Annual Report 2012
Health Protection Surveillance Centre

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Table of Contents

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Introduction

It is once again a pleasure to present the surveillance report for infectious diseases in Ireland for 2012.

There continued to be encouraging trends in some areas of infectious disease prevention and control affecting those living in Ireland in 2012. Improvements were sustained in the uptake of the childhood vaccination programme with 95% of children vaccinated against diseases in the primary schedule by the age of 24 months in all HSE areas, and 92% of children vaccinated with one dose of MMR by 24 months. The uptake of HPV vaccine in second level schools has also been very encouraging with 86% uptake recorded in first year girls' classes. These results compare favourably with those reported from other countries and reflect the effort and support put in by staff and schools involved in the school vaccination programme.

The number of measles cases reported continued to decline apart from a large outbreak in teenagers in West Cork. Ninety percent of cases in this outbreak were unvaccinated as many came from families opposed to vaccination.

Meningococcal disease continues the downward trend observed over the past decade with a decline in cases of more than 87% since 1999. Despite the marked decline meningococcal disease is still an important public health concern due to its associated severity, high mortality rate and serious adverse sequelae. Consideration is currently being given as to how best to use the new meningococcal B vaccine in the Irish setting.

TB rates in Ireland continued to decline in 2012 with 364 cases reported, a rate 7.9 per 100,000 population, the lowest recorded since surveillance began. While encouraging, strengthening of TB prevention and control strategies needs to be sustained in order to reach the WHO target of 1 case per 100,000 population by 2050.

As discussed in the 2011 annual report there has been an unwelcome increase in cases of pertussis. Newborn infants are most at risk and the highest incidence in 2012 was in children aged under six months. This unfortunately resulted in the deaths of two young infants under the age of 3 months. In August 2012 an additional pertussis booster was recommended for health care workers and pregnant women. Further information on these recommendations is available at www.immunisation.ie

The 2012-2013 influenza season was unusual in that the usual seasonal epidemic lasted for 14 consecutive weeks, one of the longest seasons on record, with the exception of the pandemic period. Seventy two outbreaks were reported to public health departments around the country. These outbreaks mainly occurred in healthcare facilities and residential institutions. As the influenza vaccine is less effective in the very elderly it is important that those with whom the elderly have contact receive the vaccine. At the other end of the age spectrum the under one year-olds were the age group who were most often hospitalised with influenza and had the highest rate of admission to ICU. Four pregnant women were also admitted to ICU. Influenza vaccine is now advised for pregnant women at all stages of pregnancy. Two novel respiratory viruses emerged during the 2012/2013 season, Middle East Respiratory Syndrome coronavirus (MERS-CoV) in the Middle East and avian origin influenza A(H7N9) in Eastern China. Both have high reported case fatality ratios but as yet do not transmit easily from person-to-person. Further information is available at www.hpsc.ie.

In 2012, 122 cases of iGAS infection were notified in Ireland which is the highest number reported to date and an increase of 82% on 2011. iGAS is a potentially life threatening disease with an overall case fatality rate of 13% and a case fatality rate of 19% in those who present with streptococcal toxic shock syndrome. Further information on iGAS disease including fact sheets for patients and contacts, national guidelines for healthcare professionals and surveillance reports are available at http://www.hpsc.ie/hpsc/A-Z/Other/GroupAStreptococcalDiseaseGAS/

2012 also saw a large increase (90% over the last two years) in the number of cases of Cryptosporidium diarrhoeal illness in Ireland, the second highest rate of countries reporting on the disease in the European Union. Possible contributing factors include the prolonged rainfall in the summer of 2012 as this illness is often associated with the contamination of drinking water by livestock effluent. Another zoonotic or animal associated infection which is a serious problem in Ireland continues to be verotoxigenic E.coli. The number of reported cases almost doubled in 2012. This may have been due to improved detection methods in the laboratory but was also likely to have been influenced by the high rainfall in 2012.

Hepatitis C continues to be one of the most frequently notified infectious diseases in Ireland. 75% of those infected go on to develop chronic infection and are at risk of severe complications such as cirrhosis and liver cancer. Fortunately, recently introduced new treatment regimes can successfully eradicate the virus in the majority of patients treated but the challenge remains to improve prevention in high risk groups and to improve access to therapy for those already infected. The overall trend in newly diagnosed HIV cases has been stable in recent years. However the proportion of cases in MSM has been increasing and sex between men has been the commonest mode of transmission since 2010. The proportion of those diagnosed late varies by risk group and was highest among heterosexual males. Strategies to improve uptake of testing need to be strengthened to enable earlier detection of the disease. The number of cases of gonorrhoea notified in 2012 is the highest ever recorded in Ireland. A multidisciplinary group was established in 2012 to investigate the reasons for this increase and to make recommendations for prevention in both the heterosexual and MSM community.

In the area of health care associated infections there was a 12% decrease in cases of Clostridium difficile infection from 2011. The National guidelines were updated in 2012 by a sub-committee of the scientific advisory committee of HPSC and are available at www.hpsc.ie The national report on the point prevalence survey of Hospital-Acquired Infections and Antimicrobial use took place in May 2012 and was published in November 2012. The full report and full list of recommendations can be accessed on the HPSC website. A voluntary survey of Hygiene and HCAI preventive practices in Irish critical care units took place in January 2012. A summary is included in this annual report and the full report is also available on the website.

The underlying trend for outpatient antimicrobial consumption has been increasing. There is still marked fluctuation in usage with the highest levels occurring during periods of increased influenza activity. While there is a welcome trend in the continued reduction in MRSA proportion of S.aureus blood stream infections, antimicrobial resistance in invasive infections caused by Enterbacteriaceae (E. coli, K. pneumoniae), P aeruginosa and Enterococcus faecium continues to increase. Rising levels of resistance threaten many aspects of healthcare that we currently take for granted It is therefore vital that we strive to implement the recommendations and guidelines produced by the HSE/ RCPI AMR and HCAI clinical advisory group.

Once again I want to express gratitude to all those who provide data and participate in committees and to staff in HPSC and elsewhere in the HSE. To all those who are managing to do more with less and continue to support the prevention and control of infectious disease in Ireland, thank you!

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01

Vaccine Preventable Diseases

1.1 *Haemophilus influenzae* (invasive)

Summary

Number of cases, 2012: 41
Number of cases, 2011: 44
Number of cases, 2010: 28
Crude incidence rate, 2012: 0.9/100,000

In 2012, 41 cases of invasive *Haemophilus influenzae* disease were notified in Ireland (0.9/100,000 total population). This is a slight reduction compared to 2011 when 44 cases were notified, but is still considerably higher than the 28 cases reported in 2010 (figure 1). No imported cases were reported in 2012.

The main change in 2012, when compared to 2011, is the marked reduction in the number of non-typeable/non-capsular strains from 34 to 26 and the increase in the type f strains from one to five (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 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 2012 (63.4%, n=26/41). The remaining cases were due to *H. influenzae* type b (7.3%, n=3), type f (12.2%; n=5), not type b (2.4%; n=1) and isolates that were not typed (14.6%; n=6). The cases ranged in age from three months to 89 years (median 56 years). The incidence rates were highest in infants <1 year (4.1/100,000) and those aged 15-19 years (1.4/100,000) (table 1).

Cases occurring in children <10 years of age (n=9) and elderly adults over 65 years of age (n=17) accounted for 63.4% of all invasive *H. influenzae* notifications in 2012 (table 1). One notable trend since 2004 is the increase in the overall proportion of cases over 65 years of age from 26.3% to 41.5% compared to the declines in those aged less than five years from 26.3% to 14.6% and those aged between 5 and 64 years from 47.4% to 43.9% (figure 2).

In 2011, male cases (n=21) marginally exceeded female cases (n=20), resulting in a male to female ratio of 1.1:1.0.

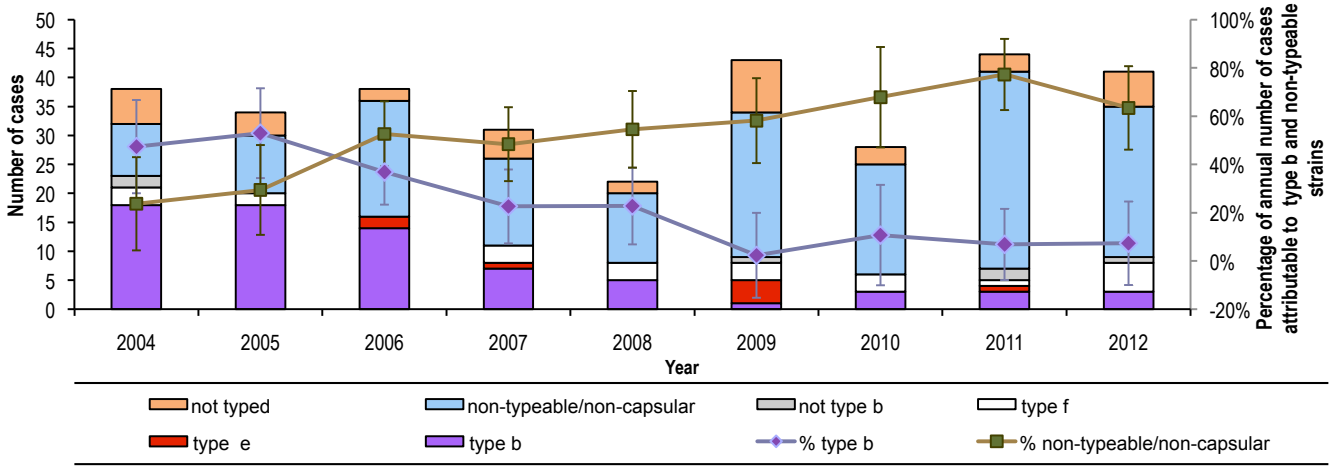

Figure 1. Number of invasive H. influenzae cases notified in Ireland and proportion of annual cases attributable to type b and non-typeable strains with 95% confidence intervals, 2004-2012

The clinical manifestations of invasive *H. influenzae* disease in the nine children < 10 years of age in 2012 were three cases of septicaemia, two cases of pneumonia, one case of meningitis, one case with a clinical diagnosis reported as 'other' and two cases where the clinical diagnosis was not known.

A breakdown by clinical diagnosis for all age groups by year between 2004 and 2012 is presented in table 2. Of note is the proportion of cases notified each year with an unknown clinical diagnosis, accounting for an annual average of 34.2% since 2004.

One death in a child < 6 months was reported in 2012, the infection was not typed, no vaccination history was available and the coroner's report is still awaited at the time of writing.

In 2012 three cases of *H. influenzae* type b (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 45-49 years and was unvaccinated. In the previous year, three cases of Hib also occurred in adults >65 years who were either unvaccinated or whose vaccination status was unknown.

Between Q3-2007 and Q4-2012, only one true Hib vaccine failure was reported, highlighting the positive impact 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

Table 1. Number and incidence rates of invasive H. influenzae cases by serotype, 2012

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	1	0	0	0	1	1	3	1.38	4.14
1-4	1	0	1	0	0	1	3	0.31	0.94
5-9	0	0	1	0	1	1	3	0.00	0.99
10-14	0	0	0	0	0	0	0	0.00	0.00
15-19	0	0	0	0	4	0	4	0.00	1.35
20-24	0	0	0	0	0	1	1	0.00	0.13
25-34	0	0	0	0	0	1	1	0.00	0.14
35-44	0	0	1	0	3	0	4	0.00	0.69
45-54	1	0	0	0	0	0	1	0.22	0.22
55-64	0	0	1	0	3	0	4	0.00	0.75
65+	0	0	1	1	14	1	17	0.00	0.37
All Ages	3	0	5	1	26	6	41	0.07	0.89
CIR	**0.07**	**0.11**	**0.02**	**0.57**	**0.13**	**0.07**	**0.89**	-	-

CIR, crude incidence rate per 100,000 total population
ASIR, age specific incidence rate per 100,000 population
*No isolate available for typing for three of the H. influenzae not typed cases, as PCR positive (culture negative) only

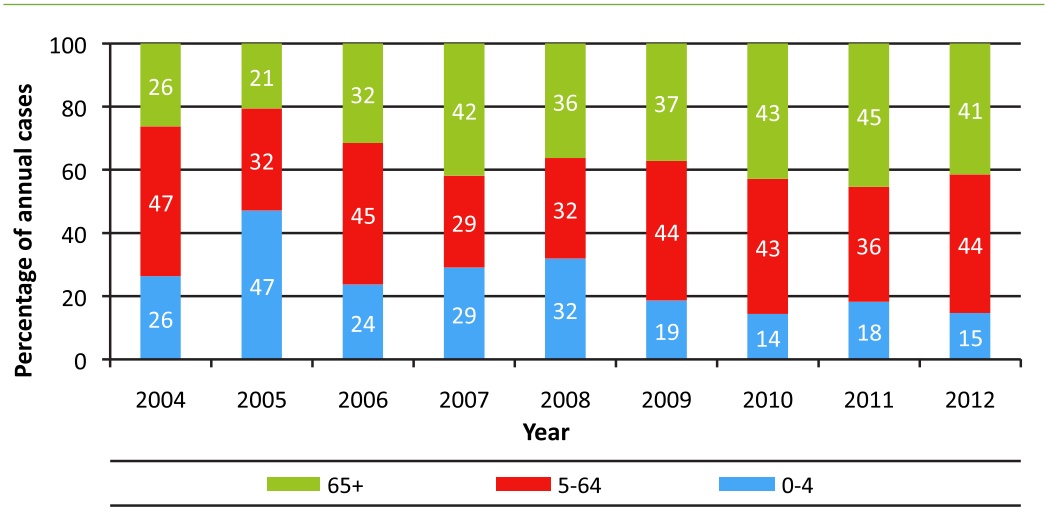

Figure 2. Percentage and number of annual cases of invasive H. influenzae cases notified in Ireland annually by age group (years), 2004-2012

Table 2. Number of invasive H. influenzae cases by clinical diagnosis, 2004-2012

Clinical Diagnosis	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total	% of Total
Septicaemia	8	14	13	6	3	9	9	11	11	84	26.3%
Pneumonia	5	0	3	6	3	8	5	12	12	54	16.9%
Meningitis	3	9	3	2	2	2	1	3	2	27	8.5%
Bacteraemia (without focus)	1	0	1	1	2	0	0	3	5	13	4.1%
Epiglottitis	1	3	3	1	1	0	2	0	0	11	3.4%
Cellulitis	1	1	2	1	1	0	0	1	0	7	2.2%
Meningitis & septicaemia	1	0	1	0	1	1	1	1	1	7	2.2%
Other	0	0	0	0	0	0	0	3	1	4	1.3%
Septic arthritis	0	1	0	0	1	0	0	0	0	2	0.6%
Osteomyelitis	1	0	0	0	0	0	0	0	0	1	0.3%
Unknown	17	6	12	14	8	23	10	10	9	109	34.2%
Total	**38**	**34**	**38**	**31**	**22**	**43**	**28**	**44**	**41**	**319**	**100%**

Table 3. Incidence rates per 100,000 population of invasive H. influenzae by HSE area, 2004-2012

HSE Area	2004	2005	2006	2007	2008	2009	2010	2011	2012
E	1.1	1.0	0.9	0.8	0.5	0.7	0.6	1.1	1.1
M	1.2	1.2	0.4	1.2	0.8	1.1	0.4	1.1	0.4
MW	0.8	0.3	0.8	0.6	0.8	2.1	0.5	0.5	1.1
NE	0.3	1.3	0.3	0.0	0.0	0.2	0.5	1.6	0.9
NW	0.4	0.0	2.1	0.4	0.0	0.4	0.4	0.8	0.8
SE	1.1	0.4	0.9	1.1	0.7	1.0	1.0	0.8	1.2
S	1.1	0.3	1.3	0.3	0.6	1.2	1.1	0.3	0.6
W	0.5	1.4	0.7	1.4	0.5	1.1	0.2	1.3	0.4
Ireland	0.9	0.8	0.9	0.7	0.5	0.9	0.6	1.0	0.9

of the routine childhood immunisation schedule in addition to the three doses given during infancy (at 2, 4 and 6 months of age). Furthermore, vaccination is routinely recommended for those at increased risk of Hib disease.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th July, 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

1.2 Measles

Summary

Number of cases, 2012: 103
Number of confirmed cases, 2012: 26
Crude incidence rate, 2012: 2.2/100,000
Crude confirmed incidence rate, 2012: 0.6/100,000

In 2012, there were 103 measles cases (2.2/100,000) notified compared to 267 cases (5.8/100,000) in 2011 and 403 cases (8.8/100,000) in 2010. Measles cases by HSE Area and week and month of notification in 2012 are shown in figure 1. Sixty-eight percent (n=70/103) of cases in 2012 were notified from early May to late June (Weeks 18-25). This increase in cases was mainly due to a measles cluster (n=59) in teenagers in West Cork in the HSE-S. The probable country of infection of the first case in the outbreak was Portugal. The infection then spread to their relatives and school contacts. Ninety-percent (n=53/59) of cases in this outbreak were unvaccinated. The HSE-S outbreak and control measures are described in detail in Epi-Insight.[1] The majority (62%, n=64/103) of cases notified in Ireland in 2012 and the highest crude incidence rate was in the HSE-S (table 1).

In 2012, new case definitions were introduced in Ireland. Two of the changes to the measles case definition include a change to the definition of a confirmed case and introduction of a probable case classification.

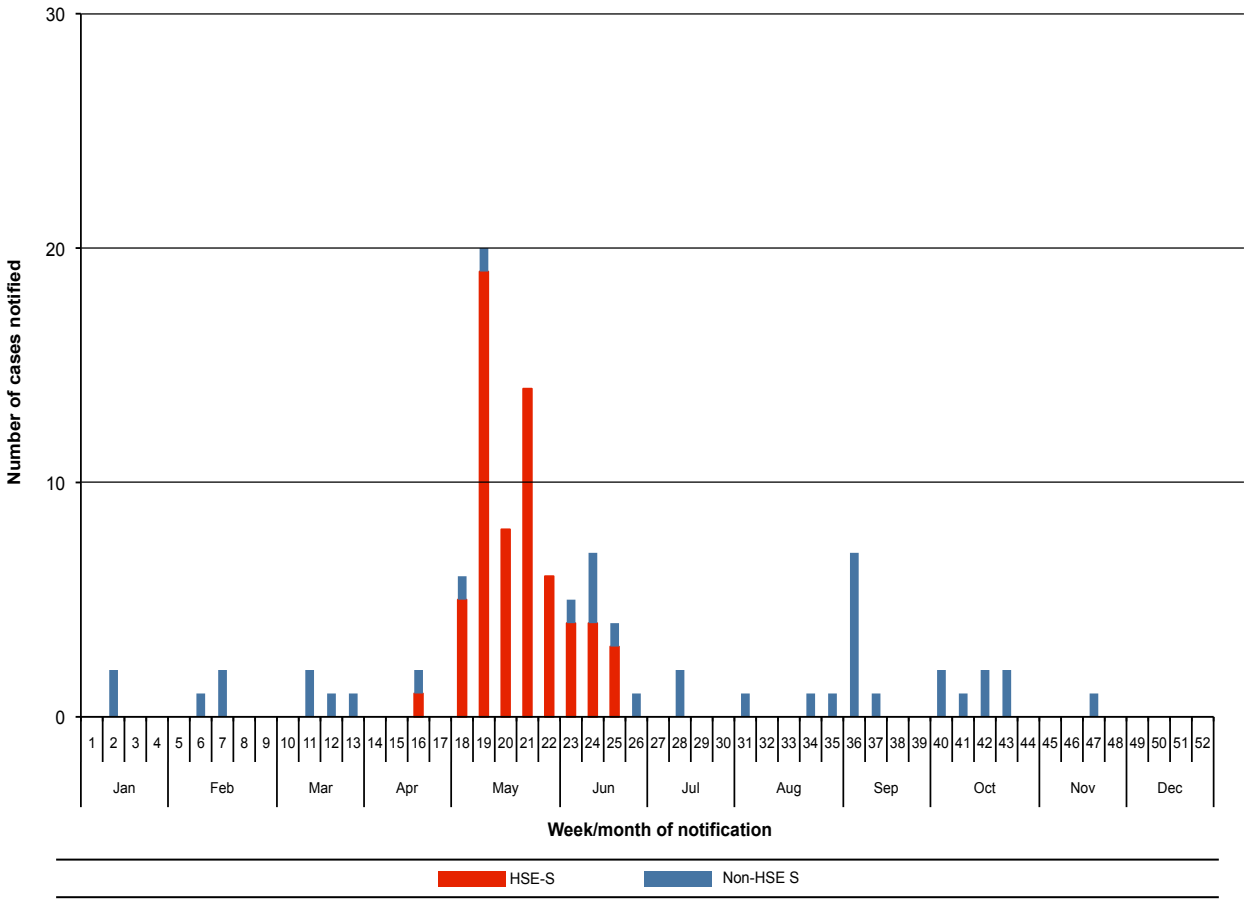

Figure 1. Number of notified measles cases by week and month in 2012 and by HSE Area
HSE-S indicates measles cases notified in the HSE-S
Non HSE-S indicates measles cases notified in the HSE-E, M, MW, NE, NW, SE and W

Under the previous case definition a measles case classified as confirmed was a case that was laboratory confirmed in absence of recent vaccination or a clinically compatible case which was epidemiologically linked to a laboratory confirmed case. Under the new 2012 measles case definition a measles case classified as confirmed is any person not recently vaccinated and meeting the clinical and the laboratory criteria. A probable case is any person meeting the clinical criteria and with an epidemiological link to a laboratory confirmed case. The case definitions are available at www.hpsc.ie. Of the 103 measles cases notifed in 2012, 23% (n=24) were classified as possible, 51% (n=53) were classified as probable while 25% (n=26) were classified as confirmed, giving a crude confirmed incidence rate of 0.6 per 100,000 population.

In 2012, measles cases ranged in age from five months to 40 years; with a mean age of twelve years and a median age of thirteen years. The number of cases by age group and the age specific incidence rates are shown in figures 2 and 3. The largest number of cases and the highest age specific incidence rates were in those aged 10-14 years and 15-19 years (figures 2 and 3). Of the 103 measles cases, 54% (n=56) were female and 46% (n=47) were male.

Laboratory results were provided for 34% (n=35/103) of cases in 2012. Twenty-five percent (n=26/103) of cases were laboratory test positive for measles. The laboratory results for four percent (n=4/103) were recorded as inconclusive/weakly positive.

Five percent (n=5/103) of cases were laboratory negative for measles, however, for 40% (n=2/5) of these the specimens were not taken at the optimal time following disease onset. Sixty percent (n=3/5) of the cases that were laboratory negative for measles were known to have a specimen collected at the optimal time. All of these were classified as possible 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.

Vaccination data were reported for 88% (n=91/103) of measles cases in 2012. Seventy-three percent (n=75/103) of cases were unvaccinated; of these only five percent (n=4/75) were less than 12 months of age.

Fourteen percent (n=14/103) of cases were reported to have one dose of MMR vaccine; the majority (71%, n=10/14) of these were less than six years of age. Sixty-four percent (n=9/14) of those reported to have one dose of MMR were classified as confirmed or probable. Ninety-three percent (n=13/14) with one dose of MMR had a vaccination date reported.

Two percent (n=2/103) of cases were reported as having received two doses of MMR. One of these cases had both vaccination dates reported and was classified as confirmed.

Seven cases were reported as hospitalised, representing seven percent (n=7/103) of all cases. The median and mean age of hospitalised cases was 16 years (range one to 33 years). Four (57%, n=4/7) hospitalised cases were classified as confirmed, two were classified as probable (29%, n=2/7) and one (14%, n=1/7) as possible. Length of hospitalisation was reported for all seven cases with a median duration of stay of two days (range one to five days). Of the seven hospitalised cases, two (29%) had no MMR details reported while four (57%) were unvaccinated. One case (14%) was reported to have one dose of MMR; this case had a vaccination date recorded.

Reported complications of measles included pneumonia (3%, n=1/31), chest infection (n=2), dehydration (n=1) and ear infection (n=1).

Table 1. Number of notified measles cases and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2012

HSE Area	Number	CIR
HSE-E	24	1.5
HSE-M	0	0.0
HSE-MW	2	0.5
HSE-NE	5	1.1
HSE-NW	3	1.2
HSE-SE	0	0.0
HSE-S	64	9.6
HSE-W	5	1.1
Total	**103**	**2.2**

Of the 103 cases, the setting where the case most likely acquired measles was reported as secondary school (34%, n=35), home (26%, n=27), day-care or pre-school (7%, n=7), overseas (4%, n=4), summer camp/school (1%, n=1), third level (1%, n=1) and was unreported for the remainder (27%, n=28).

Three localised measles outbreaks were notified during 2012, with 68 associated cases of illness. The outbreak locations included one general outbreak (family and school outbreak) with 59 ill, one outbreak in a childminders with 6 ill and one crèche outbreak with 3 ill.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 30th August 2013. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

1. **Cotter S, Ryan F, MacSweeney Mary, Coughlan H**. Measles outbreak West Cork May 2012. Epi-Insight. 2012;13(6). Available online: http://ndsc.newsweaver.ie/epiinsight/dllmrzt7dc07guhc3jcrzt?a=1&p=24661455&t=17517774

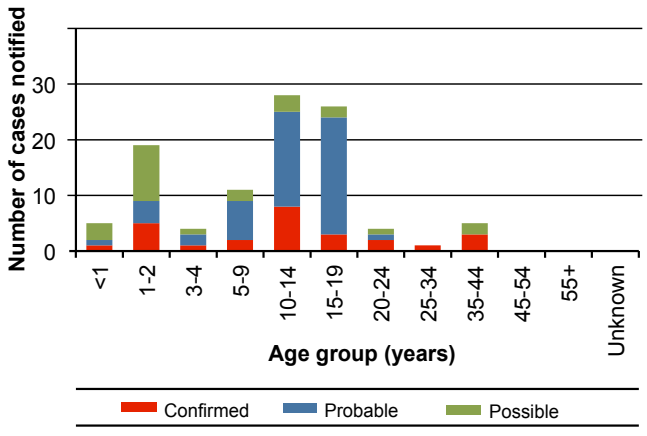

Figure 2. Number of notified measles cases in 2012 by age group and case classification

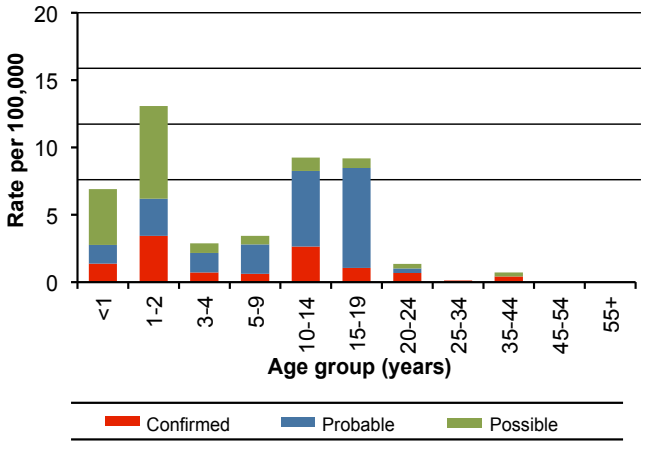

Figure 3. The age specific incidence rate (per 100,000) of notified measles cases in 2012 by case classification

1.3 Meningococcal Disease

Summary

Number of cases, 2012: 66
Number of cases, 2011: 94
Number of cases, 2010: 114
Crude incidence rate, 2012:1.4/100,000

In 2012, 66 cases (1.4/100,000) cases of invasive meningococcal disease (IMD) were notified in Ireland. This continues a downward trend observed over the past decade since 1999, when the rate was 14.8/100,000 population, a decline in cases of more than 87%.

Since 1st January 2012, a revised version of the case definition of meningococcal disease has come into effect and is detailed in the HPSC Case Definitions for Notifiable Diseases booklet on the HSPC website (www.hpsc.ie). Based on the current meningococcal disease case definition, 60 of the 66 cases (90.9%) notified in 2012 were case classified as confirmed, none (0%) as probable and six (9.1%) as possible. Laboratory confirmation of cases has improved with time. In 2012, 90.9% (n=60/66) of cases were laboratory confirmed in comparison to 78.7% (n=422/536) in 1999.

Typically, most cases are diagnosed by blood/CSF culture testing, blood/CSF PCR testing or 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 2012, 33 of the 60 confirmed cases (55.0%) were laboratory tested by PCR testing alone and another seven confirmed cases (11.6%) were diagnosed by culture of sterile specimens alone. Among the remaining 20 confirmed cases, 19 (31.7%) were diagnosed by both culture and PCR testing of sterile specimens and four (6.7%) by CSF microscopy.

Of all the 66 cases in 2012, none had a positive skin, nose or eye culture test result or a positive serology test result, but there was one positive result each of a skin microscopy test and a throat culture test.

In 2012, male cases (n=37) exceeded female cases (n=29), resulting in a male to female ratio of 1.3:1.0.

Cases ranged in age from three months to 88 years (median age of 2.2 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 (24.9/100,000; n=18), followed by children in the 1-4 year (7.8/100,000; n=22), and 15-19 year age groups (2.5/100,000; n=7) (table 1).

In 2012 the overall incidence of IMD in Ireland was highest in the HSE-SE area (2.4/100,000) with the lowest in the HSE-S area (0.9/100,000) (table 2). There were no imported cases in 2012.

Table 1. Number of cases, deaths, age-group specific incidence rates per 1000,000 population (calculated using Census 2011 data) and case fatality ratios of IMD in Ireland, 2012

Age Group	No. Cases	ASIR	No. Deaths	%CFR
<1	18	24.9	0	0.0%
1-4	22	7.8	0	0.0%
5-9	5	1.6	0	0.0%
10-14	2	0.7	1	50.0%
15-19	7	2.5	0	0.0%
20-24	1	0.3	0	0.0%
25+	11	0.4	1	9.1%
All ages	**66**	**1.4**	**2**	**3.0%**

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

Neisseria meningitidis serogroup B was the pathogen most commonly associated with IMD in 2012 and accounted for 58 of the 66 (87.9%) notifications (figure 1). Since 2003 serogroup B has accounted for more than 80% of annual IMD notifications (figure 1).

IMD due to serogroup C has remained at very low levels over the last decade with five cases or less occurring annually. In 2012 no MenC cases were notified (figure 1). There have 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 absence of MenC vaccine failures in the past three years is a measure of the positive impact with which the MenC conjugate vaccine continues to have since first introduced in October 2000. Prior to the introduction of this vaccine, the serogroup C incidence rate in 1999 was 3.7 per 100,000 total population. The National Immunisation Advisory Committee (NIAC) since September 2011 has recommended a booster dose of the MenC vaccine for close contacts of cases that have completed a course more than one year before, details of which are available at http://www.ndsc.ie/hpsc/A-Z/VaccinePreventable/Vaccination/Guidance/

There were two IMD related notified deaths in 2012 (case fatality ratio (%CFR) of 3.0%), the same number as in 2011. This compares to an annual average of 6.2 deaths between 2005 and 2010. In 2012, the %CFR was highest amongst cases 10-14 years of age (50.0%) as a result of one death among two cases (table 1). The next highest %CFR at 9.1% (n=1/11) in adults aged 25+ years (table 1).

One of the IMD deaths in 2012 was due to serogroup B disease (age 10-14 years); the other due to a serogroup Y infection (age 85+ 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 as a result of the vaccination programme and also partly due to 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.

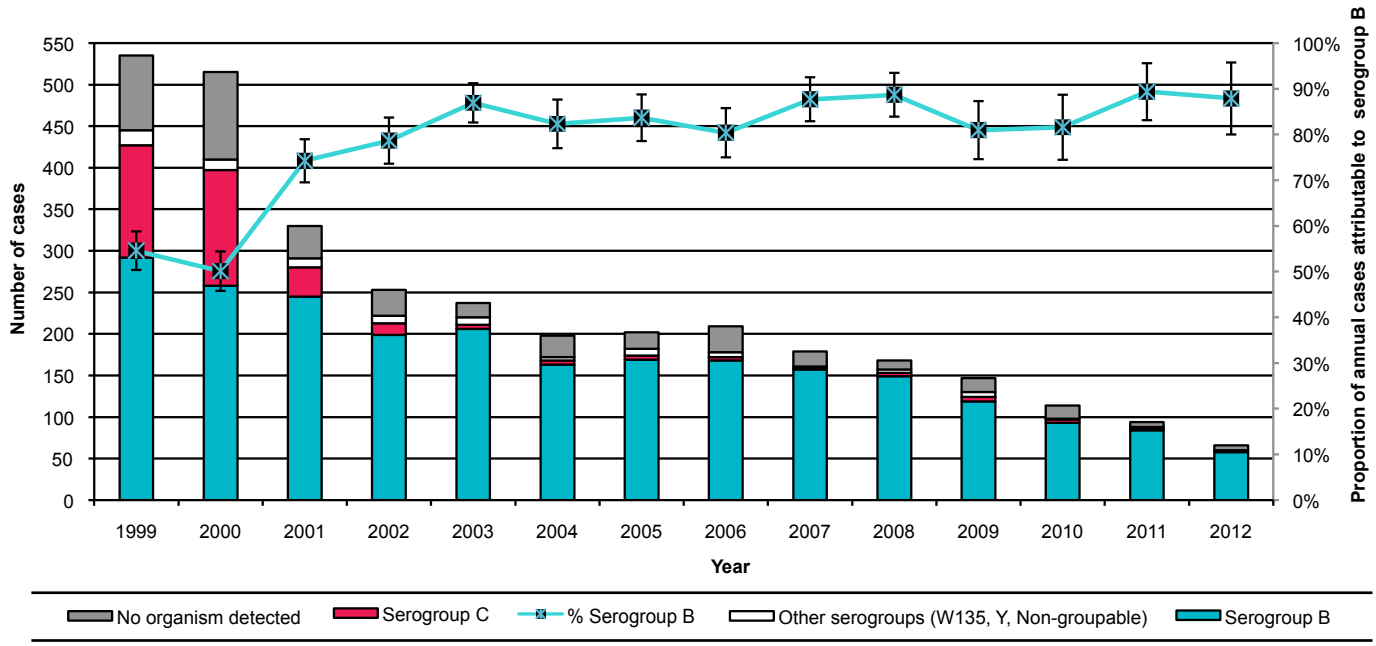

Figure 1. Number of invasive meningococcal disease (IMD) notifications in Ireland by serogroup and proportion of cases attributable to serogroup B with 95% confidence intervals, 1999-2012

Table 2. Age specific incidence rates per 100,000 population (calculated using Census 2011 data) of IMD by HSE area and age group, 2012

HSE Area	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
E	26.9	6.1	0.9	0.0	3.1	0.0	0.1	1.1
M	41.5	5.2	0.0	0.0	0.0	6.0	0.0	1.4
MW	52.6	13.2	3.8	0.0	0.0	0.0	0.4	2.1
NE	26.0	9.6	2.9	0.0	3.7	0.0	0.7	2.0
NW	25.7	0.0	0.0	0.0	0.0	0.0	0.6	0.8
SE	39.2	12.9	2.8	2.9	0.0	0.0	0.9	2.4
S	0.0	7.5	0.0	2.3	2.5	0.0	0.2	0.9
W	0.0	7.6	3.2	0.0	7.2	0.0	0.7	1.6
Ireland	**24.9**	**7.8**	**1.6**	**0.7**	**2.5**	**0.3**	**0.4**	**1.4**

Effective vaccination 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 vaccine 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 under consideration (at the time of writing) by the National Immunisation Advisory Committee.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th July, 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

Table 3. Number of cases, deaths and case fatality ratios (%CFR) by year of meningococcal serogroups B and C disease in Ireland, 1999-2012

	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%

% CFR, case fatality ratio

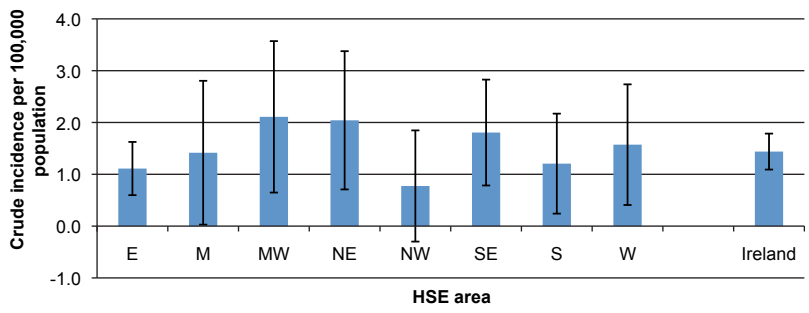

Figure 2. Crude incidence rates per 100,000 population with 95% confidence intervals for IMD notifications by HSE area, 2012

1.4 Mumps

Summary

Number of cases, 2012: 163
Number of cases, 2011: 165
Crude incidence rate, 2012: 3.6/100,000

In total, there were 163 (3.6/100,000) mumps cases notified in 2012. This is very similar to 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 2012, however, is still nearly four-fold higher compared to the years 1998 to 2003 when there was an average of 43 cases notified each year.

In 2012, of the 163 mumps cases notified 26% (n=43) were classified as confirmed and 74% (n=120) 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-W (table 1).

In 2012, the median age of cases was 21 years and the mean was 24 years (range one to 83 years, age was unknown for two cases). 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 20-24 years followed by those 15-19 years and 0-4 years. Of the 163 mumps cases, 53% (n=86) were female and 47% (n=77) were male.

Of the 163 mumps cases, 18% (n=29) were unvaccinated, 23% (n=38) had one dose of the measles-mumps-rubella vaccine (MMR), 28% (n=46) were reported to have received two doses of MMR while for 31% (n=50) of cases the number of doses of MMR was not reported. The vaccination date was reported for 63% (n=24/38) of cases reported to have received one dose of MMR. Both vaccination dates were reported for 28% (n=13/46) of cases vaccinated with two doses of MMR. Thirteen percent (n=6/46) of the cases reported

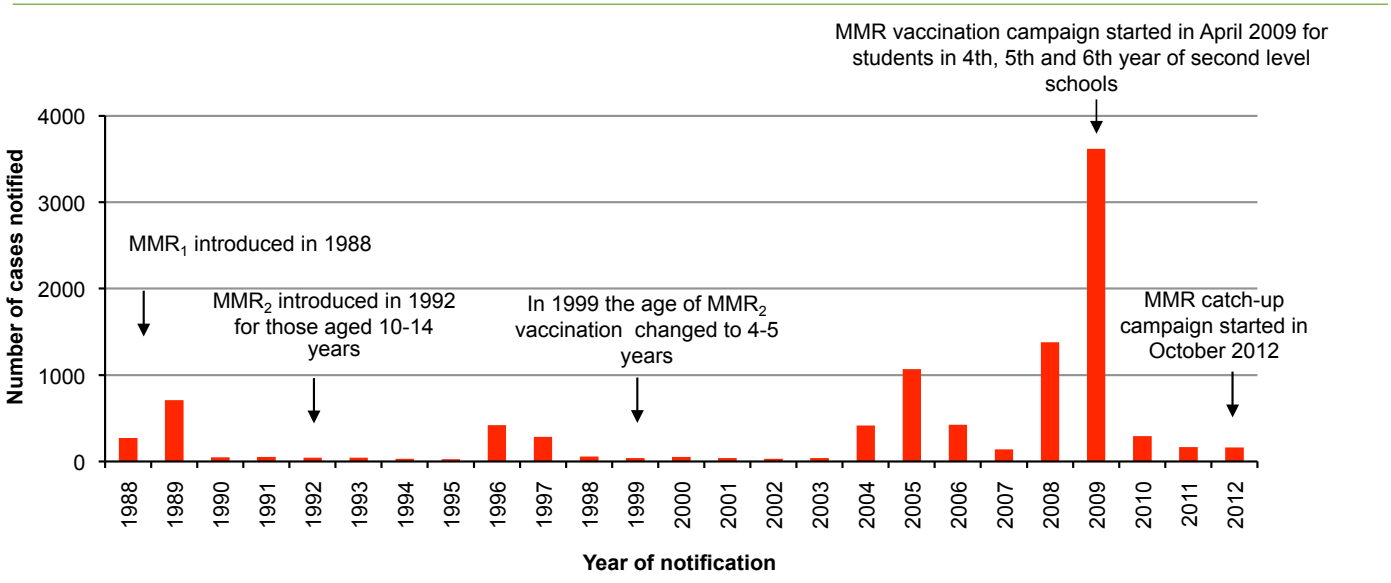

Figure 1. Number of mumps notifications by year
MMR$_1$- first dose of MMR
MMR$_2$- second dose of MMR
1988-June 2000 data collated by DoHC
July 2000-2012 data collated by HPSC

to have received two doses of MMR were classified as confirmed; only two of these cases had MMR vaccination details such as vaccination dates reported.

Nine cases were hospitalised, representing six percent (n=9/163) of all cases and eight percent (n=9/109) of cases where hospitalisation data were provided. The number of days hospitalised was reported for all nine of the hospitalised cases; the median and mean number of days hospitalised was five days (range one to 11 days).

Reported complications of mumps included orchitis (4%, n=2/46), mastitis (2%, n=2/86), meningitis (2%, n=2/86) pancreatitis (2%, n=2/83), deafness (1%, n=1/84), nephritic syndrome (n=1) and rigours and raised liver function tests (n=1).

The setting where the case most likely acquired mumps was reported for 23% (n=38/163) of cases. The identified settings for these cases were: social setting for 71% (n=27/38) of cases; international travel for 11 percent (n=4/38); university/college for eight percent (n=3/38); day-care/preschool for five percent (n=2/38); family/household for three percent (n=1/38) of these cases and hospital out-patient for three percent (n=1/38).

Two localised outbreaks of mumps were notified during 2012 with a total of seven associated cases of illness; both outbreak locations were in private houses.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 17th July 2013. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

Table 1. Number of mumps cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2012

HSE Area	Number	CIR
HSE-E	71	4.4
HSE-M	9	3.2
HSE-MW	6	1.6
HSE-NE	12	2.7
HSE-NW	12	4.6
HSE-SE	15	2.4
HSE-S	16	3.0
HSE-W	22	4.9
Total	**163**	**3.6**

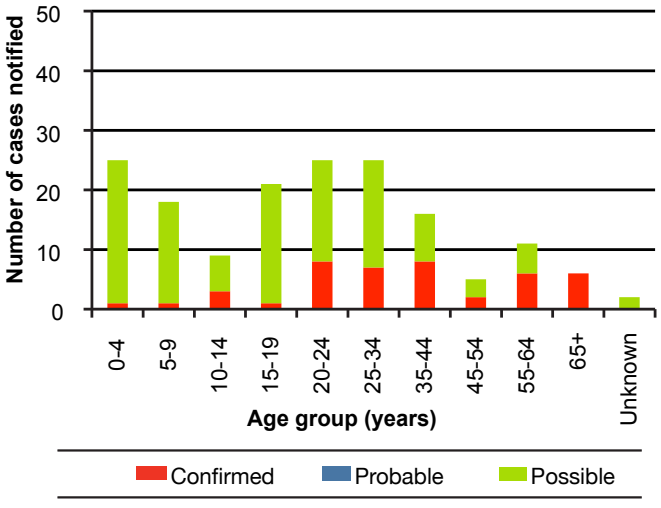

Figure 2. Number of notified mumps cases in 2012 by age group and case classification

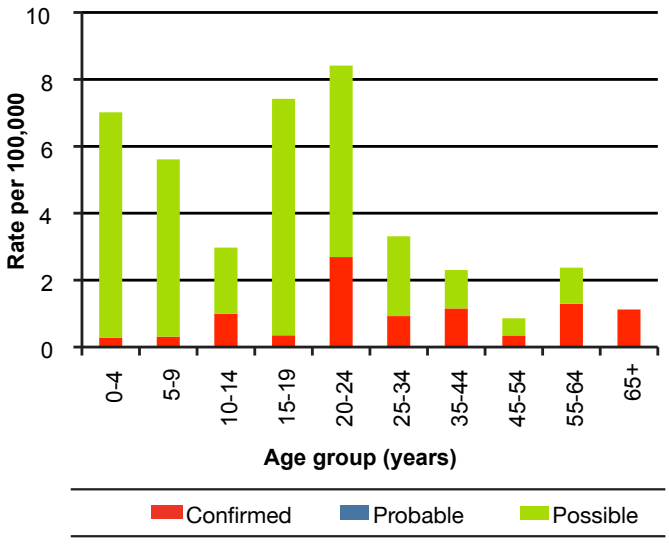

Figure 3. The age specific incidence rates (per 100,000) of notified mumps cases in 2012

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

Summary

Bacterial meningitis, not otherwise specified (NOS)
Number of cases, 2012: 29
Number of cases, 2011: 35
Number of cases, 2010: 42
Crude incidence rate, 2011: 0.6/100,000

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, details of which are presented below. For information on invasive meningococcal disease (*Neisseria meningitidis*), see the other chapter within this report. Information on bacterial meningitis caused by specified notifiable diseases is summarised below and further pathogen-specific data is 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 29th July, 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR. Furthermore, since 1st January 2012, a revised version of the case definition of bacterial meningitis has come into effect and is detailed in the HPSC Case Definitions for Notifiable Diseases booklet on the HSPC website (www.hpsc.ie).

Bacterial meningitis caused by diseases not otherwise specified:
In total, 29 cases of meningitis under this disease category were notified in 2012, among which two patients (age range 20-59 years) died (one of which was classified as probable case and the other as possible).

The causative pathogens were identified in 41% (n=12/29) of cases, but not among those two cases that died. No causative pathogen was identified in the remaining 59% (n=17) cases.

Prior to 1st January 2012, all cases of *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 in 2012 has fallen compared to the previous year because it does not include 11 meningitis–related cases of *Streptococcus agalactiae* in children < 90 days of age (table 1). Furthermore, there is evidence of an additional seven meningitis-related cases of this disease in this same age group where *Streptococcus agalactiae* was isolated from or detected in CSF specimens from patients that were not categorised as 'meningitis'; these cases have not been included in table 1.

Among the bacterial meningitis (not otherwise specified) cases notified in 2012 were seven cases of *Escherichia coli* (age range 1-4 weeks; none of which had serotype details) and one case each of the following (age range 2 weeks-77 years): *Staphylococcus aureus*, *Enterococcus faecium*, Group C Streptococcus, *Proteus mirabilis* and a combined infection of *Staphylococcus aureus/ Staphylococcus capitas*.

Bacterial meningitis caused by specified notifiable diseases:
Haemophilus influenzae
Three cases of meningitis due to *H. influenzae* were notified in 2012 and these infections were attributable to one case each of types b and f and one non-typeable/non-capsulated strain. The age range was three months to 77 years. No deaths were reported. See the chapter on invasive *H. influenzae* disease for further details.

***Leptospira* species**
In 2012, one case of leptospirosis meningitis was reported in a male aged 20-24 years. See a separate chapter on non-IID zoonotic diseases for further details.

***Listeria* species**
Two male cases of listeriosis meningitis were notified in 2012: one with a serotype 4b infection was aged 80-84 years with an underlying medical condition and the other with a 1/2a infection in a middle aged adult aged 55-59 years. See the chapter on listeriosis disease for further details.

Streptococcus pneumoniae
In 2012, 37 cases of pneumococcal meningitis were notified, compared to 23 in 2011. The age range of the 37 cases was one month to 87 years (median 42 years).

Eight (21.6%) pneumococcal meningitis related deaths were reported in 2012 with an age range of 6 months-87 years (median 29 years). Four of the eight deaths were attributable to the infection itself, one was not, one is still awaiting a coroner's report at the time of writing and the cause of death for the remaining two cases has not yet been specified.

Of the eight cases that died, three were vaccinated, one each with the PCV7, PCV13 and PPV23 vaccines. Of these three that were vaccinated, two had serotype details cases: the PCV7 vaccinated case had a 22F type infection, the PCV13 vaccinated case had a 15A type infection, neither of which were vaccine failures. The PPV23 vaccinated case had an untyped infection. Four of the remaining five deaths had their infections serotyped: one each of types 22F and 23F and two each of type 7F. Serotypes 23F and 7F both feature in the PCV23 vaccine. See a separate chapter on invasive pneumococcal disease for further details.

***Mycobacterium* species**

In 2012, three tuberculosis meningitis cases were notified (provisional). Cases ranged in age from 42 to 68 years. Two cases had a history of living abroad, one of which died. See the chapter on tuberculosis for further details.

Table 1. Annual notifications of bacterial meningitis (specified and not otherwise specified) except meningococcal disease, 2008-2012

Notified under	Causative organism	2008	2009	2010	2011	2012	2008-2012
Haemophilus influenzae disease (invasive)	*Haemophilus influenzae*	3	3	2	4	3	15
Leptospirosis	*Leptospira* spp.	2	1	0	1	1	5
Listerosis	*Listeria* spp.	3	1	3	1	2	10
Salmonellosis	*Salmonella enteritidis*	0	1	0	0	0	1
Streptococcus pneumoniae infection (invasive)	*Streptococcus pneumoniae*†	27	22	16	23	37	125
Streptococcus Group A infection (invasive) (iGAS)	*Streptococcus pyogenes*	2	0	2	0	1	5
Streptococcus Group B infection (invasive) (Group B Strep) < 90 days of age	*Streptococcus agalactiae*†	n/a	n/a	n/a	n/a	11	11
Tuberculosis*	*Mycobacterium* spp.*	6	8	9	2	3	28
Total Bacterial Meningitis, Specified		**43**	**36**	**32**	**31**	**58**	**200**
Bacterial Meningitis, Not Otherwise Specified	*Streptococcus agalactiae***	6	7	11	16	0	40
	Escherichia coli	11	3	2	1	7	24
	Staphylococcus aureus	3	2	6	2	1	14
	Enterococcus faecalis	1	1	0	0	0	2
	Streptococcus bovis biotype II/2	0	2	0	0	0	2
	Citrobacter koseri	1	0	0	0	0	1
	Enterococcus faecium	0	0	0	0	1	1
	Group C Streptococcus	0	0	0	0	1	1
	Klebsiella oxytoca	0	0	0	1	0	1
	Mycoplasma pneumoniae	0	0	1	0	0	1
	Proteus mirabilis	0	0	0	0	1	1
	Serratia liquefaciens	1	0	0	0	0	1
	Staphylococcus aureus & *Staphylococcus capitis*	0	0	0	0	1	1
	Staphylococcus capitis	0	0	1	0	0	1
	Unknown	2	1	1	1	1	6
	Not specified	15	24	20	14	16	89
Total Bacterial Meningitis, Not Otherwise Specified		**40**	**40**	**42**	**35**	**29**	**186**
Total Bacterial Meningitis, Specified & Not Otherwise Specified		**83**	**76**	**74**	**66**	**87**	**386**

†*Streptococcus pneumoniae* meningitis numbers are provisional for 2008-2012 and are subject to change
*Tuberculosis meningitis figure for 2012 is provisional
***Streptococcus agalactiae* for all ages between 2008 and 2011 and for cases > 90 days of age only in 2012
†*Streptococcus agalactiae* < 90 days of age in 2012 figures do not include seven 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'
n/a not applicable

1.6 Pertussis

Summary

Number of cases, 2012: 458
Number of cases, 2011: 229
Crude incidence rate, 2012: 10.0/100,000

Following the introduction of pertussis vaccine in the 1950s the number of pertussis cases notified declined, however, following a pertussis vaccine scare in the mid-1970s, with a decline in pertussis vaccination uptake, the notifications started to increase again (figure 1). This trend was reversed in the 1990s as notifications decreased again to a low of 40 cases in 2003 (figure 1). Between 2004 and 2010 there was on average 87 cases notified each year. The number of pertussis cases notified doubled in 2011 (n=229) compared to 2010 (n=114) (figure 2). In 2012, the number of pertussis cases notified doubled again with 458 cases notified (figure 2).

