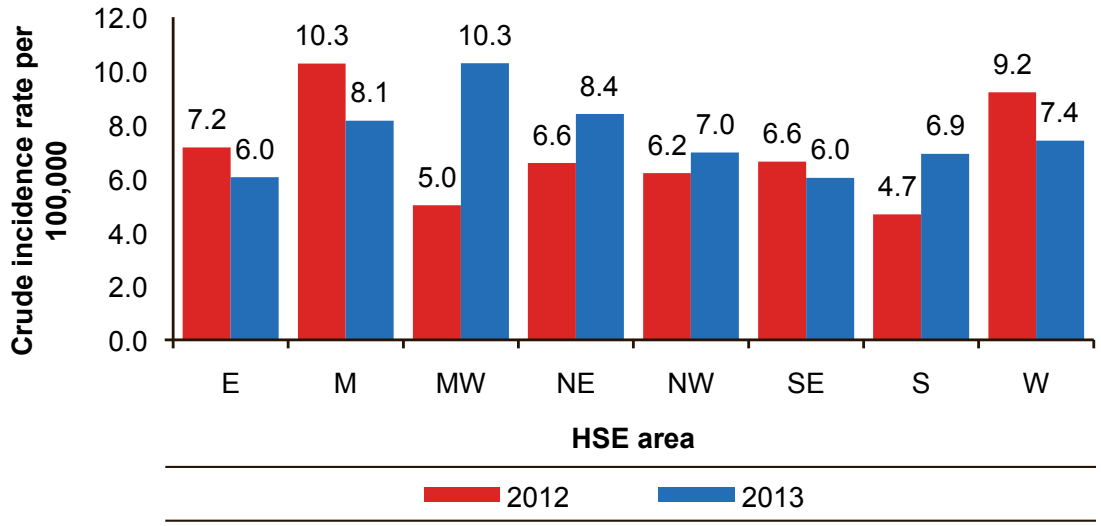

Figure 2. Regional CIR 2013 vs 2012, salmonellosis. [Data source: CIDR]

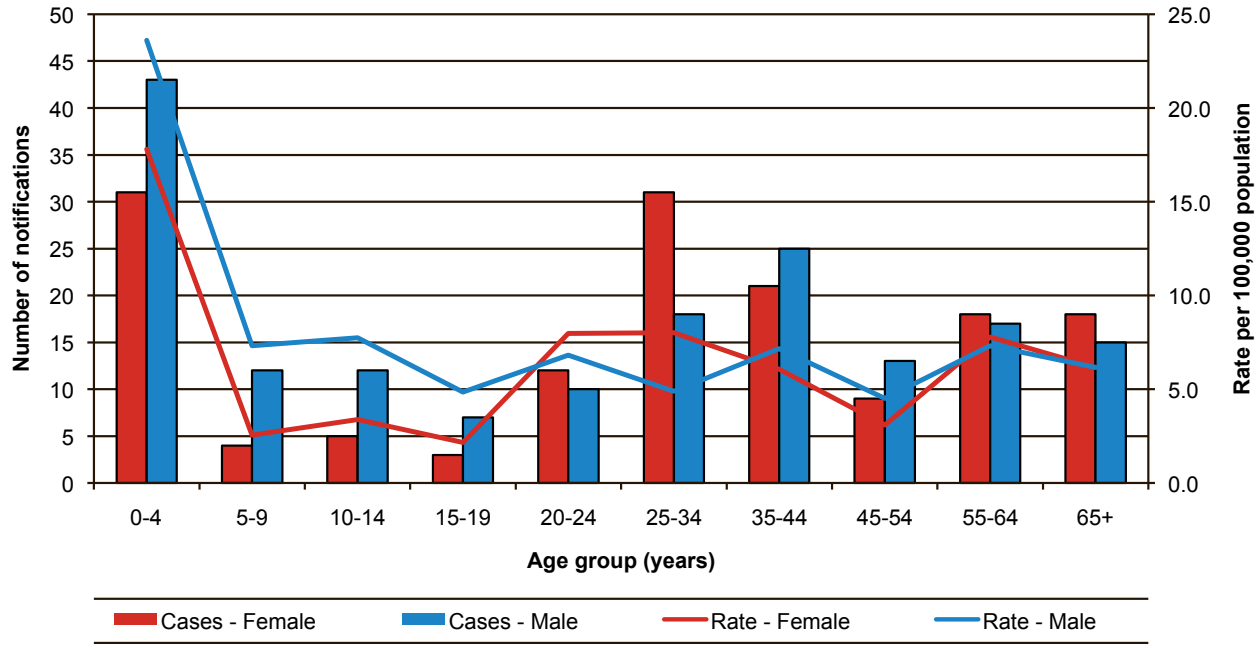

Figure 3: Salmonellosis notifications and age specific incidence rate per 100,000 population by age group (years) and sex, Ireland 2013. [Data source: CIDR]

*This includes 53 monophasic *S.* Typhimurium isolates with serotype 4,5,12:1

Phage type DT193 (n=39) comprised over 30% of all S. Typhimurium strains; this is the highest annual total of phage type DT193 cases reported since records began in 2000 (Figure 5). Other currently important S Typhimurium phage types included Untypable (14.0%) and DT104b (8.5%). Both DT193 and Untypable have increased gradually over the last 5-6 years, while the numbers of DT104b and DT104 in 2013 represent a substantial reduction compared to 10 years ago.

Phage types PT14b (22.4%), PT8 (16.3%), and PT1 (16.3%) were the most common types observed among *S.* Enteritidis isolates (Figure 6).

Of the 332 non-typhoidal isolates analysed for antimicrobial resistance, 191 (57.5%) were fully susceptible to all antimicrobials tested. The remaining 151 isolates exhibited some degree of antimicrobial resistance. 39 isolates exhibited resistance to five or more antimicrobials, the most common pattern of which was ampicillin, chloramphenicol, streptomycin, sulphadiazine and tetracycline (ACSSuT, n=20). The majority of isolates exhibiting this level of resistance were *S.* Typhimurium (32/39, 82%). Overall, the commonest resistance pattern[†] seen was resistance to ampicillin, streptomycin, sulphadiazine and tetracycline (ASSuT, n=42, 12.7% of isolates); this pattern was almost exclusively identified in *S.* Typhimurium isolates (41/42 ASSuT resistant strains were S. Typhimurium). Resistance to nalidixic acid (Na, n=21, 6.3% of isolates) was the most common AMR profile among *S.* Enteritidis isolates (30.6% of *S.* Enteritidis strains).

The NSSLRL's Annual Report 2013 provides a more detailed analysis of clinical *Salmonella* typing results and a comparison with isolates from non-human sources.[2]

Table 1: Number and percentage of non-typhoidal human Salmonella isolates by serotype, Ireland 2013

Salmonella serotype	Number of isolates	*% Isolates*
Typhimurium	76	*22.9%*
Monophasic Typhimurium[a]	53	*16.0%*
Enteritidis	49	*14.9%*
Infantis	14	*4.2%*
Dublin	12	*3.6%*
Newport	11	*3.2%*
Unnamed	10	*3.0%*
Agama	6	*1.8%*
Montevideo	5	*1.5%*
Stanley	5	*1.5%*
Virchow	5	*1.5%*
Anatum	5	*1.5%*
Other	81	*24.4%*
Total	**332**	***100.0***

aThis terms is applied for this table to isolates with the antigenic formula 4,[5],12:i:- as there is persuasive evidence that these are overwhelmingly comprised of variants of S. Typhimurium
[Data source: NSSLRL]

Foreign travel as a risk factor for salmonellosis in Ireland

The variable 'Country of infection' was completed on CIDR for over 90% of notifications in 2013, up from 86% in 2012 and 78% in 2011. In the following analyses, we have defined travel-associated cases as those where a country of infection other then Ireland was reported, and indigenous as those where the country of infection was recorded as Ireland.

Travel abroad during the incubation period is a strong risk factor for salmonellosis in Ireland. Of the two hundred and ninety-three cases where the 'country of infection' variable was completed, 177 cases were acquired in Ireland (65.5%); this compares with 2012 when 55.5% of cases with known travel status were indigenous. Among cases acquired abroad, the most common countries of infection reported were: Spain (n=27), Thailand (n=14), India (n=8) and Nigeria (n=7). The popularity of a country as a travel destination is likely to be an important factor in determining the

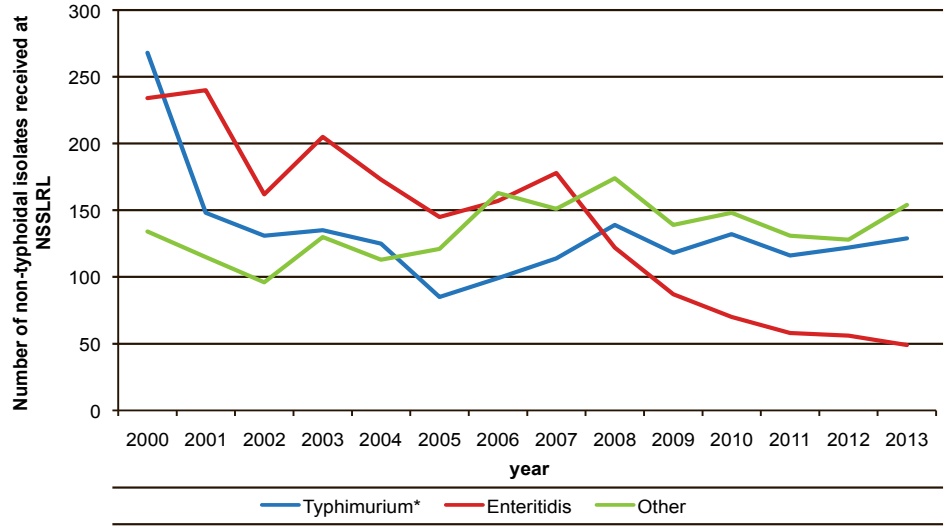

Figure 4. Annual number of non-typhoidal Salmonella isolates referred to NSSLRL by serotype, 2000-2013. [Data source: NSSLRL]

[†]Where A= Ampicillin, C= Chloramphenicol, Na = Nalidixic acid, S= Streptomycin, Su= Sulphonamide and T= Tetracycline

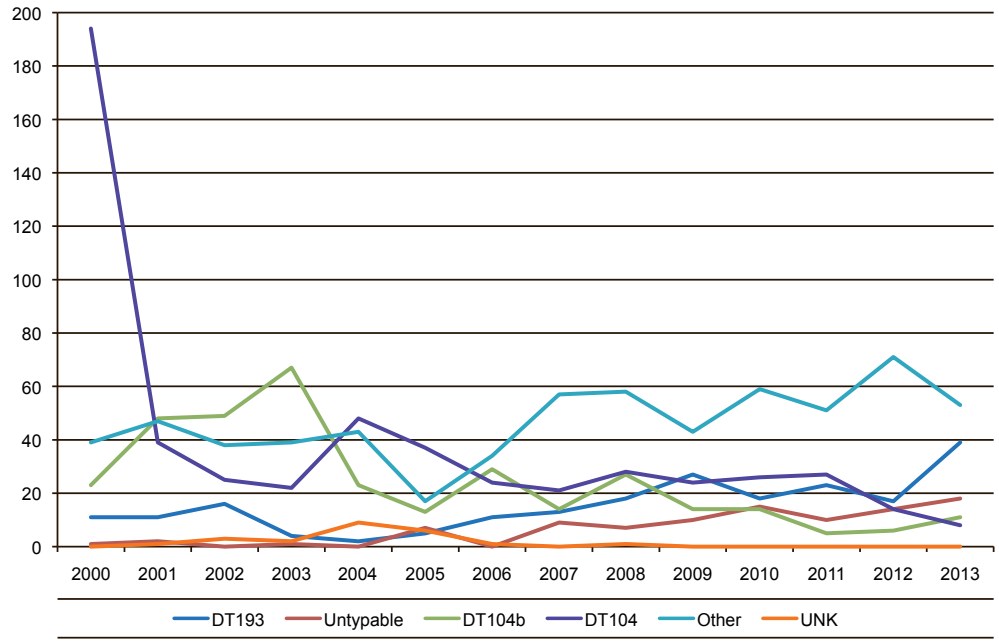

Figure 5. Annual number of S. Typhimurium isolates referred to NSSLRL by phage type, 2000-2013. [Data source: NSSLRL]

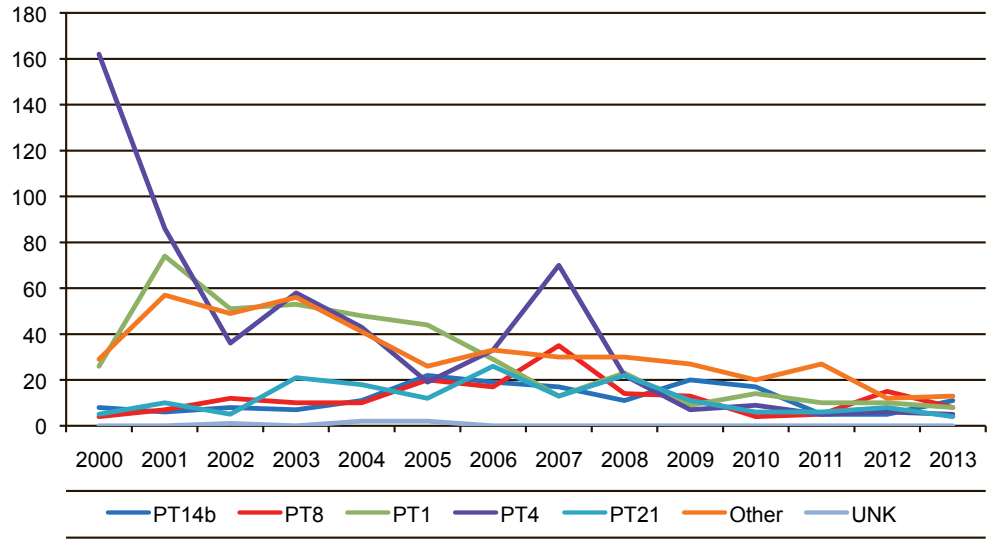

Figure 6. Annual number of S. Enteritidis isolates referred to NSSLRL by phage type, 2000-2013. [Data source: NSSLRL]

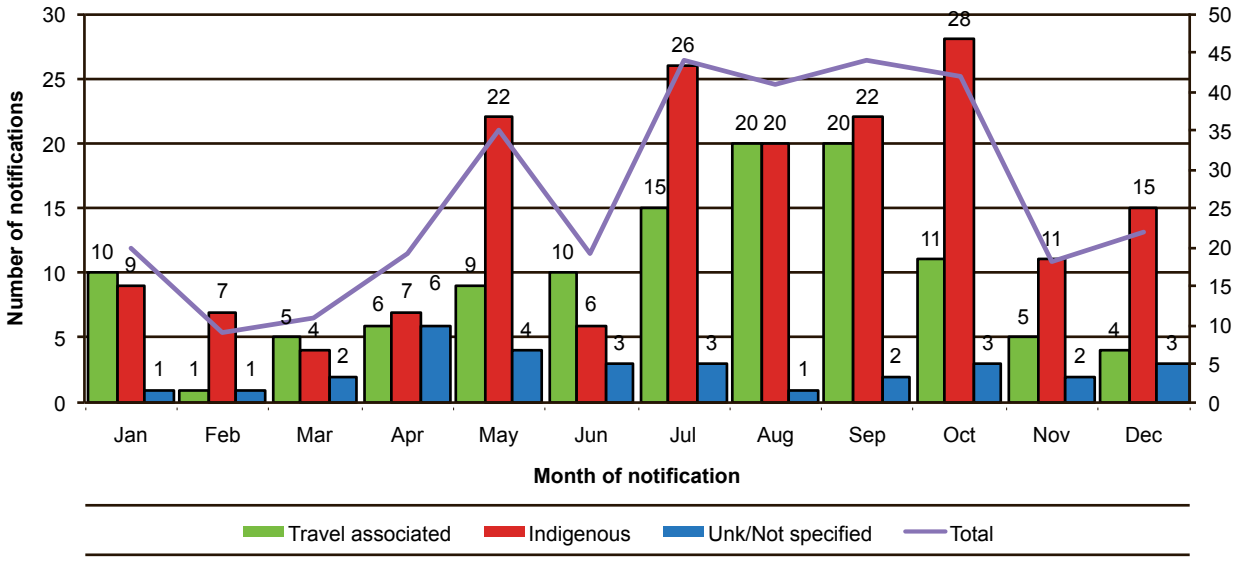

Figure 7: Salmonellosis notifications by month of notification and travel history, 2013 [Data source: CIDR]

number of cases associated with each country. *Salmonella* notifications peaked in the period July to October; with highest numbers of both indigenous and travel-associated cases occurring during this period (Figure 7). A second shorter peak in May comprised largely indigenous cases.

Indigenous cases were more common in quarter 4 than at this time of year than in the previous two years (Figure 8), in part due to a number of general indigenous outbreaks during Q4 2013 –see outbreak section below.

When serotyping data were analysed by travel history, almost half of all indigenous cases were infected with *S.* Typhimurium (or monophasic *S.* Typhimurium), with 'Other' serotypes making up a further 43.5% of cases (Table 2). Just 7.3% of indigenous cases were due to *S.* Enteritidis. In contrast, *S.* Enteritidis features more prominently among travel-associated cases (25.9%).

Specifically, cases with travel to Spain were more evenly split between Typhimurium, Enteritidis and 'Other' serotypes (9:10:8), whereas 'Other' serotypes featured exclusively among infections associated with India and Nigeria.

Travel-associated cases were also notable in that they formed a higher proportion of cases in adult age groups between 20 and 64 years (Figure 9).

Other risk factor data

As travel-associated cases are likely to have different exposures to indigenous cases, the analyses undertaken of other risk factor information focuses solely on known indigenous cases (n=177). It should be noted that in most instances, there are no comparable data for the population as a whole in order to make inferences about the relative importance of these factors as risks for salmonellosis in Ireland, however, some observations can be made.

In general, the quality of public water supplies in Ireland is better than that of domestic wells and other private water supplies (EPA). The difference in the proportion of salmonellosis cases served by non-public water supplies

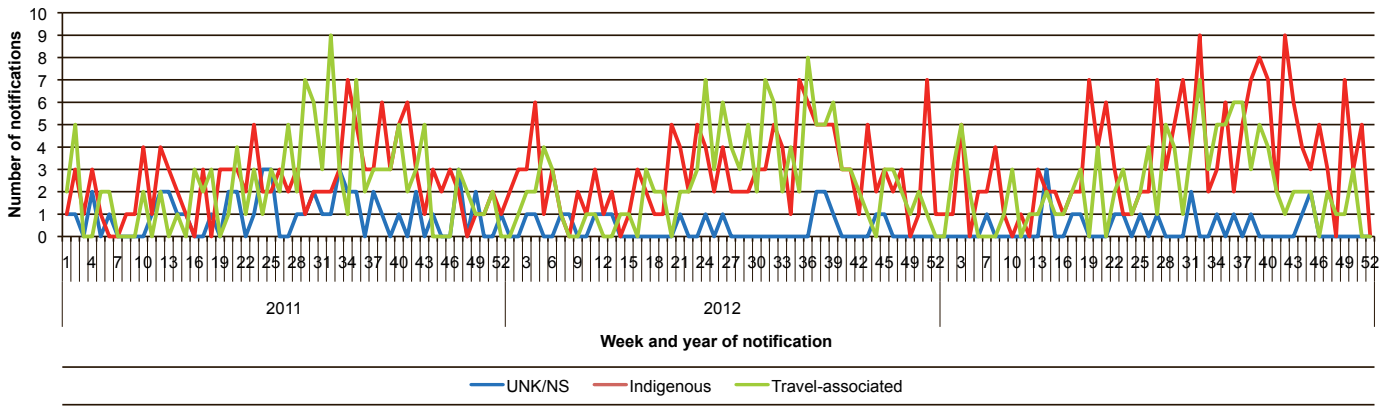

Figure 8. Salmonellosis notifications by week of notification and travel history, 2011-2013. [Data source: CIDR]

Table 2: Number and percentage Salmonellosis notifications by serotype and travel history, 2013 [Data source: CIDR]

Salmonella serotype	Indigenous N (%)	Travel associated N (%)	Travel history unknown N (%)
S. Typhimurium*	85 (48.0%)	27 (23.3%)	13 (41.9%)
S. Enteritidis	13 (7.3%)	30 (25.9%)	5 (16.1%)
Other serotypes	77 (43.5%)	58 (50.0%)	12 (50.0%)
Serotype not specified	2 (1.1%)	1 (0.9%)	1 (3.2%)
All serotypes (n)	177 (100%)	116 (100.0%)	31 (100%)

Table 3. Number of cases of indigenous salmonellosis cases (and percentage where known) for selected risk factors, Ireland 2013

	Yes (% of Known)	No (% of Known)	Unk/not specified	Total
Did case eat outside home 3 days PTO?	66 (46.5%)	76 (53.5%)	35	**177**
Contact with person with GI symptoms in 3 days PTO?	19 (12.4%)	134 (77.6%)	24	**177**
Contact with pet animals 3 days PTO?	84 (51.2%)	80 (48.8%)	13	**177**
Contact with farm animals 3 days PTO?	24 (15.3%)	133 (84.7%)	20	**177**
Home not on public water supply	33 (20.4%)	129 (79.6%)	15	**177**
Attends pre-school	10 (6.1%)	153 (93.9%)	14	**177**
Attends pre-school (cases under 5 yrs only)[a]	10 (23.3%)	33 (76.7%)	2	**45**

[a]Based on public health risk group variable.
PTO =prior to onset
[Data source: CIDR]

(20.4%) compared to the proportion of households in the general population with non public supplies (22.1% -CSO census 2011) was not statistically significant (X^2=0.2813, P =0.596), suggesting that waterborne transmission from lower quality drinking water is not a strong risk factor for salmonellosis in Ireland (Table 3).

Similarly, the proportion of indigenous salmonellosis cases attending childcare (23.3%) is below the norm (42%) [CSO quarterly survey re use of non-parental childcare], suggesting that transmission between young children at childcare facilities is not a strong risk factor either.

The proportion of indigenous cases reporting contact with farm animals is lower (15%) than for pathogens such as VTEC and *Cryptosporidium* (38%), both of which have a more rural distribution in incidence, suggesting that exposure to farm animals is not as significant a pathway for *Salmonella* transmission to humans in Ireland.

Contact with pets occurred in 51% of cases, however, we are unaware of comparable data for the general population. From the literature it would appear that particular pets confer a high risk of salmonellosis, e.g. reptiles, especially to young children. In 2013, 6/45 (13%) indigenous cases under 5 years of age reported exposure to a reptile compared with 3/132 (2%) indigenous cases 5 years of age or more. Reptile associated salmonellosis is generally associated with specific and otherwise unusual variants of salmonella which supports the causality of the association.

Outbreaks

Salmonellosis notifications in Ireland are largely comprised of sporadic cases; in 2013, only 53 of the 324 (16.3%) notified cases were linked to outbreaks. The 18 outbreaks notified in 2013 is a three-fold increase on the number notified in 2012 (n=6), but the number in 2012 was atypically low. Eight outbreaks in 2013 were general outbreaks (the highest number of general outbreaks since 2008) and ten were family outbreaks (Figure 10).

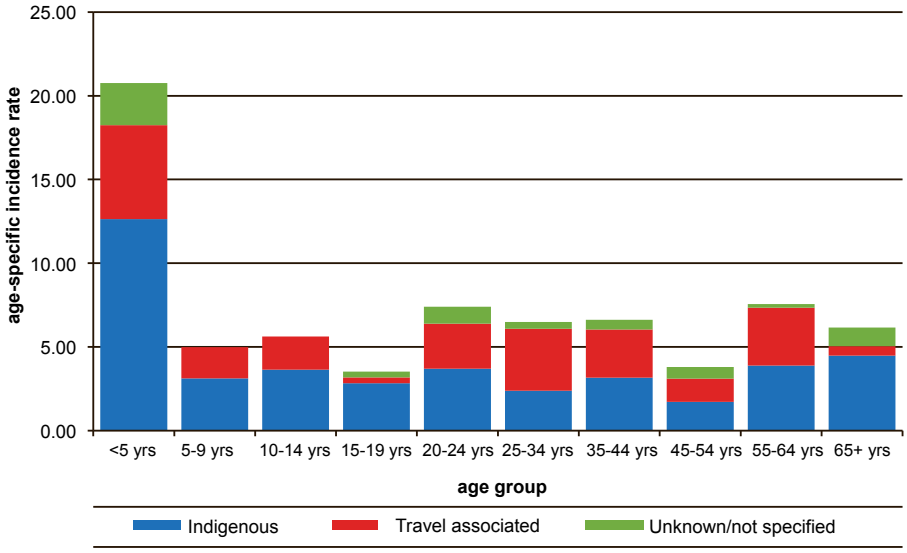

Figure 9. Salmonellosis notifications by age group and travel history, 2013 [Data source: CIDR]

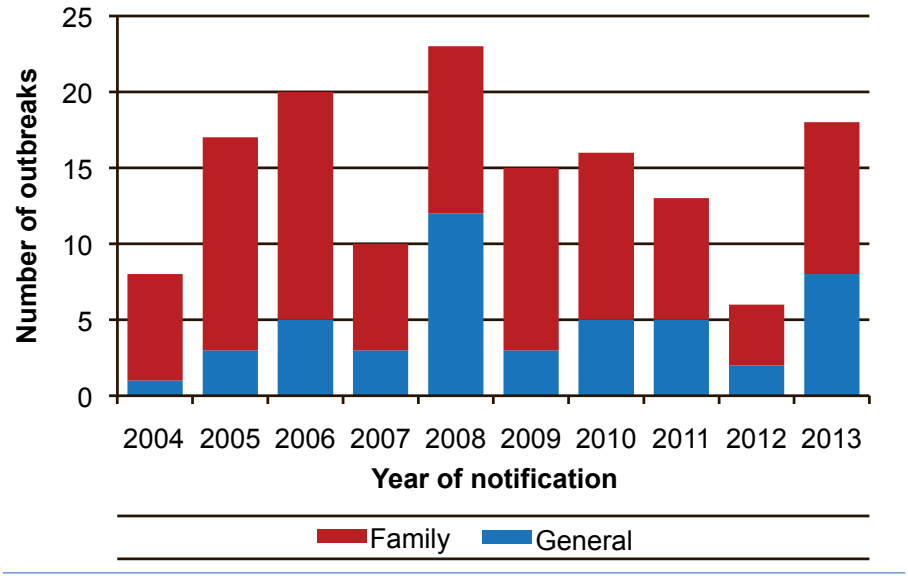

Figure 10. Annual number salmonella outbreaks by type, Ireland 2004-2013 [Data source: CIDR]

These outbreaks resulted in 56 cases of illness (median=3, range 2-9 ill per outbreak) and an associated hospitalisation rate of 34.0% (n=19 cases). Eight outbreaks occurred in private houses, five occurred in community settings, three were extended family outbreaks, one was in a crèche, and one occurred in a summer camp.

Figure 11 compares the number of outbreaks by transmission route with data from previous years. Consistently foodborne and person-to-person transmission are reported most commonly. This year, among the outbreaks with a transmission route reported, 45% were reported as foodborne and 55% as person-to-person spread. Animal contact outbreaks are reported less frequently and none were reported in 2013.

The largest salmonellosis outbreak in Ireland in 2013 was a national outbreak of *S.* Dublin. The outbreak consisted of nine cases of salmonellosis with disease onsets over a period of six weeks in October – November 2013. Cases were atypical relative to previously identified sporadic *S.* Dublin cases in Ireland in that the ratio of females to males was higher than normal (78% vs 33%), and the cases more frequently characterised by symptoms of gastrointestinal disease rather than bloodstream infections (100% vs 55%). The age-sex distribution of cases suggested that the exposure which caused the outbreak was more common among adults than children, and more common among females than males. The wide geographical distribution and absence of a common exposure to other possible non-food sources suggested the likelihood that the outbreak was caused by a widely distributed food item, with the shape of the epidemic curve being consistent with a continuous source outbreak, possibly a food product that was on the market (or had a shelf life) of approximately six weeks. The strong association between *S.* Dublin and cattle may suggest that a dairy or beef based product is more likely. However despite the use of extensive outbreak trawling questionnaires and a novel method employing supermarket loyalty cards, no single food source was identified which might account for the outbreak.

Four other community outbreaks were reported, three with transmission route unknown and one reported as foodborne although no specific food was implicated. The serotypes involved were *S.* Agama, *S.* Ball, *S.* Infantis and *S.* Montevideo, and the outbreaks were in all instances recognised in consequence of detailed typing at NSSLRL.

The remaining three general outbreaks were caused by *S.* Typhimurium: they included a person-person outbreak in a childcare facility resulted in 4 persons ill; a person-person outbreak in a private house, and an outbreak of two persons in a summer camp with unknown transmission route.

For the 10 family outbreaks, six were caused by S Typhimurium, and one each by *S.* Enteritidis, *S.* Braenderup, *S.* Telelkebir and *S.* Unnamed. Four were transmitted person-person, three were reported as foodborne and for three the transmission routes were unknown. No evidence implicating any food source was reported for any of the three foodborne outbreaks, although chicken brought in from abroad by a relative was suspected in the family outbreak of *S.* Enteritidis.

Typhoid/Paratyphoid:

In 2013 there were ten cases of *S.* Typhi notified and two cases of *S.* Paratyphi, all of whom reported a history of recent travel outside Ireland. Of the ten *S.* Typhi cases, five had travelled to Pakistan, three to India, and one each to Indonesia and Nigeria. Half of typhoid cases were reported in children under 15 years of age.

Among the *S.* Paratyphi cases, one reported travel to Pakistan and one to South America. The isolates were identified as Paratyphi A and Paratyphi B respectively. Both were adults.

Summary

The crude incidence rate of human salmonellosis in Ireland in 2013 was similar to that reported over the previous four years. The age and regional distribution of cases in 2013 was also similar to 2012, however, indigenous cases made up a higher proportion of

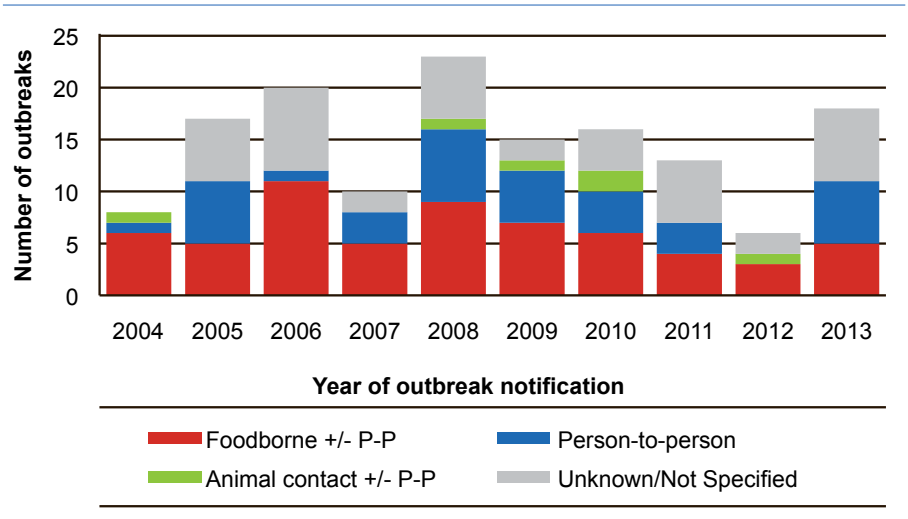

Figure 11: Annual number of outbreaks of salmonellosis by reported transmission route, Ireland 2004-2013. [Data source: CIDR]

total case numbers in 2013 than in 2012, in part due to a number of indigenous general outbreaks in the last quarter of the year. Ireland's crude incidence rate at 7.1 per 100 000 is consistently and substantially lower that the overall rate for the EU (22.2 per 100,000 population in 2012-EFSA report), but the age and seasonal distributions mirror those seen for the EU as a whole.

S. Typhimurium (including monophasic Typhimurium) remained the most common serovar in Ireland in 2013 making up almost 40% of cases. Case numbers of S. Enteritidis have been in decline for many years, such that, in 2013, *S.* Enteritidis comprised only 15% of cases, with other serovars responsible for 45% of cases. This contrasts with the picture across the EU where *S.* Enteritidis remained the top serovar at just over 40% in 2012, with *S.* Typhimurium (incl monophasic Typhimurium) at just under 30%, and 'Others' making up the remaining 30%.[1] Case numbers of *S.* Enteritidis across Europe are on the decline, contributing to a decrease also in overall case numbers over the last five years. New EU legislation concerning salmonella control programs for laying hens, which came into effect on 1 January 2009, is believed to have contributed to the reduction in *Salmonella* contaminated laying hens in the EU in recent years.[1]

In 2013, the transmission routes reported for salmonellosis outbreaks in Ireland were consistent with previous years: foodborne or person-to-person spread only were reported, although the evidence for the foodborne route was not strong in any instance, and no specific food items were implicated. The EU Zoonoses report reports that eggs and egg products continued to be the most common vehicles implicated in the salmonellosis outbreaks at EU level in 2012, however, this was strongly influenced by the fact that half of all salmonellosis outbreaks at EU level were associated with *S.* Enteritidis.[1] Pork products were the most common food vehicle in *S.* Typhimurium outbreaks in the EU in 2012.

In consequence of the increasing recognition in recent years of fresh produce as a cause of gastrointestinal disease outbreaks, the National *Salmonella* Outbreak Trawling Questionnaire was recently expanded and updated. The form is available at http://www.hpsc.ie/A-Z/Gastroenteric/Salmonellosis/SurveillanceInvestigativeForms/

References:

1. EFSA and ECDC. 2013. The European Union Summary Report on Trends and Sources of Zoonoses,Zoonotic Agents and Food-borne Outbreaks in 2012. . Accessible online at http://www.efsa.europa.eu/en/efsajournal/doc/3547.pdf

2. National *Salmonella* Reference Laboratory of Ireland, Annual Report for 2013. Available at: http://www.nuigalway.ie/research/salmonella_lab/reports.html

3.7 Less common gastroenteric infections

Listeriosis

Eight cases of human listeriosis were notified in 2013, lower that the 11 cases reported in 2012. This equates to a crude incidence rate of 0.17 (95% CI 0.05-0.30) per 100,000, below the EU average of 0.41 per 100,000 in 2012.

Among these, there were three neonatal cases. This is the same as the number of pregnancy-associated cases reported in 2012 (Figure 1). One infant was stillborn.

The number of adult/juvenile cases was lower than last year, but similar to the numbers reported in the previous five years. Three of the five cases were male. Four developed bloodstream infection, while the fifth developed meningitis. One case with a predisposing condition died, but not as a result of their listeriosis; the outcome was unknown or not specified for the remaining four adult cases. Four of the five adult cases were more than 65 years of age, with the fifth being in the 55-64 years age group. Additionally, all were receiving treatment for serious underlying illnesses.

Since 2007, the National *Salmonella, Shigella* and *Listeria* Reference Laboratory in Galway has offered a national service for typing of *Listeria* strains. In 2013, isolates from six of the eight notified cases were referred. The serotypes for these six cases are listed in table 1 below.

Listeria in Ireland remains a hazard for the elderly, persons with underlying illness, and other vulnerable groups such as pregnant women and neonates.

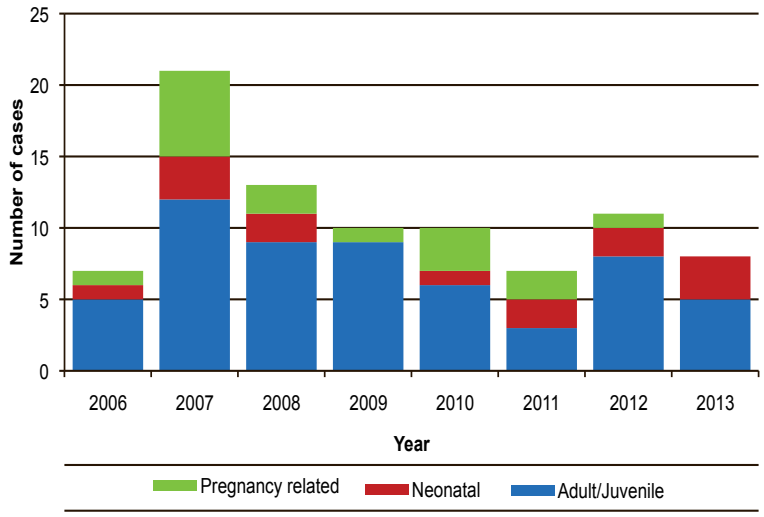

Figure 1: Number listeriosis notifications by case type, Ireland 2006-2013

Table 1. Listeriosis notifications by case type and serotype, Ireland 2013 -typing data provided courtesy of Prof Martin Cormican and staff at the NSSLRL

Type	Serotype 1/2a	Serotype 1/2b	Serotype 4b	Not referred for serotyping	Total
Adult or juvenile	0	0	4	1	**5**
Pregnancy-related	0	0	0	0	**0**
Neonatal	0	0	2	1	**3**
Total	**0**	**0**	**6**	**2**	**8**

Giardiasis

In 2013, there were 44 cases of giardiasis notified; almost 20% lower than the 54 cases notified in 2012. This equates to a crude incidence rate of 0.96 (95% CI 0.68-1.24) per 100,000.

Cases ranged in age from 1 month-70 years (median age=29 years) with only 10 cases reported in children under 15 years of age. According to CDC, *Giardia* infects nearly 2% of adults and 6% to 8% of children in developed countries worldwide so it is likely that there is a high degree of underreporting of the illness in Ireland.[1] Similar numbers of females (n=21) and males (n=23) were affected. Hospitalization rates were low with five cases admitted out of 44 (11%).

The number of cases for which travel status was reported has improved markedly over the last six years from 11% of cases in 2006 to 66% of cases this year (Figure 2). Twenty-two cases (50% of all cases; 76% of those with known travel status) were reported as being associated with foreign travel: the countries of infection reported were India (n=10), Ethiopia (n=2), Poland (n=2), and there was one case each reported associated with travel to Mexico, Pakistan, Mozambique, Russia, Nigeria, China, Israel and Sudan. Seven cases were reported as being acquired in Ireland, and for the remaining 15 cases, country of infection was unknown or not specified.

Two travel-related family outbreaks of giardiasis were notified in 2013, one associated with travel to Poland and the second with travel to India.

Giardiasis in Ireland is mainly identified among adults, unlike countries such as the United States, Australia and the United Kingdom where children are mainly affected. And if the travel histories of those with known *Country of infection* are representative of all reported giardiasis cases in Ireland, then as many as three-quarters may be related to foreign travel. Among these cases, Asia and Africa figure most prominently as reported travel destinations.

Yersiniosis

In 2013, there were four cases of yersiniosis (two females and two males), three of whom were less than five years of age. All were reported as being infected with *Y. enterocolitica*. The reported incidence of yersiniosis in Ireland is low relative to the EU as a whole, and to Northern Europe in particular.

Yersiniosis is commonly associated with consumption of pork products however, in Spring 2011, an outbreak was reported in Norway associated with salad leaves. [1]

[1] E MacDonald et al. 2011. *Yersinia enterocolitica* O:9 infections associated with bagged salad mix in Norway, February to April 2011. Eurosurveillance, Volume 16, Issue 19, 12 May 2011

Foodborne intoxications

Notifications of foodborne intoxications in Ireland are uncommon.

There was one case of infant botulism notified in 2013. The causative organism was identified as *C. butyricum* producing the botulism neurotoxin E .This is second case of infant botulism in Ireland believed to be due to exposure to turtles or to turtle feed, the first being in 2011.[2, 3]

There was one case of *Clostridium perfringens* (type A) food-borne disease in an elderly man.

In 2013, there were no cases or outbreaks of staphylococcal food poisoning or *Bacillus cereus* food-borne infection/intoxication notified.

1. CDC. 2012 Giardia -Epidemiology & Risk Factors. Available at http://www.cdc.gov/parasites/giardia/epi.html
2. HPSC. 2013. Reptiles and the risk of Infectious Diseases. Available at http://www.hpsc.ie/A-Z/Zoonotic/ReptilesandRisksofInfectiousDiseases/
3. Shelley E. B. *et al.* 2014. Infant botulism due to C. *butyricum* type E toxin: a novel environmental association with pet terrapins. Accepted for publication.

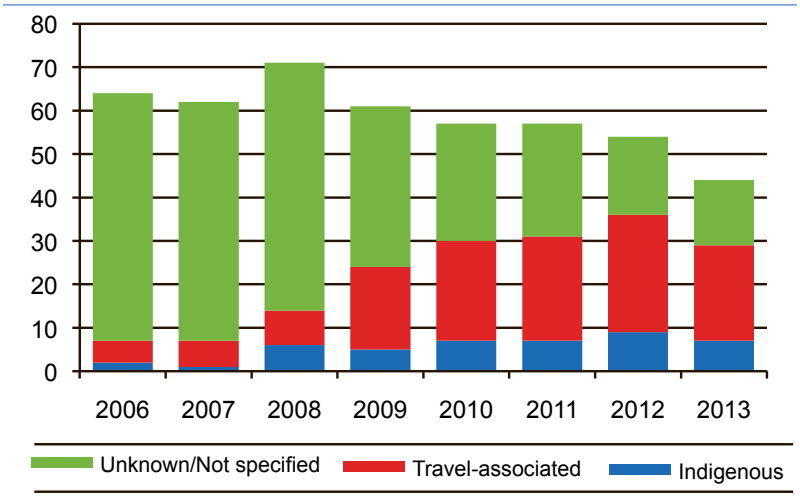

Figure 2: Number Giardiasis Notifications by Travel Status, Ireland 2006-2013

Note: Travel status is inferred from Country of Infection variable on CIDR

3.8 Shigellosis

Summary

Number of confirmed cases: 44
Number of probable cases: 5
Crude incidence rate: 1.1/100,000

In the last twenty years, the number of cases of shigellosis in Ireland has been low in comparison to the number of cases notified in the early 1990s (Figure 1). Shigellosis, however, remains a common cause of gastrointestinal illness in developing countries, and many cases notified in Ireland are now identified as being travel-associated.

While person-to-person spread is an important transmission route between children, risks also remain from food, with at least four general outbreaks having been reported in Scandinavia in 2009 associated with imported fresh produce.[1-5] Transmission between men who had sex with men (MSM) has been reported. [6, 7]

Forty-nine cases of shigellosis were notified in Ireland in 2013 (CIR 1.1 per 100,000, 95% CI 0.8-1.4), 45 of which were laboratory confirmed. This compares to 29 notifications in 2012, and 42 cases in 2011 (Figure 1). Of 43 cases where hospitalisation status was recorded, 11 (26%) were reported as hospital in-patients.

From 2009 to 2012, there was an excess of male cases compared to females, contrary to the trend prior to that. This trend was reversed again in 2013, with more females (n=29) than males (n=20) for the first time since 2008 (Figure 2).

In 2013, cases ranged in age from 11 months to 86 years (median age=28 years). In the age groups 35-44 and 45-54 yrs, males predominated, whereas females were equally or more common in all other age groups (Figure 3).

Information on travel history is very valuable when reviewing surveillance data for possible indigenous

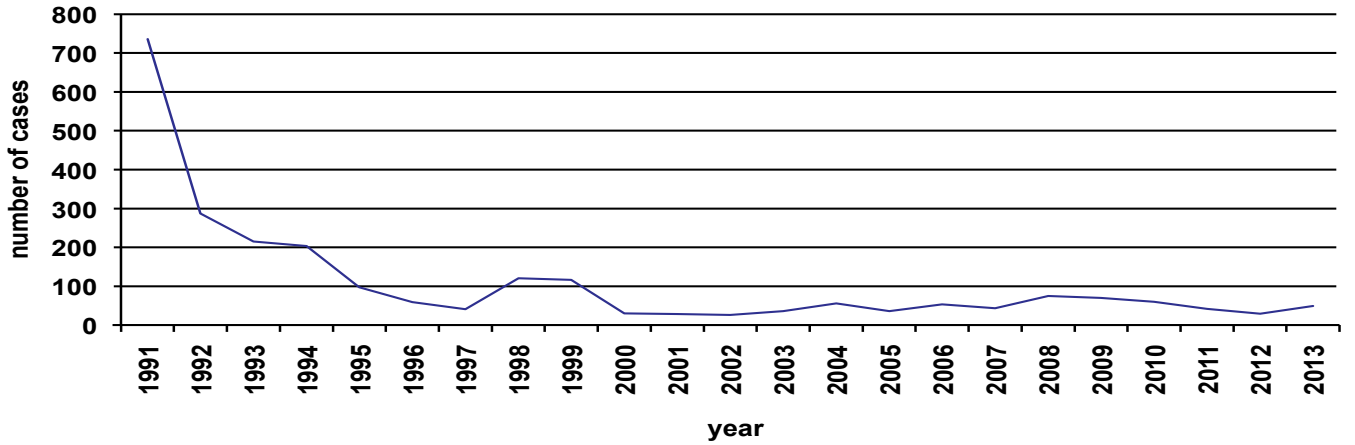

Figure 1: Annual number of notifications shigellosis, Ireland 1991-2013
(Data source: CIDR)

Table 1: Number of notifications shigellosis by species and country of infection, Ireland 2013

Organism	Africa	Asia	Other Europe	Ireland	Not specified	Total
Shigella boydii		5				5
Shigella flexneri	2	4	1	5	3	15
Shigella sonnei	3	6	1	11	3	24
Species not specified	1					1
Probable epi-linked case	1	1		2		4
Total	7	16	2	18	6	49

(Data source: CIDR)

clusters, and data on country of infection in the national dataset continues to improve, being available for 88% of shigellosis notifications this year. Historically, the country most frequently associated with travel-related shigellosis infections is India. Twenty-five cases were reported associated with foreign travel in 2013. The countries of infection reported were India (n=11), two each associated with Nigeria, Pakistan and Ethiopia, and one case each associated each with travel to Bangladesh, Germany, Rwanda, Sudan, Tanzania, Turkey, United Kindom and the United Arab Emirates. Eighteen infections were reported as being acquired in Ireland, while no country of infection information was available for six cases.

Shigella sonnei was the most common species reported (n=24), followed by *S. flexneri* (n=15), *S. boydii* (n=5) with the species not reported for the remaining confirmed case. The species distribution of cases by country of infection is reported in Table 1. *S. boydii* cases were exclusively associated with travel to Asia, while *S. flexneri* and *S. sonnei* infections were associated with travel and non-travel associated cases.

More detailed typing of *Shigella* isolates can provide useful information on the relatedness of strains which can be used by public health personnel to outrule/ provide evidence for links between cases during investigations of case clusters. The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) in Galway University Hospital provide laboratory services for speciation, serotyping, antimicrobial resistance profiling, and where appropriate, Pulsed Field Gel Electrophoresis (PFGE) of *Shigella* isolates.

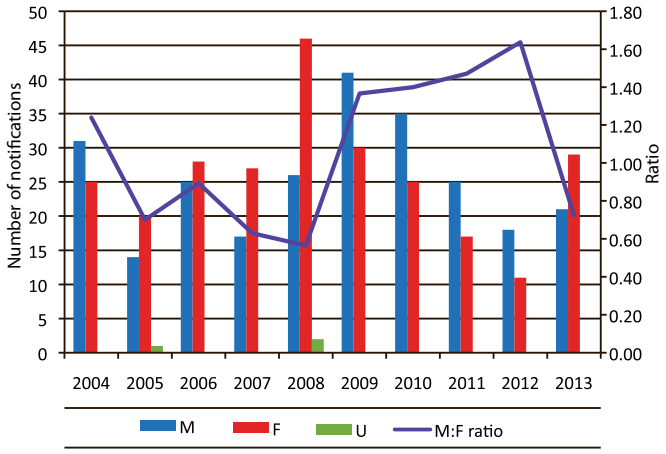

Figure 2: Sex distribution shigellosis notifications, Ireland 2004-2013
(Data source: CIDR)

In 2013, 44 human *Shigella* isolates were referred to the NSRL, 98% of the isolates from notifications reported as confirmed. This is the highest proportion of isolate referrals to NSSLRL (Figure 4). In previous years, the proportion of isolates referred to NSSLRL ranged from 41% to 71%).

The species/serotype and antimicrobial resistance patterns of these cases are reported in Table 2.

An increase in ciprofloxacin resistance among *S sonnei* isolates has been identified by NSSLRL since 2010; this appears to have a significant association with exposure in India.[8] Further details of Shigella strain characterisation performed at NSSLRL can be found in the NSSLRL Annual Report.[9]

There were four shigellosis outbreaks notified in 2013. One general outbreak of shigellosis was reported in a

Table 2: Species/serotypes and AMR profiles of Shigella isolates referred to NSSLRL in 2013 (Data courtesy of Martin Cormican, Niall de Lappe and Jean O Connor at NSSLRL)

Serotype	Number by serotype	AMR profile	Number by serotype and AMR profile
Shigella boydii	5	ASSuTTm	2
		Na	1
		SSuTm	1
		SSuTmNa	1
Shigella flexneri 1b	2	A	2
Shigella flexneri 2a	7	ACSSuTTm	6
		STTmNaCp	1
Shigella flexneri 2b	1	ACST	1
Shigella flexneri 3a	1	CSSuTTmNaCp	1
Shigella flexneri 4a	1	ASSuTTm	1
Shigella flexneri 6	2	SSuTTm	1
		SSuTTmNaCp	1
Shigella flexneri X variant	2	ASSuTTm	2
Shigella sonnei	23	ACSSuTTm	1
		ASSuTm	1
		ASSuTTmNaCpCtx	1
		ASuTm	1
		SSuTm	1
		SSuTTm	3
		SSuTTmNa	1
		SSuTTmNaCp	10
		STTmNaCp	1
		SuTm	2
		Not reported	1
Total	**44**	**Total**	**44**

[Data source: NSSLRL]

Table 3. Notified shigellosis outbreaks, Ireland 2013

HSE-area	Outbreak type	Location	Transmission mode	Number ill	Serotype
M	Family	Travel-related	Person-to-person	3	*Shigella flexneri*
MW	Family	Extended family	Unknown	5	*Shigella flexneri*
MW	Family	Travel-related	FB and WB	2	*Shigella sonnei*
S	General	Comm. Hosp/Long-stay unit	Person-to-person	9	*Shigella sonnei*

(Data source: CIDR)

long-stay unit. There were nine people ill over a period of four weeks, four of whom were confirmed as being infected with *S sonnei*. The mode of transmission was reported as person-to-person. Two small family outbreaks were associated with foreign travel, while an indigenous extended family outbreak was reported with five persons ill.

Although foreign travel is a major risk factor for shigellosis among Irish residents, indigenous risks are likely to be through person-to-person spread (in some instances from persons who have contracted shigellosis abroad), and from food, as demonstrated by the Scandinavian outbreaks associated with imported foods in recent years.

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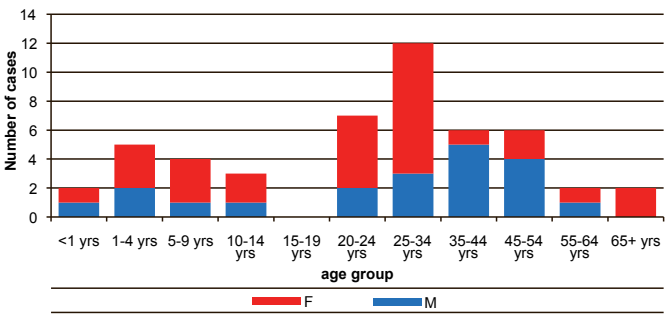

Figure 3. Age-sex distribution of shigellosis notifications, Ireland 2013
(Data source: CIDR)

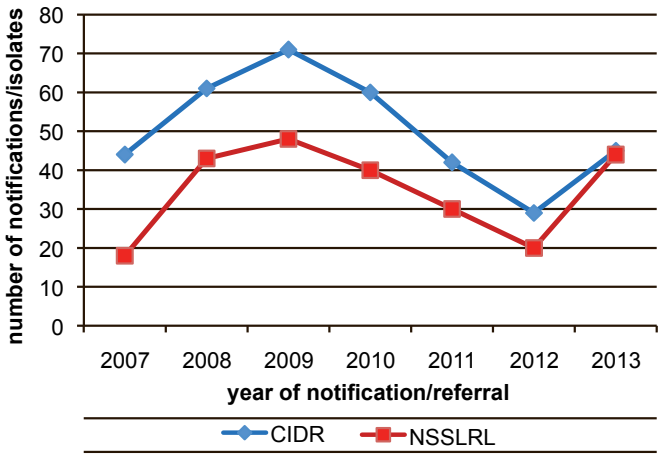

Figure 4. Annual number of confirmed shigellosis notifications compared to the number of isolates referred to NSSLRL, Ireland 2007-2013
(Data source: CIDR and NSSLRL)

04

Vectorborne and Zoonotic Diseases

4.1 Malaria

Summary

Number of cases malaria, 2013: 71
Crude incidence rate malaria 2013: 1.55/100,000
Number of cases malaria, 2012: 65

Summary:
In 2013, 71 malaria cases were notified in Ireland, an increase of 9% compared to 65 cases in 2012 (Figure 1). The incidence rate now stands at 1.55 per 100,000 population. Among European Union (EU) member states reporting malaria data to the European Centre for Disease Control, Ireland had the third highest incidence rate for imported malaria in 2010 (the latest year for which comparative data are available); only the United Kingdom and Luxembourg had higher reported incidence rates.[1]

In common with the rest of the EU, males predominated (male: female ratio 2.1:1), with the highest numbers of cases among males aged between 35 and 54. The number of paediatric cases reported was 12, an increase compared to eight cases reported during 2012 (Figure 1).

Six of the paediatric cases reported 'visiting family in country of origin' as their reason for travel while one case was a visitor from outside Ireland who became ill during their stay in Ireland. There was no information on reason for travel for the remaining five paediatric cases. Of the six paediatric cases that travelled to visit family, all visited sub-Saharan Africa, staying for between 1 to 9 months duration. Six of the paediatric cases were reported not taking any prophylaxis for their travel while the remaining six did not have prophylaxis reported.

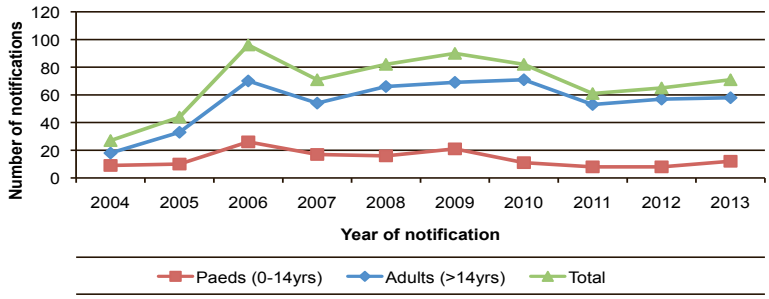

Figure 1: Annual number of malaria notifications by age, Ireland 2004-2013

Table 1: Number of malaria notifications by reason for travel and country of birth, Ireland 2013

Reason for travel	Country of Birth					
	Nigeria	Ireland	Other Africa	Oceania	Not reported	Total
Visit family country origin	23	5	7	0	1	**35**
Foreign visitor ill in Ireland	3	0	0	0	0	**3**
Business/Professional travel	0	2	0	1	0	**3**
Holiday travel	0	2	0	0	1	**3**
Irish citizen living abroad	0	2	0	0	0	**2**
Other	1	1	0	0	0	**2**
New entrant to Ireland	0	0	1	0	1	**1**
Child visiting parents	0	1	0	0	0	**1**
Reason for travel not reported	1	0	1	0	22	**21**
Total	28	13	9	1	25	71

Among all age groups, the category of traveller most affected in Ireland continued to be African immigrants and their families who were exposed while returning to 'visit family in country of origin' (table 1). This almost certainly reflects the greater frequency with which this group travels to malarious areas, but also reflects Ireland's importance as a destination for those emigrating from English speaking West Africa. Where the reason for travel was reported in 2013, 70.0% cited 'visiting family in country of origin', all of whom travelled to Africa (table 1).

The second most commonly cited reasons for travel this year were 'Business/professional travel' (n=3), 'Holiday travel' (n=3) and 'Foreign visitor ill Ireland' (n=3), each making up 6% of cases with known reason for travel in 2013.

Figure 2 shows the distribution of cases by reason for travel 2006-2013. During that time period 'visiting family in country of origin' remained the most common reason for travel, with new entrant and holidaymaker case numbers declining. The numbers of cases in persons exposed during business/professional travel has increased.

Nigeria remained the country most frequently visited, accounting for 52.1% of total cases and 64.9% of cases where country of infection was reported (table 2). The remaining cases were exposed in other countries within Africa. The majority of cases who reported travel to Nigeria were 'visiting family in country of origin' (29/35 with known reason for travel).

Plasmodium falciparum accounted for 88.7% of infections in 2013, reflecting the dominance of exposure in Africa as the source of the majority of notifications. One case each of *P. ovale* and *P vivax* were also reported which remains stable in comparison to previous years. The remaining six cases did not have *Plasmodium* species specified.

While this report has highlighted the high incidence among persons travelling to 'visit family in their country of origin', malaria prevention messages should also be targeted at tourists, business travellers and other travellers with little previous exposure to malaria.

Children can also be particularly at risk. It is important that persons born in Western and Central Africa who take up residence in Ireland and who return to their country of origin with their Irish-born children are made aware of the fact that their children have no innate immunity to malaria (and their own immunity will likely have waned considerably), and must complete their full course of advised chemoprophylaxis while taking steps to ensure they avoid mosquito bites.

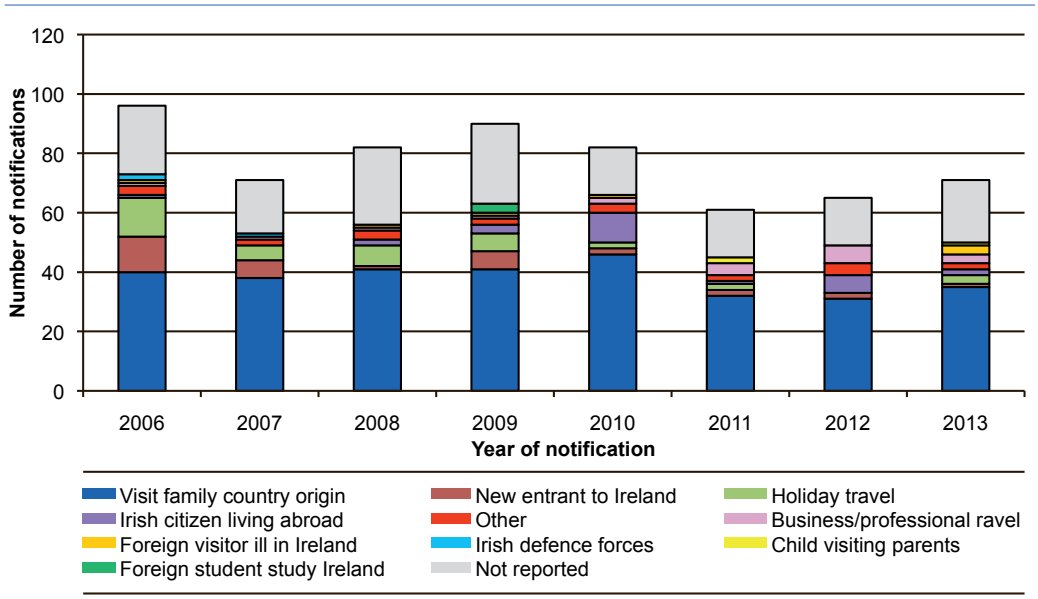

Figure 2: Annual number of notifications malaria by reason for travel, Ireland 2006-2013

Table 2: Number of cases malaria by infecting species and country of infection

Organism	Nigeria	Other African country[1]	Not reported	Total
Plasmodium falciparum	33	18	12	**63**
Plasmodium ovale	0	1	0	**1**
Plasmodium vivax	1	0	0	**1**
Plasmodium	3	0	2	**5**
Malarial parasites	0	1	0	**1**
Total	37	20	14	71

n=1 each from Angola, Congo DR, Egypt, Ivory Coast, Mozambique, Papua New Guinea, Sierra Leone, South Africa, Sudan and Tanzania n=2 each from Cameroon, Ghana and Uganda.

HPSC resources for health professional include a poster which can be downloaded from the HPSC website for display in GP surgeries, maternity hospitals, paediatric hospitals and emergency departments, advising immigrant families travelling to Africa to consult their doctor about malaria before travelling. A leaflet for intending travellers, available in English and French, highlights the value of antimalarial prophylaxis and protection against mosquito bites. The poster and leaflet are available here.

Recent developments of note include a case of autochthonous falciparum malaria was reported in a patient in France during February 2013. The case reported no recent travel to malaria-endemic countries and it was hypothesised that transmission was likely due to an infective *Anopheles* mosquito carried in the luggage of a close contact recently arrived from a malaria-endemic area. [2]

During 2013, a case of a *Plasmodium knowlesi* infection was reported as imported to Germany from Thailand. *P. knowlesi* was known as a plasmodium of macaques until transmission to humans was recognised in Borneo and later throughout South-East Asia. The retrospective analysis of blood samples from Thailand suggests that the prevalence of *P. knowlesi* infections remained stable from 1996 to 2008 so it is likely that the increasing number of cases recognised is due to raised awareness of the possibility of human *P. knowlesi* malaria and to the application of diagnostic molecular biology techniques to differentiate this parasite from other malaria parasites. However, due to of the possibility of a severe course of *P. knowlesi* infections, physicians must be increasingly aware of this as a human pathogen. [3]

Also of note is the recent re-emergence of indigenous malaria due to *P. vivax* in Greece, with continued transmission during 2013.[4,5,6,7] However, case numbers are very low and have been identified in areas not usually associated with tourism. In a European Centre for Disease Control and Prevention Risk Assessment of the situation, the risk to travellers to the country was deemed limited, with general advice for travellers to take prophylaxis not recommended, although travellers to Greece should take standard measures against mosquito bites to protect against this and other mosquito-borne diseases.[7] Moreover, health professionals who see cases of febrile illness returning from the affected parts of Greece should be alert to the possibility of malaria.

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4.2 Leptospirosis

Summary

Number of notifications: 14
Crude incidence rate: 0.31/100,000

Fourteen cases of leptospirosis were notified in Ireland in 2013, similar to the 15 cases notified in 2012 (Figure 1). This equates to a crude incidence rate of 0.31 per 100,000 (95% CI 0.15-0.46). The latest year for which data is available across the European Union is 2011. Among the 27 countries that reported leptospirosis incidence in 2011, Ireland reported the third highest incidence rate after Slovenia and Romania. The incidence in the EU as a whole was 0.22 per 100,000.

The leptospirosis notification dataset is typically dominated by adult males, and this year was no exception (Table 1). Ten cases (71.4%) were male and the age range was 21-65 (mean age =38 years, median age=46 years). This is consistent with the exposures most commonly associated with leptospirosis in temperate regions, e.g. occupational contact with farm animals, and watersports.

Among the 12 cases for which hospital admission status was reported, nine (75%) required hospitalization. There were no deaths reported.

Six cases (43%) were believed to have acquired their illness occupationally –three were either farmers or reported contact with farm environments, one reported exposure to outdoor environments during the course of their work and the source of occupational exposure was not specified for the remaining two cases, however they were known to have contact with animals. Five (36%) cases were reported as being associated with recreational activities: two with travel to a tropical destination, two with rowing/kayaking, and one case cited contact with river water as the source of their infection. One was exposed to a rat in their home, one case had accidental exposure to river water and there were no risk factors identified for the remaining case.

Figure 2 shows the trend in notifications by exposure group. The decrease in case numbers reported over the last five years appears to be due to a reduction in the number of recreational cases, with occupational cases now making up the largest proportion of cases in the last three years.

While a number of regional hospital laboratories offer a diagnostic service for leptospirosis, around two thirds of cases are diagnosed by the National Virus Reference Laboratory each year. Positive specimens are generally referred to the United Kingdom's Leptospirosis Reference Unit (LRU) for confirmation and for typing where possible. In 2013, species information was available on

Table 1: Leptopirosis notifications by age and sex, Ireland 2013

Age group	Male	Female	Total
<5 yr	0	0	**0**
5-14 yrs	0	0	**0**
15-24 yrs	2	3	**5**
25-44 yrs	2	0	**2**
45-64 yrs	5	1	**6**
65+ yrs	1	0	**1**
Total	**10**	**4**	**14**

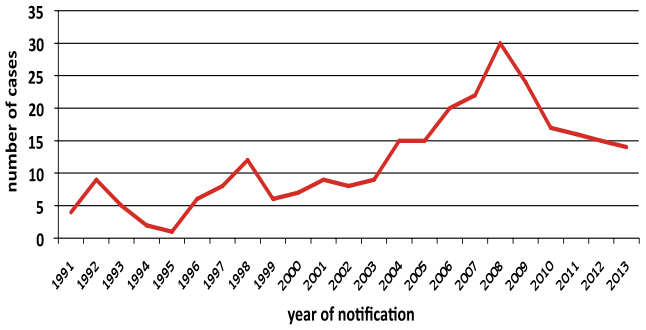

Figure 1: Annual number of leptospirosis notifications, Ireland 1991-2013
(data source: CIDR)

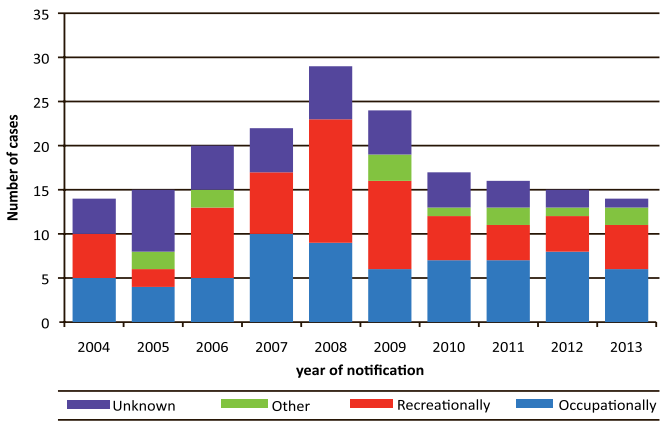

Figure 2: Annual number of leptospirosis notifications by exposure group, Ireland 2004-2013
(data source: CIDR)

CIDR for only two cases (14%)–one *Leptospira icterohaemorrhagiae*, and one *L. hardjo*. For many cases, serovar is not determined. Failure to provide follow-up samples is likely to be one contributory factor in this.

Activities that continue to be associated with leptospirosis risk in Ireland include recreational activities such as water sports, and farming. In recent years, travel to Asia and other tropical destinations has emerged as a risk factor for leptospirosis.

4.3 Other Notifiable Non-IID Zoonotic Diseases

Toxoplasmosis

During 2013, 32 cases of toxoplasmosis were notified compared to 36 in 2012 and 32 cases in 2011. 15% of cases with known patient status were hospitalized (3/20)

One congenital case was reported, the same as in each of the last three years.

The remaining 31 cases ranged in age from 10 to 87 years (median, 33 years). As in previous years, female cases were more common (53%). The high number of cases reported among women of child-bearing age is probably a reflection of enhanced testing during pregnancy (Table 1).

Brucellosis

During 2013, there was one case of brucellosis notified, an adult female. This compares with between one and four cases per annum over the previous five years. The case was reported as *Brucella species*; the country of infection was not specified.

Despite the reporting of this female case this year, the age and sex distribution for brucellosis in recent years in Ireland has tended towards adult males, suggesting that occupational exposure is likely to be a major transmission route for this disease.

Echinococcosis

In 2013, there was one notification of echinococcosis; an adult female who acquired her illness in Poland. Prior to this there have only been four cases of echinococcosis notified in Ireland since the disease became notifiable in 2004; in 2008, two adult cases were notified, and one adult case was notified each in 2009 and 2010.

Because of the long incubation period for this disease, it is possible that these infections occurred many years ago.

Trichinosis and Q Fever

No cases of either of these zoonotic diseases were notified in Ireland in 2013.

Since the disease became notifiable in 2004, there have only been two cases of trichinosis; both were associated with exposure in Poland, and were linked to the same outbreak. For Q fever between 2004 and 2012, annual totals of 5 to 17 cases were notified.

Table 1: Toxoplasmosis notifications by age and sex, Ireland 2013

Age group	Male	Female	Total
<1 yr	1	0	**1**
1-4 yrs	0	0	**0**
5-14 yrs	1	2	**3**
15-24 yrs	2	1	**3**
25-44 yrs	5	14	**19**
45-64 yrs	4	0	**4**
65+ yrs	2	0	**2**
Total	**15**	**17**	**32**

4.4 Other Vectorborne Diseases

Other Vectorborne Diseases
Four vectorborne diseases were added to the notifiable disease list in Ireland from the beginning of 2012. This chapter summarises the information gathered on these notifications in the second year of formal surveillance. The case definitions for these diseases are outlined on the HPSC website at http://www.hpsc.ie/hpsc/NotifiableDiseases/CaseDefinitions/.

Lyme neuroborreliosis
Lyme neuroborreliosis is an infection caused by a spiral-shaped bacterium called *Borrelia burgdorferi* that is transmitted to humans by bites from ticks, generally hard-bodied ticks (*Ixodidae).*

During 2013, 13 cases of Lyme neuroborreliosis were notified in Ireland, seven female and six male. Two patients were admitted to hospital, five were reported as day-patients, two were emergency department patients and three were GP patients. The hospitalisation status of the remaining case was not specified. No cases were reported as being acquired abroad.

Cases were reported from all HSE areas except HSE-M. Over half of the 13 cases were reported by HSE-S and –SE. Table 2 displays the regional distribution of cases by age group in years.

Dengue Fever
Fifteen confirmed cases of dengue fever were notified during 2013. Three cases were reported as being admitted to hospital, four were GP patients and patient type was not reported for the remaining eight cases. Table 2 displays the regional distribution of cases by age group in years.

Dengue is found commonly throughout the tropics and subtropics and is endemic in about 100 countries. Of the 15 cases reported in 2013, country of infection was reported for four cases, with one each in Cambodia, Columbia, Thailand and Viet Nam. The remaining 11 cases did not have country of infection specified. These destinations probably reflect the frequency of travel by Irish residents to dengue endemic countries.

West Nile fever
One case of West Nile fever was notified in Ireland in 2013. Country of infection was reported as United States for this case.

Chikungunya fever:
No cases of chikungunya were notified in Ireland in 2013

Table 1: Lyme neuroborreliosis notifications by age group (years) and HSE-area, 2013

Age group (years)	HSE-E	HSE-M	HSE-MW	HSE-NW	HSE-SE	HSE-S	HSE-W	Total
10-14 yrs							1	1
15-19 yrs					1			1
20-24 yrs				1				1
25-34 yrs							1	1
35-44 yrs						3		3
45-54 yrs		1	1		2			4
55-64 yrs	1							1
65+ yrs						1		1
Total	1	1	1	1	3	4	2	13

Table 2: Dengue fever notifications by age group (years) and HSE-area, 2013

Age group (years)	HSE-E	HSE-M	HSE-MW	HSE-SE	HSE-W	Total
20-24 yrs	4	1	0	0	2	7
25-34 yrs	2	0	1	0	1	4
35-44 yrs	1	0	0	0	0	1
45-54 yrs	0	0	1	0	0	1
65+ yrs	1	0	0	1	0	2
Total	8	1	2	1	3	15

05

Blood-borne and Sexually Transmitted Infections

5.1 Hepatitis B

Summary

Number of cases, 2013: 429
Crude notification rate, 2013: 9.3/100,000 population
Number of cases, 2012: 566

Hepatitis B is a vaccine preventable disease caused by the hepatitis B virus. It is transmitted through percutaneous or mucocutaneous contact with the blood or body fluids of an infected person. Over 90% of people infected in late childhood and adulthood clear the virus within a year of infection, but there is a high probability of developing chronic infection if hepatitis B is acquired in infancy (approx. 90%) or when aged under five years (approx. 30%).[1] Between 15 and 40% of people with chronic infection ultimately develop cirrhosis, liver failure or hepatocellular carcinoma (liver cancer).[2]

The prevalence of hepatitis B in the general population in Ireland is low (less than 1%). Most cases fall into defined risk groups such as people with multiple sexual partners, household or sexual contacts of known cases, injecting drug users and people who were born in countries of intermediate (2-7%) or high (≥8%) hepatitis B endemicity.

The number of hepatitis B cases reported in Ireland decreased by 24% in 2013, with 429 cases (9.3/100,000 population) notified compared to 566 in 2012. This was a continuation of a general downward trend since peak levels in 2008 (n=902). Annual hepatitis B notifications since 1997 are shown in figure 1.

Notification rates were highest in HSE E (16/100,000 population, n=260) and HSE S (11/100,000 population, n=52). Geographic trends for the past four years are shown in figure 2.

All cases were laboratory confirmed and 99% (n=423) contained information on acute/chronic status. Where status was known, 8% of cases were acute (n=32, 0.7/100,000 population) and 92% were chronic (n=391, 8.5/100,000 population). Both acute and chronic cases of hepatitis B are notifiable in Ireland.

Acute cases (recent infections)
The number of acute cases of hepatitis B notified in Ireland is relatively low and decreased by 16% in 2013

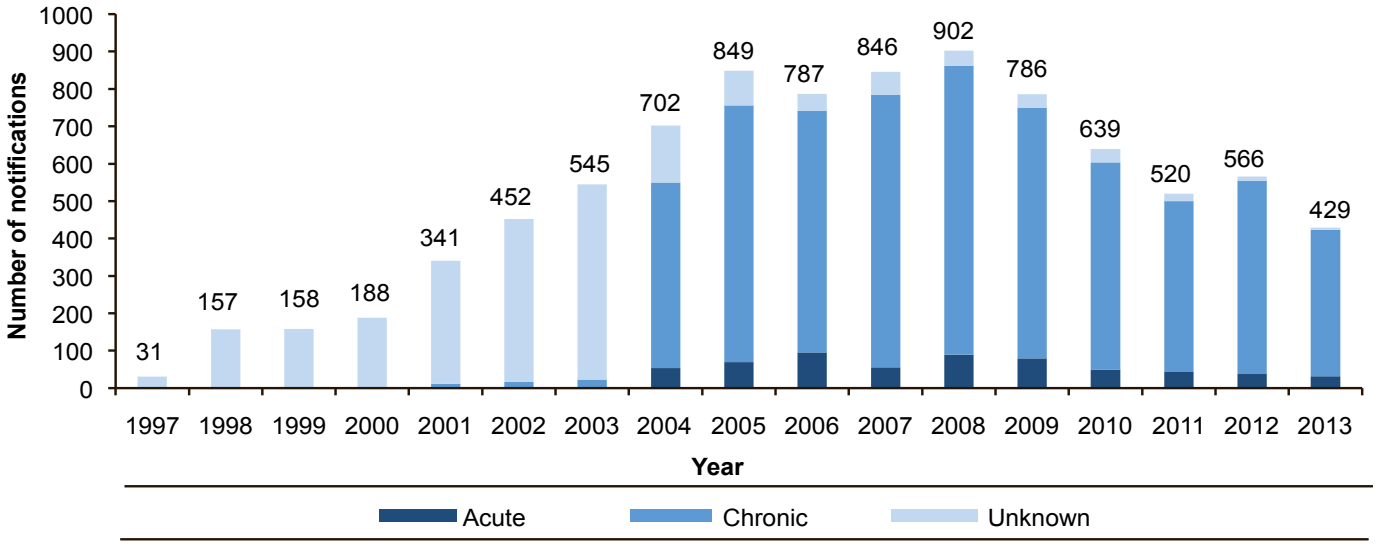

Figure 1. Number of hepatitis B notifications by acute/chronic status, 1997-2013

(n=32) compared to 2012 (n=38) (figure 3). The majority of acute cases of hepatitis B in Ireland are sexually acquired.

Of the 32 acute cases notified in 2013, 78% (n=25) were male and 22% (n=7) were female. The highest notification rates were in young to middle aged adults, with 91% (n=29) of acute cases aged between 20 and 54 years (figure 4). Males were older overall, with a median age of 40 years compared to 35 years for females. The median age at notification increased in 2013 compared to previous years (figure 3).

Information on risk factor was available for 81% (n=26) of acute cases. Of these, 81% (n=21) were likely to have been sexually acquired (12 heterosexual and 9 men who have sex with men), one case was likely to have been infected nosocomially in Ireland and another was likely to have been infected through dental procedures outside of Ireland. No risk factor was identified for remaining three cases despite public health follow up. Five further cases had no risk factor information but were known to have been born in hepatitis B endemic countries.

Country of birth was specified for all of the acute cases notified in 2013. Sixty nine percent (n=22) were born in Ireland and 16% (n=5) were born in Eastern or Central Europe. A further three cases were born in Asia, one case was born in Western Europe (excluding Ireland) and one case was born in Sub-Saharan Africa. Ninety percent of acute cases were tested because they were symptomatic.

Chronic cases (long-term infections)

There was a 24% decrease in chronic hepatitis B notifications in 2013 (n=391) compared to 2012 (n=517) (figure 5). This was a continuation of a significant downward trend in notifications of chronic hepatitis B in recent years. The large increase in hepatitis B notifications between 1997 and 2008 (figure 1) was mostly due to increased numbers of people immigrating

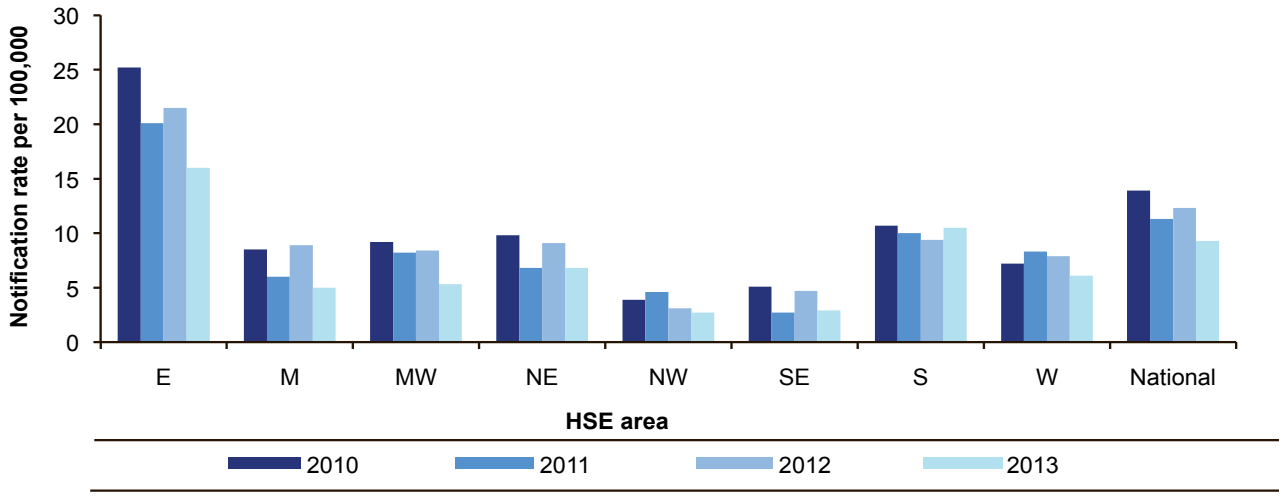

Figure 2. Hepatitis B notification rates/100,000 population, by HSE area, 2010-2013

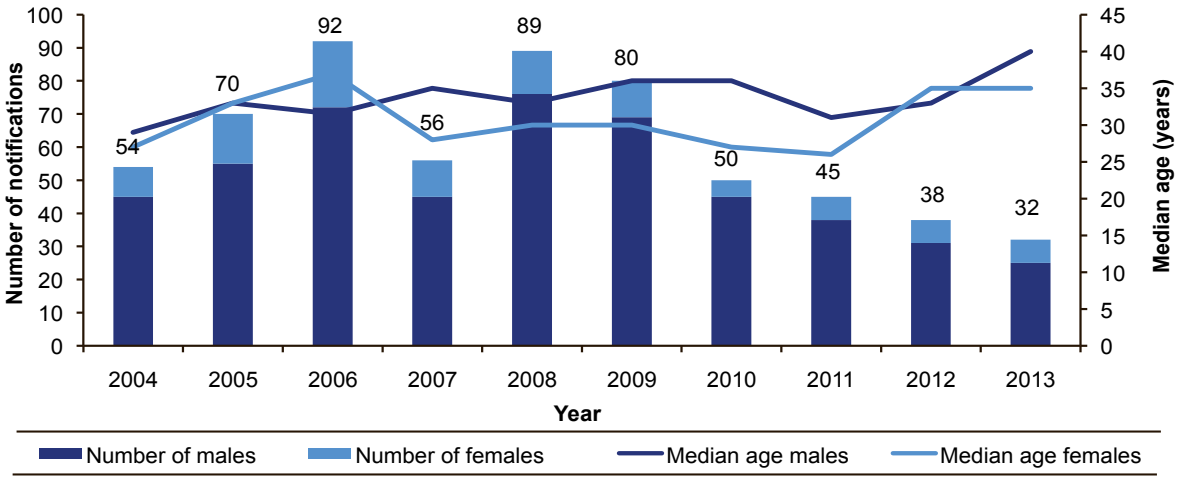

Figure 3. Number of acute cases of hepatitis B notified, by sex and median age, 2004 to 2013

to Ireland from hepatitis B endemic countries. The current economic climate has most likely contributed to reduced immigration to Ireland between 2009 and 2013, which correlates with an overall decrease in hepatitis B notifications over this time period.

Of the 391 chronic cases notified in 2013, 57% (n=221) were male, 42% (n=165) were female and sex was not reported for 1% (n=5). Eighty one percent (n=317) of chronic cases were aged between 20 and 44 years when notified (figure 6). Males were slightly older overall, with a median age at notification of 34 years compared to 30 years for females (figure 5).

Although risk factor was reported for a minority of chronic cases, some information on country of birth or asylum seeker status was available for 54% (n=212). Of these, 85% (n=180) were either born in a hepatitis B endemic country (hepatitis B surface antigen prevalence ≥2%) or were asylum seekers. Most of these cases are likely to have been infected outside Ireland, but the actual mode of acquisition of infection is unknown for the majority. Where country of birth was available (51%, n=198), the most common birth countries were in Central or Eastern Europe (34%, n=68), Asia (25%, n=49), Sub-Saharan Africa (23%, n=46) and Western Europe (12%, n=24). Of those born in Western Europe, 17 were born in Ireland.

Risk factors for transmission were provided for 20% of the chronic cases notified in 2013. Where data were available, the most common risk factors were sexual exposure (50%, n=39), vertical transmission (14%, n=11), attending an intellectual disability institution (9%, n=7) and injecting drug use (9%, n=7). All of the cases with an intellectual disability were born in Ireland, but infection may have been acquired in the past and only diagnosed in 2013 as part of routine testing.

The reason for testing was known for 71% (n=279) of chronic cases. The main reasons were: antenatal

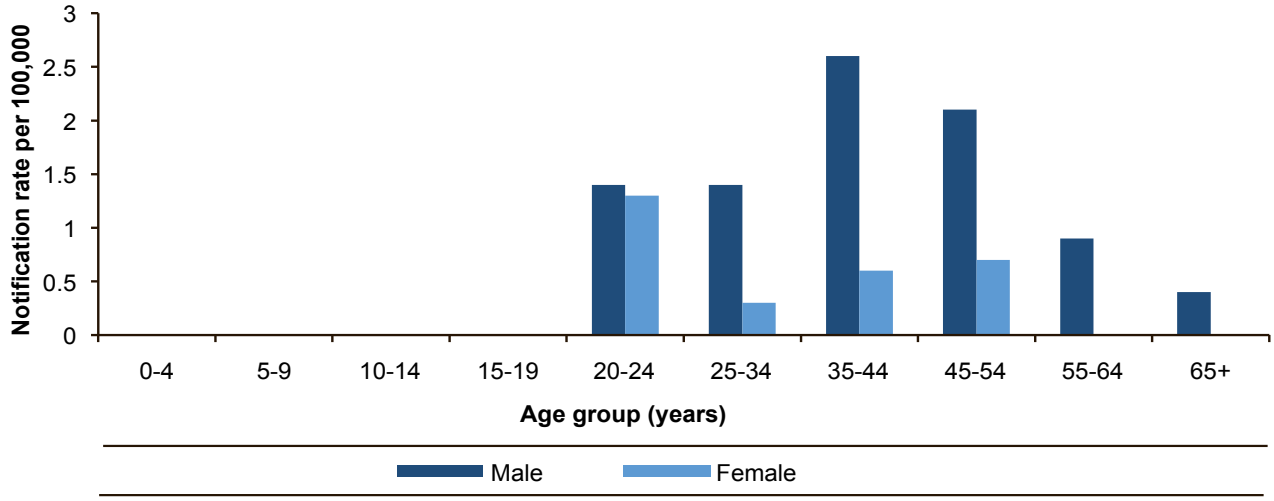

Figure 4. Age and sex-specific notification rates/100,000 population for acute cases of hepatitis B, 2013

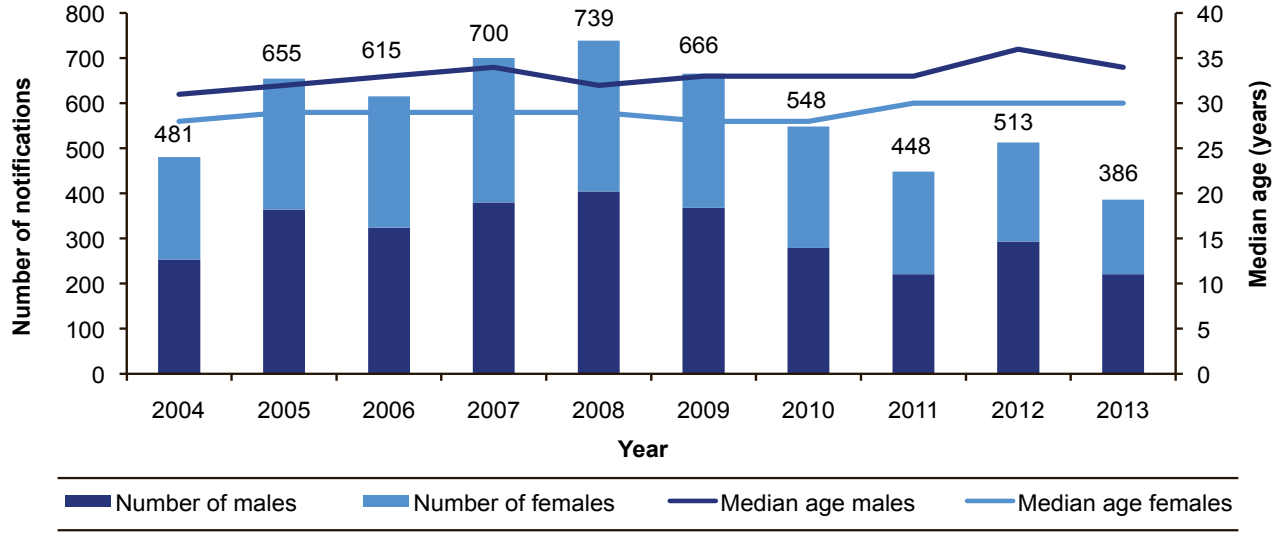

Figure 5. Number of chronic cases of hepatitis B notified, by sex and median age, 2004 to 2013

screening (23%, n=65), routine health screening (17%, n=46), STI screening (15%, n=43), re-testing of known cases (not previously notified) (13%, n=36) and asylum seeker screening (12%, n=33).

Co-infections

Co-infection with HIV or hepatitis C can lead to more severe liver disease and an increased risk of liver cancer in people with hepatitis B infection. Seven of the cases of hepatitis B notified in 2013 were co-infected with HIV, two were co-infected with hepatitis C and one additional case was infected with HIV and hepatitis C.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 17th September 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

1. Goldstein ST, Zhou F, Hadler SC, Bell BP, Mast EE, Margolis HS.A mathematical model to estimate global hepatitis B disease burden and vaccination impact. Int J Epidemiol. 2005 Dec;34(6):1329-39.
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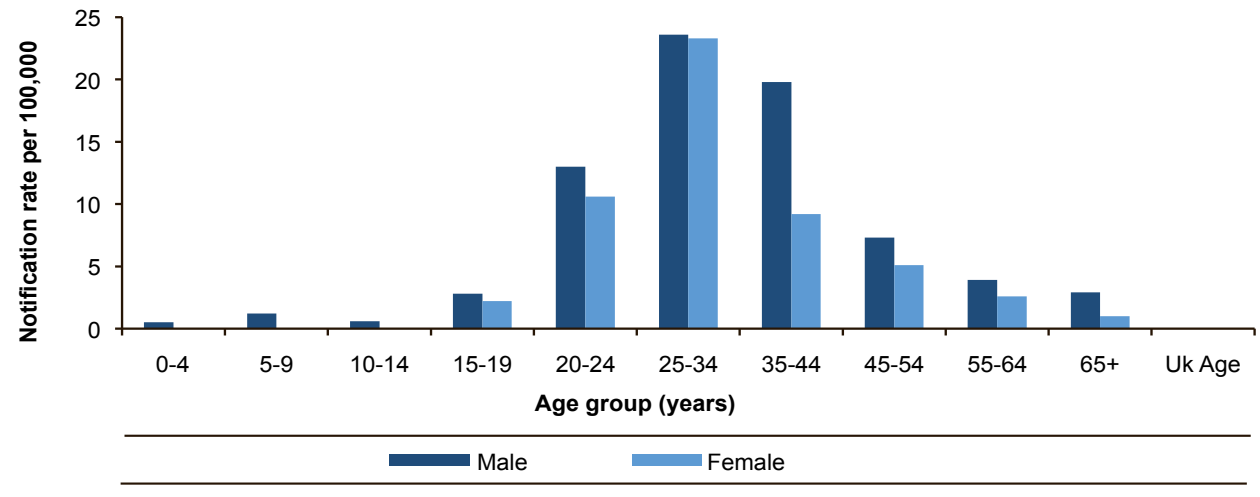

Figure 6. Age and sex-specific notification rates/100,000 population for chronic cases of hepatitis B, 2013

5.2 Hepatitis C

Summary

Number of cases, 2013: 786
Crude notification rate, 2013: 17.1/100,000 population
Number of cases in 2012: 894

Hepatitis C is a major cause of liver disease worldwide. The hepatitis C virus is primarily transmitted through sharing contaminated equipment when injecting drugs or through receipt of unscreened blood or blood products (this is no longer a risk in Ireland). Sexual, occupational and vertical transmission can also occur but are less common.

Infection is initially asymptomatic in most cases, but approximately 75% of those infected fail to clear the virus and develop chronic infection. Between 5 and 20% of chronically infected individuals develop cirrhosis of the liver after 20 years of infection. Of those with cirrhosis, 1.5 to 2.5% will go on to develop hepatocellular carcinoma (liver cancer) each year.[1] Treatment with a combination of pegylated interferon/ribavirin/telaprevir or pegylated interferon/ribavirin/boceprevir induces sustained virological response (SVR) rates of up to 75% in those with genotype 1 hepatitis C.[2] Approximately 80% of those with genotype 2 and 3 infections achieve SVR on pegylated interferon and ribavirin alone.[3] An SVR is regarded as a virological cure and is associated with improved morbidity and mortality. Several newer direct acting antiviral therapies have achieved high SVRs in clinical trials.[4] Some have been approved by the European Medicines Agency and reimbursement recommendations are currently under review by the National Centre for Pharmacoeconomics.

The overall prevalence of chronic hepatitis C in Ireland is comparable to other Northern European countries, and is estimated to be between 0.5 and 1.2%. Most cases fall into defined risk groups such as injecting drug users, people who received unscreened blood or blood products in the past and people who were born in hepatitis C endemic countries.[5]

Hepatitis C notifications decreased by 12% in 2013 (n=786, 17.1/100,000 population) compared to 2012 (n=894, 19.5/100,000 population) (figure 1). This was a continuation of a general downward trend since peak levels in 2007 (n=1539). There was a strong predominance of males: 68% (n=537) of cases were male, 31% (n=245) were female and sex was not reported for four cases. The highest notification rates were in young to middle aged adults. Eighty six percent (n=676) of cases were aged between 25 and 54 years (figure 2). The median age at notification for females was younger (36 years) than that for males (38 years).

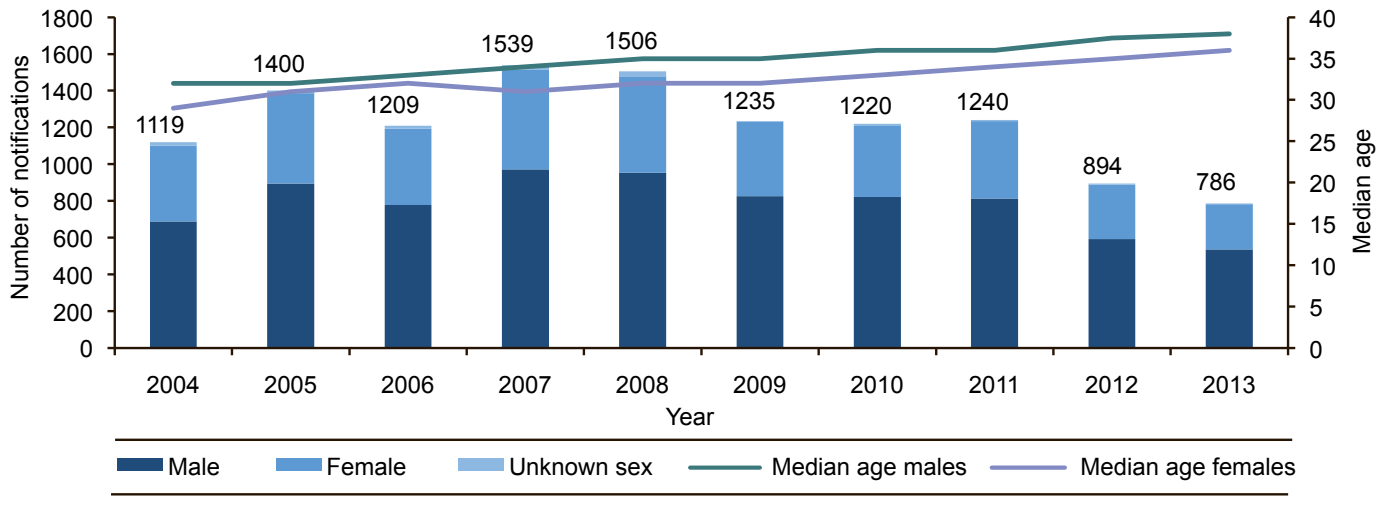

Figure 1. Number of notifications of hepatitis C and median age at notification, by sex, 2004-2013

The geographical distribution of cases was skewed, with the HSE-East reporting 71% of the cases notified in 2013 (n=556, 34/100,000 population) (figure 3).

Data on most likely risk factor were available for 57% of cases (n=445) in 2013. The most common risk factors reported were injecting drug use (79%, n=351), sexual exposure (7%, n=30), receipt of blood or blood products (3%, n=14), tattooing or body piercing (2%, n=10) and vertical transmission (2%, n=8) (figure 4). The vertically acquired infections do not all represent recent births in Ireland. Five were born in Ireland, two were born in other countries and country of birth was not available for the remaining case. Of those who were infected through contaminated blood or blood products, seven were infected in Ireland, six were infected in other countries and no country of infection was available for the remaining case. The Irish infections occurred many years in the past, but were notified for the first time in 2013. Figure 4 shows recent risk factor trends for hepatitis C in Ireland.

Data on country of birth were available for 28% of cases (n=223) in 2013. Where information was available, 46% of cases were born in Ireland and 54% were born outside of Ireland. For the non-Irish nationals, the most common regions of birth were Central and Eastern Europe (34%, n=75), Asia (8%, n=18) and Western Europe (excluding Ireland) (6%, n=13).

Hepatitis C genotype data were collected retrospectively from the NVRL and the Molecular Diagnostic & Research Laboratory in University College Cork and were available for 43% of notifications in 2013. Of these, 64% (n=213) were genotype 1, 28% (n=92) were genotype 3, 5% (n=16) were genotype 2, 3% (n=11) were genotype 4 and 1% (n=2) were genotype 6. Subtype was available for 93% (n=197) of genotype 1 cases. Seventy three percent were genotype 1a and 27% were 1b.

Co-infections with HIV or hepatitis B can lead to more severe liver disease and an increased risk of liver cancer in those with hepatitis C infection. Twenty two of the hepatitis C cases notified in 2013 were known to be co-

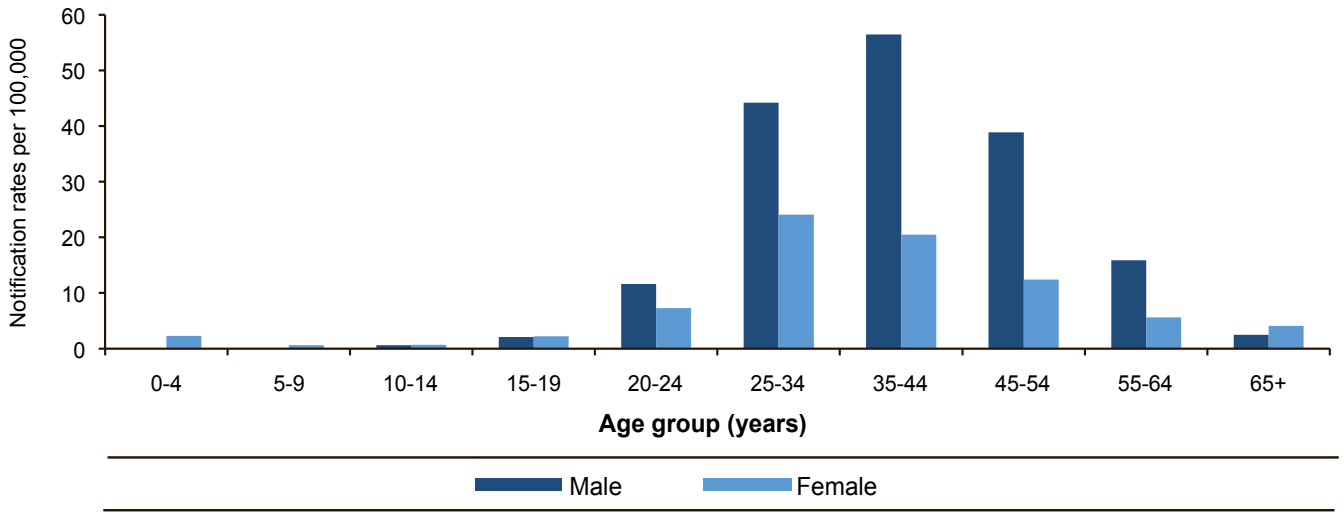

Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis C, 2013

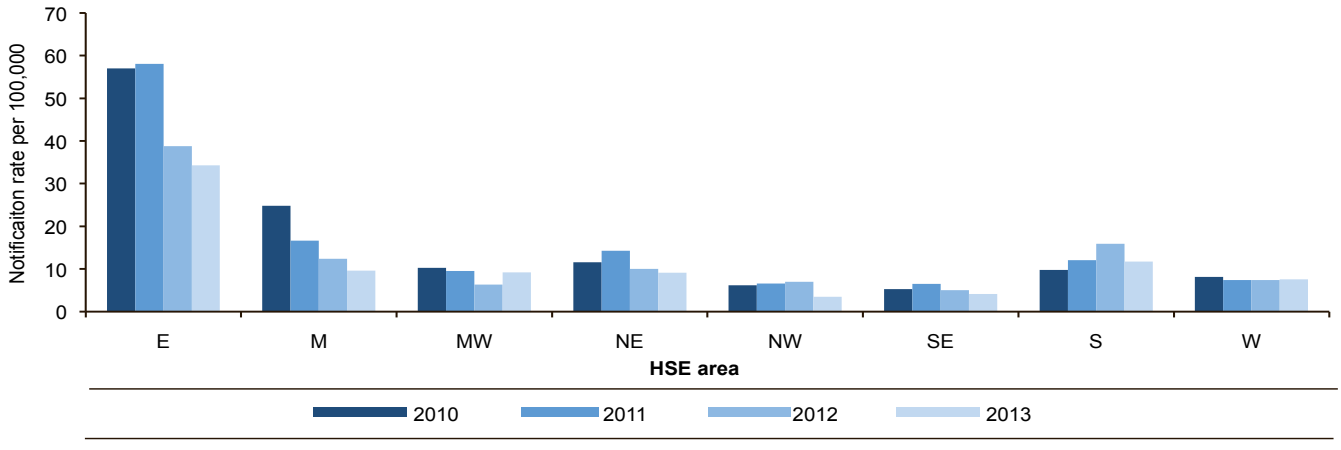

Figure 3. Notification rates/100,000 population for hepatitis C by HSE area, 2010-2013

infected with HIV and four with hepatitis B. One of these was infected with hepatitis B, hepatitis C and HIV.

Hepatitis C notifications have been decreasing in recent years. Some of this decline may be explained by the introduction of new case definitions, explicitly excluding the notification of resolved cases, in 2012. Data completeness has also improved in recent years and this has facilitated better deduplication of notifications. However, overall indications are that the incidence of hepatitis C in Ireland is decreasing. Where risk factor information was available, 79% of cases were drug users who were likely to have been infected through unsafe injecting practices. Anecdotally, the proportion of drug users who are injecting is decreasing and the incidence of hepatitis C appears to be decreasing in this population.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 30th September 2014. These figures differ from those published previously and those reported in the appendices of this report due to ongoing updating of notification data on CIDR.

1. Global Burden of Hepatitis C Working Group. Global burden of disease (GBD) for hepatitis C.J Clin Pharmacol. 2004 Jan;44(1):20-9.
2. Ramachandran P, Fraser A, Agarwal K, Austin A, Brown A, Foster GR et al. UK consensus guidelines for the use of the protease inhibitors boceprevir and telaprevir in genotype 1 chronic hepatitis C infected patients. Aliment Pharmacol Ther. 2012 Mar;35(6):647-62
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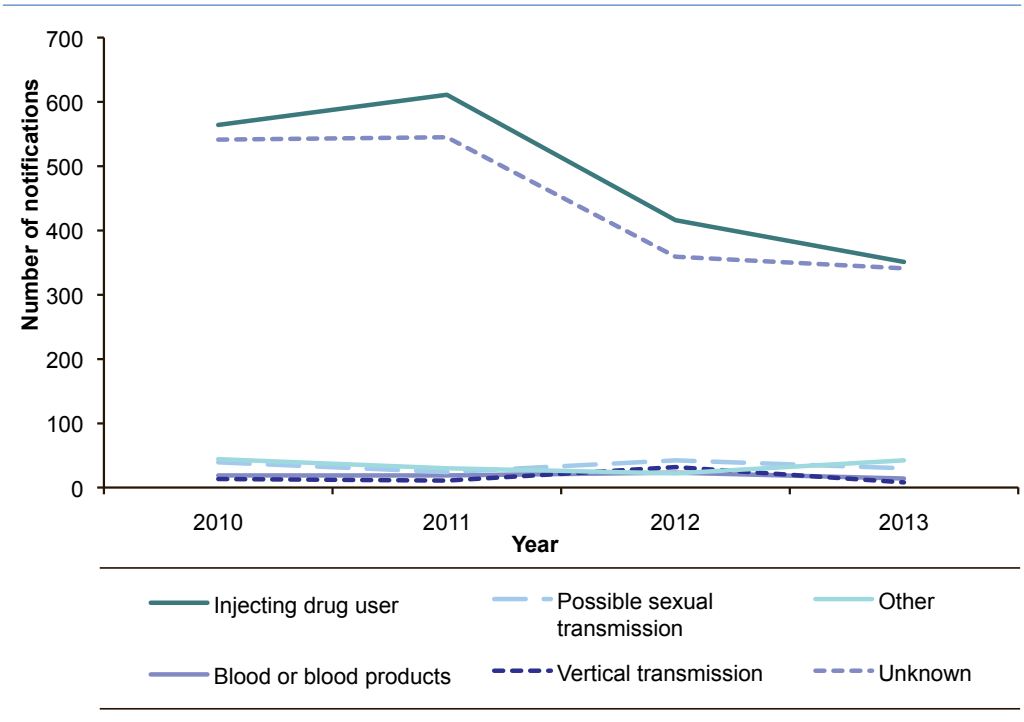

Figure 4. Most likely risk factor for hepatitis C, 2010-2013

5.3 HIV

In 2013, 344 people were newly diagnosed with HIV in Ireland giving a rate of 7.5 per 100,000 population. Since 2010, the annual rate of new HIV diagnoses has been relatively stable in Ireland, ranging from 7.0 to 7.5 per 100,000 population. Cumulatively, to the end of 2013, 6,979 people have been newly diagnosed with HIV in Ireland since the early 1980's. This number does not represent the number of people living with HIV (PLHIV) in Ireland, as it does not take factors such as death and migration into account. The prevalence of HIV in the Irish population is currently unknown. A study in 2009/2010 found that 3,254 patients accessed HIV outpatient care in six centres in Ireland over a 12 month period (1).

A summary of new HIV diagnoses in 2013 is given in table 1 and figure 1 shows the number of HIV cases diagnosed annually in Ireland from 2003 to 2013, in males and females. The rate of new HIV diagnoses by HSE area of residence is shown in table 2. In 2013, the rate was highest in HSE East (14.6 per 100,000) and lowest in HSE Northwest (1.9 per 100,000).

It is important to note that 55 (16%) of the new diagnoses in 2013 were reported to have previously tested HIV positive in another country and this should be borne in mind when interpreting the 2013 data. A further 203 (59%) did not have a previous positive test and information on previous positive HIV testing was not available for the remaining 86 cases (25%).

Probable route of transmission

Information on probable route of transmission was available for 313 (91%) new diagnoses in 2013. The predominant route of transmission was sex between men, accounting for 46% of new diagnoses. Heterosexual contact accounted for 131 new diagnoses (38%); there were 18 new diagnoses among people who inject drugs (PWID) (5%) and three cases where the route of transmission was identified as mother to child transmission (MTCT). Figure 2 shows probable route of transmission among the three major risk groups; MSM (men who have sex with men), heterosexuals and PWID (people who inject drugs) between 2003 and 2013.

MSM (Men who have sex with men)

MSM are the population most affected by HIV in Ireland, and in 2013 accounted for the highest proportion (46%) of new diagnoses. This is slightly lower than the proportion reported in 2012 (49%). The median age among MSM diagnosed in 2013 was 32 years (range 19-68 years). The median age has decreased in recent years (from 37 years in 2005). Just over half (54%) of MSM were born in Ireland, 20% in Latin America, 12% in central and eastern Europe and 6% in western Europe.

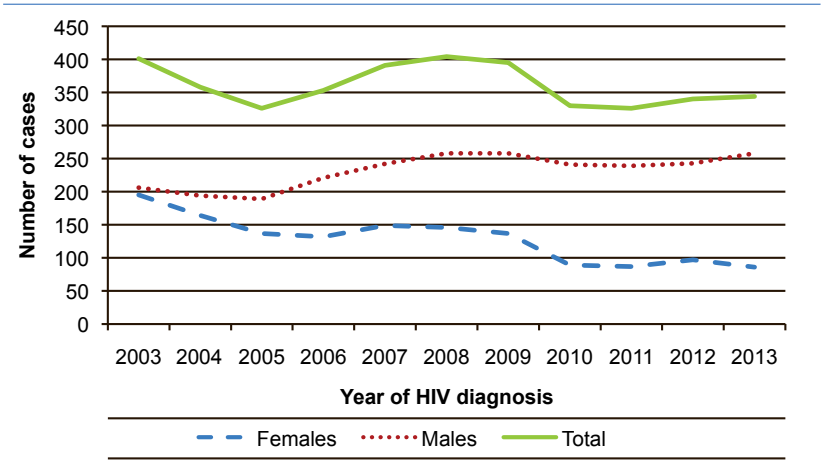

Figure 1: New HIV diagnoses by year of diagnosis, 2003 to 2013

Where CD4 count was reported (92% of cases), 37% of MSM were diagnosed late (CD4 count <350 cells/mm^3) including 15% who had advanced HIV infection (CD4 count <200 cells/mm^3). Seven MSM (4%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis in 2013. The most common indicative illness among MSM was *Pneumocystis Carinii* Pneumonia (PCP) (57%).