Pertussis cases in 2012 by week of notification are shown in figure 3. The majority of the cases in Weeks 16 and 26 relate to an outbreak over several months in which clinical cases were notified in two batches to the HSE-NW.

Of the 458 cases in 2012, 58% (n=264) were classified as confirmed, 12% (n=56) were classified as probable and 30% (n=138) were classified as possible.

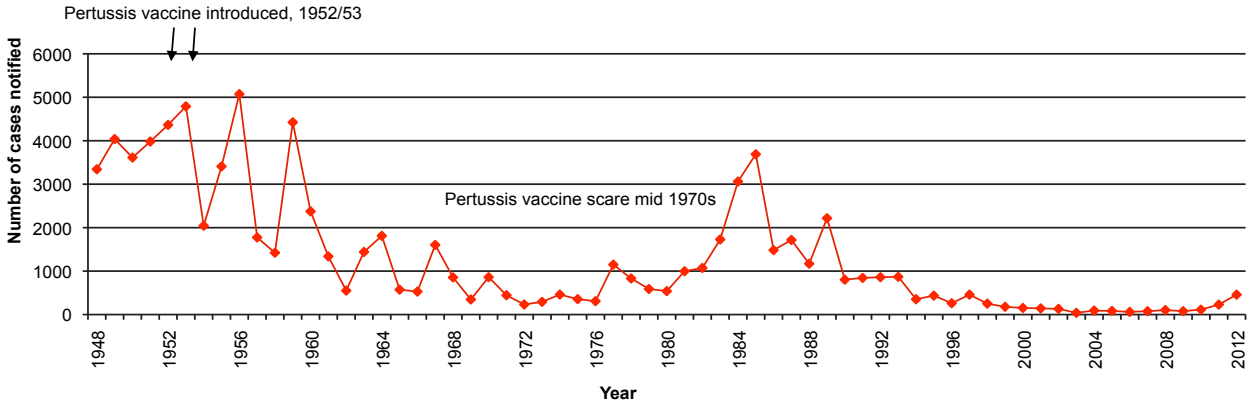

Figure 1. Number of notified pertussis cases in Ireland by year, 1948-2012
1948-June 2000 data collated by DoHC
July 2000-2012 data collated by HPSC

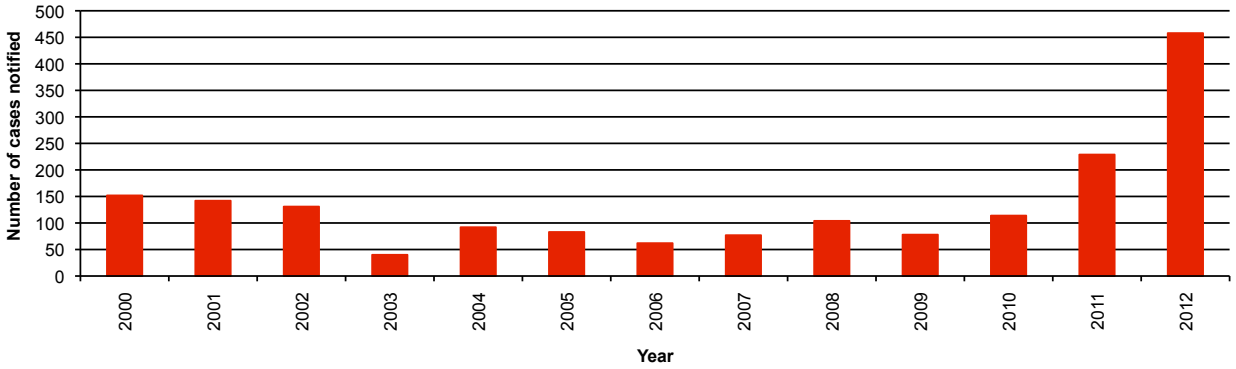

Figure 2. Number of notified pertussis cases in Ireland by year, 2000-2012

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

In 2012, the largest number of cases (n=162/458, 35%) and the highest age-specific incidence rate (224/100,000) were in children aged less than one year with nearly a third (n=143/458, 31%) of all cases aged less than six months (figures 4 and 5). Fifty-four percent of cases (n=247) were female and 46% (n=211) were male.

Two deaths occurred in children less than three months of age, both children were born prematurely.

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 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 2012, the vaccination status was reported for two-thirds (n=308/458, 67%) of pertussis cases. Nearly one third of cases (n=145/458, 32%) were unvaccinated; these cases ranged in age from four weeks to 72 years, with 71% (n=105/145) of these cases aged less than six months. Twenty-eight percent of the unvaccinated cases (n=41/145) were less than two months of age and were therefore not eligible for pertussis vaccine in the Irish schedule.

Twelve percent (n=53/458, 12%) of cases were reported as incompletely vaccinated, with 45% (n=24/53, 45%) of these less than six months of age and were therefore not eligible for three doses of pertussis vaccine in the Irish schedule.

Twenty-four percent (n=110/458, 24%) of cases were reported as completely vaccinated for their age; 49% (n=54/110) of these were reported to have had three doses of pertussis vaccine, 19% (n=21/54) were reported as having four doses while the number of doses was not specified for the remainder. Of the cases reported as having four doses, 33% (n=7/21, 33%) were classified as confirmed.

Forty-four localised pertussis outbreaks were notified during 2012, with 164 associated cases of illness. Forty one were family outbreaks (with 107 ill), two were

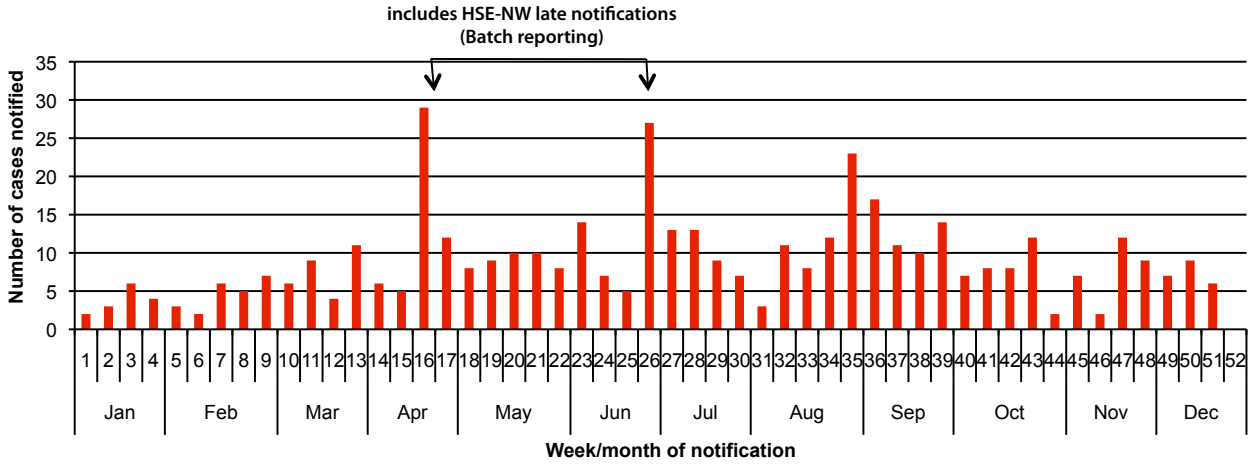

Figure 3. Number of notified pertussis cases in 2012 by week and month of notification.

Table 1. Number of pertussis cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2012

HSE Area	Number	CIR
HSE-E	159	9.8
HSE-M	13	4.6
HSE-MW	13	3.4
HSE-NE	21	4.8
HSE-NW	74	28.6
HSE-SE	54	8.1
HSE-S	79	15.9
HSE-W	45	10.1
Total	**458**	**10.0**

community outbreaks (with 54 ill) and one was a crèche outbreak (with three ill).

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 2nd August 2013. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

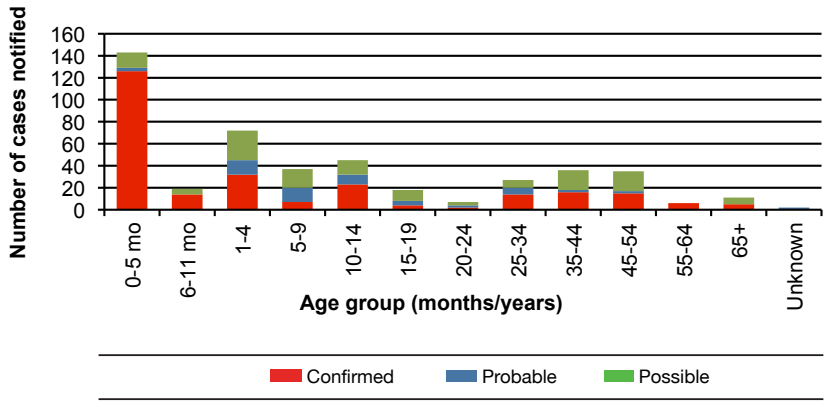

Figure 4. Number of notified pertussis cases in 2012 by age group and case classification.
"Mo" in graph indicates months i.e. 0-5 months and 6-11 months, the remaining age groups are in years

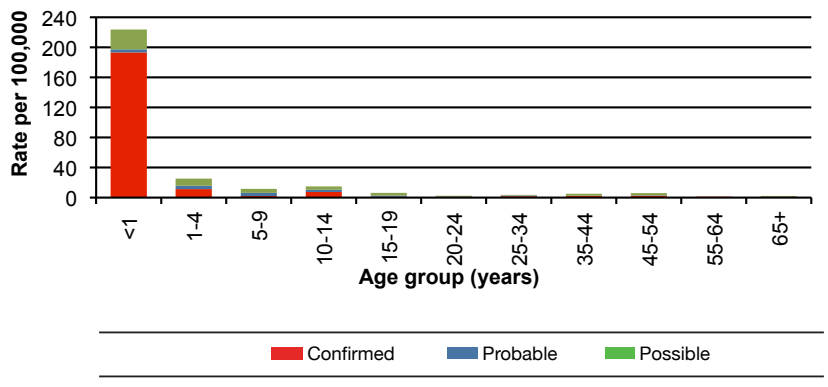

Figure 5. The age specific incidence rate (per 100,000 population) of notified pertussis cases in 2012 by case classification

1.7 Rubella

Summary

Number of cases, 2012: 9
Number of confirmed cases, 2012: 0
Crude incidence rate, 2012: 0.2/100,000
Crude confirmed incidence rate, 2012: 0.0/100,000

In 2012, nine cases (0.2/100,000) of rubella were notified in Ireland (table 1) compared to four cases in 2011.

In 2012, new case definitions were introduced in Ireland. Changes to the rubella case definition included changes to the definition of probable and confirmed cases. Under the previous case definition a rubella case classified as probable was a clinically compatible case with an epidemiological link to a laboratory confirmed rubella case while a case classified as confirmed was a clinically compatible case that was laboratory confirmed. Under the new 2012 rubella case definition a rubella case classified as probable is any person meeting the clinical criteria and with an epidemiological link to a laboratory confirmed rubella case and/or with a rubella virus specific antibody response (IgM) identified. Under the new 2012 rubella case definition a case classified as confirmed is any person not recently vaccinated and meeting the laboratory criteria for case confirmation and in the case of recent vaccination, a person with detection of wild-type rubella virus strain. Under both case definitions laboratory results were interpreted according to the vaccination status and history of recent vaccination. The case definitions are available at www.hpsc.ie.

One of the cases in 2012 was classified as probable (figure 1). This case was serum IgM positive and probable country of infection was recorded as the United Kingdom. Eight cases in 2012 were classified as possible; half of these were less than three years of age (figure 1). The age specific incidence rates by case classification are shown in figure 2.

Of the nine rubella cases five (56%) were male and four (44%) were female.

Rubella 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 for all children at twelve months of age and the second dose at four to five years of age. Vaccination status was reported for seven (78%)

Table 1. Number of rubella cases notified and the crude incidence rate per 100,000 population (CIR) by HSE Area in 2012

HSE Area	Number	CIR
HSE-E	5	0.3
HSE-M	1	0.4
HSE-MW	0	0.0
HSE-NE	0	0.0
HSE-NW	0	0.0
HSE-SE	0	0.0
HSE-S	1	0.2
HSE-W	2	0.4
Total	**9**	**0.2**

of the rubella cases in 2012. Four cases (n=4/9, 44%) were unvaccinated; one of these was aged less than 12 months of age. Two cases (n=2/9, 22%) were reported as completely vaccinated for their age, both of these were aged less than or equal to two years of age. One case was reported as incompletely vaccinated for their age as this case was aged greater than five years but had only received one dose of MMR. The probable case (adult) had no history of MMR vaccination and was of an age when a rubella containing vaccine was unlikely to have been administered.

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. In 2012 the laboratory criteria for case confirmation of rubella required the identification of rubella virus specific antibody response (IgG) in serum or saliva virus 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. In 2012 the laboratory criteria for a probable case required the identification of rubella virus specific antibody response (IgM); again laboratory results need to be interpreted according to the vaccination status. When rubella in pregnancy is suspected, further confirmation of a positive rubella IgM results 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.

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). HPSC is currently working with the HSE Areas to improve rubella surveillance data and during 2013 implemented enhanced surveillance of this disease using the Computerised Infectious Disease Reporting (CIDR) system.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 25th July 2013. These figures may differ slightly from those published previously due to ongoing updating of notification data on CIDR.

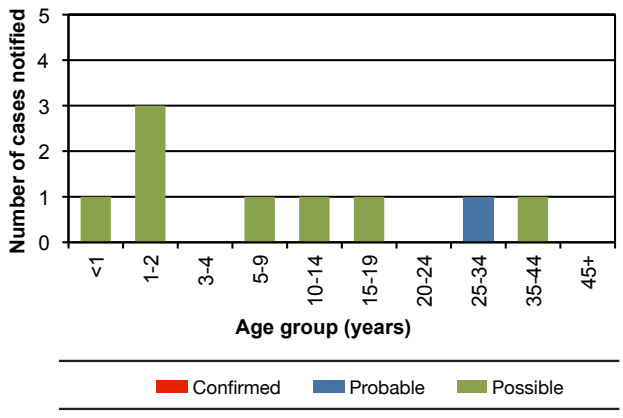

Figure 1. Number of notified rubella cases in 2012 by age group and case classification

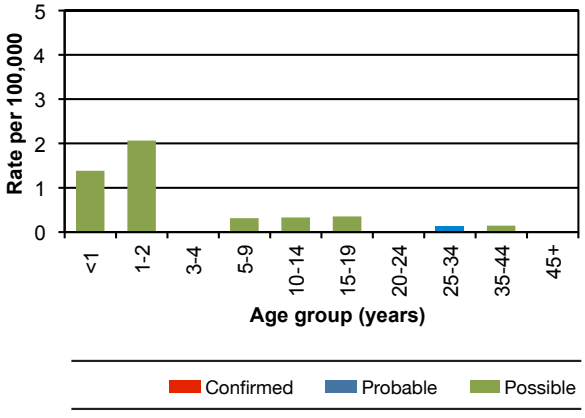

Figure 2. The age specific incidence rate (per 100,000 population) of notified rubella cases in 2012 by case classification

1.8 *Streptococcus pneumoniae* (invasive)

Summary

Number of cases in 2012: 427
Number of cases in 2011: 425
Number of deaths in 2012: 37
Number of deaths in 2011: 11
Crude incidence rate, 2012: 9.3/100,000

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 blood stream 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 on IPD notifications is undertaken by Departments of Public Health particularly on 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 been offering a typing service to Irish laboratories for all invasive *S. pneumoniae* isolates submitted. This is a collaborative project involving the RCSI/Beaumont Hospital, the Children's University Hospital, Temple Street and the HPSC. In addition, since August 2012 Health Protection Surveillance Centre (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.

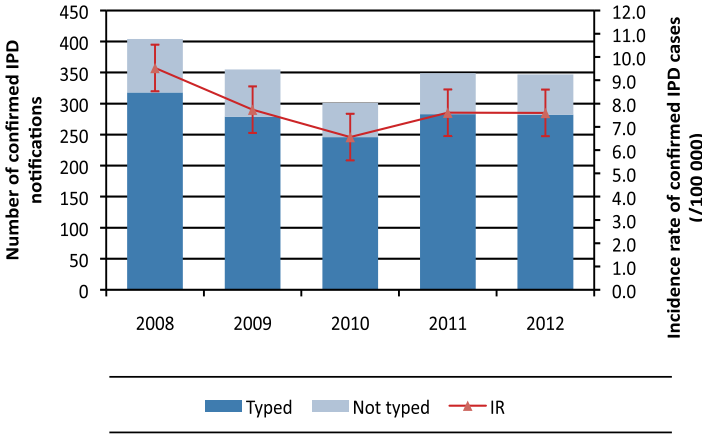

Figure 1. Number of confirmed invasive pneumococcal disease notifications by typing status and the incidence rate (IR) of confirmed IPD with 95% confidence intervals, 2008-2012
Data source: CIDR

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 2012 was 91%.

IPD notification data was extracted from CIDR on 26th June 2012. These figures may differ slightly from those previously published due to ongoing updating of notification data on CIDR. For the 2012 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 used and any case in which *S. pneumonia* antigen is detected from a sterile site is now categorized as confirmed.

Results

All IPD notifications

In 2012, 427 cases of IPD (9.3/100,000) were notified in Ireland. There was no significant increase in IPD notifications in 2012 compared with 2011 (425 cases; 9.3/100000).

In 2012, 81% (n=347) of notifications were classified as confirmed and 19% (n=80) as possible. The majority of possible cases (72%, n=58/80) were notified by HSE-SE. These figures do not necessarily indicate a higher burden of IPD in this area relative to other areas, but rather it

may reflect more consistent reporting of positive urinary antigen cases from that area.

Confirmed IPD notifications

Focusing specifically on the confirmed IPD notifications, 347 cases were notified in 2012 (7.6/100,000; 95% CI 6.8 - 8.4/100,000) (figure 1). There was no increase in incidence compared with 2011 (7.6/100,000; 95% CI 6.8 - 8.4/100,000; 349 cases). However the incidence of confirmed IPD in 2012 significantly declined by 20% compared with 2008 (9.5/100,000; 95% CI 8.6 – 10.5/100,000; 404 cases; p<0.05) (figure 1).

In 2012, 85% of the confirmed IPD notifications had an isolate submitted for serotyping, a slight improvement to the proportion in 2011 (81%) and a marked improvement from 2008 and 2009 when 79% of notifications had an isolate typed (figure 1). In 2012 however, 37% of notifications (16/43) relating to children <5 years of age did not have an isolate submitted for serotyping. For six of the 16 the cases were confirmed by PCR only and no isolate was available. For the remaining ten no isolate from a sterile site was available for typing.

Incidence rates by HSE area ranged from 6.4 per 100,000 in HSE-NE to 10.5 per 100,000 in HSE-MW with the incidence higher in the HSE NW and HSE S and highest in HSE MW (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 just 176 of the 347 confirmed cases (51%), which included meningitis (n=36), blood stream infection (BSI) with pneumonia (n=80) and other BSI for the remainder (n=60).

More cases occurred in males than in females, 52% of cases in the former (n=182). Cases ranged in age from 1 month to 96 years, with an average age of 55.6 years (median age 65 years). Those aged 65 years and older accounted for more than half of cases (51%, n=160). The age specific incidence rate (ASIR) was highest in those 85 years of age and older (63/100,000; n=37), followed by those in the 75-84 years age group (41/100,000; n=71) and 65 and 74 year age group (22/100,000; n=68) (figure 3). In children < 2 years of age the ASIR was 11 cases per 100,000 population (n=16). A statistically significant decline (74%) 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 the introduction of PCV7 in September 2008 to the infant schedule and replaced by PCV13 in December 2010 has had on reducing the burden of IPD in young children (figure 3).

The medical risk factor field was completed for 123 (35%) confirmed cases; for the remainder this information was either unknown or not specified. Based on the 123 cases with information 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=45), chronic lung disease (n=35), chronic heart disease (n=31) chronic liver disease (n=19) and renal diseases (n=17). It should also be noted that being elderly, aged 65 years and older is also a recognised IPD risk factor; 176 cases in 2012 were in this age group. Apart from being elderly, 69 cases in this age group also had a reported medical risk factor.

IPD death notifications

Outcome was reported on 47% (n=202) of the IPD notifications in 2012. Therefore, these figures may underestimate the burden of IPD in terms of mortality. Based on the data available, 37 deaths in individuals with IPD in 2012 were reported. The cause of death was reported as directly due to IPD in six cases, not due to IPD in five cases and for the remaining 26 the cause of death was not specified or was unknown. Therefore, based on the outcome data available, IPD was potentially the cause of death in 32 patients, giving an IPD case fatality rate of 16% (32/202). Twenty nine

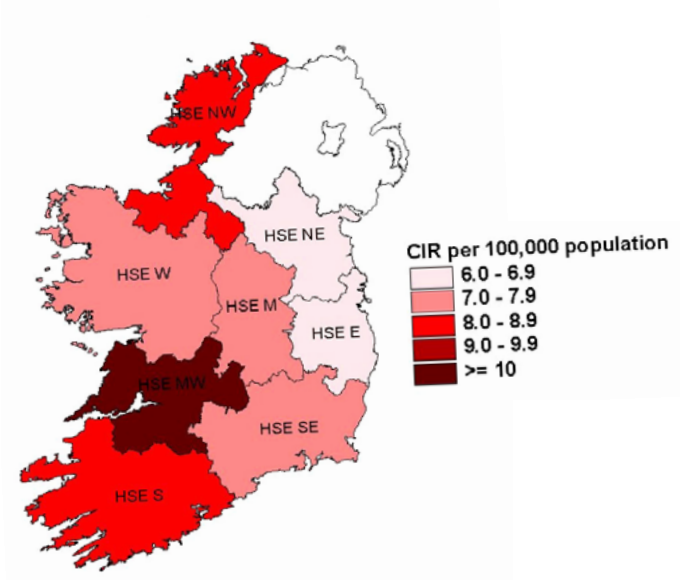

Figure 2. Incidence rate of confirmed invasive pneumococcal disease notifications by HSE area, 2012
Data source: CIDR

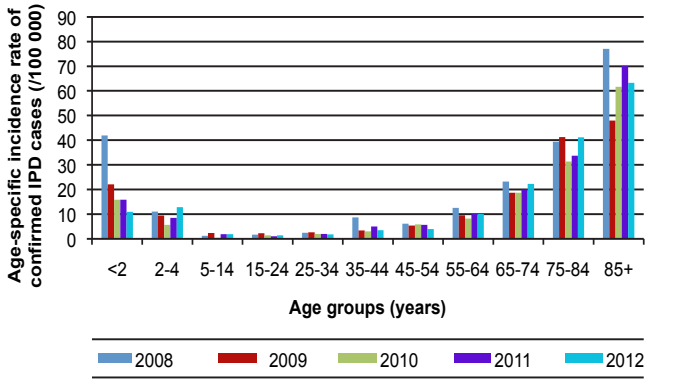

Figure 3. Age specific incidence rate of confirmed invasive pneumococcal disease notifications by age group, 2008-2012
Data source: CIDR

deaths occurred in adults, ranging in age from 46-91 years and three deaths occurred in children (aged 6 months; one and 11 years). Thirty of the 32 deaths were in confirmed cases and two deaths each in a possible IPD cases.

The apparent increase in IPD death notifications in 2012 (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. Missing information on outcome in CIDR was identified 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 2012, of the 347 confirmed IPD notifications reported in CIDR, 296 had isolates sent for typing (85%). Fourteen percent of IPD infections were due to serotypes covered by PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F), 38% were associated with the six additional serotypes included in PCV13 (1, 3, 5, 6A, 7F and 19A) and the remaining 48% of infections were due to non-vaccine types (NVTs, serotypes excluding the 13 covered by PCV13).

Since introducing PCV7 to the Irish childhood immunisation schedule towards the end of 2008, there has been a 17% reduction in the overall burden of IPD disease. In particular, 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 2012 compared with 2008 (76% decline, $p<0.001$). The greatest impact was seen in children <2 years of age where the incidence of the disease due to PCV7 serotypes has declined by 97% ($p<0.01$) (figure 4a). In 2012 the incidence of disease due to the additional six serotypes in PCV13 declined by 44% in the <2 year olds compared with 2008 (figure 4b). This decline was not observed in any of the other age groups, but rather the incidence of disease increased compared with previous years (figure 4b). An increase in incidence due to the NVTs was also seen in 2012, particularly in those aged 65 years and greater with an increase in incidence evident since 2009. There has been little change in the incidence of NVTs among other age groups (figure 4c).

The predominant serotypes in circulation in 2012, were 7F and 19A (both included in PCV13) and then followed by serotypes 22F, 8 (both NVTs) and 3 (included in PCV13). In children <2 years of age, the predominant serotypes were 19A, 15A and 7F 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/

PCV vaccine failures
Based on data obtained through the IPD enhanced

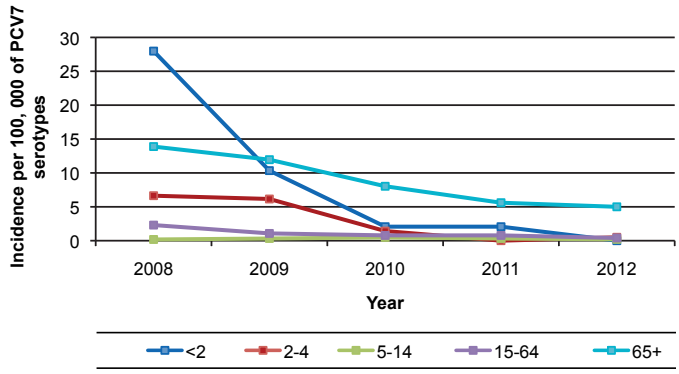

Figure 4a

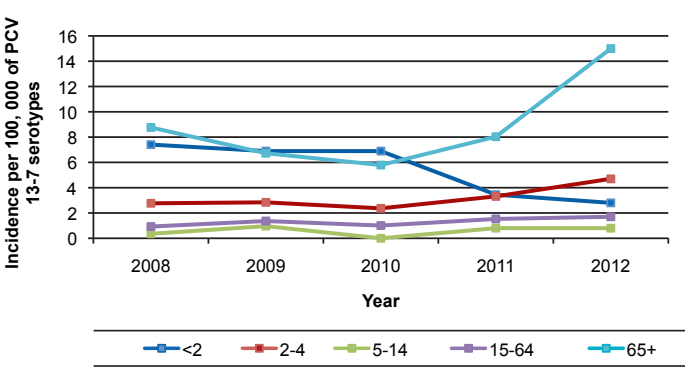

Figure 4b

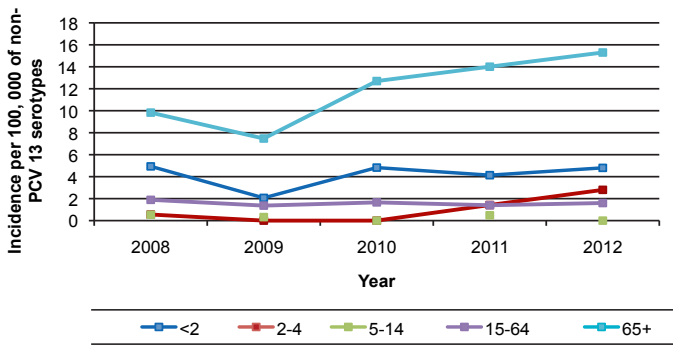

Figure 4c

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 (PCV13-7) and (c) non-vaccine types (non-PCV13 serotypes), 2008-2012
Data source: National Pneumococcal Typing Laboratory

surveillance system, two PCV vaccine failures were reported in 2012. One vaccine failure was due to serotype 19F (PCV7); another due to serotype 19A (PCV 13).In addition, since 2008, four vaccine failures have been reported, two due to serotype 14 and two due to 19F.

Penicillin non-susceptible *S. pneumoniae* (PNSP)
In 2012, the proportion of penicillin non-susceptible invasive *S. pneumoniae* (PNSP) was 19.6%, (4.0% and 15.6% with high and intermediate level resistance, respectively) while 16.9% of isolates were resistant to erythromycin (Data source: HPSC/EARS-Net Ireland). In the UK, the PNSP proportion in 2012 was 4.9% (0.7% and 4.2%, with high and intermediate level resistance, respectively).

In 2012, Ireland had one of the highest proportions of PNSP in Europe ranking 9th out of 28 countries overall. Although, 34 different serotypes were identified in 2012, only 15 serotypes were associated with being penicillin non-susceptible. The predominant PNSP serotypes in 2012 were 19A, 35B and 6B 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 2012 compared with 2011, 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 the disease incidence due to PCV7 serotypes has been reduced by 97%.

The impact due to PCV13 vaccine, which was introduced in December 2010 was observed in children <2 years of age amongst whom the reduction in the incidence of disease due to the additional six serotypes covered by PCV13 was 44%, the same as in 2011.

However, despite these reductions in IPD burden, the incidence of disease due to non-PCV7 serotypes has increased in all age groups. There has been a shift in the prevalent serotypes associated with invasive disease. Serotypes 7F, 19A, and 22F have been predominant serotypes as in 2011.

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 85% of confirmed notifications had an isolate submitted for serotyping in 2012, 15% (n=51) did not, including 16 cases in children <5 years of age. In six of these 16 cases an isolate was not available for typing and confirmation was by PCR only. The overall concern is that serotype information is unavailable for 37% of confirmed notifications in this age group.

Continued good quality IPD surveillance including the monitoring of invasive *S. pneumoniae* serotypes is crucial in identifying any epidemiological changes in the disease, assessing the impact of PCV13 on public health and in guiding further vaccination strategies as newer expanded valency vaccines are made 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.

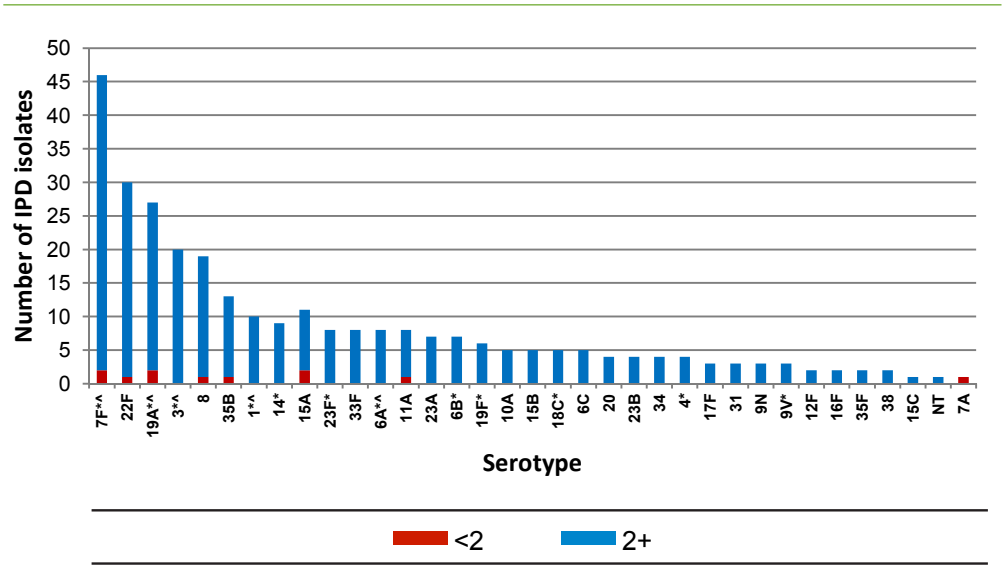

Figure 5. Serotype distribution of invasive Streptococcus pneumoniae isolates by age group (years) in Ireland, 2012
** Denotes serotypes included in PCV7*
**^ Denotes additional six serotypes included in PCV13 (PCV13-7)*
Data source: National Pneumococcal Typing Laboratory

02

Respiratory and Direct Contact Diseases

2.1 Influenza and Other Respiratory Viruses

Summary

2012/2013 influenza season summary:
Peak influenza-like illness rate: 59.3 /100,000 population
Total confirmed influenza cases hospitalised: 471
Total confirmed influenza cases admitted to ICU: 38
Total influenza-associated deaths: 32

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. Sixty-one 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 and enhanced surveillance of all severe acute respiratory infections (SARI) at two ICU sites, one adult and one paediatric.
- Enhanced surveillance of all confirmed influenza 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 17th October 2013. 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.

Sentinel GP Clinical Data
Influenza activity in Ireland was low to moderate during the 2012/2013-influenza season, with sentinel GP ILI consultation rates peaking twice, at 59.3 per 100,000 population during week 1 2013 (January) and again at 59.1 per 100,000 population during week 6 2013 (February) (figure 1). ILI rates first increased above baseline levels (21.0 per 100,000) during week 50 2012 and remained there for 14 consecutive weeks, one of the longest seasons on record, with the exception of the pandemic period. The highest age specific ILI rates were reported in the 5-14 year age group (peaking at 100.3/100,000), followed by those aged 15-64 years (70.8/100,000), 0-4 years (39.6/100,000) and those aged 65 years or older (39.3/100,000).

Virological Data - Influenza
The NVRL tested 932 sentinel specimens for influenza virus during the 2012/2013 season. Five hundred and sixteen (55.4%) sentinel specimens were positive for influenza: 151 influenza A (86 A (H3), 51 A (H1)pdm09 and 14 A unsubtyped) and 365 influenza B.

The NVRL tested 7,199 non-sentinel respiratory specimens during the 2012/2013 season, 1033 (14.3%) of which were positive for influenza: 669 influenza A (412 A(H3), 170 A(H1)pdm09 and 87 A (unsubtyped)) and 364 influenza B.

Influenza B was the predominant influenza virus circulating until February 2013, followed by influenza A(H3) and influenza A(H1)pdm09 for the remainder of the season. Influenza A accounted for 52.9% of all influenza positive specimens and influenza B for 47.1% during the 2012/2013 season. Of the 719 influenza A sentinel and non-sentinel specimens that were subtyped, influenza A(H3) accounted for 69.3% and influenza A(H1)pdm09 for 30.7%.

The NVRL genetically characterised 66 influenza viruses during the 2012/2013 influenza season. Of 43 influenza B viruses analysed, 38 (88.4%) belong to the B/ Yamagata lineage (which is included in the 2012/2013 influenza vaccine) and five (11.6%) belong to the B/ Victoria lineage. Seventeen influenza A(H3N2) viruses were genetically characterised and were similar to the vaccine strain A/Victoria/361/2011. Sequence analysis of

six influenza A(H1N1)pdm09 viruses identified them as related to the vaccine strain A/California/07/2009.

Virological Data - Other respiratory viruses
During the 2012/2013 season, of 7,199 non-sentinel specimens tested by the NVRL, 669 (9.3%) positive detections of respiratory syncytial virus (RSV) were reported, peaking at 35.9% during week 52 2012. A total of 220 (3.1%) positive detections of parainfluenza virus type 3 (PIV-3) were reported, peaking towards the end of the season, at 11.3% during week 17 2013. Positive detections of human metapneumovirus (n=165; 2.3%) also peaked at the end of the season, at 9.4% during week 20 2012. 138 (1.9%) positive detections of adenovirus were reported, nine (0.1%) parainfluenza virus type 1 (PIV-1) and eight (0.1%) parainfluenza virus type 2 (PIV-2).

Outbreaks, GP OOHs & Sentinel hospital data
Seventy-two influenza/ILI outbreaks were reported: influenza was confirmed for 63 of these outbreaks. Of the 63 outbreaks predominantly associated with influenza, 52 were associated with influenza A (42 A(H3), 6 A (H1)pdm09 and 4 with influenza A (subtyping not reported) and 11 with influenza B. No pathogens were identified for nine ILI outbreaks. One third of the influenza/ILI outbreaks were reported from HSE-E (table 1). The majority of outbreaks were associated with the elderly, in health care facilities/residential institutions. In total 23 deaths were recorded during these 72 outbreaks, 10 of these deaths were officially reported as influenza-associated deaths (all in those over 75 years of age).

A further 13 acute respiratory infection (ARI) general outbreaks (negative for influenza) were reported during the 2012/2013 influenza season, four associated with human metapneumovirus (hMPV), two with parainfluenza viruses, one with respiratory syncytial virus (RSV) and six associated with unidentified pathogens. The majority of cases associated with these ARI outbreaks displayed atypical ILI symptoms.

The percentage of influenza-related calls to GP out-of-hours services in Ireland, peaked during week 1 2013 at 6.0% (coinciding with the first peak in ILI activity, which was associated with influenza B). During the peak of activity, each service received on average, 1.7 calls per hour relating to influenza.

Hospital respiratory admissions in sentinel hospitals peaked during week 50 2012, with 413 respiratory admissions reported during that week. Respiratory admissions remained at elevated levels between week 49 2012 and week 1 2013. Total emergency admissions reported from sentinel hospitals also peaked during week 50 2012, at 2820.

Influenza and RSV notifications
A total of 1619 confirmed influenza notifications were reported on CIDR during the 2012/2013 influenza season. Of the 1619 notifications, 488 (30.1%) were influenza A(H3), 218 (13.5%) were influenza A(H1) pdm2009, 132 (8.2%) were influenza A (not subtyped) and 781 (48.2%) were influenza B. A total of 1608 RSV notifications were reported on CIDR during the 2012/2013 season, peaking at 253 during week 1 2013.

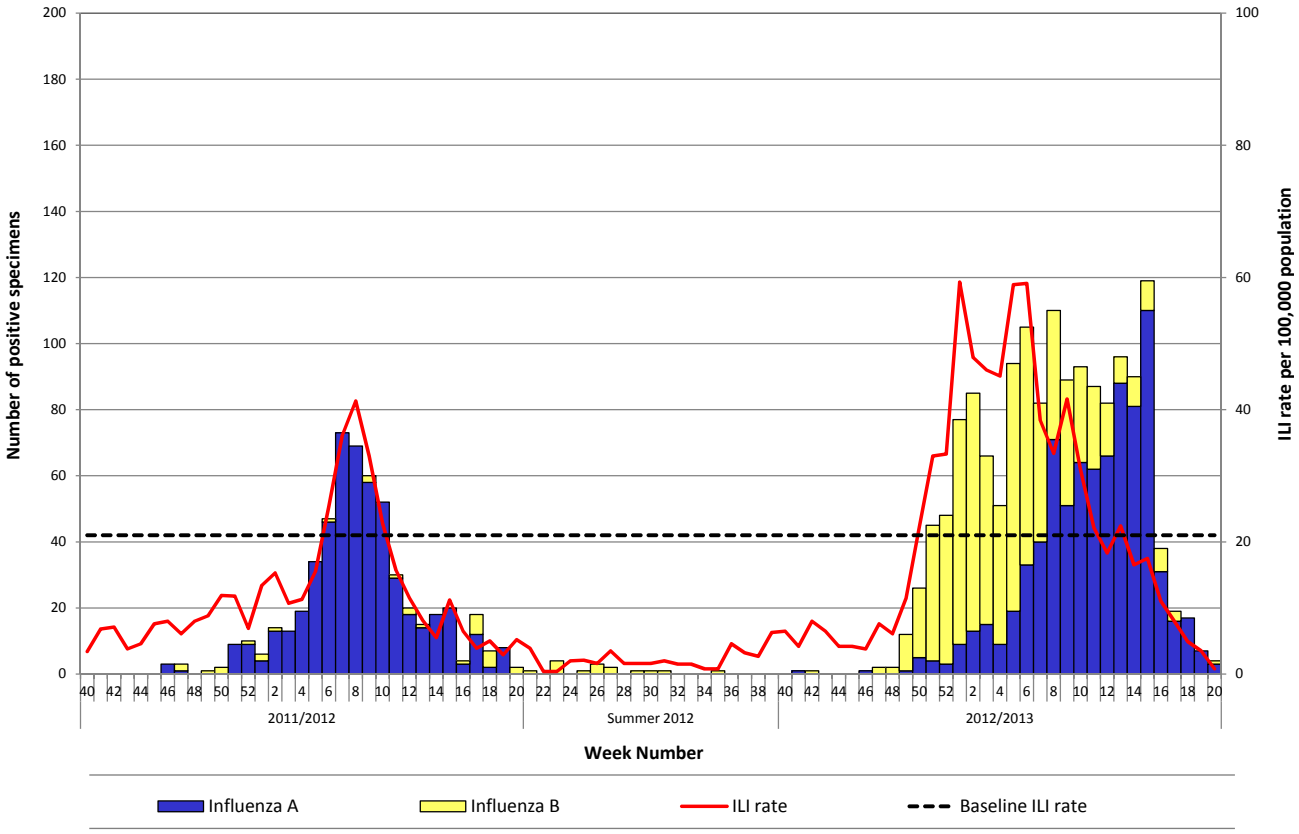

Figure 1: ILI sentinel GP consultation rates per 100,000 population, baseline ILI threshold rate, and number of positive influenza A and B specimens tested by the NVRL, by influenza week and season. Source: Clinical ILI data from ICGP and virological data from the NVRL.

Confirmed influenza cases hospitalised
Four hundred and seventy one cases with confirmed influenza were hospitalised during the 2012/2013 influenza season. The highest age specific rate in hospitalised cases for the 2012/2013 season was in those less than one year of age (56.6 per 100,000 population), followed by those aged 1-4 years of age (28.2 per 100,000) and those aged 65 years or older (19.1 per 100,000) (table 2). Of the 471 hospitalised cases, 130 (27.6%) were influenza A(H3), 79 (16.8%) were influenza A(H1)pdm09, 39 (8.3%) were influenza A (not subtyped) and 223 (47.3%) were influenza B.

Confirmed influenza cases admitted to ICU
Of the 471 hospitalised confirmed influenza cases, 38 (8.1%) were admitted to critical care (28 adults and 10 paediatric cases). Of the 38 critical care cases, five (13.2%) were associated with influenza A (H3), 16 (42.1%) were influenza A(H1)pdm09, two (5.3%) influenza A (not subtyped) and 15 (39.5%) were influenza B. Age specific rates for patients admitted to ICU were highest in those aged less than 1 year of age (5.5 per 100,000 population) followed by those aged 65 years and over (1.5 per 100,000 population) (table 2). The median age of paediatric cases was 17 months of age and the median age of adult cases was 51.5 years. Twenty-five (25/28, 89.3%) adults and nine (9/9, 100%) paediatric cases had pre-existing medical conditions. Pre-existing medical conditions were unknown for one paediatric case, aged 2 months old. The most frequently reported underlying medical condition for adults was chronic heart disease (7/25, 28.0%), followed by immunosuppression/malignancy (6/25, 24.0%). Four adult cases were pregnant. Seven (25.0%) adult cases were reported as current/former smokers. Underlying medical conditions for paediatric cases included chronic respiratory disease (n=3), neurological/neuromuscular conditions (n=3), cardiovascular conditions (n=2), and metabolic disorder (n=1). Nineteen (19/22, 86.4%) adults and nine (9/9, 100.0%) paediatric cases were ventilated during their stay in ICU. Ventilation status was unknown for six adult cases and one paediatric case. The median length of stay in ICU for adult cases was 9 days (ranging from 1 - 17 days) and for paediatric cases was 5.0 days (ranging from 1 - 85 days). Vaccination status was only known for nine of the 38 cases admitted to ICU, three cases were vaccinated (all three had underlying medical conditions) and six were not (four did have underlying medical conditions and two did not). Eleven deaths in confirmed influenza cases were reported from ICU units, two of these deaths were due to influenza.

Mortality data
During the 2012/2013 influenza season, 32 influenza-associated deaths[†] were reported. The case classification of influenza was confirmed for 21 of these cases, probable for three cases and possible for eight cases. Of the 21 cases with known virology, eight were associated with influenza A(H3), one with influenza A(H1)pdm09, five influenza A (not subtyped) and seven with influenza B. The median age of cases who died during the 2012/2013 influenza season was 86 years, ranging from <1 year – 95 years. Ten of the 32 deaths (31.3%) were associated with influenza outbreaks. Vaccination status was known for nine of the 32 (28.1%) cases. Five (55.6%) cases were vaccinated and four (44.4%) were not vaccinated with the 2012/2013 influenza vaccine. Of these 32 cases, 26 were known to have underlying medical conditions. Data on underlying medical conditions was unknown for six cases, with an age range of 84 - 94 years.

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

Overview of the 2012/2013 season
During the 2012/2013 influenza season, although influenza activity in Ireland rose to relatively low levels, activity was prolonged, and reached levels higher than those reported during the previous season. Influenza-like illness (ILI) GP consultation rates were above baseline levels for 14 consecutive weeks, a longer than average period. A mix of influenza viruses meant both children and adults were affected; influenza B was

*Table 1: Number of influenza/ILI outbreaks by HSE-Area for the 2012/2013 influenza season (n=72).**

HSE-Area	No. of outbreaks	Total number ill	Total number hospitalised	Total number dead	Total number lab confirmed	Total number lab investigated
HSE-E	24	815	16	10	132	93
HSE-M	6	152	11	6	19	16
HSE-MW	4	39	50	0	9	11
HSE-NE	3	22	4	3	6	16
HSE-NW	14	146	9	0	40	62
HSE-SE	4	77	6	1	16	29
HSE-S	10	130	9	2	7	21
HSE-W	7	136	20	1	11	9
Total	72	1517	125	23	240	257

**It should be noted that only 10/23 of the deaths reported in these outbreaks were officially reported as influenza-associated deaths.*

[†] 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.

predominantly circulating until February 2013, followed by influenza A(H3) co-circulating with influenza A(H1) pdm09 for the remainder of the season. The unusual pattern of influenza B circulating prior to influenza A, was also reported in England, Northern Ireland and Wales but not in Scotland. The number of influenza/ILI outbreaks during the 2012/2013 season reached the highest number ever reported to HPSC, with the exception of the pandemic period. These outbreaks mainly affected the elderly in healthcare/residential care facilities, the majority of which were associated with influenza A(H3). An increase in influenza severity was observed relative to the 2011/2012 influenza season with a higher number of hospitalisations, ICU admissions and influenza-associated deaths. As in previous seasons, hospitalisations and ICU admissions mainly affected those under 5 years of age and those aged 65 years and older. Cumulative excess all-cause mortality was high in the elderly, with the highest levels reported since the 2008/2009 influenza season, coinciding with high levels of influenza A(H3) activity in the elderly.

Globally, the majority of influenza A viruses characterised during 2012/2013 influenza season were antigenically related to those contained in the 2012/2013 influenza vaccine. Among influenza B viruses characterised globally, 10-30% of reported B viruses were of the Victoria lineage. The remainder were of the Yamagata lineage, and were antigenically related to the vaccine recommended component. For the 2013/2014 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(H3N2) virus antigenically like the cell-propagated prototype virus A/Victoria/361/2011 (with a recommendation for A/Texas/50/2012) and a B/Massachusetts/2/2012-like virus (Yamagata lineage).[1]

Early estimates of influenza vaccine effectiveness in Europe undertaken by the IMOVE consortium reported an early adjusted influenza vaccine effectiveness (VE) of 78.2% (95% CI: 18.0 to 94.2) against influenza B, 62.1% (95% CI: −22.9 to 88.3%) against A(H1)pdm09, 41.9 (95% CI: −67.1 to 79.8) against A(H3N2) and 50.4% (95% CI: −20.7 to 79.6) against all influenza types in the target groups for influenza vaccination. These early estimates suggest a moderate VE against all influenza viruses. By type and subtype, the highest VE was against influenza B and the lowest against influenza A(H3N2). As in 2011/12, the results suggest a low-to-moderate VE for influenza A(H3N2). Efforts to improve influenza vaccines should continue to better protect those at risk of severe illness or complications. [2]

Positive proportions of parainfluenza virus type 3 and adenovirus were higher than those reported to HPSC in previous seasons. Activity from other circulating respiratory viruses during the 2012/2013 season was similar to previous seasons. Two novel respiratory viruses emerged during the 2012/2013 season, Middle East Respiratory Syndrome coronavirus (MERS-CoV) in the Middle East and avian-origin influenza A(H7N9) in Eastern China. Both have high reported case fatality ratios, with the source of both viruses yet to be fully established. No cases of MERS-CoV or influenza A(H7N9) were identified in Ireland during the 2012/2013 season. Surveillance procedures for these viruses will continue while the risk remains. Information on MERS-CoV is available on the ECDC website. Further information and guidance documents are also available on the HPSC and WHO websites. For up to date information on human infection with avian influenza A(H7N9) virus in China including the current case numbers and the WHO assessment of the situation please see here.

For the 2013/2014 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, severe influenza and influenza-associated deaths. Work is also in progress to improve reporting of influenza vaccine uptake in health care workers and risk groups for influenza. HPSC are continuing participation in a WHO pilot project to automatically calculate the intensity of influenza each week using sentinel GP ILI consultation rates. Surveillance of influenza notifications (including hospital status), ILI/influenza outbreaks,

Table 2: Age specific rate for confirmed influenza cases hospitalised and admitted to critical care during the 2012/2013 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	41	56.6	4	5.5
1-4	80	28.2	4	1.4
5-14	64	10.3	2	0.3
15-24	21	3.6	0	0.0
25-34	52	6.9	5	0.7
35-44	51	6.8	7	1.0
45-54	34	5.9	3	0.5
55-64	26	5.6	5	1.1
65+	102	19.1	8	1.5
Total	471	10.3	38	0.8

and enhanced surveillance of confirmed hospitalised influenza cases (aged 0-14 years) and of confirmed influenza cases in critical care units (all ages) will continue for the 2013/2014 season. Additional projects include an all-cause mortality monitoring project associated with the European mortality monitoring group (EuroMOMO), participation in a European influenza vaccine effectiveness study (I-MOVE project) and a project on severe acute respiratory infections (SARI) cases admitted to two critical care units, one adult and one paediatric. Work is in progress to automate the extraction of data on SARI cases from one paediatric intensive care unit (PICU). The work at this PICU site should hopefully pave the way for further automation of SARI data extraction from similar sites. 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

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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 ICU for all ages by influenza season: 2009-2013. 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	Pandemic period	2010/2011	2011/2012	2012/2013
Total cases	1059	945	146	471	100	121	15	38
Crude rate /100,000 pop.	23.1	20.6	3.2	10.3	2.2	2.6	0.3	0.8
Age range (years)	0-84	0-97	0-97	0-99	0-79	0-80	0-80	0-88
Median age (years)	17	29	27	32	34	49	60	39
Females	533	513	83	270	50	64	12	17
	50.3%	54.3%	56.8%	57.3%	50.0%	52.9%	80.0%	44.7%
Cases with risk factor	507	No data	No data	No data	81	90	13	34
	47.9%				81.0%	74.4%	86.7%	89.5%

Table 4: Summary table of influenza-associated deaths for all ages by influenza season: 2009-2013. It should be noted that risk factor data were not available for all cases during the 2011/2012 and 2012/2013 seasons. Rates are based on the 2011 CSO census.

	Influenza-associated deaths			
	Pandemic period	2010/2011	2011/2012	2012/2013
Total cases	29	38	13	32
Crude rate /100,000 pop.	0.6	0.8	0.3	0.7
Age range (years)	8-83	2-83	81-98	0-95
Median age (years)	54	57	88	86
Females	15	18	5	16
	51.7%	47.4%	38.5%	50.0%
Cases with risk factor	27/29	32/38	7/8	26/26
	93.1%	84.2%	87.5%	100.0%

2.2 Legionellosis

Summary

Number of cases in 2012: 15
Crude incidence rate: 3.3 per million

In 2012, there were 15 cases of Legionnaires' disease notified in Ireland, a rate of 3.3 per million population, an increase from the rate of 1.5 per million seen in 2011. Three deaths were reported, of which one was reported as due to Legionnaires' disease.

Seven cases were reported from HSE East, four from HSE West, three from HSE Mid-West and one from HSE North East.

Just over half of the cases were male (53.3%). The median age was 68 years with a range from 38 to 87 years.