Ten percent of MSM newly diagnosed with HIV were co-infected with gonorrhoea and 8% were co-infected with chlamydia. Twenty four percent of MSM had positive syphilis serology but the proportion of these with infectious syphilis was not available. Almost one in every four (22%) MSM were infected relatively recently, in either 2012 or 2013 (i.e.had a previous negative test in either 2012 or 2013).

Heterosexual transmission

In 2013, 38% of newly diagnosed cases (n=131) were infected via heterosexual sex. Among the heterosexual cases, 57% were born in countries with generalised epidemics (greater than 1% of the general population is HIV positive), 14% had a partner from a country with a generalised epidemic, 7% had a high-risk partner or a partner known to be HIV positive, and a further 22% were presumed to be infected heterosexually with no further information. Fifty three percent of the new diagnoses among heterosexuals were female with a median age of 33 years (range 19-55 years) and 47% were male with a median age of 39 years (range 24-70 years).

Where CD4 count was available (91% of cases), a high proportion (59%) of heterosexual cases, were diagnosed late and 34% had advanced HIV infection at the time of diagnosis. The proportion diagnosed late in male heterosexuals decreased from 67% in 2011 to 59% in 2013. The proportion diagnosed late in female heterosexuals increased from 54% in 2011 to 59% in

Table 1: Key points, new HIV diagnoses 2013

Number of new diagnoses		**344**
Rate (per 100,000 population)		**7.5**
Age	Median Age	34 years
	Age range of adult cases	19 to 70 years
Gender	Males	258 (75.1%)
	Females	86 (24.9%)
Route of Transmission	MSM	159 (46.2%)
	Heterosexual	131 (38.1%)
	PWID	18 (5.2%)
	MTCT	3 (0.9%)
	Unknown/Other	33 (9.6%)
Geographic origin	Born in Ireland	141 (41.0%)
	Born Abroad	174 (50.6%)
	Unknown	29 (8.4%)
Stage of Infection	Late (CD4 <350 cells/mm^3)	150/303 (49.5%)
	Very late (CD4 <200 cells/mm^3)	77/303 (25.4%)

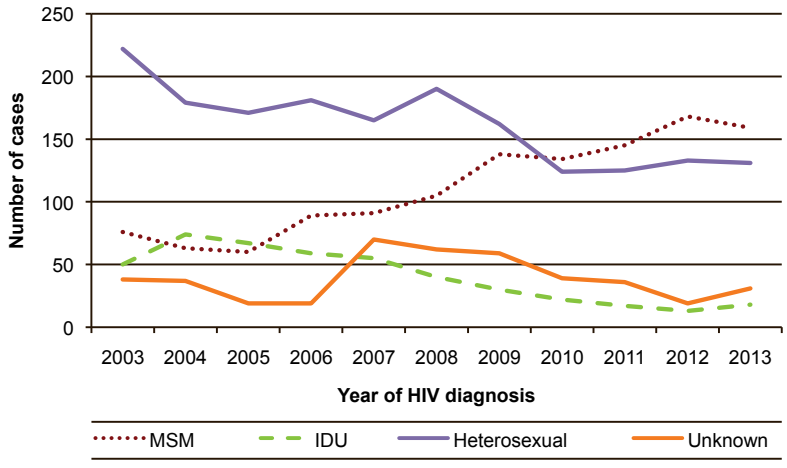

Figure 2: New HIV diagnoses in Ireland by probable route of transmission, 2003 to 2013

2013. Thirteen percent of heterosexual cases were diagnosed with an AIDS defining illness at the time of their HIV diagnosis in 2013.

PWID (People who inject drugs)
Five percent (18 cases) of new diagnoses were among PWID. This is similar to the numbers diagnosed in the last four years (ranging from 13 to 23 cases since 2010). Of the 18 new diagnoses, 12 were men and six were women. The median age was 33.5 years (range 25 to 56 years). Ten were born in Ireland, three in central and eastern Europe and one in born in western Europe. Over 80% of PWID were co-infected with hepatitis C at the time of their HIV diagnosis.

Where CD4 count was reported (89% of cases), 56% of PWID were diagnosed late including 19% who had advanced HIV infection at diagnosis. The proportion diagnosed late in 2013 is lower than in 2012 (63%) and 2011 (85%).

MTCT (Mother to Child Transmission)
Three MTCT cases were newly diagnosed in 2013 with two of the children born in sub-Saharan Africa and one in eastern Europe. No MTCT cases were identified in children born in Ireland in 2013 (Personal Communication; Michelle Goode, Rainbow Clinic, Our Lady's Children's Hospital, Crumlin).

Discussion
The overall trend in newly diagnosed HIV cases in Ireland for the period 2003 to 2013 has been relatively stable with most cases occurring in specific subgroups of the population, namely MSM, heterosexuals from countries with a generalised epidemic and PWID. Sex between men is the commonest mode of transmission in Ireland since 2010. It is also reported as the predominant mode of transmission in EU/EEA countries and accounted for 40% of the total number of diagnoses in 2012 (2). The number of new diagnoses among heterosexuals and PWID in Ireland has been relatively stable since 2010.

National information on stage of infection improved in 2013, with information available for 88% of cases, up from 73% in 2012. Overall, the number of individuals that were diagnosed at a late stage of infection remains high: 50% were reported as late presenters compared with 48% in 2012 and 52% in 2011. The proportion diagnosed late varied by risk group and was highest among heterosexuals (59% in males and females), followed by 56% among PWID and 37% in MSM. The lower levels of late presentation in MSM are encouraging, and reflect on-going efforts in improving access to testing and promotion of testing in this risk group. However, in other risk groups, late presentation rates remain high. More emphasis on the benefits of early testing and ready access to HIV testing are needed to improve the proportions presenting late, which will not only benefit the individual detected early, but reduce the likelihood of transmission to others.

The detailed 2013 report and slide set are available at http://www.hpsc.ie/A-Z/HIVSTIs/HIVandAIDS/SurveillanceReports/ and weekly HIV and STI reports are available at http://www.hpsc.ie/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/STIWeeklyReports/

Note: CIDR information is updated on an on-going basis with the most up to date information available and so numbers reflect the date of extraction from CIDR. Data for this chapter were extracted from CIDR in May 2014.

Table 2: Number of new HIV diagnoses and rate by HSE area of residence, 2013

HSE Area	Number	Rate per 100,000
HSE E	236	14.6
HSE M	10	3.5
HSE MW	23	6.1
HSE NE	14	3.2
HSE NW	5	1.9
HSE SE	12	2.4
HSE S	33	5.0
HSE W	11	2.5
Total	**344**	**7.5**

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We would like to sincerely thank all who have contributed to this report including the National Virus Reference Laboratory (NVRL), Microbiology Laboratories, the Departments of Public Health, Consultants in Infectious Disease/GUM and all other clinicians involved. Data on paediatric infections were provided by the Infectious Disease Unit, Our Lady's Hospital for Children (OLHC), Crumlin.

5.4 Voluntary antenatal HIV testing in Ireland: 2013

Key Points

National reported uptake rate:	99.9% *
Number HIV positive cases:	83
Prevalence (%):	0.14%
Number new HIV positive cases	14
Prevalence of new HIV positive cases (%):	0.02%

* Returns not available for approximately 16% of antenatal women in 2013

This chapter describes data from the antenatal HIV screening programme in Ireland in 2013. Background information on the system and a copy of the HIV antenatal data collection form can be found at www.hpsc.ie/A-Z/HIVSTIs/HIVandAIDS/AntenatalHIVTesting/

Sixteen of the twenty maternity hospitals and units provided antenatal HIV screening data for 2013. Table 1 describes the data collected from maternity hospitals between 2007 and 2013. Table 2 describes the 2013 data by HSE area.

In 2013, the national reported uptake of HIV antenatal screening was 99.9%, ranging from 99% to 100% among participating hospitals. However, antenatal screening data were only available for 57,638 women in 2013. There were 68,930 births in 2013 and while these figures are not directly comparable, there is a shortfall in returns for approximately 16% of antenatal women. This is a higher figure than that seen in 2012 (10%). Data were not available from four hospitals (one with private patients only) and a further ten hospitals provided data on public patients only.

Eighty three women tested HIV positive at their antenatal screen, giving a HIV prevalence rate of 0.14%, slightly lower than the rate in 2011 and 2012 (0.16%). The prevalence of HIV infection among pregnant women varied among HSE areas, ranging from 0.09% in HSE South to 0.19% in HSE Dublin Northeast. Of the 83 HIV cases, 14 were newly diagnosed at their antenatal screen (i.e. HIV infection was not previously known). The prevalence of newly diagnosed HIV infection was 0.02% in 2013 which is slightly lower than the prevalence in 2010, 2011 and 2012 (0.03%).

Some hospitals can only provide estimates or proxy measures for the number of women booked and/or the number offered HIV testing. Booking data was retrieved from a variety of sources including maternity IT systems

Table 1: Results of the antenatal screening programme, 2007 to 2013

Parameter	2007	2008	2009	2010	2011	2012	2013
No. of hospitals participating	19/20	18/20	19/20	19/20	20/20	18/20	16/20
No. of live births per year (CSO)	71,389	75,173	75,554	75,174	74,650	72,225	68,930
No. of women booked	60,111	66,558	68,378	70,024	68,111	64,803	57,638
No. offered test	60,052	66,558	68,026	69,615	67,849	64,803	57,638
No. tested	59,522	66,210	67,694	69,292	67,135	64,781	57,618
Uptake of HIV antenatal test (%)	99.0	99.5	99.0	99.0	98.6	99.9	99.9
Number HIV positive	117	123	140	118	109	105	83
Prevalence (%)	0.20	0.19	0.21	0.17	0.16	0.16	0.14
No. newly diagnosed HIV positive	38	34	32	21	17	22	14
Prevalence of new diagnoses (%)	0.06	0.05	0.05	0.03	0.03	0.03	0.02

(6 hospitals), maternity unit manual data collection (6 hospitals), patient administrations systems (4 hospitals), and laboratory IT systems (3 hospitals).

Acknowledgements:
We would like to sincerely thank staff in the maternity hospital/units for all the effort involved in providing the antenatal screening data. We would also like to acknowledge the help of staff in the Department of Public Health in the Northwest and laboratory staff in Waterford Regional Hospital for collating their regional data

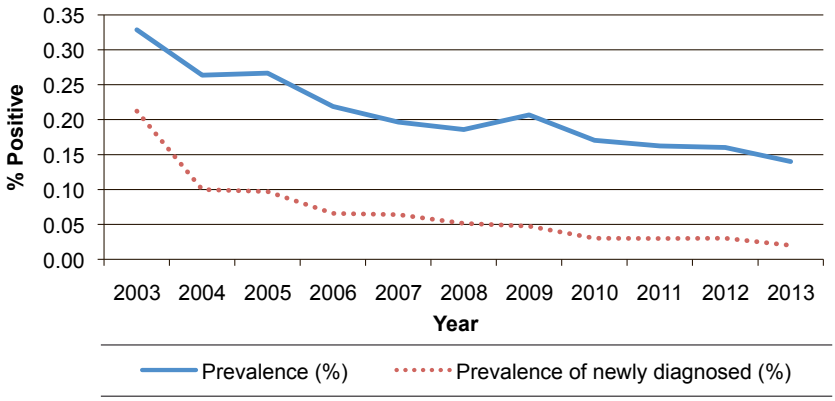

Figure 1: Prevalence of HIV and newly diagnosed HIV among pregnant women, 2002 to 2013

Technical Note:
- Percent uptake is calculated as the number of women tested divided by the number of women booked, multiplied by 100
- Prevalence of HIV infection is calculated as the number of women testing positive divided by the number of women tested, multiplied by 100

Table 2: Results of the antenatal screening programme by HSE area, 2013

HSE area	Number booked	Uptake of test (%)	Number HIV positive	Prevalence (%)	Number newly diagnosed positive	Prevalence of new diagnoses (%)
Dublin Mid Leinster	22,449	100.0	33	0.15	3	0.01
Dublin Northeast	16,233	100.0	31	0.19	6	0.04
South	11,035	100.0	10	0.09	2	0.02
West	7,921	99.7	9	0.11	3	0.04
Ireland	**57,638**	**99.9**	**83**	**0.14**	**14**	**0.02**

5.5 Sexually Transmitted Infections (STIs), 2013

Summary

Total number of STI cases in 2013: 12,753
Crude notification rate, 2013: 277.9/100,000
Most frequently reported STI in 2013: *Chlamydia trachomatis* infection (n=6,262)

During 2013, a total of 12,753 cases of sexually transmitted infections (STIs) were reported. The most frequently reported STIs were *Chlamydia trachomatis* infection (n=6,262), ano-genital warts (n=2,133), gonorrhoea (n=1,294) and non-specific urethritis (n=1,272; table 1). The burden of STIs is greatest among those aged less than 25 years and among men who have sex with men (MSM).

Chlamydia trachomatis infection

Chlamydia trachomatis infection was the most frequently reported STI. There were 6,262 notifications in 2013 giving a crude incidence rate (CIR) of 136.5 per 100,000. The rate has remained steady in recent years with rates of 139.6/100,000 and 134.3/100,000 reported in 2012 and 2011, respectively (figure 1).There were 17 cases of *Chlamydia trachomatis* infection in young children (<6 months); three-quarters of these were reported as conjunctivitis.

Gonorrhoea

Following an upsurge in 2012, notifications of gonorrhoea continued to rise in 2013. The CIR was 28.2/100,000 population in 2013, up from 24.2/100,000 in 2012. While the rates in HSE East stabilised, the CIR in most other HSE areas increased in 2013. This increase may reflect better surveillance data, with the inclusion of all laboratory diagnosed cases in the Computerised Infectious Disease Reporting (CIDR) system in 2013. Young heterosexuals and MSM were the groups most affected by the increase[1].

Ano-genital warts

During 2013, 2,133 cases of ano-genital warts were reported in Ireland giving a CIR of 46.5 per 100,000 population. This represents a slight increase from 2012 (43.2/100,000) (figure 1). The highest age-specific incidence rate was among those aged 20-24 years (196.8/100,000). The numbers reported here are likely to be an underestimate of the true incidence as data were not reported from every STI clinic. Further details on the completeness of reporting are available in the report *Ano-genital Warts in Ireland, 2013*, available on the HPSC website, www.hpsc.ie.

Table 1: Number, crude incidence rate (CIR) per 100,000 & median age of STIs, 2013

STI	Number	CIR	Median Age (range)
Chlamydia	6,262	136.5	25 yrs. (14 -81 yrs.)*
Ano-genital warts	2,133	46.5	NA
Gonorrhoea	1,294	28.2	26 yrs. (15 - 79 yrs.)**
Non-specific urethritis	1,272	27.7	NA
Herpes simplex (genital)	1,136	24.8	29 yrs. (14-75 yrs.)
Syphilis (all cases)	576	12.6	36 yrs. (19-83 yrs.)
Syphilis (early infectious)	172	3.7	33 yrs. (19-73 yrs.)
Trichomoniasis	75	1.6	33 yrs. (16-52 yrs.)
LGV	5	0.1	31 yrs. (27 -44 yrs.)
Total	**12,753**	**277.9**	**-**

*Excludes those <14 years; **Excludes those <15 years; NA: case-based data were not collected

Herpes simplex (genital)
There were 1,136 cases of herpes simplex (genital) notified in Ireland during 2013 corresponding to a CIR of 24.8 per 100,000 population, a small decrease from 2012 (28.9/100,000)(see figure 1). Most cases were reported as Herpes simplex virus (HSV) type 1 (45%) and 29% as HSV type 2; subtype was not reported for 26% of cases.

Trichomoniasis
During 2013 there were 75 cases of trichomoniasis notified in Ireland corresponding to a CIR of 1.6 per 100,000 population. While there were similar numbers of cases reported in the age groups 25-29 years, 30-34 years and 45-49 years, the highest age-specific rate was among those aged 45-49 years.

Lymphoganuloma venereum (LGV)
There were 5 cases of LGV reported in 2013 compared with 4 cases in 2012 and 2 in 2011. All cases were reported in HSE East in MSM, three of whom were reported as HIV positive.

Non-specific urethritis
At total of 1,272 cases of non-specific urethritis were reported in 2013 compared with 1,539 in 2012.

More detailed annual reports on STIs are available on the HPSC website at http://www.hpsc.ie/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/STIAnnualReports/. Weekly reports on STIs and HIV are available on the HPSC website at http://www.hpsc.ie/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/STIWeeklyReports/.

Data on syphilis, HIV and hepatitis B are presented elsewhere in this report.

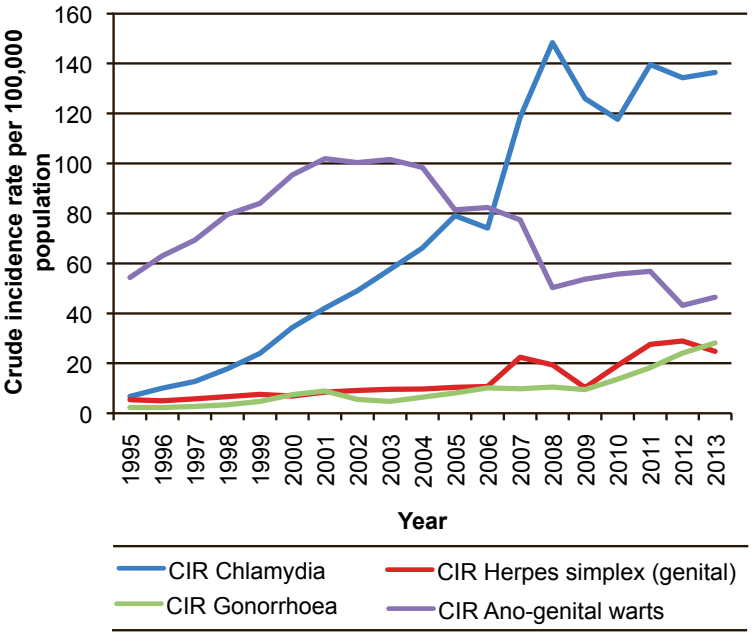

Figure 1: Trend in CIR per 100,000 population of selected STIs, 1995-2013

References

1. Fitzgerald M et al. Gonorrhoea in Ireland: men who have sex with men and young heterosexuals are most affected. ESCAIDE 2013:5-7 November 2013, Stockholm, Sweden.

Note: CIDR information is updated on an on-going basis with the most up to date information available and so numbers reflect the date of extraction from CIDR. Data for this chapter were extracted from CIDR in February (gonorrhoea), June (chlamydia, LGV) and July (chanroid, herpes simplex (genital), granuloma inguinale & trichomoniasis), 2014.

Acknowledgements
The Health Protection Surveillance Centre (HPSC) would like to thank all those who provided data for this report, particularly the STI clinics, the infectious disease surveillance staff within the departments of public health, the laboratories, and GP clinics.

5.6 Syphilis, 2013

Summary

Total number of syphilis notifications: 576
Number of early infectious syphilis cases: 172
Crude incidence rate of early infectious syphilis: 3.7/100,000 population
Number of congenital syphilis cases: 0

During 2013, there were 576 notifications of syphilis made via CIDR giving a crude incidence rate (CIR) in 2013 of 12.6 per 100,000 population. Rates of early syphilis have been steady since 2009 with a slight decrease in 2012 (figure 1). The rate for total cases in 2013 was 12.6 per 100,000 population and 3.7 per 100,000 for early cases.

Of the 576 notifications, 172 were early infectious syphilis (primary, secondary and early latent), 22 were late latent syphilis, 153 were latent cases of undetermined duration, 13 were of unknown stage and the stage of infection was not specified for the remaining 216 cases (table 1). No congenital syphilis cases were notified in 2013.

Of the 576 cases, 467 were in males, 105 were in females and sex was unknown for 4 cases. Of the 105 cases in women, 26 were pregnant at diagnosis.

Early infectious syphilis

Of the 172 early infectious cases notified in 2013:

- 92 (53.5%) were classified as primary, 45 (26.2%) as secondary syphilis and 35 (20.3%) as early latent (table 1).
- Rates varied throughout the country, with the rate (7.8 per 100,000) in HSE East (Dublin, Kildare and Wicklow) twice the national rate (3.7 per 100,000).
- The majority of cases occurred in males, with a male to female ratio of 16:1.
- The highest age specific rate was in 30-34 year olds (9.6 per 100,000 population) and the median age was 33 years (age range: 19-73 years) (table 2).
- More than three quarters of cases (78%) were identified in STI clinics, with 11% being diagnosed in general practice.
- Nearly two thirds (61.6%) of all cases occurred in men who have sex with men (MSM), with rates highest in the 30 to 34 year age group.
- The proportion of MSM who were co-infected with HIV at the time of their syphilis diagnosis continued to increase (33% in 2013 compared to 29% in 2012 and 21% in 2011).
- Thirteen percent of early infectious cases were among heterosexuals, 17% of whom were co-infected with HIV. There were no re-infections among heterosexuals.
- One of the 10 female heterosexual cases was pregnant at time of diagnosis (early latent syphilis).

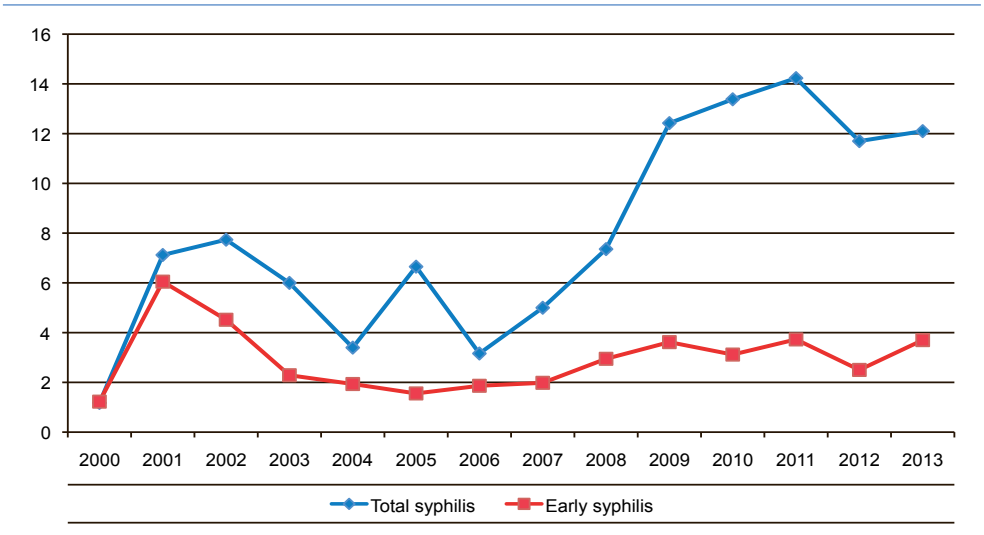

Figure 1: Crude incidence rate of total syphilis and early infectious syphilis (per 100,000 population), 2000-2013

Discussion

In 2013, the overall crude incidence rate of early syphilis increased to 3.7 per 100,000, the same rate as for 2011. For the first time in 2013 all laboratories uploaded syphilis data to CIDR and this could account for some of the increase seen over 2012.

The increase in early syphilis in 2013 was concentrated among men (94% of cases). The rate among men increased to 7.1 per 100,000 compared to 4.5/100,000 and 6.8/100,000 in 2012 and 2011, respectively. The rate among women continued to decline in 2013 with a rate of 0.4 per 100,000 compared to 0.5/100,000 and 0.7/100,000 in 2012 and 2011, respectively. As in previous years, these data demonstrate that MSM are disproportionately affected by early infectious syphilis (82% of cases where mode of transmission was known). This mirrors the pattern seen in UK[1] and the United States (US)[2].

The increase in the proportion of early syphilis cases (29%) co-infected with HIV is particularly concerning as co-infection increases the risk of transmitting HIV[3]. The proportion of co-infection was higher among MSM (33%) compared to heterosexuals (17%).

A more detailed analysis of syphilis in Ireland in 2013 is available in the report *Syphilis in Ireland, 2013*, which is available on the HPSC website www.hpsc.ie.

Note: CIDR information is updated on an on-going basis with the most up to date information available and so numbers reflect the date of extraction from CIDR. Data for this chapter were extracted from CIDR on 28th May, 2014.

References

1. Public Health England. *Table 3: Selected STI diagnoses & rates, by gender, sexual risk & age group, 2013*. Available at www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1215589014186. Accessed on 17th June, 2014.
2. Patton ME, Su JR, Nelson R, Weinstock H. Primary and secondary syphilis – United States, 2005-2013. *Morbidity and Mortality Weekly Report* 2014:63(18).
3. Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents. *Guidelines for the prevention & treatment of opportunistic infections in HIV-infected adults and adolescents: recommendations from the Centres for Disease Control and prevention, the National Institutes of Health and the HIV Medicine Association of the Infectious Diseases Society of America*. Available at http://aidsinfo.nih.gov/contentfiles/lvguidelines/adult_oi.pdf.

Acknowledgements

The Health Protection Surveillance Centre (HPSC) would like to thank all those who provided data for this report, particularly the STI clinics, and the infectious disease surveillance staff within the departments of public health, the laboratories and GPs clinics.

Table 1: Number of syphilis cases by HSE area and stage of infection, 2013

Stage of infection	HSE E	HSE M	HSE MW	HSE NE	HSE NW	HSE S	HSE SE	HSE W	Total
Congenital	0	0	0	0	0	0	0	0	0
Primary	72	1	4	0	1	7	2	5	92
Secondary	28	3	2	0	0	5	1	6	45
Early latent	27	2	1	1	1	0	2	1	35
Early syphilis	127	6	7	1	2	12	5	12	172
Late latent	8	0	2	0	0	10	1	1	22
Tertiary	0	0	0	0	0	0	0	0	0
Late syphilis	8	0	2	0	0	10	1	1	22
Latent of undetermined duration	136	1	3	0	0	3	5	5	153
Unknown	4	1	1	1	2	0	2	2	13
Not specified	164	3	2	14	1	27	1	4	216
All syphilis	**439**	**11**	**15**	**16**	**5**	**52**	**14**	**24**	**576**

Table 2: Summary of early infectious syphilis cases, 2011, 2012 and 2013

	2011		2012		2013	
	No.	%	No.	%	No.	%
Number of early infectious cases	171	-	116	-	172	-
Male	154	90.1	102	87.9	162	94.2
Men who have sex with men (MSM)	136	79.5	82	70.7	106	61.6
Heterosexuals	28	16.4	24	20.7	23	13.4
Unknown mode of transmission	7	4.1	10	8.6	43	25.0
Median age (years)	31		33		33	
Age Range (years)	18-70		19-68		19-73	

06

Other infections

6.1 Viral Encephalitis

Summary

Viral Encephalitis, not otherwise specified (NOS)
Number of cases 2013: 6
Number of cases 2012: 18
Number of cases 2011: 23
Crude incidence rate, 2011: 0.1/100,000

Encephalitis due to viruses not otherwise specified (NOS) are notifiable under the disease category 'viral encephalitis'. Details of viral encephalitis cases caused by other notifiable diseases, if any, are presented in other chapters in this report.

In 2013, only six cases of viral encephalitis (NOS) were notified in Ireland (0.1/100.000 population). This was 12 cases less than the 18 reported during the previous year (figure 1). One reason for the sharp reduction in numbers is attributable to the late notification of 15 cases from 2013 (based on their specimen dates) reported during weeks 4 to 7 in 2014 and which have been excluded from this summary analysis. It should also be noted however, that a recent paper has shown that there was underreporting of viral encephalitis notifications in Ireland between 2005 and 2008.[1]

There were twice as many viral encephalitis (NOS) cases among males (n=4), than females (n=2), a ratio of 2:1, which is the reverse of what was recorded in the previous year. Cases ranged in age from 18 months to 79 years with a median age of 61 years. Four of the six cases occurred in those aged between 54 and 79 years (figure 1, table 1).

Of the six cases reported in 2013, three were laboratory tested positive and case classified as confirmed, the remainder were classified as possible. Three of the confirmed cases had their causative organism identified, of which two were herpes simplex virus type 1 and one was human herpes virus type 6.

There were no reported deaths associated with viral encephalitis (NOS) in 2013, nor were there any imported cases in that year.

*Table 1. Number, age-specific incidence rates and proportion of viral encephalitis (NOS) cases by age group, Ireland, 2013**
** excludes the late notification of 15 cases in 2013 reported in early 2014*

	Causative pathogen					
Age Group	Herpes simplex virus	Human Herpes virus type 6	Not specified	Total	ASIR	% Proportion
<1	0	0	0	0	0.00	0.0
1-4	0	0	2	0	0.70	0.0
5-14	0	0	0	0	0.00	0.0
15-24	0	0	0	0	0.00	0.0
25-44	0	0	0	0	0.00	0.0
45-64	1	0	0	1	0.10	16.7
65+	1	1	1	2	0.56	33.3
All ages	2	1	3	6	0.13	100
% total cases	33.3	16.7	50.0	100		

ASIR, age specific incidence rate per 100,000 population of total cases

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 27th August, 2014. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

Reference

1. Kelly TA, O'Lorcain P, Moran J, Garvey P, McKeown P, Connell J, Cotter S. Underreporting of viral encephalitis and viral meningitis, Ireland, 2005-2008. Emerg Infect Dis. 2013;19(9):1428-36

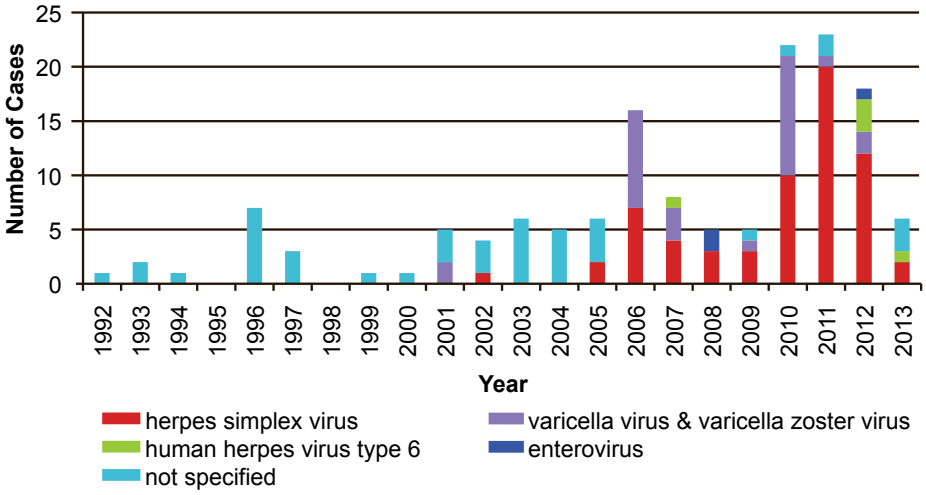

*Figure 1. Number of viral encephalitis (NOS) cases by age group and year, Ireland, 1992-2013**
** excludes the late notification of 15 cases in 2013 reported in early 2014*

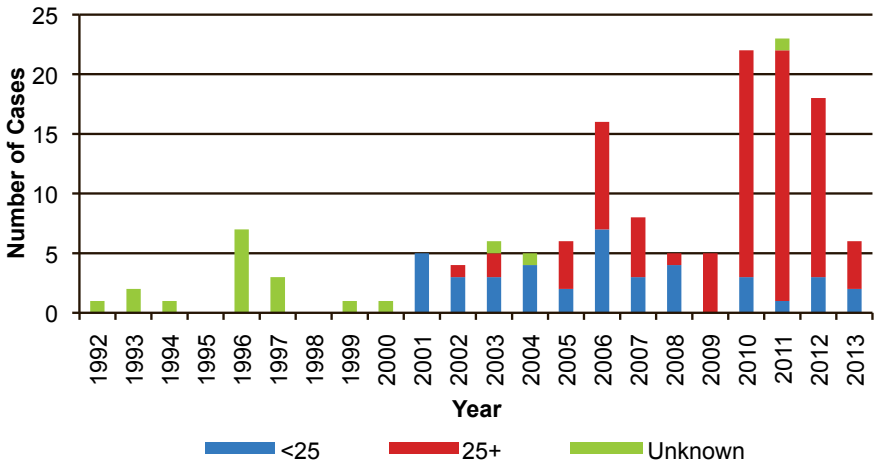

*Figure 2. Number of viral encephalitis (NOS) cases by causative pathogen and year, Ireland, 1992-2013**
** excludes the late notification of 15 cases in 2013 reported in early 2014*

6.2 Viral Meningitis

Summary

Viral Meningitis, not otherwise specified (NOS)
Number of cases 2013: 281
Number of cases 2012: 235
Number of cases 2011: 220
Crude incidence rate, 2013: 6.1/100,000

Meningitis due to viruses not otherwise specified (NOS) are notifiable under the disease category 'viral meningitis'. Details of viral meningitis caused by other specified notifiable diseases (such as mumps and influenza viruses, if any) are presented in other chapters in this report.

The sharp, steady increase in annual notifications which began in 2007 continued in 2013 when 281 were reported. The latter number is still less than the 300 cases notified back in 1990, the highest ever recorded in a single year (figure 1). However, a recent paper has shown that there was underreporting of viral meningitis notifications in Ireland between 2005 and 2008.[1] Also, the total number of cases reported in 2013 does not include the late notification of seven cases (based on their specimen dates) reported during weeks 5 and 6 of 2014.

Since 1997, only seven deaths have been reported with cases of viral meningitis (NOS), only one of which was attributable to the infection itself. There were none reported in 2013.

Of the 281 cases notified in 2013, 266 were classified as confirmed (94.7%), six as probable (2.1%) and nine as possible (3.2%). There were slightly more cases among males (n=142) than in females (n=132), giving a male to female ratio of 1.08:1.0. Seven cases were reported with unknown gender details in 2013.

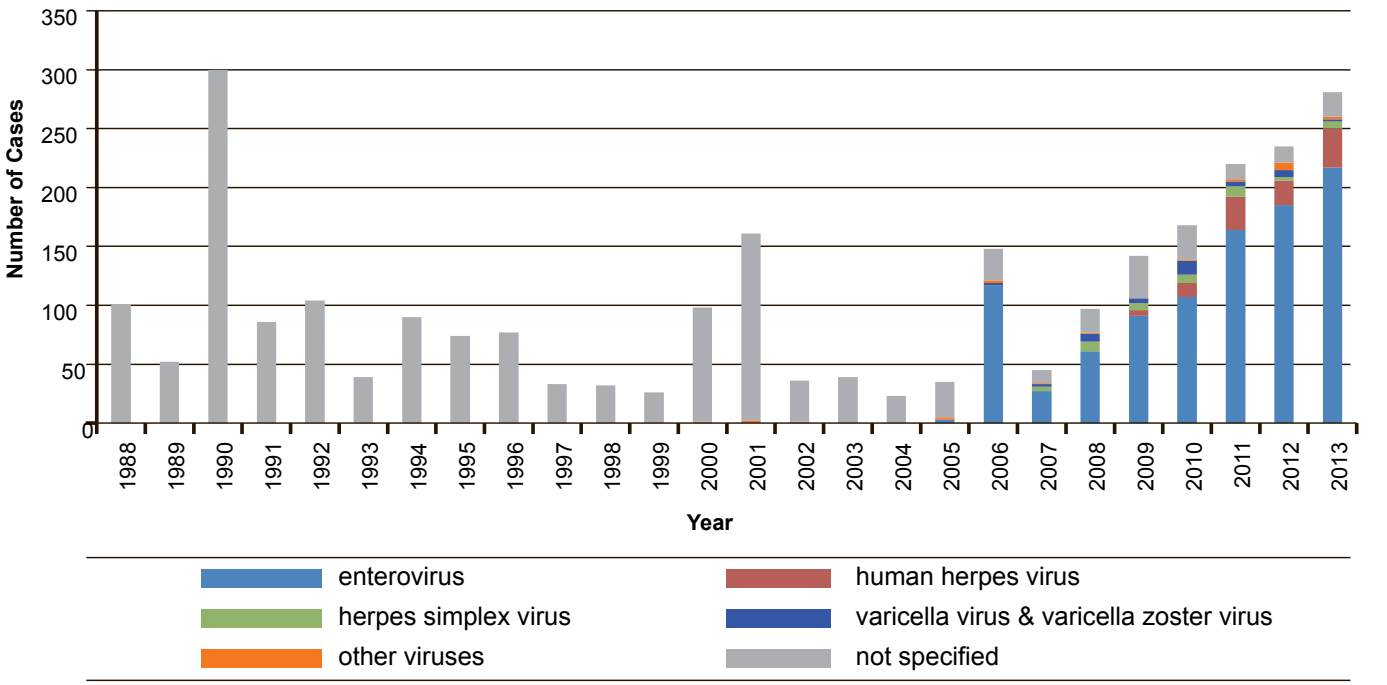

*Figure 1. Number of viral meningitis (NOS) cases by organism type and year, Ireland, 1988-2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

In 2013 the highest frequency of cases was in children aged 1 to 2 months (n=52) and in those aged between 15 to 39 years (n=113) with an overall median age of 13.6 years (range one week to 78 years) (figure 2). Over 67% of cases (n=189) occurred in those under 25 years of age (figure 3, table 1).

The highest age specific incidence rate (ASIR) in 2013 was in infants <1 year of age (165.7/100,000; n=120). The next highest ASIR was in the 20 to 24 year age group (9.5/100,000; n=27). The lowest rates were reported in the older age groups, 55 to 64 and 65+ years with rates of 0.4/100,000 (n=2) and 0.6/100,000 (n=3), respectively (table 1).

The national crude incidence rate in 2013 was 6.1 (95% CI 5.4–6.8) cases per 100,000 population, a 19.6% increase compared with the previous year when 235 cases were notified (5.1/100,000). The incidence rate in 2013 was highest in HSE W at 14.4/100,000 (95%CI 10.9–17.9) and lowest in HSE S at 2.3/100,000 (95%CI 1.1-3.4) with both rates significantly different from the national rate (figure 4).

In 2013, enteroviruses were the most common pathogen associated with viral meningitis, accounting for nearly 77.2% (n=217/281) of all notifications (figure 3, table 1). As a cause of viral meningitis, enteroviruses have accounted for more than 60% of all cases each year since 2008. In 2013, human herpes virus (type 6) (HHV) was the causative pathogen for 11.7% (n=33) notifications, herpes simplex virus (HSV) for 2.1% (n=6) with varicella virus/varicella zoster virus and echovirus each accounting for 0.7% (n=2 each) of cases (figure 3, table 1).

Enterovirus was also the most common pathogen in infants under one year of age with viral meningitis (NOS) in 2013 in 86 out of 120 cases (71.7%). Between 2007 and 2013 enteroviruses accounted for 71.7% (n=852/1188) of all viral meningitis (NOS) cases, with typical summer peaks observed each year (figure 5).

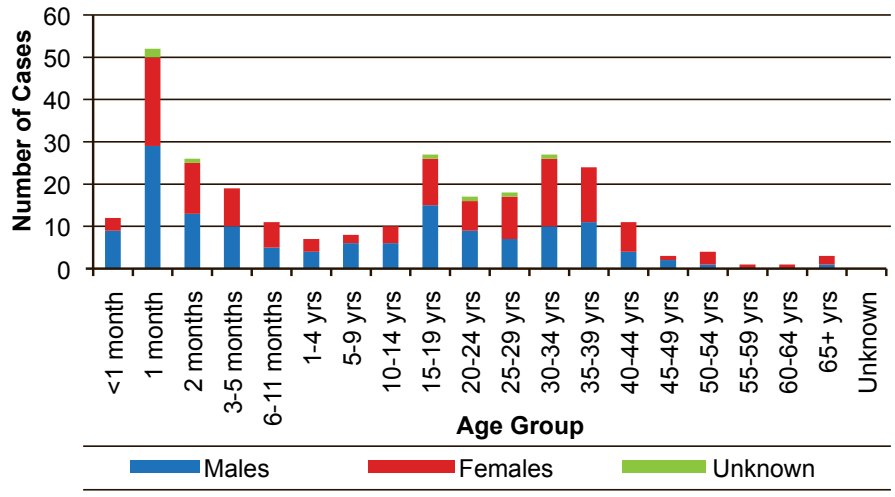

*Figure 2. Number of viral meningitis (NOS) cases by age group and gender, Ireland, 2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

*Table 1. Number, age-specific incidence rates and proportion of viral meningitis (NOS) notifications by age group and causative pathogen, Ireland, 2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

	Causative pathogen								
Age Group	entero-virus	human herpes virus	herpes simplex virus	varicella virus & varicella zoster virus	echo-virus	not specified	Total	ASIR	% Proportion
<1	86	28	0	0	0	6	120	165.7	42.7
1-4	2	4	0	0	0	1	7	2.5	2.5
5-9	6	1	0	0	0	1	8	2.5	2.8
10-14	9	0	0	0	0	1	10	3.3	3.6
15-19	23	0	0	0	1	3	27	9.5	9.6
20-24	13	0	0	0	1	3	17	5.7	6.0
25-34	39	0	3	0	0	3	45	6.0	16.0
35-44	32	0	0	1	0	2	35	5.0	12.5
45-54	4	0	1	1	0	1	7	1.2	2.5
55-64	2	0	0	0	0	0	2	0.4	0.7
65+	1	0	2	0	0	0	3	0.6	1.1
All Ages	217	33	6	2	2	21	281	6.1	100
% Total	77.2	11.7	2.1	0.7	0.7	7.5	100		

ASIR, age specific incidence rate per 100,000 population

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 27th August, 2014. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

Reference

1. Kelly TA, O'Lorcain P, Moran J, Garvey P, McKeown P, Connell J, Cotter S. Underreporting of viral encephalitis and viral meningitis, Ireland, 2005-2008. Emerg Infect Dis. 2013;19(9):1428-36

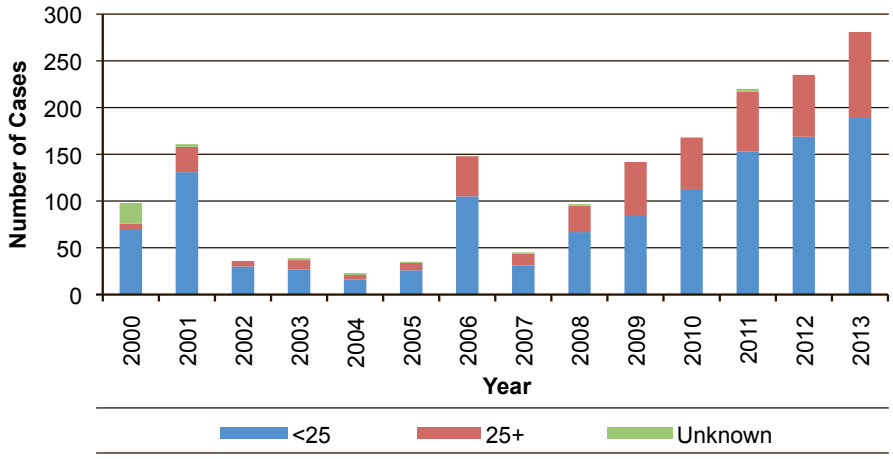

*Figure 3. Number of viral meningitis (NOS) cases by age group (<25, >25 years of age) and year, Ireland, 2000-2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

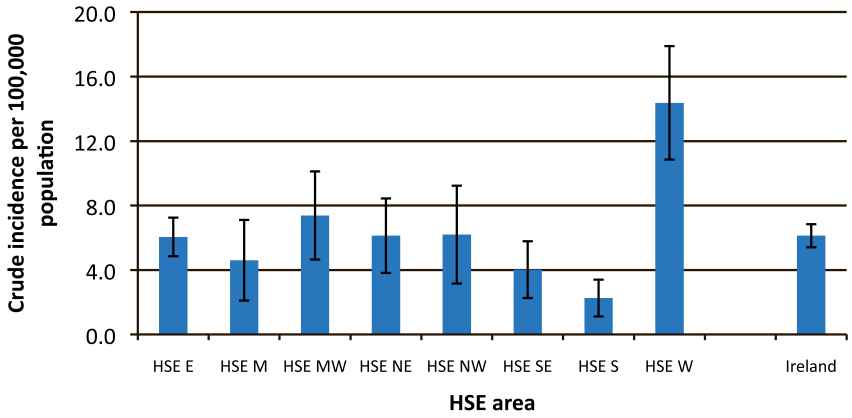

*Figure 4. Crude incidence rates per 100,000 population with 95% confidence intervals for viral meningitis (NOS) cases by HSE area, Ireland, 2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

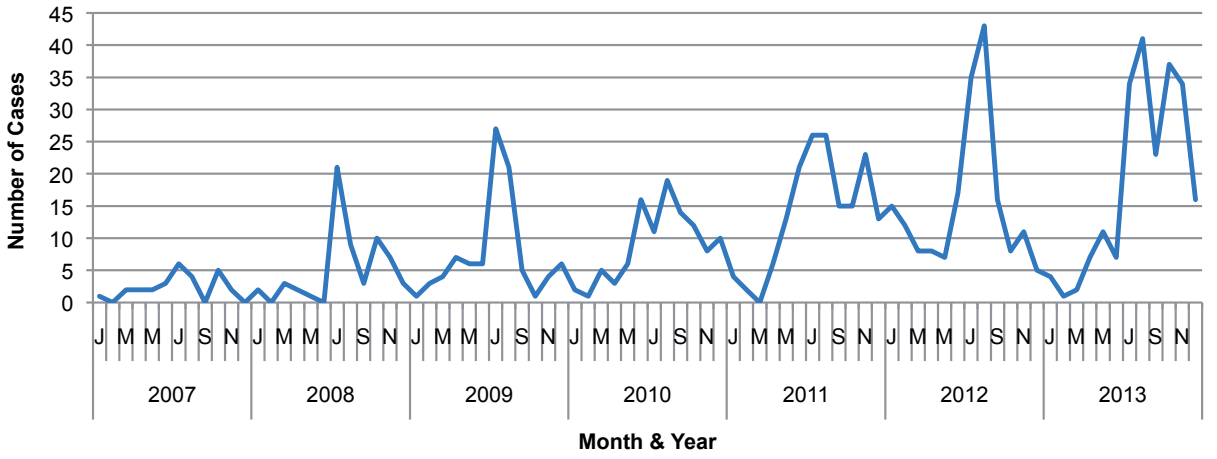

*Figure 5. Monthly number of enterovirus-related meningitis notifications, 2008-2013**
** excludes the late notification of seven cases in 2013 reported in early 2014*

6.3 Creutzfeldt-Jakob disease

Summary

Number of cases, 2013: 5
Number of cases, 2012: 5

Five cases of Creutzfeldt-Jakob disease (CJD) were notified in 2013, this is identical to 2012 when five cases were also notified. Four cases in 2013 were sporadic CJD cases and one was iatrogenic. One of the cases was in the age group 35-44 years, one was in the age group 45-54 years, two were in the age group 55-64 years and one was in the age group ≥65 years. Four cases were female and one was male.

In total, 68 cases of CJD were notified since CJD was first specified as a notifiable disease in December 1996 (figure 1). Figure 2 shows the 68 CJD notifications by age group. The majority (79%, n=54) of the cases were aged greater than 54 years. Of the 68 cases, 35 were male and 33 were female. Sixty-four cases were sporadic CJD, two were familial CJD and two were iatrogenic.

Variant CJD (vCJD) is specified as a separate notifiable disease. No cases have been notified since 2006. In total, four cases of vCJD were notified since vCJD became notifiable in December 1996. A summary of these four cases was provided in the 2006 HPSC annual report.

Data presented in this summary are based on notifications from HSE Areas and from the Irish National Creutzfeldt-Jakob Disease Surveillance Unit. Annual figures published here are based on the year the notification was entered on the Computerised Infectious Disease Reporting (CIDR) system and consequently may differ from annual figures published by the Irish National Creutzfeldt-Jakob Disease Surveillance Unit.

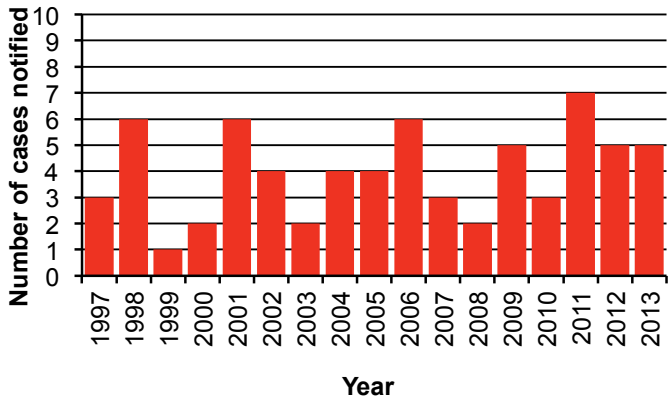

Figure 1. Number of CJD notifications by year from December 1996 to 2013

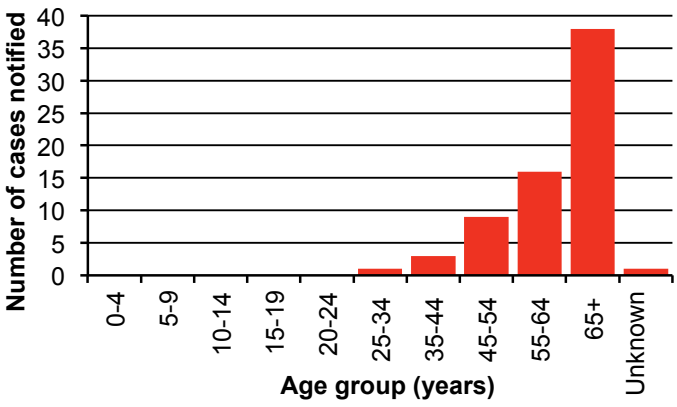

Figure 2. Number of CJD notifications (n=68) from December 1996 to 2013 by age group

6.4 Tetanus

Summary

Number of cases, 2013: 1
Number of cases, 2012: 1

One case of tetanus was notified in 2013. The case was in the age group 20-24 years and was classified as probable. The case was reported as having received one dose of a tetanus vaccine 20 years earlier but it was not known if the case had received any previous doses (ie primary tetanus vaccines as an infant). The risk factors for infection were reported as hand injuries from a can and a rusty nail.

Summary of case data since 1981:
Fourteen cases of tetanus were reported since tetanus became notifiable in November 1981. The number of tetanus cases notified by age group is shown in figure 1. Two deaths were reported, both cases were aged >60 years.

Of the 14 tetanus cases, eight (57%) were male, four (29%) were female while gender was unreported for two (14%).

The following wound injuries (n=10) were reported among the 14 notified cases: wound injuries from a road traffic accident (n=1), wound from a fall outdoors (n=1), wound associated with a dog bite (n=1), wound from a kitchen knife (n=1), gardening associated leg wound (n=1), leg scratches in an avid gardener (n=1), hand wound associated with a clean piece of wood (n=1), a farming associated hand wound (n=1), a foot wound from a thorn (n=1), and hand injuries from a can and a rusty nail (n=1).

Vaccination data were reported for five of the 14 cases. Two cases were unvaccinated. One case, in the age group 15-19 years, was reported to have received three doses of tetanus vaccine as a child and a booster at four years and again at five-six years of age. One case was reported to have received a single tetanus vaccine around 40 years prior to infection. One case was reported as having received one dose of a tetanus vaccine 20 years earlier but it was not known if the case had received any previous doses (ie primary tetanus vaccines as an infant).

Clinical efficacy after a complete series of vaccines is almost 100%. However, immunity wanes and after 10 years may be insufficient to provide protection. The childhood immunisation schedule in Ireland recommends children receive a dose of tetanus toxoid containing vaccine at two, four and six months of age

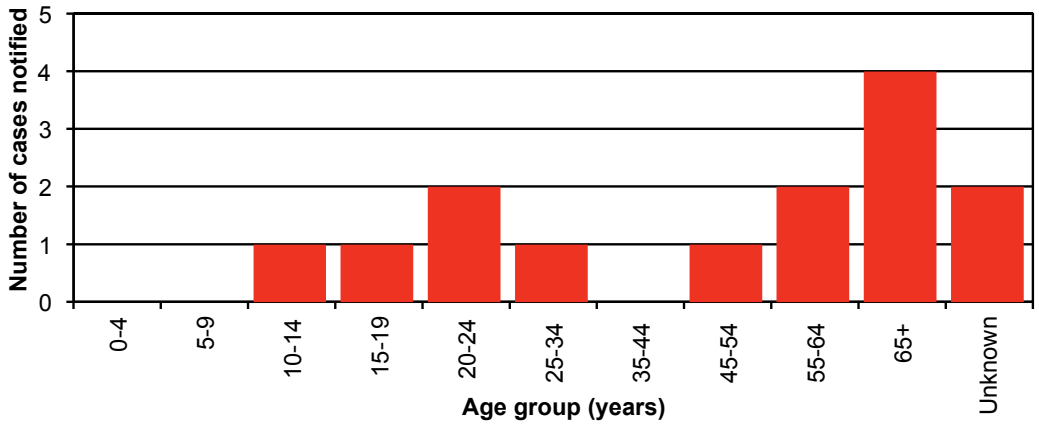

Figure 1. Tetanus cases notified (n=14) from November 1981 to 2013 by age group

and booster doses at four-five years of age and 11-14 years of age. For vaccinated persons who have received five doses of tetanus toxoid, booster doses may be considered every 10 years. This is based on concern regarding the decline of antibody levels with age and potential failure of single booster doses to produce protective levels in older individuals. For more detailed information on tetanus immunisations please see the document Immunisation Guidelines for Ireland available at www.immunisation.ie.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 12th September 2014. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

07

Infectious Disease Outbreaks

7. Outbreaks

Summary

Number of outbreaks:520
Number of IID outbreaks: 372
Number of non-IID outbreaks:148

During 2013, 520 outbreaks of infectious diseases were reported with 5,886 associated cases of illness, including 810 (13.8%) cases hospitalised and 32 deaths* Regional variation in outbreaks was observed between HSE areas with the highest rates observed in HSE-NW (25.9/100,000 population), while the lowest rate was observed in HSE-NE at 5.0 per 100,000 population. Table 1 details the regional distribution of all outbreaks of infectious disease, outbreaks of infectious intestinal disease (IID) and outbreaks of non-IID.

General outbreaks accounted for 69.4% (n= 361) of all outbreaks notified during 2013. The remaining outbreaks (30.6%, n= 159) were reported as family/ household outbreaks. Similar to previous years, person-to-person spread† was reported as the mode of transmission for the majority of outbreaks (65.6%, n=341). Most of these outbreaks were due to norovirus, acute infectious gastroenteritis (AIG), influenza/ influenza-like illness and verotoxigenic *E. coli* (VTEC).

The most frequently reported outbreak locations were private houses (n=138, 26.5%), residential institutions (n=106, 20.4%) and community hospital/ long-stay units (n=101, 19.4%). The highest numbers ill were reported from outbreaks in residential institutions (n=1,607), community hospital/long-stay units (n=1,424) and hospitals (n=1,408). Table 2 details the number of IID and non-IID outbreaks and numbers ill by outbreak location.

Infectious intestinal disease (IID) outbreaks:
During 2013, 372 IID outbreaks were reported, which was a decrease of 8.1% compared to the number of IID outbreaks reported during 2012 (n=405). However, the percentage of IID outbreaks as a proportion of total outbreaks remained stable at 71.5% when compared to recent years (78.0% in 2012 and 74.4% in 2011). The Table 3 details the regional distribution of outbreaks of infectious intestinal disease (IID).

Norovirus/ suspected viral outbreaks accounted for 54.8% of all IID outbreaks reported in 2013. Figure 1 compares norovirus/ suspected viral outbreaks with non-norovirus IID outbreaks by year from 2001 to 2013. Norovirus/ suspected norovirus was also responsible for four of the six largest outbreaks during 2013. Numbers ill ranged from two cases to 287 cases.

After noroviral infection (n=114), the next most commonly reported IID outbreaks were VTEC (n=96), AIG (n=90), and cryptosporidiosis (n=28). The number of general and family outbreaks of IID and numbers ill are outlined in Table 4.

Table 1: Number of outbreaks by HSE area, 2013

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths	Number of IID outbreaks	Number of Non-IID outbreaks
HSE-E	119	7.3	2,546	434	9	66	53
HSE-M	42	14.9	277	22	6	35	7
HSE-MW	52	13.7	222	61	0	44	8
HSE-NE	22	5.0	188	34	5	17	5
HSE-NW	67	25.9	560	58	0	43	24
HSE-SE	67	13.5	747	35	3	54	13
HSE-S	70	10.5	654	28	7	48	22
HSE-W	74	16.6	610	102	2	58	16
HPSC	7	-	82	36	0	7	0
Total	520	11.3	5,886	810	32	372	148

*Outbreak data extracted from CIDR on 22/09/2014.
† Including 78 outbreaks reported as person to person

Table 2: Number of IID and non-IID outbreaks and number ill by outbreak location, 2013

Outbreak location	IID		Non-IID		Total outbreaks	
	Number of outbreaks	Number ill	Number of outbreaks	Number ill	Number of outbreaks	Number ill
Comm. hosp/long-stay unit	62	776	39	648	**101**	**1,424**
Community outbreak	16	152	4	17	**20**	**169**
Crèche	7	25	3	13	**10**	**38**
Extended family	8	26	6	26	**14**	**52**
Hospital	50	1,065	10	343	**60**	**1,408**
Hotel	7	190	0	0	**7**	**190**
Nursing home	18	261	2	13	**20**	**274**
Other	10	57	4	21	**14**	**78**
Private house	119	229	19	44	**138**	**273**
Public house	1	17	0	0	**1**	**17**
Residential institution	61	945	45	662	**106**	**1,607**
Restaurant / cafe	2	86	0	0	**2**	**86**
School	3	106	11	120	**14**	**226**
Travel related	3	7	2	7	**5**	**14**
University/college	0	0	2	5	**2**	**5**
Workplace	0	0	1	3	**1**	**3**
Unknown	3	12	0	0	**3**	**12**
Not specified	2	10	0	0	**2**	**10**
Total	372	3,964	148	1,922	520	5,886

Table 3: IID outbreak summary by HSE area 2013

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	66	4.1	1,580	401	0
HSE-M	35	12.4	121	11	0
HSE-MW	44	11.6	180	40	0
HSE-NE	17	3.9	144	28	1
HSE-NW	43	16.6	361	39	0
HSE-SE	54	10.9	590	21	2
HSE-S	48	7.2	461	8	2
HSE-W	58	13.0	445	71	0
HPSC	7	-	82	36	0
Total	372	8.1	3,964	655	5

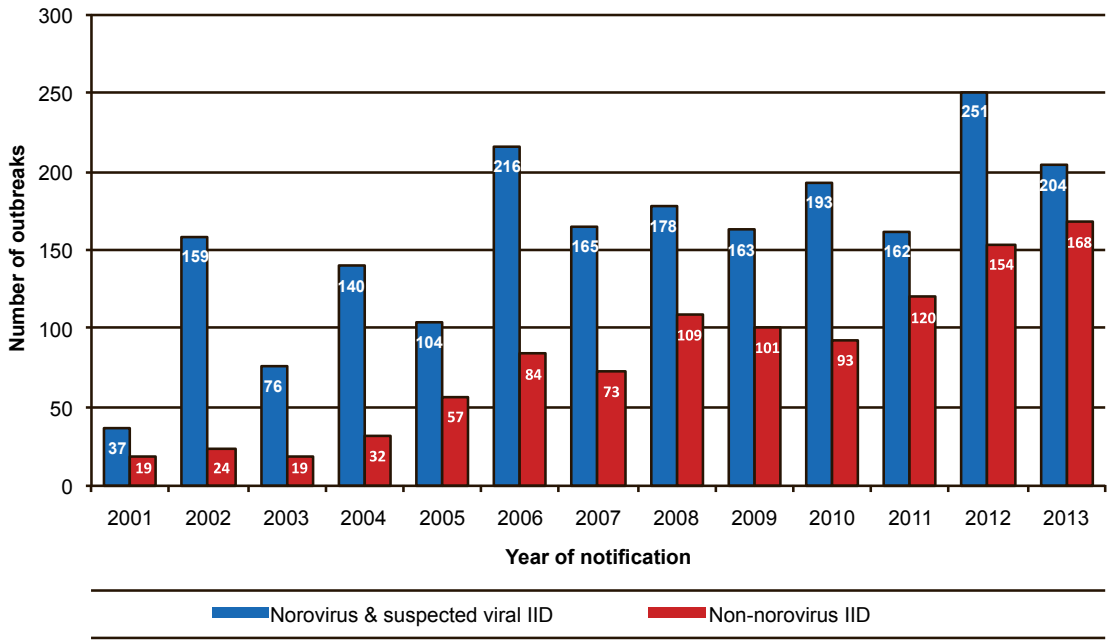

Figure 1: Number of norovirus/suspected viral outbreaks[§] and number of non-norovirus IID outbreaks by year, 2001-2013

[§] Includes all norovirus outbreaks and AIG outbreaks where organism was suspected norovirus, suspected viral or not specified

Table 4: Number of general and family IID outbreaks by disease, 2013

Outbreak disease/pathogen	Family outbreak		General outbreak		Total IID outbreaks	
	Number of outbreaks	Number ill	Number of outbreaks	Number ill	Number of outbreaks	Number ill
AIG (unspecified)	1	7	89	1,017	**90**	**1,024**
Campylobacter infection	6	14	1	2	**7**	**16**
C. difficile infection	0	0	5	28	**5**	**28**
Cryptosporidiosis	22	55	6	38	**28**	**93**
Giardiasis	2	4	0	0	**2**	**4**
Hepatitis A (acute)	2	5	4	35	**6**	**40**
Noroviral infection	4	151	110	2,310	**114**	**2,461**
Rotavirus infection	1	2	0	0	**1**	**2**
Salmonellosis	10	26	8	30	**18**	**56**
Shigellosis	3	8	1	9	**4**	**17**
VTEC infection	80	133	16	88	**96**	**221**
Yersiniosis	1	2	0	0	**1**	**2**
Total	132	407	240	3,557	372	3,964

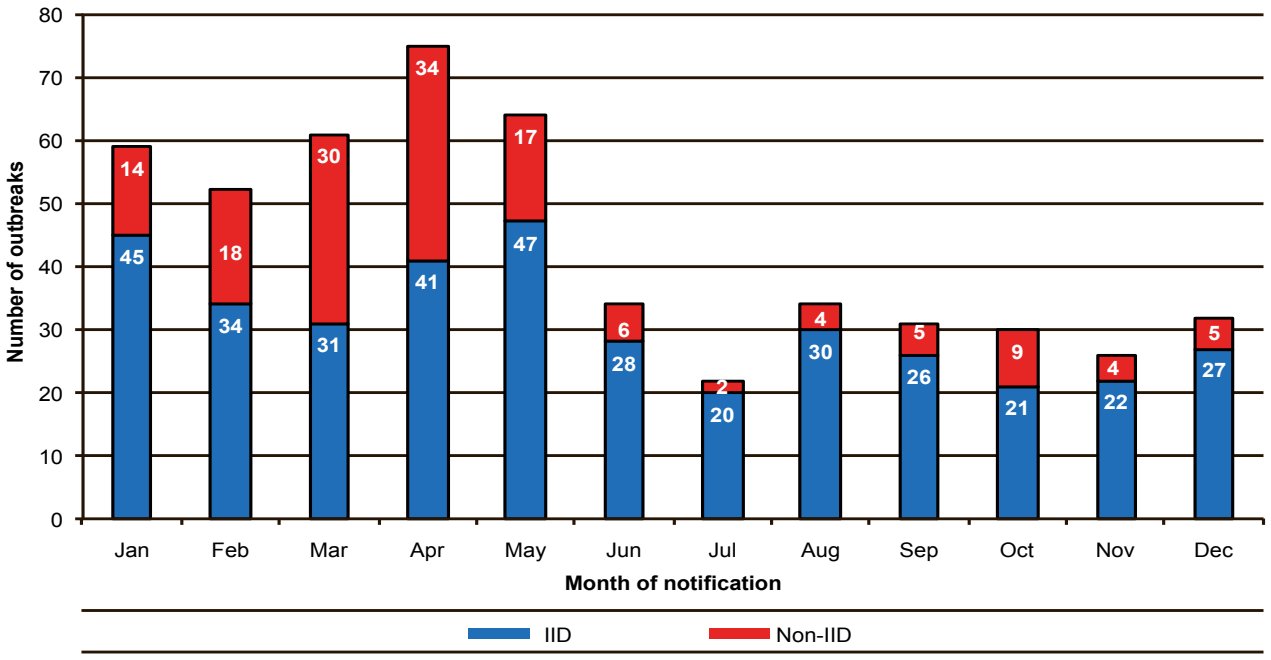

Figure 2: Number of IID and non-IID outbreaks by month of notification, 2013

Table 5: Non-IID outbreak summary by HSE area, 2013

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	53	3.3	966	33	9
HSE-M	7	2.5	156	11	6
HSE-MW	8	2.1	42	21	0
HSE-NE	5	0.0	44	6	4
HSE-NW	24	9.3	199	19	0
HSE-SE	13	2.6	157	14	1
HSE-S	22	3.3	193	20	5
HSE-W	16	3.6	165	31	2
Total	148	3.2	1,922	155	27

Table 6: Number of family and general non–IID outbreaks by disease, 2013

Outbreak disease/pathogen	Family outbreak		General outbreak		Total Non-IID outbreaks	
	Number outbreaks	Number ill	Number outbreaks	Number ill	Number outbreaks	Number ill
Influenza	0	0	64	1,391	**64**	**1,391**
Tuberculosis	6	18	6	23	**12**	**41**
Pertussis	9	25	1	3	**10**	**28**
Influenza-like illness	0	0	10	126	**10**	**126**
Parvovirus/ suspected parvovirus	1	3	6	35	**7**	**38**
Mumps	2	4	3	7	**5**	**11**
Acute respiratory illness	0	0	5	44	**5**	**44**
Measles	2	4	2	29	**4**	**33**
Viral meningitis	2	4	2	6	**4**	**10**
Parainfluenza	0	0	4	48	**4**	**48**
Respiratory syncytial virus infection	2	4	1	15	**3**	**19**
Human metapneumovirus	0	0	3	65	**3**	**65**
ESBL *E. coli*	0	0	3	8	**3**	**8**
Streptococcus group A infection (invasive)	1	2	1	2	**2**	**4**
Suspected Scabies	0	0	2	14	**2**	**14**
Pseudomonas/ P. aeruginosa	0	0	2	2	**2**	**2**
Meningococcal disease	1	2	0	0	**1**	**2**
Malaria	1	5	0	0	**1**	**5**
Carbapenem-resistant Enterobacteriaceae infection (invasive)	0	0	1	2	**1**	**2**
CFR positive linezolid resistant *Staphylococcus epidermidis*	0	0	1	2	**1**	**2**
Varicella	0	0	1	8	**1**	**8**
Human metapneumovirus & parainfluenza	0	0	1	15	**1**	**15**
Hand foot and mouth disease	0	0	1	3	**1**	**3**
Streptococcus Group A	0	0	1	3	**1**	**3**
Total	27	71	121	1,851	148	1,922

The most frequently reported locations for IID outbreaks were private houses (n=119), community hospital/long stay facilities (n=62) and residential institutions (n=61). The most commonly reported outbreaks in private houses were VTEC (n=77) and cryptosporidiosis (n=22). In community hospital/long stay facilities the most commonly reported outbreaks were AIG (n=33) and noroviral infection (n=26). In residential institutions the most commonly reported outbreaks were norovirus (n=35) and AIG (n=26).

Person-to-person (P-P) spread[‡] was the most frequently reported mode of transmission implicated in IID outbreaks during 2013 (62.6%, n=233).

During 2013, the number of IID outbreaks peaked between March and May. This peak observed was mainly due to high numbers of norovirus/ suspected norovirus and VTEC outbreaks. Figure 2 illustrates the number of IID and non-IID outbreaks by month of notification during 2013.

Non-IID outbreaks:
During 2013, 148 outbreaks of non-IID diseases were reported, representing 28.5% of all outbreaks notified nationally. The most common non-IID outbreak diseases were influenza/ influenza-like illness (50.0%, n=74), tuberculosis (8.1%, n=12) and pertussis (6.8%, n=10). Table 5 details the regional distribution of non-IID outbreaks while the number of general and family outbreaks of non-IID disease and numbers ill are outlined in Table 6.

The number of non-IID outbreaks peaked during March and April 2013. Both peaks were mainly due to influenza, influenza-like illness (ILI) and acute respiratory outbreaks (figure 2).

The most frequently reported locations for non-IID outbreaks were residential institutions (n=45), community hospital/long-stay units (n=39) and private houses (n=19), as shown in table 2. Non-IID outbreaks in these locations were most frequently caused by influenza/ILI, acute respiratory outbreaks and pertussis. Person-to-person (P-P) spread** was the most frequently reported mode of transmission implicated in non-IID outbreaks during 2013 (73.0%, n=108).

The information gathered from outbreaks reported is used to inform public health professionals on the causes and factors contributing to outbreaks, to target prevention strategies and to monitor the effectiveness of prevention programmes. For further information on disease specific outbreaks, please refer to the individual disease chapter.

[‡]Including 40 IID outbreaks reported as person to person and airborne transmission and 8 reported as person-to-person and animal transmission.

**Including 38 non-IID outbreaks reported as person to person and airborne transmission

08

Immunisation Uptake

8.1 Immunisation uptake at 12 and 24 months of age

Summary

Among children 12 months of age in 2013 uptake of: D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 were 91%

Among children 24 months of age in 2013 uptake of: D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ reached or exceeded the target of 95%
D_3, T_3, P_3 and $Polio_3$ were 96%
Hib_3 and $HepB_3$ were 95%
MMR_1 was 93%
PCV_3 was 91%
Hib_b was 90%
$MenC_3$ was 87%

The childhood immunisation schedule is shown in table 1. Five GP visits are required to ensure children receive all their recommended doses of vaccine.

In 2013, the HSE Areas provided HPSC with quarterly immunisation uptake data for their Area and for each of the Local Health Offices (LHOs) in their Area. HPSC collated these data and quarterly reports were produced which are available on the HPSC website. The annual immunisation uptake rates presented here represent the collation of the 2013 quarterly data. The proportion of children who completed the recommended childhood immunisation schedule by 12 months (born between 01/01/2012 and 31/12/2012) and 24 months (born between 01/01/2011 and 31/12/2011) of age in 2013 are reported.

Since September 1st 2008 the new primary childhood immunisation schedule has been implemented for children born on or after July 1st 2008 (table 1). These children should receive one dose of vaccine against tuberculosis (BCG vaccine) at birth or by one month of age; three doses of vaccines against diphtheria (D_3), tetanus (T_3), pertussis (P_3), *Haemophilus influenzae* type b (Hib_3), polio ($Polio_3$) and Hepatitis B ($HepB_3$) with one dose of each given at two, four and six months of age; three doses of pneumococcal conjugate vaccine (PCV_3) given at two, six and 12 months of age and three doses of meningococcal group C ($MenC_3$) vaccine given at four, six and 13 months of age. Also at 12 months of age a dose of MMR (MMR_1) is recommended and at 13 months a dose of Hib (Hib_b) is recommended. Further vaccinations are recommended for older children and adults; please see www.immunisation.ie for complete information on the Irish immunisation schedule.

In children who reached 12 months of age in 2013 (born between 01/01/2012 and 31/12/2012) uptake of BCG, D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$ and two doses of PCV (PCV_2) and MenC ($MenC_2$) were measured. In children who reached 24 months of age in 2013 (born between

Table 1. Change in primary childhood immunisation schedule (introduced on September 1st 2008)

Age	Children born before 01/07/2008	Children born on or after 01/07/2008
Birth	BCG	BCG
2 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + PCV
4 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + MenC
6 months	DTaP/Hib/IPV (5 in 1) + MenC	DTaP/Hib/IPV/HepB (6 in 1) + PCV + MenC
12 months	MMR + Hib	MMR + PCV
13 months	-	MenC + Hib

Please see www.immunisation.ie for complete information on the Irish childhood immunisation schedule including vaccinations for older children and adults

BCG	Bacille Calmette Guerin vaccine
DTaP	Diphtheria, Tetanus and acellular Pertussis vaccine
HepB	Hepatitis B vaccine
Hib	*Haemophilus influenzae* type b vaccine
IPV	Inactivated Polio Virus vaccine
MenC	Meningococcal group C vaccine
MMR	Measles, Mumps and Rubella vaccine
PCV	Pneumococcal Conjugate Vaccine

01/01/2011 and 31/12/2011) uptake of D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_3$, PCV_3, MMR_1, Hib_b, one dose of vaccine against meningococcal group C ($MenC_b$) on or after twelve months of age and one dose of vaccine against pneumococcal conjugate vaccine (PCV_b) on or after twelve months of age were measured.

The immunisation uptake rates are reported here by HSE Area and LHO. While there are 32 LHOs the immunisation uptake rates for the LHOs of North Lee and South Lee are reported as a combined figure.

Caveats to data

BCG uptake data at 12 months has been incomplete since reporting to HPSC began in Quarter 3 2003. This has occurred due to differences in implementation of a neonatal BCG programme across the HSE Areas as well as difficulties in providing these data to the HPSC where the programme was implemented. Prior to the establishment of the HSE each former health board determined their own BCG vaccination policy and some areas (Western and parts of the Southern Health Boards) stopped routine neonatal BCG vaccination but provided BCG vaccination for adolescents or high risk groups. The neonatal programme has now been routinely implemented for all neonates in most, but not all, HSE areas. Additionally more complete data on neonatal BCG vaccination is now available. However, in the HSE NE, where a neonatal programme is implemented, data is not available for reporting. In the HSE W the neonatal programme is not routinely or comprehensively implemented in all LHOs. Therefore, data provided for the HSE W reflects BCG vaccination for just a small proportion of all babies born in this area.

Data for 2013 are presented in this report and compared to 2012 data. Not all HSE Areas were able to provide data during 2012 and 2013. BCG uptake data were available for the HSE M, HSE MW, HSE NW, HSE SE, HSE S and HSE W Areas in Quarters 1-4 2012 and for all Areas except the HSE NE during 2013. The available national BCG cohort data may be around 52% of the national birth cohort in 2012 and 90% in 2013 (these figures are estimates only). In the HSE W BCG data were not available by LHO.

As uptake of $MenC_3$ and Hib_b were low since Q3 2010 and as those over 12 months need only one dose of MenC and those aged 12-23 months need only one dose of PCV, data on $MenC_b$ (one dose of MenC on or after twelve months of age) and PCV_b (one dose of PCV on or after twelve months of age) were requested in 2012 for the first time. Six HSE Areas (HSE E, M, MW, NW, SE and S) were able to provide data representing approximately 81% of the national birth cohort in 2012 and 80% in 2013 (these figures are estimates only).

Immunisation uptake rates at 12 months

National immunisation uptake rates, in children 12 months of age in 2013, were 91% for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 (table 2). Compared with 2012, the uptake rates for D_3, P_3, T_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 were unchanged.

The available 2013 BCG cohort data may be around 90% (estimate only) of the national birth cohort; based on these data BCG uptake was 86%. In contrast, the available 2012 BCG cohort data may be around 52% (estimate only) of the national birth cohort; based on these data BCG uptake in 2012 was 80%.

Among the HSE Areas, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 90% to 95% and $MenC_2$ and PCV_2 ranged from 87% to 95% (table 2). Among the LHOs, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$, PCV_2 and $MenC_2$ ranged from 82% to 97% and $HepB_3$ ranged from 82% to 96% (table 3). The target uptake of 95% was reached or exceeded in Laois/Offaly, Longford/Westmeath and Roscommon for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 and in Donegal for D_3, T_3, P_3, $Polio_3$ and PCV_2 (table 3). The target uptake of 95% was reached or exceeded for BCG in 14 LHOs reporting data (table 3).

Immunisation uptake rates at 24 months

National annual immunisation uptake rates, in children 24 months of age in 2013 were 96% for D_3, T_3, P_3 and $Polio_3$, 95% for Hib_3 and $HepB_3$, 93% for MMR_1, 91% for PCV_3, 90% for Hib_b and 87% for $MenC_3$ (table 2). This is the third year national annual uptake rates reached the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$. Compared with 2012, the uptake rates for D_3, T_3, P_3, Hib_b, $Polio_3$ and MMR_1 increased by one percent, $MenC_3$ increased by two percent while Hib_3, $HepB_3$ and PCV_3 were unchanged (figure 1).

Table 2. Annual immunisation uptake rates (based on available data) by HSE Area for children 12 and 24 months of age in 2013

	% Uptake at 12 months Cohort born 01/01/2012 - 31/12/2012					% Uptake at 24 months Cohort born 01/01/2011 - 31/12/2011								
	D_3	$HepB_3$	$MenC_2$	PCV_2	BCG	D_3	Hib_3	Hib_b	$HepB_3$	$MenC_3$	$MenC_b$	PCV_3	PCV_b	MMR_1
HSE E	90	90	90	90	94	95	95	89	95	86	89	91	93	92
HSE M	95	95	95	95	96	98	98	98	98	91	93	94	96	96
HSE MW	93	93	93	93	97	96	96	92	96	89	92	93	94	94
HSE NE	90	90	90	90	na	94	94	86	94	84	na	89	na	90
HSE NW	94	94	94	94	96	97	97	94	96	88	94	91	95	95
HSE SE	92	92	92	93	96	96	96	96	96	90	94	94	95	95
HSE S	90	89	87	87	93	96	95	83	94	84	87	90	91	92
HSE W	93	93	92	93	13	96	96	91	95	87	na	92	na	92
Ireland	**91**	**91**	**91**	**91**	**86**	**96**	**95**	**90**	**95**	**87**	**90**	**91**	**93**	**93**

na=not available

Since T_3, P_3, and $Polio_3$ uptake at 12 and 24 months and Hib_3 uptake at 12 months are identical to D_3 uptake only D_3 uptake figures presented

Table 3. Immunisation uptake (%) at 12 months of age in 2013 (i.e. cohort born 01/01/2012-31/12/2012) by LHO and HSE Area

HSE Area	Local Health Office/HSE Area	Number in cohort for BCG *	Number in cohort for D_3, T_3 & P_3 †	Immunisation Uptake (%)					
				BCG	D_3	Hib_3	$HepB_3$	$MenC_2$	PCV_2
HSE E	Dublin South	1780	1780	92	92	92	92	91	92
	Dublin South East	1673	1673	93	90	90	90	90	90
	Dublin South City	1791	1791	92	93	93	93	93	94
	Dublin South West	2663	2663	96	93	93	93	93	94
	Dublin West	2929	2929	93	93	93	93	93	93
	Dublin North West	3971	3971	93	82	82	82	82	82
	Dublin North Central	1903	1903	93	89	89	89	89	90
	Dublin North	4346	4346	95	91	91	91	91	91
	Kildare/West Wicklow	3959	3959	96	92	92	92	92	92
	Wicklow	1943	1943	93	91	91	91	90	91
	HSE E Total	**26958**	**26958**	**94**	**90**	**90**	**90**	**90**	**90**
HSE M	Laois/Offaly	2583	2583	96	95	95	95	95	95
	Longford/Westmeath	2078	2078	96	96	96	96	96	96
	HSE M Total	**4661**	**4661**	**96**	**95**	**95**	**95**	**95**	**95**
HSE MW	Clare	1721	1747	97	94	94	94	94	94
	Limerick	1899	1955	98	92	92	92	92	92
	Tipperary NR/East Limerick	1812	1849	97	94	94	94	94	94
	HSE MW Total	**5432**	**5551**	**97**	**93**	**93**	**93**	**93**	**93**
HSE NE	Cavan/Monaghan	na	2012	na	91	91	91	92	92
	Louth	na	1978	na	89	89	89	90	90
	Meath	na	3377	na	89	89	89	89	89
	HSE NE Total	**na**	**7367**	**na**	**90**	**90**	**90**	**90**	**90**
HSE NW	Donegal	2195	2195	95	95	94	94	94	95
	Sligo/Leitrim	1431	1431	96	94	94	94	93	94
	HSE NW Total	**3626**	**3626**	**96**	**94**	**94**	**94**	**94**	**94**
HSE SE	Carlow/Kilkenny	1988	1988	96	92	92	92	92	92
	South Tipperary	1290	1290	98	93	93	93	93	93
	Waterford	1908	1908	95	93	93	93	93	93
	Wexford	2197	2197	96	92	92	92	92	92
	HSE SE Total	**7383**	**7383**	**96**	**92**	**92**	**92**	**92**	**93**
HSE S	North Cork	1585	1544	92	91	91	90	88	88
	North South Lee	5863	5759	94	89	89	89	87	87
	West Cork	784	780	92	88	88	88	85	85
	Kerry	1997	1968	93	92	92	92	90	89
	HSE S Total	**10229**	**10051**	**93**	**90**	**90**	**89**	**87**	**87**
HSE W	Galway	na	3889	na	93	93	93	93	93
	Mayo	na	1734	na	90	90	90	90	91
	Roscommon	na	884	na	97	97	96	97	97
	HSE W Total	**6507***	**6507**	**13***	**93**	**93**	**93**	**92**	**93**
Ireland		**64796**	**72104**	**86**	**91**	**91**	**91**	**91**	**91**

na=not available
* HSE W BCG data were not available by LHO
†As the denominator/number in cohort varied slightly according to vaccine the most commonly used number is reported here
Since T_3, P_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 uptake figures are presented
Please note while North Lee and South Lee are two separate Local Health Offices their combined immunisation uptake data are reported here

Six of the eight HSE Areas were able to provide uptake data on $MenC_b$ (one dose of MenC at ≥12 months of age) and PCV_b (one dose of PCV at ≥12 months of age) in 2013. These Areas cover approximately 80% of the national birth cohort. Where data were available, national uptake was 90% for $MenC_b$ and 93% for PCV_b.

Since September 1st 2008 the new primary childhood immunisation schedule has been implemented for children born on or after July 1st 2008 (table 1); children who were 24 months of age in Quarter 3 2010 were born between July 1st and September 31st 2008 and were the first children recommended the new immunisation schedule. Under the new immunisation schedule children are now recommended HepB vaccine and PCV. In addition, there is a change in timing of the MenC and Hib_b vaccines (table 1). The changes to the schedule mean that three injections (6 in 1, PCV and MenC vaccines) are now recommended at six months of age and two GP visits are required on or after 12 months; the first dose of MMR and the third dose of PCV should be given at 12 months of age and at 13 months of age the third dose of MenC vaccine and Hib_b should be given (table 1). $MenC_3$ uptake was 93% in Quarter 1 2010 but declined to 80% in Quarter 3 2010 and was 82% in Quarter 4 2010 (figure 2). During 2011 and 2012, $MenC_3$ increased from 83% in Quarters 1 and 2 2011 to 87% in Quarter 4 2012. During 2013, $MenC_3$ uptake was 86% during Quarters 1-3 and was 88% in Quarter 4. Hib_b was 87% in Quarters 1 and 2 2010 but declined to 84% in Quarters 3 and 4 2010 (figure 2). During 2011 and 2012 Hib_b uptake increased from 86% in Quarter 1 2011 to 91% in Quarter 4 2012. During 2013, Hib_b uptake was 89% during Quarters 1 and 2, 90% in Quarter 3 and 91% in Quarter 4. There was also low uptake of PCV_3 in 2010 (combined Quarters 3 and 4 data was 88%). During 2011 and 2012, PCV_3 increased from 90% during Quarters 1 and 2 2011 to 92% during Quarter 4 2012. During 2013, PCV_3 uptake was 91% during Quarters 1-3 and 92% in Quarter 4.

Uptake rates among the HSE Areas, for children at 24 months of age in 2013, for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 94% to 98%, MMR_1 ranged from

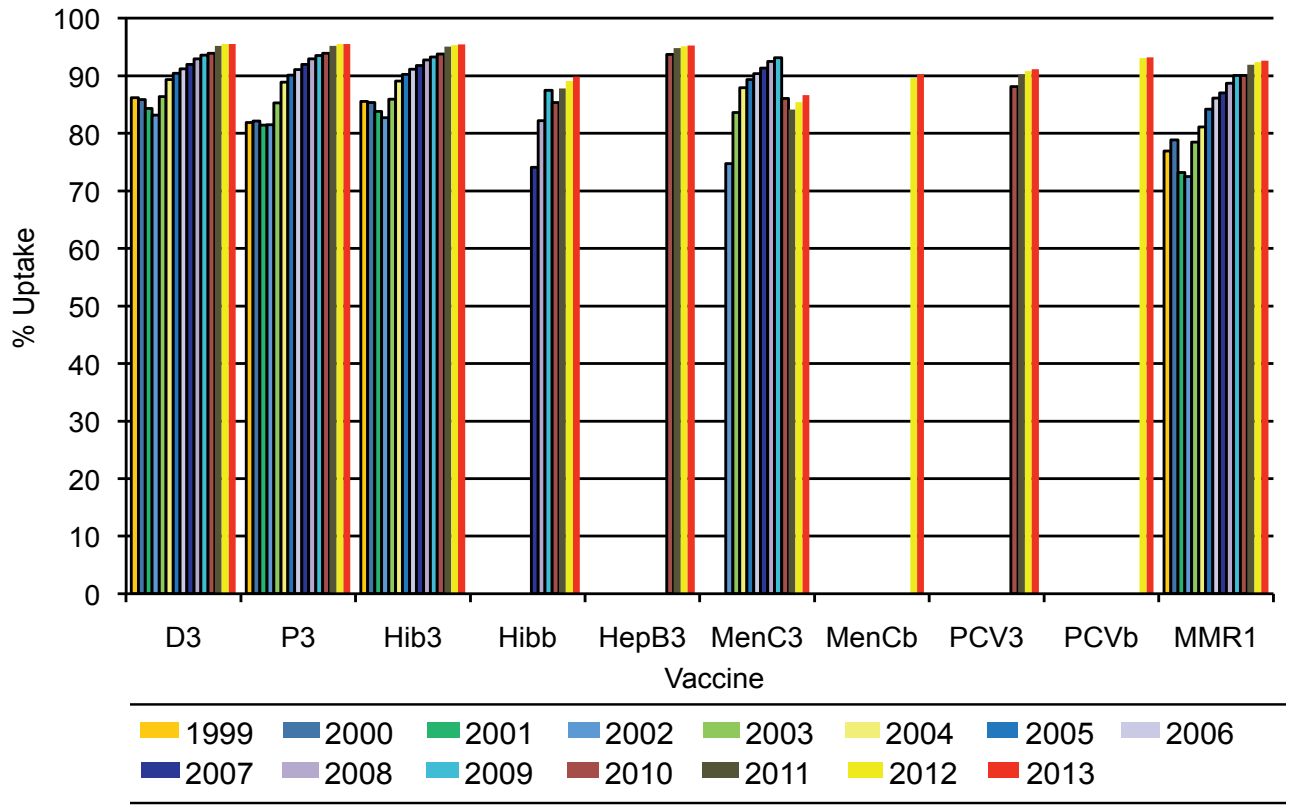

Figure 1. National annual immunisation uptake rates (based on available data) at 24 months, 1999-2013

Since T_3 and $Polio_3$ uptake identical to D_3 uptake only D_3 uptake figures presented.
P_3 uptake could not be calculated accurately during 1999-2001 as DTaP/DT uptake was reported as a combined value for the HSE NE during 1999, Quarters 3 and 4 2000 and Quarter 1 2001 and the HSE NW in 2000 and 2001. The 2002 $MenC_3$ figure is based on uptake rates for Quarter 3 and Quarter 4 2002 only. The 2005 MMR_1 uptake figure is incomplete as the HSE E was unable to provide MMR data for Quarter 4 2005, due to technical problems with extraction of MMR_1 data from the HSE E database. The 2006 MMR_1 figure includes the Quarter-1 2006 HSE E figure, which is an estimate only due to technical problems with extraction of MMR_1 data from the HSE E database. The 2007 national Hib_b figure is incomplete, as the HSE W data for Quarter 1 2007 and the HSE NW data for Quarter 3 2007 were not available. The 2007 national Hib_b figure also includes the HSE SE data which are an underestimate due to data extraction methods. The 2008 Hib_b figure is incomplete as the HSE SE data for Q2 2008 and the HSE MW data for Quarter 3 2008 were not available. The 2008 national $MenC_3$ figure is incomplete as the HSE E and HSE MW $MenC_3$ data for Quarter 3 2008 were not available. The 2009 data are incomplete as the following were unavailable: the Quarter 1 2009 HSE E D_3, T_3, P_3 and $Polio_3$ data for those born on the 31/03/2007; the Quarter 2 2009 HSE E Dublin North Hib_b uptake data and; the Quarter 4 2009 HSE MW data, HSE E Dublin North Hib_b data and HSE SE Hib_b data for those given a Hib dose as part of the five in one or six in one vaccine after 12 months of age. The 2010 data are incomplete as the following were unavailable: the Quarter 1 2010 HSE M and HSE S data and the HSE E Dublin North Hib_b data; the Quarter 2 2010 HSE M data and; the Quarter 4 2010 HSE NE data. As a new childhood immunisation schedule was introduced in 2008, for those born on or after July 1st 2008, the 2010 $HepB_3$ and PCV_3 data at 24 months are for those born between July 1st and December 31st 2008 (i.e. Quarters 3 and 4 2010 data) only. The $MenC_b$ and PCV_b data were available for only six of the eight HSE Areas.

Table 4. Immunisation uptake (%) at 24 months of age in 2013 (i.e. cohort born 01/01/2011-31/12/2011) by LHO and HSE Area

HSE Area	Local Health Office/ HSE Area	Number in cohort for D_3, T_3 & P_3 *	Immunisation Uptake (%)									
			D_3	Hib_3	Hib_b	$Polio_3$	$HepB_3$	$MenC_3$	$MenC_b$	PCV_3	PCV_b	MMR_1
HSE E	Dublin South	1788	95	95	89	95	95	86	89	90	92	91
	Dublin South East	1766	92	92	88	92	92	86	87	89	90	90
	Dublin South City	1737	97	97	91	97	97	87	90	92	94	94
	Dublin South West	2790	96	96	93	96	96	88	92	91	94	95
	Dublin West	2874	96	96	90	96	96	86	89	91	94	93
	Dublin North West	4007	93	93	84	93	93	81	84	87	89	89
	Dublin North Central	1795	95	95	89	95	95	85	89	89	92	91
	Dublin North	4456	95	95	91	95	95	89	91	92	93	93
	Kildare/West Wicklow	4154	96	96	92	96	96	90	92	93	95	94
	Wicklow	1901	94	94	85	94	94	81	85	89	91	91
	HSE E Total	**27268**	**95**	**95**	**89**	**95**	**95**	**86**	**89**	**91**	**93**	**92**
HSE M	Laois/Offaly	2683	98	98	98	98	98	91	93	94	95	96
	Longford/Westmeath	1986	97	97	97	97	97	91	94	94	97	97
	HSE M Total	**4669**	**98**	**98**	**98**	**98**	**98**	**91**	**93**	**94**	**96**	**96**
HSE MW	Clare	1748	96	96	95	96	96	92	95	94	95	95
	Limerick	2056	95	95	91	95	95	88	90	92	93	93
	Tipperary NR/East Limerick	1947	96	96	90	96	96	87	90	93	94	94
	HSE MW Total	**5751**	**96**	**96**	**92**	**96**	**95**	**89**	**92**	**93**	**94**	**94**
HSE NE	Cavan/Monaghan	2220	95	95	87	95	95	85	na	91	na	92
	Louth	2027	92	92	85	92	92	82	na	86	na	88
	Meath	3748	95	95	86	95	95	84	na	90	na	91
	HSE NE Total	**7995**	**94**	**94**	**86**	**94**	**94**	**84**	**na**	**89**	**na**	**90**
HSE NW	Donegal	2279	97	97	93	97	95	88	93	92	95	94
	Sligo/Leitrim	1391	97	97	95	97	97	88	95	90	95	96
	HSE NW Total	**3670**	**97**	**97**	**94**	**97**	**96**	**88**	**94**	**91**	**95**	**95**
HSE SE	Carlow/Kilkenny	2102	96	96	96	96	96	89	94	94	95	96
	South Tipperary	1389	98	98	98	98	98	92	96	95	96	95
	Waterford	1980	95	95	93	95	95	89	92	93	93	94
	Wexford	2246	96	96	98	96	97	91	95	94	96	95
	HSE SE Total	**7717**	**96**	**96**	**96**	**96**	**96**	**90**	**94**	**94**	**95**	**95**
HSE S	North Cork	1487	95	95	85	95	94	86	88	89	89	91
	North South Lee	6040	96	95	83	96	95	83	85	90	91	91
	West Cork	763	91	90	75	91	90	76	80	86	86	89
	Kerry	2023	97	97	87	97	96	89	92	92	94	94
	HSE S Total	**10313**	**96**	**95**	**83**	**96**	**94**	**84**	**87**	**90**	**91**	**92**
HSE W	Galway	3964	95	95	89	95	95	86	na	91	na	91
	Mayo	1770	95	95	91	95	95	82	na	90	na	90
	Roscommon	913	99	99	97	99	98	97	na	98	na	98
	HSE W Total	**6647**	**96**	**96**	**91**	**96**	**95**	**87**	**na**	**92**	**na**	**92**
Ireland		**74030**	**96**	**95**	**90**	**96**	**95**	**87**	**90**	**91**	**93**	**93**

*As the denominator/number in cohort varied slightly according to vaccine. The most commonly used number is reported here.
Since T_3 and P_3 uptake identical to D_3 uptake only D_3 uptake figures are presented
Please note while North Lee and South Lee are two separate Local Health Offices their combined immunisation uptake data are reported here

90% to 96%, PCV_3 ranged from 89% to 94%, $MenC_3$ ranged from 84% to 91% and Hib_b ranged from 83-98% (table 2). Among the six Areas in a position to provide data $MenC_b$ uptake ranged from 87% to 94% and PCV_b uptake ranged from 91% to 96%. The target uptake of 95% was reached or exceeded in seven HSE Areas during 2013 for D_3, T_3, P_3, Hib_3 and $Polio_3$, in six Areas for $HepB_3$, in three for PCV_b and MMR_1 and in two for Hib_b (table 2).

D_3, Hib_b, $MenC_3$ and MMR_1 uptake rates are mapped by LHO in figure 3. Among the LHOs the uptake rates ranged from 91% to 99% for D_3, T_3, P_3 and $Polio_3$, 90% to 99% for Hib_3, 90-98% for $HepB_3$, 88% to 98% MMR_1, 86% to 98% for PCV_3, 86% to 97% for PCV_b, 80% to 96% for $MenC_b$, 76% to 97% for $MenC_3$ and 75% to 98% for Hib_b (table 4). The target uptake of 95% was reached or exceeded in 26 LHOs for D_3, T_3, P_3, Hib_3 and $Polio_3$, in 25 LHOs for $HepB_3$, in nine LHOs for PCV_b and MMR_1, in eight LHOs for Hib_b, in four LHOs for $MenC_b$, in two LHOs for PCV_3 and in one LHO for $MenC_3$ (table 4). Roscommon was the only LHO to reach and exceed the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, Hib_b, $MenC_3$, PCV_3 and MMR_1 at 24 months.

There was a large decline in $MenC_3$ and a decline in Hib_b uptake at 24 months in Quarters 3 and 4 2010 ie children who were born between July 1st and December 31st 2008 and were the first recommended the new immunisation schedule. There was a change in timing of the MenC and Hib_b vaccines under the new immunisation schedule (table 1). The uptake of $MenC_3$ (87%) in particular and Hib_b (90%) in 2013 were still lower than the uptake of the other recommended vaccines. In addition, to low uptake of $MenC_3$ and Hib_b, MMR_1 (93%) and PCV_3 (91%) uptake in 2013 are lower than the target uptake of 95%.

In contrast in 2013, annual national uptake rates at 24 months for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ reached the target rate of 95%. This is the third year national annual uptake rates reached the target of 95% for these vaccines. Seven HSE Areas reached or exceeded the target uptake of 95% for D_3, T_3, P_3, Hib_3 and $Polio_3$ at 24 months during 2013. Roscommon reached or exceeded the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_3$, PCV_3, Hib_b and MMR_1 uptake at 24 months of age.

The immunisation reports for Quarters 1 to 4 2013 are available on the HPSC website in *Topics A-Z* under the heading *vaccination*.

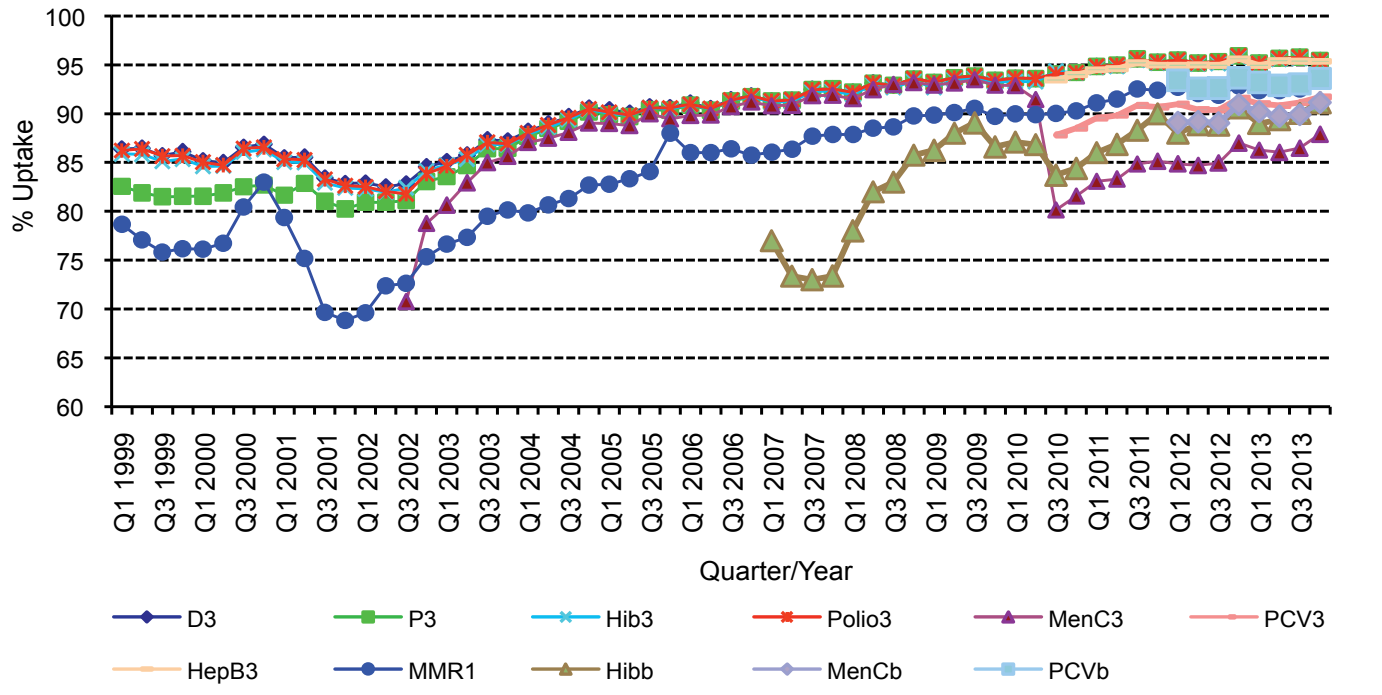

Figure 2. National quarterly immunisation uptake rates at 24 months

Note scale ranges from 60-100%
P3 uptake could not be calculated accurately during 1999-2001 as DTaP/DT uptake was reported as a combined value for the HSE NE during 1999, Quarters 3 and 4 2000 and Quarter 1 2001 and the HSE NW in 2000 and 2001. The Q4 2005 MMR1 figure is based on data from seven of the eight HSE Areas. The Q1 2006 MMR1 figure includes the HSE E figure that is an estimate only. The Q1 2007, Q3 2007, Q2 2008 and Q3 2008 Hibb figures are based on data from seven of the eight HSE Areas. In Q1 2008 the HSE SE changed their Hibb data extraction method compared to previous quarters; in Q1 2008 the uptake of Hibb in the HSE SE was 83% compared to 53% in Q4 2007. The Q3 2008 MenC3 figure is based on data from six of the eight HSE Areas. The Q1 2009 HSE E D3, P3, T3, Polio3 and MMR1 uptake figures exclude those born on the 31/03/2007. The Q2 2009 HSE E Hibb uptake figures exclude uptake figures from Dublin North. The Q4 2009 figures are based on data from seven of the eight HSE Areas. The Q4 2009 Hibb figures also exclude uptake figures from Dublin North and HSE SE Hibb data for those given a Hib dose as part of the five in one or six in one vaccine after 12 months of age. The Q1 2010 figures are based on data from six of the eight HSE Areas. The Q1 2010 Hibb figures also exclude uptake figures from HSE E Dublin North. The Q2 2010 and Q4 2010 figures are based on data from seven of the eight HSE Areas. MenCb and PCVb figures are based on data form six of the eight HSE Areas.

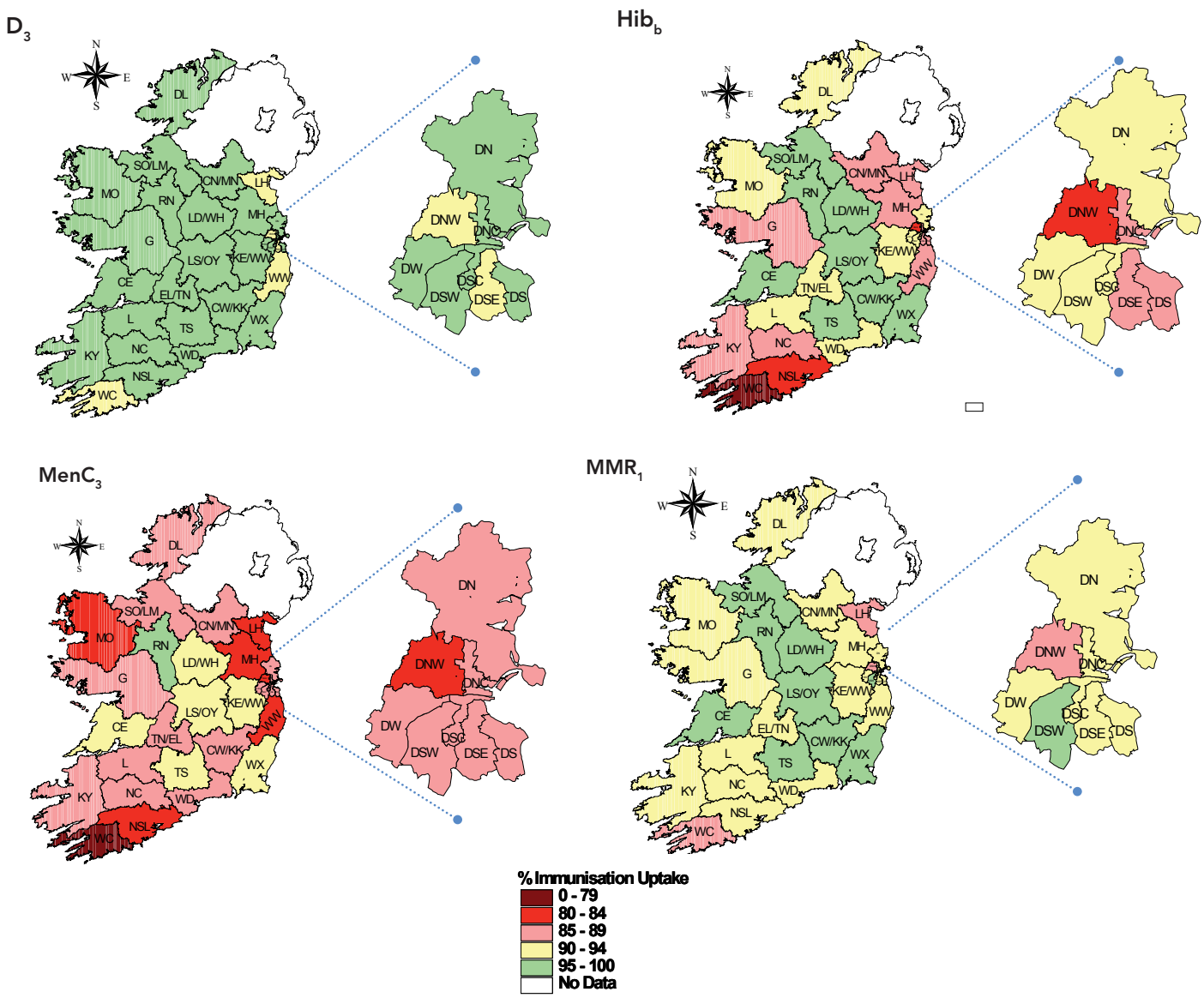

Figure 3. D_3, Hib_b, $MenC_3$ and MMR_1 immunisation uptake rates (%) in those 24 months of age in 2013 by Local Health Office (LHO)
LHOs in Dublin are highlighted separately for ease of viewing
North Lee and South Lee are separate LHOs, however, their combined (labelled NSL on the map) immunisation uptake rate is reported here
Please see table 5 to translate LHO abbreviations

Table 5. Local Health Office (LHO) abbreviations used in this chapter

Local Health Office Abbreviations	Local Health Office
CE	Clare
CN/MN	Cavan/Monaghan
CW/KK	Carlow/Kilkenny
DL	Donegal
DN	Dublin North
DNC	Dublin North Central
DNW	Dublin North West
DS	Dublin South
DSC	Dublin South City
DSE	Dublin South East
DSW	Dublin South West
DW	Dublin West
G	Galway
KE/WW	Kildare/West Wicklow
KY	Kerry
L	Limerick
LD/WD	Longford/Westmeath

Local Health Office Abbreviations	Local Health Office
LH	Louth
LS/OY	Laois/Offaly
MH	Meath
MO	Mayo
NC	North Cork
NSL*	North South Lee*
RN	Roscommon
SO/LM	Sligo/Leitrim
TN/EL	Tipperary North /East Limerick
TS	South Tipperary
WC	West Cork
WD	Waterford
WX	Wexford
WW	Wicklow

*Please note while North Lee and South Lee are two separate LHOs their combined immunisation

8.2 HPV vaccine uptake 2012/2013

Summary

In the academic year 2012/2013, 84.2% of girls in first year and 67.4% of girls in sixth year in second level schools were recorded as having received at least stage 3 HPV vaccine (considered to have completed a three dose HPV vaccine course).

In addition, 286 girls in the first year and sixth year age equivalent cohorts in non-second level schools (ie special schools, Youthreach, Community Training Centres, home schooled or out of school) and 158 girls outside these cohorts recommended for vaccination were recorded as having received at least stage 3 HPV vaccine.

Background

Following a recommendation from the National Immunisation Advisory Committee, that human papillomavirus (HPV) vaccine should be given to 12 year old girls, a routine Health Service Executive (HSE) school HPV vaccination programme began in May 2010 for girls in first year of second level schools and age equivalent in non second level schools (see below for cohort details). The aim of the programme is to protect girls from their future risk of developing cervical cancer.