All fifteen cases were classified as confirmed. Thirteen of the 15 cases were diagnosed by urinary antigen test (UAT) and three had the organism cultured. The organism involved in the 13 cases confirmed by UAT and cultured in one of those cases was *Legionella pneumophila* serogroup 1. *Legionella pneumophila* serogroup 3 was cultured in the remaining two cases. Monocloncal subtyping information was not available.

Eight cases were travel-associated. Countries of travel included France (2), Ireland (1), Italy (1), Spain (2) and the USA (2). Three of these cases were linked to travel related clusters. Of the seven remaining cases, two were healthcare-associated and the remaining five were assumed to be community acquired.

The peak month for notifications was October when three cases were notified.

Table 1. Number of Legionnaires' disease cases per million population in Ireland, 2005-2012

Age group (years)	2005	2006	2007	2008	2009	2010	2011	2012
<30	0	0	1	0	0	1	0	0
30-39	2	0	3	0	0	0	0	1
40-49	3	7	4	2	0	2	0	1
50-59	1	2	2	3	2	1	1	1
60-69	1	1	3	4	3	3	4	6
70+	1	2	2	2	2	4	2	6
Total	**8**	**12**	**15**	**11**	**7**	**11**	**7**	**15**
CIR	**1.9**	**2.8**	**3.5**	**2.6**	**1.5**	**2.4**	**1.5**	**3.3**

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

Number of cases, 2012: 122
Crude incidence rate, 2012: 2.66 per 100,000 population

Notifications

One hundred and twenty-two cases of invasive Group A streptococcal (iGAS) disease were notified in 2012. This corresponds to 2.66 iGAS cases per 100,000 population [95% confidence interval (CI), 2.21 to 3.17 per 100,000], which is higher than in 2011 when the iGAS rate was 1.46 per 100,000 population (95% CI, 1.13 to 1.85 per 100,000). This increase is considered to be statistically significant as the confidence intervals do not overlap. One hundred and eighteen cases were confirmed, defined as patients with Group A streptococcus (GAS), or *Streptococcus pyogenes*, isolated from a sterile site. Four cases were probable, defined as patients with streptococcal toxic shock syndrome (STSS) and GAS isolated from a non-sterile site (e.g. throat, sputum, vagina).

Patient demographics

Of the 122 cases, 59 (48%) were males and 63 (52%) were females, with ages ranging from 2 weeks to 92 years (mean, 44 years; median, 42 years). iGAS was more common in young children and older adults (Figure 1).

Geographic spread and seasonal variation

Table 1 outlines the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2006 to 2012. Of note, the highest number of cases and CIR in 2012 occurred in the HSE-East (n=51; CIR, 3.15 per 100,000 population). The numbers of cases and CIRs increased in all HSE Areas, with the HSE-North-East reporting the biggest increase (up by over 10-fold on 2011).

In 2012, the peak periods were January-February (21 cases) and April-July (66 cases), which is broadly similar to the data from previous years with the peak typically occurring during the first half of the year (Figure 2). Comparing monthly data between 2011 and 2012, the first signs of an increase in notifications in 2012 occurred in April (n=11; 2011, n=6), with the highest number of monthly notifications reported to date following in May (n=21; previously the highest monthly figure was 12) (Figure 3). Note: the data presented here are based on the date the case was notified to public health and not on the date the case was first detected.

Isolate details

GAS was isolated from a sterile site in 103 of 118

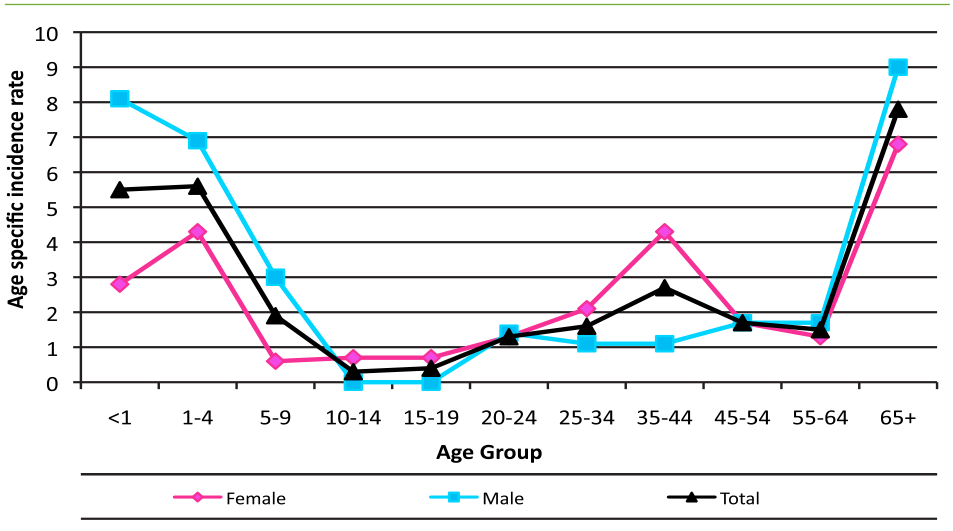

Figure 1. Age and sex specific rates of iGAS disease in 2012

confirmed cases (no data on the source were available for the other 15 cases), primarily from blood cultures (n=83 isolates, 91%), but also deep tissue (n=8), abscesses (n=6), joints (n=2), pleural aspirates (n=2), bone (n=1) and cerebrospinal fluid (CSF) (n=1). For 8 cases, GAS was isolated from another sterile site in addition to blood: abscesses (n=3), CSF (n=2), deep tissue (n=1) and pleural fluid (n=1). For the four probable cases, GAS source was wound swabs.

Typing data, based on sequencing of the *emm* genes that encode the M protein (the major virulence factor), were available on 108 isolates submitted from 27 laboratories: *emm*-types 1.0 (n=50; 46%), 12.0 (n=10; 9%) and 28.0 (n=8; 7%) comprised 63% of all the isolates typed. Nineteen other *emm*-types (each represented by four isolates or less) were also detected. Of the 24 patients with STSS for which *emm*-typing was undertaken, 17 of the GAS isolates belonged to *emm*-type 1.0 (71%) and three to type 12.0 (13%).

Enhanced surveillance data

Enhanced data fields were entered for 112 (92%) of the 122 iGAS cases, which is similar to 2011 (90%, 61 of 67 cases). The source laboratory could be ascertained for all cases. As in previous years, a wide variation in completed fields was observed.

Clinical details

Clinical presentation data were provided for 111 of the 122 cases. As in 2011 and previous years, bacteraemia (n=84 cases, including cases where bacteraemia was not specifically stated but GAS was isolated from blood) and cellulitis (n=40) were the most common clinical presentations, followed by STSS (n=26; seven of which were implied based on the information provided on the clinical presentation), pneumonia (n=16), necrotising fasciitis (n=7), septic arthritis (n=7), myositis (n=4), erysipelas (n=3), puerperal sepsis (n=3), meningitis (n=3) and peritonitis (n=1). Note that cases could have more than one clinical manifestation of infection.

Risk factors

Risk factor data were provided for 105 of the 122 cases. Risk factors associated with iGAS disease included age ≥65 years (n=42), presence of skin or wound lesions (n=29), malignancy (n=10), varicella infection (n=8), steroid use (n=7), childbirth (n=6), intravenous drug

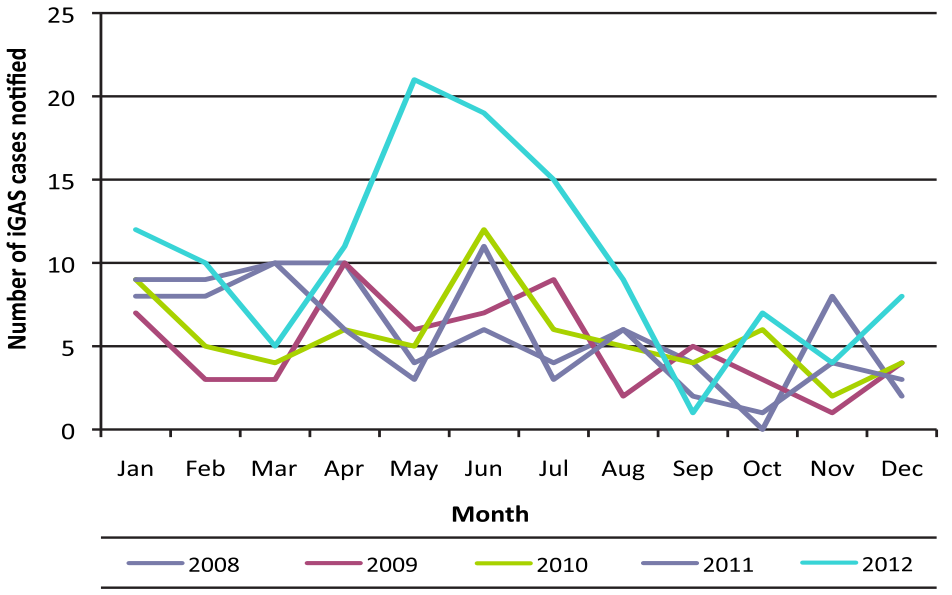

Figure 2. Monthly distribution of iGAS cases, 2008-2012

Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area, 2006-2012

HSE Area	2006		2007		2008		2009		2010		2011		2012	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE-E	37	2.47	28	1.87	31	2.07	32	1.98	22	1.36	29	1.79	51	3.15
HSE-M	2	0.79	0	0.00	0	0.00	2	0.71	2	0.71	5	1.77	7	2.48
HSE-MW	2	0.55	2	0.55	3	0.83	5	1.32	6	1.58	6	1.58	8	2.11
HSE-NE	5	1.27	3	0.76	10	2.54	3	0.68	7	1.59	1	0.23	11	2.50
HSE-NW	1	0.42	3	1.27	3	1.27	1	0.39	8	3.10	2	0.77	5	1.94
HSE-SE	4	0.87	10	2.17	8	1.74	8	1.20	5	0.75	7	1.05	16	2.41
HSE-S	3	0.48	4	0.64	5	0.80	5	1.00	12	2.41	12	2.41	14	2.81
HSE-W	7	1.69	7	1.69	10	2.41	4	0.90	6	1.35	5	1.12	10	2.25
IRELAND	61	1.44	57	1.34	70	1.65	60	1.31	68	1.48	67	1.46	122	2.66

CIRs for 2006-2008 calculated using the 2006 census; CIRs for 2010-2012 calculated using the 2011 census

use (IDU) (n=6), diabetes mellitus (n=5), alcoholism (n=5) and non-steroidal anti-inflammatory drug (NSAID) use (n=2). Note that cases could have one or more associated risk factors: 63 cases had one risk factor, 22 had two risk factors, three had three risk factors, one had four risk factors and one had five risk factors. No risk factors were identified for 15 cases. Among the 26 patients with STSS, risk factor data were provided for 25 cases. Skin or wound lesions were identified as a risk factor in 15 cases, age 65 years and over in 10 cases, alcoholism in four cases, varicella in three cases, and childbirth, steroid and NSAID use in one case each. No risk factors were identified for two STSS cases.

Clinical management
Surgical intervention was required for 24 patients (compared to 8 in 2011), ranging in age from 17 months to 81 years.

Forty patients, ranging in age from 2 weeks to 84 years, were admitted to an intensive care unit (ICU) (compared to 11 in 2011). This included 18 patients with STSS, one patient with necrotising fasciitis and five patients with both STSS and necrotising fasciitis.

Risk factors for patients admitted to an ICU included skin and wound lesions (n=18), age over 65 years (n=12), varicella infection (n=5), alcoholism (n=4), diabetes mellitus (n=2), NSAID use (n=2), steroid use (n=3), childbirth (n=2) and malignancy (n=2). Twenty patients had one risk factor, nine had two risk factors and one each had three, four and five risk factors, respectively. No risk factors were identified in four patients. No risk factor data were available for four patients.

Length of ICU stay was provided for 21 cases, ranging from one to nine days (mean, 3.6 days; median, 3 days).

Other epidemiological information
Three cases (one with bacteraemia; one with bacteraemia and cellulitis; and one with STSS and peritonitis) were reported as hospital-acquired (compared to two in 2011).

In 2012, one family outbreak of iGAS was notified (compared to none in 2011). In addition, there were two reported outbreaks of scarlet fever in 2012 (compared to one in 2011), and one reported outbreak of non-invasive GAS infection (strep throat) in 2012 (compared to none in 2011).

Outcome
Outcome at seven-days following GAS isolation was reported for 64 cases:
- 55 were still alive
- Nine patients died: GAS was the main or contributory cause of death for eight patients

The seven-day case fatality rate (CFR) for iGAS disease was 13% in 2012 (similar to that in 2011; 12%).

Of the twenty-six STSS cases, five patients died due to GAS resulting in a CFR of 19%. Two other patients with STSS died but GAS was not identified as the cause of death.

Antimicrobial susceptibility
Antimicrobial susceptibility data were reported on 80 iGAS isolates (72 from blood and eight from other specimens) by 20 laboratories in 2012 (note: these were reported via the EARS-Net Antimicrobial Resistance Surveillance Network). All isolates tested were susceptible to penicillin (n=78) and vancomycin (n=58). Resistance to erythromycin was reported in four (5%) of 80 isolates, to clindamycin in two (6%) of 34 isolates and to tetracycline in five (17%) of 29 isolates.

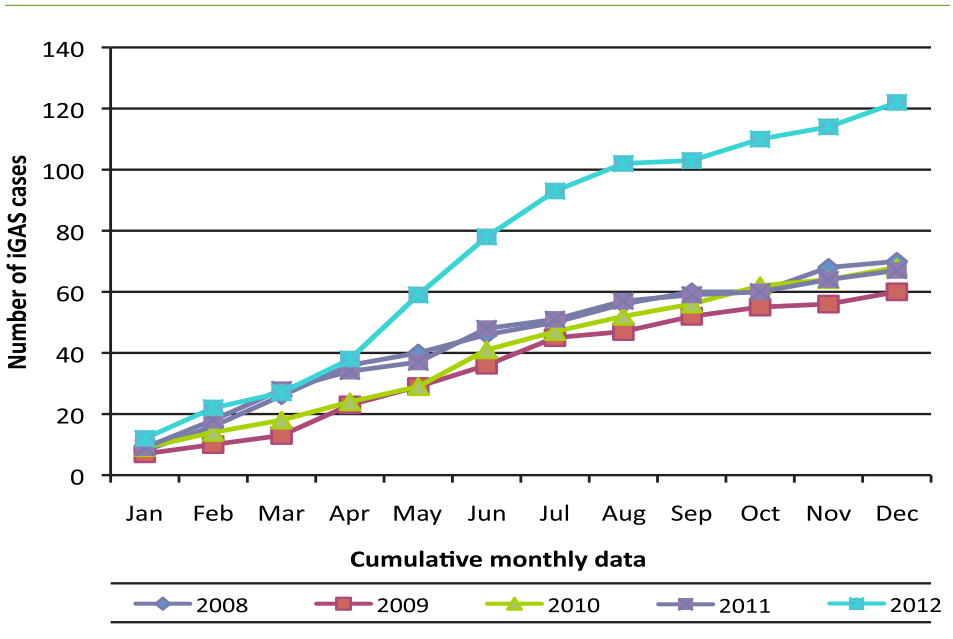

Figure 3. Cumulative monthly numbers of iGAS cases, 2008-2012

Conclusion

In 2012, 122 cases of iGAS infection were notified in Ireland, which is the highest annual number reported to date and represents an increase of 82% on 2011 (n=67). The crude incidence rate increased from 1.46 per 100,000 population in 2011 to 2.66 per 100,000 in 2012 and this was found to be statistically significant.

iGAS is a potentially life-threatening disease with an overall case fatality rate (CFR) of 13%, and even higher CFR (19%) for patients presenting with STSS, in 2012. Last year, more patients presented with STSS than in previous years: 26 cases, comprising 23% of 111 cases for which clinical presentation was provided, the highest proportion reported to date.

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), Children's University Hospital, Temple Street. Laboratories were asked to submit all iGAS isolates for 2012, and 2011 if possible, for comparison purposes. In 2012, one *emm*-type, type 1.0 (representing 50 of 108 isolates), comprised 46% of all isolates typed, compared with 29% (8 of 28 isolates) in 2011. Certain *emm*-types, including type 1.0, are associated with STSS, and STSS in turn is strongly associated with increased mortality. Although typing data were available for just 42% of isolates in 2011, it is likely that the large increase in iGAS cases in 2012 is in part at least due to the proliferation of GAS isolates belonging to *emm*-type 1.0.

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 the EMBU is another vital element to help us understand what is happening with GAS 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 first line treatment where iGAS is suspected.

HPSC would like to thank participating microbiology laboratories and public health departments for their contribution to the iGAS enhanced surveillance scheme.

All microbiology laboratories are encouraged:

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

The enhanced surveillance form can be downloaded from the HPSC web site at: 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: 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 26th August 2013.

2.4 Invasive Group B Streptococcal Infections

Summary

Number of cases, 2012: 77
- 58 cases of early-onset disease (EOD)
- 19 cases of late-onset disease (LOD)

EOD rate per 1,000 live births, 2012: 0.80
LOD rate per 1,000 live births, 2012: 0.26

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 2012, there were 77 iGBS cases, of which 58 and 19 cases represented EOD and LOD, respectively (Figure 1). The EOD and LOD rates were 0.80 and 0.26 per 1,000 live births, respectively (72,225 live births, CSO 2012 data obtained from http://www.cso.ie/en/statistics/birthsdeathsandmarriages/numberofbirthsdeathsandmarriages/)

Nineteen cases presented with meningitis (meningitis was specifically mentioned as a case presentation for 11 cases and inferred from eight cases where the specimen type tested included CSF).

The figures presented in this summary are based on data extracted from the Computerised Infectious Diseases Reporting (CIDR) System on 23rd August 2013.

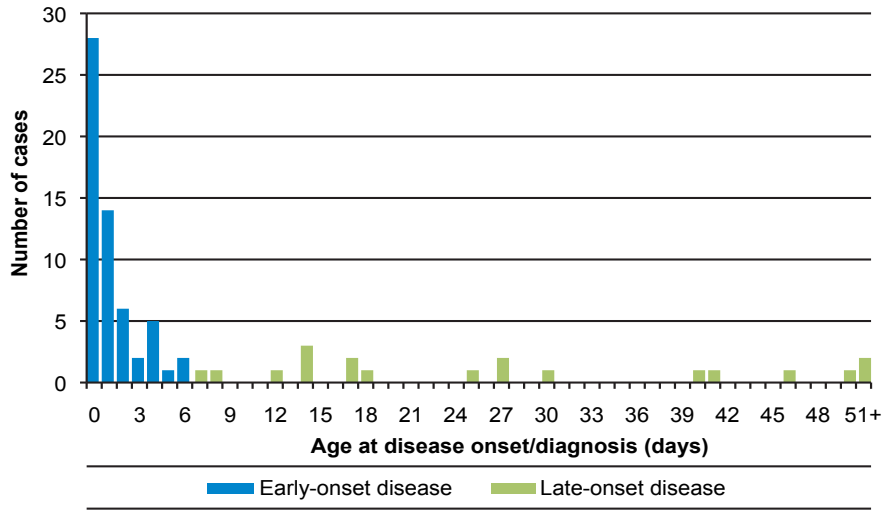

Figure 1. Number of cases of invasive Group B streptococcal infection by age at onset/diagnosis: early-onset disease (<7 days) and late-onset disease (7-89 days)

2.5 Tuberculosis, 2011

Summary

Number of cases in 2011: 413
Crude incidence rate in 2011: 9.0/100,000
Number of cases in 2012*: 364
Crude incidence rate in 2012*: 7.9/100,000

In 2011, 413 cases of tuberculosis (TB) were notified in Ireland, corresponding to a crude notification rate of 9.0 per 100,000 population, which remains stable compared to 2010 (9.2/100,000 population). A summary of the epidemiology of TB in Ireland during 2011 is shown in table 1 while the number of cases and crude incidence rates from 1991 to 2012* with three-year moving averages are shown in figure 1.

The highest crude incidence rates were reported by HSE-S (12.6/100,000 population) and HSE-E (11.6/100,000 population) while the lowest rates were reported by HSE-NW (5.0/100,000 population) and HSE-NE (5.7/100,000 population).

Cases ranged in age from one to 91 years of age, with a median age of 39 years. The highest age-specific rate in 2011 occurred among those aged 25-34 years (14.4/100,000 population) followed by those aged 65 years and over (12.7/100,000 population). The rate among males (10.5/100,000 population) was higher than that among females (7.5/100,000 population). Rates among males were higher than females for all age groups except in the 0-14 year age group where the rate in males was lower (3.1/100,000 population in females compared to 0.8/100,000 population in males). The highest rate among males (18.5/100,000 population) was in the group aged 65 years and older while the highest rate in females (12.7/100,000 population) was in the 25-34 year age group. The male to female ratio (1.4:0.7) reported in 2011 was consistent with the ratio reported in previous years.

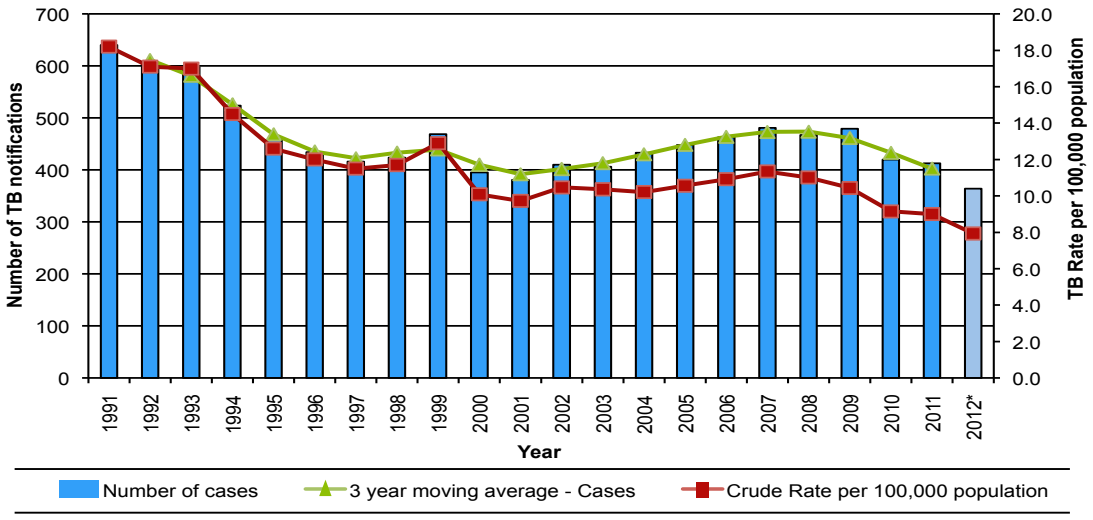

Figure 1: Notified cases of TB in Ireland with crude rates per 100,000 population, 1991 to 2012 and 3-year moving averages, 1992-2011*

*Data for 2012 are provisional data which may change significantly following validation

Geographic origin
During 2011, 46.7% (193 cases) of TB cases were born outside Ireland. This is the highest proportion of foreign-born cases reported annually since TB enhanced surveillance began in 2002(range: 21.9%-43.3%). The crude rate in the foreign-born population increased slightly to 25.2 per 100,000 population, compared to 22.3 per 100,000 population reported in 2010. The crude rate in the indigenous population was 5.7 per 100,000 population, which decreased slightly compared to 6.5 per 100,000 population reported in 2010. There was a notable difference in age between those born in Ireland and those born outside Ireland, with a median age of 48 years and 32 years respectively.

Site of infection
Pulmonary TB was reported in 288 (69.7%) cases and 122 (29.8%) had exclusively extrapulmonary disease. Of the extrapulmonary cases reported in 2011, there were two cases of TB meningitis corresponding to a rate of 0.04/100,000 population (0.4/million population).

Microbiology
Of the 413 cases reported in 2011, 66.3% (274 cases) were culture confirmed. Of the 274 culture confirmed cases, species identification showed *M. tuberculosis* in 92.7% (254 cases), M. tuberculosis complex‡ in 5.1% (14 cases) and *M. bovis* in 2.2% (6 cases). Of the 288 cases with a pulmonary component, 214 (74.3%) were reported as culture confirmed, and 119 (41.3%) were reported as smear positive.

Drug sensitivity
Information on antibiotic sensitivity testing was available for 250 (91.2%) of the 274 culture confirmed cases. Of these, resistance was documented in 24 (9.6%) cases, three (0.7% of total cases) of which were MDR-TB cases. Mono-resistance to isoniazid was recorded in nine cases, to streptomycin in six and to pyrazinamide in one case. Further details on the resistance profiles of TB cases reported in 2011 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2011 (www.hpsc.ie).

Outcome
In 2011, information on treatment outcome was provided for 74.8% (309) of cases, a decrease compared to 88.1% in 2010. Treatment outcome was reported as completed for 243 (58.8%) cases, 28 (6.8%) cases died, 22 (5.3%) were lost to follow up, seven (1.7%) had treatment interrupted, six were still on treatment (1.5%) and two cases transferred out (0.5%). Nine (32.1%) of the 28 deaths were attributable to TB. During 2011, the reported treatment success rate was 65.6% for new culture confirmed pulmonary TB cases and 59.8% 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 2011, five outbreaks of TB were reported to HSPC, with 38 cases of active TB, 15 with latent TB infection (LTBI) and 13 hospitalisations. Three outbreaks were reported by HSE-E, one by HSE-NE and one by HSE-S. There were three general outbreaks, one of which occurred in a school, one was associated with a public house and the remaining outbreak occurred in a prison. There were also two family outbreaks, both of which occurred across extended families. The number of outbreaks reported during 2011 remained stable in comparison to 2010, however the number of cases of LTBI reported as associated with the outbreaks decreased. Figure 2 shows a summary of TB outbreaks from 2004 to 2012 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 2012 data
There were 364 cases of TB provisionally notified in 2012, corresponding to a crude rate of 7.9 per 100,000

Table 1: Summary of the epidemiology of TB in Ireland, 2011

Parameter	Number	% of Total cases
Total number of cases	413	
Crude notification rate per 100,000	9.0	
Cases in indigenous population†	214	51.8
Cases in foreign-born persons†	193	46.7
Culture positive cases	274	66.3
Pulmonary cases	288	69.7
Smear positive pulmonary cases	119	28.8
Multi-drug resistant cases	3	0.7
Mono-resistant to isoniazid	9	2.2
Deaths attributable to TB	9	2.2
Outcomes reported in cases	308	74.6
TB meningitis cases	2	0.5

†Country of birth was unknown for 6 cases

‡ Species of mycobacteria not specified

population. It is important to note that these data are provisional and **may change significantly following validation**.

Of the 364 cases provisionally notified in 2012,

- Pulmonary TB was diagnosed in 220 cases (60.4%), extrapulmonary TB in 105 cases (28.8%) and pulmonary and extrapulmonary TB in 31 cases (8.5%). Diagnostic type was not reported for eight cases (2.2%).
- Of the 251 cases with a pulmonary disease component, 209 (83.3%) were culture positive and 116 (46.2%) were smear positive.
- There were three cases of TB meningitis provisionally notified corresponding to a rate of 0.07 per 100,000 population (0.65/million population).
- There were 201 (55.2%) cases born in Ireland and 158 (43.4%) were foreign-born. Country of birth was not reported for 5 (1.4%) cases.
- There were 145 cases (39.9%) notified in females and 218 cases (60.1%) in males.
- The mean age of cases was 43.2 years (range: 0 to 90 years).
- Resistance was reported in 21 cases, 10 of which were mono-resistant to isoniazid. Five cases of MDR-TB were reported during 2012. Fifteen (71.4%) of the 21 resistant cases (including all five MDR cases) were born outside Ireland.
- There were seven TB outbreaks reported to HPSC during 2012, with 23 active TB cases, four cases of latent TB infection and 6 hospitalisations. No deaths were reported from these outbreaks. Please note that numbers of LTBI for outbreaks reported during 2012 are provisional and may increase as outbreak investigations continue.

Further details on the epidemiology of TB cases reported in 2011 will be available in the HPSC Report on the Epidemiology of TB in Ireland, 2011 (www.hpsc.ie).

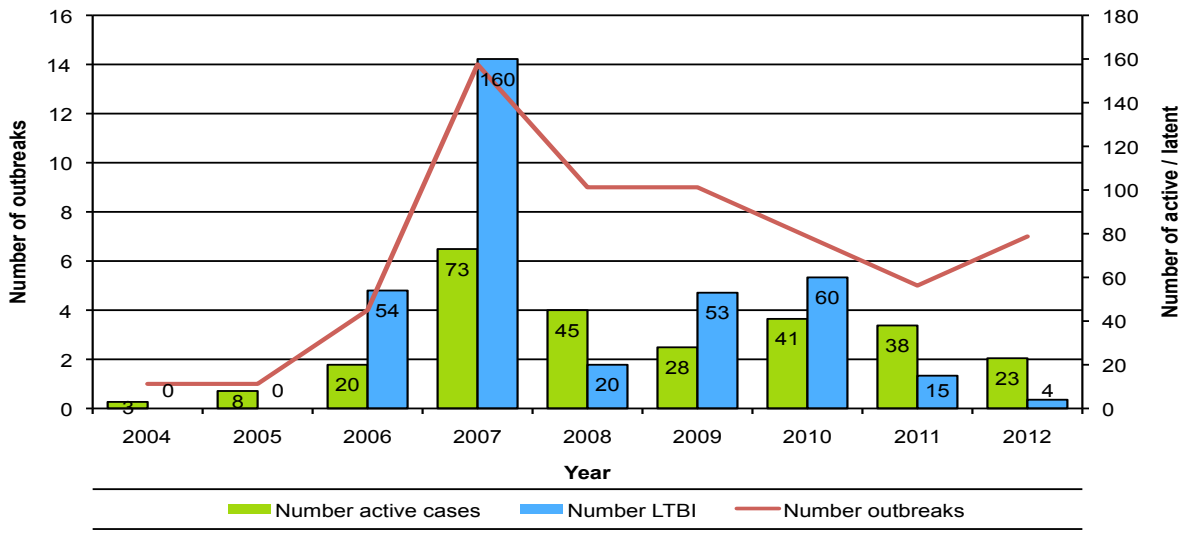

Figure 2: TB outbreak summary by year, 2004-2012

2.6 Chickenpox-hospitalised cases

Summary

Number of cases, 2012: 80
Number of confirmed cases, 2012: 57
Crude incidence rate, 2012: 1.7/100,000
Crude confirmed incidence rate, 2012: 1.2/100,000

Chickenpox-hospitalised cases

The Health Act, 1947 entitles the Minister for Health and Children to specify 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 2012, 80 (1.7/100,000) hospitalised chickenpox cases were notified in Ireland. The largest number of cases and largest crude incidence rate was in the HSE-E (table 1). Of the 80 cases, 57 (71%) were classified as confirmed and 23 (29%) as possible. The largest number of cases and the highest age specific incidence rate was in the age group one to two years (figures 1 and 2). Of the 80 cases, 50 (63%) were male, 29 (36%) were female while gender was not reported for one case.

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 2012. This outbreak occurred in a crèche with 23 ill.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 30th July 2013. 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 2012

HSE Area	Number	CIR
HSE-E	43	2.7
HSE-M	2	0.7
HSE-MW	4	1.1
HSE-NE	7	1.6
HSE-NW	1	0.4
HSE-SE	11	0.9
HSE-S	6	2.2
HSE-W	6	1.3
Total	**80**	**1.7**

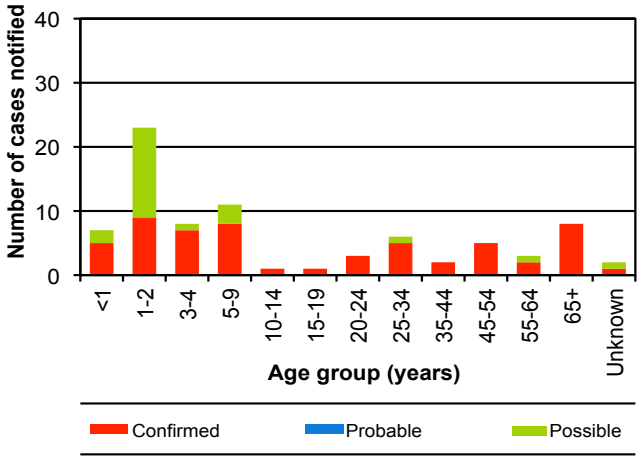

Figure 1. Number of notified hospitalised chickenpox cases in 2012 by age group and case classification

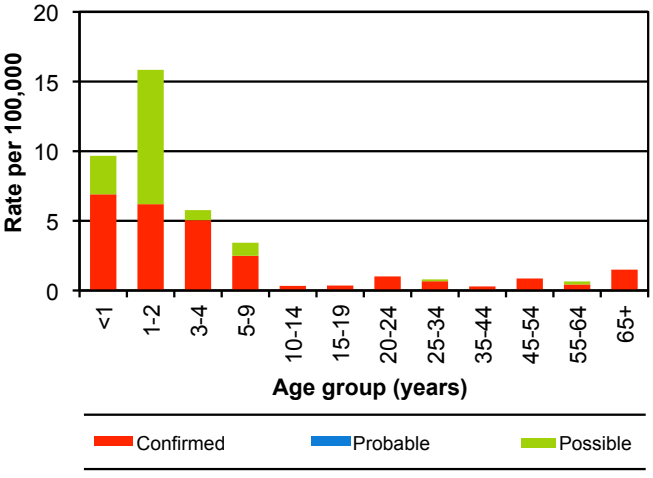

Figure 2. The age specific incidence rate (per 100,000 population) of notified hospitalised chickenpox cases in 2012 by case classification

03

Infectious Intestinal Diseases

3.1 Campylobacter

Summary

Number of cases: 2,388
Crude incidence rate: 52.0/100,000

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 2011, where 56.7% 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

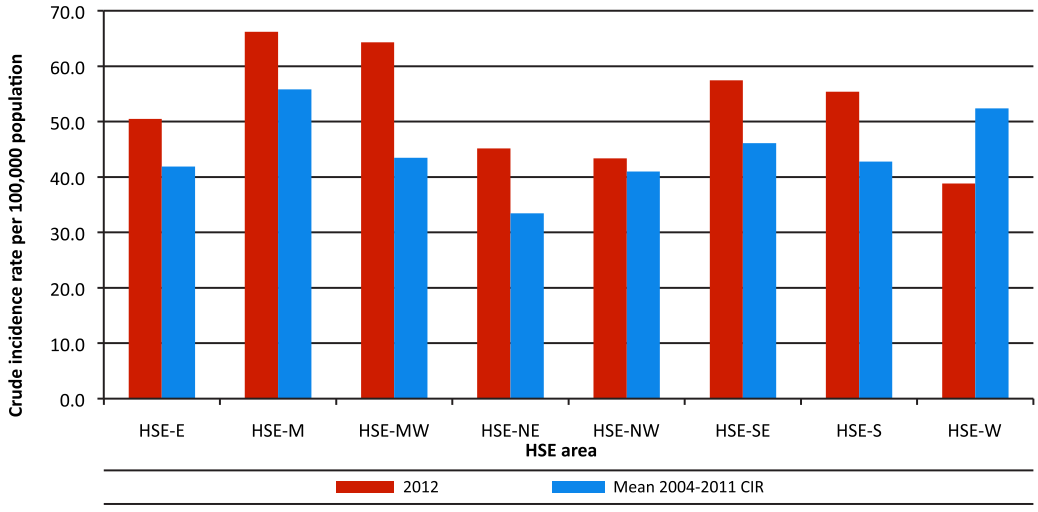

Figure 1: Campylobacteriosis 2012 CIR compared to 2004-2011 mean CIR by HSE area (CIDR)

contracting the disease in Ireland. Contact with sheep, 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 2012, levels of campylobacteriosis remained elevated with 2,388 notifications reported to HPSC. This corresponded to a crude incidence rate of 52.0/100,000 population, which is comparable with the 2011 European crude incidence rate of 50.3 per 100,000 population.[7]

Historically, variation in campylobacteriosis crude incidence rates (CIRs) has been reported between HSE areas. During 2012, the highest CIRs occurred in HSE-M (66.2/100,000 population) and HSE-MW (64.3/100,000 population). The lowest CIR was reported by HSE-W (38.8/100,000 population), which was the only region during 2012 where the CIR decreased in comparison to the mean rate for 2004 to 2011. However it is important to note that due to resource constraints, University College Galway Hospital ceased testing for *Campylobacter* for between late June 2012 and mid-January 2012 which has likely affected rates in the western part of the country. Figure 1 compares the campylobacteriosis CIRs in 2012 with the mean campylobacteriosis incidence rates for 2004 to 2011 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 2010 was reported in males in the 0-4 year age group (155.5/100,000 population).[7]

In Ireland between 2004 and 2011, the highest mean ASIR occurred in the 0-4 year age group (155.8/100,000 population) followed by the 25-34 year age group (40.6/100,000 population) and the 5-14 year age group (38.8/100,000 population). A comparison of the mean age-specific incidence rate between 2004-2011 and the number of notifications in 2012 showed an increase of >40% in the 15-24 year age group (42.7%) and those aged 65 years and older (41.6%). Figure 2 compares the campylobacteriosis age specific rates (ASIR) for 2012 with the mean campylobacteriosis ASIR for 2004 to 2011.

During 2012, 44.8% of all cases were male, 55.2% of cases were female and sex was not reported for 0.2% 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 20-24 year 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 2012, large increases were also seen outside this period. A comparison of the mean monthly number of notifications between 2004 and 2011 and the monthly number of notifications in 2012 showed an increase of >50% in February (93.9%) and August (65.8%). Figure 3 compares the monthly number of campylobacteriosis notifications for 2012 to the mean monthly number of campylobacteriosis notifications between 2004 and 2011.

Of the cases notified in Ireland during 2011, 99.9% 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 2012, 36.2% (n=864) of isolates were speciated. Of the 864 speciated isolates, 90.7% of isolates were *C. jejuni*, 8.9% were

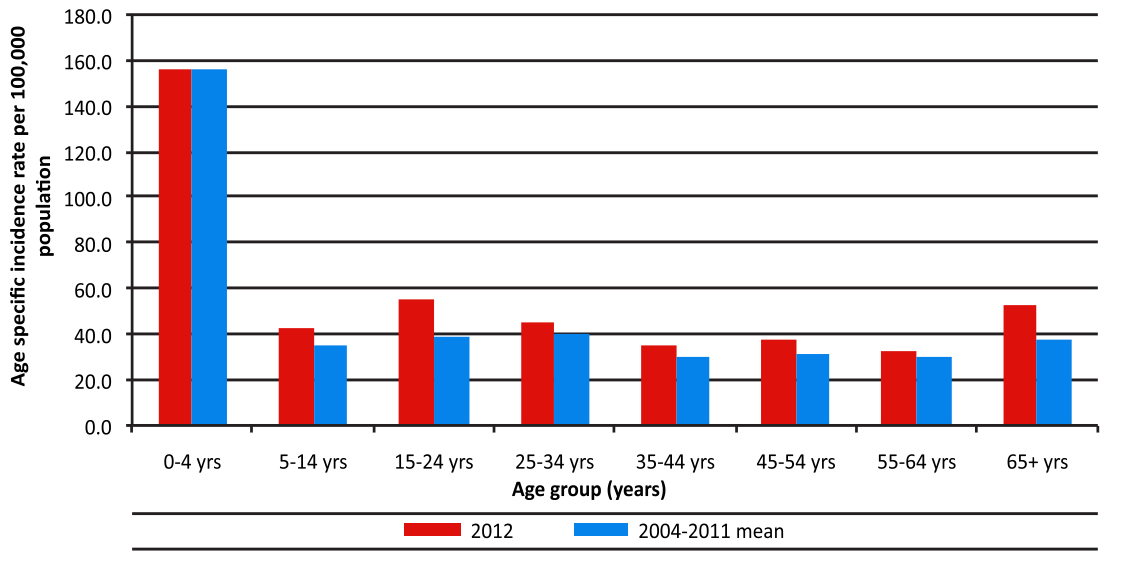

Figure 2: Campylobacteriosis ASIR 2012 compared to 2004-2011 mean ASIR (CIDR)

C. coli and 0.3% were *C. lari*. The remaining 63.8% (n=1,523) of *Campylobacter* isolates identified were not further speciated. This compares with 51.8% of *Campylobacter* isolates in Europe reported to ECDC during 2010 remaining unspeciated.[7]

During 2012, there were four outbreaks of campylobacteriosis reported to HPSC with 13 associated cases of illness, one of whom was hospitalised. This is slightly lower than the average number of outbreaks per annum between 2004 and 2011. All four outbreaks were family outbreaks occurring in private houses, as is typical of previous years. Two reported mode of transmission as food-borne while mode of transmission was unknown for the remaining two outbreaks. During 2011, 16 European countries reported 596 food-borne outbreaks of campylobacteriosis which accounted for 10.6% of the total food-borne outbreaks reported to EFSA. These outbreaks comprised 1,205 associated cases of illness and 191 hospitalisations.[4]

References:

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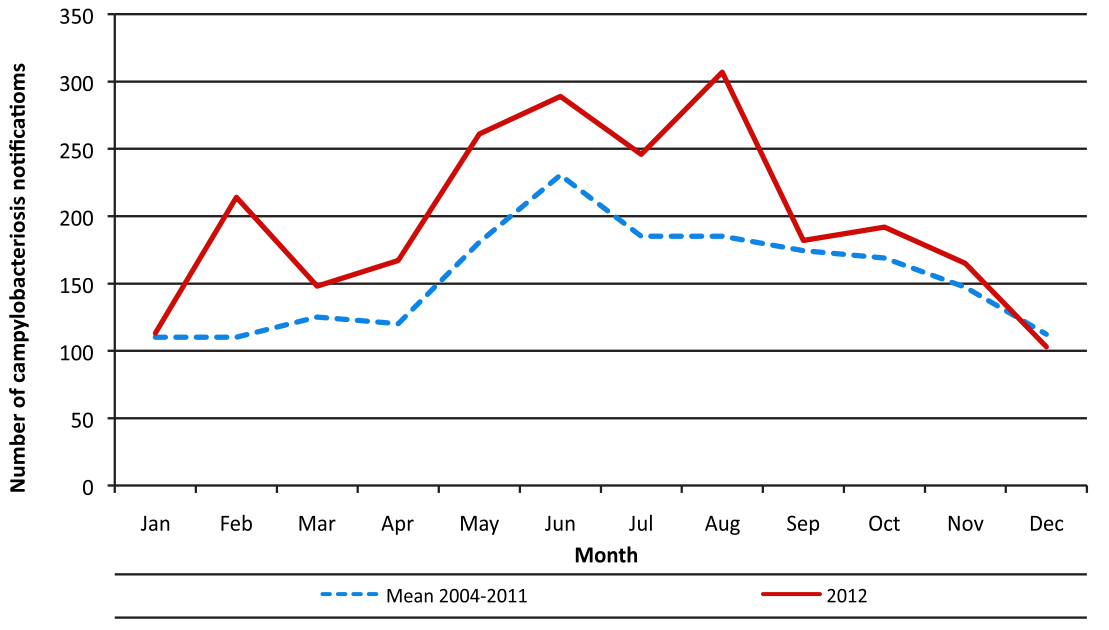

Figure 3: Campylobacteriosis notifications by month during 2012 compared to mean monthly notifications 2004-2011 (CIDR)

Table 1: Campylobacteriosis outbreaks summary, 2012 (CIDR)

Mode of transmission	Outbreak location	Number outbreaks	Number ill	Number hospitalised	Number dead
Food-borne	Private house	2	8	0	0
Unknown	Private house	2	5	1	0
Total		4	13	1	0

3.2 Cryptosporidiosis

Summary

Number of cases, 2012: 556
Number of cases, 2011: 428
Crude incidence rate, 2012: 12.12/100,000

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 2012, 556 cases of cryptosporidiosis were notified in Ireland, a crude incidence rate (CIR) of 12.12 per 100,000 population (95% CI 11.11-13.13), with 40% of notified cases reported as hospitalised for their illness. There were no reported deaths.

This was a 30% increase on the number of cases notified in 2011 (Figure 1), the third highest annual crude incidence rate since the disease became notifiable in 2004. In 2010 (the most recent year for which data are available), the ECDC reported an incidence rate overall of 2.29 per 100,000 population in the European Union, with Ireland reporting the second highest rate among those countries reporting on this disease at the time.[1] The highest incidence rate among EU Member States in 2010 was reported by the United Kingdom at 7.37 per 100,000.

Consistent with previous years, the highest reported incidence was in children under 5 years, with around 85 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 2012 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 (2.1 per 100,000) than all other HSE areas. The HSE- MW and HSE-W reported the highest crude incidence rates this year (22.41 and 22.0 per 100,000 respectively). Compared to 2011, all areas except HSE-W reported increased rates.

As in previous years, the highest number of cases was recorded in spring (Figure 4), although the number of cases from August onwards was slightly elevated compared to the same time period in previous years.

Risk factors

Reviewing case-based enhanced surveillance data, exposure to farm animals or their faeces either by virtue of residence on a farm or by visiting a farm during the

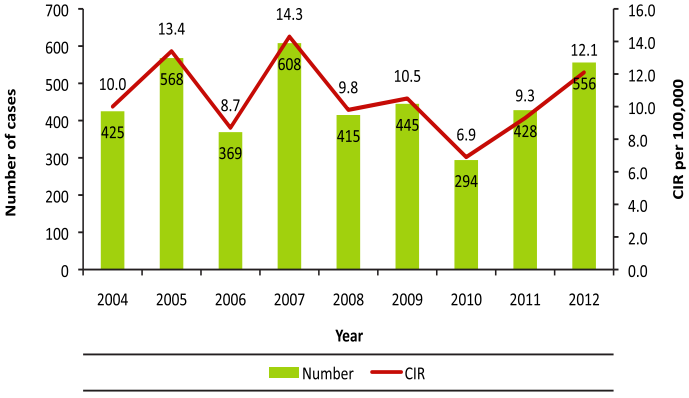

Figure 1: Annual number and crude incidence rate cryptosporidiosis, Ireland 2004-2012

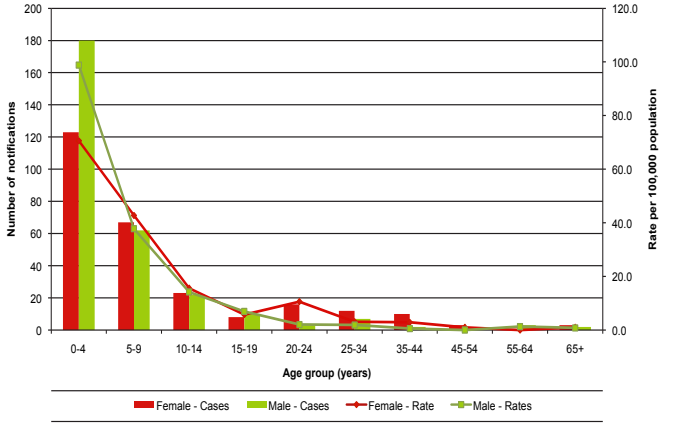

Figure 2: Age-specific incidence rate cryptosporidiosis, Ireland 2012

potential incubation period were common among cases; 32.4% and 32.0% reported these exposures respectively (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 (92.5%). Although, like the United Kingdom, a higher proportion of cases from late summer/early autumn were reported as being acquired abroad (Figure 5).

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.

Outbreaks

In 2012, there were three general and 21 family outbreaks in total (Figure 6). The increase in the number of outbreaks in 2011 and 2012 is most likely due to increased recognition of small family outbreaks following the introduction of enhanced surveillance for cryptosporidiosis cases late in 2010.

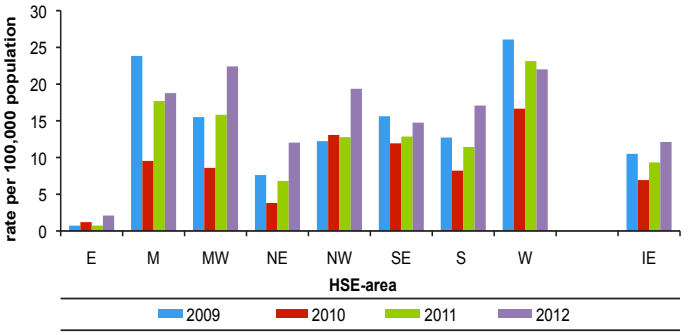

Figure 3: Regional crude incidence rates cryptosporidiosis, Ireland 2009-2012.

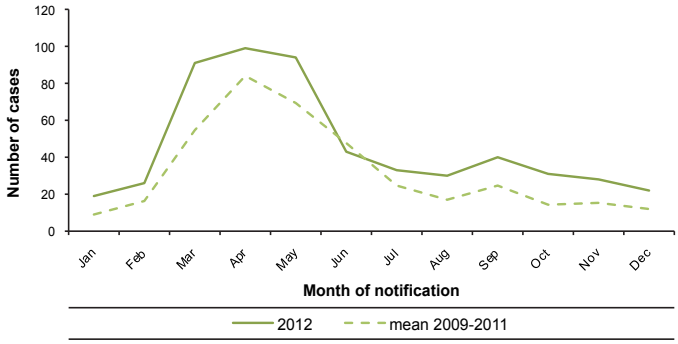

Figure 4. Seasonal distribution of cryptosporidiosis cases, Ireland 2012 compared to the mean for 2009-2011

Table 1: Number of cases (and percentage of cases where information available) where selected risk factors were reported for cryptosporidiosis cases, Ireland 2012

Risk factor	Yes (% of known)	No	Unknown	Not Specified	Total
Travel	36 (7.5%)	442	4	74	556
Lives/cared for on farm	143 (32.4%)	299	11	103	556
Visited farm	2132 (32.0%)	280	5	139	556
Lives/works on or visited farm[a]	*250 (58.8%)*	*175*	*11*	*120*	*556*
Swimming pool visit	112 (25.2%)	332	7	105	556
Pets	281 (64.4%)	155	6	114	556
Other water based activities	19 (5.1%)	356	8	173	556

[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 2012.

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)	18	3.8%	45,774	2.9%	
Group water scheme (public)	45	9.8%	144,428	9.0%	
Other	1	0.2%	2,080	0.1%	P<.001
Private well	114	24.4%	161,532	10.1%	
Public water supply	290	62.0%	1,247,185	77.9%	
Unknown	7				
Not specified	81		48,409		
Total	556	100%	1,649,408	100%	

Comparing the proportion of cases and households served by public water supplies versus all other supply types: X^2=78.3, P<.001

The most common mode of transmission reported in 2012 was person-to-person spread (eight outbreaks due solely to person-to-person transmission resulted in 16 illnesses), with animal contact being the second most common transmission route reported (contact with animals contributed to transmission in four outbreaks resulting in 17 cases) (Table 3 and Figure 7).

The twenty-one family outbreaks ranged in size from two to five persons ill, and the majority occurred in private households, with one reported as being associated with travel to Spain. Among the three general outbreaks reported, one was waterborne, one was due to animal contact and one was reported to be transmitted by person-to-person spread.

For the general waterborne outbreak, 12 confirmed cases were reported, three of whom were hospitalised. A public water supply was implicated on the basis of strong descriptive epidemiological evidence, and evidence of failure of the water treatment process; *Cryptosporidium* was found in the treated drinking water; however the strain identified was not the same species as identified in human cases. Remedial action was taken at the water treatment plant.

The second general outbreak occurred among third level students and was reported to be due to animal contact on a farm. Six students reported gastrointestinal symptoms, one of whom required hospitalisation, and four were confirmed as having cryptosporidiosis. The students spent several days on the farm studying livestock skills. While the farm included a variety of animal species, the most likely cause of the outbreak was contact with calves that were reported to have had diarrhoea.

In the third general outbreak, person-to-person spread in a hospital setting resulted in an outbreak with two persons ill.