A catch-up campaign for girls in sixth year of second level schools and their age equivalents in non-second level schools (see below for cohort details) was added in the academic year 2011/2012, this catch-up campaign continued during the academic year 2012/2013.

Quadrivalent HPV vaccine, which protects against HPV types 6, 11, 16 and 18 associated with 70% of cervical cancer, is used in the school vaccination programme. A schedule of three vaccine doses given over a six month period was recommended in the academic year 2012/2013. The HPV vaccine does not protect against all cervical cancers, so regular cervical screening is still needed.

The vaccinations are provided by vaccination teams from the Local Health Offices (LHOs) who go into schools in their areas to vaccinate or provide vaccination clinics free of charge for girls in the target cohorts. Please see the HSE National Immunisation Office (NIO) website at www.immunisation.ie for detailed and current information on the HPV school vaccination programme.

The target for uptake of three doses of vaccine for the routine HPV vaccination programme is >80% and the target for the catch-up programme is >60% uptake.

HPV vaccinations provided through the schools immunisation programme are entered onto a database. Here we report on the uptake of HPV vaccine, provided through the school immunisation programme and recorded on the database, in the academic year 2012/2013 in Ireland. This is the second HPV report from the database which is the result of collaboration between NIO, School Immunisation Teams, Immunisation Coordinators, Immunisation System Administrators, Immunisation administrative staff, HPV vaccine working groups and HPSC.

Cohorts for vaccination in the academic year 2012/2013

The routine and catch-up cohorts for the 2012/2013 HPV vaccination programme as agreed with the Department of Education and Skills was as follows:

Routine HPV Vaccination programme

All girls in **first year of second level schools and their equivalents** ie those who were born between 01/09/2000 and 31/08/2001

- attending special schools or
- registered with the National Educational Welfare Board to be home schooled.

Catch up HPV Vaccination Programme

All girls in **sixth year of second level schools and their equivalents** ie those who were born between 01/09/1994 and 31/08/1995 and

- attending special schools or
- registered with the National Educational Welfare Board to be home schooled or
- attending Youthreach and Community Training Centres funded by the Department of Education and Skills.

Terminology used in this report

At least stage 1 - means a girl had a stage 1 HPV

vaccine recorded on the database, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on the database.

At least stage 2 - means a girl had a stage 2 HPV vaccine recorded on the database, she may or may not have had stage 1 or a stage 3 HPV vaccine recorded on the database.

At least stage 3 - means a girl had a stage 3 HPV vaccine recorded on the database, she may or may not have had a stage 1 or a stage 2 HPV vaccine recorded on the database.

Girls with at least stage 3 are considered to have completed a course of vaccination.

Home schooled - refers to girls registered with the National Educational Welfare Board to be educated at home. These girls were recorded on the database and reported here as home schooled.

Out of school - refers to vaccinated girls who were neither enrolled in a second level school, special school, Youthreach or Community Training Centre nor registered with the National Educational Welfare Board as 'home schooled'.

Local Health Office (LHO) - refers to the LHO the school is located in (it does not refer to the LHO the girl is resident in).

Outside cohort - refers to those who were vaccinated but who were not in first year or sixth year of second level schools or their equivalents.

The **denominator** for girls in second level schools was defined as the number of girls on the school roll on 30th September 2012 for first year in the routine programme and for sixth year in the catch-up programme. The denominator for age equivalent to first years in second level schools in the routine programme was defined as girls born between 01/09/2000 and 31/08/2001 on the school roll of special schools or registered with the National Educational Welfare Board on 30th September 2012. The denominator for age equivalent to sixth years in second level schools in the catch-up programme was defined as girls born between 01/09/1994 and 31/08/1995 on the school roll of special schools or registered with the National Educational Welfare Board or attending Community Training Centres or Youthreach on 30th September 2012. All the denominator data was entered on the immunisation database by the relevant System Administrator.

Results

Academic Year 2012/2013

The figures presented in this summary are based on data recorded on the immunisation system on the 25th June 2014. These figures are provisional and subject to change due to ongoing updating of data on the database.

First year girls in second level schools

In Ireland, 84.2% of girls in first year in second level schools were recorded as having received at least stage 3 HPV vaccine (considered to have completed a three dose course) (Table 1). This is a decline of 1.3% compared to the academic year 2011/2012 when 85.5% of girls in first year in second level schools were recorded as having received at least stage 3 HPV vaccine.[1] Among the 32 Local Health Offices (LHOs), in the academic year 2012/2013, uptake of at least stage 3 HPV vaccine ranged from 58.4% to 96.0%; with four recording ≥90.0% uptake and four recording <80.0% uptake.

Sixth year girls in second level schools

In Ireland, 67.4% of girls in sixth year in second level schools were recorded as having at least stage 3 HPV vaccine (Table 2). This is a decline of 4.1% compared to the academic year 2011/2012 when 71.5% of girls in sixth year in second level schools were recorded as having received at least stage 3 HPV vaccine.[1] Among the 32 LHOs, in the academic year 2012/2013, uptake of stage 3 HPV vaccine ranged from 48.7% to 81.0%; with one recording ≥80.0% uptake and seven recording <60.0% uptake.

Some girls in the catch-up cohort were vaccinated privately by General Practitioners or other medical agencies following the licensing of HPV vaccines in 2006/2007 and prior to the announcement in early 2011 that there would be a HPV catch-up programme. These vaccinated girls would be included in the denominator data but not in the numbers vaccinated as they were not vaccinated as part of the school programme. Some LHOs have highlighted this issue: Donegal, Dublin North Central, Limerick, Louth, North Tipperary/East Limerick, Tipperary South and Wexford.

First and Sixth year second level equivalent cohorts in non-second level schools/Outside cohort/Out of school

An additional 444 girls were recorded as having received at least stage 3 HPV vaccine (Table 3); of these 286 were recorded in the first year routine and sixth year catch up age equivalent cohorts in special schools, Youthreach, Community Training Centres, home schooled or out of school and 158 were recorded as being outside the cohorts recommended for vaccination.

The target cohort of girls in special schools, Community Training Centres, Youthreach, and home schooled were identified by birth cohort either equivalent to first years (born between 01/09/2000 and 31/08/2001) or equivalent to sixth years (born between 01/09/1994 and 31/08/1995). For operational reasons HSE vaccinating staff did not adhere strictly to these birth cohorts. The identification of denominator data for the target birth cohorts in these settings was difficult and staff focused on vaccinations rather than defining cohort numbers accurately. Therefore, this report gives the number of girls vaccinated in these settings reflecting activity in these settings rather than HPV vaccine uptake.

Table 1. HPV vaccine uptake in the academic year 2012/2013 among first year girls (routine HPV programme) in second level schools

HSE Region	Local Health Office/ HSE Region	2012/2013						
		First year (routine HPV vaccination programme)**						
		Denominator	Numbers vaccinated with:			% Vaccinated with:		
			At least Stage 1	At least Stage 2	At least Stage 3	At least Stage 1	At least Stage 2	At least Stage 3
Dublin Mid Leinster	Dublin South	932	834	831	822	89.5%	89.2%	88.2%
	Dublin South East	597	519	518	517	86.9%	86.8%	86.6%
	Dublin South City	800	696	686	668	87.0%	85.8%	83.5%
	Dublin South West	758	687	678	660	90.6%	89.4%	87.1%
	Dublin West	947	812	806	761	85.7%	85.1%	80.4%
	Kildare/West Wicklow	1575	1387	1383	1361	88.1%	87.8%	86.4%
	Wicklow	724	646	640	635	89.2%	88.4%	87.7%
	Laois/Offaly	942	849	844	839	90.1%	89.6%	89.1%
	Longford/Westmeath	1049	925	919	896	88.2%	87.6%	85.4%
	Total Dublin Mid Leinster	**8324**	**7355**	**7305**	**7159**	**88.4%**	**87.8%**	**86.0%**
Dublin North East	Dublin North	1479	1355	1342	1292	91.6%	90.7%	87.4%
	Dublin North Central	651	558	552	532	85.7%	84.8%	81.7%
	Dublin North West	1331	969	956	912	72.8%	71.8%	68.5%
	Cavan/Monaghan	892	542	535	521	60.8%	60.0%	58.4%
	Louth	1019	871	861	842	85.5%	84.5%	82.6%
	Meath	1252	1091	1082	1058	87.1%	86.4%	84.5%
	Total Dublin North East	**6624**	**5386**	**5328**	**5157**	**81.3%**	**80.4%**	**77.9%**
South	North Cork	610	536	530	525	87.9%	86.9%	86.1%
	North Lee - Cork	1157	1028	1023	941	88.9%	88.4%	81.3%
	South Lee - Cork	1122	975	962	940	86.9%	85.7%	83.8%
	West Cork	357	282	282	278	79.0%	79.0%	77.9%
	Kerry	930	833	826	804	89.6%	88.8%	86.5%
	Carlow/Kilkenny	973	910	896	862	93.5%	92.1%	88.6%
	South Tipperary	582	553	550	529	95.0%	94.5%	90.9%
	Waterford	756	732	729	723	96.8%	96.4%	95.6%
	Wexford	1122	951	946	922	84.8%	84.3%	82.2%
	Total South	**7609**	**6800**	**6744**	**6524**	**89.4%**	**88.6%**	**85.7%**
West	Donegal	1152	1018	1012	1004	88.4%	87.8%	87.2%
	Sligo/Leitrim	628	559	557	551	89.0%	88.7%	87.7%
	Galway	1659	1341	1328	1297	80.8%	80.0%	78.2%
	Mayo	848	764	759	754	90.1%	89.5%	88.9%
	Roscommon	300	292	290	288	97.3%	96.7%	96.0%
	Clare	765	697	691	680	91.1%	90.3%	88.9%
	Limerick	912	818	809	789	89.7%	88.7%	86.5%
	Tipperary NR/ East Limerick	990	910	904	893	91.9%	91.3%	90.2%
	Total West	**7254**	**6399**	**6350**	**6256**	**88.2%**	**87.5%**	**86.2%**
Ireland		**29811**	**25940**	**25727**	**25096**	**87.0%**	**86.3%**	**84.2%**

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Local Health Office refers to the Local Health Office of the school.
'At least stage 1' means a girl had a stage 1 HPV vaccine recorded on the database, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 2' means a girl had a stage 2 HPV vaccine recorded on the database, she may or may not have had stage 1 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, she may or may not have had stage 1 or a stage 2 HPV vaccine recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2012/2013.

Table 2. HPV vaccine uptake in the academic year 2012/2013 among sixth year (catch up campaign) girls in second level schools

HSE Region	Local Health Office/ HSE Region	2012/2013						
		Sixth year (catch up campaign)**						
		Denominator	Numbers vaccinated with:			% Vaccinated with:		
			At least Stage 1	At least Stage 2	At least Stage 3	At least Stage 1	At least Stage 2	At least Stage 3
Dublin Mid Leinster	Dublin South	837	526	519	505	62.8%	62.0%	60.3%
	Dublin South East	550	353	344	335	64.2%	62.5%	60.9%
	Dublin South City	843	604	593	557	71.6%	70.3%	66.1%
	Dublin South West	677	563	529	477	83.2%	78.1%	70.5%
	Dublin West	742	513	478	415	69.1%	64.4%	55.9%
	Kildare/West Wicklow	1271	1029	1016	975	81.0%	79.9%	76.7%
	Wicklow	572	474	472	450	82.9%	82.5%	78.7%
	Laois/Offaly	894	638	625	603	71.4%	69.9%	67.4%
	Longford/Westmeath	823	627	619	605	76.2%	75.2%	73.5%
	Total Dublin Mid Leinster	**7209**	**5327**	**5195**	**4922**	**73.9%**	**72.1%**	**68.3%**
Dublin North East	Dublin North	1180	684	660	605	58.0%	55.9%	51.3%
	Dublin North Central	668	438	427	389	65.6%	63.9%	58.2%
	Dublin North West	1071	755	718	642	70.5%	67.0%	59.9%
	Cavan/Monaghan	797	478	469	454	60.0%	58.8%	57.0%
	Louth	869	457	442	423	52.6%	50.9%	48.7%
	Meath	970	667	660	650	68.8%	68.0%	67.0%
	Total Dublin North East	**5555**	**3479**	**3376**	**3163**	**62.6%**	**60.8%**	**56.9%**
South	North Cork	464	371	363	348	80.0%	78.2%	75.0%
	North Lee - Cork	1075	817	803	774	76.0%	74.7%	72.0%
	South Lee - Cork	1031	762	752	710	73.9%	72.9%	68.9%
	West Cork	340	215	213	211	63.2%	62.6%	62.1%
	Kerry	923	733	715	689	79.4%	77.5%	74.6%
	Carlow/Kilkenny	815	649	637	599	79.6%	78.2%	73.5%
	South Tipperary	519	354	342	322	68.2%	65.9%	62.0%
	Waterford	703	551	546	539	78.4%	77.7%	76.7%
	Wexford	972	689	681	643	70.9%	70.1%	66.2%
	Total South	**6842**	**5141**	**5052**	**4835**	**75.1%**	**73.8%**	**70.7%**
West	Donegal	947	763	758	739	80.6%	80.0%	78.0%
	Sligo/Leitrim	526	438	433	426	83.3%	82.3%	81.0%
	Galway	1344	1113	1100	1046	82.8%	81.8%	77.8%
	Mayo	775	591	582	568	76.3%	75.1%	73.3%
	Roscommon	348	236	233	229	67.8%	67.0%	65.8%
	Clare	647	476	467	461	73.6%	72.2%	71.3%
	Limerick	921	659	637	606	71.6%	69.2%	65.8%
	Tipperary NR/East Limerick	876	529	524	511	60.4%	59.8%	58.3%
	Total West	**6384**	**4805**	**4734**	**4586**	**75.3%**	**74.2%**	**71.8%**
Ireland		**25990**	**18752**	**18357**	**17506**	**72.2%**	**70.6%**	**67.4%**

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Local Health Office refers to the Local Health Office of the school.
'At least stage 1' means a girl had a stage 1 HPV vaccine recorded on the database, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 2' means a girl had a stage 2 HPV vaccine recorded on the database, she may or may not have had stage 1 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, she may or may not have had stage 1 or a stage 2 HPV vaccine recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2012/2013.

Table 3. HPV vaccinations in the academic year 2012/2013 among those in non-second level schools and those outside the recommended cohorts in second level schools

HSE Region	Local Health Office/ HSE Region	Recommended cohorts** for vaccination and those outside cohort in special schools, Youthreach, Community Training Centres, home schooled and out of school and those outside cohort in second level schools with:		
		At least Stage 1	At least Stage 2	At least Stage 3
Dublin Mid Leinster	Dublin South	19	17	13
	Dublin South East	2	2	2
	Dublin South City	9	4	4
	Dublin South West	18	15	11
	Dublin West	18	16	16
	Kildare/West Wicklow	32	31	29
	Wicklow	10	9	8
	Laois/Offaly	10	9	8
	Longford/Westmeath	18	11	10
	Total Dublin Mid Leinster	**136**	**114**	**101**
Dublin North East	Dublin North	5	2	1
	Dublin North Central	23	15	6
	Dublin North West	31	30	29
	Cavan/Monaghan	1	1	1
	Louth	11	10	10
	Meath	20	19	14
	Total Dublin North East	**91**	**77**	**61**
South	North Cork	9	9	9
	North Lee - Cork	37	35	32
	South Lee - Cork	22	19	15
	West Cork	0	0	0
	Kerry	12	11	10
	Carlow/Kilkenny	39	36	31
	South Tipperary	12	12	12
	Waterford	34	29	26
	Wexford	35	30	24
	Total South	**200**	**181**	**159**
West	Donegal	15	14	13
	Sligo/Leitrim	7	6	6
	Galway	21	20	15
	Mayo	13	13	13
	Roscommon	6	6	4
	Clare	17	14	10
	Limerick	54	50	45
	Tipperary NR/East Limerick	19	17	14
	Total West	**152**	**140**	**120**
Home schooled		3	2	2
Total of LHOs and home schooled		**582**	**514**	**443**
Out of school		1	1	1
Total of LHOs and home schooled and out of School		**583**	**515**	**444**

The figures presented in this table are based on data recorded on the immunisation system on the 25th June 2014. These figures are provisional and subject to change due to ongoing updating of data on the database.
Local Health Office refers to the Local Health Office of the school.
'At least stage 1' means a girl had a stage 1 HPV vaccine recorded on the database, this girl may or may not have had a stage 2 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 2' means a girl had a stage 2 HPV vaccine recorded on the database, she may or may not have had stage 1 or a stage 3 HPV vaccine recorded on the database. Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, she may or may not have had stage 1 or a stage 2 HPV vaccine recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2012/2013.

Total doses administered
A total of 132,925 administered vaccine doses were recorded in the academic year 2012/2013. This compares to 139,646 administered vaccine doses recorded in 2011/2012.[1]

Academic Years 2009/2010 and 2010/2011
HPV vaccine uptake for 2009/2010 and 2010/2011 cohorts of first year girls vaccinated from May 2010 was measured by manual reports and national uptake for the combined cohort was estimated at 81.9%.[2]

Discussion

The uptake of HPV vaccine in Ireland is very encouraging and reflects the huge effort and support put in by all staff and schools involved in the school vaccination programme. Uptake of HPV vaccine compares very favourably with estimates in other countries that have introduced HPV vaccination and monitored uptake.[3,4,5,6,7,8,9,10]

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8.3 Seasonal Influenza Vaccine Uptake in Hospitals & Long Term Care Facilities (LTCFs)

Summary

Uptake in Hospitals during 2013-2014 Season

- 80.7% (46/59) of hospitals (including six private ones) participated
- Overall, 24.4% of hospital health care workers (HCWs) were reported as vaccinated
- Vaccine uptake varied by HSE region (range 15.6%- 35.2%)
- Highest uptake was reported in Dublin North East region
- Nationally, vaccine uptake varied by staff category (18.2%-33.6%)
- Highest uptake was reported among 'medical & dental' staff and lowest among 'nursing' staff

Uptake in LTCFs during 2013-2014 Season

- 54.1% (131/242) of LTCFs participated
- Overall, 22.8% of LTCF HCWs were reported as vaccinated
- Vaccine uptake varied by HSE region (range 13.7%- 28.4%)
- Highest uptake was reported in Dublin Mid Leinster region
- Nationally, vaccine uptake varied by staff category (range 17.7%-30.3%)
- Highest uptake was reported among 'medical & dental' staff and lowest among 'management & administration' staff

Achieving a high uptake of influenza vaccination among HCWs is recognised as an important infection control intervention and occupational health issue. Vaccination is designed to reduce the risk of influenza transmission between patients and HCWs with the potential for severe disease in both patients and staff. On 8th October 2013, the HSE Leadership team reviewed and endorsed an action plan to achieve a national influenza vaccination target of 40% among HCWs.

A 2013-2014 season based protocol on measuring uptake of influenza vaccine among HCWs was posted on to the HPSC website on 1st November 2013. Separate online survey forms for hospitals and LTCFs were designed to capture aggregate data on eligible and vaccinated staff and were based on six categories of HSE staff: management & administration; medical & dental; nursing; health & social care professionals; other patient & client care; and general support staff.

For hospitals, occupational health departments were asked to provide data on the number and category of HCWs vaccinated by the service with human resource departments requested to provide data on the numbers of staff employed. For LTCFs, uptake details were sought from nominated coordinators on the number of staff, residents and respite care patients present and vaccinated.

For the 2013-2014 season, a link to an online form was emailed to each nominated coordinator in 53 known public hospitals and separately to identified HSE funded LTCFs on 8th November 2013. Each coordinator was asked to complete the online form using aggregate uptake data relating to the previous month. Further monthly requests for cumulative seasonal uptake figures were made with new online survey forms between December 2013 and February 2014 and a final survey

Table 1. Vaccine uptake (with 95% CIs) among HCWs in participating hospitals and LTCFs by season (2011-2012, 2012-2013, 2013-2014)

	Hospitals			LTCFs		
Season	No. Participating Hospitals	% Uptake	% Uptake 95% CIs	No. Participating LTCFs	% Uptake	% Uptake 95% CIs
2011-2012	41	18.0	17.1-18.8	70	17.7	15.1-20.2
2012-2013	35	17.4	17.1-17.8	137	14.4	12.9-15.9
2013-2014	46	24.4	24.0-24.7	118	22.8	21.3-24.2

Note: All 46 participating hospitals in 2013-2014 season provided both eligible and vaccinated staff details (including four out of six private hospitals), but of the 131 participating LTCFs during the same season, only 118 (90.1%) provided these details to allow vaccine uptake to be calculated.

seeking aggregate data for the for the entire season was sent in early May 2014.

For the 2013-2014 influenza season, vaccination uptake among HCWs in hospitals and LTCFs was monitored and comparisons made with estimated uptakes for the previous 2011-2012 and 2012-2013 seasons (table 1).

Figures 1 to 4 below give details of vaccine uptake among HCWs based in hospitals and LTCFs over the past three seasons by category of staff and HSE region.

The highest hospital uptake was reported in Dublin North-East region and the lowest in the Western region. Overall, a statistically significant increased uptake between seasons 2011-2012 and 2013-2014 was seen across all hospital staff categories: health and social care professionals (+10.2%); medical and dental staff (+10.1%); management and administration staff (+8.1%); nursing (+5.9%); general support staff (+4.5%); and other patient and client care professionals (+2.6%).

The highest LTCF uptake was reported in Dublin Mid Leinster region (28.4%) with the lowest in the Southern region (13.7%). Only Dublin North East region exhibited an increasing uptake trend among LTCFs since the 2011-2012 season. A statistically significant increased uptake across all staff categories, with the exception of management and administration, was observed between 2012-2013 and 2013-2014: health and social care professionals (+18.8%); medical and dental staff (+16.5%); nursing (+9.3%); general support staff (+8.2%) and other patient and client care professionals (+8.1%). Twenty-five (21.2%) of LTCFs in 2013-2014 exceeded the 40% national uptake target.

Among the most notable improvements in uptake during the 2013-2014 season compared to the previous one was:

- An increase in hospital participation from 35 to 46 (all of which had provided complete eligible and vaccinated staff details)
- A 7% increase in uptake among hospital staff nationally to an overall uptake of 24.4%
- An 8.4% increase in uptake among staff in LTCFs to an overall uptake of 22.8%
- An 11.3% increase in uptake among long stay residents to an overall uptake of 84.3%
- A 16.4% increase in uptake among respite residents (vaccinated either prior to admission or within the facility itself) to an overall uptake of 32.1%
- An increase in the number of LTCFs with a policy recommending vaccination of respite residents prior to their admission from 11 to 24 LTCFs reporting such policies

Some reductions in uptake were also observed in LTCFs between 2012-2013 and 2013-2014 in relation to:

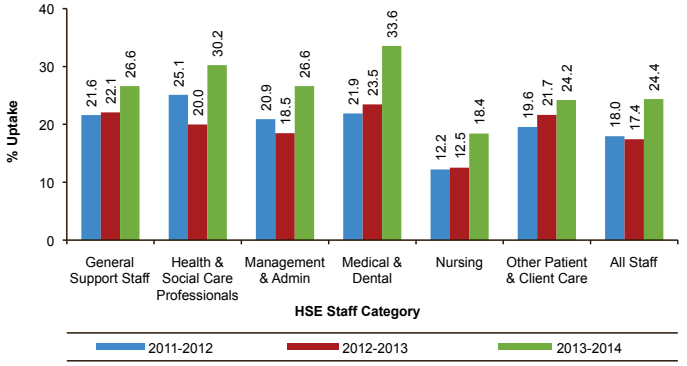

Figure 1. Hospital staff uptake by HSE grade category in 2011-2012 (Hospital n= 41), 2012-2013 (n=35) and 2013-2014 (n=46) seasons

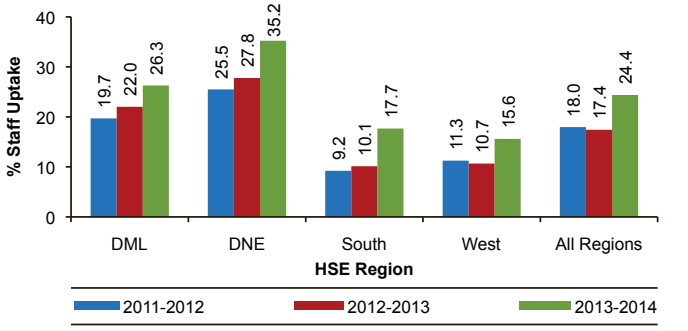

Figure 2. Hospital staff uptake by HSE region in 2011-2012 (Hospital n= 41), 2012-2013 (n=35) and 2013-2014 (n=46) seasons

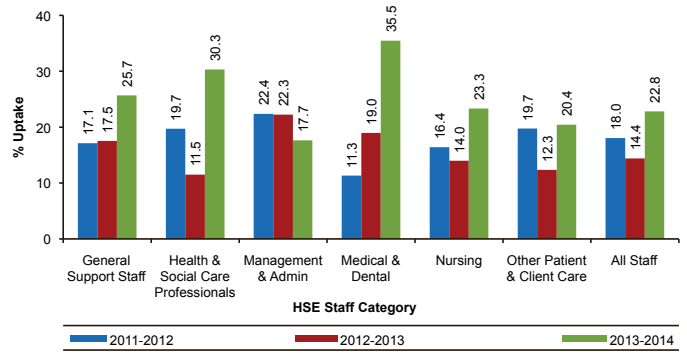

Figure 3. LTCF staff uptake by HSE grade category in 2011-2012 (LTCF n=70), 2012-2013 (n=137) and 2013-2014 (n=118) seasons

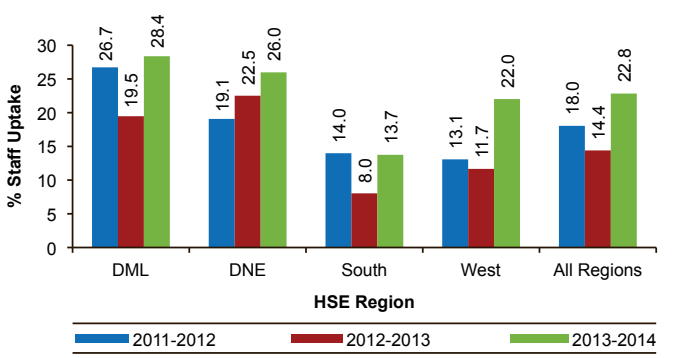

Figure 4. LTCF staff uptake by HSE region in 2011-2012 (LTCF n=70), 2012-2013 (n=137) and 2013-2014 (n=118) seasons

- Participation of LTCFs declining from 183 to 131 (a fall of 28.4%)
- Uptake among management and administration staff falling from 22.3% to 17.7%

Reasons for failing to meet an overall target of influenza vaccine uptake of 40% among staff were not specifically sought during the 2013-2014 data collection survey. The national uptake among hospital staff was somewhat higher that the overall uptake reported among LTCFs. This lack of substantial difference occurs against different organisational structures for vaccination in these services. In theory, one would expect uptake to be substantially higher in hospitals that are more likely than LTCFs to have their own occupational health departments to facilitate staff vaccination clinics. In the LTCFs, the absence of site specific vaccination policies, despite national recommendations[1], may reflect a lack of awareness at senior management level about the value of having vaccination policies to enable and support vaccination for staff.

The World Health Organization have stated that annual vaccination is especially important for people at higher risk of serious influenza complications, and for people who live with or care for high risk individuals.[2] In Ireland, more action is required to reach a national HSE target of 40% vaccination uptake among HCWs if unnecessary disease and mortality is to be prevented. Other countries have already achieved uptake rates beyond our target. For example, in England during the 2013-2014 season, uptake among frontline HCWs was 54.8%.[3] In the United States, 81.8% of hospital-based health care professionals were reported to be vaccinated during the same season.[4]

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8.4 Uptake of other childhood and adolescent vaccines

Vaccine uptake in Junior Infants during the 2012/2013 academic year

Background
Uptake of the DTaP-IPV* and MMR vaccines in 4 to 5 year old schoolchildren was monitored across all Local Health Offices (LHOs) during the academic year 2012/2013 and the findings compared to those reported for the previous 2011/2012 season.

HSE- versus GP-vaccine administered LHOs
During both seasons, the administration of the DTaP-IPV vaccine was performed by GPs based in the following LHOs: Louth, Cavan/Monaghan, Meath, Dublin North Central, Galway, Mayo, Donegal and Sligo/Leitrim. These same LHOs, apart from Galway and Mayo, also had GPs administer the MMR vaccine to the same cohort of children. In all other LHOs, the administration of vaccines was performed by HSE public health personnel. Only the Dublin Mid Leinster and Southern regions were exclusively HSE-vaccine administered regions, unlike the Dublin North East and Western regions, which were a combination of HSE- and GP-vaccine administered regions.

Target populations in the 2011/2012 and 2012/2013 academic years

For the 2012/2013 academic year, the target population in HSE-vaccine administered LHOs was all children in Junior Infants on the school register on the 30th September 2012. For GP-vaccine administered LHOs, the target population was all children born between the 1st September 2006 and 31st August 2007.

In 2011/2012, the target population in HSE-vaccine administered LHOs was less well defined as Junior Infants on the school register during that academic year. Similarly, in GP-vaccine administered LHOs, the target population were simply children aged 4 to 5 years.

The different ways in which the target populations have been defined in the HSE- and GP-vaccinated administered LHOs has meant that a national uptake for either vaccine could not be calculated for the 2012/2013 or 2011/2012 academic years.

Uptake of DTaP-IPV vaccine
Between 2011/2012 and 2012/2013, the uptake of the DTaP-IPV vaccine in HSE-vaccine administered LHOs increased from 89.1% to 90.7% in Dublin Mid Leinster, from 83.5% to 87.1% in Dublin North East and from 82.0% to 90.4% in the Southern region, but fell from 92.1% to 89.7% in the Western region. Overall, DTaP-IPV uptake across all HSE-administered LHOs increased from 86.2% to 90.4%.

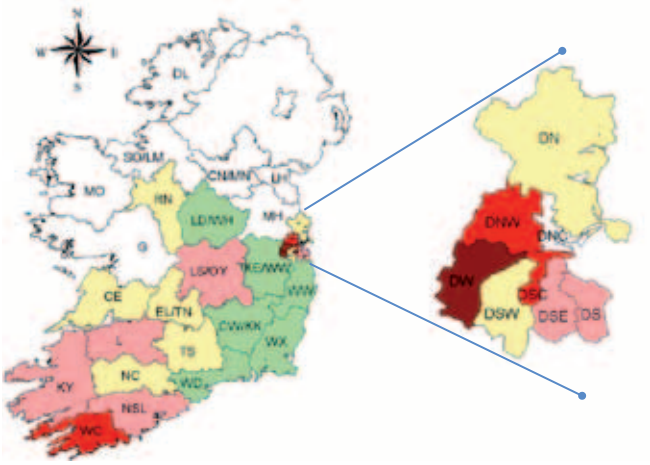
During the same period of time, DTaP-IPV uptake in GP-vaccine administered LHOs fell from 79.3% to 73.9% in Dublin North East and from 73.0% to 59.8% in the Western region. It should be noted that there was no uptake data reported by Louth, Cavan/Monaghan and Meath during 2011/2012 or by Mayo during 2012/2013. Overall, GP-administered DTaP-IPV uptake decreased from 73.8% to 67.6%.

Uptake of MMR vaccine
Between 2011/2012 and 2012/2013, the uptake of the MMR vaccine in HSE-vaccine administered LHOs increased from 89.1% to 90.6% in Dublin Mid Leinster, from 82.8% to 86.8% in Dublin North East, from 78.5% to 83.1% in the Southern region and from 81.6% to 92.3% in the Western region. Overall, HSE-administered MMR uptake increased from 83.7% to 89.1%.

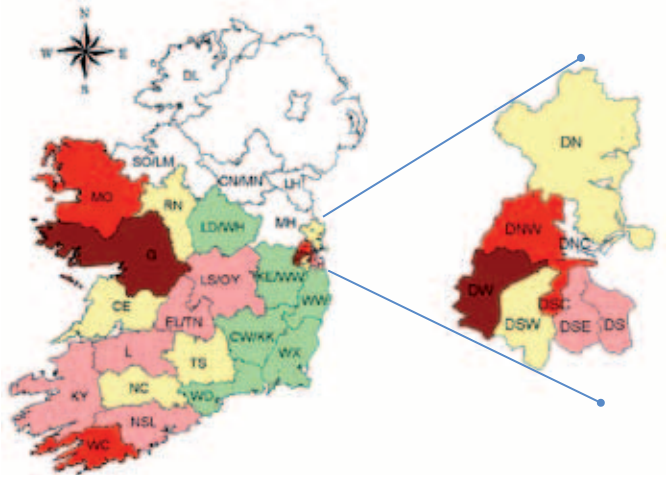
In GP-vaccine administered LHOs, uptake fell from 79.3% to 73.2% in Dublin North East, but increased from 86.6% to 90.3% in the Western region. During 2011/2012, no MMR uptake data was available for Louth, Cavan/Monaghan and Meath. Overall, GP-administered MMR uptake decreased from 84.6% to 78.2%.

It is hoped that the limitation of GP-vaccine administered only LHOs to Donegal and Sligo/Leitrim in 2013/2014 will lead to further overall increases in uptake for both vaccines.
Details of the uptake of the two vaccines in the HSE- and GP-vaccinated LHOs during 2012/2013 are presented in Table 1 and in the maps in Figure 1.

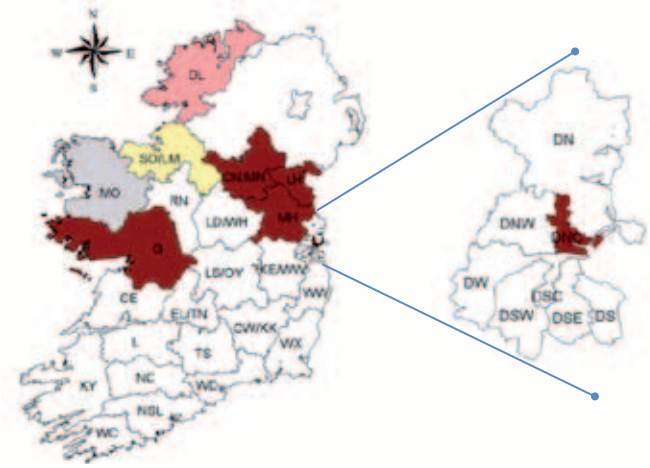
* DTaP-IPV = Diphtheria, Tetanus, acellular Pertussis and Polio vaccine



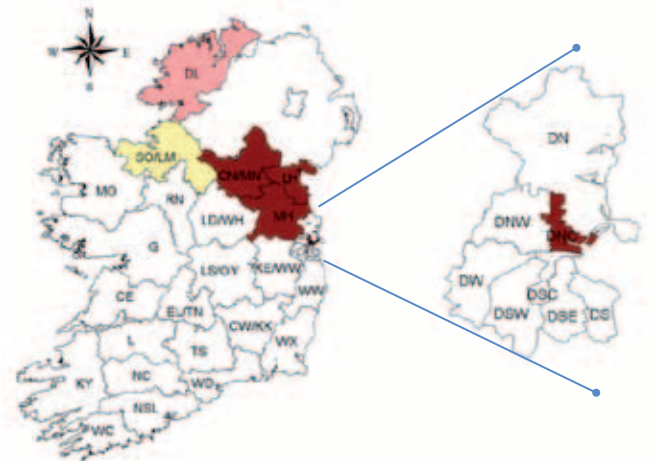
HSE-DTaP-IPV Vaccine Administered LHOs



HSE-MMR Vaccine Administered LHOs



GP-DTaP-IPV Vaccine Administered LHOs



GP-MMR Vaccine Administered LHOs

Data Not Reported
0-79
80-84
85-89
90-94
95-100
No Data

Figure 1. LHO Maps of DTaP-IPV & MMR vaccine uptake at Junior Infants level during the 2012/2013 academic year

Tdap vaccine uptake during the 2012/2013 academic year

The National Immunisation Advisory Committee recommends vaccination with tetanus and low-dose diphtheria and acellular pertussis (Tdap) vaccine at 11-14 years of age. Tdap vaccine uptake in the academic year 2012/2013, provided through the school immunisation programme for those in first year of second level schools and their equivalents in non-second level schools (i.e. special school, home schooled and out of school), and recorded on a national immunisation IT system are presented in table 2. The vaccinations are provided by vaccination teams from the Local Health Offices (LHOs) who go into schools in their areas to vaccinate. Data on vaccination is inputted into the national immunisation IT system at a local level. Delays in data inputting may impact on the accuracy of uptake data extracted from the system. Please see the HSE National Immunisation Office (NIO) website at www.immunisation.ie for detailed and current information on the school vaccination programme.

The data presented here are the result of collaboration between NIO, School Immunisation Teams, Immunisation Coordinators, Immunisation System Administrators, Immunisation administrative staff and HPSC.

The figures presented in this summary are based on data recorded on the national immunisation system on the 24th September 2014. These figures are provisional and subject to change due to ongoing updating of data on the database.

Table 1. Uptake of the DTaP-IPV and MMR vaccines in Junior Infants during the 2012/2013 academic year

	HSE-Vaccine Administered School Immunisations Programme for Junior Infants 2012/2013						GP-Vaccine Administered Programme for Junior Infants 2012-2013					
HSE Region & LHO	Cohort	Number children who have received 1 dose DTaP-IPV vaccine	%	Cohort	Number children who have received 1 dose MMR vaccine	%	Cohort	Number children who have received 1 dose DTaP-IPV vaccine	%	Cohort	Number children who have received 1 dose MMR vaccine	%
Dublin Mid Leinster												
Dublin South	1,915	1,690	88.3%	1,915	1,683	87.9%	HSE	HSE	HSE	HSE	HSE	HSE
Dublin South East	1,466	1,271	86.7%	1,466	1,271	86.7%	HSE	HSE	HSE	HSE	HSE	HSE
Wicklow	1,967	1,872	95.2%	1,967	1,870	95.1%	HSE	HSE	HSE	HSE	HSE	HSE
Dublin South City	1,423	1,185	83.3%	1,423	1,178	82.8%	HSE	HSE	HSE	HSE	HSE	HSE
Dublin South West	2,407	2,187	90.9%	2,407	2,188	90.9%	HSE	HSE	HSE	HSE	HSE	HSE
Dublin West	2,731	2,136	78.2%	2,731	2,131	78.0%	HSE	HSE	HSE	HSE	HSE	HSE
Kildare/W Wicklow	4,284	4,233	98.8%	4,284	4,223	98.6%	HSE	HSE	HSE	HSE	HSE	HSE
Laois/Offaly	2,742	2,424	88.4%	2,742	2,445	89.2%	HSE	HSE	HSE	HSE	HSE	HSE
Longford/Westmeath	2,116	2,089	98.7%	2,116	2,085	98.5%	HSE	HSE	HSE	HSE	HSE	HSE
Totals	21,051	19,087	90.7%	21,051	19,074	90.6%	0	0	0.0%	0	0	0.0%
Dublin North East												
Louth	GP	GP	GP	GP	GP	GP	2,099	1,523	72.6%	2,099	1,521	72.5%
Cavan/Monaghan	GP	GP	GP	GP	GP	GP	2,157	1,710	79.3%	2,157	1,709	79.2%
Meath	GP	GP	GP	GP	GP	GP	3,481	2,480	71.2%	3,481	2,427	69.7%
Dublin Nth West	3,275	2,695	82.3%	3,275	2,688	82.1%	HSE	HSE	HSE	HSE	HSE	HSE
Dublin Nth Central	GP	GP	GP	GP	GP	GP	1,385	1,024	73.9%	1,385	1,024	73.9%
Dublin North	4,183	3,804	90.9%	4,183	3,785	90.5%	HSE	HSE	HSE	HSE	HSE	HSE
Totals	7,458	6,499	87.1%	7,458	6,473	86.8%	9,122	6,737	73.9%	9,122	6,681	73.2%
West												
Limerick	2,015	1,760	87.3%	2,015	1,754	87.0%	HSE	HSE	HSE	HSE	HSE	HSE
Clare	1,894	1,717	90.7%	1,894	1,714	90.5%	HSE	HSE	HSE	HSE	HSE	HSE
Tipperary North	2,079	1,877	90.3%	2,079	1,867	89.8%	HSE	HSE	HSE	HSE	HSE	HSE
Galway	GP	GP	GP	3,640	2,620	72.0%	3,640	1,019	28.0%	HSE	HSE	HSE
Mayo	GP	GP	GP	1,881	1,530	81.3%	N/A	N/A	N/A	HSE	HSE	HSE
Roscommon	929	849	91.4%	929	850	91.5%	HSE	HSE	HSE	HSE	HSE	HSE
Donegal	GP	GP	GP	GP	GP	GP	2,305	2,054	89.1%	2,305	2,046	88.8%
Sligo/leitrim	GP	GP	GP	GP	GP	GP	1,456	1,353	92.9%	1,456	1,352	92.9%
Totals	6,917	6,203	89.7%	12,438	10,335	83.1%	7,401	4,426	59.8%	3,761	3,398	90.3%
South												
North Lee/South Lee	5,845	5,103	87.3%	5,845	5,103	87.3%	HSE	HSE	HSE	HSE	HSE	HSE
North Cork	1,527	1,390	91.0%	1,527	1,388	90.9%	HSE	HSE	HSE	HSE	HSE	HSE
West Cork	767	623	81.2%	767	623	81.2%	HSE	HSE	HSE	HSE	HSE	HSE
Kerry	2,184	1,961	89.8%	2,184	1,961	89.8%	HSE	HSE	HSE	HSE	HSE	HSE
South Tipperary	1,358	1,275	93.9%	1,353	1,275	94.2%	HSE	HSE	HSE	HSE	HSE	HSE
Carlow/Kilkenny	1,981	1,905	96.2%	1,979	1,973	99.7%	HSE	HSE	HSE	HSE	HSE	HSE
Waterford	2,041	2,011	98.5%	2,052	2,032	99.0%	HSE	HSE	HSE	HSE	HSE	HSE
Wexford	2,427	2,367	97.5%	2,403	2,367	98.5%	HSE	HSE	HSE	HSE	HSE	HSE
Totals	18,130	16,635	91.8%	18,110	16,722	92.3%	0	0	0.0%	0	0	0.0%
Overall Total	53,556	48,424	90.4%	59,057	52,604	89.1%	16,523	11,163	67.6%	12,883	10,079	78.2%

GP=Vaccine administered by GPs in these areas; HSE=Vaccine administered by HSE public health personnel in these areas; N/A=Data Not Available; Target population HSE-vaccine administered areas: All children in Junior Infants on the school register on 30/09/2012 for the 2012/2013 academic year; Target population in GP-vaccine administered areas: All children born between 01/09/2006 and 31/08/2007

Table 2. Tdap uptake data in the academic year 2012/2013 (provisional data)

HSE Region	Local Health Office/HSE Region	2012/2013				
		First year in second level and equivalent in special schools, home schooled and out of school (Routine cohort)			Outside cohort	
		Denominator	Numbers vaccinated with Tdap:	% Vaccinated with Tdap:	Denominator	Numbers vaccinated with Tdap:
Dublin Mid Leinster	Dublin South	1947	1455	74.7%	N/A	2
	Dublin South East	1164	889	76.4%	N/A	9
	Dublin South City	1432	1159	80.9%	N/A	6
	Dublin South West	1707	1355	79.4%	N/A	487
	Dublin West	1935	1344	69.5%	N/A	38
	Kildare/West Wicklow	3377	2825	83.7%	N/A	20
	Wicklow	1483	1187	80.0%	N/A	4
	Laois/Offaly	-	-	-	N/A	-
	Longford/Westmeath	-	-	-	N/A	-
	Total Dublin Mid Leinster	**13045**	**10214**	**78.3%**	**N/A**	**566**
Dublin North East	Dublin North	2943	2542	86.4%	N/A	8
	Dublin North Central	1479	1008	68.2%	N/A	1
	Dublin North West	2402	1727	71.9%	N/A	0
	Cavan/Monaghan	1805	1149	63.7%	N/A	1
	Louth	2036	1398	68.7%	N/A	5
	Meath	2340	742	31.7%	N/A	1665
	Total Dublin North East	**13005**	**8566**	**65.9%**	**N/A**	**1680**
South	North Cork	1208	991	82.0%	N/A	2
	North Lee - Cork	2472	2147	86.9%	N/A	4
	South Lee - Cork	2250	1973	87.7%	N/A	3
	West Cork	728	606	83.2%	N/A	0
	Kerry	1908	1650	86.5%	N/A	0
	Carlow/Kilkenny	1927	1800	93.4%	N/A	111
	South Tipperary	1148	1045	91.0%	N/A	8
	Waterford	1622	1592	98.2%	N/A	7
	Wexford	2165	1944	89.8%	N/A	20
	Total South	**15428**	**13748**	**89.1%**	**N/A**	**155**
West	Donegal	2289	2025	88.5%	N/A	1
	Sligo/Leitrim	1229	1175	95.6%	N/A	3
	Galway	2946	2212	75.1%	N/A	1
	Mayo	1742	1260	72.3%	N/A	132
	Roscommon	-	-	-	N/A	-
	Clare	1451	1281	88.3%	N/A	3
	Limerick	1887	1420	75.3%	N/A	96
	Tipperary NR/East Limerick	1908	1677	87.9%	N/A	6
	Total West	**13452**	**11050**	**82.1%**	**N/A**	**242**
Homeschooled		0	1	0	N/A	1
Total of LHOs and home schooled		**54930**	**43579**	**79.3%**	**N/A**	**2644**
Out of School		N\A	1	N\A	N/A	0
Total of LHOs and home schooled and out of school		**N\A**	**43580**	**N\A**	**N/A**	**2644**

Outside cohort refers to those who were vaccinated but who were outside the routine cohort for vaccination

Please note at the time of running this report Tdap vaccinations in Laois/Offaly, Longford/Westmeath and Roscommon were not recorded on the national database therefore their denominator numbers (i.e. numbers eligible for vaccination) are excluded here from the total denominator and calculation of percentage uptake figures.

Local health office (LHO) refers to the LHO of the school. Therefore, in reports the LHOs of homeschooled and out of school children do not appear

N/A-Not applicable

MMR vaccine catch-up campaign

In Ireland the first dose of MMR vaccine is recommended for children at 12 months of age. A second dose of MMR is recommended at four to five years of age. A MMR catch-up campaign started in October 2012 and continued during 2013. During the MMR catch up campaign the HSE offered a dose of MMR vaccine to second level students and primary school children who had not completed (or were not sure they had) their two dose MMR vaccination schedule. In Ireland this campaign was in response to measles and mumps outbreaks among those who had not received their recommended two MMR vaccine doses. It is also part of the World Health Organization campaign to eliminate measles and congenital rubella. Please see the NIO website at www.immunisation.ie for detailed and current information on the school vaccination programme.

MMR catch-up data entry was not complete at the time of writing this report and therefore MMR catch-up uptake data are not reported on here.

Acknowledgements

Many thanks to all HSE staff, Department of Education and Skills staff, staff in all educational settings, GPs, parents and children/students, who implemented, participated in and supported all these vaccination programmes.

09

Healthcare-Associated Infections
Antimicrobial Consumption
Antimicrobial Resistance

9.1.0 Healthcare-associated infections (HCAI)

Key Points

- In 2013, 1,835 cases of *Clostridium difficile* infection (CDI) were notified. Of those, 1,668 (91%) were classified as new cases, 146 (8%) as recurrent, with 21 (1%) of unknown case type. This represents a national crude incidence rate of 41.3 cases per 100,000 population, which is similar to the rate reported in 2012 (41.1)
- Of the 1,835 CDI cases, 1,240 (68%) were reported from patients aged 65 years or older
- The voluntary enhanced CDI surveillance scheme received information on 1,801 CDI cases from 50 hospitals, covering 89% of all cases notified to Public Health Departments. Of those, 875 were healthcare-associated, representing a national CDI incidence rate of 2.4 cases per 10,000 bed days used for 2013, a decrease from 2.7 in 2012
- Data collected on patient location at symptom onset highlights that CDI is not confined to acute healthcare facilities. It is commonly encountered in long term care facilities (11% of all CDI) and in the community (29% of all CDI)
- Of 258 *C. difficile* isolates with available ribotyping data (14% of all cases) reported from 19 hospitals, the most frequent ribotypes were: 078 (n=45; 17%), 014 and 001/072 (both n=24; 9%), 005 (n=18; 7%), 015 and 002 (both n=12; 5%)

9.1.1 *Clostridium difficile* Infection

Notifiable *C. difficile* infection

In May 2008, new cases of CDI in persons two years or older became notifiable in Ireland under the disease category "acute infectious gastroenteritis" (AIG). Since January 2012, CDI has become a notifiable infection in its own category, with both new and recurrent CDI cases now notifiable.

In 2013, 1,835 cases of CDI were notified to Public Health Departments via the Computerised Infectious Diseases Reporting (CIDR) system. Of those, 1,668 (91%) were classified as new, 146 (8%) as recurrent, with 21 (1%) of unknown case type (**Table 1**). All cases were laboratory-confirmed.

The national crude incidence rate (CIR) of new CDI cases in 2013 was 37.5 per 100,000 population, an increase of 2.7% from 36.6 per 100,000 population in 2012 (**Table 1**). Taking both new and recurrent cases into account, the overall CIR for 2013 was 41.3 per 100,000 population, which is similar to the reported rate in 2012 (41.1).

Since surveillance began in 2008, there has been a decrease in the incidence of CDI in Ireland (**Table 1, Figure 1**). Since 2012, the CDI incidence rate has remained stable. Fewer recurrent cases were notified in 2013 (n=146) compared to 2012 (n=179). Identification

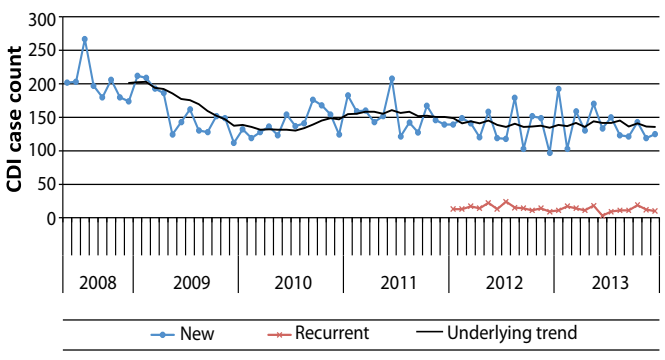


Figure 1. Numbers of CDI notifications by month and case type, 2008 – 2013. (Source: CIDR)

of seasonal patterns from CIDR notification data is hindered by delayed and batched laboratory notifications.

The majority of patients with CDI were female (61%). The mean age was 68 years (range: 2 – 99 years), with 1,240 cases (68%) reported in patients aged 65 years and older.

Regarding patient location at the time of CDI diagnosis, most were classified as 'hospitalised' (73%), with 14% from general practice, 5% from outpatients or day patients, 5% from the emergency department and 4% from either 'other', or 'unknown' patient location. This is similar to that reported in 2012. However, this data does not provide information on the origin or onset of CDI, as that information is collected as part of the enhanced CDI surveillance scheme.

In 2013, 28 deaths were reported in patients with CDI, which is similar to that reported in 2012. Two deaths were attributed to CDI, 16 were not attributed to CDI and for the remaining 10 deaths, the contribution of CDI to death was unknown.

Notifiable *C. difficile* infection: Outbreaks

In 2013, six CDI outbreaks, all healthcare-associated and involving 30 patients, were notified to Public Health Departments as displayed in **Table 2**. Five were linked to hospitals, and one to a residential institution.

Enhanced surveillance of *C. difficile* infection

Although notifiable CDI data provides important preliminary information on the burden of CDI in Ireland, it represents an underestimate of the true burden of CDI, as it does not capture information on the origin, onset or severity of CDI. National collation of *C. difficile* enhanced surveillance information commenced on a voluntary basis on 1st August 2009. Information on case type, origin, onset and infection severity is collected using the European Society for Clinical Microbiology

Table 1. CDI notifications by year and case type, 2008 – 2013 (Source: CIDR)

	Number of CDI cases notified				CDI rate per 100,000 population	
	New	Recurrent	Unknown	Total	New CDI rate[b]	Total CDI rate[c]
2008 (Wks19-53)[a]	1609	-	-	1609	59.2	-
2009	1900	-	-	1900	42.8	-
2010	1692	-	-	1693	38.1	-
2011	1847	-	-	1848	41.6	-
2012	1624	179	25	1828	36.6	41.1
2013	1668	146	21	1835	37.5	41.3

[a] The CDI rate from 2008 was adjusted for the year; [b] The new CDI rate is based on new cases of CDI only. [c] The total CDI rate is based on both new and recurrent cases of CDI. The CDI rate from 2008 was based on the 2006 census data, the data from 2009 onwards was based on 2011 census data

public hospitals [26 general (100%), nine tertiary (100%) and seven specialist hospitals (58%)] and eight private hospitals (67%).

In 2013, 1,801 CDI cases were reported to the enhanced surveillance scheme (89% of all the CDI cases notified via CIDR). Of those, 1,523 (84.5%) were classified as new, 154 (8.5%) as recurrent and 124 (7%) of unknown CDI case type.

Of the reported cases, 49% (n=875) originated within the reporting healthcare facility. The overall national CDI incidence rate of new and recurrent cases combined, acquired within the reporting healthcare facility was 2.4 cases per 10,000 bed days used (BDU), a decrease from 2.7 in 2012. The incidence rate of new CDI was 2.2 cases per 10,000 BDU, a decrease from 2.4 in 2012. The incidence of recurrent cases remained at 0.2 cases, unchanged from 2012. The CDI rate is based on the number of new and recurrent CDI cases that originated in the participating healthcare facility (both public and private hospitals). The rate is calculated using acute public hospital activity data from the HSE Business Intelligence Unit, Corporate Planning and Corporate Performance (CPCP), with private hospital activity data provided directly by participating hospitals.

Since enhanced surveillance began in 2009, the national CDI rate has declined from 3.1 cases per 10,000 BDU (2009) to 2.8 (2010), with an increase to 3.0 (2011). Since 2011, the rate further decreased from 2.7 (2012) to 2.4 (2013) (**Figure 2**).

Caution should be taken when interpreting national CDI trends, particularly prior to 2012 due to:

(i) Changes in the numbers of participating hospitals, as displayed in **Figure 2.** Throughout 2012, the total number of hospitals participating in enhanced CDI surveillance stabilised. In 2012 and 2013, there was complete participation in CDI enhanced surveillance by all tertiary and general hospitals

Table 2. CDI outbreaks reported in Ireland in 2013 by public health region (Source: CIDR)

Public Health Region	Outbreak location	Total number ill
West	Hospital	7
West	Hospital	7
West	Hospital	6
South	Residential insitution	2
South	Hospital	5
NorthWest	Hospital	3

(ii) Changes in *C. difficile* laboratory testing protocols. Throughout 2012 and 2013, there were fewer changes in laboratory testing protocols. Please also refer to the section on laboratory testing of *C. difficile* in Ireland.

There was a wide range in the incidence of CDI among participating hospitals in 2013 (range, 0 – 6.8 cases per 10,000 BDU; median = 1.8 cases). In 2013, tertiary hospitals (n = 9) had a median CDI rate of 2.6 cases per 10,000 BDUs (range: 2.1 – 3.8), which was higher when compared to that of general hospitals (n = 27), with a median rate of 2.0 (range: 0 – 6.8). Since 2011, the median CDI rate in both tertiary (3.0 to 2.6 cases per 10,000 BDU) and general hospitals (2.4 to 2.0 cases per 10,000 BDU) declined.

The differences in CDI median incidence rates may reflect inter-hospital variation with regard to patient case mix, *C. difficile* ribotypes, laboratory testing protocols, antimicrobial prescribing policies, antimicrobial stewardship interventions and surveillance resources. No obvious seasonal trend for CDI is distinguishable from enhanced surveillance data in 2013.

The percentage coverage of acute hospital activity was calculated using bed days used data from participating hospitals as a percentage of total acute hospital bed days used activity in Ireland

Severe CDI

A severe case of CDI is defined as (i) a patient requiring admission to an intensive care unit (ICU) for treatment of CDI or its complications, (ii) a patient requiring colectomy or (iii) death within 30 days after diagnosis, if CDI is either the primary or contributory cause of death. The enhanced CDI surveillance scheme does not collect information on patient outcome. Therefore, surgery and ICU admission for CDI are the two markers of severity captured via enhanced surveillance. In 2013, 31 (1.7%) severe CDI cases were reported, similar to 2012 (1.5%). Six patients required both surgery and ICU admission, six required surgery only and 19 required ICU admission without surgery.

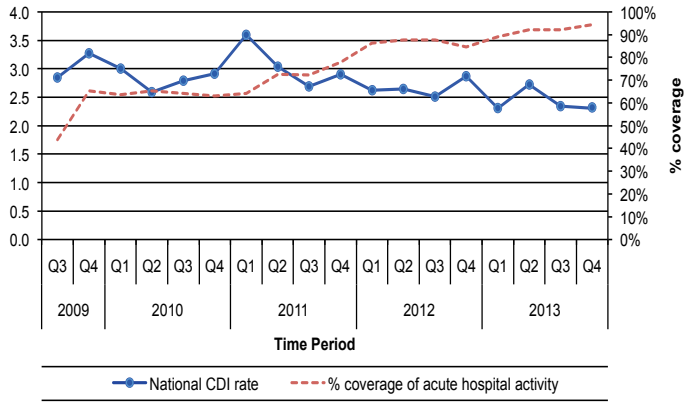


Figure 2. Quarterly national rate of healthcare-associated CDI (new and recurrent): 2009 – 2013
The percentage coverage of acute hospital activity was calculated using bed days used data from participating hospitals as a percentage of total acute hospital bed days used activity in Ireland

Onset & Origin of CDI

Onset: Patient location when symptoms of CDI commenced

Sixty percent (n=1,088) of patients had CDI symptom onset in a healthcare facility (healthcare-onset), 29% (n=520) had symptom onset in the community and for 11% (n=193), location at CDI onset was unknown (**Table 3**).

Of the 1,088 patients with healthcare onset CDI, 75.3% (n=819) had onset in the reporting hospital, 2.4% (n=26) in another hospital, 18% (n=196) in a long term care facility (LTCF) and for the remaining 4% (n=47) onset location was unknown.

Between 2011 and 2013, there was a decrease in the proportion of patients with CDI symptom onset in a healthcare facility (71 to 60%), with the exception of LTCFs, where an increase was noted (14 to 18%). While community onset remained unchanged over this period, an increase in the proportion with unknown location of symptom onset was observed (2 to 11%) (**Table 3**).

Origin: Location where the patient acquired the CDI

For the majority of CDI cases, the infection was acquired in a healthcare setting (healthcare-associated) (n=1,145; 64%). Community-associated cases accounted for 18% (n = 324) and in 5% (n = 87) the origin could not be assigned as either healthcare or community-associated, as the patient had been discharged from a healthcare facility between four and 12 weeks prior to the CDI

Table 3. Origin and onset of CDI, 2011 – 2013

	Year		
	2011 %	2012 %	2013 %
ONSET: Location of where patient symptoms occurred			
Healthcare-onset	71	64	60
Breakdown of healthcare-onset cases:			
Within reporting hospital	78	77	76
Other hospital	6	4	2
Nursing home/LTCF	14	16	18
Unknown	1	3	4
Community-onset	27	30	29
Unknown	2	6	11
ORIGIN: Location of where infection was acquired			
Healthcare-associated	74	68	64
Breakdown of healthcare-associated cases:			
Within reporting hospital	78	76	76
Other hospital	8	6	5
Nursing home/LTCF	13	15	17
Unknown	1	3	2
Community-associated	20	17	18
Indeterminate	3	5	5
Unknown	4	10	14

onset date. For the remaining 14% (n = 245) of cases, the origin was unknown (**Table 3**).

Of the 1,145 healthcare-associated CDI cases, 76% (n=875) originated in the reporting hospital, 5% (n=53) originated in a hospital other than the reporting hospital, 17% (n=189) originated in a LTCF and 2% (n=28) originated in another unspecified healthcare facility or were of unknown origin.

Between 2011 and 2013, there was a decrease in the proportion of cases associated with a healthcare facility (74 to 64%), in particular for the reporting hospital and other hospital categories. However an increase in cases associated with LTCFs was reported (13 to 17%). There was little change in cases classified as community-associated or indeterminate, while cases classified as 'unknown' increased (4 to 14%) (**Table 3**).

Of the 1,145 cases of healthcare-associated CDI:

- 88.5% (n=1,013) experienced onset of CDI symptoms at least 48 hours following admission to a healthcare facility (healthcare-onset, healthcare-associated)
- 11.2% (n=128) experienced symptom onset in the community, within four weeks of discharge from a healthcare facility (community-onset, healthcare-associated)
- 0.3% (n = 4) had no information recorded on symptom onset

Of the 324 cases of community-associated CDI:

- 89% (n=289) experienced CDI symptom onset while outside a healthcare facility and without a history of discharge from a healthcare facility within the previous 12 weeks
- 10% (n=33) experienced symptom onset within the first 48 hours of admission to a healthcare facility, without a history of admission to or residence in a healthcare facility within the previous 12 weeks
- 1% (n = 2) had no information recorded on symptom onset

Information was also captured on the location where the patient's faeces specimen was taken. The reporting hospital accounted for the majority (76%) of specimens (n=1,379), with 10% (n=179) taken in the GP surgery, 11% (n=203) in LTCF and 2% (n=28) in a hospital other than the reporting hospital. For the remaining 1% (n=12), no information was provided.

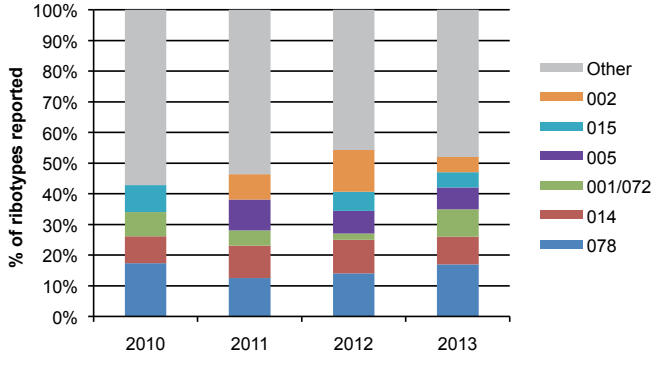


Figure 3. Most frequently reported C. difficile ribotypes in Ireland: 2010 – 2013

Discussion

The collation of national data on *C. difficile* through CIDR notifications and the enhanced CDI surveillance system has provided a valuable insight into the burden of CDI in Ireland. Both surveillance systems present a similar decreasing trend since 2009. The notifiable surveillance system, which reflects total burden of disease, shows that the CDI rate stabilised in 2012 and 2013, while the enhanced surveillance system shows a decrease in the CDI rate during this time period, including a decrease in the number of new CDI cases acquired in an acute hospital. The reasons for this decrease are unknown, but may be attributed to improved hand hygiene compliance and other infection control practices, changes in antimicrobial prescribing or changes in laboratory testing practices.

In 2013, recurrent CDI accounted for 8.5% of notifications through the enhanced surveillance scheme, a slight decrease from 9.2% in 2012. Recurrent CDI may result in severe infection, places a further burden on limited hospital isolation resources and results in significant patient morbidity.

CDI is not confined to acute healthcare settings and is increasingly common in LTCF and the community. In 2013, 11% of cases had onset in LTCF, with 29% having onset in the community. Of the 324 community-associated cases reported in 2013, 89% experienced CDI symptom onset in the community, without a history of discharge from a healthcare facility within the previous 12 weeks. It is important to consider CDI in the differential diagnosis of all patients presenting with diarrhoea of potentially infectious origin and to send specimens in a timely fashion for laboratory diagnosis.

***C. difficile* PCR ribotyping**

As part of the voluntary *C. difficile* enhanced surveillance scheme, participating hospitals are requested to provide *C. difficile* PCR ribotyping information, where available. Ireland does not yet have a national *C. difficile* reference laboratory or ribotyping service. Therefore, laboratories submit specimens abroad for ribotyping. In 2013, ribotyping data was provided for 258 *C. difficile* isolates (14% of all samples) from 19 hospitals.

The most common ribotypes reported in 2013 were: 078 (n=45; 17%), 014 and 001/072 (both n=24; 9%), 005 (n=18; 7%), 015 and 002 (both n=12; 5%) (**Figure 3**). In 2013, one tertiary hospital reported that 60% of all *C. difficile* isolates were ribotyped, with a similar pattern of ribotypes to the national picture.

Laboratory Testing of *C. difficile* in Ireland
Since 2010, information on *C. difficile* testing has been collected quarterly as part of the enhanced surveillance system. In the first quarter of 2010, the majority of hospitals participating in the enhanced surveillance project were using a one step Toxin EIA (60%). In the last quarter of 2013, this had reduced to 18%. A gradual increase in the use of more sensitive testing approaches, such as PCR has been observed: 0% (Q1 2010) versus 61% (Q4 2013) (**Figure 4**).

Owing to considerable variations in current Irish laboratory *C. difficile* testing methodologies, inter-hospital comparison of CDI rates is not recommended where testing methods differ, as the data in the national quarterly enhanced surveillance reports are not adjusted for differences in the sensitivities of the different diagnostic methodologies.

Conclusion
The continued excellent participation in the voluntary CDI enhanced surveillance scheme ensures that a significant amount of information is collected regarding the burden of CDI in Ireland.

The updated National Clinical Guidelines on the Surveillance, Diagnosis and Management of CDI in Ireland were updated in 2013 and endorsed by the National Clinical Effectiveness Committee in 2014. The updated guidelines may be accessed on the HPSC website at:
www.hpsc.ie/A-Z/Gastroenteric/Clostridiumdifficile/Guidelines/.

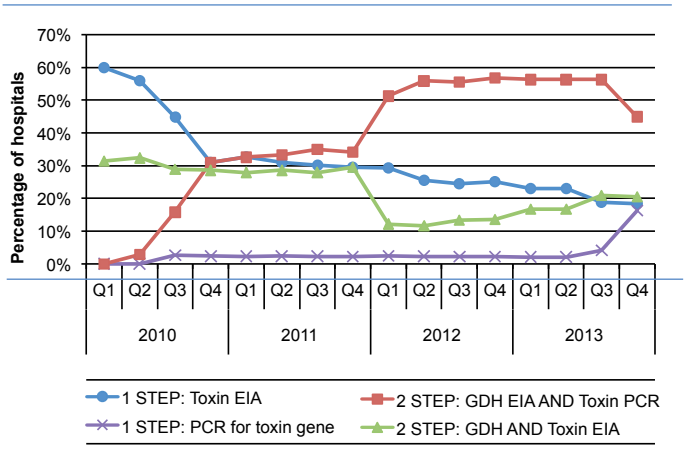


Figure 4. Changes in C. difficile laboratory testing protocols: 2010 - 2013

1 STEP: Toxin EIA: EIA for the detection of *C. difficile* TcdA and/or TcdB. **1 STEP: PCR for toxin gene:** Polymerase chain reaction (PCR) for the detection of TcdA and/or TcdB genes; **2 STEP: GDH AND TOXIN EIA:** Enzyme immunoassay (EIA) for the detection of glutamate dehydrogenase (GDH) of *C. difficile* as well as or followed by an EIA for the detection of *C. difficile* TcdA and/or TcdB.; **2 STEP: GDH EIA AND Toxin PCR:** EIA for the detection of GDH of *C. difficile* as a first screening test followed by a PCR for the detection of TcdA and/or TcdB genes.

9.1.2 HCAI Surveillance

9.1.2.1 Point Prevalence Survey of Healthcare-Associated Infections & Antimicrobial Use in European Long-Term Care Facilities (HALT): May 2013

Summary

In May 2013, 9,318 residents in 190 Irish long-term care facilities (LTCF) were included in a European point prevalence survey (PPS) of healthcare-associated infections (HCAI) and antimicrobial use. The survey is also known as the HALT survey.

- Of the 190 LTCF, the majority were owned by the Health Service Executive (HSE) [n=128; 67%], followed by private [n=39; 21%] and voluntary services [n=23; 12%]
- The median capacity of participating LTCF was 46 beds (range = 5 – 203) and the median bed occupancy on the HALT survey date was 94%
- Overall, single room accommodation accounted for a median of 34% of available beds. The proportion of single room accommodation was much lower in HSE-owned than privately-owned LTCF (21% versus 76%)
- For the purposes of data analysis and reporting, the 190 LTCF were stratified into the following different care type categories, based on the characteristics and estimated length-of-stay (LOS) for the majority of the residents:
    - **General nursing homes >12 months (GN>12m):** 103 long-stay facilities with 5,807 residents
    - **Mixed care type facilities >12 months (Mixed>12m):** 26 long-stay facilities with 1,409 residents
    - **LTCF caring for residents with intellectual disabilities (Intellectually disabled):** 24 facilities with 1,060 residents
    - **LTCF (either general nursing homes or mixed care type facilities) <12 months (LTCF<12m):** 15 short-stay facilities with 374 residents
    - **LTCF caring for residents with psychiatric conditions (Psychiatric):** 11 facilities with 345 residents
    - **Other care types:** Facilities caring for residents with palliative care needs (4 facilities with 89 residents), rehabilitation needs (3 facilities with 139 residents), physical disabilities (2 facilities with 46 residents) and 'other' care types (2 facilities with 49 residents)
- The national crude HCAI prevalence was 5.3% and the national median HCAI prevalence was 4.2%. The median prevalence was higher in rehabilitation (7.8%), LTCF<12m (8.3%), Mixed>12m (6.1%) and the lowest median HCAI prevalence was reported from GN>12m (4.2%), psychiatric (4.3%) and physically disabled LTCF (no HCAI detected in 46 residents)
- The most prevalent HCAI types were: respiratory tract infections (RTI), urinary tract infections (UTI) and skin infections; affecting 1.9%, 1.7% and 1.3% of all residents, respectively
- The national crude antimicrobial use prevalence was 9.8% and the national median antimicrobial use prevalence was 9.7%. The median prevalence was higher in LTCF<12m (11.2%). At 24.5%, the prevalence in palliative care was more similar to antimicrobial use prevalence reported from acute hospital settings
- The majority of antimicrobials were prescribed within the LTCF (81%), mainly by GPs and directly-employed doctors
- Whilst the majority of antimicrobials were prescribed to treat infection, the proportion that were prescribed for infection prevention/prophylaxis was particularly high in intellectually disabled LTCF (49%), GN>12m (39%) and Mixed>12m (35%)
- During HALT 2013, 3.2% of GN>12m, 2.9% of Mixed>12m and 2% of intellectually disabled LTCF residents were prescribed antimicrobials for UTI prophylaxis. Prophylaxis against RTI (1.9%) and skin infection (1.4%) was most prevalent in intellectually disabled LTCF
- The full HALT 2013 National Report and the recommended future priorities for prevention of HCAI and improving antimicrobial stewardship in Irish LTCF is available at the following link:

http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HCAIinlongtermcarefacilities/HALTReports/2013Report/National2013HALTReport/

9.1.3 Hand Hygiene

9.1.3.1 Alcohol Hand Rub Surveillance

Summary

Key Points

- The median rate of alcohol hand rub consumption in acute hospital in Ireland increased by 10% to 26.3 litres per 1,000 bed-days used in 2013, from 23.9 in 2012

Hand hygiene is one of the most important actions to prevent Healthcare Associated Infection (HCAI). Alcohol hand rubs (AHR) are an effective and rapid method of hand hygiene, and recommended as the primary means of hand hygiene in national and international guidelines. Measurement, which includes alcohol hand gels and foams, of hospital-level consumption of AHR, expressed as volume used per 1,000 bed-days, has been shown to correlate with overall hand hygiene activity in hospitals. It is a recommended process measure of hand hygiene activity by both the World Health Organisation (WHO) and the US Centers for Disease Control & Prevention (CDC).

HPSC has collated data on AHR consumption in acute public hospitals in Ireland since 2006. The data are collected quarterly and represent the total volume of AHR dispensed to wards, clinics and other hospital areas for hospitals that provide the data via their pharmacy department, and total volume purchased for hospitals that provide the data via their supplies department. Quantities used for pre-operative surgical hand hygiene were excluded. The rate of usage per hospital is calculated as the total volume of AHR consumed in litres per 1,000 bed-days used (Table 1).

In 2013, the median rate of AHR consumption increased to 26.3 litres per 1,000 bed-days used, from 23.9 in 2012, an increase of 10%. The wide variation in levels of AHR consumption between hospitals (16.4 – 132.5 litres per 1,000 bed-days used) may, in part, be explained by differences in methodologies for collecting and reporting the data, and difference in types and range of hand hygiene agents used. One limitation of this surveillance system is that the data refer to the use of AHR only, and do not take account of the other hand hygiene agents (e.g. medicated liquid soap) that may also be in use in hospitals. In addition, the data do not give an indication of the frequency with which hand decontamination is carried out at a given hospital, whether or not hand hygiene is carried out at the correct time or using the correct technique, nor distinguish between who has used the AHR (visitor, patient or healthcare worker). Nevertheless, given that AHR should be used for the vast majority of hand hygiene opportunities in hospital settings, AHR consumption remains a useful process measure for hand hygiene activity.

The data are prone to reporting artefacts, particularly for hospitals that report supplies (rather than pharmacy dispensing) data. For example, the hospital with the highest reported rate had undergone a change in suppliers and the products had been restocked in all areas of the hospital over a relatively short period of time. It is expected that there will be occasional outliers of this nature. Using the median consumption figure provides a stable indicator of the national AHR rate over time. However, the volume of AHR consumed remains a crude measure of hand hygiene activity at individual hospital level and must be viewed with other indicators such as direct observation of hand hygiene compliance.

Further information may be found at: http://www.hpsc.ie/A-Z/Gastroenteric/Handwashing/

Table 1. National data on AHR consumption in acute public hospitals in Ireland by year, 2006 – 2013.

	2006	2007	2008	2009	2010	2011	2012	2013
Number of participating hospitals	52	50	50	49	45	43	44	44
National consumption rate*	10.3	14.9	18.1	22.1	19.2	21.2	23.9	26.3
Range for participating hospitals in litres per 1,000 bed-days used	0.5 - 29.0	5.2 - 47.1	5.9 - 52.5	7.8 - 47.7	7.6 – 36.4	10.6 - 129.4	12.5 - 160	16.4 - 132.5

* The consumption rate is the total volume of AHR consumed in the defined time period in litres per 1,000 bed-days used. The national rate represents the median of the national sample for each time period.

9.1.3.2 Hand Hygiene Compliance

Summary

There were two national hand hygiene compliance audits in 2013:

- For Period 5 (May/June), 49 hospitals participated: 42 HSE and seven private hospitals. In total, 10,247 hand hygiene opportunities were observed; achieving an average compliance of 86.3% (range = 63.8 - 95.7%)
- For Period 6 (October/November), 48 hospitals participated: 42 HSE and six private hospitals. In total, 10,040 hand hygiene opportunities were observed; achieving an average compliance of 87.1% (range = 69 - 98.1%)
- Overall hand hygiene compliance in HSE hospitals, for periods 5 & 6 combined, was 85.7%, which was below the 2013 HSE target of 90%. However, the underlying trend in hand hygiene compliance increased
- Overall hand hygiene compliance in participating private hospitals, for periods 5 & 6 combined, was 93.4%

Hand hygiene is one of the most important actions to prevent healthcare-associated infections (HCAI). Measuring hand hygiene compliance by direct observation is described by the World Health Organisation (WHO) as the gold standard. In Ireland, collection of biannual hand hygiene compliance audit data from acute hospitals commenced in 2011. Healthcare workers (HCWs) are observed for their compliance against the '5 moments for hand hygiene' by trained auditors using the WHO methodology for hand hygiene audits. Each participating hospital is required to measure HCW compliance against 30 hand hygiene opportunities for each of the seven randomly selected wards in the facility, resulting in a maximum of 210 opportunities per hospital per audit period. In 2013, data analysis and management moved to the Health Protection Surveillance Centre (HPSC) on-line service: MicroB.

Biannual audits were undertaken in May/June (Period 5) and October/November 2013 (Period 6). Within the 42 participating HSE hospitals, a total of 8,800 hand hygiene opportunities were observed in Period 5, with 8,786 observed in Period 6. Combined results for the two periods are displayed in Table 1 and Figure 1.

In 2013, the overall compliance for HSE and private hospitals combined was 86.2%. The compliance of 85.7% for HSE hospitals alone fell below the HSE 2013 target of 90%. However, the underlying trend for compliance among HSE hospitals has increased (Figure 2) over the last six periods. Participating private hospitals had an overall compliance of 93.4% in 2013.

In 2013, of the four major HCW categories, medical staff had the lowest compliance at 75.2% and nursing/midwifery staff the highest at 90.1%. Based on the WHO '5 moments for hand hygiene', compliance for 'Moment 5' (after touching patient surroundings) was the lowest at 81.8% and highest for 'Moment 3' (after body fluid exposure risk) at 91.2%. The proportion of hand hygiene actions involving soap and water was 34.6% versus those involving use of alcohol hand rub at 65.4%. Data from private hospitals were excluded from Table 1 and Figure 1 sections: Staff Categories and WHO 5 Moments.

Caveats

While standardised hand hygiene auditor training and validation (with inter-rater reliability testing) should ensure that measurement of hand hygiene compliance is comparable, the results have not been validated by external auditors. Furthermore, all auditors measured compliance in the facility in which they work. Therefore, there may be an element of bias in the results. It is therefore possible that hand hygiene auditing may not have been performed in a comparable fashion in all hospitals. The results may also not be reflective of HCW compliance at all times. Compliance with hand hygiene is measured by auditors observing HCWs workers undertaking patient care who may change their behaviour if aware that they are being observed. However, this effect (known as the Hawthorne effect) diminishes over time and HCWs under observation may not be aware of the presence of the auditor due to the many competing demands on their attention. Auditors are requested to give immediate feedback to ward staff following an audit, thereby increasing awareness and knowledge of hand hygiene. This risk of bias should be balanced by the benefits of increasing local staff knowledge and awareness of hand hygiene.

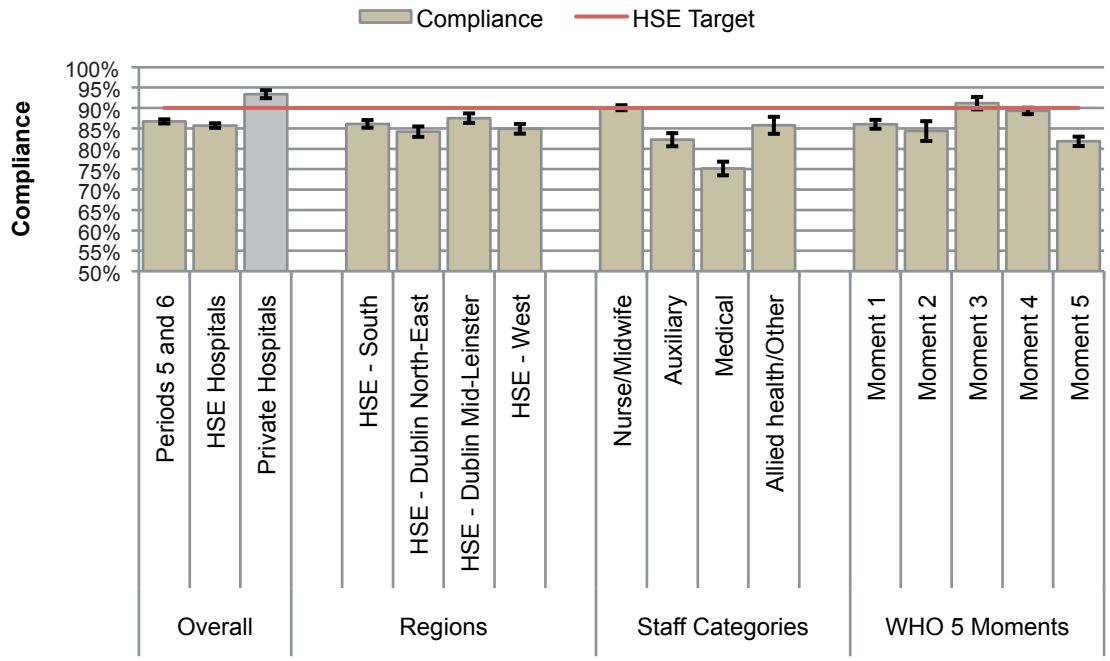
Table 1: Summary of hand hygiene compliance in acute hospitals in Ireland (combined for the two national audit periods in 2013).

	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Overall	20,287	17,591	86.7%	86.2%	87.2%
HSE Hospitals	17,586	15,069	85.7%	85.1%	86.2%
Private Hospitals	2,701	2,522	93.4%	92.4%	94.3%
HSE - South	6,084	5,238	86.1%	85.2%	87.0%
HSE - Dublin North-East	3,746	3,154	84.2%	82.9%	85.5%
HSE - Dublin Mid-Leinster	3,561	3,116	87.5%	86.3%	88.7%
HSE - West	4,195	3,561	84.9%	83.7%	86.1%
Nurse/Midwife	10,274	9,253	90.1%	89.5%	90.7%
Auxiliary	2,638	2,169	82.2%	80.6%	83.8%
Medical	3,411	2,564	75.2%	73.5%	76.8%
Allied health/Other	1,263	1,083	85.7%	83.7%	87.8%
Moment 1	4,614	3,968	86.0%	84.9%	87.1%
Moment 2	1,028	867	84.3%	81.9%	86.8%
Moment 3	1,473	1,343	91.2%	89.7%	92.7%
Moment 4	6,627	5,916	89.3%	88.5%	90.1%
Moment 5	5,275	4,316	81.8%	80.7%	83.0%

Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "Allied health/Other" includes physiotherapists, radiologists, dieticians, social workers and pharmacists

Moment 1: Before touching a patient; Moment 2: Before clean/aseptic procedure; Moment 3: After body fluid exposure risk; Moment 4: After touching a patient; Moment 5: After touching patient surroundings

Note that data from private hospitals were excluded for the 'Staff Categories' and 'WHO 5 Moments'.



Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "Allied health/Other" includes physiotherapists, radiologists, dieticians, social workers and pharmacists

Moment 1: Before touching a patient; Moment 2: Before clean/aseptic procedure; Moment 3: After body fluid exposure risk; Moment 4: After touching a patient; Moment 5: After touching patient surroundings

Figure 1: Summary of hand hygiene compliance in acute hospitals in Ireland (combined for the two national audit periods in 2013). The 95% confidence intervals are shown in bars and the HSE target for 2013 (90%) is shown as a red line.

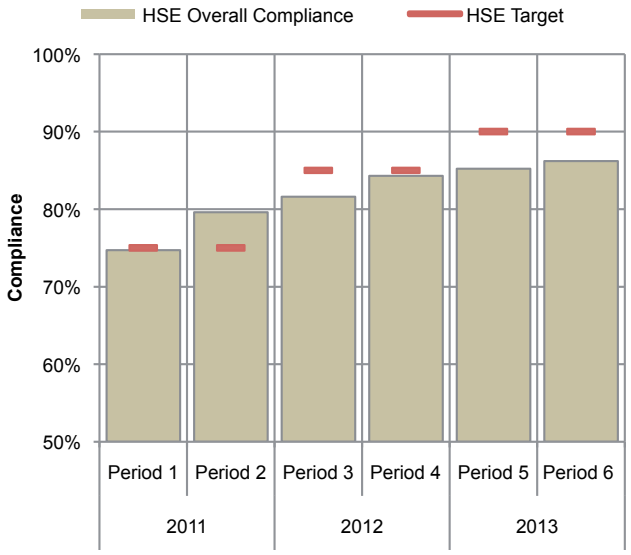


Figure 2: Summary of biannual hand hygiene compliance in HSE acute hospitals in Ireland for the first six national audit periods (2011 to 2013). The annual HSE target for compliance is shown as red lines.

Note that data from private hospitals were excluded for the 'Staff Categories' and 'WHO 5 Moments' sections.

9.2.0 Antimicrobial Consumption

Key Points

- The overall outpatient antimicrobial consumption in Ireland for 2013 was 23.8 DID, an increase from the 2012 rate of 22.9 DID. This rate is mid-to-high in comparison with other European countries
- The median rate of hospital antimicrobial consumption in Ireland for 2013 was 84.9 DBD (range 32.8 – 114.8 DBD), a 2.5% decrease from 2012. This rate is mid-range in comparison with other European countries. Forty-two public acute hospitals contributed data in 2013

Ireland participates in ECDC's European Surveillance of Antimicrobial Consumption (ESAC-Net) project which aims to collect systemic antimicrobial usage data from the outpatient (ambulatory, community or primary care) setting and from the hospital (inpatient) setting. Antimicrobial consumption is measured in Defined Daily Dose (DDD), which is the assumed average maintenance dose per day for a drug used for its main indication in adults. Rates are calculated in DDD per 1000 inhabitants per day (DID) for outpatients and DDD per 100 bed-days used (DBD) for inpatients. Please see "Antimicrobial consumption" and "Denominator data" parts of the explanatory notes section for further details. In 2013, the analysis and management of data were moved to the HPSC online service, MicroB.

Outpatient Antimicrobial Consumption

The overall outpatient antimicrobial consumption for Ireland in 2013 was 23.8 DID, an increase of 4% from the previous year's rate of 22.9 DID. In the latest interim ESAC-Net report (provisional 2013 data), the reported range of outpatient antimicrobial usage among European countries was 10.8 to 30.1 DID. The median for 27 European countries with reliable data was 19.0 DID, with Ireland ranking as the seventh highest.

The underlying trend for outpatient antimicrobial consumption for Ireland (Figure 1) has been increasing steadily since 2000. After a decrease in 2009, the rate increased again to the highest level so far in 2013. There is a marked seasonal fluctuation in usage, with the highest levels occurring during periods of increased influenza activity.

In Ireland in 2013, outpatient consumption of penicillins accounted for the largest class used (55.1% of total at 13.1 DID), followed by macrolides (18.5%, 4.4 DID), tetracyclines (12.5%, 3.0 DID), cephalosporins (5.7%, 1.4 DID), sulphonamides/trimethoprim (4.1%, 1.0 DID) and fluoroquinolones (3.7%, 0.9 DID). Other antimicrobial classes accounted for less than 1% of total use. Penicillin in combination with a beta-lactamase inhibitor (such as co-amoxiclav) accounted for the largest proportion of all penicillins at 53% (7.0 DID). Broad-spectrum penicillin (such as amoxicillin) usage was also high at 29.7% of all penicillins (3.9 DID). See Table 1 for a detailed breakdown by pharmacological drug groups.

There was considerable variability in the overall outpatient antimicrobial usage at county level (18.2 to 32.6 DID) as shown in Figure 2.

Hospital Antimicrobial Consumption

Forty-two public acute hospitals provided valid antimicrobial usage data for 2013. The median rate of antimicrobial consumption was 84.9 DBD (range 32.8 – 114.8 DBD). This was a 2.5% decrease from the previous year's rate of 89.1 DBD. The overall rate for 2013 was 84.4 DBD. These levels are mid-to-high in Europe.

The largest group of antimicrobials, penicillins at 41.8 DBD accounted for 50% of all inpatient antimicrobial usage. The use of fluoroquinolones such as ciprofloxacin (representing 7% of all inpatient antimicrobial usage) was 5.5 DBD. Consumption of cephalosporins, monobactams and carbapenems (representing 10% of all inpatient antimicrobial usage) was 8.1 DBD. Consumption of glycopeptides such as intravenous vancomycin, imidazoles such as intravenous

metronidazole and nitrofurans (representing 10% of all inpatient antimicrobial usage) was 8.8 DBD. Consumption of erythromycin and related agents (representing 14% of all inpatient antimicrobial usage) was 11.7 DBD. Less frequently used agents in hospitals are tetracyclines, sulfonamides/trimethoprim, aminoglycosides and other systemic antimicrobials; collectively these drugs represent just less than 10% of all inpatient antimicrobial usage. All consumptions levels remained proportionately the same as those seen 2012 (see Figure 3).

Hospital function was the main driver for the differences in the rates of antimicrobial consumption between hospitals. The rates for regional/tertiary and general hospitals (medians 84.4 and 87.5 DBD) centred around the median for Ireland, while the rate for single specialist facilities (maternity, orthopaedic or paediatric) was much lower (median 47.2 DBD). The lower median consumption in single speciality hospitals probably reflects differences in case-mix, compared to other hospitals. However it may also reflect the fact that DDDs are based on adult dosing and may therefore underestimate antimicrobial consumption in paediatric settings.

It should be noted that the data do not indicate whether or not the level of antimicrobial use is

Table 1. Breakdown by pharmacological drug groups for outpatient antibiotic use in Ireland for 2012 and 2013.

	2012	Percent of 2012	2013	Percent of 2013	Percent Change 2012 to 2013
Penicillins	12.5	54.6%	13.1	55.1%	5.0%
Narrow spectrum penicillins	1.0	4.4%	1.1	4.5%	7.2%
Beta-lactamase resistant penicillins	1.0	4.6%	1.2	5.0%	13.6%
Broad spectrum penicillins	3.7	15.9%	3.9	16.4%	6.8%
Penicillin with beta-lactamase inhibitor	6.8	29.7%	7.0	29.2%	2.4%
Macrolides and related drugs	4.2	18.2%	4.4	18.5%	5.7%
Tetracylines	2.9	12.8%	3.0	12.5%	1.6%
Cephalosporins and other beta-lactam drugs	1.2	5.2%	1.4	5.7%	14.6%
First-generation cephalosporins	0.2	0.8%	0.2	0.8%	10.9%
Second-generation cephalosporins	0.9	4.0%	1.1	4.5%	17.9%
Third-generation cephalosporins	0.1	0.4%	0.1	0.4%	-8.5%
Quinolones	0.9	3.8%	0.9	3.7%	0.3%
Sulfonamides and Trimethoprim	1.2	5.0%	1.0	4.1%	-14.5%
Other antibiotics	0.1	0.5%	0.1	0.4%	-8.1%
TOTAL	**22.9**	**100.0%**	**23.8**	**100.0%**	**4.0%**

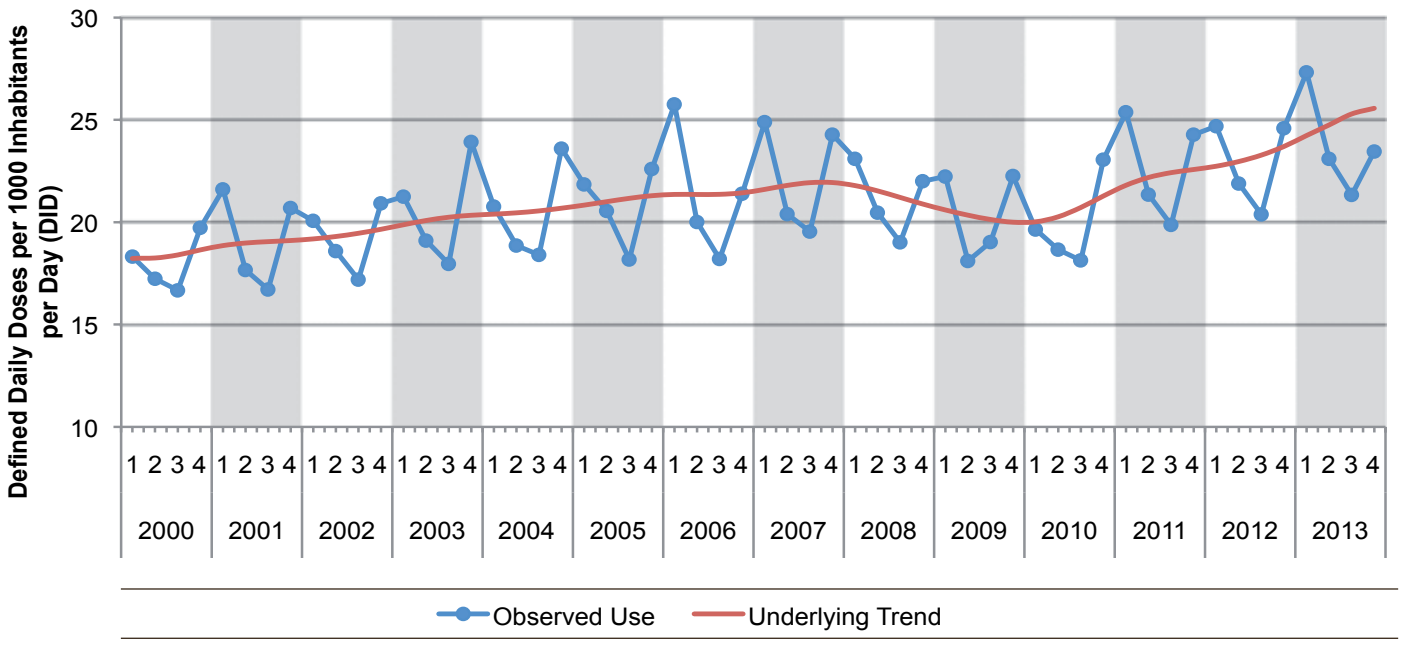


Figure 1. Outpatient antibiotic consumption in Ireland by quarter, 2000-2013.

appropriate for a given patient population. For example, higher levels of antimicrobial consumption among tertiary hospitals may be appropriate if such hospitals have specific patient populations that are more likely to require antimicrobial therapy (e.g. organ transplant, cystic fibrosis etc).

More detailed analyses of antimicrobial usage data can be found on the www.hpsc.ie website, through "Topics A-Z", under "Antibiotic Consumption Surveillance". Details of the WHO ATC/DDD system of classifying and measuring drug consumption can be found at www.whocc.no/atc_ddd_index/. The figures presented in this report may vary from previously published levels owing to methodological changes.

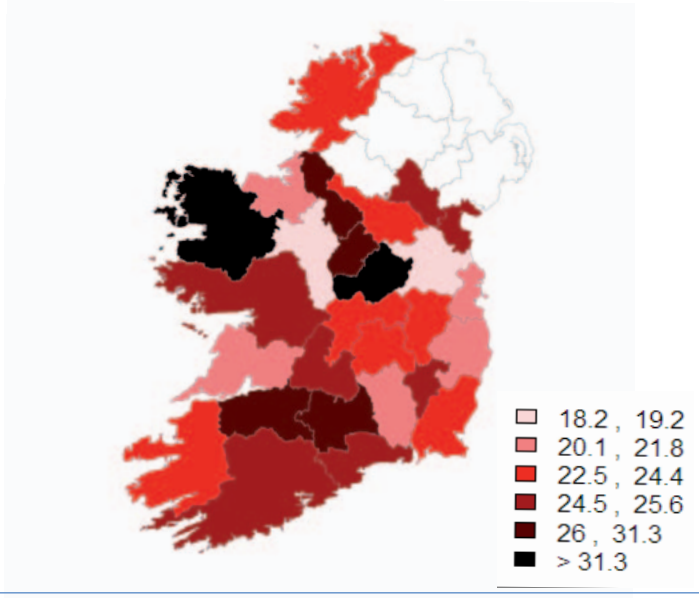


Figure 2. Outpatient antibiotic consumption in Ireland by county, in DDD per 1000 inhabitants per day for 2013.

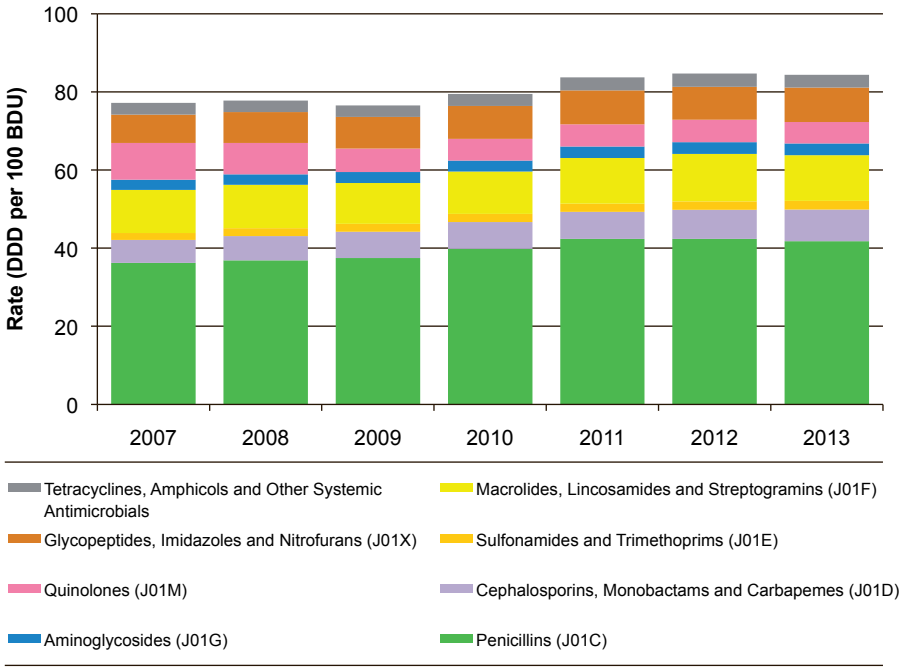


Figure 3. Overall hospital antibiotic consumption rate in DDD per 100 BDU by pharmacological subgroup (ATC level 3) by year.

9.3.0 Antimicrobial Resistance

Key Points

- There were 2,530 reports of invasive *E. coli* infection, an increase of 3% from 2,450 (2012):
  - The proportions of invasive *E. coli* resistant to 3rd generation cephalosporins (3GCs) (12.8%), ciprofloxacin (25.3%) and aminoglycosides (12.8%), those that were extended spectrum beta lactamase (ESBL) positive (10.5%) and those that exhibited multi-drug resistance (14.8%) were at their highest levels since surveillance began

- There were 1,094 reports of *S. aureus* bloodstream infection (BSI), an increase of 3% from 1,060 (2012). Of those, 222 (20.3%) were meticillin resistant *S. aureus* (MRSA):
  - For acute hospitals, the rate of MRSA BSI was 0.056 cases per 1,000 bed days used (BDU), a decrease from 0.060 (2012). Conversely, the rate of meticillin susceptible *S. aureus* (MSSA) BSI increased from 0.208 (2012) to 0.218 (2013)
  - Enhanced surveillance data revealed that 21% of *S. aureus* BSI were associated with infection related to central venous catheters (CVC) and 7% with peripheral venous catheter (PVC) infection

- There were 409 reports of *E. faecium* BSI, an increase of 4% from 392 (2012):
  - Vancomycin resistant *E. faecium* (VREfm) accounted for 43.1%, a decrease from 45.4% (2012)

- There were 326 reports of invasive *K. pneumoniae* infection, a decrease of 5.5% from 345 (2012):
  - The proportions of invasive *K. pneumoniae* resistant to 3GCs (21.2%) and those that were ESBL positive (18.4%) were at their highest levels since surveillance began
  - Two predominant clones have been identified among *K. pneumoniae* that are both ESBL positive and non-susceptible to ciprofloxacin and gentamicin. Some also produce carbapenemases. Together, these are termed multi-drug resistant *K. pneumoniae* (MDRKP) and the proportion of invasive *K. pneumoniae* that were MDRKP further increased between 2012 and 2013: 5.3% (18 of 342 isolates) to 12.3% (40 of 325 isolates). An outbreak control team was established in October 2013 to investigate this emerging threat
  - Two invasive *K. pneumoniae* isolates were carbapenemase producers, also known as carbapenem-resistant *Enterobacteriaceae* (CRE)

- There were 311 reports of invasive *S. pneumoniae* infection, a decrease of 3% from 321 (2012). Of those, 64 (20.7%) were penicillin-non-susceptible *S. pneumoniae* (PNSP), an increase from 19.6% (2012)
  - The national rate of invasive infection was 6.8 per 100,000 population, compared to 7.0 (2012)
  - Serotype data were available for 271 of 311 invasive *S. pneumoniae* isolates (87%). Results indicate good coverage (71%) for the 23-valent pneumococcal polysaccharide vaccine (PPV-23) in its target population (adults ≥65 years)

- There were 207 reports of invasive *P. aeruginosa* infection, a decrease of 5.5% from 219 (2012) and resistance to all indicator antimicrobials decreased

- Enhanced surveillance data were provided on 1,908 cases from 11 laboratories, representing 36% of all reported cases in 2013

- See http://www.hpsc.ie for further details of EARS-Net, antimicrobial resistance and enhanced BSI surveillance in Ireland. European data are available at http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

Introduction

The European Antimicrobial Resistance Surveillance Network (EARS-Net), previously the European Antimicrobial Resistance Surveillance System (EARSS), collects routinely-generated antimicrobial susceptibility testing data on seven important bacterial pathogens using the EARS-Net case definition. Participating laboratories in Ireland submit data on the "primary" or first isolate from blood or cerebrospinal fluid (CSF) per patient per quarter. EARS-Net does not distinguish clinically significant isolates from contaminants, nor does it distinguish between hospital-acquired, healthcare-associated and community-acquired infections. EARS-Net primarily serves as a surveillance system to measure national levels of antimicrobial resistance (AMR). In 2013, all 41 microbiology laboratories participated in EARS-Net resulting in complete coverage of the Irish population.

Escherichia coli

There were 2,530 reports of invasive *E. coli* infection (2,525 from blood and five from CSF) from 2,480 patients, an increase of 3.3% from 2,450 reports in 2012. **Table 1** displays the annual trends since 2004 in the proportion of *E. coli* isolates resistant to the four "indicator" antimicrobials/antimicrobial classes [ampicillin, third-generation cephalosporins (3GCs); cefotaxime, ceftriaxone, ceftazidime or cefpodoxime, fluoroquinolones (ciprofloxacin or ofloxacin) and aminoglycosides (gentamicin, amikacin or tobramycin)]:

- Of 2,528 isolates, 323 (12.8%) were resistant to 3GCs and of those, 256 were ESBL positive, with 65 ESBL negative
- Of 2,526 isolates, 640 (25.3%) were resistant to ciprofloxacin
- Of 2,525 isolates, 247 (9.8%) were resistant to gentamicin [325 (12.8%) of 2,530 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)]
- Two (0.2%) of 2,254 isolates were resistant to carbapenems, but both were confirmed not to be carbapenemase producers

In 2013, resistance to 3GCs, ciprofloxacin and aminoglycosides were at their highest levels since surveillance began (**Figure 1**). The trend in 3GC resistance has been upwards since 2004, which is highly significant (Chi^2 trend=187, P<0.0001).

In 2013, Ireland had moderately high levels (10 to <25%) of resistance to 3GCs (**Figure 2**), ciprofloxacin and aminoglycosides (ranking 13th, 13th and 11th, respectively, out of 30 countries reporting to EARS-Net). The median proportion for resistance among EARS-Net countries was 3GC (11.3%), ciprofloxacin (22.9%) and aminoglycosides (9.9%).

ESBLs are enzymes that confer resistance to most penicillins and cephalosporins (including 3GCs). ESBL positive bacteria (including *E. coli* and *K. pneumoniae*) are also often resistant to other classes of antimicrobials and have emerged as important causes of healthcare associated infection (HCAI). ESBLs were detected in 264 (10.5%) of 2,515 isolates tested. In 2013, ESBL production among *E. coli* isolates was at its highest level since surveillance began. The trend in ESBL production has been upwards since 2004, which was highly significant (Chi^2 trend=213, P<0.0001).

Of 2,524 isolates tested against all four "indicator" antimicrobials, 373 (14.8%) reported from 49 hospitals/institutions were identified as multi-drug resistant (MDR); defined as resistance to three or more of indicator antimicrobials), an increase from 13.4% (2012):

- 151 resistant to ampicillin, 3GCs, ciprofloxacin and aminoglycosides. ESBL positive (138), ESBL negative (13)
- 105 resistant to ampicillin, 3GCs and ciprofloxacin. ESBL positive (87), ESBL negative (17)
- 110 resistant to ampicillin, ciprofloxacin and aminoglycosides. ESBL positive (1), ESBL negative (108)
- Seven resistant to ampicillin, 3GCs and aminoglycosides. ESBL positive (5), ESBL negative (2)

In 2013, MDR *E. coli* was at its highest level since surveillance began. Between 2009 and 2013, the trend in MDR was upwards, which was highly significant (Chi^2 trend=22.28, P<0.0001).

Females were slightly more likely (1.1-times) to have an invasive *E. coli* infection than males (z=2.63, P=0.01). The frequency of invasive *E. coli* infection increased with age, with the majority (n=1,884; 75%) occurring in adults aged over 60. The median age was 72 years (95%CI, 72-73).

Staphylococcus aureus

There were 1,094 reports of *S. aureus* BSI from 1,068 patients, an increase of 3.2% from 1,060 (2012). Of those, 222 (20.3%) were MRSA, which represents the lowest annual proportion since surveillance began in 1999. (**Table 1**). In 2010, the proportion was 24.4%, the first year that MRSA accounted for <25% of *S. aureus* BSI in Ireland, thus changing from red to orange on the EARS-Net map and 2013 was the seventh successive year in which a decrease was observed. The overall downward trend over this time period is highly significant (Chi^2_{trend}=249, P<0.0001) (**Figure 3**). Overall, there was a 9.2% reduction in the number of reported MRSA BSI compared with 2012 (222 versus 242). In contrast, the total number of MSSA BSI increased by 6.6% compared with 2012 (872 versus 818).