Summary

The crude incidence of cryptosporidiosis in Ireland in 2012 was the highest since 2007, with a 90% increase in incidence over the last two years. However, the seasonal, age and regional distribution in incidence reported in 2012 was typical of previous years; consistently there has been a higher incidence in springtime, in young children and in non HSE-E areas.

Increases in incidence were also reported in the United Kingdom, Germany and the Netherlands in 2012, particularly in the latter part of the year; these were attributed to a range of possible factors including climatic drivers, such as the increased rainfall in the summer of 2012 in these countries, or a widely distributed commonly consumed product. [2]

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

Table 3: Number of outbreaks, number ill and number laboratory-confirmed cases by transmission route, Ireland 2012

Transmission mode	Number of outbreaks	Total number ill	Number lab confirmed
Animal contact	3	12	8
Person-to-person	8	16	13
P-P and Animal	1	5	2
P-P and Waterborne	2	4	2
Waterborne	1	12	12
Unknown	8	20	16
Not Specified	1	2	-
Total	**24**	**71**	**53**

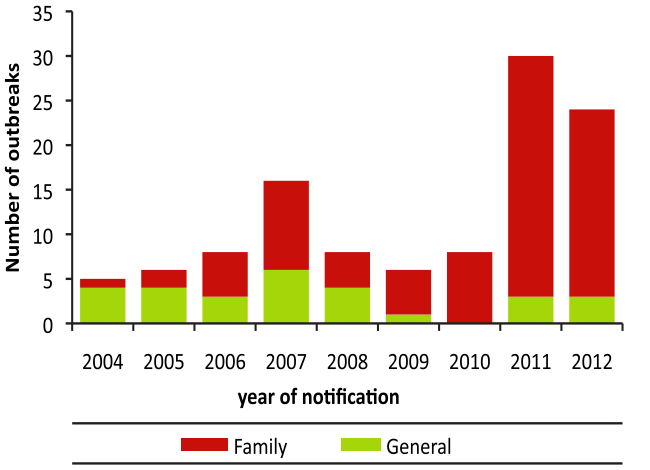

Figure 6: Number of cryptosporidiosis outbreaks notified by type, Ireland 2004-2012

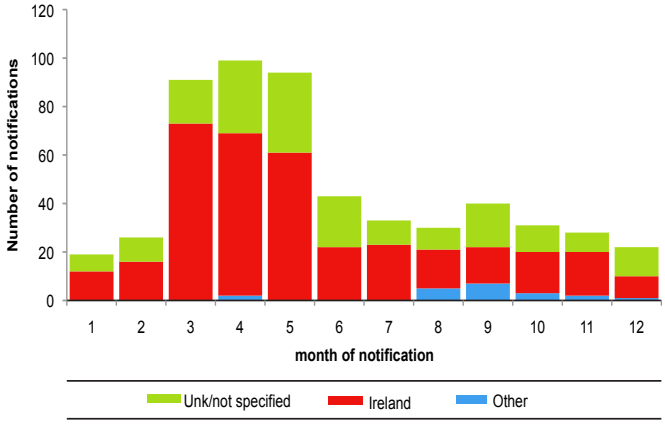

Figure 5. Seasonal distribution of cryptosporidiosis cases by Country of Infection, Ireland 2012

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 or swimming pools.

While there have been fewer general waterborne outbreaks reported between 2008 and 2012 relative to earlier years, exposure to water from non-public supplies may present a higher risk of cryptosporidiosis; from the enhanced dataset, 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. The EPA drinking water reports provide information on improvements in the public water supply sector in relation to *Cryptosporidium*.[3]

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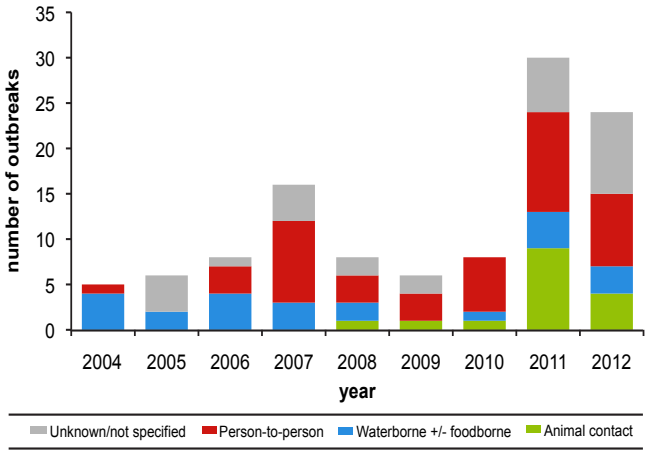

Figure 7: Number of cryptosporidiosis outbreaks notified by reported transmission route, Ireland 2004-2012

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, 2012: 554
Crude incidence rate, 2011: 12.07/100,000
Number of VTEC-associated HUS 2012: 32
Number of VTEC cases, 2011: 283

Introduction

The reported verotoxigenic *E. coli* (VTEC) incidence rate in Ireland is generally high relative to other European countries. In 2011 (the latest year for which data are published), the overall VTEC incidence rate in the European Union was 1.93 per 100,000.[1] For several years, Ireland has reported the highest VTEC incidence rate of any Member State in the EU, although Germany reported the highest rate in 2011 due to the 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, 8-10]

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 National VTEC Reference Service at the Public Health Laboratory HSE Dublin at Cherry Orchard Hospital (-PHL-Dub.) provided the 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.

Data from the CSO 2011 census were used to provide denominators for the calculation of national, regional and age-specific incidence rates in 2012.

Results

Incidence

In 2012, there were 554 notifications of VTEC, equating to a crude incidence rate (CIR) of 12.07 per 100,000 (95% CI 11.07-13.08). This compares to an overall rate of 6.2 per 100,000 in 2011, an increase of 96%. 408 notifications in 2012 were reported as confirmed cases (CIR 8.89 95% CI 8.03-9.76), 144 were probable and there were two cases reported in the new possible case class. The criteria under which notified cases were reported in 2012 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 previous years.

Of the 535 cases with laboratory evidence of infection, 229 cases were reported as being infected with *E. coli*

Table 1. Number of VTEC notifications by criteria for notification, Ireland 2012

Notification criteria	Confirmed	Probable	Possible	Total
Culture confirmation[a]	382	122		**504**
Laboratory confirmation by PCR[b]	24	5		**29**
Serodiagnosis (valid for HUS only)	2			**2**
Reported solely on the basis of epidemiological link		17		**17**
Clinical HUS not meeting laboratory or epidemiological criteria			2	**2**
Total	408	144	2	**554**

[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

O157 (5.0 per 100,000 (95% CI 4.3-5.6), 207 with *E. coli* O26 (4.5 per 100,000 (95% CI 3.9-5.1), 91 with other VTEC strains, and 8 cases had mixed VTEC infections, being infected with more than one VTEC strain. Of the 17 probable cases reported on the basis of an epidemiological link to a confirmed case, 8 were linked to *E. coli* O157 outbreaks, and 9 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 16% increase in O157 infections and a 315% increase in non-O157 infections compared to 2011.

Severity of illness

Four hundred and twenty eight of the 554 notified cases were symptomatic (77.3%), 151 (35.3%) of which developed bloody diarrhoea (42.5% when only cases with this variable completed are included). Thirty-two individuals (5.8%) developed HUS, an increase of 68% on 2011. No deaths were reported, however one HUS case developed long-term sequelae. Where reported (n=504), 159 (31.5%) of notified cases were hospitalised (37.1% of symptomatic cases).

Thirteen HUS cases were infected with *E. coli* O157, with a further HUS case epidemiologically linked to an *E. coli* O157 outbreak. Nine had laboratory evidence of VTEC O26 infection, with a further two HUS cases epidemiologically linked to *E. coli* O26 outbreaks. One had a mixed VTEC O26/O145 infection, two had VTEC O145 infections and two were infected with other VTEC strains. The remaining two HUS cases were reported as possible VTEC notifications (table 2).

Seasonal distribution

Figure 2 shows the seasonal distribution of notifications in 2012 relative to the mean monthly number of cases in the years 2009-2011. Despite the very large increase in the number of notifications, the typical summer seasonal peak was maintained - albeit possibly slightly earlier than usual - with the highest number of cases being in August.

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 June during 2012 (figure 3).

Regional distribution

The highest VTEC incidence rates were reported in the HSE-M followed by the HSE-MW and the HSE-S, where the rates were two to two and half times the national crude rate (Table 3). The HSE-E reported the lowest overall crude incidence rate (Table 3), followed by the HSE-SE and HSE-NE. The rate of VTEC associated HUS in the HSE-M was also higher than all other areas, and was six times the national rate. Over one third of all VTEC-associated HUS cases in 2012 were reported in HSE-M.

In 2012, the national annual incidence rate for non-O157 infections exceeded the rate for VTEC O157 infections

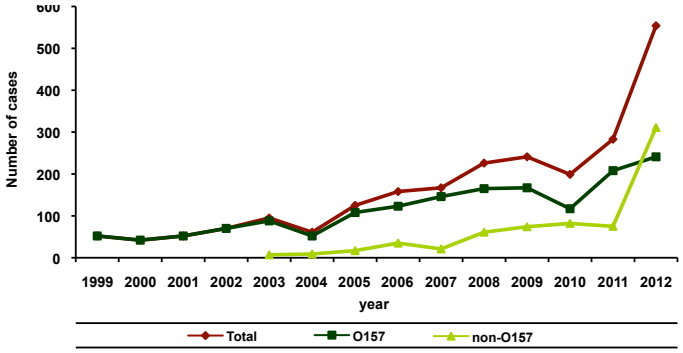

Figure 1. Annual number of VTEC cases by serogroup, Ireland 1999-2012

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

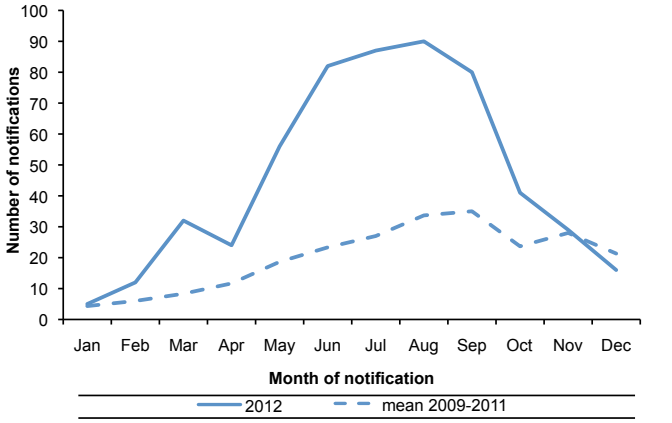

Figure 2. Seasonal distribution of VTEC notifications, Ireland 2012 compared to the mean number of notifications 2009-2011

Table 2. Number of VTEC notifications by infecting serogroup and HUS status, Ireland 2012

Serogroup	HUS	non-HUS	Total
O157 or epi-linked to O157 outbreak	14	223	**237**
O26 or epi-linked to O26 outbreak	11	205	**216**
Other	5	94	**99**
No organism	2	0	**2**
Total	**32**	**522**	**554**

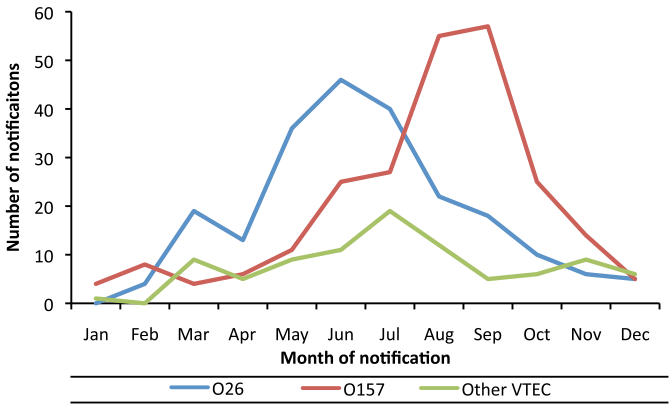

Figure 3: Seasonal distribution of VTEC notifications by serogroup, Ireland 2012

for the first time; when reviewed by HSE-area, the crude rate for non-O157 infections was higher than for VTEC O157 in five HSE-areas (Table 3; Figure 4). This geographic variation in serogroup distribution is likely to have been influenced by regional variation in diagnostic practices.

Laboratory typing

In 2012, the serogroup and verotoxin profiles of VTEC isolates referred to the PHL HSE Dublin Mid Leinster, Cherry Orchard Hospital are displayed in Table 4. The most common serogroup reported was VTEC O157, followed by VTEC O26. Among the other serogroups listed by the WHO as having the highest association with HUS internationally, there were six VTEC O103 cases, six VTEC O111 and 24 VTEC O145.

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 2012

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
East	40 [2.5 (1.7-3.2)]	15 [0.9 (0.5-1.4)]	**55 [3.4 (2.5-4.3)]**	4 [0.3 (0.0-0.5]
Midlands	34 [12.0 (8.0-16.1)]	48 [17.0 (12.2-21.8)]	**82 [29.0 (22.8-35.3)]**	12 [4.3 (1.85-6.7)]
Mid-West	18 [4.8 (2.6-6.9)]	69 [18.2 (13.9-22.5)]	**87 [22.9 (18.1-27.8)]**	3 [1.8 (-0.1-1.7)]
North-East	30 [6.8 (4.4-9.2)]	1 [0.2 (-0.2-0.7)]	**31 [7.0 (4.6-9.5)]**	2 [0.5 (-0.2-1.1)]
North-West	13 [5.0 (2.3-7.8)]	24 [9.3 (5.6-13.0)]	**38 [14.7 (10.0-19.4)]**	2 [0.8 (-0.3-1.9)]
South-East	18 [3.6 (2.0-5.3)]	5 [1.0 (0.1-1.9)]	**23 [4.6 (2.7-6.5)]**	2 [1.4 (-0.2-1.0)]
South	58 [8.7 (6.5-11.0)]	91 [13.7 (10.9-16.5)]	**150 [22.6 (19.0-26.2)]**	6 [0.9 (0.2-1.6)]
West	30 [6.7 (4.3-9.2)]	58 [13.0 (9.7-16.4)]	**88 [19.8 (15.6-23.9)]**	1 [0.2 (-0.2-0.7)]
Ireland	241 [5.3 (4.6-5.9)]	311 [6.8(6.0-7.5)]	**554 [12.1 (11.1-13.1)]**	32 {0.7 (0.5-0.9)]

[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.

Table 4. Serotype and verotoxin (VT) profiles for strains associated with laboratory confirmed VTEC cases, as determined at the PHL HSE Dublin Mid Leinster, Cherry Orchard Hospital in 2012

Serogroup	VT1	VT1+VT2	VT2	Not applicable	Total
O157		37	190	2 [a]	229
O26	83	104	20		207
Ungroupable	17	9	14		40
O145		1	23		24
O103	2	2	2		6
O111	5	1			6
O146	1	1	1		3
O182	3				3
O130			2		2
O55			2		2
O104	1				1
O121			1		1
O153			1		1
O166	1				1
O84	1				1
Mixed serogroup	4		4		8
Total	118	155	260	2	535

[a] No vt type for two VTEC O157 cases as diagnosed by serodiagnosis

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 40% of all VTEC O26 reported, with 50% of VTEC O26 containing the genes for both *vt1* and *vt2*, and those containing *vt2* making up the remaining 10% of VTEC O26.

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; 45.5% and 46.6% reported these exposures respectively. This is consistent with the low incidence of VTEC infection among residents in the largely urban HSE-E population and the higher incidence recorded in more rural parts of the country. 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 is likely 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.

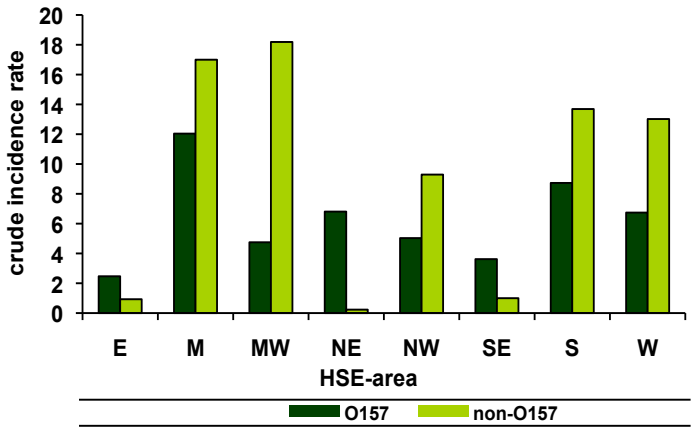

Figure 4: Crude incidence rate VTEC O157 and non-O157, Ireland 2012

Where the information was available, around a quarter of VTEC cases in 2012 were reported to attend a Childcare Facility (CCF). When these analyses were restricted to notified VTEC under five years of age, half reported attendance at a childcare facility. This is slightly higher than the proportion of children in the general population who use non-parental childcare (42%) as reported by the Central Statistics Office. [19]

Outbreak and environmental investigations

The outbreak surveillance system plays a key role in our understanding of VTEC transmission in Ireland. Ninety-seven VTEC outbreaks were notified in 2012, which included 334 of the 554 VTEC notifications. 47 outbreaks were due to VTEC O157, 39 to VTEC O26, two were mixed VTEC strain outbreaks, and nine were caused by other VTEC strains.

The majority of outbreaks (82%) were family outbreaks, with seventeen general outbreaks notified. The 80 family outbreaks resulted in 156 persons becoming ill, an average of 2.0 (range 1-6) persons ill per outbreak, while the seventeen general outbreaks resulted in 126 persons becoming ill, an average of 7.4 (range 1 to 30) persons ill per outbreak.

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 34 (35%) VTEC outbreaks in 2012 in which 111 persons were reported ill (Table 6 and Figure 5). Twenty seven of these outbreaks were reported as being solely due to person-to-person transmission, including seven of the outbreaks associated with CCFs.

The second most common transmission route reported was waterborne transmission, which was reported to have contributed to 21 outbreaks (22%) with 83 persons ill. Four were general outbreaks and 17 were family outbreaks; these 21 outbreaks were linked to 17 private wells, one water scheme serving a private housing development, two group water schemes and exposure to river water. Microbiological evidence was obtained in ten outbreaks, where an indistinguishable strain was identified in both the implicated water supply and among the outbreak cases. For two further outbreaks, VTEC other than that identified in the outbreak cases

Table 5. Number of cases of VTEC (and percentage where known) for selected risk factors, Ireland 2012

Risk factor	Number 'Yes' and % where reported	Number 'No' and % where reported	Number where risk factor was unknown or not reported
Food suspected	28 (8.8%)	287 (92.2%)	239
Exposure to farm animals or their faeces	195 (45.5%)	233 (54.5%)	126
Exposure to private well water[a]	207 (46.6%)	237 (53.4%)	110
Travel-associated[b]	13 (2.8%)	451 (97.2%)	90
Attendance at a CCF[c]	101 (25.8%)	291 (74.2%)	162
Attendance at a CCF[c] (among <5 yrs)	95 (50.5%)	93 (49.5%)	61

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

were found in the implicated supply. Evidence was circumstantial for water supplies suspected in 8 further drinking water associated outbreaks, and for one outbreak suspected to be associated with exposure to river water.

Three outbreaks (four person ill in total) were reported as being suspected to be foodborne; no definitive evidence was reported implicating any food vehicles, although one outbreak which was foreign travel related was suspected to be due to chicken. Animal/ environmental contact being reported as the suspected mode of transmission in an additional three family outbreaks; contact with a goat was reported as the suspected source of infection in one of these outbreaks. For 44% (n=43) of VTEC outbreaks in 2012, the transmission route was reported as unknown or not specified (Table 6 and Figure 5).

Focus on general outbreaks
Eight of the 17 general outbreaks were associated with childcare facilities/arrangements (CCFs), six were reported as community outbreaks, one foreign travel related general outbreak was linked to a hotel, one was reported in a private house and one reported among an extended family. This is the highest number of general VTEC outbreaks reported in a single year since surveillance for VTEC infection commenced in 1999.

Five of the outbreaks associated with CCFs were reported as being due to person-to-person spread. The mode of transmission for the remaining three CCF outbreaks was unknown. The number of cases per outbreak ranged from 1 to 30 (median 3). There was epidemiological and microbiological evidence linking two CCF outbreaks in the HSE-M. [14] Between the two outbreaks, there were 31 laboratory confirmed cases, and four cases developed HUS. Both outbreaks were reported to be due to person-to-spread with attack rates of 30-40%. [14]

Among the community VTEC outbreaks, three waterborne outbreaks was reported in the HSE-M, with 46 person ill (20 laboratory confirmed) between them. Six persons required admission to hospital and one person developed HUS. A community outbreak primarily centred in the HSE-MW but including cases from HSE-W and HSE-S, was investigated by the Dept. of public health HSE-MW. Fourteen persons developed illness and 17 persons had laboratory confirmed infection. Five cases required admission to hospital and two children developed HUS. The outbreak was caused by VTEC O26 VT2 and occurred over an 11 week period in early spring 2012. Foodborne transmission was suspected but no food item was identified; secondary person-to-person spread in private homes and in a childcare facility was also reported.

Four persons (age range 12-72) were reported ill over a nine day period in a community outbreak in the HSE-E; three required hospital admission and one adult developed HUS. Neither the source of infection nor the transmission route were identified. A sixth community outbreak was reported in HSE-W and there were two persons ill; the transmission route was also reported as unknown.

The remaining general outbreaks included (i) a travel-associated suspected foodborne outbreak (1 ill, 2 laboratory-confirmed) associated with a hotel; no specific food was reported as being responsible, (ii) an extended family outbreak in which six persons became ill and for which microbiological and epidemiological evidence suggested exposure to a private well as the source of infection, and (iii) a private house associated outbreak with two persons ill where no transmission route was reported..

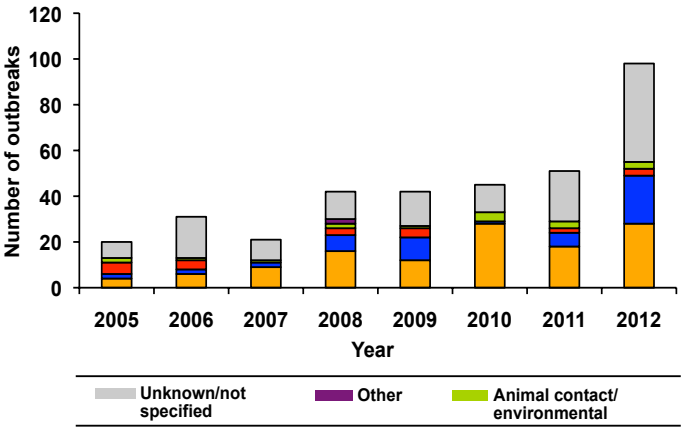

Figure 5. Number of VTEC outbreaks by suspected transmission route and year, Ireland 2004-2011
Note: In this figure, reported transmission routes were grouped for simplicity. Any outbreak where food contributed was reported as foodborne, any outbreak where water contributed was reported as waterborne, 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.

Summary
There was a notable increase in the number of VTEC notifications in 2012 relative to previous years, with the reported number of cases almost doubling compared to 2011. The great majority of this increase was accounted for by non-O157 VTEC infections, which increased by 315% relative to 2011. This development was accompanied by more widespread use of methods that detect both VTEC O157 and non-O157 VTEC, for example, PCR (followed by culture confirmation where possible) and chromogenic agars. In addition, 2012 was notable for its high rainfall, which may have contributed to the rise through a range of mechanisms, including contamination of drinking water.

Surveillance for VTEC in the United Kingdom largely centres on surveillance for VTEC O157. The incidence rate of 5.0 per 100,000 for VTEC O157 in Ireland was around 11% higher than that for Scotland (4.5 per 100,000) and around double that reported in England and Wales in 2012.[11] In contrast, the VTEC O157 incidence rate in Northern Ireland was around twice that in Ireland in 2012, in part due to occurrence of a large outbreak in Belfast in late 2012.[12]

Within the European context, the latest available data shows that the overall incidence rate for VTEC in Europe in 2011 was 1.93 (range 0.0-6.8).[1] Germany, Ireland, the Netherlands and Sweden reported the highest incidence rates at that time. It seems likely when the data are available across Europe for 2012, that Ireland will have one of the highest reported incidence rates in Europe again.

The HSE-M reported both the highest overall incidence of VTEC and the highest incidence of VTEC-associated HUS in 2012. Two large crèche outbreaks and two large outbreaks linked to private drinking water supplies contributed to this overall high incidence; [13, 14] the HSE-M however, consistently reports one of the highest VTEC incidence rates each year.

Transmission by person-to-person spread between young children in childcare facilities was a feature in other HSE-areas too, with 8 general and 2 family outbreaks reported in 2012 associated either with crèches or families and their childcare arrangements. This is the same number of outbreaks associated with childcare as in 2011, but is higher than in previous years. Active follow-up of facilities when VTEC cases are reported who attend a crèche/childminders remains a key public health intervention for VTEC given the greater potential for transmission in these situations because of the less developed hygiene skills in general of small children and because of the higher vulnerability of this group to the more severe manifestations of VTEC infection such as HUS. Guidance for crèche owners and management in the prevention of infectious disease spread in CCFs [15] and guidance for Public Health professionals on the management of VTEC cases and outbreaks in CCFs [16] have been published in 2012 and 2013 respectively.

This year, water was reported to have contributed to transmission in 21 outbreaks (38% of outbreaks with a reported transmission route); this is the highest annual number and percentage of VTEC outbreaks to be reported as waterborne since outbreaks became notifiable in 2004. 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 previously been recognized as a strong risk factor for VTEC infection in Ireland.[6,7] This has been particularly pronounced following periods of heavy rainfall. Ireland experienced record rainfall amounts in many parts of the country in 2012, and this is likely to have contributed to the large number of waterborne VTEC outbreaks reported.

Private water supplies in Ireland include small water schemes managed by trustees or other private individuals, and private wells/springs serving one-off houses or business premises which are the responsibility of the home/business owner. These sources of water present a risk to public health when they have not been designed and managed appropriately, and those responsible should be mindful of the requirements for their maintenance and protection. In 2013, the HSE published a leaflet for well owners outlining the infectious disease risks associated with drinking water from private wells, providing advice on actions that can be taken including: checking the supply, water testing and treatment, and what to do in the event their well water is found to be contaminated .[18] Further advice on private wells is available from both HSE Environmental Health Service and local authorities, and at www.hpsc.ie/hpsc/A-Z/Gastroenteric/VTEC/VTECandwater/

Foodborne outbreaks were reported infrequently in the Irish VTEC dataset, but may be underestimated as evidence that an outbreak is foodborne can be difficult to establish. Within households, family members can have similar food histories making it difficult to conclude if a particular food item within the household was responsible for the outbreak. Moreover, it is rare for there to be food leftover for analyses in the household by the time an investigation commences. For general outbreaks that are suspected to be foodborne, unless a single food premises or meal is reported by the majority of cases, finding the source of foodborne outbreaks can be challenging, especially if the food is a widely distributed common food item or if it is an ingredient which has been incorporated into lots of different dishes reported by cases. The suspected food bourne general outbreak in the MW was not found to be associated with any particular food premises or retail outlet, an no specific food item was identified as a potential vehicle. The proportion of VTEC outbreaks where no suspected transmission route is reported remains very high.

Table 6. VTEC outbreaks by suspected mode of transmission, Ireland 2012

Suspected mode of transmission	Number of outbreaks	Number ill	Number of associated events
Person-to-person	27	103	138
Waterborne	15	75	51
Person-to-person and waterborne	4	4	14
Waterborne and animal contact	2	4	6
Animal contact	1	3	3
Person-to-person and animal contact	1	1	2
Foodborne	1	1	2
Person-to-person and foodborne	2	3	5
Environmental/Fomite	1	2	2
Unknown	38	77	97
Not Specified	5	10	14
Total	97	283	334

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3.4 Hepatitis A

Summary

Number of cases, 2012: 30
Crude notification rate, 2012: 0.7/100,000 population
Number of cases, 2011: 19

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 2012, with 30 cases notified. This corresponds to a crude notification rate of 0.7/100,000 population and is higher than in 2011 when 19 cases were notified (figure 1). Case classification was reported for all cases. Twenty eight were laboratory confirmed and two were classified as probable.

Fifty seven percent of cases were female (n=17) and 43% were male (n=13). Most age groups were affected but the highest notification rates were in children (figure 2).

Eleven cases were linked to travel outside of Ireland and a further three cases had a history of recent travel outside of

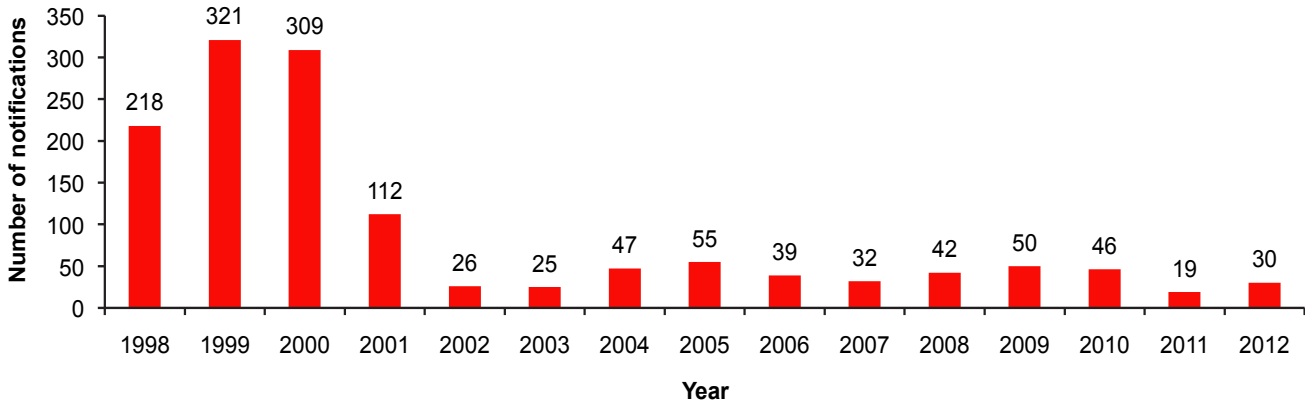

Figure 1. Number of hepatitis A notifications, 1998-2012

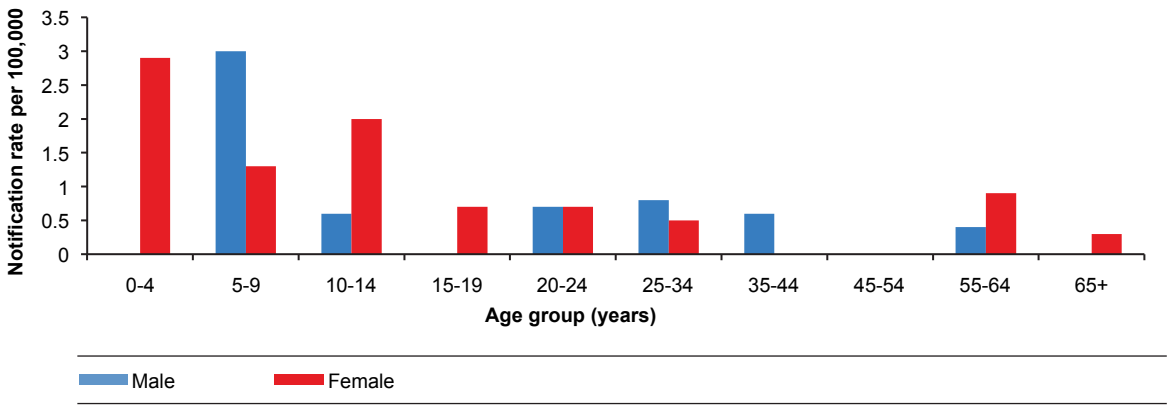

Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis A, 2012

Ireland but could also have been infected in Ireland. Seven further cases were reported as infected in Ireland. Country of infection was not known for the remaining nine cases.

Four hepatitis A outbreaks were reported in 2012. One outbreak in the HSE-East involved two children and was associated with travel to Sudan. No source of infection was identified in a further outbreak affecting two children in the HSE-East, but this outbreak was not associated with travel. There were two outbreaks in the HSE-South, each involving two people. One involved adult household contacts, and the other involved young siblings. No source of infection was identified for either, but the cases were not associated with travel.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 29th August 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

3.5 Rotavirus

Summary

Number of cases: 2,652
Crude incidence rate: 57.8/100,000 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 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).

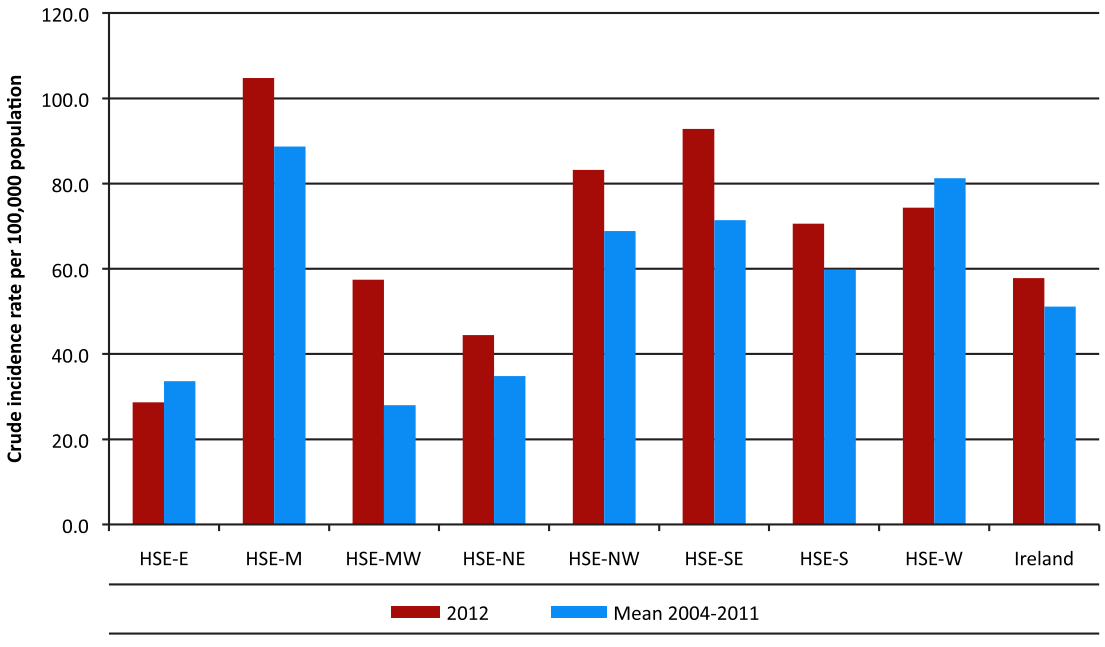

Figure 1: Rotavirus 2012 CIR compared to 2004-2011 mean CIR by HSE area (CIDR).

Rotavirus case definition:
A case of rotavirus infection is defined as a patient with acute onset of vomiting followed by watery diarrhea 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 2012, there were 2,652 cases of rotavirus notified in Ireland, corresponding to a national crude incidence rate (CIR) of 57.8 per 100,000 population and representing an increase of 8.2% compared to 2011.

Significant geographical variation was observed in regional rotavirus CIR. The highest regional CIRs were observed in HSE-M (104.8/100,000 population), HSE-SE (92.8/100,000 population) and HSE-NW (83.2/100,000 population). The lowest regional CIR was observed in HSE-E at 28.7 per 100,000 and HSE-NE at 44.5 per 100,000 population. Figure 1 illustrates the rotavirus CIR by HSE area for 2012 compared to the mean CIR during 2004-2011.

Rotavirus infection has a well documented seasonal pattern in Ireland with the number of cases typically peaking during March to May. During 2012, rotavirus notifications peaked during April (n=559) and May (n=788). Figure 2 illustrates the seasonal variation in rotavirus cases by month of notification for 2012

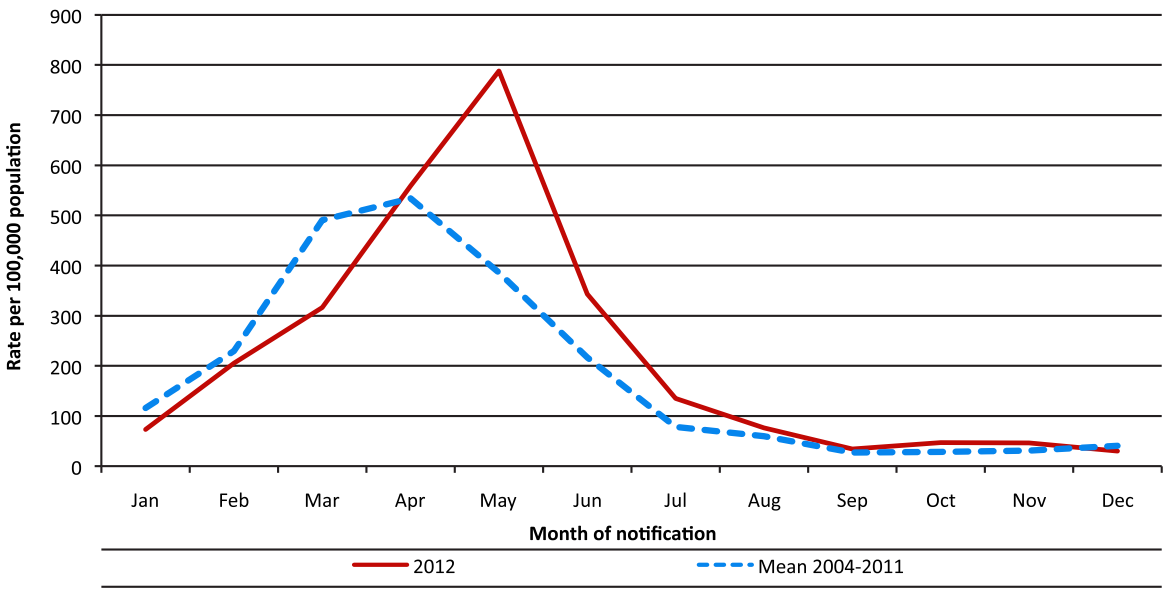

Figure 2: Rotavirus notifications by month during 2012 compared to mean monthly notifications, 2004-2011 (CIDR).

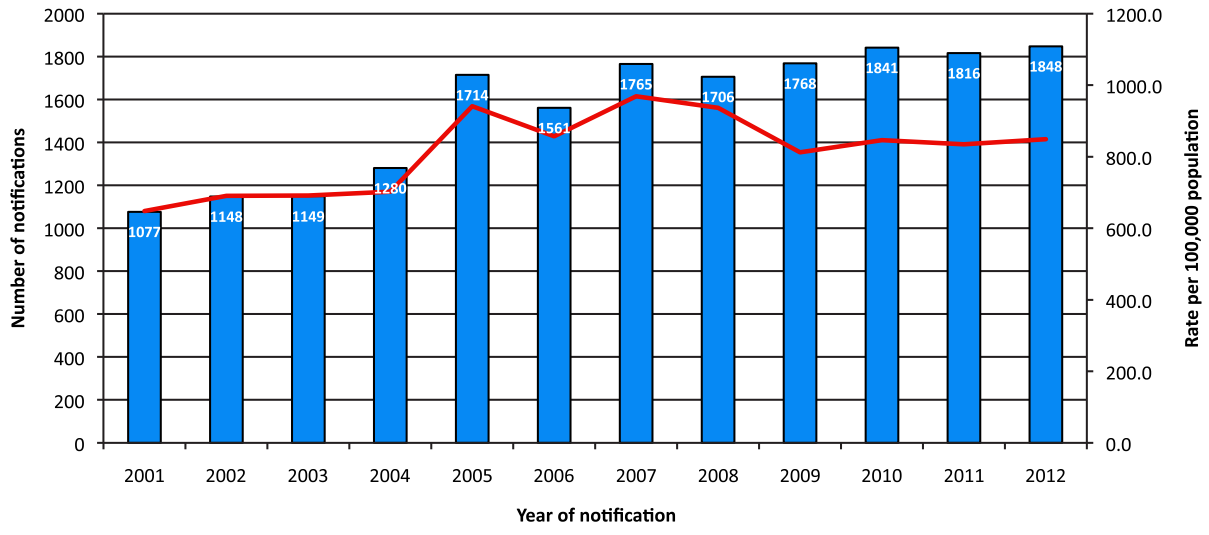

Figure 3: Number of cases of rotavirus in children less than two years of age by year, 2001 to 2012

compared to the mean monthly number of notifications reported during 2004 to 2011. 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 2012, 69.7% (n=1,848) of cases were aged two years or under. Data from 2004 to 2012 show that the peak incidence of clinical disease occurred in the 6-18 month age group, with 49.1% 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 2012.

During 2012, 1,227 cases (46.3%) were female and 1,419 (53.5%) were male. Sex was not reported for 6 (0.2%) cases. This represented a ratio of females: males of 0.9:1.2, which was similar to the ratio observed in previous years.

There were nine outbreaks of rotavirus notified during 2012 with 18 cases of associated illness, 15 of whom were hospitalised. All nine outbreaks were family outbreaks occurring in private homes. Mode of transmission was reported as person to person spread for eight outbreaks while the remaining outbreak reported transmission as unknown. Table 1 summarises the number of rotavirus outbreaks by location and month during 2012.

Table 1: Summary of rotavirus outbreaks by location and month, 2012

Month	Location	Number of outbreaks	Number ill	Number hospitalised	Number dead
Feb	Private house	1	2	2	0
Mar	Private house	1	2	2	0
Apr	Private house	2	4	4	0
May	Private house	1	2	2	0
Jun	Private house	2	4	3	0
Aug	Unknown	1	2	2	0
Nov	Private house	1	2	0	0
Total		**9**	**18**	**15**	**0**

3.6 Salmonella

Summary

Number of confirmed cases: 309
Number of probable cases: 5
Crude incidence rate: 6.8/100,000

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.

Notification data (CIDR)

There were 314 cases of salmonellosis in reported in 2012, 309 of which were laboratory confirmed. The national crude incidence rate (CIR) for salmonellosis in 2012 was 6.8 per 100,000 population which was a remained stable in comparison to 2011 (6.8/100,000) as shown in figure 1. Figure 2 illustrates the regional variation in CIR during 2012. The highest CIR occurred in HSE-M (10.3/100,000), representing an increase of 2.1 per 100,000 population compared to 2011. The lowest CIR occurred in HSE-S (4.7/100,000), which remains stable compared to 4.1 per 100,000 population during 2011. The largest decrease in regional CIR during 2012 was observed in HSE-MW, with a decrease of -5.5 per 100,000 population.

The female:male ratio for 2012 was 0.90:1.11. In terms of age distribution, 28.3% of cases occurred in children under five. This is likely to be, at least in part, a reflection of clinicians more readily seeking clinical samples in that age group. This is also reflected in the age specific incidence rate (ASIR) with the 0-4 age group having the highest ASIR nationally (23.5/100,000 in females and 26.4/100,000 in males) in both sexes (figure 3).

The seasonality of salmonellosis notifications in Ireland during 2012 is shown in figure 4, with the highest

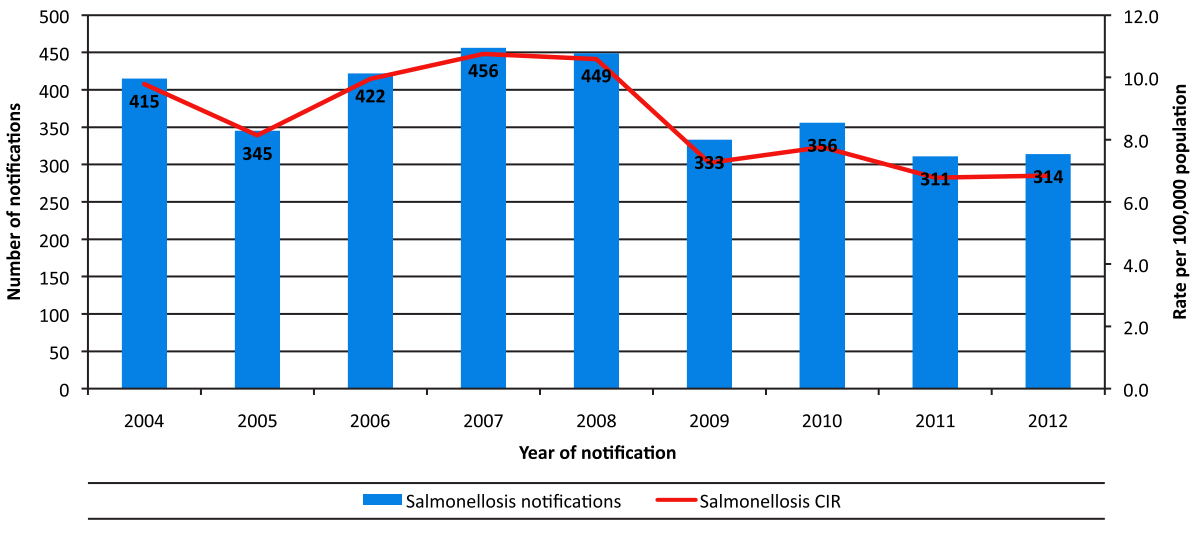

Figure 1: Salmonellosis notifications and crude incidence rate per 100,000 population by year of notification (CIDR)

number of notifications occurring between June and September. During 2012, the peaks observed during June and July were largely due to a high proportion of travel associated salmonellosis, which are anticipated seasonal increases that correlate with peak holiday periods and resultant increase of people travelling abroad. However, a peak in indigenous notifications was also observed during August and September due to an outbreak of monophasic *S.* Typhimurium U323.

Of the 314 cases notified on CIDR during 2012, travel history was provided for 269 cases (85.7%). Of the 269 cases where travel history was reported, 142 (52.8%) of salmonellosis cases were indigenous to Ireland and 127 cases (47.2%) reported a recent history of travel. Where travel history was documented, the three countries with highest occurrence of recent travel and subsequent development of salmonellosis were; Spain (n=21), Thailand (n=15) and Philippines (n=7). The popularity of a country as a travel destination is likely to be an important factor in determining the number of cases associated with each country. When serotyping data were analysed by travel history, 31.5% of all travel associated cases were *S.* Enteritidis (compared with 17.8% of all cases) whereas 54.2% of cases indigenous to Ireland are *S.* Typhimurium* (compared with 37.9% of all cases). Thus relatively speaking *S.* Enteritidis is over represented in travel associated salmonellosis, where as *S.* Typhimurium is under represented in travel associated cases (table 1).

NSSLRL data:

The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) based in Galway has been providing reference services nationally since 2000. In 2012, the NSSLRL analysed 319 human *Salmonella* isolates referred for further typing, identifying 55 serotypes. Table 2 presents the most dominant

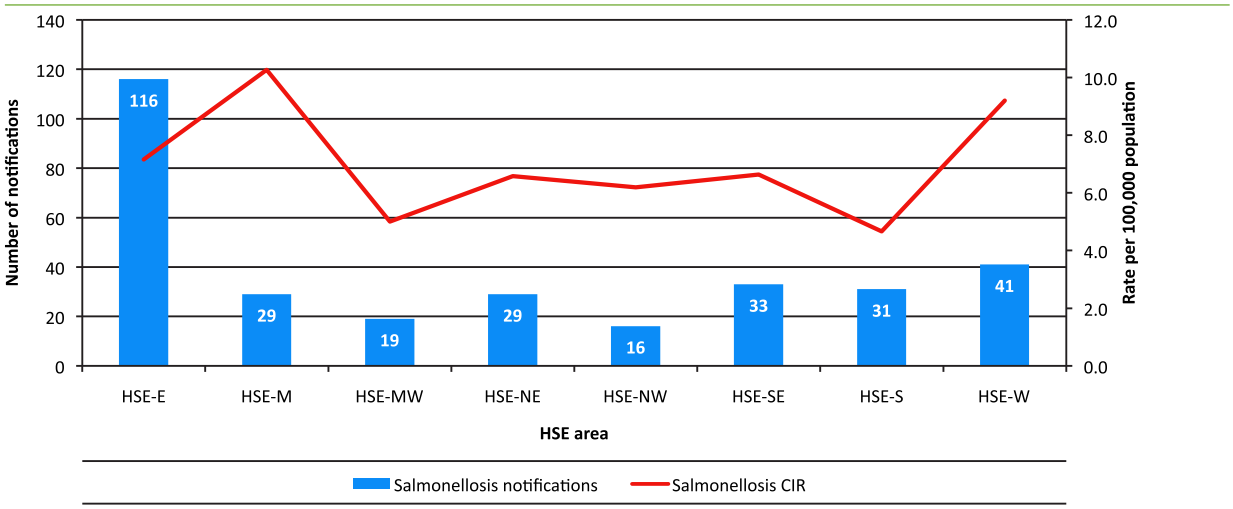

Figure 2: Salmonellosis notifications and crude incidence rate per 100,000 population by HSE area, 2012 (CIDR)

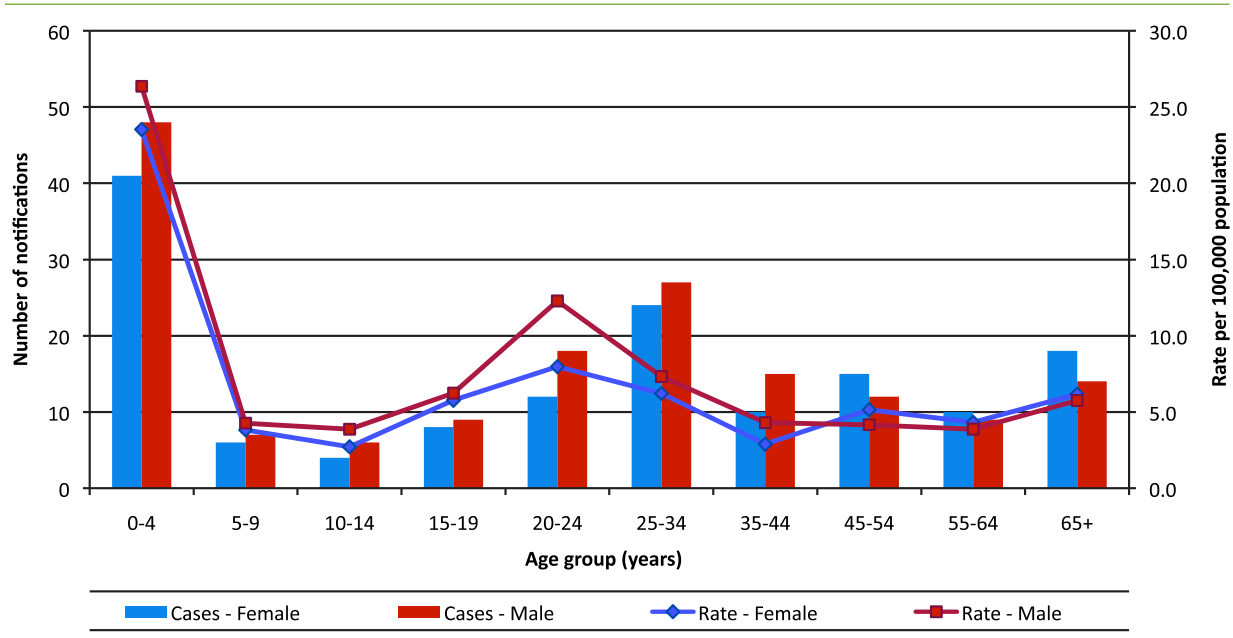

Figure 3: Salmonellosis notifications and age specific incidence rate per 100,000 population by age group (years) and sex, 2012 (CIDR)

*Includes monophasic *S.* Typhimurium.

serotypes detected during 2012. *S.* Typhimurium† (n=122) was the most common serotype, followed by *S.* Enteritidis (n=56).