Despite the decrease in numbers and proportion of MRSA BSI in 2013, Ireland still had one of the higher proportions of MRSA in Europe (see http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx for more detailed European data, including EARS-Net tables, charts and maps) (**Figure 4**). Ireland ranked 11th out of 30 countries reporting to EARS-Net, with the median proportion of MRSA BSI at 14.9%. All countries with MRSA proportions higher than

Table 1. Summary of EARS-Net data by pathogen and year, 2004-2013

Pathogen	Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Number laboratories by year-end	**40**	**41**	**42**	**44**	**42**	**43**	**40†**	**41†**	**41**	***41***
E. coli										
Number of isolates	1256	1445	1656	1785	1926	2064	2170	2210	2450	***2530***
%Ampicillin-R*	65.0	67.6	70.7	68.3	70.4	68.7	68.4	71.9	69.6	***70.9***
%3GC-R*	2.6	4.1	4.2	6.7	7.4	7.5	8.3	9.5	10.8	***12.8***
%ESBL-producers*	1.1	2.4	2.5	4.1	5.0	5.8	6.1	7.5	8.8	***10.5***
%Ciprofloxacin-R*	12.6	17.3	21.5	22.1	23.3	22.3	23.6	23.8	25.2	***25.3***
%Gentamicin-R*	5.7	8.5	7.7	9.9	10.2	7.7	9.4	8.7	9.7	***9.8***
%Gentamicin/Amikacin/Tobramycin-R*	6.1	8.6	8.6	10.6	11.0	9.3	11.8	12.2	12.6	***12.8***
%Carbapenem[1]-R*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.1***
%MDR*	5.6	7.7	9.0	11.3	12.1	10.4	11.7	13.0	13.4	***14.8***
Number laboratories by year-end	**41**	**42**	**42**	**44**	**43**	**43**	**40†**	**41†**	**41**	***41***
S. aureus										
Number of isolates	1323	1424	1412	1393	1303	1309	1251	1095	1060	***1094***
Number Meticillin-R (or MRSA)	553	592	592	536	439	355	305	263	242	***222***
%Meticillin-R (or MRSA)	41.8	41.6	41.9	38.5	33.7	27.1	24.4	24.0	22.8	***20.3***
Number laboratories by year-end	**40**	**41**	**42**	**44**	**42**	**43**	**40†**	**41†**	**41**	***41***
E. faecium										
Number of isolates	187	224	265	330	406	397	392	364	392	***409***
%Ampicillin-R*	95.7	92.3	93.9	93.1	95.1	92.9	95.6	95.9	92.9	***93.2***
%Vancomycin-R (VREfm)	23.2	31.7	37.1	33.4	35.7	38.3	39.3	37.4	45.4	***43.1***
%HLG-R*	58.0	51.4	44.3	35.2	28.1	39.1	39.6	36.8	39.3	***41.4***
%MDR*	18.5	25.6	25.6	22.7	16.2	26.7	24.9	21.1	20.3	***19.6***
Number laboratories by year-end	**40**	**41**	**42**	**44**	**42**	**43**	**40†**	**41†**	**41**	***41***
E. faecalis										
Number of isolates	242	290	294	280	301	289	298	265	298	***336***
%Ampicillin-R*	0.8	3.5	4.5	2.2	0.7	2.1	0.7	0.8	4.0	***2.7***
%Vancomycin-R (VREfa)	1.3	2.5	3.7	2.9	3.7	0.7	0.3	4.9	3.0	***2.1***
%HLG-R*	41.3	44.4	42.4	36.9	30.5	36.7	29.7	29.1	32.9	***33.6***
Number laboratories by year-end			**36**	**39**	**41**	**42**	**40†**	**41†**	**41**	***41***
K. pneumoniae										
Number of isolates			217	244	310	323	326	312	345	***326***
%Ampicillin-R*			97.7	99.2	99.7	99.7	99.1	100.0	98.5	***99.1***
%3GC-R*			10.2	9.9	11.4	11.2	10.5	8.0	11.9	***21.2***
%ESBL-producers*			8.6	3.7	7.7	8.2	5.0	5.6	8.8	***18.4***
%Ciprofloxacin-R*	*No data*	*No data*	15.3	18.1	12.8	13.0	10.5	13.2	11.9	***20.9***
%Gentamicin-R*			7.8	9.9	10.7	11.1	6.8	7.4	9.9	***16.9***
%Gentamicin/Amikacin/Tobramycin-R*			9.2	11.1	10.7	11.1	7.1	8.3	9.6	***17.5***
%Carbapenem[1]-R*			0.0	0.6	0.0	0.0	0.0	1.6	0.3	***1.2***
%MDRKP[2]*			1.7	2.9	3.9	4.3	2.2	4.6	5.3	***12.3***
%MDR*			11.2	11.9	10.6	11.9	8.0	8.4	9.9	***19.4***
Number laboratories by year-end	**41**	**42**	**42**	**44**	**42**	**43**	**40†**	**41†**	**41**	***41***
S. pneumoniae										
Number of isolates	400	401	407	438	447	356	314	327	321	***311***
%Penicillin-NS*	10.3	11.7	15.7	17.4	23.1	20.2	18.2	19.6	19.6	***20.7***
of which: %HLR	*1.8*	*3.0*	*2.9*	*5.7*	*6.0*	*5.6*	*4.8*	*6.1*	*4.7*	***2.3***
%Int	*7.0*	*8.7*	*12.5*	*11.0*	*16.8*	*13.8*	*12.7*	*13.5*	*15.0*	***18.3***
%Erythromycin-R*	14.4	12.1	16.1	16.4	16.7	17.3	15.7	18.9	16.9	***17.9***
%Penicillin-NS/Erythromycin-R	3.1	3.2	7.4	7.9	10.2	11.9	12.6	13.8	12.1	***13.0***
Number laboratories by year-end			**36**	**39**	**41**	**42**	**40†**	**41†**	**41**	***41***
P. aeruginosa										
Number of isolates			128	177	199	248	222	184	219	***207***
%Piperacillin/tazobactam-R*			9.4	12.6	9.7	8.9	10.0	2.8	17.4	***15***
%Ceftazidime-R*			10.6	11.8	8.7	11.8	9.2	8.2	15.2	***11***
%Imipenem/meropenem-R*	*No data*	*No data*	11.8	12.2	9.3	10.2	8.3	12.0	19.6	***12***
%Ciprofloxacin-R*			18.0	22.9	21.8	12.1	13.2	12.6	20.6	***15***
%Gentamicin-R*			10.2	13.3	9.0	7.7	8.7	6.5	11.9	***12***
%Gentamicin/Amikacin/Tobramycin-R*			10.2	13.3	9.0	7.7	8.7	6.5	11.9	***12***
%MDR*			9.5	12.4	11.1	6.4	6.5	4.0	13.0	***9***
Number laboratories by year-end										***41***
Acinetobacter spp.										
Number of isolates										***91***
%Ciprofloxacin-R*										***3***
%Gentamicin-R*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	*No data*	***0***
%Gentamicin/Amikacin/Tobramycin-R*										***1***
%Carbapenem[1]-R*										***4***
%MDR*										***0***

R, Resistant; **NS**, Non-Susceptible [includes isolates with intermediate (**Int**) and high-level resistance (**HLR**)]
MRSA, Meticillin-Resistant *S. aureus*; **VREfm**, Vancomycin-Resistant *E. faecium*; **VREfa**, Vancomycin-Resistant *E. faecalis*
HLG, High-Level Gentamicin; **3GC**, 3rd-Generation Cephalosporin (includes cefotaxime, ceftriaxone, ceftazidime and cefpodoxime); **ESBL**, Extended-Spectrum Beta-Lactamase; **MDR**, Multi-Drug Resistant
* Not all isolates tested
† The number of laboratories processing blood cultures has changed on a number of occasions between 2006 and 2014; however, coverage of acute hospitals has remained at 100%
[1] Carbapenems include imipenem, meropenem and ertapenem
[2] MDRKP, MDR *K. pneumoniae* phenotype (ESBL-producer plus non-susceptibility to Ciprofloxacin and Gentamicin) OR carbapenemase-producer (e.g. KPC, OXA-48)

Ireland are located in Southern and Central/Eastern Europe.

No MRSA isolates with reduced susceptibility to vancomycin were detected at the National MRSA Reference Laboratory.

The MRSA rate for all acute hospitals in 2013 was 0.056 cases per 1,000 BDU, a decrease from 0.060 in 2012, while the MSSA rate increased from 0.208 to 0.218 [Rates are calculated from denominator data (bed days used) obtained from the HSE Business Intelligence Unit (BIU) for all acute public hospitals; and directly from private hospitals where available, where both numerator (*S. aureus* numbers) and denominator data have been provided].

Males were approximately 1.7-times more likely to have invasive *S. aureus* infection (2.3-times for MRSA, z=6.26, P<0.0001; 1.5-times for MSSA, z=6.38, P<0.0001) than females (z=8.43, P<0.0001). The frequency of invasive *S. aureus* infection increased with age, with the majority of infections (n=650; 60%) occurring in adults aged over 60. The median age for MRSA infection was 71 years (95%CI, 69-73) and for MSSA infection was 63 years (95%CI, 61-64). This was considered to be a significant difference, as the confidence intervals did not overlap.

Enterococcus faecium

There were 409 reports of *E. faecium* BSI from 399 patients, an increase of 4.3% from 392 (2012). **Table 1** displays the annual trends since 2004 in the proportion of *E. faecium* isolates resistant to the three "indicator" antimicrobials (ampicillin, vancomycin and high-level gentamicin).

- Of 399 isolates, 165 (41.4%) were resistant to high-level gentamicin (**Figure 5**)
- Of 408 isolates, 176 (43.1%) were resistant to vancomycin, with a decrease in the proportion of vancomycin resistant *E. faecium* (VREfm) from 45.4% (2012). Since 2008, Ireland has had the highest proportion of VREfm in Europe. In 2013, countries with the next highest proportions of

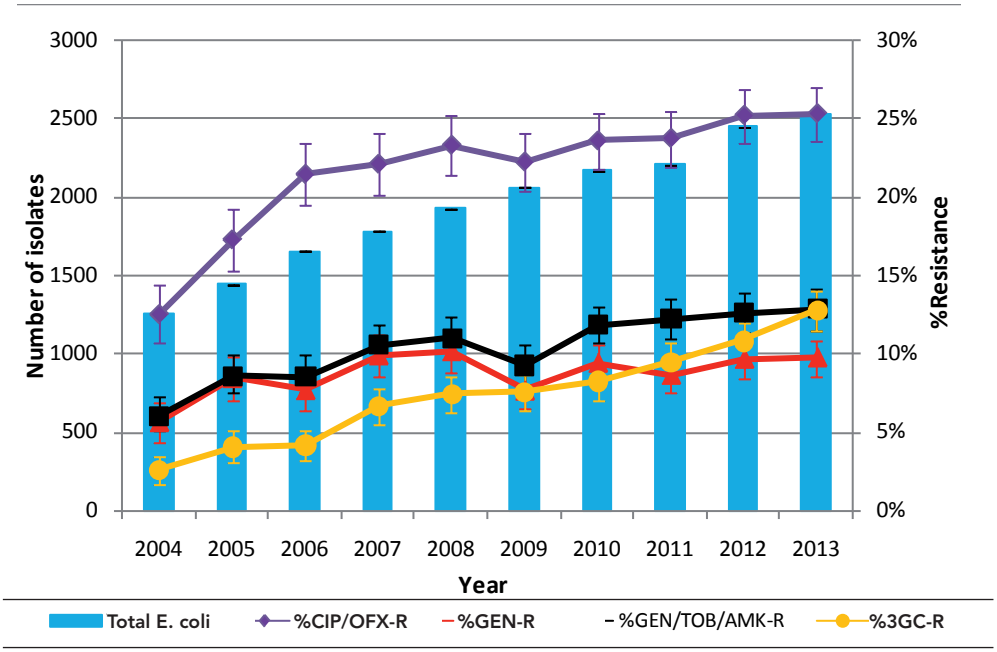


Figure 1. Trends for E. coli – total numbers of E. coli and percentage resistance to 3rd generation cephalosporins (3GCs), ciprofloxacin/ofloxacin (CIP/OFX), gentamicin (GEN) and gentamicin/amikacin/tobramycin (GEN/AMK/TOB) with 95% confidence intervals

Table 2. Age and gender breakdown of patients by organism with major resistance profiles (data from laboratories participating in enhanced surveillance for 2013). Proportion of isolates detected <48 hours and >5 days post-admission is also shown.

		Total for 2013	Percent female	Mean age in years	Detected <48 hours after admission	Detected >5 days after admission
Staphylococcus aureus	Meticillin Resistant (MRSA)	**97**	25%	69.0	59%	34%
	Meticillin Susceptible	**327**	37%	57.7	66%	23%
Streptococcus pneumoniae	Penicillin non-Susceptible	**21**	29%	59.3	67%	19%
	Penicillin Susceptible	**89**	52%	61.5	90%	4%
Enterococci	Vancomycin Resistant	**84**	45%	66.2	18%	76%
	Vancomycin Sensitive	**196**	40%	65.3	41%	47%
Escherichia coli	Fluoroquinolone Resistant	**234**	46%	72.1	73%	22%
	Fluoroquinolone Susceptible	**672**	56%	67.7	77%	16%
Klebsiella pneumoniae		**117**	37%	65.7	49%	41%
Pseudomonas aeruginosa		**71**	44%	67.5	54%	34%

VREfm were; the United Kingdom (23%), Greece (23%) and Portugal (22%) (**Figure 6**), while the median proportion of VREfm in EARS-Net countries was just 5.6%.

- Of 398 isolates tested against the three "indicator" antimicrobials, 78 (19.6%) reported from 18 hospitals were resistant to all three and termed MDR, which represents a slight decrease from 20.3% (2012)

Males were approximately 1.4-times more likely to have invasive *E. faecium* infection than females (z=3.36, P<0.001). The frequency of invasive *E. faecium* infection increased with age, with the majority of infections (n=290; 71%) occurring in adults aged over 60. The median age was 68 years (95%CI, 65-70).

Klebsiella pneumoniae

There were 326 reports of invasive *K. pneumoniae* infection (323 from blood and three from CSF) from 317 patients, a decrease of 5.5% from 345 (2012). **Table 1** displays annual trends since 2004 in the proportion of *K. pneumoniae* isolates resistant to the four "indicator" antimicrobials (as for *E. coli* above) plus carbapenems (imipenem, meropenem or ertapenem).

- Of 326 isolates, 69 (21.2%) were resistant to 3GCs, 60 (18.4%) were ESBL positive and nine were ESBL negative. In 2013, the proportion of invasive ESBL positive *K. pneumoniae* infection was at its highest level since surveillance began, with an increase from 8.8% in 2012 (**Figure 7**)
- Of 325 isolates, 68 (20.9%) were resistant to ciprofloxacin
- Of 326 isolates, 55 (16.9%) were resistant to gentamicin [57 (17.5%) of 326 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)]
- Of 326 isolates, four (1.2%) were resistant to carbapenems, with two confirmed to be carbapenemase producers, both reported from the same hospital (both OXA-48 type CRE) and two confirmed not to be carbapenemase producers. The two invasive OXA-48 *K. pneumoniae* isolates in 2013 followed the last reported invasive CRE isolates in 2011: OXA-48 (3) and KPC (1)

In 2013, resistance to 3GCs, ciprofloxacin and gentamicin/aminoglycosides were all at their highest levels since surveillance began.

Three invasive *K. pneumoniae* isolates were reported as susceptible to ampicillin, an unexpected finding as all *K. pneumoniae* is inherently resistant to ampicillin.

Of 326 isolates, 63 (19.4%) reported by 17 hospitals that were tested against all four "indicator" antimicrobials were identified as MDR, a large increase from 9.9% (2012):

- 42 resistant to ampicillin, 3GCs, ciprofloxacin and aminoglycosides. ESBL positive (38), ESBL negative (4). This represented a large increase from 16 isolates reported as resistant to all four antimicrobials in 2011
- Seven resistant to ampicillin, 3GCs and ciprofloxacin. All ESBL positive
- Six resistant to ampicillin, 3GCs and gentamicin. ESBL positive (5), ESBL negative (1)

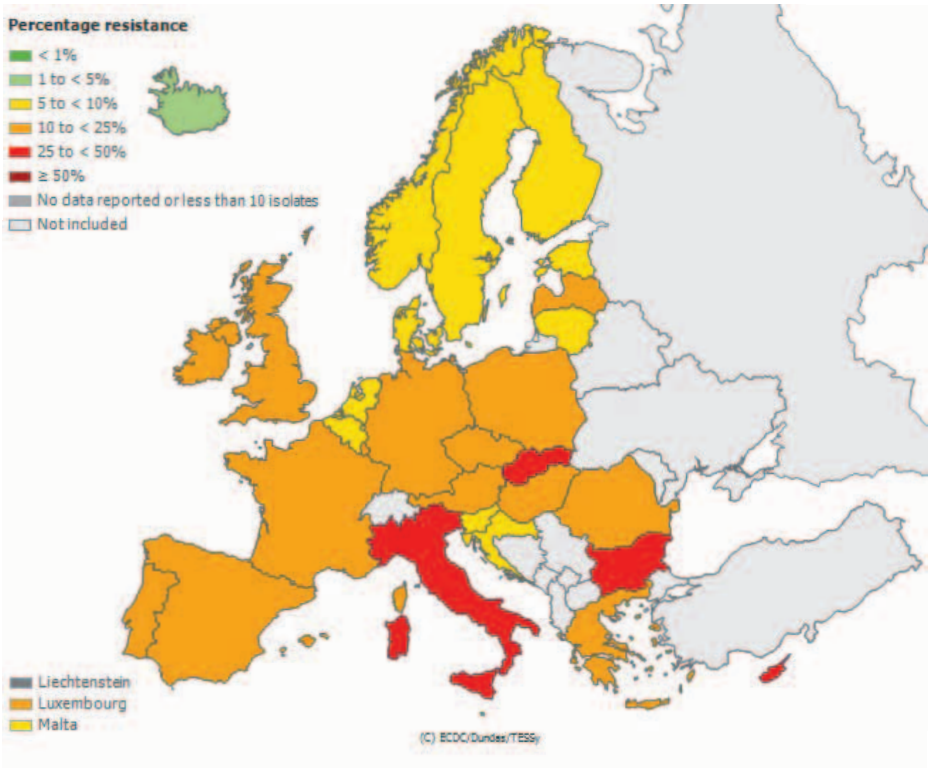


Figure 2. Distribution of 3rd-generation cephalosporin resistant E. coli in EARS-Net countries in 2013
Map downloaded from ECDC's TESSy database on 28/07/2014: http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

- Eight resistant to ampicillin, ciprofloxacin and aminoglycosides. All ESBL negative

In 2013, the Antimicrobial Resistance and Microbial Ecology (ARME) group at NUI Galway alerted HPSC to the presence of two predominant *K. pneumoniae* clones implicated in both patient infection and colonisation in a number of Irish hospitals. Both clones were simultaneously ESBL positive and non-susceptible to ciprofloxacin and gentamicin. Some were also found to produce carbapenemases. Together, these are termed multi-drug resistant *K. pneumoniae* (MDRKP) and the proportion of invasive *K. pneumoniae* that were MDRKP further increased between 2012 and 2013: 5.3% (18 of 342 isolates) to 12.3% (40 of 325 isolates), as displayed in **Figure 8**. An outbreak control team was established in October 2013 to evaluate this emerging threat.

Antimicrobial resistance in invasive *K. pneumoniae* isolates in Ireland were previously among the lowest in Europe, but this appears to be changing. In 2013, at 21.2% 3GC resistance, Ireland ranked 18th of 30 countries (up from a rank of 26th in 2012; 11.9%). At 21.2% fluoroquinolone resistance, Ireland ranked 21st (up from a rank of 25th in 2012; 11.9%). Aminoglycoside resistance in Ireland has also increased from 9.9% (ranking 19th of 29 countries) in 2012 to 17.5% (ranking 18th of 30 countries) in 2013. With only two reports of carbapenemase-producing *K. pneumoniae*, Ireland ranked 19th of 29 countries in 2013, with the median proportion among EARS-Net countries being 1.0% (**Figure 9**).

Males were approximately 1.5-times more likely to have an invasive *K. pneumoniae* infection than females (z=3.85, P=0.0001). The frequency of invasive *K. pneumoniae* infection increased with age with the majority of infections (n=220; 67%) occurring in adults aged over 60. The median age was 68 years (95%CI, 66-70).

Streptococcus pneumoniae

There were 311 reports of invasive *S. pneumoniae* infection (304 from blood and seven from CSF) from 310 patients, a decrease of 3.1% from 321 (2012). Table 1 displays annual trends since 2004 in the proportions of *S. pneumoniae* isolates non-susceptible/resistant to penicillin and erythromycin.

Penicillin-non-susceptible *S. pneumoniae* (PNSP) accounted for 20.7% (n=64) of all isolates tested against penicillin (n=309) in 2013. Of the PNSP isolates, 56 were intermediately-resistant (Int; MIC=0.1-1 mg/L for laboratories following the Clinical Laboratory Standards Institute (CLSI) old/oral guidelines and MIC=0.1-2mg/L for those following European Committee on Antimicrobial Susceptibility Testing (EUCAST) non-meningitis guidelines) and eight were high-level resistant (HLR; MIC >1.0mg/L for CLSI and >2mg/L for EUCAST) to penicillin. Penicillin susceptibility was not determined for two isolates. Fifty-four (17.9%) of 302 isolates were resistant to erythromycin.

There was a slight increase in the proportion of PNSP isolates from 19.6% (2012) to 20.7% (2013) as displayed in **Figure 10**. However, the proportion that displayed penicillin HLR decreased from 4.7% (2012) to 2.6% (2013).

In 2013, Ireland remained among European countries with the highest proportions of PNSP (ranking 10th of 30 countries overall; and 6th of 22 countries reporting ≥50 isolates). In 2013, the median proportion among EARS-Net countries was 9.2%. However, it is important to consider that comparison with other EARS-Net countries is increasingly problematic due to the possibility of different interpretive criteria being applied to the data from different countries (and indeed from different laboratories within a country). Many Irish microbiology laboratories have recently switched or are currently in the process of switching from CLSI to EUCAST guidelines: 27 laboratories had switched by the

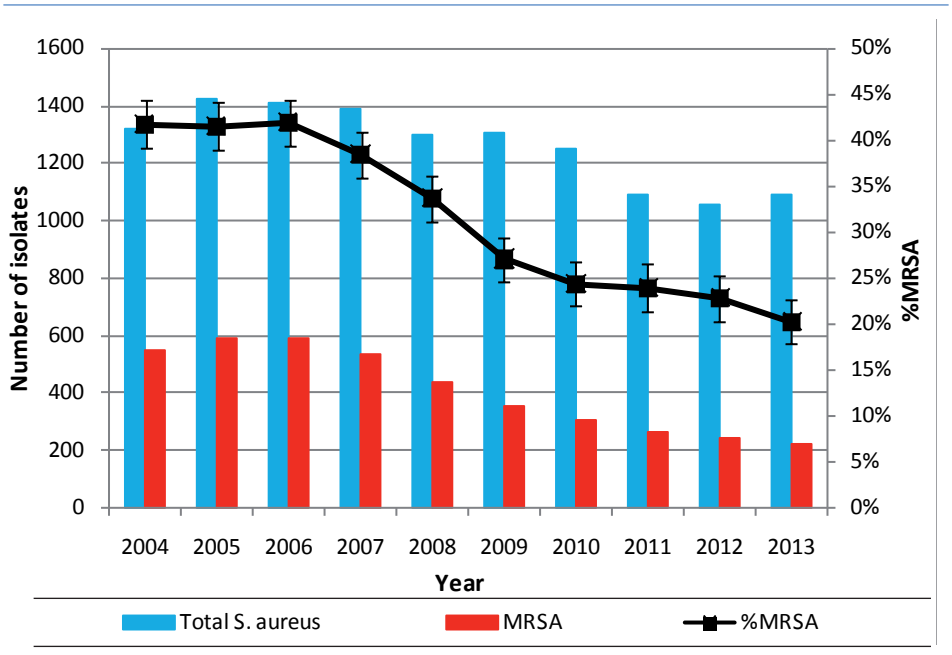


Figure 3. Trends for S. aureus – total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals

end of 2013, an increase from 15 by the end of 2012.

- CLSI provides three sets of breakpoints for interpreting penicillin susceptibility of *S. pneumoniae* isolates: meningitis, non-meningitis and oral
- EUCAST provides two sets of breakpoints: meningitis and infections other than meningitis

In Ireland, EARS-Net data are reported using the "oral" CLSI breakpoints (which correspond to the original CLSI breakpoints) or the EUCAST breakpoints for infections other than meningitis, as these are broadly similar for epidemiological purposes and thus facilitate a more meaningful analysis of the data. This also permits a relatively consistent approach for comparing historical data.

Moderately high levels of erythromycin resistance were seen, with Ireland ranking 18th of 30 countries overall and 10th of 22 countries reporting 50 or more isolates. This is similar to the situation observed in much of Southern and Central/Eastern Europe. In 2013, the median proportion among EARS-Net countries was 18.0%.

Of 299 isolates tested against both penicillin and erythromycin, 39 (13.0%) were simultaneously PNSP (33

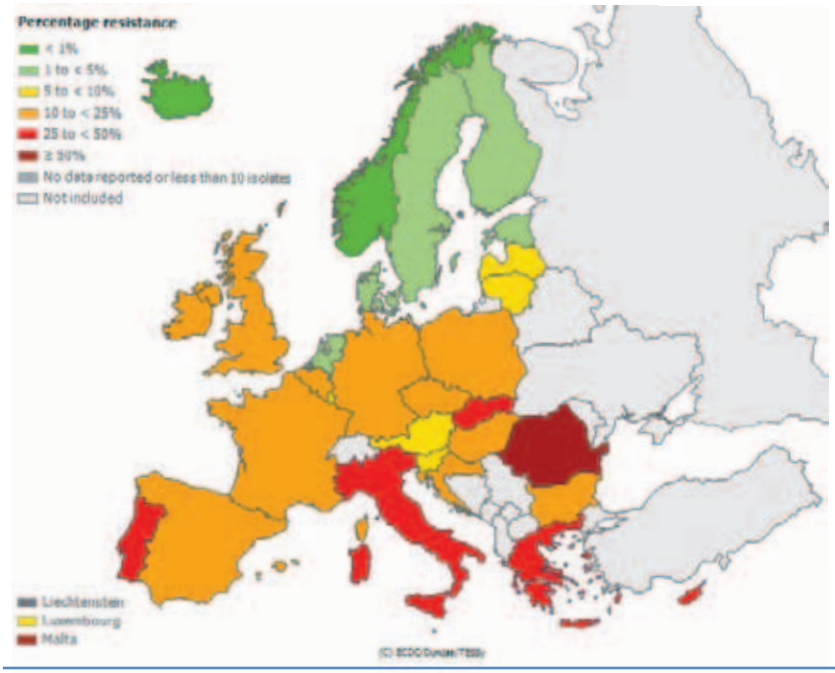


Figure 4. Distribution of MRSA in EARS-Net countries in 2013
Map obtained from ECDC on 28/07/2014:
http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

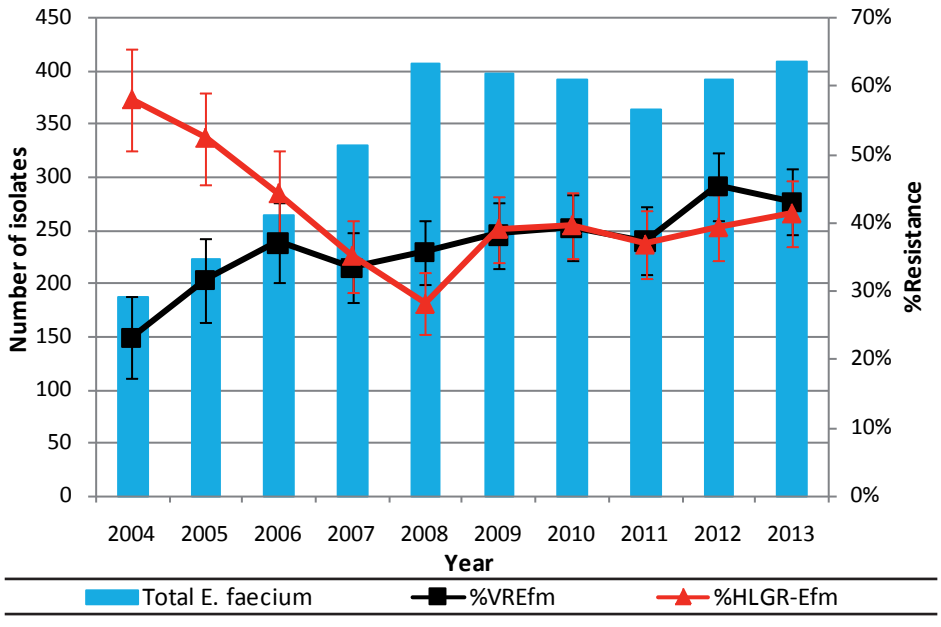


Figure 5. Trends for E. faecium – total numbers of E. faecium and percentage resistance to vancomycin (VREfm) and high-level gentamicin (HLG) with 95% confidence intervals

Int, 6 HLR) and erythromycin-resistant in 2013, which is the highest proportion of penicillin/erythromycin co-resistance since surveillance began.

In early 2007, a national pilot project was established as a collaborative initiative between RCSI/Beaumont Hospital, Children's University Hospital, Temple St and HPSC, with the aim of providing baseline serotyping data on invasive *S. pneumoniae* isolates. This project pre-dates the introduction of the 7-valent pneumococcal conjugate vaccine (PCV7) into the childhood immunisation schedule in September 2008 and PCV13 replaced PCV7 from September 2010.

In 2013, serotype data were available for 271 pneumococcal isolates reported by 31 of the 33 laboratories reporting pneumococcal isolates to EARS-Net, representing 87% of all pneumococcal isolates reported:

- Of 138 isolates from patients aged ≥65 years, 98 (71%) belonged to serotypes included in the PPV-23 vaccine
- Only 12 isolates were referred for typing from patients aged <2 years (the target population for the PCV13 vaccine) and eight of these were non-vaccine serotypes

The most common serotypes identified were; 7F (n=48), 19A (n=33), 3 and 22F (n=18 each), 8 (n=11), 14 and 23B (n=10 each) representing 55% of all isolates typed.

Of the 64 PNSP isolates, 55 were serotyped:

- Of 36 isolates from patients age ≥65 years, 24 (67%) belonged to serotypes included in the PPV-23 vaccine
- None of the serotyped PNSP isolates came from children <2 years (note: one PNSP isolate from a child in this age group was not serotyped)

Ongoing surveillance of the predominant serotypes is required, as strains with non-vaccine serotypes have been reported to increase in prevalence following the introduction of conjugate vaccines in other countries, hence the need for a fully-resourced Irish pneumococcal reference laboratory. The separate chapter on invasive pneumococcal disease (IPD) in Ireland in 2013 contains additional information on pneumococcal serotyping.

In 2013, the rate of IPD in Ireland was estimated at 6.8 cases per 100,000 population, compared with 7.0 in 2012 (Note that both rates were calculated using 2011 census data). The highest rates of IPD were observed at extremes of age; children aged <1 year (11.0 per 100,000) and 1 year (10.5 per 100,000) and adults aged 65-74 (20.3 per 100,000), 75-79 (39.2 per 100,000) and ≥80 (40.5 per 100,000) as displayed in **Figure 11**. The IPD rates in all age groups were broadly similar to 2012, with the exception of ages 1 year (increase from 5.5 to 10.5) and ≥80 years (decrease from 53.7 to 40.5).

Males were approximately 1.1-times more likely to have an invasive *S. pneumoniae* infection than females, but this was not statistically significant (z=0.97, P=0.33). The frequency of invasive *S. pneumoniae* infection increased with age, with the majority (n=182; 59%) occurring in adults aged over 60. The median age was 64 years (95%CI, 62-67).

Enterococcus faecalis

There were 336 reports of *E. faecalis* BSI from 327 patients, an increase of 12.8% from 298 (2012). **Table 1** displays annual trends since 2004 in the proportions of *E. faecalis* isolates resistant to the three "indicator" antimicrobials (as for *E. faecium*):

- Of 334 isolates, seven (2.1%) were resistant to vancomycin (VREfa), with Ireland ranking 7th

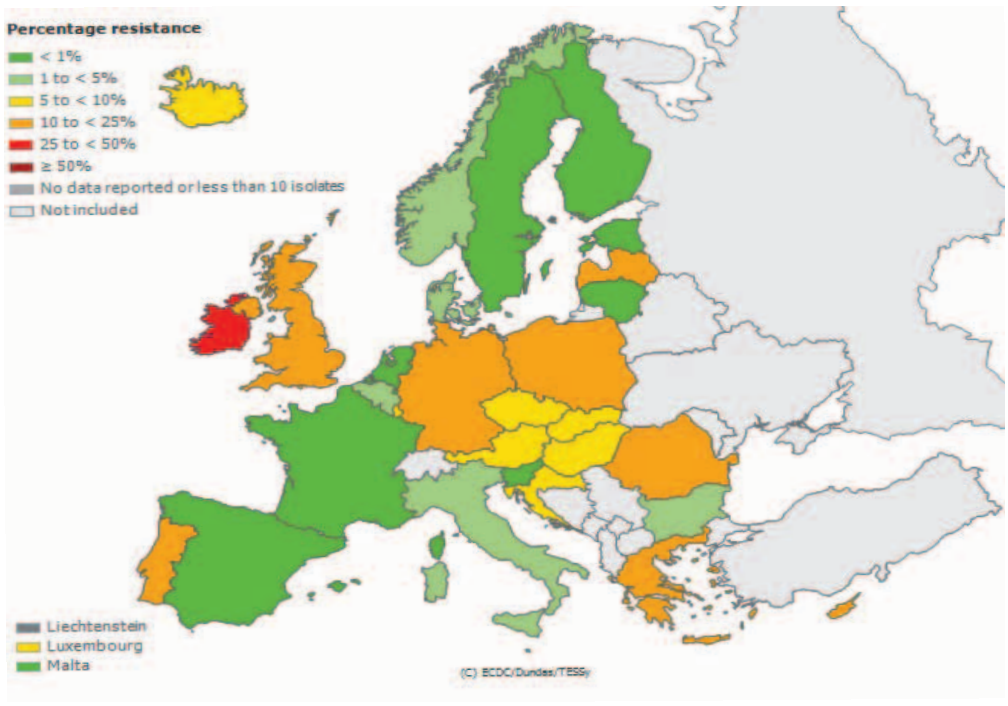


Figure 6. Distribution of vancomycin-resistant E. faecium (VREfm) in EARS-Net countries in 2013
Map downloaded from ECDC's TESSy database on 28/07/2014:
http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

among European countries for resistance. The median proportion in Europe was 0.4%, although the proportion of VREfa in Ireland has decreased from the highest reported proportion of 4.9% in 2011
- Of 318 isolates, 107 (33.6%) were resistant to high-level gentamicin

Nine isolates were reported resistant to ampicillin, which is suggestive of misidentification of species or misclassification, as resistance to ampicillin is rare in *E. faecalis*.

Males were approximately 2.1-times more likely to have invasive *E. faecalis* infection than females (z=6.74, P<0.0001). The frequency of invasive *E. faecalis* infection increased with age, with the majority of infections (n=236; 70%) occurring in adults aged over 60. The median age was 69 years (95%CI, 67-71).

Pseudomonas aeruginosa

There were 207 reports of invasive *P. aeruginosa* infection (206 from blood and one from CSF) from 205 patients, a decrease of 5.5% from 219 (2012). **Table 1** displays annual trends since 2006 in the proportion of *P. aeruginosa* isolates resistant to the five "indicator" antimicrobials/antimicrobial classes [piperacillin-tazobactam, ceftazidime, carbapenems (meropenem or imipenem), fluoroquinolones (ciprofloxacin or ofloxacin) and gentamicin]. In 2013, resistance to all five indicator antimicrobials decreased.

- Of 204 isolates, 31 (15.2%) were resistant to piperacillin-tazobactam
- Of 206 isolates, 22 (10.7%) were resistant to ceftazidime
- Of 206 isolates, 25 (12.1%) were resistant to imipenem or meropenem
- Of 207 isolates, 31 (15.0%) were resistant to ciprofloxacin
- Of 207 isolates, 24 (11.6%) were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)]

Nineteen (9.4%) of 203 isolates reported from 13 hospital and that were tested against all five "indicator" antimicrobials were identified as MDR, the highest since surveillance began:

- Three resistant to all five antimicrobial classes
- Ten resistant to four of five antimicrobial classes
- Six resistant to three of five antimicrobial classes

Antimicrobial resistance levels among *P. aeruginosa* isolates in Ireland are at moderately low levels in comparison with other European countries, with Ireland ranking 18th – 23rd of 30 countries for all five indicator antimicrobials.

Males were approximately 1.5-times more likely to have invasive *P. aeruginosa* infection than females (significant; z=2.91, P=0.004). The frequency of invasive *P. aeruginosa* infection increased with age, with the majority of infections (n=155; 75%) occurring in adults aged over 60. The median age was 71 years (95%CI, 69-73).

Acinetobacter spp.

In 2013, surveillance of invasive *Acinetobacter spp.* Infection began in Ireland, with 91 reports of invasive infection caused by *Acinetobacter spp.* (90 from blood and one from CSF) from 90 patients. **Table 1** displays the proportion of *Acinetobacter spp.* isolates resistant to the three "indicator" antimicrobials/antimicrobial classes [carbapenems (meropenem or imipenem), fluoroquinolones (ciprofloxacin or ofloxacin) and gentamicin]:

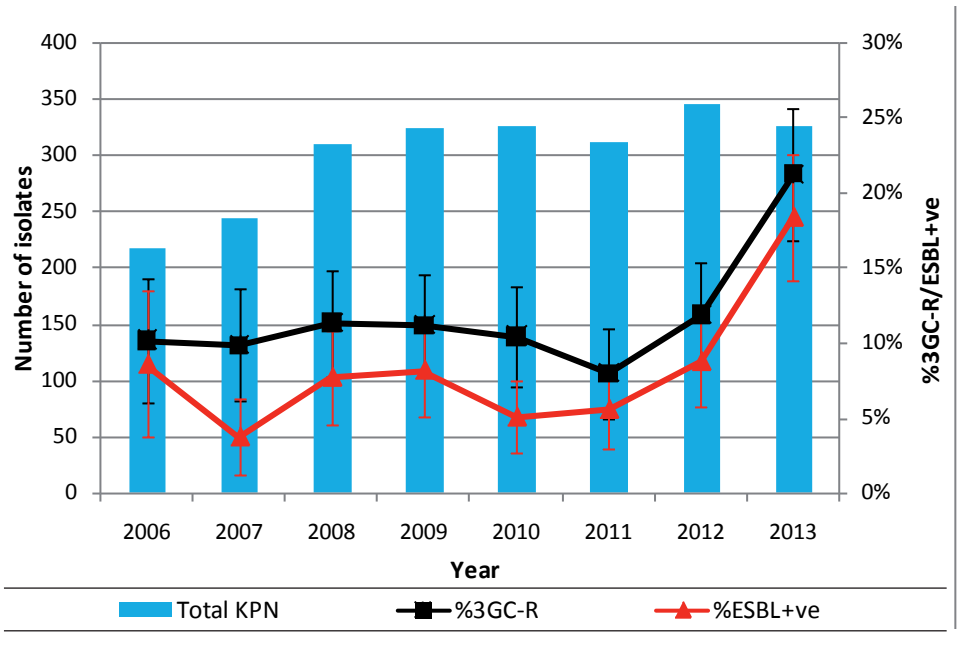


Figure 7. Trends for K. pneumoniae – total numbers of K. pneumoniae and percentage resistance to 3rd generation cephalosporins (3GCs) and ESBL-positivity with 95% confidence intervals

- Of 86 isolates, three were resistant to imipenem or meropenem
- Of 89 isolates, three were resistant to ciprofloxacin
- None of 89 isolates were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)]

Enhanced Surveillance

The voluntary EARS-Net enhanced surveillance programme was established in 2004. Laboratories that participate in EARS-Net are invited to provide additional demographic, risk factor and clinical data on invasive pathogens causing BSI.

In 2013, enhanced surveillance data on 1,908 individual records (cases or isolates under the EARS-Net definition) were submitted from 11 participating laboratories, representing 36% of all reports to EARS-Net. In late 2013, the layout of the enhanced surveillance data collection form was revised and piloted. The field structures were simplified to allow greater participation. **Table 2** displays demographic and other basic data for the major resistance profiles of pathogens reported to EARS-Net enhanced surveillance.

1. *S. aureus* BSI

- Healthcare associated infection was reported for the majority of MRSA (69%) and MSSA (63%) BSI
- From 2010 to 2012, a reduction in the proportion of *S. aureus* BSI due to CVC infection was observed (from 23% to 15%). However, the proportion increased to 21% in 2013. The proportion of *S. aureus* BSI due to PVC infection declined from 11% (2012) to 7% (2013)
    - MRSA BSI = 23% CVC & 3% PVC infection
    - MSSA BSI = 20% CVC & 8% PVC infection
- The most common risk factors reported were recent surgery, malignancy and stay in an intensive care unit

2. Enterococcal BSI

- Healthcare associated infection was reported for the vast majority of vancomycin resistant (92%) and vancomycin susceptible (74%) enterococcal BSI
- The most common primary sources of BSI were: CVC and intra-abdominal or gastrointestinal tract infection

3. *S. pneumoniae* BSI

- The proportion of PNSP detected within two days after admission decreased from 95% (2012) to 67% (2013), while the proportion of penicillin susceptible *S. pneumoniae* (PSSP) increased from 77% (2012) to 90% (2013). However, the number of PNSP BSI isolates for which enhanced information was reported was small, thus the results must be interpreted with caution
- Respiratory tract infection remained the most common source of pneumococcal BSI

4. *E. coli* BSI

- Healthcare associated infection was reported for the majority of fluoroquinolone resistant *E. coli* BSI, which contrasts with 44% for fluoroquinolone susceptible *E. coli*
- The most common source of *E. coli* bloodstream infection was urinary tract infection, with 5% reported in association with the presence of a urinary catheter

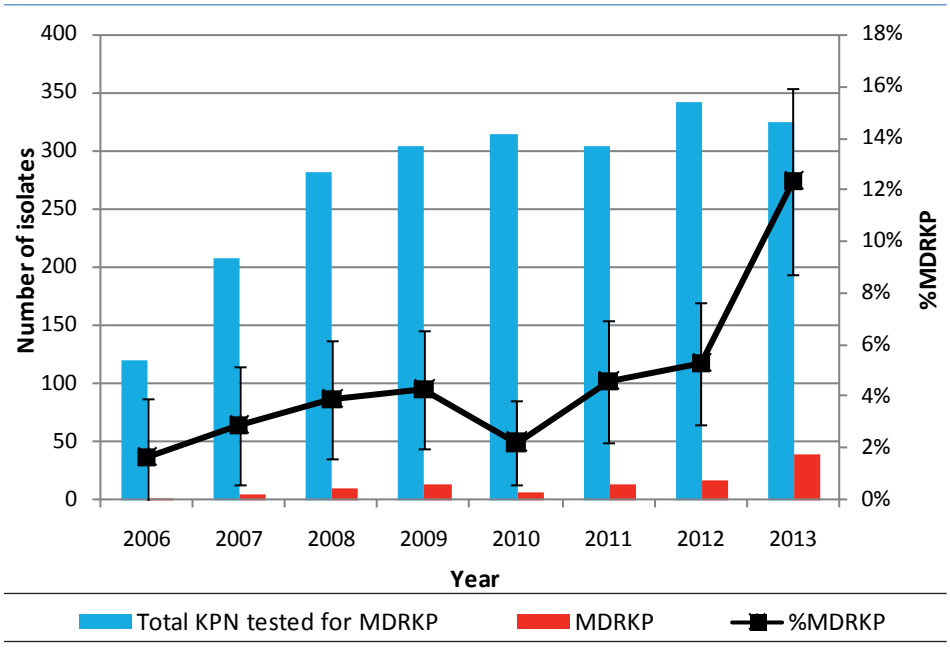


Figure 8. Trends for K. pneumoniae isolates with the MDRKP phenotype (simultaneously ESBL-producers and non-susceptible to both ciprofloxacin and gentamicin and/or a carbapenemase producer) — numbers and percentage with MDRKP phenotype with 95%CIs

Further information is available on the HPSC website: http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/EuropeanAntimicrobialResistanceSurveillanceSystemEARSS/EnhancedBacteraemiaSurveillance/

Conclusion

For the seventh consecutive year, the proportion of *S. aureus* BSI attributable to MRSA further declined to 20.3%, the lowest reported level since Ireland joined EARS-Net. Unfortunately, antimicrobial resistance in other important BSI causative pathogens increased further and remains a cause for concern.

For the sixth consecutive year, Ireland remained the European country with the highest proportion of VREfm BSI (43.1%), which was far in excess of the countries reporting the second highest proportion (UK and Greece, both at 23%).

Additionally, the proportions of ESBL positive and multi-drug resistant *Enterobacteriaceae* (*E. coli* and *K. pneumoniae*) reached the highest reported levels to date. In 2013, the ARME research group at NUI Galway alerted the HPSC to the detection of two *K. pneumoniae* clones causing both infection and colonisation in patients attending a number of Irish hospitals. These clones exhibited a multi-drug

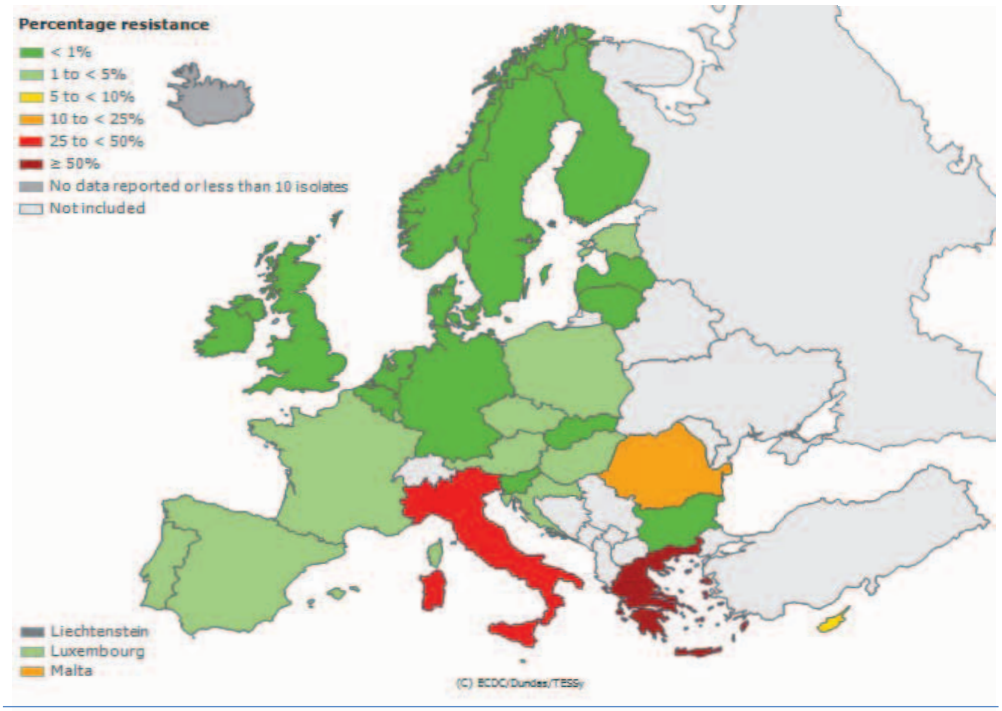


Figure 9. Distribution of carbapenem-resistant K. pneumonie in EARS-Net countries in 2013
Map downloaded from ECDC's TESSy database on 28/07/2014:
http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

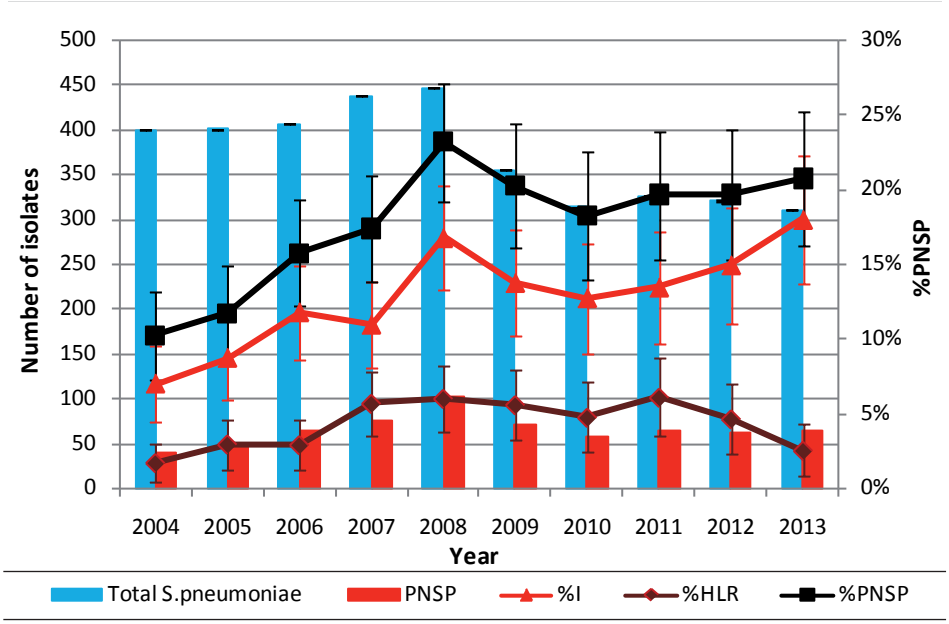


Figure 10. Trends for S. pneumoniae – total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals
HLR, High-level resistant; I, Intermediately resistant

resistant phenotype, involving both ESBL production and non-susceptibility to both ciprofloxacin and gentamicin and have been termed MDRKP, with a smaller proportion also producing carbapenemases, hence the term CRE. Further analysis of EARS-Net data revealed a large increase in invasive *K. pneumoniae* that were MDRKP between 2012 and 2013 (from 5.3% to 12.3%), supporting the hypothesis of emergence and dissemination of MDRKP in Ireland. Given the extent of antimicrobial resistance exhibited by MDRKP, coupled with increasing concerns worldwide on both dissemination of multi-drug resistant organisms and paucity of effective antimicrobial treatments, in response to this data, a national outbreak control team was established by HPSC in October 2013 to evaluate this emerging threat.

In 2013, there were two reported cases of invasive carbapenemase-producing *K. pneumoniae* (CRE) infection in Ireland, with 24 of 29 EARS-Net participant countries reporting one or more cases and 15 countries reporting five or more cases. Greece (60%) and Italy (36%) remained the European countries with the largest proportion of invasive CRE infections (among *K. pneumoniae*). Additionally, significant increases were reported by Romania (22%) and Malta (15%). This clearly illustrates the successful dissemination of these highly resistant microorganisms in Europe, which may be contributed to by suboptimal infection prevention and control and antimicrobial stewardship practices in both acute and non-acute healthcare settings. To address the threat of MDR-*Enterobacteriaceae*, such as MDRKP, ESBLs and CRE to Ireland, it is vital that control measures are strengthened in both acute and non-acute healthcare settings, with implementation of the recommendations contained in the Guidelines for the prevention and control of multi-drug resistant organisms, other than MRSA, published in 2013 and the Guidelines for antimicrobial stewardship in hospitals, published in 2009.

The decline in the burden of MRSA BSI in recent years may be partly attributable to improvements in infection prevention and control interventions, such as increased emphasis on and improved healthcare worker awareness of the importance of compliance with standard and contact precautions, screening of patients for MRSA carriage and the availability of decolonisation regimens to eradicate MRSA carriage. The development of and strengthening of hospital antimicrobial stewardship programmes and restricted prescribing of certain broad spectrum antimicrobials, particularly in response to other healthcare associated infections, such as *Clostridium difficile* infection, may also have positively contributed to the decreasing proportion of MRSA BSI.

Since 2008, pneumococcal conjugate vaccines have been a component of the childhood immunisation programme, an intervention which has already resulted in a reduction in the burden of paediatric invasive pneumococcal disease (IPD) in Ireland. However, pneumococcal antimicrobial resistance remains a major problem in Ireland and the increasing number of reported invasive infections due to multi-drug resistant strains is of particular concern. Clearly, IPD manifesting as BSI or meningitis reflects the most severe form of pneumococcal infection and data on other more common manifestations of infection (e.g., pneumonia, sinusitis and otitis media) are not captured by EARS-Net. While data from invasive infections is extremely valuable in comparing national levels of AMR, the true burden of infection caused by antimicrobial resistant pneumococci may be underestimated.

The enhanced EARS-Net surveillance data are particularly useful in informing infection prevention and control programmes, both nationally and in those hospitals that participate in the surveillance scheme. Participation in enhanced surveillance can also help to identify risk factors and potentially preventable

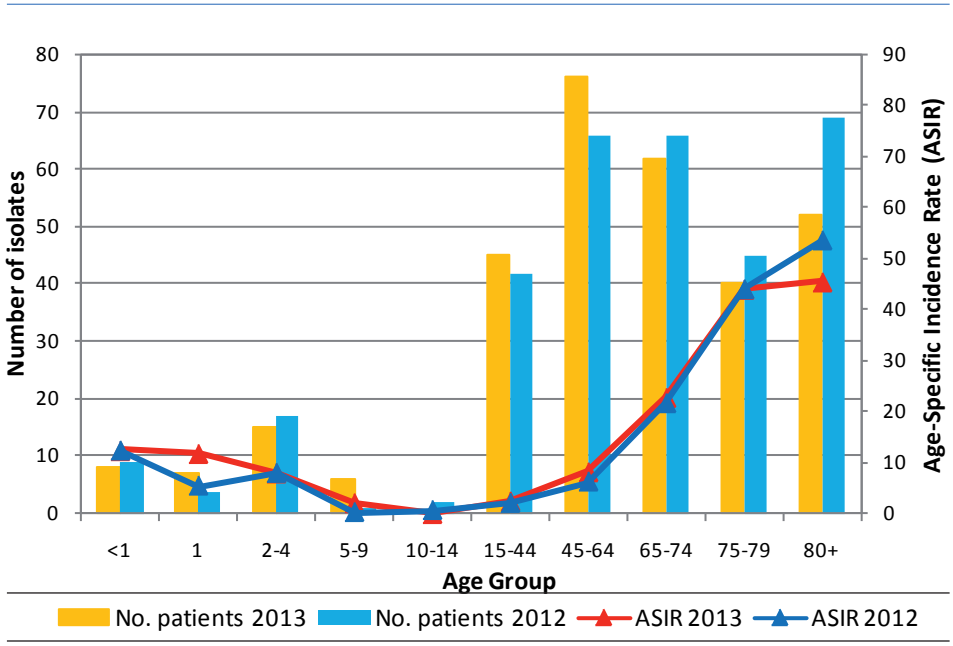


Figure 11. Numbers and age-specific incidence rates of patients with invasive S. pneumoniae infection in 2013 compared with 2012

healthcare associated infections that can be targeted as part of preventative programmes (e.g., invasive medical device related infections).

Infections caused by antimicrobial resistant bacteria result in excess patient mortality, morbidity and costs to the healthcare system. Rising levels of AMR threaten many aspects of healthcare that we currently take for granted. It is critical that comprehensive infection prevention and control and antimicrobial stewardship programmes continue to be developed and maintained at all levels and settings within the Irish health service. To this end, it is vital that recommendations and guidelines produced by the HSE RCPI Clinical Advisory Group on HCAI and AMR are implemented.

HPSC thanks all the microbiology laboratories for their continued participation and enthusiasm for the EARS-Net project.

The data presented in this report were taken from the EARS-Net database on **1st September 2014**.