The NSSLRL conducted phage typing analysis on all 122 *S.* Typhimurium and all 56 *S.* Enteritidis isolates. Phage types U323 (23.8%), DT193 (13.9%), untypable (11.5%) and DT104 (11.5%) were the commonest phage types observed among *S.* Typhimurium isolates while phage types PT8 (26.8%), PT1 (17.9%), PT21 (14.3%) and PT4 (10.7%) were the dominant types observed among *S.* Enteritidis isolates.

Of the 319 human isolates analysed by the NSSLRL, 168 (52.7%) were fully susceptible to all antimicrobials tested. The remaining 151 isolates exhibited some degree of antimicrobial resistance. The three commonest resistance patterns** seen were resistance to ampicillin, streptomycin, sulphadiazine and tetracycline (ASSuT, n=47, 14.7% of total and 31.1% of resistant isolates), resistance to ampicillin, chloramphenicol, streptomycin, sulphadiazine and tetracycline (ACSSuT, n=22, 6.9% of total and 14.6% of resistant isolates), followed by resistance to nalidixic acid (Na, n=18, 5.6% of total and 11.9% of resistant isolates). All human isolates with a resistance profile of ACSSuT or ASSuT were *S.* Typhimurium (including 44 monophasic isolates) while 61.1% of human isolates with a resistance profile of Na were *S.* Enteritidis.

One *S.* Typhimurium isolate was resistant to 10 antibiotics tested, one *S.* Concord isolate was resistant to eight antibiotics tested and three *S.* Typhimurium isolates and one S. Java isolate were resistant to seven antibiotics tested. A further 11 isolates were resistant to six antibiotics tested (including four *S.* Typhimurium isolates, two *S.* Kentucky isolates and one isolate each of *S.* Agona, *S.* Anatum, *S.* Give, *S.* Newport and *S.* Rissen). Please refer to the NSSLRL's Annual Report 2012 for more detailed analysis of results[1]. The pattern of antimicrobial resistance observed is broadly similar to previous years. To date carbapenemase production in salmonella has not been detected in Ireland.

Outbreaks:
There were six outbreaks of salmonellosis during 2012 which is a decrease compared to the number of salmonellosis outbreaks reported in 2011 (n=13). These outbreaks resulted in 39 cases of illness and an associated hospitalisation rate of 23.1% (n=9 cases). Table 3 outlines the number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode during 2012.

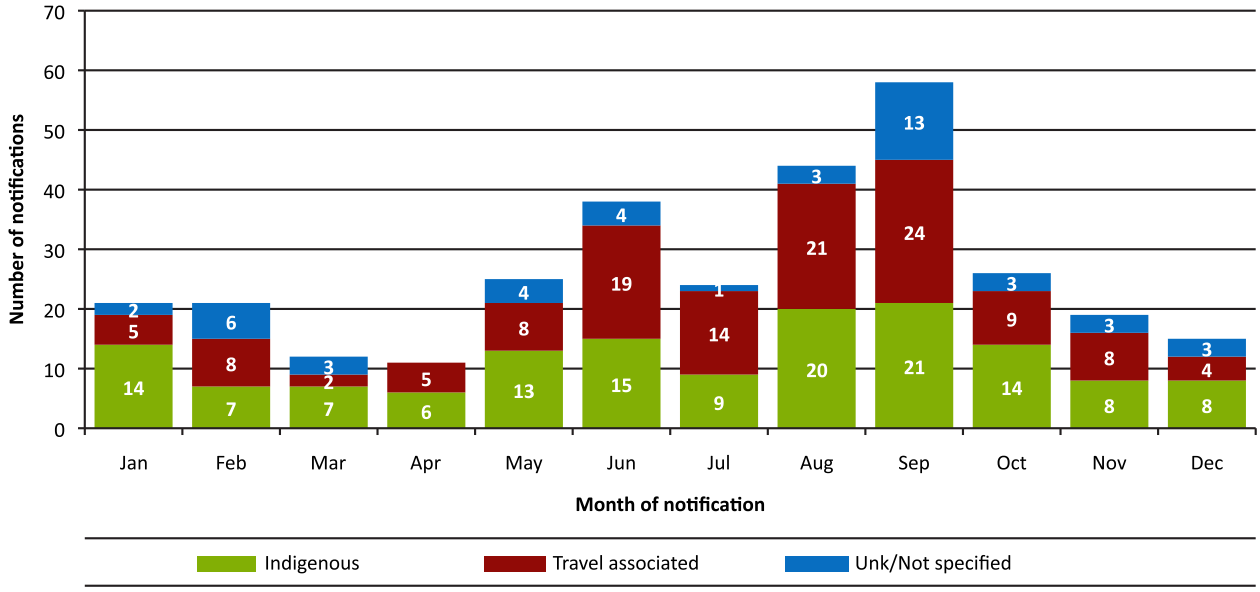

Figure 4: Salmonellosis notifications by month of notification and travel history, 2012 (CIDR)

Table 1: Percentage of Salmonellosis notifications by serotype and travel history, 2012 (CIDR)

Salmonella serotype	Travel associated	Indigenous	Travel history unknown	Total
***S.* Enteritidis (%)**	31.5	7.0	13.3	17.8
***S.* Typhimurium* (%)**	20.5	54.2	35.6	37.9
Other serotypes (%)	43.3	32.4	40.0	37.9
Serotype not specified (%)	4.7	6.3	11.1	6.4
All serotypes (%)	40.4	45.2	14.3	100.0
All serotypes (n)	127	142	45	314

†This includes 56 *S.* Typhimurium isolates with serotype 4,5,12:1
**Where A= Ampicillin, C= Chloramphenicol, Na = Nalidixic acid, S= Streptomycin, Su= Sulphonamide and T= Tetracycline

There were four family outbreaks during 2012, two of which were in private houses and two were travel associated. Of the two travel associated family outbreaks, one reported exposure in China and the other reported exposure in Spain. Two family outbreaks were reported as food-borne transmission, one was reported as animal contact while transmission was unknown for the remaining family outbreak.

There were two general outbreaks during 2012, one was an international outbreak in a community setting and one was a national outbreak in a community setting.

In January 2012, a cluster of four cases of *S.* Newport indistinguishable by molecular typing Pulsed Field Gel Electrophoresis (PFGE) were identified by the NSSLRL. Concurrently this PFGE profile was reported in *S.* Newport case clusters in England & Wales (30 cases), Scotland (5 cases), and Germany (15 cases) during December 2011 and January 2012. Epidemiological investigations at the time indicated a potential link with watermelon consumption. Among the four Irish cases, three (75%) reported watermelon consumption during their incubation periods.

In September 2012, a national cluster of monophasic *S.* Typhimurium U323 was detected by the NSSLRL. A total of 26 cases spread over six HSE areas were investigated. Isolates were predominantly 3-12-11-NA-211 (or a single locus variant) MLVA pattern and were resistant to Ampicillin, Streptomycin, Sulphonamides and Tetracycline (ASSuT). Cases matching this profile were also detected in the UK and Germany. Mode of transmission for this outbreak was not identified but was almost certainly food-borne due to the diffuse geographical nature.

Typhoid/Paratyphoid:
In 2012 there were eight cases of *S.* Typhi reported and five cases of *S.* Paratyphi.

Of the eight *S.* Typhi, seven reported a recent history of travel outside Ireland. Two travelled to Bangladesh, two to Pakistan, two to India and one to the Philippines. One case reported country of infection as Ireland, following secondary transmission from a recently returned traveller to an endemic area. In the *S.* Paratyphi cases three had a recent travel history to Indonesia, one to India and one to South America.

Table 2: Number and percentage of human Salmonella isolates by serotype, NSSLRL 2012

Salmonella serotype	Number of isolates	*% Isolates*
Typhimurium‡	122	*38.2*
Enteritidis	56	*17.6*
Stanley	11	*3.4*
Typhi	9	*2.8*
Newport	8	*2.5*
Infantis	7	*2.2*
Bredeney	6	*1.9*
Dublin	6	*1.9*
Unnamed§	6	*1.9*
Braenderup	6	*1.9*
Saintpaul	5	*1.6*
Other	77	*24.1*
Total	**319**	***100.0***

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Table 3: Number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode, 2012 (CIDR)

Location	Food-borne[3]		Animal contact		Unknown		Total	
	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill
Community outbreak	1	3	0	0	1	27	**2**	30
Private house	0	0	1	2	1	2	**2**	4
Travel related	2	5	0	0	0	0	**2**	5
Total	**3**	**8**	**1**	**2**	**2**	**29**	**6**	**39**

‡ This includes 56 (16.3%) S. Typhimurium isolates with serotype 4,5,12:1
§ Unamed is not a serotype. The term refers to a very diverse group of isolates where the complete antigenic formula cannot be determined and which therefore can not be formally designated as belonging to any specific serovar
†† Includes 1 outbreak reported as Person to Person and Foodborne

3.7 Less common gastroenteric infections

Listeriosis

Eleven cases of human listeriosis were notified in 2012, higher that the seven cases reported in 2011. This equates to a crude incidence rate of 0.24 (95% CI 0.10-0.28) per 100,000, below the EU average of 0.32 per 100,000 in 2011.

Among these, there were one pregnancy-related and two neonatal cases. This is one less than the number of pregnancy-associated cases reported in 2011 (Figure 1). Both infants developed bloodstream infections. The pregnancy-related case resulted in miscarriage.

The number of adult/juvenile cases was higher than last year, but similar to the numbers reported in the previous five years. Seven of the eight adult/juvenile cases were more than 65 years of age, with the eighth being in the 55-64 years age group. Half were male. Four developed bloodstream infection, two developed meningitis, while the clinical presentation was described as 'other' for the remaining two adult cases. The outcome was reported as recovered/recovering for three cases, while the outcome was unknown or not specified for the remaining five adult cases.

Since 2007, the National *Salmonella, Shigella* and *Listeria* Reference Laboratory in Galway has offered a national service for typing of *Listeria* strains. In 2012, isolates from nine of the eleven notified cases were referred. The serotypes for these nine cases are listed in table 1 below.

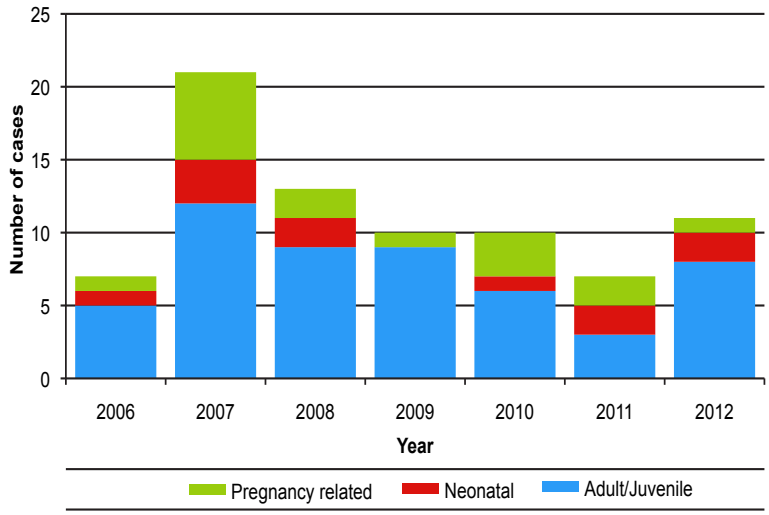

Figure 1: Number listeriosis notifications by case type, Ireland 2006-2012

Table 1. Listeriosis notifications by case type and serotype, Ireland 2012 -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	2	0	4	2	**8**
Pregnancy-related	0	0	1	0	**1**
Neonatal	0	2	0	0	**2**
Total	**2**	**2**	**5**	**2**	**11**

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

Giardiasis

In 2012, there were 54 cases of giardiasis notified; slightly lower than the 57 cases notified in 2011. This equates to a crude incidence rate of 1.18 (95% CI 0.86-1.49) per 100,000.

Cases ranged in age from 1-83 years (median age=33 years) with only 13 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]. Lower numbers of females (n=23) were affected than males (n=31), which differs from the three previous years when females were more numerous than males. Hospitalization rates were low with nine cases admitted out of 50 (18%) for which this information was available.

The number of cases for which travel status was reported has improved markedly over the last five years from 11% of cases in 2006 to 66% of cases this year (Figure 2). Twenty-seven cases (50% of all cases; 75% of those with known travel status) were reported as being associated with foreign travel: the countries of infection reported were India (n=11), Ethiopia (n=3), Nepal (n=3), South Africa (n=2), and there was one case each reported associated with travel to Afghanistan, Cuba, Kenya, Mexico, Spain, Pakistan, Poland, and Sudan. Nine cases were reported as being acquired in Ireland, and for the remaining 18 cases, country of infection was unknown or not specified.

No outbreaks of giardiasis were notified in 2012 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.

[1] http://www.cdc.gov/parasites/giardia/epi.html

Yersiniosis

In 2012, there were two cases of yersiniosis. Both were female, and included one adult and one paediatric case. One was reported as being infected with *Y. enterocolitica* and one with *Y. spp*. 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. In 2012, there were no cases or outbreaks of *Clostridium perfringens* (type A) food-borne disease, staphylococcal food poisoning, botulism or *Bacillus cereus* food-borne infection/intoxication notified.

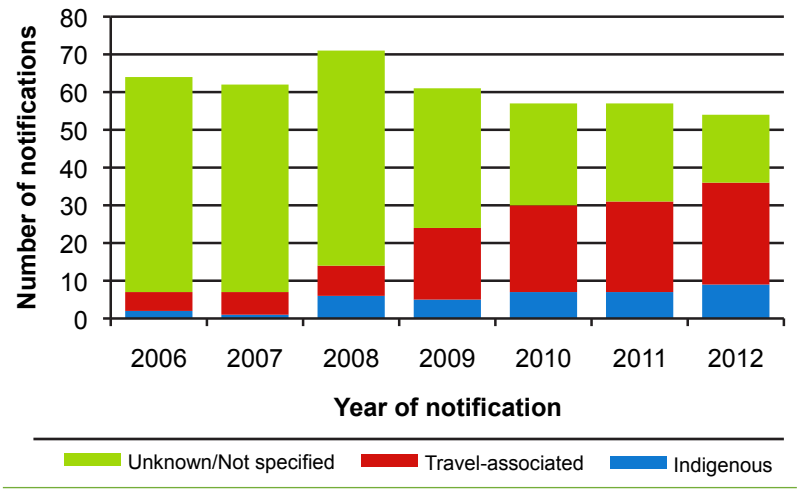

Figure 2: Number Giardiasis Notifications by Travel Status, Ireland 2006-2012
Note: Travel status is inferred from Country of Infection variable on CIDR

3.8 Shigellosis

Summary

Number of cases 2012: 29
Crude incidence rate 2012: 0.63/100,000
Number of cases 2011: 42

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]

Twenty-nine cases of shigellosis were notified in Ireland in 2012 (CIR 0.63 per 100,000, 95% CI 0.40-0.86), all of which were laboratory confirmed. This compares to 42 cases in 2011 and 60 cases in 2010 (Figure 1). Of 25 cases where hospitalisation status was recorded, five (20%) were reported as hospital in-patients.
Cases ranged in age from two to 70 years (median age=33 years). Like 2009 to 2011, more males (n=18) than females (n=11) were notified (Figure 2).

Information on travel history is very valuable when reviewing surveillance data for possible indigenous clusters, and data on country of infection in the national dataset continues to improve, being available for 86% of shigellosis notifications this year. Sixteen cases were reported associated with foreign travel (Table 1).

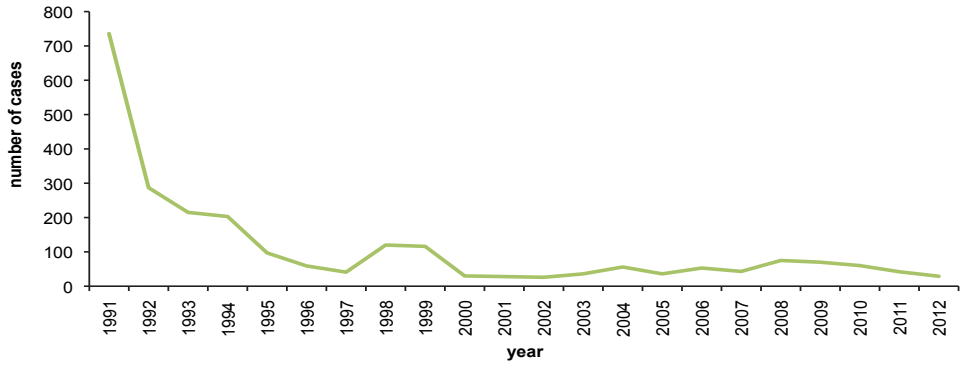

Figure 1: Annual number of notifications shigellosis, Ireland 1991-2012

Table 1: Number of notifications shigellosis by species and country of infection, Ireland 2012

Organism	Carribean	Africa	Asia	Other Europe	Ireland	Not specified	Total
Shigella dysenteriae	0	0	2	0	0	0	2
Shigella flexneri	0	2	1	0	3	1	7
Shigella sonnei	1	2	6	2	6	3	20
Total	1	4	9	2	9	4	29

(Data source: CIDR)

The countries of infection reported were India (n=7), Morocco (n=2), Spain (n=2) with one case associated each with travel to Pakistan, Tanzania, Nigeria, Dominican Republic and Nepal. Nine infections were reported as being acquired in Ireland, while no country of infection information was available for four cases.

Shigella sonnei was the most common species reported (n=20), followed by *S. flexneri* (n=7), with two *S. dysenteriae* reported. The species distribution of cases by country of infection is reported in Table 1.

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 University College Hospital, Galway can provide laboratory services for speciation, serotyping, antimicrobial resistance profiling, and where appropriate, Pulsed Field Gel Electrophoresis (PFGE) of *Shigella* isolates.

In 2012, 20 human *Shigella* isolates were referred to the NSRL, 69% of the isolates from all notified cases. The species/serotype of these cases are reported in Table 2.

There was one shigellosis outbreak notified in 2012, a family outbreak with three persons ill, caused by Shigella flexneri. The mode of transmission was reported as person-to-person.

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.

Table 2: Species/serotypes of Shigella isolates referred to NSSLRL in 2012 (Data courtesy of Martin Cormican, Niall de Lappe and Jean O Connor at NSSLRL)

Serotype	Number by serotype
Shigella dysenteriae	*2*
Shigella flexneri 2a	*1*
Shigella flexneri 3a	*1*
Shigella flexneri 4a	*1*
Shigella flexneri 6	*3*
Shigella sonnei	*12*
Total	**20**

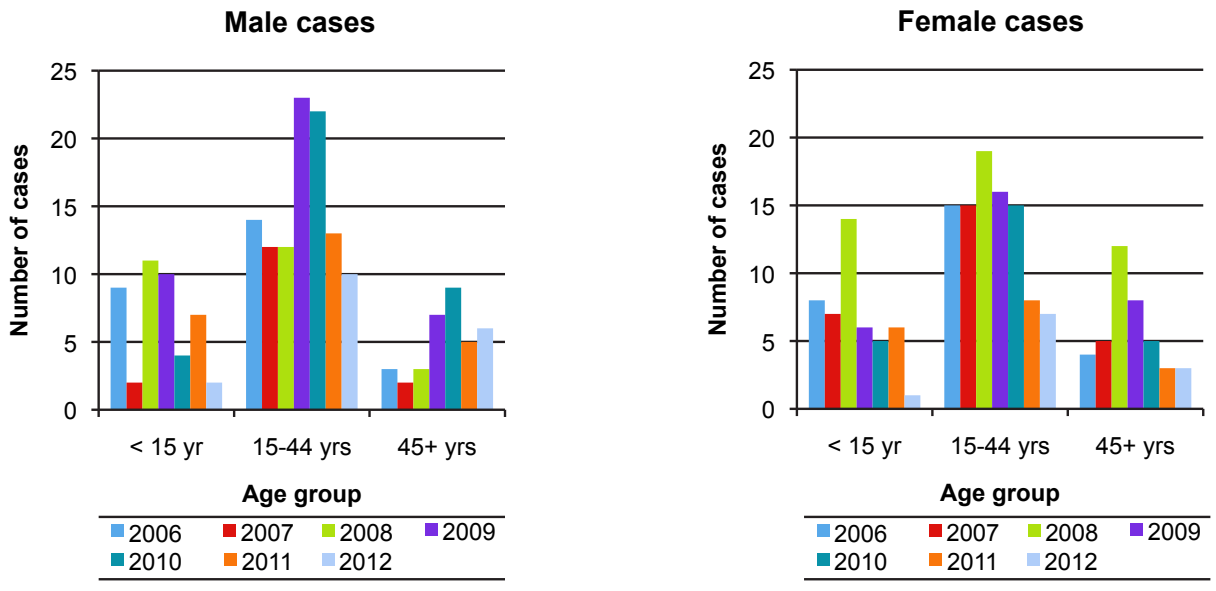

Figure 2: Age-sex distribution shigellosis notifications, Ireland 2012 relative to 2006-2011

References

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04

Vectorborne and Zoonotic Diseases

4.1 Malaria

Summary

Number of cases malaria, 2012: 65
Crude incidence rate malaria 2012: 1.42/100,000
Number of cases malaria, 2011: 61

In 2012, the number of malaria cases in Ireland increased slightly to 65 from 61 cases in 2011 (6% increase), but stayed low relative to the annual number of malaria cases in the three years prior to that (Figure 1). The incidence rate now stands at 1.42 per 100,000 population. Among European Member (EU) 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. Despite the decreased incidence in 2011 and 2012, it is likely that Ireland will continue to have one of the highest reported incidence rates in the EU for 2011-2012. [1]

In common with the rest of the EU, males predominated (male: female ratio 1.5:1), with the highest numbers of cases among males aged between 35 and 54. The number of paediatric cases reported this year is the same as last year (n=8), but represents a 70% decrease on 2006 (n=26), the year in which notifications of paediatric malaria cases peaked in Ireland (Figure 1). Seven of the paediatric cases reported 'visiting family in country of origin' as their reason for travel; there was no information on reason for travel for the remaining paediatric case. All seven visited sub-Saharan Africa, staying for between 3 and 7 weeks duration. At least four were children born in Ireland to immigrant

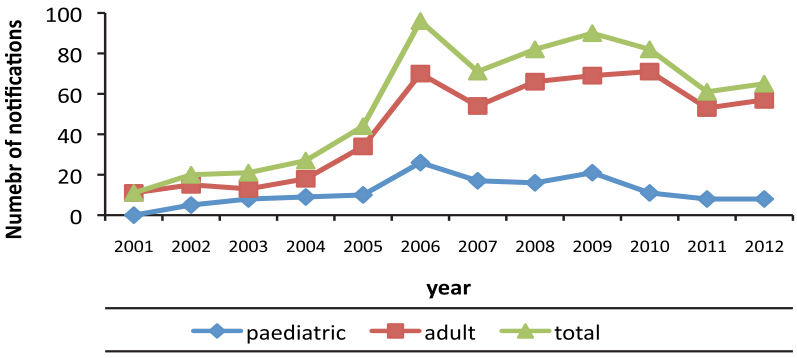

Figure 1. Annual number of malaria notifications by age, Ireland 2001-2012

Table 1. Number of malaria notifications by reason for travel and country of birth, Ireland 2012

Reason for travel	Country of Birth					
	Nigeria	Ireland	Other Africa	Asia	Unk/NS	Total
Visit family country origin	21	4	4	0	2	31
Business/Professional Travel	1	3	2	0	0	6
Irish citizen living abroad	0	6	0	0	0	6
New entrant to Ireland	1	0	0	1	0	2
Other	2	1	0	0	1	4
Not reported	3	1	1	0	11	16
Total	28	15	7	1	14	65

Unk/NS =Unknown/Not specified

parents, and only two were reported to have taken any prophylaxis for their travel.

The group 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. Sixty-three per cent of cases with a known reason for travel in 2012 cited 'visiting family in country of origin', with at least 80% of these being of African origin (Table 1).

The second most commonly cited reasons for travel this year were 'Business/professional travel' (n=6) and 'Irish Citizens Living Abroad' (n=6), each making up 12% of cases with known reason for travel in 2012. There were no cases reported associated with holiday travel - the first time since enhanced malaria records began in 2001.

Figure 2 shows the distribution of cases by reason for travel 2006-2012. 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 as has the number of notifications in Irish citizens living abroad.

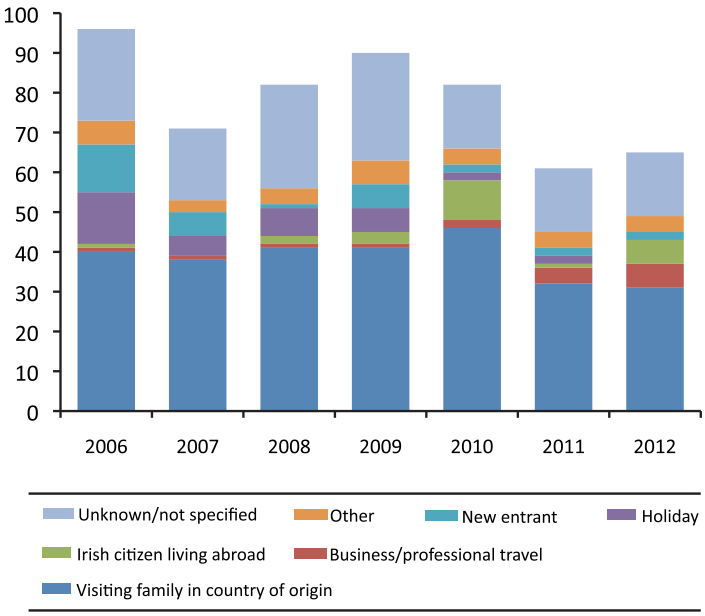

Figure 2: Annual number of notifications malaria by reason for travel, Ireland 2006-2012

Nigeria remained the country most frequently visited -51% of all cases [58% of those with country of infection reported (Table 2)]. The majority of the remaining cases were exposed in other countries within Africa, with only one case each reporting exposure in Asia and South America.

The majority of cases who reported travel to Nigeria were 'visiting family in country of origin' (24/29 with known reason), whereas visitors to other parts of Africa reported a variety of reasons for travel.

Plasmodium falciparum accounted for 80% of infections in 2012, reflecting the dominance of exposure in Africa as the source of the majority of notifications. *P. ovale* was the second most common species (n=5). *The one P vivax* case reported in 2012 is considerably lower than the 10 cases reported in 2011 but not atypical relative to previous years.

There has been a welcome decline in malaria notifications in Ireland over the last two years. 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 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.

HPSC resources for health professional include a poster which can be downloaded from the HPSC website for

Table 2. Number of cases malaria by infecting species and country of infection, in Ireland 2012

Organism	Country of Infection				Total
	Nigeria	Other Africa[a]	Other	Unknown/Not specified	
P.falciparum	29	16	1	11	57
P.ovale	2	3	0	0	5
P.vivax	0	0	1	0	1
P. malariae	0	1	0	0	1
Not Specified	0	0	0	1	1
Total	31	20	2	12	65

[a]*Includes cases associated with Ghana (n=5), Cameroon (n=3), Siera Leone (n=3), Uganda(n=2), Sudan (n=2), and one each with Tunisia, Mozambique, Zambia, DR Congo and Africa Unspecified.*

display in GP surgeries, maternity hospitals, paediatric hospitals and A&E 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.

Finally, one pertinent recent development at European level is the re-emergence of indigenous malaria due to *P. vivax* in Greece, particularly in 2011 and 2012.[2,3] 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.[4] Moreover, health professionals who see cases of febrile illness returning from the affected parts of Greece should be alert to the possibility of malaria (NaTHNaC).[5]

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4.2 Leptospirosis

Summary

Number of cases, 2012: 15
Crude incidence rate, 2012: 0.33/100,000
Number of cases, 2011: 16

Fifteen cases of leptospirosis were notified in Ireland in 2012, similar to the 16 cases notified in 2011 (Figure 1). This equates to a crude incidence rate of 0.33 per 100,000 (95% CI 0.16-0.49). The latest year for which data is available across the European Union is 2010. Among the 26 countries that reported leptospirosis incidence in 2010, Ireland reported the joint fourth highest incidence rate after Romania, Slovakia and Slovenia. The incidence in the EU as a whole was 0.13 per 100,000.

The leptospirosis notification dataset is typically dominated by adult males, and this year was no exception (Table 1). Eleven cases (73.3%) were male and the age range was 20-62 (mean age =44 years, median age=48 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 14 cases for which hospital admission status was reported, 13 (93%) required hospitalization. One person died but their death was due to another medical condition.

Eight cases (53%) were believed to have acquired their illness occupationally –four were either farmers or reported contact with farm environments, one worked in an abattoir, two reported exposure to outdoor environments during the course of their work and the eighth case reported seeing rats in their work environment. Four (27%) cases were reported as being associated with recreational activities: one with travel to a tropical destination, one with kayaking, and two with freshwater swimming in rivers. One case (7%) was exposed to a rat in their garden, while for two cases (13%), it was not possible to obtain information on risk factors.

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

Table 1: Leptopirosis notifications by age and sex, Ireland 2012

Age group	Male	Female	Total
<5 yr	0	0	**0**
5-14 yrs	0	0	**0**
15-24 yrs	1	2	**3**
25-44 yrs	3	1	**4**
45-64 yrs	7	1	**8**
65+ yrs	0	0	**0**
Total	**11**	**4**	**15**

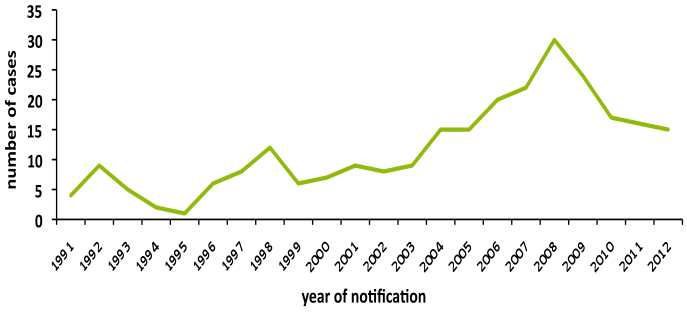

Figure 1: Annual number of leptospirosis notifications, Ireland 1991-2012
(data source: CIDR)

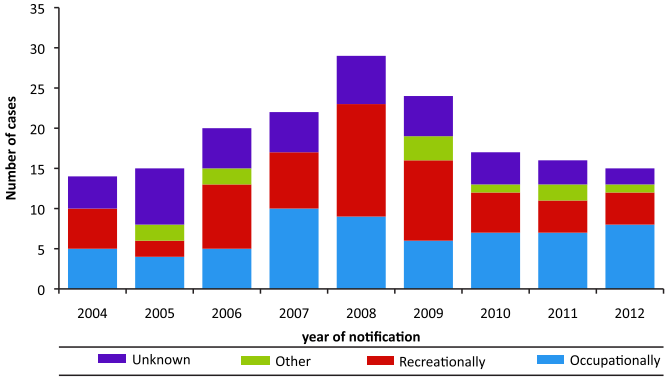

Figure 2: Annual number of leptospirosis notifications by exposure group, Ireland 2004-2012
(data source: CIDR)

and for typing where possible. In 2012, species information was available on CIDR for only three cases (20%)–two *Leptospira icterohaemorrhagiae*, and one *L. saxkoebing*. 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.

HPSC and NVRL recently published a review of leptospirosis in Ireland in the journal Epidemiology and Infection, which is available at http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8963217&fulltextType=RA&fileId=S0950268813001775

4.3 Other Non-IID Zoonotic Diseases

Toxoplasmosis

During 2012, 36 cases of toxoplasmosis were notified compared to 32 in 2011 and 36 cases in 2010.

One congenital case was reported. The remaining 31 cases ranged in age from 15 to 61 years (median, 31 years). As in previous years, female cases were more common (64%). The high number of cases reported among women of child-bearing age is probably a reflection of enhanced testing during pregnancy (Table 1).

Q Fever

One probable and five confirmed cases of Q fever were notified during 2012, three of which were admitted to hospital (50%).

There were five male cases and one female case (Table 2), and they ranged in age from 35 to 70 years (median age, 60 years). Cases were reported from five different HSE-areas: two in HSE-S and one each in HSE-E, HSE-M, HSE-SE, and HSE-MW.

Although no details are collected on potential sources of infections for notified cases in Ireland, the disease is commonly acquired through occupational exposure to infected sheep and other small ruminants, e.g. by farmers, veterinarians, and abattoir workers.

Brucellosis

During 2012, there were two cases of brucellosis notified, one paediatric and one adult. This compares with between one and three cases per annum over the previous four years. Both cases were reported as *Brucella species*, and one case was associated with travel to Asia.

Despite the reporting of a paediatric 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 2012, there were no notifications of echinococcosis. 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

No cases of trichinosis were notified in Ireland in 2012.

Table 1: Toxoplasmosis notifications by age and sex, Ireland 2012

Age group	Male	Female	Total
<1 yr	0	1	**1**
1-4 yrs	0	0	**0**
5-14 yrs	0	0	**0**
15-24 yrs	4	0	**4**
25-44 yrs	7	20	**27**
45-64 yrs	2	2	**4**
65+ yrs	0	0	**0**
Total	**13**	**23**	**36**

Table 2: Q fever notifications by age and sex, Ireland 2012

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

4.4 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 first year of formal surveillance. The case definitions for these diseases are outlined on the HPSC website at 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*).

Lyme neuroborreliosis is the notifiable disease entity, and in 2012, eight cases of lyme neuroborreliosis were notified in Ireland, four male and four female. Two were for cases less than 15 years of age, while the remaining six notifications were for adult cases. Six patients were admitted to hospital, one was reported as a day-patient, with the hospitalization status of the eighth case not specified.

Cases were distributed along the western seaboard, with three reported from HSE-MW, two each from HSE-S and HSE-NW, and one from HSE-W. None were reported as being acquired abroad.

Dengue Fever

Seven confirmed cases of dengue fever were notified during 2012, two of which were reported as being admitted to hospital. Cases ranged in age from 23-63 years of age (median 32 years), and four were female.

Dengue is found commonly throughout the tropics and subtropics and is endemic in about 100 countries. Three of the notified cases in 2012 were associated with travel in India, two in Thailand, while the country of infection was not specified for the remaining two cases. These destinations probably reflect the frequency of travel by Irish residents to dengue endemic countries.

Chikungunya fever and West Nile fever

No cases of chikungunya or west nile fever were notified in Ireland in 2012.

05

Blood-borne and Sexually Transmitted Infections

5.1 Hepatitis B

Summary

Number of cases, 2012: 580
Crude notification rate, 2012: 12.6/100,000 population
Number of cases, 2011: 525

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 increased by 11% in 2012, with 580 cases (12.6/100,000 population) notified compared to 525 in 2011 (figure 1). However, the hepatitis B notification rate has been decreasing in Ireland in recent years and the 2012 figure was lower than the numbers reported annually between 2004 and 2010. Sixty two percent (n=361) of the 2012 cases were from the HSE-East, corresponding to a notification rate of 22/100,000 population. All cases were laboratory confirmed and 96% contained information on acute/chronic status. Where status was known, 7% of cases were acute (n=37) and 93% were chronic (n=522). Both acute and chronic cases of hepatitis B are notifiable in Ireland.

Acute cases (recent infections)

Of the 37 acute cases notified in 2012, 81% (n=30) were male and 19% (n=7) were female. The highest notification rates were in young to middle aged adults, and 95% (n=35)

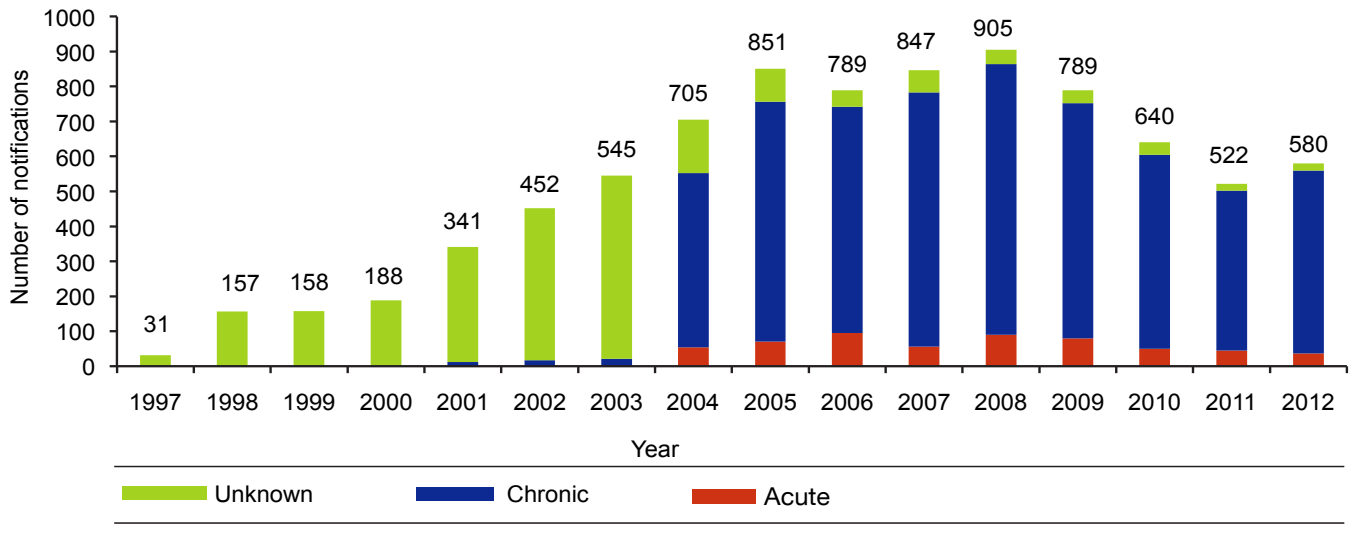

Figure 1. Number of hepatitis B notifications by acute/chronic status, 1997-2012

of acute cases were aged between 20 and 54 years when notified (figure 2). Male cases were younger than females overall, with a median age of 32.5 years compared to 35 years for females.

Information on risk factor was available for 97% (n=36) of acute cases. Of these, 78% (n=28) were likely to have been sexually acquired. Thirteen were heterosexual, nine were men who have sex with men and sexual orientation was not known for six cases. No risk factors were identified for five cases (14%) despite public health follow up being carried out. Where information on reason for testing was available (97%, n=36), most acute cases were identified because they were symptomatic (64%, n=23) or through STI screening (25%, n=9).

Country of birth was known for 87% (n=32) of acute cases. Of these, 66% (n=21) were born in Ireland and 13% (n=4) were born in Eastern or Central European countries. Country of infection was available for 73% (n=27) of acute cases. Most were infected in Ireland (63%, n=17), but a significant number were infected in Thailand (19%, n=5).

The number of acute cases of hepatitis B notified in Ireland is generally relatively low and decreased by 18% in 2012 (n=37) compared to 2011 (n=45).

Chronic cases (long-term infections)

Of the 522 chronic cases notified in 2012, 55% (n=290) were male, 42% (n=218) were female and sex was not reported for 3% (n=14). Eighty one percent (n=422) of chronic cases were aged between 20 and 44 years when notified (figure 3). The median age at notification for male cases was 33 years and the median age for females was 29 years.

Some data on risk factor, country of birth or asylum seeker status were available for 48% (n=250) of the chronic cases notified in 2012. Of these, 64% (n=161) were born in hepatitis B endemic countries or were identified as asylum seekers. No further detail is available on the actual mode of transmission in their country of origin. Risk factors identified in other cases included sexual acquisition (18%, n=44), vertical transmission (5%, n=13), attending an intellectual disability institution (2%, n=6) and injecting drug use (2%, n=5).

Data on country of birth were available for 44% (n=227). Of these, only 8% (n=17) were born in Ireland. The most common regions of birth were Eastern or Central Europe (35%, n=80), Sub-Saharan Africa (26%, n=59) and Asia (25%, n=57).

The reason for testing was known for 63% (n=326) of chronic cases. Of these, 30% (n=98) were identified through antenatal screening programmes, 16% (n=53) were tested in STI settings, 17% (n=54) were diagnosed as a result of routine health screens and 7% (n=24) were identified through asylum seeker screening centres.

There was a 14% increase in chronic hepatitis B notifications in 2012 (n=522) compared to 2011 (n=457). However the number of cases was similar to 2010 (n=555) and notifications of chronic hepatitis B and hepatitis B overall have been decreasing 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 to Ireland from hepatitis B endemic countries. The current economic climate has most likely contributed to reduced immigration to Ireland between 2009 and 2012, which correlates with an overall decrease in hepatitis B notifications over this time period.

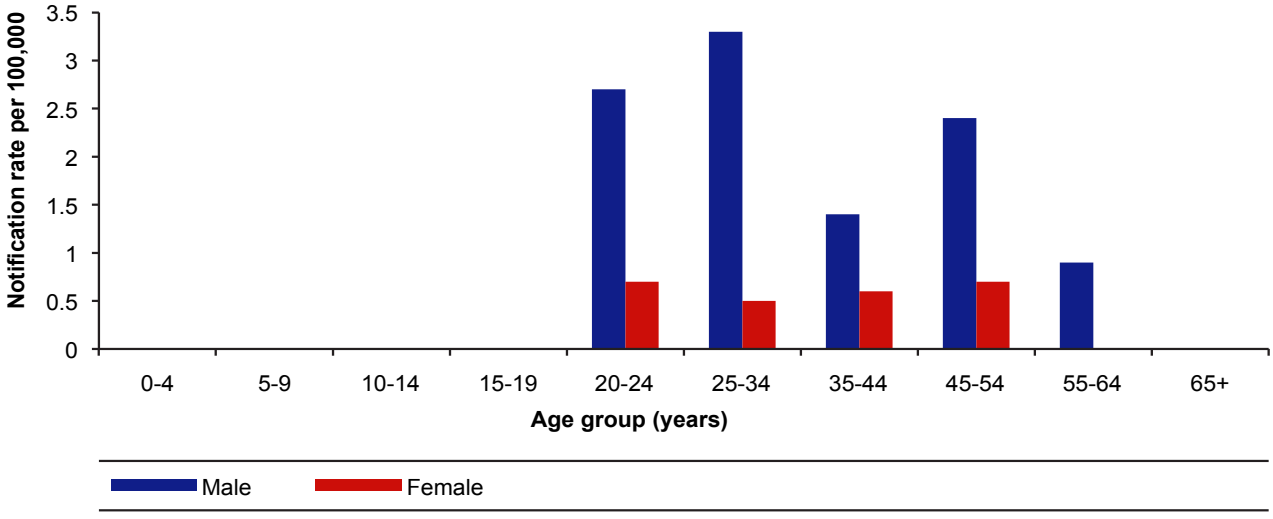

Figure 2. Age and sex-specific notification rates/100,000 population for acute cases of hepatitis B, 2012

Co-infections

Co-infections 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. Fourteen of the hepatitis B cases notified in 2012 were also known to be infected with HIV. Two were born in Ireland and nine of the remaining twelve were born in countries in Sub-Saharan Africa. Seven hepatitis B cases notified in 2012 were also known to be infected with hepatitis C. Two cases had hepatitis B, hepatitis C and HIV infections.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 29th August 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

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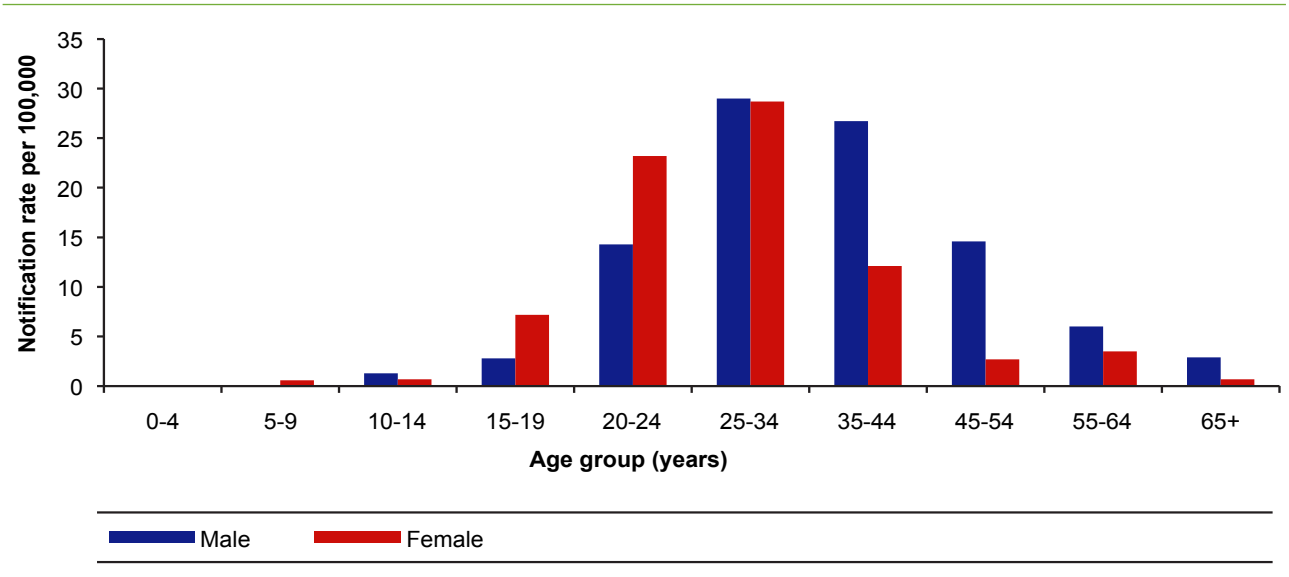

Figure 3. Age and sex-specific notification rates/100,000 population for chronic cases of hepatitis B, 2012

5.2 Hepatitis C

Summary

Number of cases, 2012: 1,036
Crude notification rate, 2012: 22.6/100,000 population
Number of cases in 2011: 1,255

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 perinatal 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 peginterferon and ribavirin induces sustained virologic response (SVR) rates of 40-50% in those with genotype 1 and of 80% or more in those with genotype 2 and 3 infections. Recently introduced new treatment regimes, which include protease inhibitors, have greatly improved SVR rates. An SVR is regarded as a virologic cure and is associated with improved morbidity and mortality.[2]

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%. The prevalence in the general population is low and 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.[3]

Hepatitis C notifications decreased by 18% in 2012 (n=1036, 22.6/100,000 population) compared to 2011 (n=1,255, 27.4/100,000 population) (figure 1). There was a strong predominance of males: 66% (n=686) of cases were male, 33% (n=343) were female and sex was not reported for seven cases (figure 1). The highest notification rates were in young to middle aged adults. Eighty two percent (n=851) of cases were aged between 25 and 54 years (figure 2). The median

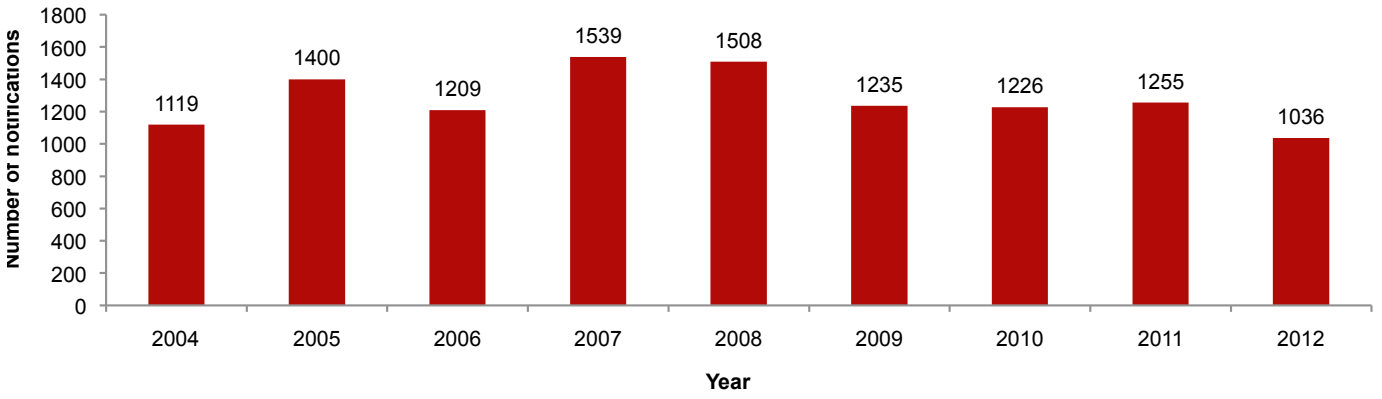

Figure 1. Number of hepatitis C notifications, 2004-2012

age at notification for females was younger (35 years) than that for males (38 years).

The geographic distribution of cases was skewed, with the HSE-East reporting 74% of the cases notified in 2012 (n=762, 47/100,000 population) (figure 3).

Data on most likely risk factor were available for 63% of cases (n=655). The most common risk factors reported were injecting drug use (74%, n=485), sexual exposure (7%, n=43), being an asylum seeker/born in an endemic country (6%, n=41), vertical transmission (5%, n=32) and receipt of blood or blood products (4%, n=26) (figure 4).

The vertically acquired infections do not all represent recent births in Ireland. Eighteen of the thirty two were born in Ireland, five were born in other countries and country of birth was not available for the remaining nine. Only four of the Irish-born cases were children aged less than two years. Thirteen were older children and one was an adult. These cases were previously diagnosed but were notified for the first time in 2012.

Of those who were infected through contaminated blood or blood products, nine were infected in Ireland, four were infected in other countries and no country of infection was available for the remaining thirteen. The Irish infections occurred many years in the past, but were notified for the first time in 2012.

Data on country of birth were only available for 21% of cases (n=219). Where information was available, the most common countries of birth were Ireland (46%, n=101), Latvia (8%, n=18), Poland (8%, n=18), Lithuania (6%, n=14), the United Kingdom (6%, n=14) and Pakistan (5%, n=11).

Co-infections

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 2012 were known to be co-infected with HIV. Of the fourteen of these for whom country of birth was known, seven were born in Ireland and five of the remaining seven were born in countries in Eastern or Central Europe. Eight of the 2012 hepatitis C cases were also known to be co-infected

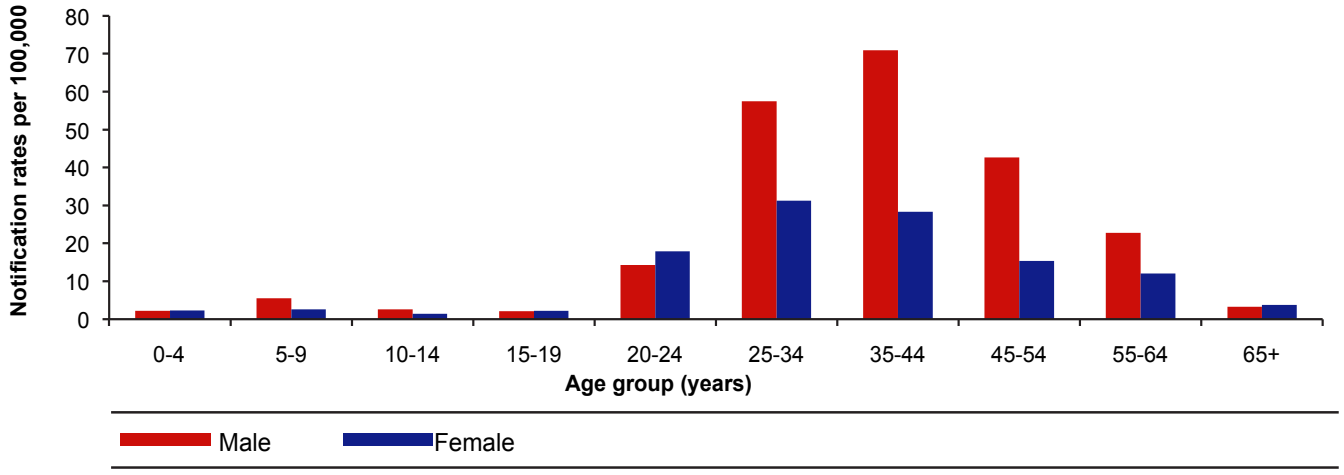

Figure 2. Age and sex-specific notification rates/100,000 population for hepatitis C, 2012

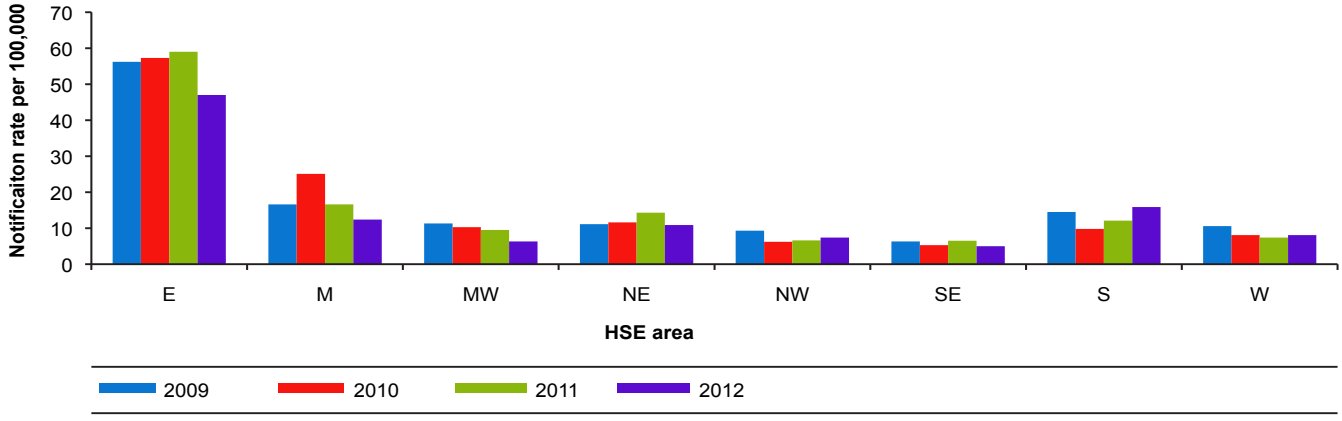

Figure 3. Notification rates/100,000 population for hepatitis C by HSE area, 2009-2012

with hepatitis B. Two cases had hepatitis B, hepatitis C and HIV infections.

The figures presented in this summary are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) System on 29th August 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR.

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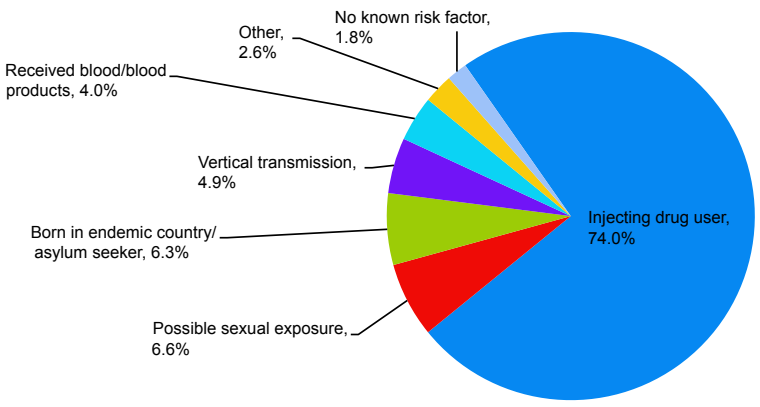

Figure 4. Most likely risk factor for hepatitis C, where data available (63%, n=655 cases), 2012

5.3 HIV

Summary - 2012 cases		
Number of new diagnoses		**341**
Rate (per 100,000 population)		7.4
Age	Median Age	33 years
	Age Range	3 to 71 years
Gender	Males	244 (71.6%)
	Females	97 (28.4%)
	Male: female ratio	2.5
Prob Route of Transmission	MSM	166 (48.7%)
	Heterosexual	130 (38.1%)
	IDU	13 (3.8%)
	Mother to Child Transmission	5 (1.5%)
	Unknown	27 (7.9%)
Geographic origin	Born in Ireland	123 (36.1%)
	Born Abroad	162 (47.5%)
Stage of Infection	Late (CD4 <350 cells/mm^3)	119/249 (47.8%)
	Very late (CD4 <200 cells/mm^3)	60/249 (24.1%)
	Concurrent AIDS diagnosis	34 (10.0%)
Co-infections	With an STI	53 (15.5%)
	With Hepatitis C	25 (7.3%)
	With Hepatitis B	17 (5.0%)

A total of 341 new HIV diagnoses (244 men and 97 women) were reported to HSPC during 2012. This compares with 321 in 2011 and represents a 7% increase. The rate of newly diagnosed HIV infection in Ireland in 2012 was 7.4 per 100,000 population (10.7 per 100,000 in men and 4.2 per 100,000 in women). Previously, the annual number of newly diagnosed HIV infections had been decreasing since 2008. A rate of 5.7 per 100,000 population (ranging from 0.9 to 27.3) was reported in the European Union and European Economic Area (EU/EEA) in 2011 (1).

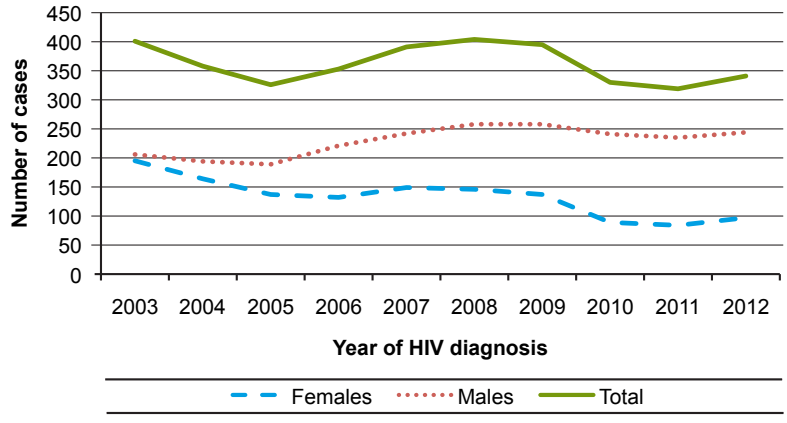

Figure 1: New HIV diagnoses by year of diagnosis (2003 to 2012)

Cumulatively, to the end of 2012, 6,629 people have been newly diagnosed with HIV in Ireland since the early 1980's. This number does not however 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 recent study found that 3,254 patients accessed HIV outpatient care in six centres in Ireland over a 12 month period in 2009/2010 (2).

Figure 1 shows the number of HIV cases diagnosed annually in Ireland from 2003 to 2012, in males and females.

Probable route of transmission

The predominant route of transmission of HIV in Ireland in 2012 was sex between men, accounting for 49% of new diagnoses. Heterosexuals accounted for 38% and injecting drug users (IDUs) for 4%. There were five cases where the route of transmission was identified as mother to child transmission (MTCT). The probable route of transmission was unknown or unreported for 7% of cases.

Figure 2 shows probable route of transmission among the three major risk groups; MSM, heterosexual contact and IDUs between 2003 and 2012.

Men who have sex with men (MSM)

The commonest route of transmission was men who have sex with men, accounting for 49% of cases in 2012. This proportion has been increasing since 2004.

The median age among MSM diagnosed in 2012 was 32 years (range 18-71 years) with 43% of MSM newly diagnosed aged between 25 and 35 years old. Fifty six percent of MSM were born in Ireland, 13% in South America, 10% in Western Europe and 5% in Central and Eastern Europe.

One in four MSM (27%) newly diagnosed with HIV in 2012 was co-infected with a sexually transmitted infection (STI) (chlamydia/gonorrhoea/syphilis). In relation to syphilis, this included all stages of infection, including evidence of infection at some time, as well as current infection.

Where CD4 count was reported, 39% of MSM were diagnosed late (CD4 count <350 cells/mm3) including 13% who were severely immuno-compromised (CD4 count <200 cells/mm3). A higher proportion of older MSM (aged 50 years and older) were diagnosed late compared with younger MSM (75% v 35%, p=0.006). Thirteen MSM (8%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis in 2012. The most common indicative illnesses among MSM were Pneumocystis Carnii Pneumonia (PCP) (54%) and Kaposi's sarcoma (38%).

Heterosexual transmission

In 2012, 38% of newly diagnosed cases (n=130) were infected via heterosexual sex. Among the heterosexual cases, 63% were born in countries with generalised epidemics, 8% had a high-risk partner or a partner known to be HIV positive, and 6% had a partner from a country with a generalised epidemic.* The number of heterosexual cases originating in a country with a generalised HIV epidemic had been decreasing since 2008 but increased slightly in 2012.

Sixty five percent of the new diagnoses among heterosexuals were female, and 35% were male. The median age was 35 years (range 16 to 73), 36 years in men (range 16 to 73 years) and 33 years in women (range 20 to 55 years).

Where CD4 count was available, a high proportion of heterosexual cases (59%), were diagnosed late and 42% were severely immuno-compromised at the time of diagnosis. The proportion diagnosed late was higher in male heterosexuals (64%) than female heterosexuals (56%). Nineteen heterosexual cases (15%) were diagnosed with an AIDS defining illness at the time of their HIV diagnosis in 2012. The most common indicative illnesses among heterosexuals were pulmonary TB (21%) and extrapulmonary TB (21%).

* A generalised HIV epidemic is where greater than 1% of the general population is HIV positive.

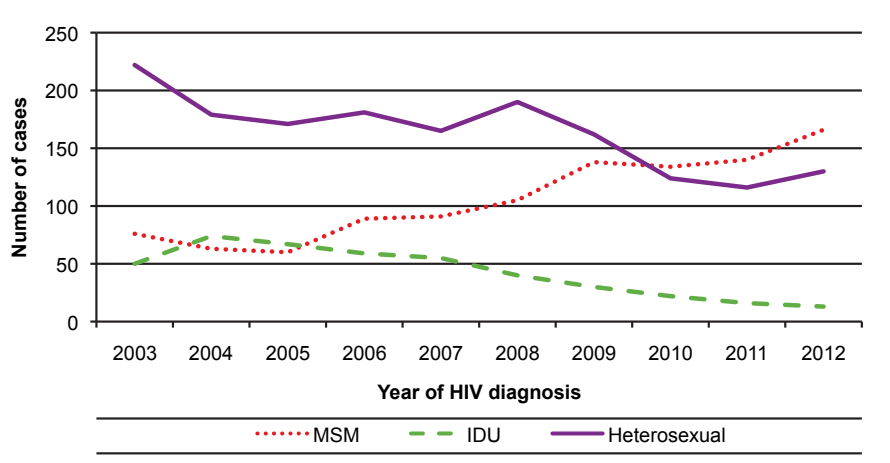

Figure 2: New HIV diagnoses in Ireland by probable route of transmission (2003 to 2012)

Injecting Drug Users (IDUs)
Four percent of new diagnoses were among IDUs and this proportion has been declining since 2004. Of the 13 IDU cases, 10 were men and three were women. The median age was 34 years (range 22 to 50 years). Five were born in Ireland, three were born in Central and Eastern Europe and two were born in Western Europe.

Where CD4 count was reported, 63% of IDUs in 2012 were diagnosed late including 38% who were severely immuno-compromised at diagnosis.

Almost 70% of IDUs were co-infected with hepatitis C at the time of their HIV diagnosis.

Mother to Child Transmission (MTCT)
Five MTCT cases were newly diagnosed in 2012. The probable countries of infection for all cases were in sub-Saharan Africa. No MTCT cases were identified in children born in Ireland in 2012 (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 2012 has been relatively stable with most cases occurring in specific subgroups of the population, namely MSM, heterosexuals from a country with a generalised epidemic and IDUs. However, the proportion of cases in MSM has been increasing and sex between men has been the commonest mode of transmission since 2010. Sex between men is also reported as the predominant mode of transmission in EU/EEA countries and accounted for 39% of the total number of diagnoses in 2011 (1). Numbers among heterosexuals in Ireland have been decreasing in recent years due to decreasing number of cases among those born in a country with a generalised HIV epidemic. This trend was reversed slightly in 2012.

Late HIV diagnosis, where a person is unaware of their HIV status for many years, carries an increased risk of HIV-related illness and death (3). In addition, prompt HIV diagnosis and appropriate treatment can provide an opportunity to prevent further HIV transmission. In 2012 (where CD4 count available; 73% of cases), 48% were reported as late presenters compared with 52% in 2011 (where CD4 count available; 70% of cases). This compares with 49% in EU and EEA countries in 2011(1). The proportion of those diagnosed late varied by risk group and was highest among heterosexual males (64%) and IDUs (63%). In 2012, 24% of people were severely immuno-compromised at diagnosis compared with 33% in 2011. The overall reduction seen in late diagnoses between 2011 and 2012 is encouraging, but the proportion needs to continue to drop further. Strategies to improve uptake of testing in persons coming from countries with a generalised epidemic need to be strengthened. There is however a limitation in the use of CD4 counts, in that our figures report on the number of cases newly diagnosed in Ireland. In 2012, 19% of cases counted were reported to have tested positive for HIV previously in other countries and this should be borne in mind when interpreting the data. When these cases were removed from the analysis, the proportions late and very late increased to 49.5% and 26.3% respectively.

In 2012, for the first time, data on co-infections with HIV was available. People co-infected with HIV and STIs are more likely to transmit HIV during sex (4). In 2012 overall, 16% of individuals newly diagnosed with HIV were co-infected with one or more STI (Chlamydia/Gonorrhoea/Syphilis). In relation to syphilis, this included all stages of infection, including evidence of infection at some time, as well as current infection.

The surveillance information available on newly diagnosed cases in 2012 allows us to monitor trends in the epidemiology of HIV, and timeliness of diagnosis. The detailed 2012 report and slide set are available at http://www.hpsc.ie/hpsc/A-Z/HIVSTIs/HIVandAIDS/SurveillanceReports/.

Acknowledgements
The Health Protection Surveillance Centre (HPSC) would like to sincerely thank all who have contributed to this report – 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 are provided by the Infectious Disease Unit, Our Lady's Hospital for Children (OLHC), Crumlin.

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5.4 Voluntary antenatal HIV testing in Ireland: 2012

Key Points

National reported uptake rate: 99.9%
Number HIV positive cases: 105
Prevalence rate: 0.16%
Number new HIV positive cases: 22

This chapter describes data from the antenatal HIV screening programme in Ireland in 2012. Background information on the system and a copy of the HIV antenatal data collection form can be found at http://www.hpsc.ie/hpsc/A-Z/HIVSTIs/HIVandAIDS/AntenatalHIVTesting/

Eighteen of twenty maternity hospitals/units provided antenatal HIV screening data for 2012. Table 1 describes the data collected from maternity hospitals between 2006 and 2012. Table 2 describes the 2012 data by HSE area.

In 2012, the national reported uptake of HIV antenatal screening was 99.9%, ranging from 98% to 100% among participating hospitals. However, antenatal screening data were only available for 64,803 women in 2012. There were 72,225 births in 2012 and while these figures are not directly comparable, there is a shortfall in returns for approximately 10% of antenatal women. Data were not available from two hospitals (one with private patients only) and nine hospitals provided data on public patients only.

One hundred and five women tested HIV positive at their antenatal screen, giving a HIV prevalence rate of 0.16%, the same as 2011. The prevalence of HIV infection among pregnant women varied among HSE areas, ranging from 0.10% in HSE South to 0.29% in HSE Dublin Northeast. Of the 105 HIV cases, 22 were newly diagnosed at their antenatal screen (i.e. HIV infection was not previously known). The prevalence of newly diagnosed HIV infection was 0.03%. Since HIV antenatal screening began in 2002, the number of newly diagnosed cases has decreased steadily and has been stable for the last 3 years (see Figure 1).

Some hospitals can only provide estimates or proxy measures for the number of women booked and/or

Table 1: Results of the antenatal screening programme, 2006 to 2012

	2006	2007	2008	2009	2010	2011	2012
No. of hospitals participating	19/21	19/20	18/20	19/20	19/20	20/20	18/20
No. of live births per year (CSO)	65,425	71,389	75,173	75,554	75,174	74,650	72,225
No. of women booked	52,434	60,111	66,558	68,378	70,024	68,111	64,803
No. offered test	52,434	60,052	66,558	68,026	69,615	67,849	64,803
No. tested	51,649	59,522	66,210	67,694	69,292	67,135	64,781
Uptake of HIV antenatal test (%)	98.5	99.0	99.5	99.0	99.0	98.6	99.9
No. HIV positive	113	117	123	140	118	109	105
Prevalence (%)	0.22	0.20	0.19	0.21	0.17	0.16	0.16
No. newly diagnosed HIV positive	34	38	34	32	21	17	22
Prevalence of new diagnoses (%)	0.07	0.06	0.05	0.05	0.03	0.03	0.03

the number offered HIV testing. Booking data was retrieved from a variety of sources including maternity IT systems (5 hospitals) patient administrations systems (5 hospitals), manual extraction (4 hospitals) and laboratory systems (2 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

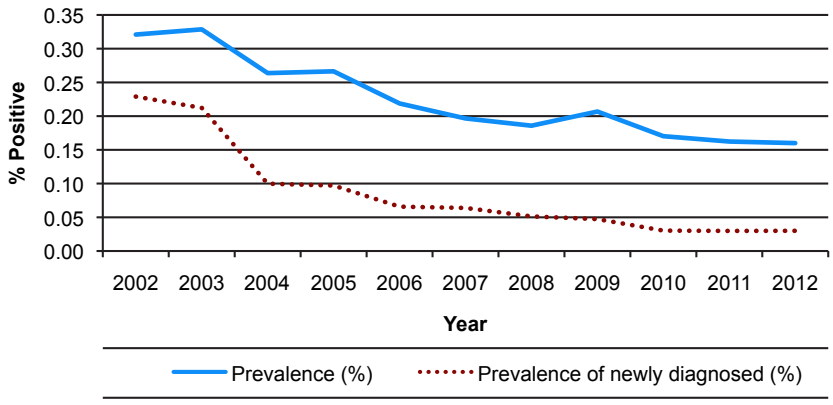

Figure 1: Prevalence of HIV and newly diagnosed HIV among pregnant women, 2002 to 2012

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, 2012

HSE area	Total number of women booked	Uptake of test (%)	Prevalence (%)	Prevalence of newly diagnosed (%)
Dublin Mid Leinster	23,099	100.0	0.14	0.03
Dublin Northeast	14,466	100.0	0.29	0.08
South	15,043	100.0	0.10	0.03
West	12,195	99.8	0.12	0.01
Ireland	**64,803**	99.9	0.16	0.03

5.5 Sexually Transmitted Infections (STIs), 2012

Summary

Total number of STI notifications in 2012: 12,719
Crude notification rate, 2012: 277.2/100,000

Summary
There were 12,719 notifications of sexually transmitted infections (STIs) in 2012, corresponding to a crude notification rate of 277.2 per 100,000 population. This represents a decrease of 5.4% when compared with 2011 (n=13,442; rate = 293.0/100,000). The highest age-specific rate (1,142/100,000 population) was observed among those aged 20 to 29 years in 2012 (see table 1 and figure 1). In line with previous years, *Chlamydia trachomatis* was the most frequently notified STI in 2012, accounting for 48.4% of notifications. A significant increase was seen in the number of notifications of gonorrhoea, particularly in the HSE East region.

A more detailed report on STIs in 2012 is available on the HPSC website at www.hpsc.ie/hpsc/A-Z/HIVSTIs/SexuallyTransmittedInfections/Publications/STIReports/

Chlamydia:
There were 6,162 Chlamydia notifications in 2012, corresponding to a notification rate of 134.3 per 100,000 population, which was a slight decrease compared to the rate of 139.6 reported in 2011. Both rates are below the peak rate of 148.4 per 100,000 recorded in 2008 (see figure 2). Where sex was reported, Chlamydia was more frequently reported among women (53.6%) than men (44.0%), continuing the trend seen in previous years. Chlamydia was most frequently reported in those aged 20-29 years (59.1%); there has been a slight increase in notifications in those aged 30 years and older since 2008.

Gonorrhoea:
The number of gonorrhoea notifications continued to increase (+32.9%) in 2012. The notification rate now stands at 24.1 per 100,000 population, the highest ever recorded for gonorrhoea in Ireland. This rate is also much higher than the latest data available from Europe; the rate for 28 EU/EEA Member States was 12.6 per 100,000 population[1] in 2011. In Ireland, the majority of gonorrhoea notifications continue to be reported in men (n=864; 78.0%). In line with previous years, the majority of gonorrhoea notifications in 2012 were reported in those aged 20-29 years (55.6%). During 2012 the age-specific rate in the 20-29 year age group increased to 93.6 per 100,000 population, compared to 70.5 during 2011. Rates also increased in the 0-19 and 30-39 year age groups. The notification rates in each HSE area from 2009 to 2012 are shown in figure 3. The rate was highest in the HSE East area and has risen significantly year on year.

Table 1: STI notifications and percentage change, 2011-2012

STI	2011	2012	% change
Ano-genital warts	2605	1981	*-24.0*
Chancroid	0	0	*0.0*
Chlamydia trachomatis	6407	6162	*-3.8*
Gonorrhoea	834	1108	*+32.9*
Granuloma inguinale	0	0	*0.0*
Herpes simplex (genital)	1263	1326	*+5.0*
Lymphogranuloma venereum	2	4	*+100.0*
Non-specific urethritis	1603	1539	*-4.0*
Syphilis	653	518	*-20.7*
Trichomoniasis	75	81	*+8.0*
Total	**13442**	**12719**	*-5.4*

Ano-genital warts:
Ano-genital warts was the second most frequently reported STI in 2012, accounting for 15.6% of all STI notifications. The number of notifications (n=1,981) represents a 24% decrease compared to 2,605 notifications reported in 2011 (table 1). There were more notifications among men (56.6%) and 61.3% of cases were aged 20-29 years.

Herpes simplex (genital):
Notifications of herpes simplex (genital) increased by 5.0% between 2011 and 2012 (table 1). The notification rate was 28.9 per 100,000; the highest rate recorded since genital herpes was added to the list of notifiable diseases in 1985. The increase in notifications seen in recent years may be due to improved detection as a result of the introduction of molecular testing which is more sensitive than viral culture. Herpes simplex (genital) was reported among more women (65.3%) than men (32.7%) and was most frequently reported among 20-29 year olds (51.1%).

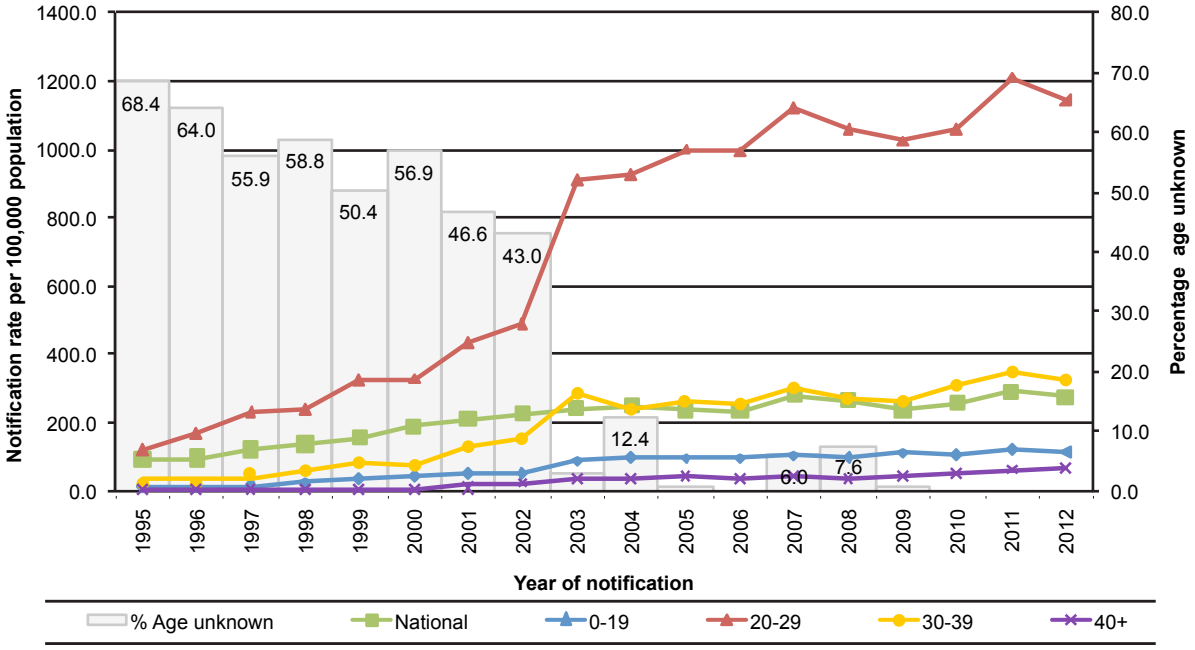

Figure 1: STI notification rates, age specific notification rates, and percentage of cases in which age group data was missing, 1995-2012[1]

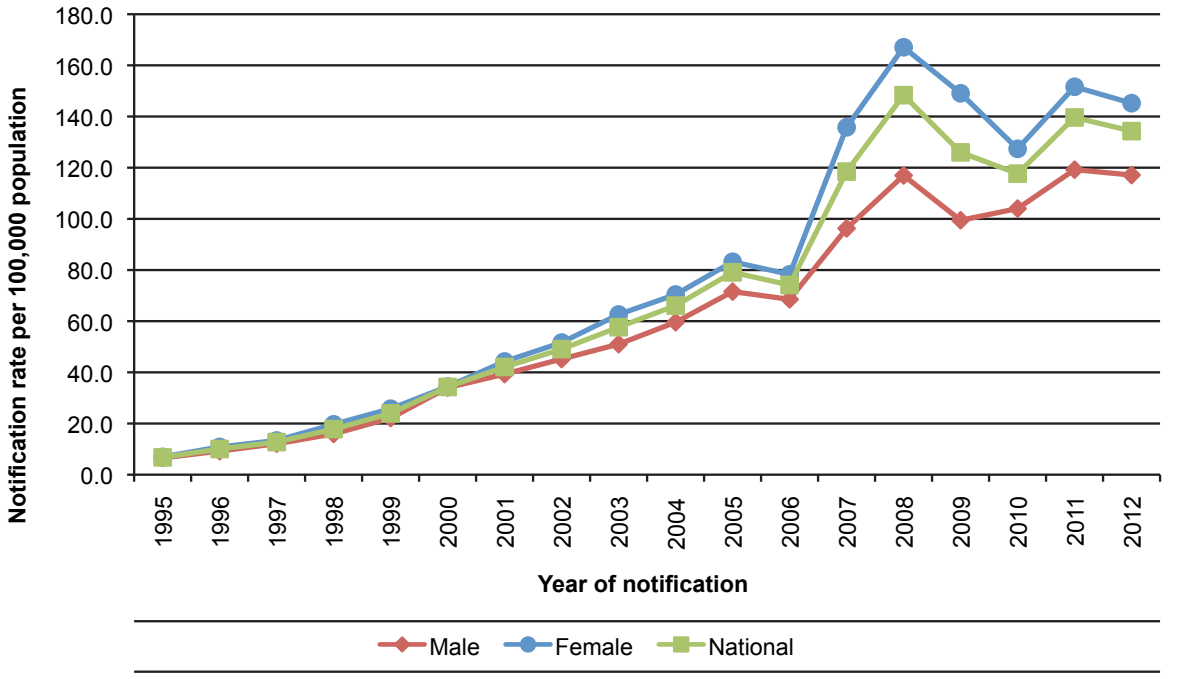

Figure 2: Chlamydia trachomatis notification rates by gender, 1995-2012

1 *Notification rates have been calculated using data from Census 1996 (1995-1999), Census 2002 (2000-2003), Census 2006 (2004-2008) and Census 2011 (2009-2011)

Lymphogranuloma venereum (LGV)
Four cases of LGV were reported in 2012 all in men aged 20-39 years old. Although LGV rarely occurs in Western Europe, outbreaks among MSM have occurred in the United Kingdom and the Netherlands in the past few years.

Non-specific urethritis
Non-specific urethritis (NSU) notifications decreased by 4% during 2012 (n=1,539) compared to 2011 (n=1,603) (table 1).

Trichomoniasis
There were 81 cases of trichomoniasis notified in 2012. Where sex was reported, notifications were all female. Trichomoniasis continues to be reported more commonly among older age groups, with just 28.4% of case reported in those aged 20-29 years, while 70.4% of cases were aged 30 years or older.

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

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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 GP clinics.

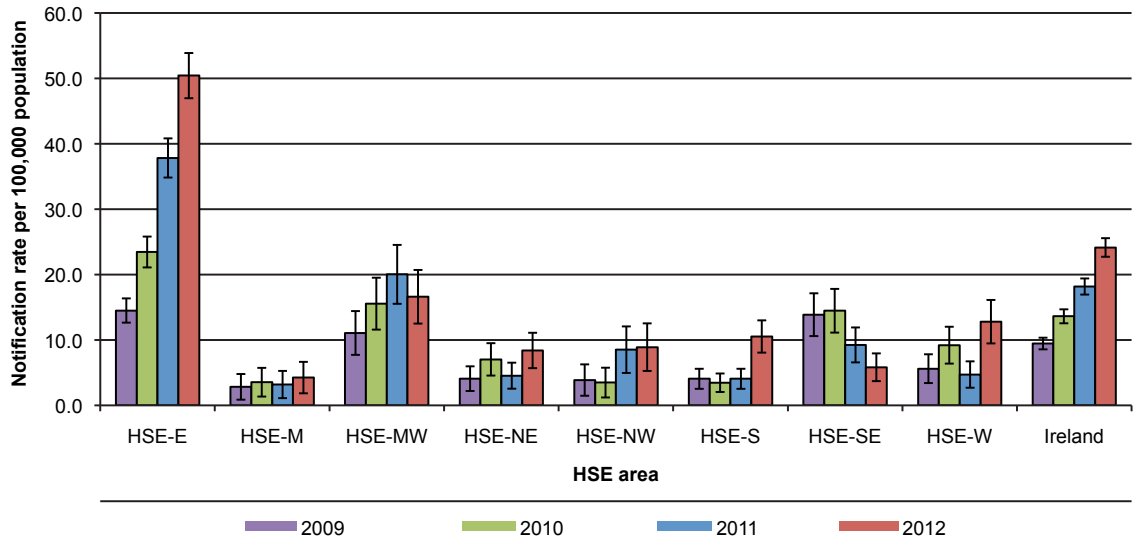

Figure 3: Gonorrhoea notification rates by HSE area and year with 95% confidence intervals, 2009-2012

5.6 Syphilis, 2012

Summary

Total number of syphilis notifications: 518
Number of early infectious syphilis cases: 116
Crude incidence rate of early infectious syphilis: 2.5 per 100,000 population

In 2012, all cases of syphilis notified from laboratories and clinicians were entered into the Computerised Infectious Disease Reporting System, CIDR. Enhanced information was sought on all notified cases, including demographic information, reason for attending, stage of infection, ethnicity, presence of symptoms, and probable country of infection. From July 2012, an additional question was added regarding whether the case had a history of treated syphilis with no current indication of current infection

During 2012, there were 561 notification of syphilis made via CIDR and enhanced surveillance forms were received for 50% of cases (279 forms). Of the 561 cases notified, it was indicated that 43 cases had a history of previously treated syphilis with no evidence of recent infection, including one case of tertiary syphilis and these cases were excluded from further analysis. The remaining 518 cases were included for analysis, giving a crude incidence rate (CIR) of 11.3 per 100,000 population. Of the 518 notifications, there were 116 early infectious syphilis cases (primary, secondary and early latent), 28 were late syphilis (27 were late latent and one was tertiary), 103 were latent cases of undetermined duration, 12 were of unknown stage and the stage of infection was not specified for the remaining 259 cases. There were no congenital syphilis cases notified in 2012.

Figure 1 shows the trend in CIR for all cases and early cases from 2000 to 2012 and Table 1 shows the breakdown of all notified cases of syphilis in 2012 by stage of infection and HSE area.

Early infectious syphilis

One hundred and sixteen cases of early infectious syphilis were notified in 2012, giving a crude incidence rate of 2.5 per 100,000 population (see figure 1 for trends). This compares to 171 early infectious cases in 2011 (CIR: 3.7 per 100,000) and represents a 31% decrease in notifications of early infectious syphilis. A summary of early infectious syphilis cases diagnosed in 2010, 2011 and 2012 is shown in Table 2.

Of the 116 early infectious cases notified in 2012

- 61 (52.6%) were classified as primary syphilis, 31 (26.7%) as secondary syphilis and 24 (20.7%) as early latent.

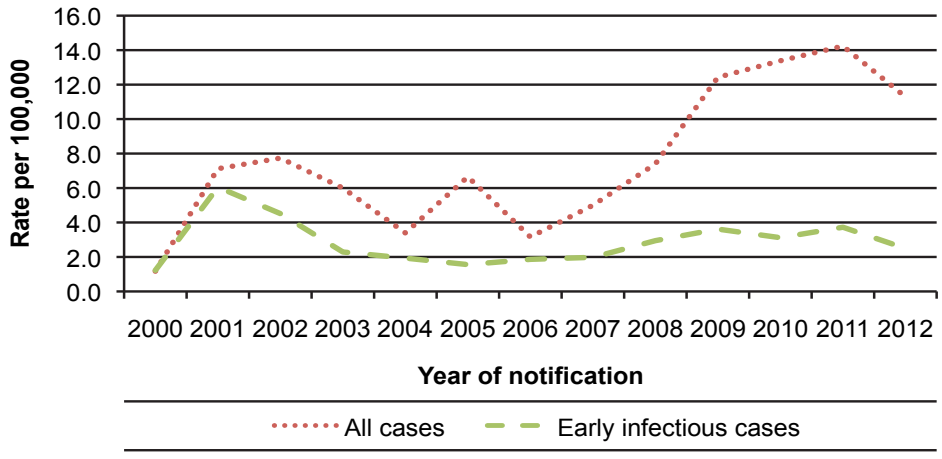

Figure 1: Crude incidence rate of total syphilis and early infectious syphilis (per 100,000 population), 2000-2012

- Rates varied throughout the country, with the rate in HSE East (Dublin, Kildare and Wicklow) twice the national rate (4.8 per 100,000 versus 2.5 per 100,000)
- The majority of cases (87.9%) occurred in males with a male to female ratio of 9:1.
- The most frequently reported age group was 25-29 years (20.7%) and the median age was 33 years (range 19-68 years).
- The majority of cases (71%) were among men who have sex with men (MSM) and a significant proportion of MSM (29%) were co-infected with HIV at the time of their syphilis diagnosis. The proportion has increased since 2011, when it was 21%.
- Twenty one percent were among heterosexuals. Eight percent of heterosexuals were co-infected with HIV.
- The proportion of re-infections was 18.1% overall with the proportion amongst MSM at 24.4% and no re-infections among heterosexuals.

Discussion

In 2012, there was a fall in both the total and early infectious syphilis case numbers. Rates dropped from 14.3 per 100,000 for total cases and 3.7 per 100,000 for early cases in 2011 to 11.3 per 100,000 and 2.5 per 100,000 respectively in 2012.

The enhanced data available in 2012 demonstrate that cases of infectious syphilis are concentrated in the MSM population, with evidence of ongoing risky behaviour in some of those affected. They also illustrate the need for targeted health promotion and primary prevention activities for MSM and the importance of regular screening in this group.

Planned changes to syphilis surveillance, commencing January 2014 will focus enhanced surveillance on early infectious cases only, thereby hopefully leading to an improvement in the quality of the enhanced surveillance data.

A more detailed analysis of syphilis in Ireland in 2012 is available in the report Syphilis in Ireland, 2012, which is available on the HPSC website www.hpsc.ie.

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[1], 2012

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	45	3	6	1	2	0	4	0	61
Secondary	20	3	1	1	1	0	2	3	31
Early latent	12	1	2	2	2	0	5	0	24
Early syphilis	**77**	**7**	**9**	**4**	**5**	**0**	**11**	**3**	**116**
Late latent	17	1	4	0	0	1	2	2	27
Tertiary	0	0	1	0	0	0	0	0	1
Late syphilis	**17**	**1**	**5**	**0**	**0**	**1**	**2**	**2**	**28**
Latent of undetermined duration	65	5	16	2	1	0	11	3	103
Unknown	5	1	2	0	2	0	1	1	12
Not specified	228	3	6	14	1	2	0	5	259
Total	**392**	**17**	**38**	**20**	**9**	**3**	**25**	**14**	**518**

[1] Excludes 43 cases with a history of treated syphilis

Table 2: Summary of early infectious syphilis cases, 2010, 2011 and 2012

	2010		2011		2012	
	No.	%	No.	%	No.	%
Number of early infectious cases	139	-	171	-	116	-
Male	127	91.4	154	90.1	102	87.9
Men who have sex with men	111	79.9	136	79.5	82	70.7
Symptomatic	63	45.3	70	40.9	48	41.4
Infection acquired in Ireland	110	79.1	118	69.0	73	62.9
Born in Ireland	96	69.1	97	56.7	83	71.6
HIV positive	34	24.5	32	18.7	27	23.3
Re-infections	28	20.1	23	13.5	21	18.1
Pregnant at diagnosis	4	2.9	9	5.3	3	2.6
Median age (years)	33	-	31	-	33	-
Age Range (years)	18-70	-	17-68	-	19-68	-

06

Other infections

6.1 Viral Encephalitis

Summary

Number of cases 2012: 18
Number of cases 2011: 23
Number of cases 2010: 22
Crude incidence rate, 2012: 0.4/100,000

Encephalitis due to viruses not otherwise specified (NOS) in the Irish Infectious Disease (Amendment) (No. 3) Regulations 2011 (SI No. 452 of 2011) are notifiable under the disease viral encephalitis. Since 1st January 2012, a revised version of the case definition of viral encephalitis, NOS has come into effect and is detailed in the HPSC Case Definitions for Notifiable Diseases booklet on the HSPC website (www.hpsc.ie). (Details of viral encephalitis cases caused by other notifiable diseases, if any, are presented in other chapters in this report). Clinicians and laboratories (the latter since 2004) are legally obliged to notify all cases of viral encephalitis.

In 2012, 18 cases of viral encephalitis (NOS) were notified in Ireland (0.4/100.000 population). This was five cases less than that 23 reported in the previous year (figure 1).

There were twice as many viral encephalitis (NOS) cases among females (n=12), than males (n=6) giving a male to female ratio of 0.5:1.0. Cases ranged in age from seven months to 85 years with a median age of 55 years. The majority of the notifications occurred in those aged 45-64 years (50%; n=9; 0.9/100,000 population) followed by the 65+ years age group (27.8%; n=5; 0.9/100,000 population) (table 1).

In 2012, seven of the eight HSE areas notified cases of viral encephalitis (NOS) (range 1-3), with HSE-E accounting for 33.3% (n=6/18) of cases. There were no cases reported in HSE-NW in 2012. The national crude incidence rate in 2012 was 0.4 (95% CI 0.3–0.7) cases per 100,000 population with the rate in HSE-E being 0.4 (95%CI 0.1–0.7) cases/100,000 population.

Of the 18 cases reported in 2012, all were laboratory tested positive and case classified as confirmed.

In recent years herpes simplex virus (HSV) and varicella virus have been the two main causative agents of viral encephalitis, NOS notifications in Ireland (figure 2). Notifications due to HSV and varicella have fluctuated considerably between 2010 and 2012: in 2010 there

Table 1. Number, age-specific incidence rates and proportion of viral encephalitis (NOS) cases by age group, 2012

	Causative pathogen						
Age Group	Herpes simplex virus	Human Herpes virus type 6	Varicella virus	Enterovirus	Total	ASIR	% Proportion
<1	0	1	0	0	1	1.38	5.6
1-4	0	1	0	1	1	0.35	5.6
5-14	0	0	0	0	0	0.00	0.0
15-24	0	0	0	0	0	0.00	0.0
25-44	1	0	0	0	1	0.07	5.6
45-64	8	1	0	0	9	0.86	50.0
65+	3	0	2	0	5	0.93	27.8
All ages	**12**	**3**	**2**	**1**	**18**	**0.39**	**100**
% total cases	**66.7**	**16.7**	**11.1**	**5.6**	**100.0**		

ASIR, age specific incidence rate per 100,000 population of total cases

were 10 HSV cases, in 2011 there were 20 and in 2012 there were 12. Similarly with varicella, there were 11 cases reported in 2010, but only one and two cases reported in 2011 and 2012, respectively. Of the 12 HSV encephalitis cases notified in 2012, 10 were reported as HSV type 1, one as type 2 and the typing details of the remaining case were not reported.

There no reported deaths associated with viral encephalitis in 2012 nor were there any imported cases in the same year.

In summary the numbers of viral encephalitis notifications in Ireland between 2011 and 2012 fell by 21.7%. During the same period, there was a marked decline in viral encephalitis notifications associated with HSV from 20 to 12.

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th July, 2012. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

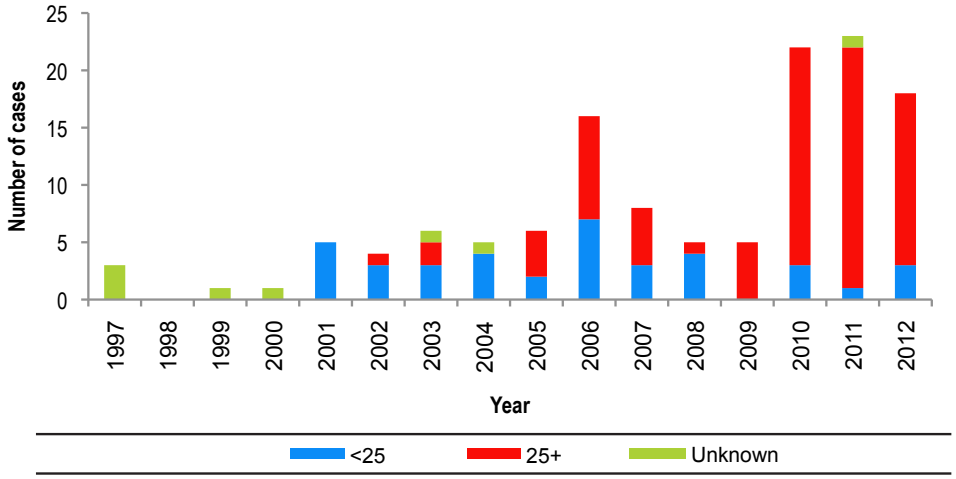

Figure 1. Annual number of viral encephalitis (NOS) cases by age group, 1997-2012

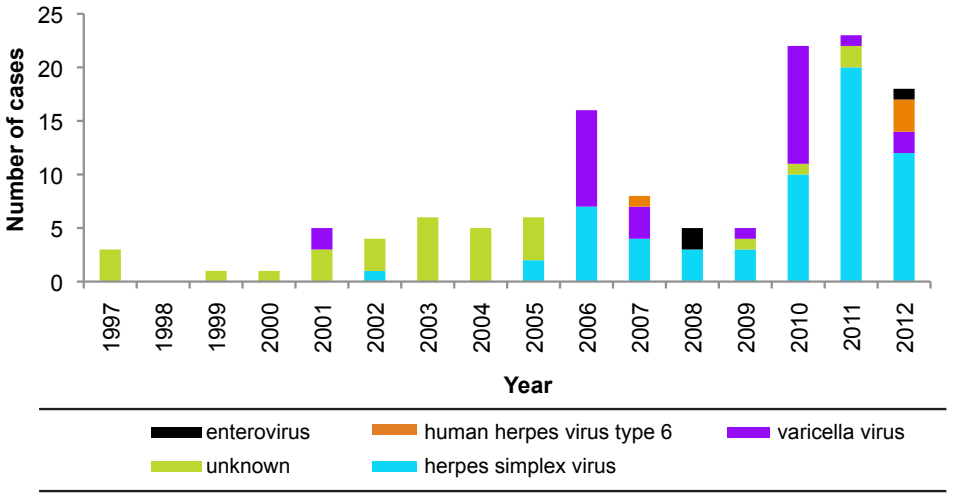

Figure 2. Annual number of viral encephalitis (NOS) cases by causative pathogen, 1997-2012

6.2 Viral Meningitis

Summary

Number of cases 2012: 235
Number of cases 2011: 220
Number of cases 2010: 168
Crude incidence rate, 2012: 5.1/100,000

Meningitis due to viruses not otherwise specified (NOS) in the Irish Infectious Disease (Amendment) (No. 3) Regulations 2011 (SI No. 452 of 2011) are notifiable under the disease viral meningitis. Since 1st January 2012, a revised version of the case definition of viral meningitis, NOS has come into effect and is detailed in the HPSC Case Definitions for Notifiable Diseases booklet on the HSPC website (www.hpsc.ie). (Details of viral meningitis cases caused by other notifiable diseases (such as mumps and influenza viruses, if any) are presented in other separate chapters in this report). Clinicians and laboratories (the latter since 2004) are legally obliged to notify all cases of viral meningitis. In 2012, 235 cases of viral meningitis (NOS) were notified in Ireland, the highest number recorded since 1997 (figure 1). One death as a direct cause by viral

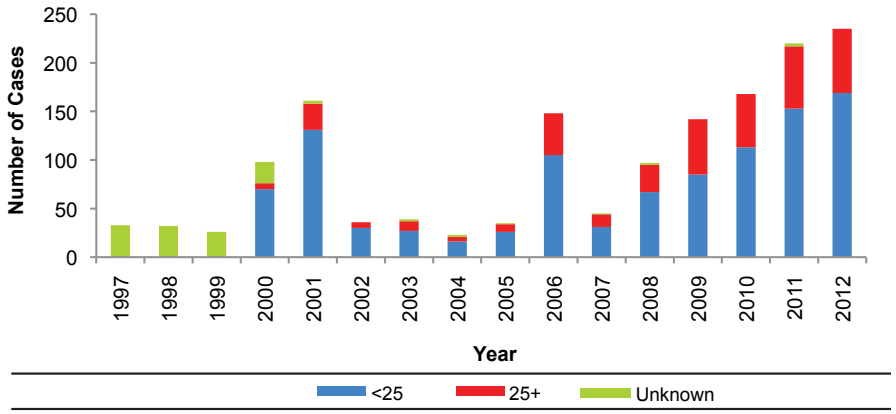

Figure 1. Number of viral meningitis (NOS) cases by age group (<25, >25 years of age) and year, 1997-2012

Table 1. Number, age-specific incidence rates and proportion of viral meningitis (NOS) notifications by age group and causative pathogen, 2012

Age Group	Causative pathogen									Total	ASIR	% Proportion
	enterovirus	human herpes virus	varicella virus	herpes simplex virus	echovirus	adenovirus	coxsacki-evirus	parechovirus	unk			
<1	87	17	0	1	1	0	1	1	3	111	153.3	47.2
1-4	14	3	0	0	0	1	0	0	2	20	7.0	8.5
5-14	11	1	1	0	0	0	0	0	1	14	2.2	6.0
15-24	18	0	2	0	0	0	0	0	4	24	4.1	10.2
25-34	34	0	1	1	0	0	0	0	1	37	4.9	15.7
35-44	17	0	0	1	1	0	0	0	2	21	3.0	8.9
45-54	2	0	1	0	1	0	0	0	1	5	0.9	2.1
55-64	1	0	0	0	0	0	0	0	0	1	0.2	0.4
65+	1	0	1	0	0	0	0	0	0	2	0.4	0.9
All ages	**185**	**21**	**6**	**3**	**3**	**1**	**1**	**1**	**14**	**235**	**5.1**	**100**
% total cases	**78.7**	**8.9**	**2.6**	**1.3**	**1.3**	**0.4**	**0.4**	**0.4**	**6.0**	**100.0**		

ASIR, age specific incidence rate per 100,000 population; unk, unknown/organism not reported

meningitis (NOS) was reported in an infant <2 years of age in 2012. Another death in 2012 was also reported in a case that had viral meningitis, but it is unknown if the infection was the cause of death. Since 1997 only seven deaths have been reported in cases of viral meningitis, only one of which was attributable to the infection.

Of the 235 cases notified in 2012, 220 were classified as confirmed (93.6%), 11 as probable (4.7%) and four as possible (1.7%). There were more cases among males (n=130) than in females (n=103), giving a male to female ratio of 1.3:1.0. Two cases were reported with unknown gender details.
Children and young adults were most commonly affected with a median age of 1.7 years (range one week to 86 years). Nearly 72% of cases (n=169) occurred in those under 25 years of age (figure 1, table 1).

The highest age specific incidence rate (ASIR) was in infants <1 year of age (153.3/100,000; n=111). The next highest ASIR was in the 1-4 years age group (7.0/100,000; n=20). Lowest rates were reported in the older age groups 55-64 and 65+ with rates of 0.2/100,000 (n=1) and 0.4/100,000 (n=2), respectively (table 1).

The national crude incidence rate in 2012 was 5.1 (95% CI 4.5 – 5.8) cases per 100,000 population, a 6.8% increase compared with 2011 when 220 cases were notified (4.8/100,000). The incidence rate in 2012 was highest in HSE-E at 8.0/100,000 (95%CI 6.7–9.4) and lowest in HSE-S at 2.1/100,000 (95%CI 1.0-3.2), both of these rates were significantly different from the national rate (figure 2).

In 2012, enterovirus was the most common pathogen associated with viral meningitis, accounting for nearly 78.9% (n=185/235) of all notifications (figure 3, table 1). Human herpes virus (type 6) (HHV) was the causative pathogen for 8.9% (n=21) notifications; varicella

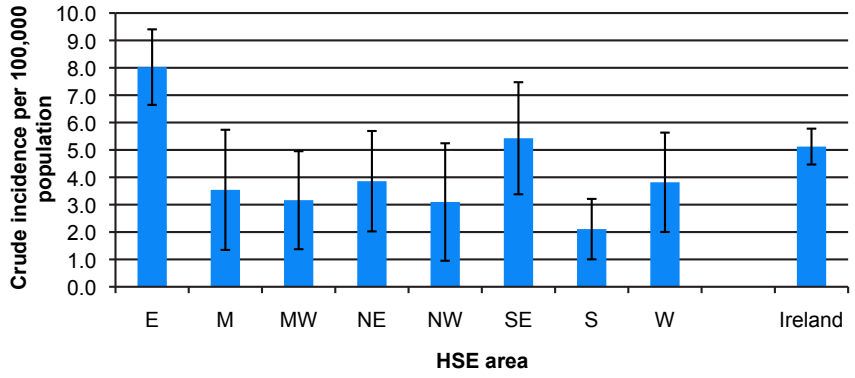

Figure 2. Crude incidence rates per 100,000 population with 95% confidence intervals for viral meningitis (NOS) cases by HSE area, 2012

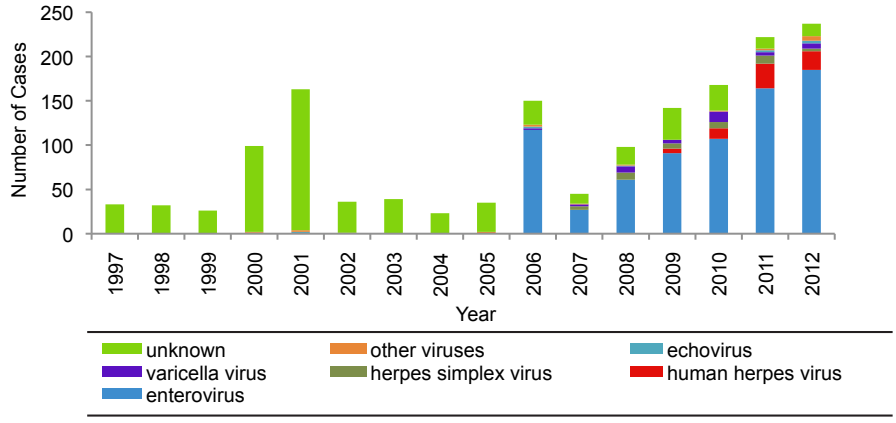

Figure 3. Number of viral meningitis (NOS) cases by organism type and year, 1997-2012

for 2.6% (n=6) and herpes simplex virus (HSV) and echovirus each accounted for 1.3% (n=3 each) (figure 3, table 1).