9.3.0.1 Enhanced surveillance of Carbapenem Resistant *Enterobacteriaceae* (CRE) in Ireland – 2013

Summary:

- In 2013, enhanced surveillance data was received on 24 CRE cases. This represented a decrease compared with 2012, when enhanced surveillance data was received on 32 CRE cases. In contrast, the National Carbapenemase Producing *Enterobacteriaceae* (CPE) Reference Laboratory Service (CPEaRLS) at Galway University Hospital confirmed carbapenemase production in 48 *Enterobacteriaceae* isolates in 2013
- Just one patient (4%) had a history of hospitalisation in another jurisdiction (Northern Ireland: KPC-type CRE isolated)
- The clinical significance of the CRE isolate was reported for 20 patients (83%), representing colonisation in the majority (n=13). CRE infection was reported for the remaining seven patients

Carbapenem resistant *Enterobacteriaceae* (CRE) are multi-drug resistant Gram-negative bacteria that can be easily spread between patients in healthcare settings and have the ability to cause infections for which effective antimicrobial therapy may be lacking. Most CRE produce carbapenemase, an enzyme that breaks down the carbapenem class of antimicrobials (e.g. imipenem, meropenem). Carbapenemase production has spread worldwide in the past 15 years and is now a prominent resistance mechanism reported in many countries.

Detection of confirmed carbapenemase-producing CRE, hereafter known as CRE, became notifiable in Ireland in March 2011, under the category of 'unusual cluster or changing pattern of illness'. Upon amendment to the Infectious Diseases Regulations in September 2011, invasive CRE infection (blood, CSF or normally sterile site) became notifiable in its own category. The CRE enhanced surveillance scheme was established in June 2011 and reporting of CRE isolates from any site, whether colonisation or infection is encouraged.

In 2013, enhanced surveillance data was received from 11 laboratories on 24 confirmed cases of carbapenemase-producing CRE and one tertiary hospital reported a CRE outbreak. **Figure 1** displays annual trends in CRE cases and types reported to enhanced surveillance since 2011. Of the 24 patients, 15 were male (63%). The average age was 67 years (range: 31 – 95). At the time of CRE detection, 21 patients (88%) were hospitalised, two were in the community (8%) and one was a nursing home resident (4%). Of the 21 hospitalised patients, 10 (48%) had been admitted from home, eight (38%) were transfers from another acute hospital, one had been admitted from long-term care (4%) and the source of admission was not provided for the remaining two patients (10%). Of the eight patients who had been transferred from another acute hospital, one was repatriated from a hospital in another jurisdiction (Northern Ireland).

At the time of CRE detection, nine patients (38%) were already known to be colonised or infected with one or more other multi-drug resistant organisms (MDRO) and seven of those were inpatients.

Nine patients (38%) reported no foreign travel in the last 12 months and the travel history was unknown for the remaining 15 (62%).

Two patients had no identifiable risk factors for CRE colonisation or infection and risk factor data was not provided for two patients. Of the remaining 20 patients, 17 (85%) had more than one risk factor. Reported risk factors included; Hospitalisation in the past 12 months (15; 75%), history of surgery in the past six months (9; 45%), history of admission to intensive care in the last 12 months (3; 15%). Reported underlying co-morbidities included: immunocompromise (7 patients), renal disease (5 patients), diabetes mellitus (4 patients), liver disease (3 patients), chronic lung disease (1 patient) and urological abnormality (1 patient).

Antimicrobial exposure history prior to isolation of CRE was provided for 10 patients (42%), all of whom were hospitalised. Of those, nine had recent antimicrobials, with six having received more than one antimicrobial class:

- β lactam - β lactamase inhibitor combination agents; 9 (100%)
- Carbapenems; 3 (33%)
- Aminoglycosides; 3 (33%)
- Cephalosporins; 2 (22%)
- Fluoroquinolones; 2 (22%)

The clinical significance of the CRE isolate was reported for 20 patients (83%), representing colonisation in the majority (n=13). CRE infection was reported for the remaining seven patients, with three cases of urinary tract infection, two cases of surgical site infection and one case each of respiratory tract and intra-abdominal infection.

Half of CRE (n=12) were isolated from screening swabs (rectal or stoma). Five isolates were detected from urine (21%), two each from vascular catheter tips, respiratory specimens and tissue specimens and one from a superficial swab.

Outcome was reported for one of the three non-hospitalised patients (who survived) and for 17 of the 21 hospitalised patients (81%). Of those, nine (53%) were discharged home, two (12%) remained inpatients at the time the surveillance form was returned, one of whom had already had CRE infection and it is not known whether or not the second CRE colonised patient subsequently went on to develop CRE infection later in the hospital admission. Six patients died (35%). For two of the six deaths, the patient was reported to have had CRE infection. The potential contribution of CRE to patient death was not collected. Date of death was provided for four patients. Thus the interval

between CRE positive specimen date and death could be calculated for four patients and was four, 17 and 19 days, respectively with CRE isolated from a post mortem specimen obtained from the final patient.

Length-of-stay could be calculated for all nine admitted patients. The median length-of-stay was 18 days (range: 3 – 77).

Klebsiella pneumoniae accounted for 20 CRE isolates. There were two cases each of *Escherichia coli* CRE and *Citrobacter freundii* CRE reported to enhanced surveillance.

The carbapenemase enzyme types reported to enhanced surveillance in 2013 were; OXA-48 (11), KPC (11) and NDM-1 (2). This contrasts with 48 CPE confirmed by the CPEaRLS in 2013, subdivided as follows: KPC (14), OXA-48 (29), NDM-1 (3), IMI (1) and IMP (1). Therefore, a significant proportion of confirmed CPE cases in 2013 were not reported to the enhanced surveillance scheme.

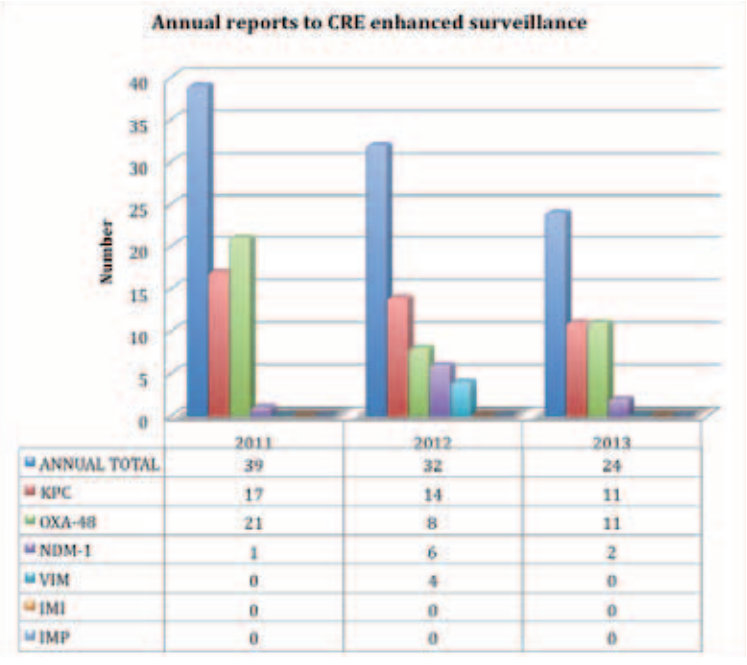
- **Carbapenems;** Reported minimum inhibitory concentrations for meropenem and ertapenem ranged from 0.38 to >32 mg/L
- **Gentamicin;** Reported on 23 isolates, with 9 resistant (39%)
- **Amikacin;** Reported on 18 isolates, with 7 resistant (39%)
- **Fluoroquinolones;** Reported on 21 isolates, with 15 resistant (71%) and one of intermediate susceptibility
- **Tigecycline;** Reported on 16 isolates; with 5 resistant (31%) and 4 with intermediate susceptibility (25%)
- **Colistin;** Reported on 15 isolates, with none resistant

In response to the emergence of CRE, Irish guidelines for the prevention and control of multi-drug resistant organisms, excluding MRSA, in the healthcare setting were developed under the auspices of the Royal College of Physicians of Ireland (RCPI) Clinical Advisory Group on Healthcare-Associated Infections and Antimicrobial Resistance and were first published in early 2013. In response to the changing epidemiology of CRE and other types of multi-drug resistance in *Enterobacteriaceae* in Ireland, the guidelines on screening for carriage of resistant *Enterobacteriaceae* were further updated in July 2014. The latest versions of the guidelines are available on the HPSC website at the following link: http://www.hpsc.ie/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/CarbapenemResistantEnterobacteriaceaeCRE/ScreeningforCREinIreland/

Please note that in the reduction in reported cases between 2012 and 2013 reflects under-reporting rather than a true decline in CRE. Twice as many isolates were confirmed by the CPEaRLS, Galway University Hospital (n=48) than were reported to the voluntary CRE enhanced surveillance scheme (n=24) in 2013.

Acknowledgements:
Sincere thanks to colleagues working in microbiology laboratories and infection prevention and control teams across Ireland for submitting enhanced surveillance data on patients with CRE.

Sincere thanks also to colleagues in the CPEaRLS, Galway University Hospital for data on confirmed carbapenemase producing *Enterobacteriaceae* in 2013 (Source: CPEaRLS annual report).



	2011	2012	2013
ANNUAL TOTAL	39	32	24
KPC	17	14	11
OXA-48	21	8	11
NDM-1	1	6	2
VIM	0	4	0
IMI	0	0	0
IMP	0	0	0

Figure 1. Annual trends in CRE cases and types reported to HPSC since enhanced surveillance of CRE commenced in 2011.

10

Computerised Infectious Disease Reporting System (CIDR)

10. Computerised Infectious Disease Reporting (CIDR)

Summary

STI surveillance on CIDR was implemented nationally

- The highest ever annual number of notifications was recorded on CIDR in 2013
- Major infrastructure and software upgrade from CIDR2 (32 bit) to CIDR3 (64 bit) virtual environment was completed
- IS27001 Information Security accreditation was retained
- The number of active CIDR users in 2013 was 246
- Delivery of CIDR user training transferred from central delivery at HPSC to local delivery in Public Health Departments and Laboratories
- Outbreak management functionality was improved

CIDR OPERATIONS

SEXUALLY TRANSMITTED INFECTION SURVEILLANCE ON CIDR

Initiated at the end of 2012, implementation of the notification of case-based laboratory-identified notifiable sexually transmitted infections using CIDR was completed in 2013. The completion of this implementation led to significant improvements in accuracy and timeliness of notification, analysis and reporting of these diseases. The inclusion of STI surveillance on CIDR resulted in an expected increase in the total number of infectious disease notifications made through CIDR in 2013 and represents the highest annual number of notifications recorded on CIDR to date.

INFRASTRUCTURE AND SOFTWARE UPGRADE FOR CIDR

Building on the virtualisation of the CIDR architecture in 2012, the infrastructure and software were upgraded from the CIDR2 (32-bit) to CIDR3 (64-bit) virtual environment in 2013. Use of the 64-bit server, database and CIDR Application software improved system performance by maximising the use of additional memory available in the CIDR infrastructure. The upgrade also ensured that the latest 64-bit tools and applications can be used in the CIDR architecture where required.

INFORMATION SECURITY ACCREDITATION

Following a full re-accreditation audit as required every four years, HPSC and CIDR retained ISO 27001 accreditation in 2013. The HPSC Information Governance Framework, which includes CIDR, provides re-assurance to users and partners of the CIDR system, the Data Protection Commissioner and the data

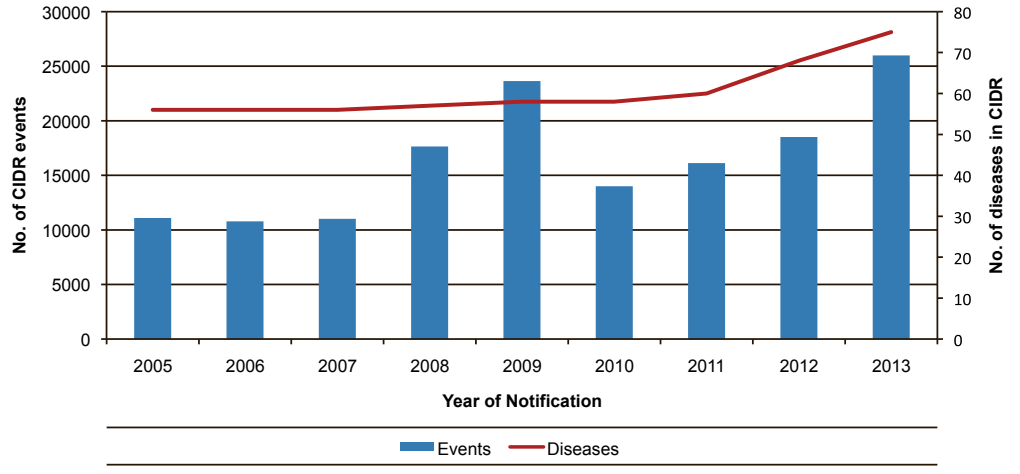


Figure 1. The volume of statutory infectious disease notifications and corresponding number of diseases in CIDR per year, since 2005 when national implementation commenced (as of 18th September 2014)

subjects relating to sensitive data stored and managed by the system. Maintenance of this accreditation standard is vital to information security.

CIDR USER TRAINING

Delivery of CIDR User training was transferred from central delivery at HPSC to local delivery in Public Health Departments and Laboratories. The de-centralisation of CIDR training became necessary as a result of reduced resources in Public Health and Laboratories where staff were finding it increasingly difficult to travel to HPSC for training and at HPSC where availability of trainers was reduced due to other duties. Local training by previously trained and experienced users was made possible by the virtualisation of the CIDR environment and the availability of the CIDR Test / Training system on the Government Virtual Private Network.

OUTBREAK MANAGEMENT FUNCTIONALITY IMPROVED

The outbreak management functionality of CIDR was re-designed according to end-user specification in 2013 for delivery early in 2014. The changes to the system were extensive and designed to simplify and streamline the use of the outbreak functions. The enhanced surveillance data associated with outbreak management was expanded significantly in this re-design.

GOVERNANCE AND COMMUNICATIONS

The National CIDR Steering Group continued to provide guidance and oversight of CIDR through 2013 and met by teleconference on four occasions during the year. The wider National CIDR User Group convened on four occasions throughout the year, also by teleconference, to discuss the ongoing use of CIDR and associated developments.

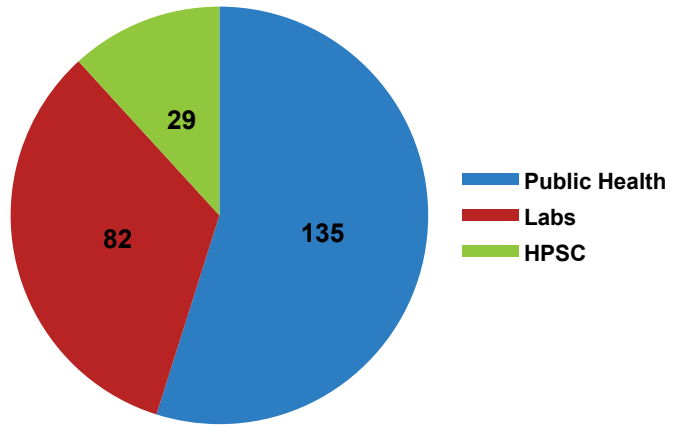


Figure 2. The number of users of the CIDR system in Departments of Public Health, in diagnostic and reference laboratories and in HPSC in 2013 (total=246)

Appendix 1
Notifiable Infectious Diseases in Ireland

Notes:

Figures for the year 2013 presented in this appendix were extracted from the Computerised Infectious Disease Reporting (CIDR) system on the 12th September, 2014. Please note that some figures may differ from figures published previously or other chapters in this report, due to ongoing updating of notification data on CIDR.

Figures on EARS-Net pathogens and certain sexually transmitted infections (specifically, ano-genital warts and non-specific urethritis) are not presented here, since these diseases were not reported via the CIDR system during 2013; separate databases are used to collate data on these diseases.

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2013) under Infectious Diseases (Amendment) (No. 3) Regulations 2011 (S.I. No. 452 of 2011)

Infectious Disease	Causative Pathogen(s)
Acute anterior poliomyelitis	Polio virus
Ano-genital warts	Human papilloma virus
Anthrax	*Bacillus anthracis*
Bacillus cereus food-borne infection/intoxication	*Bacillus cereus*
Bacterial meningitis (not otherwise specified)	
Botulism	*Clostridium botulinum*
Brucellosis	*Brucella* spp.
Campylobacter infection	*Campylobacter* spp.
Carbapenem-resistant *Enterobacteriaceae* infection (invasive)	Carbapenem-resistant *Enterobacteriaceae* (blood, CSF or other normally sterile site)
Chancroid	*Haemophilus ducreyi*
Chickenpox – hospitalised cases	Varicella-zoster virus
Chikungunya disease	Chikungunya virus
Chlamydia trachomatis infection (genital)	*Chlamydia trachomatis*
Cholera	*Vibrio cholerae*
Clostridium difficile infection	*Clostridium difficile*
Clostridium perfringens (type A) food-borne disease	*Clostridium perfringens*
Creutzfeldt Jakob disease	
variant Creutzfeldt Jakob disease	
Cryptosporidiosis	*Cryptosporidium parvum, hominis*
Cytomegalovirus infection (congenital)	Cytomegalovirus
Dengue fever	Dengue virus
Diphtheria	*Corynebacterium diphtheriae* or *ulcerans* (toxin producing)
Echinococcosis	*Echinococcus* spp.
Enterococcal bacteraemia	*Enterococcus* spp. (blood)
Escherichia coli infection (invasive)	*Escherichia coli* (blood, CSF)
Giardiasis	*Giardia lamblia*
Gonorrhoea	*Neisseria gonorrhoeae*
Granuloma inguinale	*Klebsiella granulomatis*
Haemophilus influenzae disease (invasive)	*Haemophilus influenzae* (blood, CSF or other normally sterile site)
Hepatitis A (acute) infection	Hepatitis A virus
Hepatitis B (acute and chronic) infection	Hepatitis B virus
Hepatitis C infection	Hepatitis C virus
Herpes simplex (genital)	Herpes simplex virus
Human immunodeficiency virus infection	Human immunodeficiency virus
Influenza	Influenza A and B virus
Klebsiella pneumoniae infection (invasive)	*Klebsiella pneumoniae* (blood or CSF)
Legionellosis	*Legionella* spp.
Leprosy	*Mycobacterium leprae*
Leptospirosis	*Leptospira* spp.
Listeriosis	*Listeria monocytogenes*
Lyme disease (neuroborreliosis)	*Borrelia burgdorferi*
Lymphogranuloma venereum	*Chlamydia trachomatis*
Malaria	*Plasmodium falciparum, vivax, knowlesi, ovale, malariae*
Measles	Measles virus
Meningococcal disease	*Neisseria meningitidis*
Mumps	Mumps virus
Non-specific urethritis	
Noroviral infection	Norovirus
Paratyphoid	*Salmonella* Paratyphi
Pertussis	*Bordetella pertussis*
Plague	*Yersinia pestis*
Pseudomonas aeruginosa infection (invasive)	*Pseudomonas aeruginosa* (blood or CSF)
Q Fever	*Coxiella burnetii*
Rabies	Rabies virus

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2013) under Infectious Diseases (Amendment) (No. 3) Regulations 2011 (S.I. No. 452 of 2011)
(Continued)

Infectious Disease	Causative Pathogen(s)
Respiratory syncytial virus infection	Respiratory syncytial virus
Rotavirus infection	Rotavirus
Rubella	Rubella virus
Salmonellosis	*Salmonella* spp. other than S. Typhi and S. Paratyphi
Severe Acute Respiratory Syndrome (SARS)	SARS-associated coronavirus
Shigellosis	*Shigella* spp.
Smallpox	Variola virus
Staphylococcal food poisoning	Enterotoxigenic *Staphylococcus aureus*
Staphylococcus aureus bacteraemia	*Staphylococcus aureus* (blood)
Streptococcus group A infection (invasive)	*Streptococcus pyogenes* (blood, CSF or other normally sterile site)
Streptococcus group B infection (invasive)	*Streptococcus agalactiae* (blood, CSF or other normally sterile site)
Streptococcus pneumoniae infection (invasive)	*Streptococcus pneumoniae* (blood, CSF or other normally sterile site)
Syphilis	*Treponema pallidum*
Tetanus	*Clostridium tetani*
Toxoplasmosis	*Toxoplasma gondii*
Trichinosis	*Trichinella* spp.
Trichomoniasis	*Trichomonas vaginalis*
Tuberculosis	*Mycobacterium tuberculosis* complex
Tularemia	*Francisella tularensis*
Typhoid	*Salmonella* Typhi
Typhus	*Rickettsia prowazekii*
Verotoxigenic *Escherichia coli* infection	Verotoxin producing *Escherichia coli*
Viral encephalitis	
Viral haemorrhagic fevers	
Viral meningitis	
West Nile fever	West Nile virus
Yellow fever	Yellow fever virus
Yersiniosis	*Yersinia enterocolitica, Yersinia pseudotuberculosis*

Table A1.2 Number of notifiable infectious diseases, 2011-2013 and crude incidence rates of diseases, 2013

Infectious Disease	2011	2012*	2013	CIR 2013
Acute anterior poliomyelitis	0	0	0	0.00
Anthrax	0	0	0	0.00
Bacillus cereus food-borne infection/intoxication	0	0	0	0.00
Bacterial meningitis (not otherwise specified)	35	29	21	0.46
Botulism	1	0	1	0.02
Brucellosis	1	2	1	0.02
Campylobacter infection	2427	2388	2276	49.60
Carbapenem-resistant Enterobacteriaceae infection (invasive)	NA	0	0	0.00
Chancroid	NA	NA	0	0.00
Chickenpox - hospitalised cases	NA	80	53	-
Chikungunya disease	NA	0	0	0.00
Chlamydia trachomatis infection (genital)†	NA	NA	6261	136.46
Cholera	0	0	0	0.00
Clostridium difficile infection‡	1847	1822	1814	39.54
Clostridium perfringens (type A) food-borne disease	0	0	1	0.02
Creutzfeldt Jakob disease	7	5	5	0.11
Creutzfeldt Jakob disease (variant)	0	0	0	0.00
Cryptosporidiosis	428	556	514	11.20
Cytomegalovirus infection (congenital)	NA	8	7	0.15
Dengue fever	NA	7	15	0.33
Diphtheria	0	0	0	0.00
Echinococcosis	0	0	1	0.02
Giardiasis	57	54	44	0.96
Gonorrhoea	NA	NA	1293	28.18
Granuloma inguinale	NA	NA	0	0.00
Haemophilus influenzae disease (invasive)	44	41	41	0.89
Hepatitis A (acute)	19	30	50	1.09
Hepatitis B (acute and chronic)	520	566	429	9.35
Hepatitis C	1241	998	841	18.33
Herpes simplex (genital)	NA	NA	1136	24.76
Human immunodeficiency virus infection	NA	340	341	7.43
Influenza	2077	743	1602	34.92
Legionellosis§	7	15	14	0.31
Leprosy	NA	0	2	0.04
Leptospirosis	16	15	14	0.31
Listeriosis	7	11	8	0.17
Lyme disease	NA	8	13	0.28
Lymphogranuloma venereum	NA	NA	5	0.11
Malaria	61	65	71	1.55
Measles‖	267	103	51	1.11
Meningococcal disease	94	66	81	1.77
Mumps	165	163	223	4.86
Noroviral infection†	990	1704	1489	32.45
Paratyphoid	2	5	2	0.04
Pertussis	229	458	174	3.79
Plague	0	0	0	0.00
Q fever	5	6	0	0.00
Rabies	0	0	0	0.00
Respiratory syncytial virus infection†	NA	1972	1283	27.96
Rotavirus infection†	2451	2651	2514	54.79
Rubella	4	9	0	0.00
Salmonellosis	310	313	324	7.06
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0.00
Shigellosis	42	29	49	1.07
Smallpox	0	0	0	0.00
Staphylococcal food poisoning	0	0	0	0.00
Streptococcus group A infection (invasive)	67	122	168	3.66
Streptococcus group B infection (invasive)¶	NA	77	66	-
Streptococcus pneumoniae infection (invasive)	425	427	637	13.88
Syphilis**	NA	494	555	12.10
Tetanus	0	1	1	0.02
Toxoplasmosis	32	36	32	0.70

Table A1.2 Number of notifiable infectious diseases, 2011-2013 and crude incidence rates of diseases, 2013 (Continued)

Infectious Disease	2011	2012*	2013	CIR 2013
Trichinosis	0	0	0	0.00
Trichomoniasis	NA	NA	75	1.63
Tuberculosis	413	359	380	8.28
Tularemia	0	0	0	0.00
Typhoid	14	8	10	0.22
Typhus	1	0	0	0.00
Verotoxigenic *Escherichia coli* infection	284	554	702	15.30
Viral encephalitis	23	18	6	0.13
Viral haemorrhagic fevers	0	0	0	0.00
Viral meningitis	220	235	281	6.12
West Nile fever	NA	0	1	0.02
Yellow fever	0	0	0	0.00
Yersiniosis	6	2	4	0.09
Total	14839	17595	25982	

Notes:

1. NA: Indicates that data not available in CIDR for the diseases and years indicated above
2. CIR, Crude incidence rate per 100,000 total population

* In 2012, new notifiable diseases were introduced on January 1st 2012 along with the revised versions of case definitions of certain diseases at that time

† Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

‡ Since 01/01/2012 both new and recurrent cases of *Clostridium difficile* infection are notifiable, prior to this only new cases were notifiable; please interpret comparisons between current and historical data with caution

§ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

‖ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

¶ Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

** Syphilis data were reported via CIDR from May 2011, but syphilis data for 2011 are excluded from this appendix as they represent only a portion of the cases notified in 2011

Table A1.3 Number of notifiable infectious diseases by HSE area, 2013

Infectious Disease	HSE E	HSE M	HSE MW	HSE NE	HSE NW	HSE SE	HSE S	HSE W	Total
Bacterial meningitis (not otherwise specified)	9	1	4	0	2	3	1	1	21
Botulism	*	*	*	*	*	*	*	*	1
Brucellosis	*	*	*	*	*	*	*	*	1
Campylobacter infection	697	160	214	155	108	343	383	216	2276
Chickenpox - hospitalised cases	32	2	6	2	1	1	7	2	53
Chlamydia trachomatis infection (genital)†	3346	247	465	334	242	659	498	470	6261
Clostridium difficile infection‡	816	39	159	87	94	175	206	238	1814
Clostridium perfringens (type A) food-borne disease	*	*	*	*	*	*	*	*	1
Creutzfeldt Jakob disease	3	0	0	0	0	2	0	0	5
Cryptosporidiosis	25	43	74	34	60	88	86	104	514
Cytomegalovirus infection (congenital)	3	0	0	3	0	0	1	0	7
Dengue fever	8	1	2	0	0	1	0	3	15
Echinococcosis	*	*	*	*	*	*	*	*	1
Giardiasis	14	6	4	5	1	2	8	4	44
Gonorrhoea	830	43	67	53	35	90	119	56	1293
Haemophilus influenzae disease (invasive)	10	4	3	6	3	5	6	4	41
Hepatitis A (acute)	20	1	0	12	3	2	9	3	50
Hepatitis B (acute and chronic)	260	14	20	30	7	19	52	27	429
Hepatitis C	607	27	35	44	9	27	58	34	841
Herpes simplex (genital)	694	33	64	27	13	105	97	103	1136
Human immunodeficiency virus infection	235	10	21	14	5	12	33	11	341
Influenza	645	64	165	148	104	129	138	209	1602
Legionellosis§	10	1	1	0	0	2	0	0	14
Leprosy	*	*	*	*	*	*	*	*	2
Leptospirosis	6	0	1	2	0	1	2	2	14
Listeriosis	1	2	2	0	1	1	0	1	8
Lyme disease	1	1	1	0	1	3	4	2	13
Lymphogranuloma venereum	5	0	0	0	0	0	0	0	5
Malaria	41	4	1	7	2	6	2	8	71
Measles‖	19	1	2	1	1	22	2	3	51
Meningococcal disease	28	6	7	7	5	12	9	7	81
Mumps	101	13	17	13	10	30	20	19	223
Noroviral infection†	712	75	167	179	60	72	70	154	1489
Paratyphoid	*	*	*	*	*	*	*	*	2
Pertussis	68	4	11	8	8	39	23	13	174
Respiratory syncytial virus infection†	520	93	144	95	125	162	54	90	1283
Rotavirus infection†	502	330	170	211	169	419	414	299	2514
Salmonellosis	98	23	39	37	18	30	46	33	324
Shigellosis	17	3	15	1	0	1	9	3	49
Streptococcus group A infection (invasive)	67	7	16	14	6	21	18	19	168
Streptococcus group B infection (invasive)¶	35	3	0	13	2	1	8	4	66
Streptococcus pneumoniae infection (invasive)	199	11	91	38	38	169	56	35	637
Syphilis	420	11	13	16	5	14	52	24	555
Tetanus	*	*	*	*	*	*	*	*	1
Toxoplasmosis	13	8	2	1	1	1	3	3	32
Trichomoniasis	37	7	6	9	4	5	4	3	75
Tuberculosis	151	16	32	30	16	31	68	36	380
Typhoid	5	0	0	1	0	1	2	1	10
Verotoxigenic *Escherichia coli* infection	89	70	151	15	16	148	111	102	702
Viral encephalitis	1	0	0	0	2	2	0	1	6
Viral meningitis	98	13	28	27	16	20	15	64	281
West Nile fever	*	*	*	*	*	*	*	*	1
Yersiniosis	*	*	*	*	*	*	*	*	4

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2013

* Data not reported to HSE area level when total number in Ireland <5 cases

† Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

‡ *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2013 epidemiological calendar year as shown here

§ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

‖ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

¶ Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.4 Number of notifiable infectious diseases by HSE region, 2013

Infectious Disease	Dublin Mid Leinster	Dublin North East	South	West	HSE E LHO area unspecified	Total
Bacterial meningitis (not otherwise specified)	7	3	4	7	0	21
Botulism	*	*	*	*	*	1
Brucellosis	*	*	*	*	*	1
Campylobacter infection	617	395	726	538	0	2276
Chickenpox - hospitalised cases	16	20	8	9	0	53
Chlamydia trachomatis infection (genital)†	566	632	1157	1177	2729	6261
Clostridium difficile infection‡	591	351	381	491	0	1814
Clostridium perfringens (type A) food-borne disease	*	*	*	*	*	1
Creutzfeldt Jakob disease	1	2	2	0	0	5
Cryptosporidiosis	59	43	174	238	0	514
Cytomegalovirus infection (congenital)	2	4	1	0	0	7
Dengue fever	8	1	1	5	0	15
Echinococcosis	*	*	*	*	*	1
Giardiasis	15	10	10	9	0	44
Gonorrhoea	692	234	209	158	0	1293
Haemophilus influenzae disease (invasive)	7	13	11	10	0	41
Hepatitis A (acute)	18	15	11	6	0	50
Hepatitis B (acute and chronic)	143	161	71	54	0	429
Hepatitis C	399	279	85	78	0	841
Herpes simplex (genital)	528	226	202	180	0	1136
Human immunodeficiency virus infection	141	118	45	37	0	341
Influenza	411	446	267	478	0	1602
Legionellosis§	10	1	2	1	0	14
Leprosy	*	*	*	*	*	2
Leptospirosis	4	4	3	3	0	14
Listeriosis	3	0	1	4	0	8
Lyme disease	2	0	7	4	0	13
Lymphogranuloma venereum	2	3	0	0	0	5
Malaria	27	25	8	11	0	71
Measles‖	6	15	24	6	0	51
Meningococcal disease	22	19	21	19	0	81
Mumps	69	58	50	46	0	223
Noroviral infection†	359	293	142	381	314	1489
Paratyphoid	*	*	*	*	*	2
Pertussis	47	33	62	32	0	174
Respiratory syncytial virus infection†	279	215	216	359	214	1283
Rotavirus infection†	447	265	833	638	331	2514
Salmonellosis	81	77	76	90	0	324
Shigellosis	15	6	10	18	0	49
Streptococcus group A infection (invasive)	51	37	39	41	0	168
Streptococcus group B infection (invasive)¶	21	30	9	6	0	66
Streptococcus pneumoniae infection (invasive)	100	148	225	164	0	637
Syphilis	288	159	66	42	0	555
Tetanus	*	*	*	*	*	1
Toxoplasmosis	17	5	4	6	0	32
Trichomoniasis	19	34	9	13	0	75
Tuberculosis	104	93	99	84	0	380
Typhoid	3	3	3	1	0	10
Verotoxigenic *Escherichia coli* infection	152	22	259	269	0	702
Viral encephalitis	1	0	2	3	0	6
Viral meningitis	79	59	35	108	0	281
West Nile fever	*	*	*	*	*	1
Yersiniosis	*	*	*	*	*	4

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2013

* Data not reported to HSE region level when total number in Ireland <5 cases

† Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

‡ *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2013 epidemiological calendar year as shown here

§ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

‖ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

¶ Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.5 Number of notifiable infectious diseases by age group (years), 2013

Infectious Disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Bacterial meningitis (not otherwise specified)	7	0	0	3	3	2	2	0	2	2	0	21
Botulism	1	0	0	0	0	0	0	0	0	0	0	1
Brucellosis	0	0	0	0	0	0	0	1	0	0	0	1
Campylobacter infection	524	118	72	121	166	331	205	211	204	322	2	2276
Chickenpox - hospitalised cases	35	7	3	0	0	2	1	0	1	4	0	53
Chlamydia trachomatis infection (genital)*	¬	¬	¬	746	2640	2279	410	111	38	6	12	6261
Clostridium difficile infection†	27	10	7	21	29	100	82	132	183	1223	0	1814
Clostridium perfringens (type A) food-borne disease	0	0	0	0	0	0	0	0	0	1	0	1
Creutzfeldt Jakob disease	0	0	0	0	0	0	1	1	2	1	0	5
Cryptosporidiosis	295	103	56	16	8	23	8	0	1	3	1	514
Cytomegalovirus infection (congenital)	7	0	0	0	0	0	0	0	0	0	0	7
Dengue fever	0	0	0	0	7	4	1	1	0	2	0	15
Echinococcosis	0	0	0	0	0	1	0	0	0	0	0	1
Giardiasis	6	1	3	0	8	12	5	4	2	3	0	44
Gonorrhoea	¬	¬	¬	136	424	488	164	48	21	4	4	1293
Haemophilus influenzae disease (invasive)	10	1	0	0	1	5	2	0	7	15	0	41
Hepatitis A (acute)	3	2	3	1	2	15	12	4	7	1	0	50
Hepatitis B (acute and chronic)	1	2	1	7	39	190	114	45	17	12	1	429
Hepatitis C	5	1	2	6	28	276	291	161	52	18	1	841
Herpes simplex (genital)	¬	¬	¬	126	318	402	191	59	28	7	2	1136
Human immunodeficiency virus infection	1	2	0	3	37	130	100	48	16	4	0	341
Influenza	165	95	57	49	44	174	239	188	141	444	6	1602
Legionellosis‡	0	0	0	0	0	0	2	5	1	6	0	14
Leprosy	0	0	0	0	0	1	1	0	0	0	0	2
Leptospirosis	0	0	0	2	3	2	0	4	2	1	0	14
Listeriosis	3	0	0	0	0	0	0	0	1	4	0	8
Lyme disease	0	0	1	1	1	1	3	4	1	1	0	13
Lymphogranuloma venereum	¬	¬	¬	0	0	3	2	0	0	0	0	5
Malaria	3	3	6	2	3	7	24	16	3	3	1	71
Measles§	29	14	3	2	1	1	1	0	0	0	0	51
Meningococcal disease	47	8	2	9	3	0	3	1	3	5	0	81
Mumps	40	20	21	23	33	35	25	13	6	7	0	223
Noroviral infection*	221	39	10	11	25	59	47	61	113	896	7	1489
Paratyphoid	0	0	0	0	0	2	0	0	0	0	0	2
Pertussis	72	23	9	8	4	14	14	20	4	6	0	174
Respiratory syncytial virus infection*	1194	9	6	1	5	11	3	8	11	35	0	1283
Rotavirus infection*	2402	87	7	1	1	5	0	2	2	6	1	2514
Salmonellosis	74	16	17	10	22	49	46	22	35	33	0	324
Shigellosis	7	4	3	0	7	12	6	6	2	2	0	49
Streptococcus group A infection (invasive)	23	14	6	6	10	17	13	14	15	50	0	168
Streptococcus group B infection (invasive)‖	66	0	0	0	0	0	0	0	0	0	0	66
Streptococcus pneumoniae infection (invasive)	44	12	2	5	6	28	40	45	105	350	0	637
Syphilis	0	0	0	3	54	182	178	91	32	15	0	555
Tetanus	0	0	0	0	1	0	0	0	0	0	0	1
Toxoplasmosis	1	0	3	0	3	14	5	3	1	2	0	32
Trichomoniasis	¬	¬	¬	3	7	31	15	19	0	0	0	75
Tuberculosis	7	2	0	11	37	89	80	55	45	54	0	380

Table A1.5 Number of notifiable infectious diseases by age group (years), 2013 (Continued)

Infectious Disease	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+	Unknown	Total
Typhoid	1	2	2	0	0	4	1	0	0	0	0	10
Verotoxigenic *Escherichia coli* infection	303	55	28	25	20	55	53	28	43	92	0	702
Viral encephalitis	2	0	0	0	0	0	0	1	0	3	0	6
Viral meningitis	127	8	10	27	17	45	35	7	2	3	0	281
West Nile fever	0	0	0	0	0	0	0	0	0	1	0	1
Yersiniosis	3	0	0	0	0	0	0	1	0	0	0	4
Total	5756	658	340	1385	4017	5101	2425	1440	1149	3647	38	25982

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2013

* Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

† *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2013 epidemiological calendar year as shown here

‡ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

‖ Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

¬ Data for the age groups 0-4 years, 5-9 years and 10-14 years are not presented here, but data for the age group 0-14 years are available in the STI annual slide-set at www.hpsc.ie

Table A1.6 Number of notifiable infectious diseases by gender, 2013

Infectious Disease	Male	Female	Unknown	Not Specified	Total
Bacterial meningitis (not otherwise specified)	13	8	0	0	21
Botulism	1	0	0	0	1
Brucellosis	0	1	0	0	1
Campylobacter infection	1196	1072	8	0	2276
Chickenpox - hospitalised cases	28	24	1	0	53
Chlamydia trachomatis infection (genital)*	2750	3421	89	1	6261
Clostridium difficile infection†	696	1117	1	0	1814
Clostridium perfringens (type A) food-borne disease	1	0	0	0	1
Creutzfeldt Jakob disease	1	4	0	0	5
Cryptosporidiosis	298	216	0	0	514
Cytomegalovirus infection (congenital)	2	5	0	0	7
Dengue fever	7	8	0	0	15
Echinococcosis	0	1	0	0	1
Giardiasis	23	21	0	0	44
Gonorrhoea	1021	261	11	0	1293
Haemophilus influenzae disease (invasive)	11	30	0	0	41
Hepatitis A (acute)	23	27	0	0	50
Hepatitis B (acute and chronic)	247	177	5	0	429
Hepatitis C	573	263	5	0	841
Herpes simplex (genital)	305	821	10	0	1136
Human immunodeficiency virus infection	255	86	0	0	341
Influenza	678	922	2	0	1602
Legionellosis‡	9	5	0	0	14
Leprosy	1	1	0	0	2
Leptospirosis	10	4	0	0	14
Listeriosis	4	4	0	0	8
Lyme disease	6	7	0	0	13
Lymphogranuloma venereum	5	0	0	0	5
Malaria	48	22	1	0	71
Measles§	25	26	0	0	51
Meningococcal disease	44	37	0	0	81
Mumps	126	97	0	0	223
Noroviral infection*	649	838	2	0	1489
Paratyphoid	1	1	0	0	2
Pertussis	84	90	0	0	174
Respiratory syncytial virus infection*	720	561	2	0	1283
Rotavirus infection*	1342	1163	9	0	2514
Salmonellosis	172	152	0	0	324
Shigellosis	20	29	0	0	49
Streptococcus group A infection (invasive)	95	73	0	0	168
Streptococcus group B infection (invasive)‖	37	20	9	0	66
Streptococcus pneumoniae infection (invasive)	315	322	0	0	637
Syphilis	446	105	4	0	555
Tetanus	0	1	0	0	1
Toxoplasmosis	15	17	0	0	32
Trichomoniasis	1	74	0	0	75
Tuberculosis	239	139	2	0	380
Typhoid	7	3	0	0	10
Verotoxigenic *Escherichia coli* infection	324	378	0	0	702
Viral encephalitis	4	2	0	0	6
Viral meningitis	142	132	7	0	281
West Nile fever	1	0	0	0	1
Yersiniosis	2	2	0	0	4
Total	13023	12790	168	1	25982

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2013

* Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

† *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2013 epidemiological calendar year as shown here

‡ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

‖ Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.7 Number of notifiable infectious diseases by case classification, 2013

Infectious Disease	Confirmed	Probable	Possible	Not Specified	Total
Bacterial meningitis (not otherwise specified)	6	5	10	0	21
Botulism	1	0	0	0	1
Brucellosis	1	0	0	0	1
Campylobacter infection	2276	0	0	0	2276
Chickenpox - hospitalised cases	37	3	13	0	53
Chlamydia trachomatis infection (genital)*	6261	0	0	0	6261
Clostridium difficile infection†	1814	0	0	0	1814
Clostridium perfringens (type A) food-borne disease	1	0	0	0	1
Creutzfeldt Jakob disease	5	0	0	0	5
Cryptosporidiosis	511	3	0	0	514
Cytomegalovirus infection (congenital)	7	0	0	0	7
Dengue fever	15	0	0	0	15
Echinococcosis	1	0	0	0	1
Giardiasis	44	0	0	0	44
Gonorrhoea	1293	0	0	0	1293
Haemophilus influenzae disease (invasive)	41	0	0	0	41
Hepatitis A (acute)	47	3	0	0	50
Hepatitis B (acute and chronic)	429	0	0	0	429
Hepatitis C	841	0	0	0	841
Herpes simplex (genital)	1061	75	0	0	1136
Human immunodeficiency virus infection	341	0	0	0	341
Influenza	1582	6	14	0	1602
Legionellosis‡	14	0	0	0	14
Leprosy	2	0	0	0	2
Leptospirosis	13	1	0	0	14
Listeriosis	8	0	0	0	8
Lyme disease	13	0	0	0	13
Lymphogranuloma venereum	5	0	0	0	5
Malaria	71	0	0	0	71
Measles§	33	10	8	0	51
Meningococcal disease	74	1	6	0	81
Mumps	80	6	137	0	223
Noroviral infection*	1489	0	0	0	1489
Paratyphoid	2	0	0	0	2
Pertussis	112	9	53	0	174
Respiratory syncytial virus infection*	1283	0	0	0	1283
Rotavirus infection*	2514	0	0	0	2514
Salmonellosis	324	0	0	0	324
Shigellosis	45	4	0	0	49
Streptococcus group A infection (invasive)	158	10	0	0	168
Streptococcus group B infection (invasive)‖	66	0	0	0	66
Streptococcus pneumoniae infection (invasive)	344	0	293	0	637
Syphilis	531	24	0	0	555
Tetanus	0	1	0	0	1
Toxoplasmosis	32	0	0	0	32
Trichomoniasis	75	0	0	0	75
Tuberculosis	287	37	56	0	380
Typhoid	10	0	0	0	10
Verotoxigenic *Escherichia coli* infection	571	128	3	0	702
Viral encephalitis	3	0	3	0	6
Viral meningitis	266	6	9	0	281
West Nile fever	1	0	0	0	1
Yersiniosis	4	0	0	0	4
Total	25045	332	605	0	25982

Notes:

1. This table does not include details of diseases for which a zero number of cases were notified; see Appendix A1.1 for details of these diseases in 2013
2. The case definitions booklet, available at http://www.hpsc.ie has been updated since 2012; case classifications are assigned to notifications as per the Case Definitions for Notifiable Diseases during 2013

* Since 17/03/2013, due to a change in business process in HSE E, figures for *Chlamydia trachomatis* infection, Noroviral infection, Respiratory syncytial virus infection and Rotavirus infection may refer to notifications rather than events

† *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2013 epidemiological calendar year as shown here

‡ Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

§ These tables exclude two measles cases that are on CIDR but were laboratory negative for measles and were not epidemiologically linked to a confirmed measles case

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Explanatory Notes

Notifiable Infectious Diseases

Computerised Infectious Disease Reporting (CIDR) system

For the majority of the notifiable infectious diseases (see Appendix 1), data were collated using the Computerised Infectious Disease Reporting (CIDR) system. During 2013, notification data were inputted directly by areas using the system. Enhanced surveillance was undertaken for certain diseases and these data are collated on CIDR. Outbreak data were also collated on CIDR using the same process outlined above. Weekly Reports on infectious disease notifications (including a separate report for *Clostridium difficile associated disease,* HIV & STIs) and outbreaks were produced by HPSC and published on the HPSC website, www.hpsc.ie. Throughout the year data were cleaned and validated on an ongoing basis and final data checks and cleaning were undertaken following year end by HPSC and the Departments of Public Health. Data analysis was performed using CIDR Business Objects Reporting and MS Excel. Figures for the relevant chapters within this report were extracted from CIDR between February and September 2014. These figures may differ from those previously published due to ongoing updating of data on CIDR.

HIV

HIV was made a notifiable disease in Ireland in September 2011. Since 1st January 2012, CIDR has been used to record notifications of HIV, thereby allowing the replacement of HIV case based reporting. Since 1st January 2012, AIDS diagnoses are only reported if they occur at the time of HIV diagnoses.

Data on the notifiable infectious diseases not yet on CIDR were collated as follows:

Sexually Transmitted Infections (STIs)

Clinicians notified their respective Departments of Public Health of cases of ano-genital warts and non-specific urethritis. Data for 2013 were collated and analysed by Departments of Public Health and aggregated data were reported quarterly to HPSC. National data were collated on an MS Access database, analysis preformed and reports produced by HPSC.

Other Surveillance Systems

Influenza/Influenza-like illness Surveillance Systems

Since 2000, HPSC has worked in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on the influenza sentinel surveillance project. Sixty-one general practices (located in all HSE-Areas and representing 5.8% of the population) were recruited to report electronically, on a weekly basis, the number of patients who consulted with influenza-like illness (ILI). ILI is defined using the Irish case definition for ILI which is sudden onset of symptoms AND at least one of the following four systemic symptoms: fever, malaise, headache, myalgia; AND at least one of the following three respiratory symptoms: cough, sore throat, shortness of breath. Sentinel GPs were requested to send a combined nasal and throat swab on one ILI patient per week to the NVRL. The NVRL also tested respiratory non-sentinel specimens, referred mainly from hospitals. Other surveillance systems set up to monitor influenza/ILI activity include a network of sentinel hospitals reporting admissions data. The Departments of Public Health also notified HPSC weekly of all cases of influenza (including hospitalisation status), all influenza/ILI outbreaks and enhanced surveillance data on all hospitalised cases of confirmed influenza in 0-14 year olds. HPSC was notified of all registered deaths on a daily basis from the General Register Office.

Several surveillance projects that were initiated/ augmented during the 2009 influenza pandemic were continued during subsequent influenza seasons:

- Surveillance of all calls to GP out-of-hours (OOHs) centres were monitored for self-reported influenza. These data were provided by HSE-NE.
- Intensive Care Society of Ireland (ICSI) enhanced surveillance of all critical care patients with confirmed influenza in all critical care units and enhanced surveillance of all severe acute respiratory infections (SARI) in two pilot ICU sites.
- Enhanced surveillance of all confirmed influenza deaths.

Other routine surveillance include the monitoring of the uptake of the seasonal influenza vaccine among residents in long term care facilities (LTCFs) and that of the health care workers in both LTCFs and hospitals since the 2011/2012 season. Uptake levels by different categories of staff over time, along with other details are presented in the influenza chapter of this report.

At HPSC, data were collated from the various sources, analysed and routine reports were produced. Influenza surveillance reports were posted on the HPSC website

www.hpsc.ie. Aggregated clinical and virological data and annonymised data on confirmed influenza cases admitted to hospital were reported weekly to the European Centre for Disease Prevention and Control (ECDC).

Immunisation Uptake

- **Immunisation uptake among children at 12 and 24 months of age**

Each HSE Area maintains a childhood immunisation database. In 2012, HSE Areas provided HPSC with immunisation uptake data for their area and for each of the Local Health Offices in their area on a quarterly basis. National data were collated and analysed at HPSC using a MS Excel database. Quarterly reports were produced and are available on the HPSC website. For further details on methods used, please see the immunisation uptake chapter within this report.

- **HPV uptake**

Following a recommendation from the National Immunisation Advisory Committee, that human papillomavirus (HPV) vaccine should be given to 12 year old girls, a routine HSE school HPV vaccination programme began in May 2010. HPV vaccinations provided through the schools immunisation programme are now collated on a national database. Uptake of HPV vaccine, provided through the school immunisation programme in the academic year 2012/2013 and recorded on the database, is reported in the HPV uptake chapter within this report. For further details please see the HPV uptake chapter.

- **Other school immunisations excluding HPV**

Since the 2011/2012 academic year, the uptake of the DTaP and MMR vaccines in 4-5 year old schoolchildren (at Junior Infant level) has been monitored across all Local Health Offices (LHOs) each year. Each LHO provides details of the cohort size and the number of vaccinated children and the returns collated to calculate uptake levels which are also presented in maps in the 'other school immunisations' chapter. Uptake of the Tdap vaccine, provided through the school immunisation programme in the academic year 2012/2013 and recorded on a national database, is also reported in this chapter.

European Antimicrobial Resistance Surveillance Network (EARS-Net)

Data were collected by participating EARS-Net (formerly the European Antimicrobial Resistance Surveillance System, EARSS) laboratories in 2012 on the first invasive isolate per patient per quarter on *Staphylococcus aureus* and *Enterococcus faecalis* from blood only and on *Streptococcus pneumoniae*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* from blood and cerebrospinal fluid (CSF). Data were reported quarterly to HPSC, via WHONET software, and collated in an MS Access database. Quarterly and annual reports were produced.

Note: Invasive infections due to *K. pneumoniae* and *P. aeruginosa* became notifiable as of 13th September 2011.

Antimicrobial consumption

- Community (outpatient) consumption data were obtained from IMS Health and represent wholesaler to retail pharmacy sales figures for Ireland. Hospital (inpatient) consumption data were obtained directly from clinical pharmacies and validated with the support of the Irish Antimicrobial Pharmacists Association. Quarterly and annual consumption trends by named public acute hospitals are published on the HPSC website. All data were interpreted using the WHO Anatomical Therapeutic Chemicals index (www.whocc.no/atcddd/) in line with European Surveillance of Antimicrobial Consumption (ESAC-Net) methodology, which is now managed by the ECDC. See relevant section for notes on the denominator data.

Healthcare associated infections

- ***Clostridium difficile:*** Data on *C.difficile* enhanced surveillance were collected by participating hospitals, reported quarterly to the HPSC and stored in an MS Access database. Quarterly and annual reports were produced.
- Data were also collected on the total volume of alcohol-based hand rub used per hospital per year/quarter, exeluding that used for pre-operative surgical "scrub". See relevant section for notes on the denominator data. The rate of usage per hospital was calculated as the total volume of hand rub consumed (in litres) per 1000 bed days used, and quarterly and annual reports were produced for publication on the HPSC website.

Denominator Data

To calculate disease incidence rates, Census of Population data were used as the denominator (available from the Central Statistics Office, http://www.cso.ie). Population figures were applied as follows:

- Census 2011 for analysis of 2009-2013 data
- Census 2006 for analysis of 2004-2008 data
- Census 2002 for 2000-2003 data
- Census 1996 for 1999 data

Monthly population changes were estimated between 1993 and 2013 using a curve interpolation method for the calculation of outpatient antibiotic consumption rate.

Bed-days used and other activity data for public acute hospitals were provided by the Performance Monitoring Unit of the HSE and used to calculate rates of MRSA, hospital antibiotic consumption and rates used in other hospital-based surveillance systems. Similar activity data were obtained directly from private acute hospitals.

HSE Areas

Although organisational changes have taken place in the Health Services, the term HSE Areas are used in this report when analysing and presenting data by geographical area (equating to the eight former health board regions/areas). This is because operationally the surveillance, prevention and control of infectious

diseases are still managed by eight Departments of Public Health, one in each HSE Area.

Regional Directors of Operations (RDO's)

The range of health and personal social services provided by the HSE and its funded agencies are managed within four regions known as RDOs. Details of the four RDOs and their relationship with the eight HSE areas are shown below.

1. Dublin Mid Leinster (HSE-Midland plus CCA1-5 and CCA9-10 of HSE-East)
2. Dublin North East (HSE-North East plus CCA6-8 of HSE-East)
3. South (HSE-South and HSE-South East)
4. West (HSE-Midwest, HSE-North West and HSE-West)

Glossary of Terms

CIDR	Computerised Infectious Disease Reporting
DoHC	Department of Health
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control
EISN	European Influenza Surveillance Network
FSAI	Food Safety Authority of Ireland
FSPB	Food Safety Promotion Board
ICGP	Irish College of General Practitioners
IDU	Injecting Drug User
IMMRL	Irish Meningococcal and Meningitis Reference Laboratory
IPD	Invasive pneumococcal disease
HCAI	Healthcare associated infections
HPSC	Health Protection Surveillance Centre
HSE	Health Services Executive
HSE E	HSE Eastern Region
HSE M	HSE Midland Area
HSE MW	HSE Mid-Western Area
HSE NE	HSE North Eastern Area
HSE NW	HSE North Western Area
HSE SE	HSE South Eastern Area
HSE S	HSE Southern Area
HSE W	HSE Western Area
MRSA	Meticillin Resistant *Staphylococcus aureus*
MSM	Men who have Sex with Men
NSRL	National Salmonella Reference Laboratory
NVRL	National Virus Reference Laboratory
STIs	Sexually Transmitted Infections
TB	Tuberculosis
WHO	World Health Organization

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