Enterovirus was also the most common pathogen in infants under one year of age with viral meningitis (NOS) in 2012 with 87 of the 111 cases (78.3%) in this age group (figure 4). Between 2008 and 2012 enteroviruses accounted for 70.5% (n=608/862) of all viral meningitis (NOS) cases, with a distinct seasonal peak observed in the period June to August (figure 5).

The figures presented in this report are based on data extracted from the Computerised Infectious Disease Reporting (CIDR) system on 29th July, 2013. These figures may differ from those published previously due to ongoing updating of notification data in CIDR.

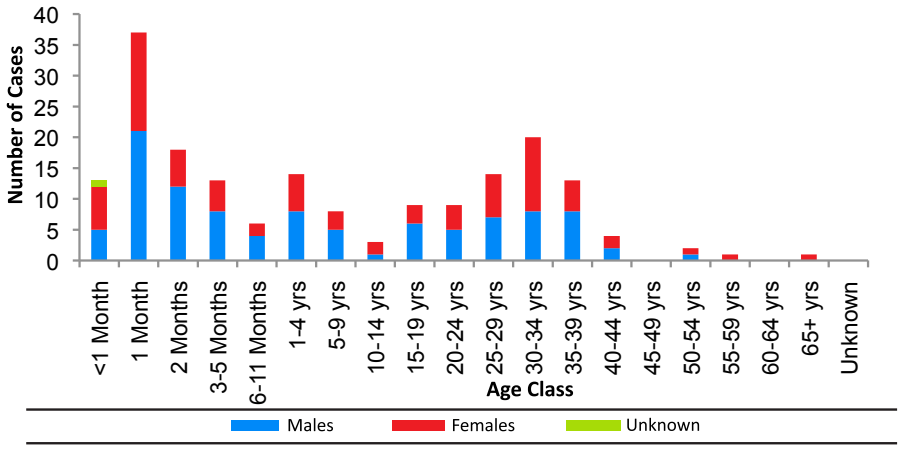

Figure 4. Number of enterovirus cases notified by age group and gender, 2012

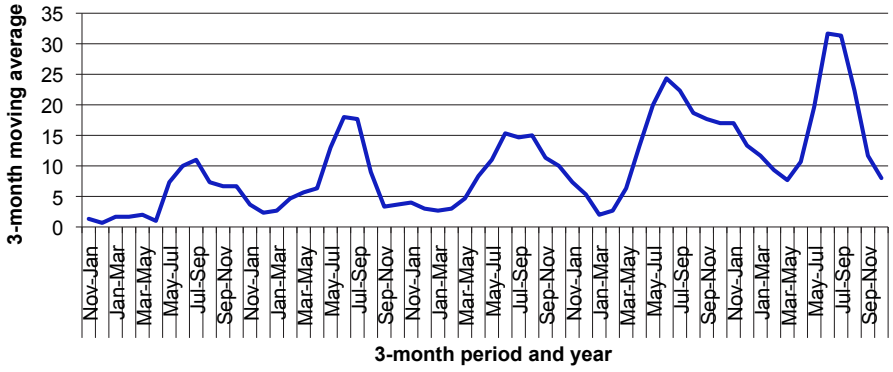

Figure 5. Three-month moving average of the annual number of enterovirus notifications, 2008-2012

6.3 Creutzfeldt-Jakob disease

Summary

Number of cases, 2012: 5
Number of cases, 2011: 7

Five cases of Creutzfeldt-Jakob disease (CJD) were notified in 2012 compared to seven cases in 2011. All cases in 2012 were sporadic CJD cases. Two of the cases were in the age group 45-54 years and three cases were in the age group ≥65 years. Two cases were female and three were male.

In total, 63 cases of CJD were notified since CJD was first specified as a notifiable disease in December 1996 (figure 1). Figure 2 shows the 63 CJD notifications by age group. The majority (81%, n=51) of the cases were aged greater than 54 years. Of the 63 cases, 34 were male and 29 were female. Sixty cases were sporadic CJD, two were familial CJD and one was iatrogenic CJD.

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.

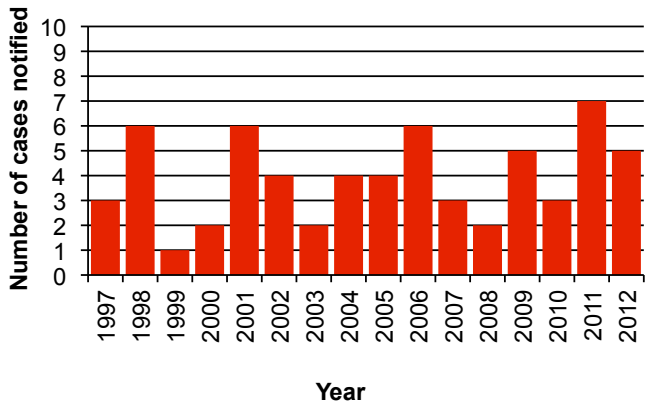

Figure 1. Number of CJD notifications by year from December 1996 to 2012

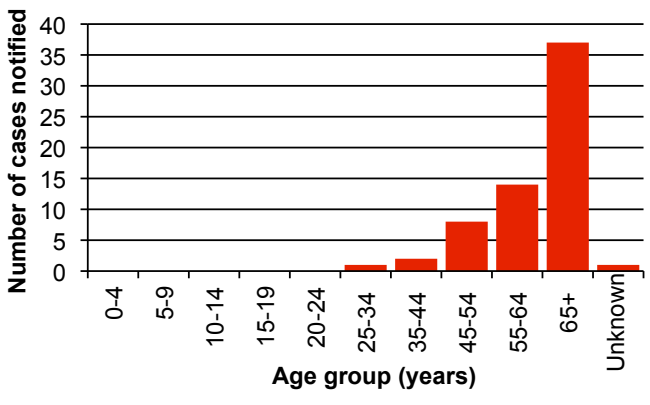

Figure 2. Number of CJD notifications (n=63) from December 1996 to 2012 by age group

6.4 Tetanus

Summary

Number of cases, 2012: 1
Number of cases, 2011: 0

One case of tetanus was notified in 2012. This is the first case notified since 2008. The case was unvaccinated, in the age group 10-14 years and the risk factor for infection was a foot wound injury from a thorn. The case was hospitalised but recovered following treatment with antibiotics and immunoglobulin.

Summary of case data since 1981:
Thirteen 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 13 tetanus cases, eight (62%) were male, three (23%) were female while gender was unreported for two (15%).

The following wound injuries (n=9) were reported among the 13 notified cases: wound injuries from a road traffic accident (n=1), wound from a fall outdoors (n=1), wound associated with dog bite (n=1), wound from 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) and a foot wound from a thorn (n=1)

Vaccination data was reported for four of the 13 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.

Tetanus vaccine provides protection in 90-95% of children who are fully vaccinated. However, as protection declines over time up to 50% of 20-year-olds and up to 70% of 70-year-olds may be unprotected if they have not received boosters. The childhood immunisation schedule in Ireland recommends children receive a dose of tetanus toxoid-containing vaccine at two, four and six months of age and booster doses at four-five years 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

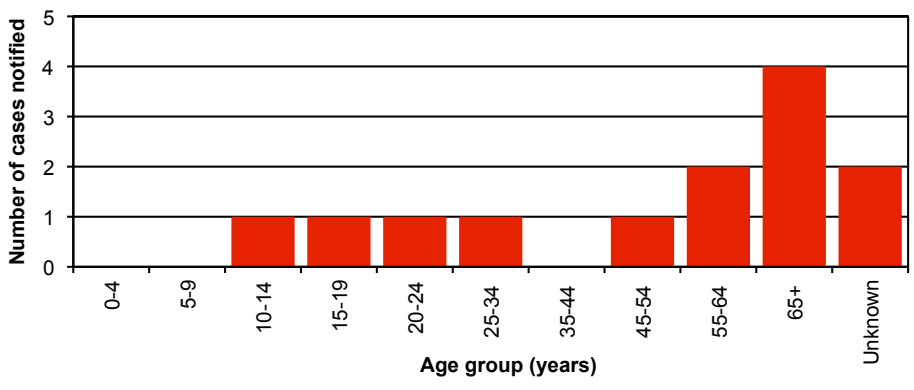

Figure 1. Tetanus cases notified (n=13) from 1982 to 2012 by age group

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 25th July 2013. 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: 518
Number of IID outbreaks: 405
Number of non-IID outbreaks: 113

During 2012, 518 outbreaks of infectious diseases were reported with 6,622 associated cases of illness, including 1,473 (22.2%) cases hospitalised and 20 deaths.* Regional variation in outbreaks was observed between HSE areas with the highest rates observed in HSE-NW (22.5/100,000 population) and HSE-M (17.4/100,000 population) while the lowest rate was observed in HSE-MW at 8.7 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 65.4% (n= 339) of all outbreaks notified during 2012. The remaining outbreaks (34.6%, n= 179) 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 in 2012 (68.9%, n=357). Most of these outbreaks were due to norovirus, acute infectious gastroenteritis (AIG), pertussis and verotoxigenic *E. coli* (VTEC).

The most frequently reported outbreak locations in 2012 were private houses (n=161, 31.1%), residential institutions (n=110, 21.2%) and community hospital/long-stay units (n=90, 17.4%). The highest numbers ill were reported from outbreaks in hospitals (n=1,978), residential institutions (n=1,790) and community hospital/long-stay units (n=1,534). Table 2 details the number of IID and non-IID outbreaks and numbers ill by outbreak location for outbreaks reported during 2012.

Infectious intestinal disease (IID) outbreaks:
During 2012, 405 IID outbreaks were reported, which was an increase of 43.6% compared to the number of IID outbreaks reported during 2011 (n=282). However, the percentage of IID outbreaks as a proportion of total outbreaks remained stable at 78.2% when compared to recent years (74.4% in 2011 and 77.7% in 2010). The Table 3 details the regional distribution of outbreaks of infectious intestinal disease (IID) during 2012.

Table 1: Number of outbreaks by HSE area, 2012

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	162	10.0	3,284	934	1	112	50
HSE-M	49	17.4	435	21	0	42	7
HSE-MW	33	8.7	262	117	1	28	5
HSE-NE	43	9.8	469	42	2	38	5
HSE-NW	58	22.5	633	139	8	46	12
HSE-SE	50	10.0	647	11	1	40	10
HSE-S	62	9.3	413	21	4	47	15
HSE-W	60	13.5	452	182	3	51	9
HPSC	1	-	27	6	0	1	0
Total	**518**	**11.3**	**6,622**	**1473**	**20**	**405**	**113**

*Outbreak data extracted from CIDR on 07/08/2013.
† Including 87 outbreaks reported as person to person and airborne transmission and 2 person-to-person and animal contact

Table 2: Number of IID and non-IID outbreaks and number ill by outbreak location, 2012

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	75	1,312	15	222	**90**	**1,534**
Community outbreak	9	99	5	63	**14**	**162**
Crèche	9	88	7	57	**16**	**145**
Extended family	5	26	4	13	**9**	**39**
Guest house / B & B	1	1	0	0	**1**	**1**
Hospital	60	1,879	8	99	**68**	**1,978**
Hotel	11	249	0	0	**11**	**249**
Other	5	60	7	41	**12**	**101**
Private house	112	235	49	133	**161**	**368**
Residential institution	99	1,531	11	259	**110**	**1,790**
Restaurant / Cafe	3	38	0	0	**3**	**38**
School	2	42	7	116	**9**	**158**
Travel related	5	28	0	0	**5**	**28**
University/College	1	6	0	0	**1**	**6**
Unknown	2	4	0	0	**2**	**4**
Not Specified	6	21	0	0	**6**	**21**
Total	**405**	**5,619**	**113**	**1,003**	**518**	**6,622**

Table 3: IID outbreak summary by HSE area 2012

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	112	6.9	2,890	866	0
HSE-M	42	14.9	367	18	0
HSE-MW	28	7.4	246	105	1
HSE-NE	38	8.6	397	34	0
HSE-NW	46	17.8	447	122	1
HSE-SE	40	8.0	612	7	0
HSE-S	47	7.1	269	7	0
HSE-W	51	11.5	364	165	0
HPSC	1	-	27	6	0
Total	**405**	**8.8**	**5,619**	**1,330**	**2**

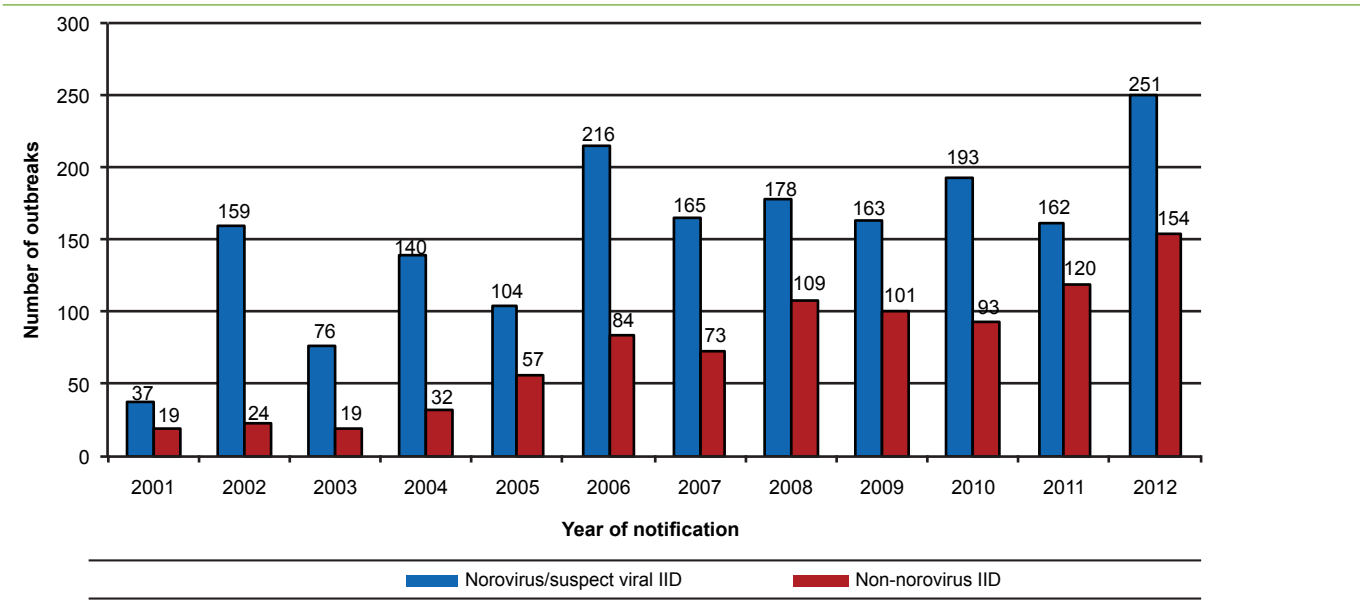

Figure 1: Number of norovirus/suspected viral outbreaks[§] and number of non-norovirus IID outbreaks by year, 2001-2012

[§] 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, 2012

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	2	22	85	1,000	87	1,022
Campylobacter infection	4	13	0	0	4	13
C. difficile infection	0	0	7	40	7	40
Cryptosporidiosis	21	51	3	19	24	70
Food poisoning (bacterial other than salmonella)	0	0	1	9	1	9
Hepatitis A (acute)	2	4	0	0	2	4
Listeriosis	1	2	0	0	1	2
Noroviral infection	2	7	162	4,108	164	4,115
Rotavirus infection	9	16			9	16
Salmonellosis	4	9	2	30	6	39
Shigellosis	1	3	0	0	1	3
Typhoid	2	3	0	0	2	3
VTEC	80	157	17	126	97	283
Total	**128**	**287**	**277**	**5,332**	**405**	**5,619**

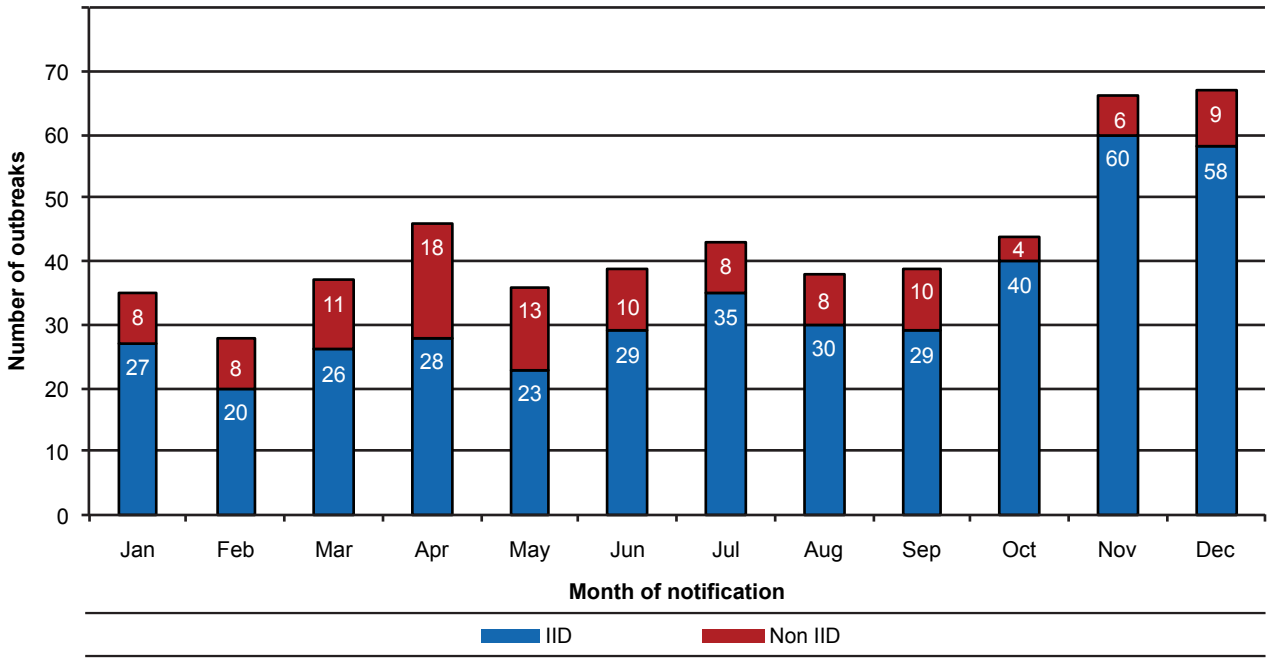

Figure 2: Number of IID and non-IID outbreaks by month of notification, 2012

Table 5: Non-IID outbreak summary by HSE area, 2012

HSE area	Number of outbreaks	Outbreak rate per 100,000	Number ill	Number hospitalised	Number of deaths
HSE-E	50	3.1	394	68	1
HSE-M	7	2.5	68	3	0
HSE-MW	5	1.3	16	12	0
HSE-NE	5	0.0	72	8	2
HSE-NW	12	4.6	186	17	7
HSE-SE	10	2.0	35	4	1
HSE-S	15	2.3	144	14	4
HSE-W	9	2.0	88	17	3
Total	**113**	**2.5**	**1,003**	**143**	**18**

Norovirus/ suspected viral outbreaks, accounted for 62.0% of all IID outbreaks reported in 2012. Figure 1 compares norovirus/ suspected viral outbreaks with non-norovirus IID outbreaks by year from 2001 to 2012. Norovirus/ suspected norovirus was also responsible for the seven largest outbreaks during 2012. Numbers ill ranged from two cases to 336 cases. This was the highest number of norovirus/ suspected norovirus outbreaks reported since outbreak surveillance was initiated in Ireland in 2001.

After noroviral infection (n=164), the next most commonly reported IID outbreaks during 2012 were VTEC (n=97), AIG (n=87), and cryptosporidiosis (n=24). The number of general and family outbreaks of IID and numbers ill, are outlined in Table 4.

The most frequently reported locations for IID outbreaks were private houses (n=112), residential institutions (n=99) and community hospital/long stay facilities (n=75). The most commonly reported outbreak in private houses was VTEC (n=72) and cryptosporidiosis (n=20). In community hospital/long stay facilities the most commonly reported outbreaks were of noroviral infection (n=42) and AIG (n=33). In residential institutions the most commonly reported outbreaks were of norovirus (n=60) and AIG (n=37).

Person-to-person (P-P) spread[‡] was the most frequently reported mode of transmission implicated in IID outbreaks during 2012 (64.4%, n=261).

In 2012, the number of IID outbreaks peaked during November and December. This peak was mainly due to high numbers of norovirus/ suspected norovirus outbreaks, with 51 norovirus/ suspected norovirus outbreaks reported during November and 54 during December. Figure 2 illustrates the number of IID and non-IID outbreaks by month of notification during 2012.

Non-IID outbreaks:
During 2012, 113 outbreaks of non-IID diseases were reported, representing 21.8% of all outbreaks notified nationally. The most common non-IID outbreak diseases were pertussis (36.3%, n=41) and influenza (16.8%, n=19). Table 5 details the regional distribution of non-

Table 6: Number of family and general non–IID outbreaks by disease, 2012

Outbreak disease/pathogen	Family outbreak		General outbreak		Total Non-IID outbreaks	
	Number outbreaks	Number ill	Number outbreaks	Number ill	Number outbreaks	Number ill
Pertussis	38	100	3	57	**41**	**157**
Influenza	0	0	19	402	**19**	**402**
Tuberculosis	4	12	3	11	**7**	**23**
Respiratory Illness	0	0	6	61	**6**	**61**
Measles	0	0	3	68	**3**	**68**
Viral meningitis	2	4	1	3	**3**	**7**
Suspected pertussis	3	7	0	0	**3**	**7**
Hand foot and mouth disease (HFMD)/ suspected HFMD	0	0	3	22	**3**	**22**
Hepatitis B (acute and chronic)	1	6	1	1	**2**	**7**
Mumps	1	2	1	5	**2**	**7**
Respiratory syncytial virus infection	0	0	2	14	**2**	**14**
Human metapneumovirus	0	0	2	67	**2**	**67**
MRSA	0	0	2	12	**2**	**12**
Scarlet fever	0	0	2	20	**2**	**20**
Parvovirus B19/ suspected parvovirus B19	0	0	2	8	**2**	**8**
Scabies/ suspected scabies	0	0	2	17	**2**	**17**
Hepatitis C	1	2	0	0	**1**	**2**
Streptococcus group A infection (invasive)	1	3	0	0	**1**	**3**
Syphilis	0	0	1	4	**1**	**4**
Acute respiratory illness	0	0	1	17	**1**	**17**
Coxsackievirus	0	0	1	11	**1**	**11**
Influenza-like illness	0	0	1	13	**1**	**13**
Linezolid resistant VRE	0	0	1	6	**1**	**6**
Neisseria gonorrhoeae	0	0	1	4	**1**	**4**
Parvovirus B20	0	0	1	6	**1**	**6**
Streptoccus Group A	0	0	1	3	**1**	**3**
Suspected parvovirus	0	0	1	12	**1**	**12**
Varicella chickenpox	0	0	1	23	**1**	**23**
Total	**51**	**136**	**62**	**867**	**113**	**1003**

[‡]Including 63 IID outbreaks reported as person to person and airborne transmission and 2 reported as person-to-person and animal transmission.
**Including 24 non-IID outbreaks reported as person to person and airborne transmission

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 April and May 2012. The April peak was mainly due to influenza, influenza-like illness (ILI) and acute respiratory outbreaks while the May peak was due to high numbers of pertussis outbreaks reported (figure 2).

The most frequently reported locations for non-IID outbreaks were private houses (n=49), Comm. Hosp/ Long-stay units (n=15) and residential institutions (n=11) as shown in table 2. Non-IID outbreaks in these locations were most frequently caused by pertussis, influenza and ILI. Person-to-person (P-P) spread** was the most frequently reported mode of transmission implicated in non-IID outbreaks during 2012 (85.0%, n=96).

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.

08

Immunisation Uptake

8.1 Immunisation Uptake

Summary

Among children 12 months of age in 2012 uptake of: D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 was 91%

Among children 24 months of age in 2012 uptake of: D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ reached the target of 95%
MMR_1 was 92%
PCV_3 was 91%
Hib_b was 89%
$MenC_3$ was 85%

$MenC_3$ and Hib_b uptake are considerably lower than the uptake of the other recommended vaccines. 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 2012, 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 2012 quarterly data. The proportion of children who completed the recommended childhood immunisation schedule by 12 months (born between 01/01/2011 and 31/12/2011) and 24 months (born between 01/01/2010 and 31/12/2010) of age in 2012 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 2012 (born between 01/01/2011 and 31/12/2011) 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 2012 (born between 01/01/2010 and 31/12/2010) 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

Not all HSE Areas were able to provide data during 2011 and 2012. BCG uptake data were available for the HSE-M, HSE-MW, HSE-NW, HSE-SE and HSE-S Areas in Quarters 1-4 2011 and the HSE-W in Quarters 3-4 2011. In Quarters 3 and 4 2011 the HSE-W reported BCG uptake data (4%), for children at 12 months of age for the first time, resulting in a low national uptake rate (85%) compared to previous years. This is not a true decline as uptake rates are based on available data and the HSE-W BCG data were not available previously. Traditionally BCG was given at age 10 - 12 years in the HSE-W. 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. The available national BCG cohort data may be around 48% of the national birth cohort in

2011 and 52% of the national birth cohort in 2012 (these figures are estimates only). 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) was 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% (estimate only) of the national birth cohort.

Immunisation uptake rates at 12 months

National immunisation uptake rates, in children 12 months of age in 2012, were 91% for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 and 80% (based on available data) for BCG (table 2). Compared with 2011, the uptake rates for D_3, P_3, T_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2 increased by one percent in 2012.

In Quarters 3 and 4 2011 the HSE-W reported BCG uptake data (4%) for the first time, resulting in an apparent decline in reported national uptake in 2011 (85%). The HSE-W BCG uptake in 2012 (Quarters 1-4) was 5%. National uptake of BCG was 80% in 2012. This is not a true decline in 2012 as national uptake rates are based on available data and the HSE-W BCG data were not available previously for all four quarters.

Among the HSE Areas, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 90% to 94% and $MenC_2$ and PCV_2 ranged from 88% to 94% (table 2). Among the LHOs, uptake rates for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ ranged from 83% to 97%, PCV_2 ranged from 82% to 98% and $MenC_2$ ranged from 82% to 97% (table 3). The target uptake of 95% was reached or exceeded in Longford/Westmeath and Roscommon for D_3, T_3, P_3, Hib_3, $Polio_3$, $HepB_3$, $MenC_2$ and PCV_2, in Sligo/Leitrim for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ and in Tipperary NR/East Limerick for $MenC_2$ (table 3). The target uptake of 95% was reached or exceeded for BCG in 12 LHOs reporting data (table 3).

Immunisation uptake rates at 24 months

National annual immunisation uptake rates, in children 24 months of age in 2012, reached the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ and were 92% for MMR_1, 91% for PCV_3, 89% for Hib_b and 85% for $MenC_3$ (table 2). Compared with 2011, the uptake rates for Hib_b, $MenC_3$ and PCV_3 increased by one percent while D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$ were unchanged (figure 1). This is the second year national annual uptake rates reached the target of 95% for D_3, T_3, P_3, Hib_3, $Polio_3$ and $HepB_3$.

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 2012. These Areas cover approximately 81% 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

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

Table 2. Annual immunisation uptake rates (based on available data) by HSE Area for children 12 and 24 months of age in 2012

	% Uptake at 12 months Cohort born 01/01/2011 - 31/12/2011					% Uptake at 24 months Cohort born 01/01/2010 - 31/12/2010								
	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	na	95	95	88	95	84	87	90	92	92
HSE-M	94	94	94	94	96	97	97	97	97	91	95	94	95	96
HSE-MW	94	94	94	94	97	95	95	90	95	86	90	91	93	93
HSE-NE	91	91	90	90	na	95	95	86	94	84	na	91	na	91
HSE-NW	94	94	94	94	96	97	96	92	96	87	93	91	95	93
HSE-SE	93	93	92	93	96	97	96	95	96	89	93	93	95	94
HSE-S	91	90	88	88	94	96	95	85	95	86	89	91	93	93
HSE-W	91	91	90	91	5	95	95	89	95	82	na	90	na	90
Ireland	**91**	**91**	**91**	**91**	**80**	**95**	**95**	**89**	**95**	**85**	**90**	**91**	**93**	**92**

na=not available
Where T_3, P_3 and Hib_3 uptake identical to D_3 uptake only D_3 uptake figures presented
$Polio_3$ uptake identical to D_3 except HSE-SE $Polio_3$ uptake at 24 months was 96%

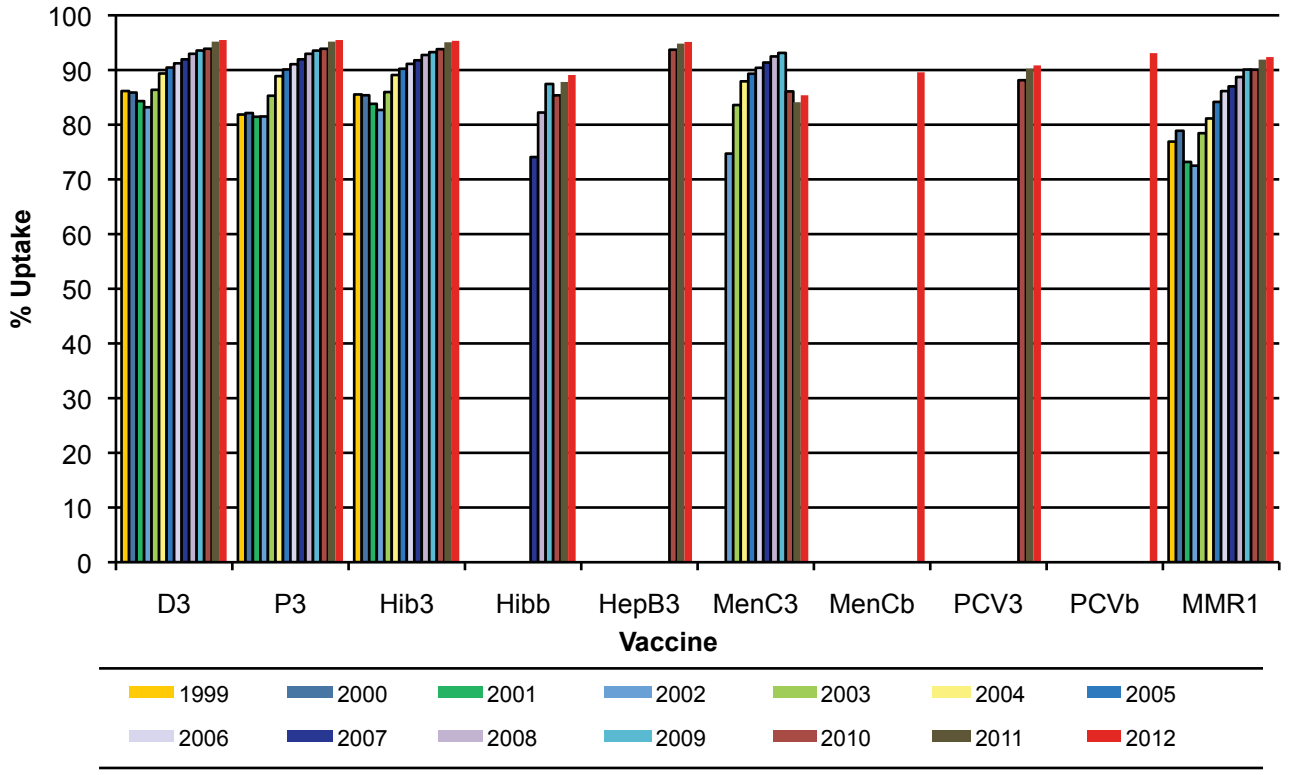

Figure 1. National annual immunisation uptake rates (based on available data) at 24 months, 1999-2012

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 3. Immunisation uptake (%) at 12 months of age in 2012 (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 BCG *	Number in cohort for D_3, T_3 & P_3 †	Immunisation Uptake (%)				
				BCG	D_3	$HepB_3$	$MenC_2$	PCV_2
HSE-E	Dublin South	na	1738	na	92	92	92	92
	Dublin South East	na	1792	na	90	90	89	90
	Dublin South City	na	1808	na	93	93	92	93
	Dublin South West	na	2789	na	93	93	92	93
	Dublin West	na	2906	na	91	90	90	90
	Dublin North West	na	4065	na	83	83	83	82
	Dublin North Central	na	1891	na	89	89	89	89
	Dublin North	na	4406	na	91	91	91	91
	Kildare/West Wicklow	na	4185	na	92	92	92	92
	Wicklow	na	1885	na	90	90	89	90
	HSE-E Total	**na**	**27465**	**na**	**90**	**90**	**90**	**90**
HSE-M	Laois/Offaly	2676	2676	96	94	94	94	94
	Longford/Westmeath	1966	1966	95	95	95	95	95
	HSE-M Total	**4642**	**4642**	**96**	**94**	**94**	**94**	**94**
HSE-MW	Clare	1729	1752	97	94	94	93	94
	Limerick	2058	2071	98	93	93	93	93
	Tipperary NR/East Limerick	1967	1974	97	94	94	95	94
	HSE-MW Total	**5754**	**5797**	**97**	**94**	**94**	**94**	**94**
HSE-NE	Cavan/Monaghan	na	2253	na	93	93	91	91
	Louth	na	2003	na	90	89	88	88
	Meath	na	3719	na	91	91	90	90
	HSE-NE Total	**na**	**7975**	**na**	**91**	**91**	**90**	**90**
HSE-NW	Donegal	2296	2296	95	94	93	94	94
	Sligo/Leitrim	1394	1394	97	95	95	94	94
	HSE-NW Total	**3690**	**3690**	**96**	**94**	**94**	**94**	**94**
HSE-SE	Carlow/Kilkenny	2105	2105	97	91	91	91	92
	South Tipperary	1399	1399	98	94	94	94	94
	Waterford	1985	1985	95	93	92	92	92
	Wexford	2261	2261	96	93	93	92	93
	HSE-SE Total	**7750**	**7750**	**96**	**93**	**93**	**92**	**93**
HSE-S	North Cork	1525	1494	93	90	90	88	88
	North South Lee	6114	5992	95	92	91	89	89
	West Cork	768	765	94	85	85	82	82
	Kerry	2063	2037	93	91	90	88	87
	HSE-S Total	**10470**	**10288**	**94**	**91**	**90**	**88**	**88**
HSE-W	Galway	na	4014	na	89	89	89	90
	Mayo	na	1773	na	90	90	89	90
	Roscommon	na	913	na	97	97	97	98
	HSE-W Total	**6701***	**6700**	**5**	**91**	**91**	**90**	**91**
Ireland		**39007**	**74307**	**80**	**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, $Polio_3$ and Hib_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.

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. 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. 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.

Table 4. Immunisation uptake (%) at 24 months of age in 2012 (i.e. cohort born 01/01/2010-31/12/2010) 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	1739	94	94	90	94	94	87	90	90	92	91
	Dublin South East	1706	93	93	89	93	93	86	88	90	91	91
	Dublin South City	1802	96	96	86	96	96	82	86	89	91	91
	Dublin South West	2665	96	96	90	96	96	84	89	90	94	94
	Dublin West	2937	92	92	80	92	92	75	79	87	90	89
	Dublin North West	4054	93	93	83	93	93	81	83	87	89	88
	Dublin North Central	1737	96	96	90	96	96	85	90	88	92	92
	Dublin North	4481	95	95	91	95	95	88	91	92	93	93
	Kildare/West Wicklow	4400	96	96	94	96	96	90	93	93	95	94
	Wicklow	2122	94	94	83	94	94	79	83	89	91	90
	HSE-E Total	**27643**	**95**	**95**	**88**	**95**	**95**	**84**	**87**	**90**	**92**	**92**
HSE-M	Laois/Offaly	2764	97	97	97	97	97	91	95	93	95	96
	Longford/Westmeath	2107	97	97	97	97	97	92	95	94	96	96
	HSE-M Total	**4871**	**97**	**97**	**97**	**97**	**97**	**91**	**95**	**94**	**95**	**96**
HSE-MW	Clare	1716	95	95	93	95	95	89	93	92	94	94
	Limerick	2041	94	94	89	94	94	85	89	90	92	91
	Tipperary NR/East Limerick	2090	96	96	89	96	96	85	88	92	94	93
	HSE-MW Total	**5847**	**95**	**95**	**90**	**95**	**95**	**86**	**90**	**91**	**93**	**93**
HSE-NE	Cavan/Monaghan	2037	96	96	88	96	94	85	na	92	na	92
	Louth	1958	94	94	84	94	94	82	na	89	na	90
	Meath	3404	95	95	87	95	95	84	na	91	na	91
	HSE-NE Total	**7399**	**95**	**95**	**86**	**95**	**94**	**84**	**na**	**91**	**na**	**91**
HSE-NW	Donegal	2360	97	97	92	97	96	87	93	91	95	93
	Sligo/Leitrim	1428	96	96	93	96	96	86	93	90	95	95
	HSE-NW Total	**3788**	**97**	**96**	**92**	**97**	**96**	**87**	**93**	**91**	**95**	**93**
HSE-SE	Carlow/Kilkenny	2144	96	96	94	96	96	87	93	92	94	94
	South Tipperary	1389	97	97	95	97	97	89	94	94	95	95
	Waterford	2081	96	96	94	96	96	89	92	93	94	94
	Wexford	2245	97	97	97	97	96	90	95	93	96	95
	HSE-SE Total	**7859**	**97**	**96**	**95**	**96**	**96**	**89**	**93**	**93**	**95**	**94**
HSE-S	North Cork	1589	97	96	84	97	94	85	87	90	91	92
	North South Lee	5998	97	96	86	97	95	87	90	93	94	94
	West Cork	768	89	88	75	89	89	76	80	83	86	86
	Kerry	1906	97	97	86	97	96	88	91	92	94	94
	HSE-S Total	**10261**	**96**	**95**	**85**	**96**	**95**	**86**	**89**	**91**	**93**	**93**
HSE-W	Galway	4147	94	94	91	94	94	79	na	89	na	89
	Mayo	1800	96	96	82	96	96	82	na	91	na	91
	Roscommon	946	98	98	96	98	98	95	na	98	na	96
	HSE-W Total	**6893**	**95**	**95**	**89**	**95**	**95**	**82**	**na**	**90**	**na**	**90**
Ireland		**74561**	**95**	**95**	**89**	**95**	**95**	**85**	**90**	**91**	**93**	**92**

*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.

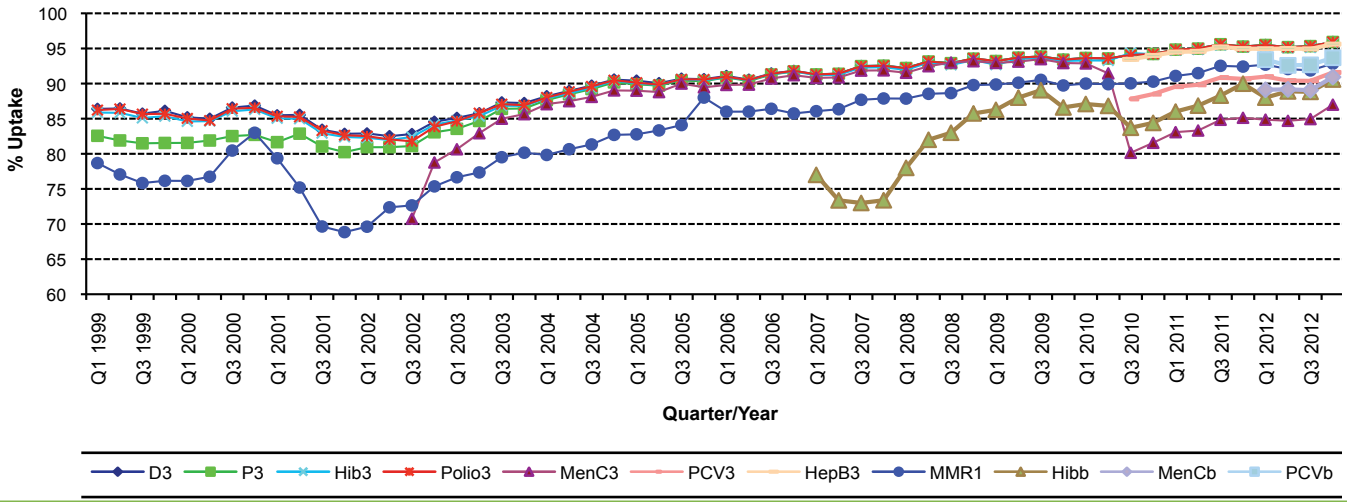

Figure 2. National quarterly immunisation uptake rates at 24 months

Note scale ranges from 60-100%
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 Q4-2005 MMR_1 figure is based on data from seven of the eight HSE-Areas. The Q1-2006 MMR_1 figure includes the HSE-E figure that is an estimate only. The Q1-2007, Q3-2007, Q2-2008 and Q3-2008 Hib_b figures are based on data from seven of the eight HSE Areas. In Q1-2008 the HSE-SE changed their Hib_b data extraction method compared to previous quarters; in Q1-2008 the uptake of Hib_b in the HSE-SE was 83% compared to 53% in Q4-2007. The Q3-2008 $MenC_3$ figure is based on data from six of the eight HSE Areas. The Q1-2009 HSE-E D_3, P_3, T_3, $Polio_3$ and MMR_1 uptake figures exclude those born on the 31/03/2007. The Q2-2009 HSE-E Hib_b 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 Hib_b figures also exclude uptake figures from Dublin North 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 Q1-2010 figures are based on data from six of the eight HSE Areas. The Q1-2010 Hib_b 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.

Uptake rates among the HSE Areas, for children at 24 months of age in 2012, for D_3, T_3, P_3, Hib_3 and $Polio_3$ ranged from 95% to 97%, $HepB_3$ ranged from 94% to 97%, MMR_1 ranged from 90% to 96%, PCV_3 ranged from 90% to 94%, Hib_b ranged from 85-97% and $MenC_3$ ranged from 82% to 91% (table 2). Among the six Areas in a position to provide data $MenC_b$ uptake ranged from 87% to 95% and PCV_b uptake ranged from 92% to 95%. The target uptake of 95% was reached or exceeded in all HSE Areas for the first time during 2012 for D_3, T_3, P_3, Hib_3 and $Polio_3$ and in seven Areas for $HepB_3$. In addition, the target uptake of 95% was reached or exceeded in the HSE-M for Hib_b, $MenC_b$, PCV_b and MMR_1, in the HSE-NW for PCV_b and in the HSE-SE for Hib_b and PCV_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 89% to 98% for D_3, T_3, P_3, $Polio_3$ and $HepB_3$, 88% to 98% for Hib_3, 86% to 96% for PCV_b and MMR_1, 83% to 98% for PCV_3, 79% to 95% for $MenC_b$, 75% to 97% for Hib_b and 75% to 95% for $MenC_3$ (table 4). The target uptake of 95% was reached or exceeded in 22 LHOs for D_3, T_3, P_3, Hib_3 and $Polio_3$, in 20 LHOs for $HepB_3$, in seven LHOs for PCV_b, in six LHOs for MMR_1, in five LHOs for Hib_b, in three LHOs for $MenC_b$ and in one LHO for $MenC_3$ and PCV_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 i.e. 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 $MenC_3$ (85%) and Hib_b (89%) in 2012 were still considerably lower than the uptake of the other recommended vaccines. In addition, to low uptake of $MenC_3$ and Hib_b, MMR_1 (92%) and PCV_3 (90%) uptake in 2012 are lower than the target uptake of 95%.

In contrast in 2012, 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 second year national annual uptake rates reached the target of 95% for these vaccines. All eight 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 2012. 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 2012 are available on the HPSC website in *Topics A-Z* under the heading *vaccination*.

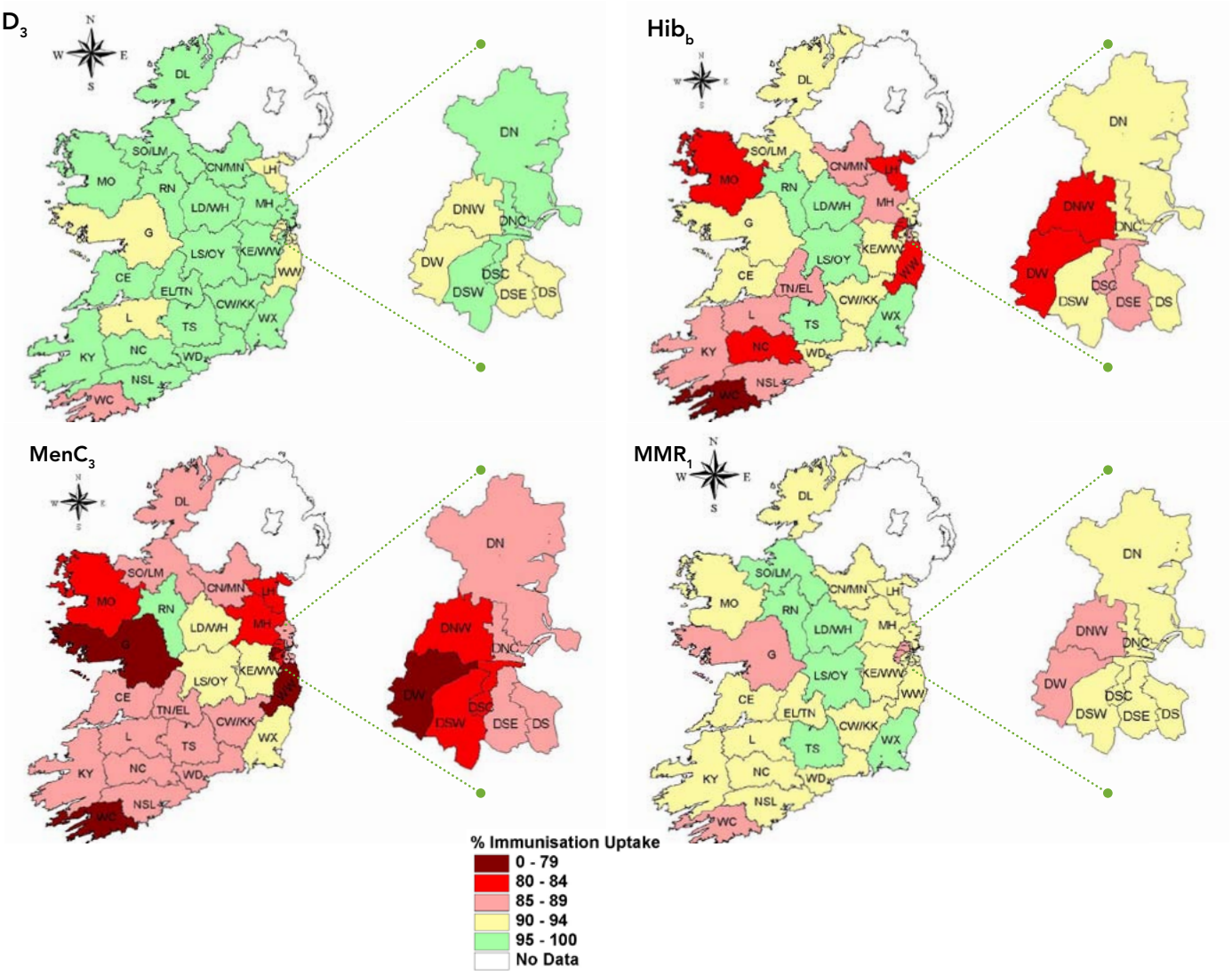

Figure 3. D_3, Hib_b, $MenC_3$ and MMR_1 immunisation uptake rates (%) in those 24 months of age in 2012 by Local Health Office (LHO)
LHOs in Dublin are highlighted separately for ease of viewing
North Lee and South Lee are separate LHOs, however, their combined (labelled NSL on the map) immunisation 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 uptake data are reported

8.2 HPV vaccine uptake 2011/2012

Summary

In the academic year 2011/2012 uptake of at least HPV stage 3 was:

85.5% among first year girls in second level schools
71.5% among sixth year girls in second level schools

In addition, 1,131 girls were recorded as having received at least HPV stage 3; of these 563 were recorded in the first year routine and sixth year catch up age equivalent cohorts in non-second level schools (i.e. special schools, Youthreach, Community Training Centres, home schooled or out of school) and 568 were recorded as being outside the cohorts recommended for vaccination.

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 the first year of second level school 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 will continue until 2013/2014.

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 is required. 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 information on the HPV school vaccination programme.

The Health Information and Quality Authority and HSE target for uptake of three doses of vaccine for the routine HPV vaccination programme is >80% and the HSE target for the catch-up programme is >60% uptake.[1]

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 2011/2012 in Ireland. This is the first HPV report from the database which is the result of collaboration between NIO, School Immunisation Teams, Immunisation System Administrators, Immunisation Coordinators, Immunisation administrative staff, HPV vaccine working groups and HPSC.

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]

Cohort for vaccination in the academic year 2011/2012

The routine and catch-up cohorts for the 2011/2012 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** i.e. those who were born between 01/09/1999 and 31/08/2000
    - attending special schools or
    - registered with the National Education and Welfare Board to be home schooled.

Catch up HPV Vaccination Programme

- All girls in **sixth year of second level schools**
- **and their equivalents** i.e. those who were born between 01/09/1993 and 31/08/1994 and
    - attending special schools* or
    - registered with the National Education and Welfare Board to be home schooled* or
    - attending Youthreach and Community

Training Centres funded by the Department of Education and Skills*.

* As the catch up programme will run until the end of the academic year 2013/2014, areas could choose to vaccinate the total cohort in these groups in 2011/2012 i.e. girls who reached 15 - 18 years of age between 1st September 2011 and 31st August 2012 for operational reasons. (However, those who were not in the cohort's equivalent to sixth year of second level schools were to be recorded on the immunisation database as outside cohort in the academic year 2011/2012.)

Terminolgy 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 Education and 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 National Education and 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 2011 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 01/09/1999 and 31/08/2000 on the school roll of special schools or registered with the National Education and Welfare Board on 30th September 2011. The denominator for age equivalent to sixth years in second level schools in the catch-up programme was defined as girls born between 01/09/1993 and 31/08/1994 on the school roll of special schools or registered with the National Education and Welfare Board or attending Community Training Centres or Youthreach on 30th September 2011. All the denominator data was entered on the immunisation database by the relevant System Administrator.

Results

The figures presented in this summary are based on data recorded on the immunisation system on the 21st August 2013. 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, 85.5% of girls in first year in second level schools were recorded as having received at least HPV stage 3 (considered to have completed a three dose course) (Table 1). Among the 32 Local Health Offices (LHOs) uptake of at least HPV stage 3 ranged from 73.3% to 91.7%; with four recording ≥90.0% uptake and five recording <80.0% uptake.

Sixth year girls in second level schools
In Ireland, 71.5% of girls in sixth year in second level schools were recorded as having at least HPV stage 3 (Table 2). Among the 32 LHOs uptake of at least HPV stage 3 ranged from 54.7% to 85.5%; with four recording ≥80.0% uptake and two 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.

First and Sixth year second level equivalent cohorts in non-second level schools/Outside cohort/Out of school
In addition, 1,131 girls were recorded as having received at least HPV stage 3 (Table 3); of these 563 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 568 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 01/09/1999 and 31/08/2000) or equivalent to sixth years (born between 01/09/1993 and 31/08/1994). For operational reasons HSE vaccinating staff did not adhere strictly to these birth cohorts. Many of the vaccinations in these school settings were actually "outside cohort". 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.

Total doses administered
A total of 139,646 administered vaccine doses were recorded.

Table 1 HPV vaccine uptake in the academic year 2011/2012 among first year girls in second level schools

HSE Region	Local Health Office/ HSE Region	2011/2012						
		First Year (routine HPV vaccination programme)**						
			Numbers Vaccinated with:			% Vaccinated with:		
		Denominator	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	922	817	816	808	88.6%	88.5%	87.6%
	Dublin South East	622	538	535	531	86.5%	86.0%	85.4%
	Dublin South City	838	652	651	649	77.8%	77.7%	77.4%
	Dublin South West	791	667	661	631	84.3%	83.6%	79.8%
	Dublin West	941	823	817	758	87.5%	86.8%	80.6%
	Kildare/West Wicklow	1580	1397	1384	1367	88.4%	87.6%	86.5%
	Wicklow	731	644	639	625	88.1%	87.4%	85.5%
	Laois/Offaly	1021	951	946	930	93.1%	92.7%	91.1%
	Longford/Westmeath	936	839	835	818	89.6%	89.2%	87.4%
	Total Dublin Mid Leinster	**8382**	**7328**	**7284**	**7117**	**87.4%**	**86.9%**	**84.9%**
Dublin North East	Dublin North	1441	1278	1272	1244	88.7%	88.3%	86.3%
	Dublin North Central	695	610	608	597	87.8%	87.5%	85.9%
	Dublin North West	1121	1078	1064	1004	96.2%	94.9%	89.6%
	Cavan/Monaghan	901	835	833	826	92.7%	92.5%	91.7%
	Louth	1023	912	905	894	89.1%	88.5%	87.4%
	Meath	1239	1104	1093	1079	89.1%	88.2%	87.1%
	Total Dublin North East	**6420**	**5817**	**5775**	**5644**	**90.6%**	**90.0%**	**87.9%**
South	North Cork	574	489	486	472	85.2%	84.7%	82.2%
	North Lee - Cork	1192	1049	1040	996	88.0%	87.2%	83.6%
	South Lee - Cork	1200	982	972	939	81.8%	81.0%	78.3%
	West Cork	372	283	281	277	76.1%	75.5%	74.5%
	Kerry	913	816	805	796	89.4%	88.2%	87.2%
	Carlow/Kilkenny	907	832	829	818	91.7%	91.4%	90.2%
	South Tipperary	555	482	475	463	86.8%	85.6%	83.4%
	Waterford	824	756	752	743	91.7%	91.3%	90.2%
	Wexford	1075	948	943	930	88.2%	87.7%	86.5%
	Total South	**7612**	**6637**	**6583**	**6434**	**87.2%**	**86.5%**	**84.5%**
West	Donegal	1173	1045	1042	1036	89.1%	88.8%	88.3%
	Sligo/Leitrim	602	540	537	534	89.7%	89.2%	88.7%
	Galway	1573	1337	1324	1312	85.0%	84.2%	83.4%
	Mayo	798	598	593	585	74.9%	74.3%	73.3%
	Roscommon	348	296	296	289	85.1%	85.1%	83.0%
	Clare	730	652	647	633	89.3%	88.6%	86.7%
	Limerick	967	890	886	865	92.0%	91.6%	89.5%
	Tipperary NR/ East Limerick	895	788	786	775	88.0%	87.8%	86.6%
	Total West	**7086**	**6146**	**6111**	**6029**	**86.7%**	**86.2%**	**85.1%**
Ireland		**29500**	**25928**	**25753**	**25224**	**87.9%**	**87.3%**	**85.5%**

The figures presented in this table are based on data recorded on the immunisation system on the 21st August 2013. 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 recorded on the database, this girl may or may not have had a stage 2 or a stage 3 recorded.
Similarly, 'at least stage 2' means a girl had a stage 2 recorded on the database, they may or may not have had stage 1 or a stage 3 recorded.
Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, they may or may not have had stage 1 or a stage 2 recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2011/2012.

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 in Ireland compares very favourably with estimates in other countries that have introduced and monitored HPV vaccination.[3,4,5,6,7,8,9,10,11,12]

Acknowledgements

Thank you to all HSE staff, Department of Education and Skills staff, staff in all educational settings, parents and girls, who implemented, participated in and supported the school HPV vaccination programme.

Table 2 HPV vaccine uptake in the academic year 2011/2012 among sixth year (catch up campaign) girls in second level schools

HSE Region	Local Health Office/ HSE Region	2011/2012						
		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	938	596	593	583	63.5%	63.2%	62.2%
	Dublin South East	569	335	333	332	58.9%	58.5%	58.3%
	Dublin South City	908	590	582	562	65.0%	64.1%	61.9%
	Dublin South West	710	623	601	575	87.7%	84.6%	81.0%
	Dublin West	790	607	589	535	76.8%	74.6%	67.7%
	Kildare/West Wicklow	1315	972	959	941	73.9%	72.9%	71.6%
	Wicklow	613	504	491	455	82.2%	80.1%	74.2%
	Laois/Offaly	805	580	572	549	72.0%	71.1%	68.2%
	Longford/Westmeath	925	731	725	712	79.0%	78.4%	77.0%
	Total Dublin Mid Leinster	**7573**	**5538**	**5445**	**5244**	**73.1%**	**71.9%**	**69.2%**
Dublin North East	Dublin North	1268	772	747	694	60.9%	58.9%	54.7%
	Dublin North Central	572	388	376	361	67.8%	65.7%	63.1%
	Dublin North West	956	673	658	605	70.4%	68.8%	63.3%
	Cavan/Monaghan	875	673	673	667	76.9%	76.9%	76.2%
	Louth	829	583	574	549	70.3%	69.2%	66.2%
	Meath	886	650	632	619	73.4%	71.3%	69.9%
	Total Dublin North East	**5386**	**3739**	**3660**	**3495**	**69.4%**	**68.0%**	**64.9%**
South	North Cork	539	420	413	399	77.9%	76.6%	74.0%
	North Lee - Cork	1236	902	886	842	73.0%	71.7%	68.1%
	South Lee - Cork	965	701	689	667	72.6%	71.4%	69.1%
	West Cork	326	209	209	206	64.1%	64.1%	63.2%
	Kerry	945	793	788	767	83.9%	83.4%	81.2%
	Carlow/Kilkenny	833	642	641	632	77.1%	77.0%	75.9%
	South Tipperary	530	410	397	389	77.4%	74.9%	73.4%
	Waterford	743	619	608	591	83.3%	81.8%	79.5%
	Wexford	926	743	735	699	80.2%	79.4%	75.5%
	Total South	**7043**	**5439**	**5366**	**5192**	**77.2%**	**76.2%**	**73.7%**
West	Donegal	1038	856	854	836	82.5%	82.3%	80.5%
	Sligo/Leitrim	524	458	454	448	87.4%	86.6%	85.5%
	Galway	1565	1227	1205	1149	78.4%	77.0%	73.4%
	Mayo	782	636	632	612	81.3%	80.8%	78.3%
	Roscommon	338	285	279	269	84.3%	82.5%	79.6%
	Clare	659	504	498	482	76.5%	75.6%	73.1%
	Limerick	923	750	734	706	81.3%	79.5%	76.5%
	Tipperary NR/ East Limerick	740	578	575	562	78.1%	77.7%	75.9%
	Total West	**6569**	**5294**	**5231**	**5064**	**80.6%**	**79.6%**	**77.1%**
Ireland		**26571**	**20010**	**19702**	**18995**	**75.3%**	**74.1%**	**71.5%**

The figures presented in this table are based on data recorded on the immunisation system on the 21st August 2013. 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.
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Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, they may or may not have had stage 1 or a stage 2 recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2011/2012.

Table 3 HPV vaccine uptake in the academic year 2011/2012 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	22	22	18
	Dublin South East	9	8	5
	Dublin South City	69	68	51
	Dublin South West	54	53	46
	Dublin West	224	200	162
	Kildare/West Wicklow	29	25	21
	Wicklow	33	30	23
	Laois/Offaly	33	26	23
	Longford/Westmeath	49	49	43
	Total Dublin Mid Leinster	**522**	**481**	**392**
Dublin North East	Dublin North	84	66	44
	Dublin North Central	60	51	42
	Dublin North West	53	37	25
	Cavan/Monaghan	1	1	1
	Louth	17	15	14
	Meath	63	58	55
	Total Dublin North East	**278**	**228**	**181**
South	North Cork	9	8	6
	North Lee - Cork	34	33	29
	South Lee - Cork	33	32	26
	West Cork	2	2	0
	Kerry	29	26	24
	Carlow/Kilkenny	63	60	50
	South Tipperary	22	20	20
	Waterford	66	58	46
	Wexford	87	82	71
	Total South	**345**	**321**	**272**
West	Donegal	11	9	6
	Sligo/Leitrim	58	56	56
	Galway	59	53	29
	Mayo	61	59	54
	Roscommon	9	8	5
	Clare	39	36	28
	Limerick	86	79	69
	Tipperary NR/ East Limerick	45	37	32
	Total West	**368**	**337**	**279**
Homeschooled		3	3	3
Total of LHOs and Home Schooled		**1516**	**1370**	**1127**
Out of School		5	5	4
Total of LHOs and Home Schooled and Out of School		**1521**	**1375**	**1131**

The figures presented in this table are based on data recorded on the immunisation system on the 21st August 2013. 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 recorded on the database, this girl may or may not have had a stage 2 or a stage 3 recorded.
Similarly, 'at least stage 2' means a girl had a stage 2 recorded on the database, they may or may not have had stage 1 or a stage 3 recorded.
Similarly, 'at least stage 3' means a girl had a stage 3 recorded on the database, they may or may not have had stage 1 or a stage 2 recorded.
**Please see Background section of report for details of cohorts recommended HPV vaccine during the academic year 2011/2012.

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09

Healthcare-Associated Infections Antimicrobial Consumption Antimicrobial Resistance

9.1.0 Healthcare-associated infections (HCAI)

Key Points

- Prior to 2012, only new cases of *Clostridium difficile* infection (CDI) were notifiable. Effective 1st January 2012, recurrent CDI cases also became notifiable
- In 2012, 1,830 cases of CDI were notified. Of those, 1,624 (89%) were classified as new, 181 (10%) as recurrent and 25 (1%) of unknown case type. This represents a national crude incidence rate of 35.4 new cases per 100,000 population, a decrease of 12% compared with notifications in 2011
- Of the 1,830 CDI cases, 1,174 (64%) were reported from patients aged 65 years or older
- The voluntary enhanced CDI surveillance scheme received information on 1,735 CDI cases [1,499 (86.4%) new, 159 (9.2%) recurrent and 77 (4.4%) of unknown case type] from 46 acute hospitals. This represents a national CDI incidence rate in 2012 of 2.7 cases per 10,000 bed days used, a decrease from 3.1 in 2011. However, caution should be taken when interpreting trends in the national CDI rates due to changes in the numbers of hospitals participating in the enhanced surveillance scheme and also due to changes in laboratory testing protocols
- The majority of CDI cases (68%) originated in a healthcare setting (acute hospital or residential institution), with 17% originating in the community
- Whilst the majority of patients experienced CDI symptom onset in healthcare facilities (64%), 30% had symptom onset in the community
- Of 294 *C. difficile* isolates with available ribotyping data (17% of all cases) that were reported from 14 hospitals, the most frequent ribotypes reported were: 078 (n=26; 13%), 014 (n=23; 11%), 005 (n=21; 10%), 002 and 015 (n=17 each; 8%)

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 2012, 1,830 cases of CDI were notified to Public Health Departments via the Computerised Infectious Diseases Reporting (CIDR) system. Of those, 1,624 (89%) were classified as new, 181 (10%) as recurrent and 25 (1%) of unknown case type. All cases were laboratory-confirmed. **Table 1** displays the number and crude incidence rate (CIR) of CDI notifications nationally and by public health region.

The national CIR of new CDI cases in 2012 was 35.4 per 100,000 population. This reflects a decrease of 12% from 40.3 per 100,000 population in 2011. Taking both new and recurrent cases into account, the overall CIR for 2012 was 39.9 per 100,000 population. Variation was observed in the incidence of CDI by public health

Table 1. Number of CDI cases (both new and recurrent) notified in 2012, CDI CIR, by public health region and overall new CDI notifications with CIR for 2011 and 2012 (Source: CIDR)

Public Health Region	No. of cases	*CIR incl. 95% C.I.
East	941	58.1 (47.9 - 54.9)
Midlands	48	17 (10.6 - 19.8)
Mid West	163	43 (27.4 - 39)
North East	89	20.2 (12.4 - 19.8)
North West	65	25.2 (15.3 - 26.5)
South East	188	28.3 (22.6 - 30.4)
South	165	33.2 (26 - 35.8)
West	171	38.4 (30.8 - 42)
Total 2012	1830	39.9 (33.6 - 37)
Total 2012 [NEW cases only]**	1624	35.4 (33.6 - 37)
Total 2011 [NEW cases only]**	1848	40.3 (38.5 - 42.1)

** Crude incidence rates (CIR) calculated using 2011 census data*
*** Numbers reflect new CDI cases only. Prior to January 2012, only new cases of CDI were notifiable. As of 1st January 2012, recurrent cases also became notifiable. CIR for new cases only is provided to allow comparison with historical data.*

region. However, this most likely reflects geographical differences in the distribution of acute healthcare facilities and differences in laboratory diagnostic and reporting protocols, rather than true regional variation in CDI incidence. Identification of seasonal patterns from CIDR notification data is hindered by delayed and batched laboratory notifications.

Figure 1 displays the gender and age breakdown of patients with CDI. The majority of patients were female (61%). The mean patient age was 67 years (range: 2 – 101 years), with 1,174 cases (64%) reported in patients aged 65 years and older.

Regarding the patient location at the time of CDI diagnosis, the majority were classified as 'hospitalised' (73%), 13% from general practice, 4.4% from outpatients or day patients, 5.5% from the emergency department and 4% from either 'other', or 'unknown' patient location. This is similar to that reported in 2011. 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 2012, 28 deaths were reported in patients with CDI. Two deaths were reported as due to CDI, 14 were reported as not due to CDI and for the remaining 12 deaths, the contribution of CDI to death was unknown.

Notifiable *C. difficile* infection: Outbreaks
In 2012, seven CDI outbreaks, all healthcare-associated and involving 40 patients, were notified to Public Health Departments as displayed in **Table 2**. Five were linked to hospitals, and two to residential institutions.

Table 2. CDI outbreaks reported in Ireland in 2012 by public health region (Source, CIDR)

Public Health Region	Outbreak location	Total number ill
East	Hospital	6
East	Hospital	9
East	Residential insitution	4
Mid West	Hospital	6
North East	Residential insitution	2
West	Hospital	5
West	Hospital	8

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 and Infectious Diseases Study Group on *C. difficile* (ESCMID-ESGCD) interim case definitions. To the end of 2012, 46 acute hospitals participated in the voluntary enhanced surveillance CDI scheme, comprising 40 public hospitals (26 general (100%), nine tertiary (100%) and five specialist hospitals (42%)) and six private hospitals (50%).

In 2012, 1,735 CDI cases were reported to the enhanced surveillance scheme (representing 83% of all the CDI cases notified to Public Health Departments via CIDR). Of these, 1,499 (86%) were classified as new, 159 (7.1%) as recurrent and 77 (4.4%) of unknown CDI case type.

Of the reported cases, 52% (n=894) originated within the reporting healthcare facility. The overall national CDI incidence rate of new and recurrent cases combined, which were acquired within the reporting healthcare facility was 2.7 cases per 10,000 bed days used (BDU), a decrease from 3.1 in 2011. The incidence rate of new CDI cases was 2.4 cases per 10,000 BDUs representing a decrease from 2.8 in 2011 while the incidence of recurrent cases remained at 0.2 cases, unchanged from 2011.

Caution should be taken when interpreting national CDI trends, particularly prior to 2012 because of:
(i) Changes in the numbers of participating hospitals as displayed in **Figure 2.** Throughout 2012, the overall number of hospitals participating in enhanced CDI surveillance stabilised. In 2012, there was complete participation in CDI enhanced surveillance by all tertiary and general hospitals

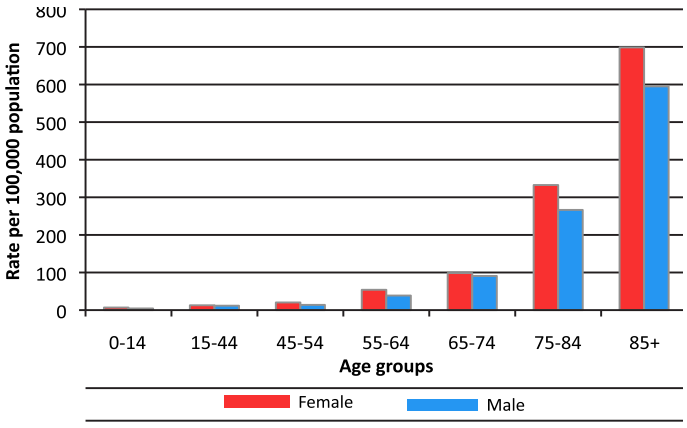

Figure 1: Age and gender distribution of CDI in Ireland, 2012 (Source, CIDR)

** Rates calculated using 2011 census data*

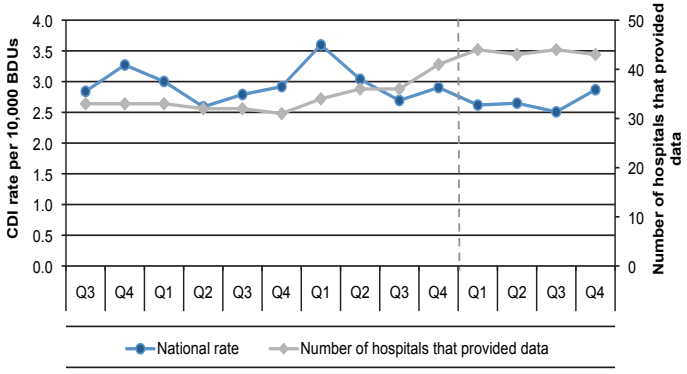

Figure 2. Quarterly national rate of healthcare-associated CDI (new and recurrent): 2009 – 2012.

(ii) Changes in *C. difficile* laboratory testing protocols. Throughout 2012, there were fewer changes in laboratory testing protocols. Please also refer to the section on laboratory testing of *C. difficile* in Ireland.

During 2012, the national CDI rate remained relatively stable as displayed in **Figure 2**. The CDI rate is based on the number of new and recurrent CDI cases that originated in the participating healthcare facility. The rate is calculated using acute public hospital activity data from the HSE Business Intelligence Unit, Corporate Planning and Corporate Performance (CPCP).
There was a wide range in the incidence of CDI among participating hospitals in 2012 (range, 0 – 6.6 cases per 10,000 BDU; median, 1.7 cases). The median incidence rate for the nine participating tertiary hospitals was higher compared to the 26 general hospitals (2.7 versus 1.9 CDI cases per 10,000 BDU). The differences in CDI median incidence rates may reflect variation between hospitals 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 2012.

There were significant changes in laboratory testing protocols for *C. difficile* between 2009 and 2011. The vertical grey dotted line (Q1 2012) reflects a time beyond which there have been fewer changes in laboratory testing.

Severe CDI

A severe case of CDI is defined as a patient requiring admission to an intensive care unit (ICU) for treatment of CDI or its complications, a patient requiring colectomy or 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 2012, 26 (1.5%) severe CDI cases were reported, which was similar to 2011 (1.4%). Three patients required both surgery and ICU admission, five required surgery only and 18 required ICU admission without surgery.

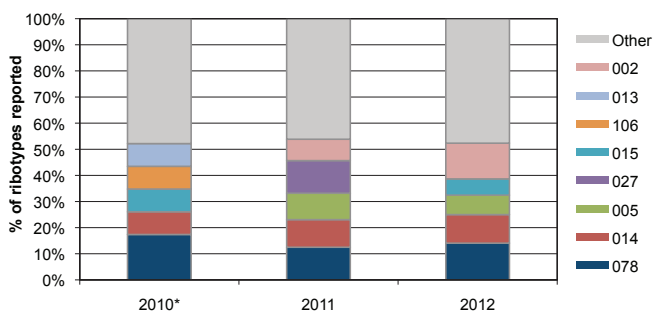

Figure 3. Most frequently reported C. difficile ribotypes in Ireland: 2010 – 2012

Onset & Origin of CDI

Onset: Patient location when symptoms of CDI commenced

Sixty-four percent (n=1,118) of patients had CDI symptom onset in a healthcare facility (healthcare onset), 30% (n=515) had symptom onset in the community and for 6%, location at CDI onset was unknown.

Of the 1,118 patients with healthcare onset CDI, 77% (n=859) had onset in the reporting hospital, 3% (n=39) in another hospital, 17% (n=177) in a nursing home and for the remaining 3% (n=39) onset was in another unspecified healthcare facility or of unknown location. Over the period 2010 to 2012, there was a decrease in the proportion of patients with CDI symptom onset in a healthcare facility (73% to 64%). Conversely, there was an increase in the proportion of patients with symptom onset in the community (27% to 30%) and those with unknown location of symptom onset (0 – 6%) (**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=1,174; 68%). Community-associated cases accounted for 17% (n = 303) and for 5% (n = 90) of CDI cases the origin could not be assigned as either healthcare or community-associated, as the patient had been discharged from a healthcare facility between 4 and 12 weeks prior to the CDI onset date. For the remaining 10% (n = 168) of cases the origin was unknown, an increase from 2010 (3%) and 2011 (4%).

Of the 1,174 healthcare-associated CDI cases, 76% (n=894) originated in the reporting hospital, 6% (n=71) originated in a hospital other than the reporting hospital, 15% (n=174) originated in nursing homes and 3% (n=30) originated in another unspecified healthcare facility or were of unknown origin (**Table 3**).

Of the 1,174 cases of healthcare-associated CDI:
- 90.4% (n=1,061) experienced onset of CDI symptoms at least 48 hours following admission to a healthcare facility (healthcare-onset, healthcare-associated)
- 8.8% (n=104) experienced symptom onset in the community within four weeks of discharge from a healthcare facility (community-onset, healthcare-associated)
- 0.8% (n = 9) had no information recorded on symptom onset

Of the 303 cases of community-associated CDI:
- 91% (n=275) experienced CDI symptom onset while outside a healthcare facility and without a history of discharge from a healthcare facility within the previous 12 weeks
- 8.2% (n=25) 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
- 0.8% (n = 3) had no information recorded on symptom onset

Information was captured on the location where the patient's faecal specimen was taken. The reporting hospital accounted for the majority (75%) of patient specimens (n=1,306), with 9% (n=151) taken in the GP surgery, 9% (n=156) in nursing homes and 3% (n=50) in a hospital other than the reporting hospital. For the remaining 4% (n=72) of specimens, no information was provided.

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. There was a decrease in the number of new CDI cases reported in 2012 compared to 2011. However, this may be partly due to changes in laboratory testing protocols for *C. difficile*. Please refer to section on laboratory testing of *C. difficile* in Ireland. In 2012, recurrent CDI accounted for 9% of notifications through the enhanced surveillance scheme. This reflects a small increase in recurrent CDI from 7% in 2011. Recurrent CDI may result in severe infection, places a further burden on limited hospital isolation resources and results in significant patient morbidity.

Table 3 National CDI rates and breakdown by enhanced data types, 2010 – 2012

	2010	2011	2012
Total CDI cases reported nationally	**1187**	**1511**	**1735**
Cases known to have originated in a hospital	726	862	894
National CDI rate	2.8	3.0	2.7
National median rate	2.3	2.2	1.7
Case Type			
% New cases	92%	92%	86%
% Recurrent cases	8%	7%	9%
% Unknown cases	0%	1%	4%
Age/Sex			
% >65	71%	69%	66%
% M	44%	39%	41%
%F	56%	61%	59%
Origin			
Healthcare-associated	77%	74%	68%
Breakdown of those that were healthcare associated:			
Within reporting hospital	80%	78%	76%
Other Hospital	7%	8%	6%
Nursing Home/LTCF	10%	13%	15%
Unknown	2%	1%	3%
Community-associated	20%	20%	17%
Discharged 4-12 wks from healthcare facility	0%	3%	5%
Unknown	3%	4%	10%
Onset			
Healthcare-onset	73%	71%	64%
Breakdown of those that were healthcare-onset			
Within reporting hospital	82%	78%	77%
Other Hospital	5%	6%	3%
Nursing Home/LTCF	10%	14%	16%
Unknown	2%	1%	3%
Community-onset	27%	27%	30%
Unknown	0%	2%	6%
Severity			
% Severe cases	1.4%	1.4%	1.5%

Enhanced surveillance data collected since Q3 2009 indicates that CDI is not confined to healthcare settings and is increasingly common in community and nursing home settings. In 2012, 30% of all CDI cases had symptom onset in the community an increase from 27% in 2011 and 2010. In 2012, 17% of CDI cases were community-associated and 10% were associated with nursing homes, a figure which is similar to data from 2011 and 2010.

Of the 303 community-associated cases reported in 2012, 91% of those patients experienced CDI symptom onset in the community, without a history of discharge from a healthcare facility within the previous 12 weeks. It is essential that CDI is considered in the differential diagnosis of all patients presenting with diarrhoea and that specimens are sent in a timely fashion for laboratory diagnosis.

Patients with CDI in healthcare facilities must be isolated with contact precautions as outlined in national guidelines. All healthcare professionals must promote practices known to reduce the incidence of CDI including; compliance with infection prevention and control measures, awareness of local CDI surveillance data and prudent use of antimicrobials. The national guidelines for antimicrobial stewardship in hospitals in Ireland are available at: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/

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 have a national *C. difficile* reference laboratory or ribotyping service. Therefore, laboratories submit specimens abroad for ribotyping. In 2012, ribotyping data was provided for 294 *C. difficile* isolates (17% of all samples) submitted from 14 hospitals. This represents an increase from data reported in 2010 and 2011 as displayed in **Table 4**.

The most common ribotypes reported in 2012 were: 078 (n=26, 13%), 014 (n=23, 11%), 005 (n=21, 10%), 015 and 002 (both n=17, 8%). Many of these ribotypes were also reported as the five most common ribotypes in 2010 and 2011 (**Figure 3**). In 2012, one hospital reported that 75% of all *C. difficile* isolates were ribotyped. The most common ribotypes reported from that hospital correlate with the most common ribotypes reported nationally in 2012 and include: 002 (n=23, 14%), 078 and 014 (n = 16 each, 10%), 005 and 015 (n=13 each, 8%), 023 (n=5, 3%) and 027 (n=1, 1%).

Table 4.0 Increases in the National Reporting of C. difficile ribotyping data in Ireland, 2010 - 2012

	2010	2011	2012
Total number of CDI cases reported	1187	1511	1735
Number (%) of cases with ribo-type data	48 (4%)	204 (14%)	294 (17%)
Number of hospitals providing ribotype data	5	10	14

Laboratory Testing of *C. difficile* in Ireland
There have been significant changes in *C. difficile* diagnostic methods in Ireland in recent years. In 2006, a laboratory survey on *C. difficile* diagnostic practices in 25 Irish microbiology laboratories reported that all 25 used an enzyme immunoassay (EIA) for toxin detection. Changes in the recommended *C. difficile* laboratory testing practice were proposed in 2009 and 2010 by the European Society for Clinical Microbiology and Infectious Diseases (ESCMID) and the United Kingdom (UK) National Health Service (NHS).

The Irish laboratory survey was repeated in 2011, with information received from 33 laboratories performing on-site testing for *C. difficile*. Over half (58%) reported having changed the *C. difficile* testing algorithm in the past two years. The majority (74%) reported that the change in testing had involved a move from a one-step to a two-step testing algorithm.

In 2012, a further survey was conducted to update information on current laboratory diagnostic methods used. Combined information from repeated surveys on laboratory testing methodologies has provided a quarterly summary of testing methods between Q1 2010 and Q4 2012 as displayed in **Figure 4.**

Over that time period, there was a large decrease in the numbers using the one step testing method (17 to 7) and contemporaneously, there was an increase in two-step testing methods, of which there are a variety in use (**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.

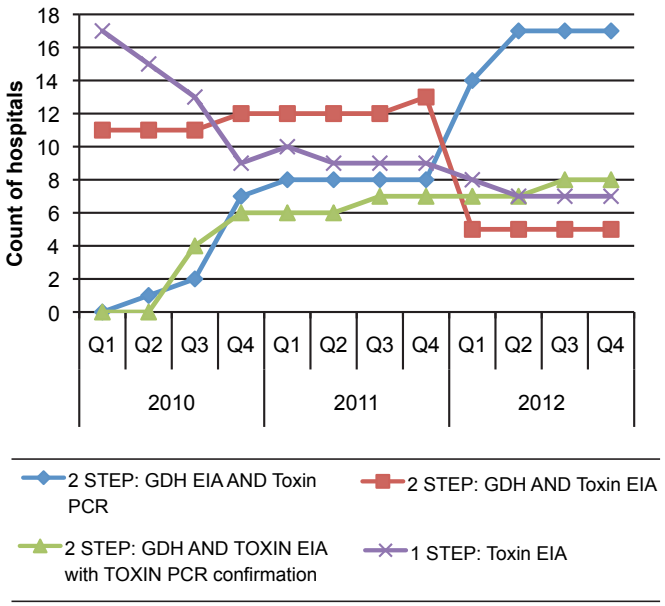

Figure 4. Changes in C. difficile laboratory testing protocols: 2010 - 2012

- **1 STEP: Toxin EIA** - Enzyme immunoassay (EIA) for the detection of *C. difficile* TcdA and/or TcdB;
- **2 STEP: GDH EIA AND Toxin PCR** - EIA for the detection of glutamate dehydrogenase (GDH) of *C. difficile* as a first screening test followed by a PCR for the detection of TcdA and/or TcdB genes;

- **2 STEP: GDH AND TOXIN EIA** - EIA for the detection of 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 AND TOXIN EIA with TOXIN PCR confirmation** - Same as for 2 STEP: GDH AND TOXIN EIA but with the addition of a confirmatory TOXIN PCR if the first Toxin EIA is negative.

Conclusion
As a result of changes to the Infectious Diseases Regulations, effective January 2012, CIDR notification now includes both new and recurrent cases of CDI in their own category. 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. To maintain the quality of this information, it is important that all positive *C. difficile* laboratory results are discussed with the clinician responsible for the patient to ascertain the following information:

1. That the patient with the positive laboratory test result for *C. difficile* meets the CDI case definition – if the case definition is not met, the laboratory result is not notifiable

2. Whether the patient has previously had a positive *C. difficile* test result within the past eight weeks:
   a. If yes, and the patient's diarrhoea had resolved but has subsequently returned, this represents recurrent CDI
   b. If yes, and the patient's diarrhoea has not yet resolved, this is a repeat positive specimen from the same CDI episode

The original 2008 *C. difficile* national guideline was updated in 2012 by the Sub-Committee of the Health Protection Surveillance Centre (HPSC) and has been approved by the Scientific Advisory Committee of the HPSC in February 2013. The updated *C. difficile* guidelines may be accessed on the HPSC website at: http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/Publications/

9.1.2 HCAI Surveillance

9.1.2.1 National Report on the Point Prevalence Survey of Hospital-Acquired Infections & Antimicrobial Use in European Acute Care Hospitals: May 2012

In May 2012, 50 acute Irish hospitals (42 public and eight private) participated in the voluntary European Centre for Disease Prevention and Control (ECDC) point prevalence survey (PPS) of hospital-acquired infections (HAI) and antimicrobial use (AMU). The national PPS report was published in November 2012.

Key Points:

- The breakdown of participating hospitals by type included: 15 primary/general, ten secondary/regional, six tertiary, 11 specialist public, one specialist private and seven other private hospitals
- The average number of acute beds in the 42 public hospitals ranged from 135 to 603, depending on the hospital type. The average proportion of single patient rooms was lowest in public primary hospitals (14.8%) and highest in private hospitals (36.8%)
- One hospital reported having no infection prevention and control nurse (IPCN) and 17 hospitals (34%) reported having no designated infection prevention and control doctor (IPCD). Both public and private hospitals reported having 0.70 IPCN per 100 beds. Private hospitals reported having 0.19 IPCD per 100 beds, which was higher than the 0.11 IPCD/100 beds reported by public hospitals
- Of the 9,030 eligible patients surveyed, there was a slight female preponderance at 53.7%, with 12% of the population aged <16 and 48% aged ≥65 years
- Eighteen percent of patients had undergone surgery since hospital admission and 49% had at least one invasive device *in situ* (e.g., peripheral vascular catheter or urethral catheter)

Hospital-Acquired Infections

- There were 501 active HAI identified in 467 patients. The overall HAI prevalence was 5.2%. The majority of the HAI occurred in patients aged ≥16 years (92.9%)
- The overall HAI prevalence, by hospital type was highest for tertiary hospitals (7.5%) and lowest for private hospitals (2.5%)
- Patients with HAI were more likely to have risk factors, such as surgery since hospital admission and invasive medical devices *in situ*, than the overall eligible population
- The prevalence of HAI was highest in augmented care units [adult and paediatric intensive care units (ICU), neonatal intensive care units (NICU) and high dependency units (HDU)] (16.5%), followed by surgical wards (6.7%). Psychiatric wards and obstetrics/gynaecology wards had the lowest HAI prevalence (1.5%)
- The top four HAI types reported were:
  1. Surgical site infection (91 cases; 18.2%)
  2. Pneumonia (86 cases; 17.2%)
  3. Urinary tract infection (75 cases; 15%)
  4. Bloodstream infection (66 cases; 13%)
- Of the bloodstream infections, 28 (42%) were due to infection of an indwelling vascular catheter
- There were 29 patients with *Clostridium difficile* infection, accounting for 5.7% of all HAI
- The most frequent group of pathogens causing HAI were the *Enterobacteriaceae* and of those, one-in-four were resistant to broad spectrum third generation cephalosporins. *Staphylococcus aureus* was the next most frequent pathogen causing HAI, and 37% of *Staphylococcus aureus* was resistant to flucloxacillin (i.e., meticillin-resistant *Staphylococcus aureus* or MRSA)

Antimicrobial Use

- The survey collected information on all patients who were prescribed antimicrobials, not just those being treated for a HAI. There were 3,108 patients who were prescribed 4,532 systemic antimicrobials. The overall AMU prevalence was 34%. The majority of antimicrobial use occurred in patients aged ≥16 years (91%)
- The overall AMU prevalence, by hospital type was highest for tertiary hospitals (37.4%) and lowest for specialist hospitals (20.3%)
- The prevalence of AMU, by ward type was highest in augmented care units [e.g., ICU, NICU, HDU] (50.4%) and lowest in psychiatric units (5.5%)
- The parenteral (i.e., intravenous) route accounted for most prescribed antimicrobials (63%)
- There was a documented indication for the antimicrobial prescription in 3,767 cases (83%). The indication for prescription was for treatment of infection in 78% of cases, surgical antimicrobial prophylaxis in 11% of cases and medical prophylaxis in 8% of cases
- Treatment of community-associated infections represented the majority of antimicrobial prescriptions (69%), followed by hospital-associated infections, which accounted for 29% of prescriptions. The most common infection sites for which antimicrobials were prescribed included; respiratory tract (35%), skin/soft tissue/wound (14%), abdominal (11%) and lower urinary tract infections (7%)
- The majority of surgical antimicrobial prophylaxis (73%) exceeded single-dose and almost half (47%) of surgical antimicrobial prophylaxis was continued beyond 24 hours duration
- Although the indication for prescription of antimicrobials for medical prophylaxis was not specifically recorded, broad spectrum agents including, co-amoxiclav and ciprofloxacin accounted for 8.6% and 4.4% of medical prophylaxis, respectively
- Broad spectrum β lactam-β lactamase inhibitor combination antimicrobials (i.e., co-amoxiclav and piperacillin-tazobactam) together accounted for 35% of prescribed antimicrobials. Fluoroquinolones (ciprofloxacin, levofloxacin, moxifloxacin and olfloxacin) combined ranked fourth (8%) and

meropenem ranked tenth (3%) in the top 20 agents prescribed

Future priorities as recommended in the national PPS report

1. Ensure all acute hospital staff have been made aware of the local and national results of the 2012 PPS.
2. Provide ongoing education and training for healthcare workers, regarding the importance and impact of HAI and antimicrobial resistance.
3. Improve hand hygiene compliance in all staff.
4. Implement plans to prevent infections associated with medical devices (intravascular catheters, urinary catheters, devices for respiratory tract intubation and prosthetic surgical devices).
5. Monitor and measure infections associated with medical devices and implement prospective surveillance programmes.
6. Implement the core, high impact interventions to promote prudent antimicrobial prescribing.
7. Ensure that frontline healthcare worker staffing levels reflect patient case mix and dependency levels.
8. Ensure that key infection prevention and control, antimicrobial stewardship and surveillance staff are not diverted to tasks outside their designated roles and that activities related to prevention of antimicrobial resistance and HAI are appropriately resourced.
9. Ensure that future strategic developments in Irish healthcare facilities include infrastructure and information technology that support the prevention of HAI and antimicrobial resistance.
10. Plan for periodic repeat prevalence surveys, locally and nationally to monitor and measure improvements in HAI prevalence and antimicrobial prescribing practices.

The full national PPS report and the full list of recommended implementation priorities may be accessed on the HPSC website:
http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HospitalPointPrevalenceSurveys/2012/PPS2012ReportsforIreland/

9.1.3 Hand Hygiene

9.1.3.1 Alcohol Hand Rub Consumption

Key Points

- In 2012, the median rate of alcohol hand rub consumption in acute hospitals in Ireland increased by 10% (23.4 litres per 1,000 bed days used compared with 21.3 in 2011)

Hand hygiene is one of the most important actions to prevent HCAI. Alcohol hand rubs (AHR) including gels and foam products are an effective and rapid method of performing hand hygiene and are recommended as the primary means of hand hygiene in national and international guidelines. Measurement of hospital-level AHR consumption, expressed as volume used in litres per 1,000 bed days used (BDU), 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).

Since 2006, the HPSC has collated data on AHR consumption in acute public hospitals in Ireland. Data is collected quarterly. For hospitals providing AHR data via the pharmacy department, the data represents the total volume of AHR dispensed to wards, clinics and other hospital areas. For hospitals providing AHR data via the supplies or stores department, the data represents the total volume of AHR purchased. 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 BDU (**Table 1**).

In 2012, the median rate of AHR consumption (L/1,000 BDU) increased by 10% to 23.4 from 21.2 in 2011. The wide range of inter-hospital variation in AHR consumption (12.5 – 160L/1,000 BDU) may partly be explained by differences in methodologies for collecting and reporting the data and by differences in formulations and brands of AHR used.

The main limitation of this surveillance system is that the data refers to the use of AHR only, and does not take account of other hand hygiene products (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 nor distinguish between who has used the AHR (visitor, patient or healthcare worker). The data are also prone to reporting artefacts, particularly for hospitals that report supplies (rather than pharmacy dispensing) data. For example, the hospital with the highest rate in 2012 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 outliers of this nature from time to time. 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/hpsc/A-Z/Gastroenteric/Handwashing/

Table 1. National data on AHR consumption in acute public hospitals in Ireland by year, 2006 – 2012.

	2006	2007	2008	2009	2010	2011	2012
Number of participating hospitals	52	50	50	49	45	44	42
National consumption rate*	10.5	15	18.7	22.1	19.2	21.2	23.4
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

** 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 Audit

Key Points

- Two national hand hygiene compliance audits took place in 2012
- For Period 3 (May/June), 45 (43 public and 2 private) hospitals participated. In total, 9,387 opportunities for hand hygiene were observed; achieving an average compliance of 82.0% (range = 70.3 - 94.8%)
- For Period 4 (October), 44 (42 public and 2 private) hospitals participated. In total, 9,171 opportunities for hand hygiene were observed; achieving an average compliance of 84.6% (range = 68.6 - 94.3%)
- The overall compliance for the combined periods for HSE hospitals was 82.9%. This figure is below the 2012 HSE target of 85%. However, the underlying trend from the four periods of publicly-reported hand hygiene compliance audit to the end of 2012 has been increasing
- Compliance for the two participating private hospitals over both periods in 2012 was 91.7%

Hand hygiene is one the most important actions to prevent HCAI. Measuring hand hygiene compliance by direct observation is described by the World Health Organisation (WHO) as the gold standard. In 2011, public reporting of biannual hand hygiene compliance data from acute hospitals commenced and has continued in 2012. Healthcare workers (HCWs) were observed for their compliance against the 'WHO 5 moments for hand hygiene' by trained auditors using the WHO methodology for hand hygiene audits. Each hospital was required to measure HCW compliance against 30 hand hygiene opportunities for each of the seven randomly selected wards in their facility resulting in a maximum of 210 opportunities per hospital per period.

The 2012 audits were undertaken in May/June (Period 3) and October (Period 4). A total of 8,967 opportunities for hand hygiene were observed in 43 HSE hospitals for Period 3, and 8,799 opportunities in 42 facilities in Period 4. Results for the two periods are combined in a summary in **Table 1** and **Figure 1**. In 2012, the overall compliance for HSE and private hospitals combined was 83.3%, and for the HSE hospitals was 82.9%, below the 2012 target of 85%. However, the underlying trend for compliance among HSE hospitals is rising (**Figure 2**) over the first four periods. Of the four HSE regions in 2012, HSE-West had the lowest (81.3%) and HSE-South had the highest compliance (83.8%). Two private hospitals submitted data for both audits in 2012, reporting an overall compliance of 91.7%.

In 2012, of the four major HCW categories, medical

Table 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2012 (Note that data from private hospitals were excluded for the Staff Categories, WHO 5 Moments and Wards sections)

	Hand Hygiene Opportunities	Hand Hygiene Actions	Percent Compliance	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Overall (Periods 3 & 4)	18,558	15,460	83.3%	82.8%	83.8%
HSE Hospitals	17,746	14,715	82.9%	82.4%	83.5%
Private Hospitals	812	745	91.7%	89.6%	93.5%
HSE - South	6,288	5,269	83.8%	82.9%	84.7%
HSE – DNE	3,565	2,956	82.9%	81.6%	84.1%
HSE - DML	3,768	3,135	83.2%	82.0%	84.4%
HSE - West	4,125	3,355	81.3%	80.1%	82.5%
Nurse/Midwife	10,288	8,996	87.4%	86.8%	88.1%
Auxiliary	2,647	2,167	81.9%	80.3%	83.3%
Medical	3,544	2,474	69.8%	68.3%	71.3%
Other	1,267	1,078	85.1%	83.0%	87.0%
Moment 1	4,659	3,895	83.6%	82.5%	84.7%
Moment 2	1,013	840	82.9%	80.5%	85.2%
Moment 3	1,595	1,416	88.8%	87.1%	90.3%
Moment 4	6,609	5,732	86.7%	85.9%	87.5%
Moment 5	5,366	4,169	77.7%	76.6%	78.8%
Intensive Care Unit Wards	2,023	1,729	85.5%	83.9%	87.0%

Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "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

staff had the lowest (69.8%) and nursing/midwifery staff had the highest compliance (87.4%).

Based on the 'WHO 5 moments for hand hygiene', compliance with moment 5 (after touching patient surroundings) was lowest (77.7%) and with moment 3 (after body fluid exposure risk) was highest (88.8%). The majority of hand hygiene opportunities were taken using alcohol hand rub (61.3%), with soap and water accounting for 38.7% of opportunities. Data submitted from two private hospitals has been excluded from the compliance audit reports by staff categories, WHO 5 Moments and wards sections (**Table 1** and **Figure 1**).

Whilst standardised hand hygiene auditor training and validation (with inter-rater reliability testing) should ensure that measurement of hand hygiene should be comparable, these results have not been validated by external auditors. Furthermore, all auditors measured compliance in the facility in which they usually work; thus there may be an element of bias in the results. It is also possible that hand hygiene compliance auditing may not have been performed in a comparable fashion in all participating hospitals. The results may also not reflect HCW compliance at all times. Hand hygiene compliance is measured by auditors who directly observe HCWs workers whilst they are undertaking patient care. HCW may change their behaviour if they become aware that they are being observed (known as the Hawthorne effect). It is also known that the Hawthorne effect diminishes over time and HCWs under observation may not be aware of the auditor's presence due to 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.

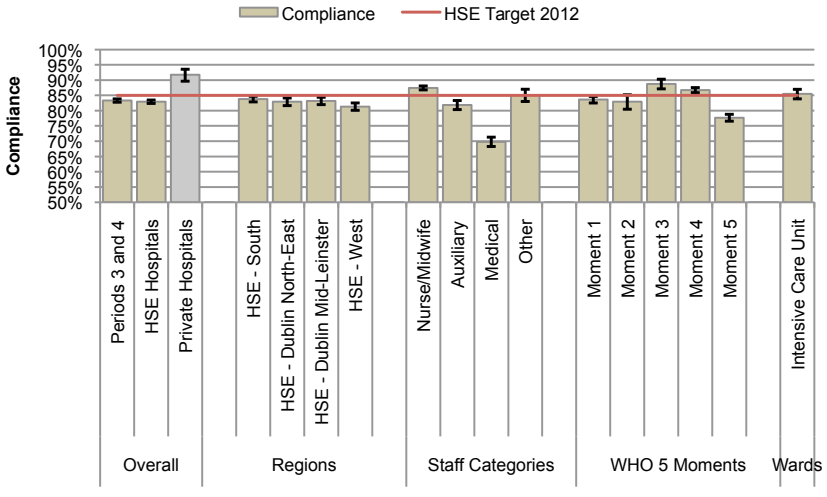

Figure 1: Summary of hand hygiene compliance in acute hospitals in Ireland combined for the two national audit periods in 2012. The 95% confidence intervals are shown in bars and the HSE target for 2012 (85%) is shown as a horizontal red line. Note that data from private hospitals were excluded for the Staff Categories, WHO 5 Moments and Wards sections.

Staff category: "Auxiliary" includes healthcare assistants, porters, catering and household services; "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

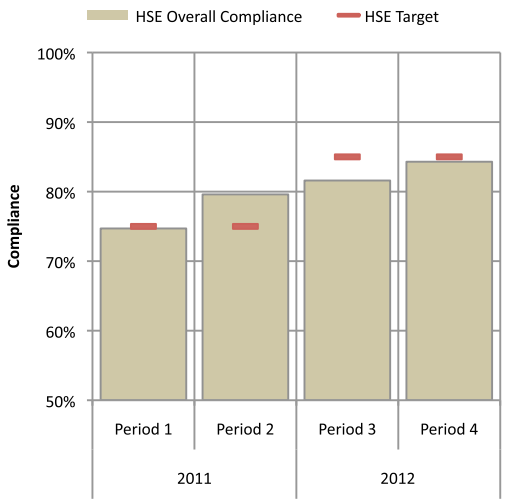

Figure 2: Summary of hand hygiene compliance in HSE acute hospitals in Ireland for the first four national audit periods in 2011 and 2012. The HSE target for each year is shown as red lines.

9.1.3.3 Survey of Hygiene & HCAI Prevention Practices in Irish Critical Care Services 2012

In 2011, the Health Services Executive (HSE) Critical Care and Healthcare Associated Infection National Clinical Programmes convened a joint multi-disciplinary steering group for HCAI prevention in Irish critical care units. A voluntary survey was devised to obtain baseline data with regard to existing hygiene and HCAI prevention practices in Irish critical care units and circulated to all critical care units in January 2012.

Key Points

- Completed surveys were received from 29 hospitals (25 public and four private), incorporating 36 critical care units (35 adult and one paediatric)
- It has been over five years since 19 critical care units underwent reconfiguration of patient accommodation. In the 29 hospitals participating in this survey, single room accommodation accounted for just 28% of critical care unit beds. Current isolation capacity in Irish critical care units is inadequate. Inability to isolate patients colonised or infected with multi-drug resistant organisms increases the risk of onward transmission to a neighbouring patient
- None of the HDUs, 43% of mixed ICUs and 31% of level 3 ICUs have an airborne infection isolation room (AIIR). Prompt isolation of patients with suspected or confirmed infection transmitted via the airborne route (e.g., tuberculosis, measles, and varicella) is vitally important as such pathogens are highly infectious
- Access to alcohol hand rub (AHR) at every bed space was available in 92% of units
- Access to a formal training programme on preventable device-related infections (vascular catheters related infection (CRI), ventilator associated pneumonia (VAP) and catheter associated urinary tract infection (CAUTI) is not universal in Irish critical care units. Formal staff training on CRI prevention is provided by 86%, VAP prevention by 68% and CAUTI prevention by 56%
- Central vascular catheter (CVC) insertion checklists are in use in 69% and insertion packs are in use in 66% of Irish critical care units
- Use of care bundles as one method to prevent device-related infections (peripheral catheter and CVC-related infections, VAP and CAUTI) is not universal in Irish critical care units. Care bundles for CVC-CRI prevention are in use in 47%, for VAP prevention in 45% and for CAUTI prevention in 31% of units
- Ongoing prospective surveillance of potentially-preventable HCAI (BSI, CRI, VAP & UTI) is currently being undertaken by only the minority of critical care units (35%, 36%, 14% and 8%, respectively)
- Access to clinical advice from an infection specialist is not available in all Irish critical care units. Of the 29 hospitals participating in this survey, 20 (69%) have an on-site consultant microbiologist. However, seven critical care units (19%) report having no access to round-the-clock infection specialist advice
- A designated antimicrobial pharmacist was not in post in six (21%) hospitals participating in this survey

Key Recommendations & Implementation Proposals

- Ongoing investment in and capital development of the physical infrastructure of critical care units in Ireland is urgently required to bring existing units up to the standards outlined in national guidance documents. This should include increasing the overall isolation room capacity in critical care units and for beds not in isolation rooms, increasing the space between beds. The provision of at least one isolation room per unit with a ventilation design capable of accommodating patients with specialised requirements is also recommended
- Ongoing formal education regarding impact, consequences and prevention of device-related infection (CRI, VAP, and CAUTI) should be provided to all healthcare workers in critical care
- Care bundles for maintenance of vascular catheters, intubation equipment and urinary catheters should be implemented in all Irish critical care units. Where existing practice guidelines are available, these should be adapted to include recommended care bundle components
- It is recommended that critical care units are supported in establishing HCAI surveillance modules using European Hospitals in Europe Link for Infection Control through Surveillance (HELICS) definitions. Priorities for HCAI surveillance include; unit-acquired bloodstream infection (UABSI), CRI, VAP and CAUTI. Resources to support the introduction of HCAI surveillance in Irish critical care units should be prioritised and central collation, analysis and reporting of surveillance data is recommended
- Every critical care unit must have round-the-clock access to infection specialist advice and an active antimicrobial stewardship programme, including daily clinical microbiology rounds and access to a dedicated critical care and antimicrobial pharmacist

- All healthcare workers in critical care units should be encouraged to avail of annual seasonal influenza vaccine and vaccine uptake should be recorded and reported within each unit. Measures to promote and improve healthcare worker uptake of seasonal influenza vaccine should be encouraged

The full survey report may be accessed on the HPSC website: http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/InfectionControlandHAI/Surveillance/HHCAISurvey2012/

9.2.0 Antimicrobial Consumption

Key Points

- In 2012, the overall rate of outpatient antimicrobial consumption in Ireland was 22.9 DID, a small increase from 2011. This rate is mid-to-high in comparison with other European countries
- In 2012, the median rate of antimicrobial consumption of 41 acute public hospitals in Ireland was 87.0 DBD (range 27.9 – 126.7 DBD), a 5% increase from 2011. This rate is mid-to-high in comparison with other European countries

Ireland participates in ECDC's European Surveillance of Antimicrobial Consumption (ESAC-Net) project which aims to collect systematic antimicrobial usage data from both the outpatient (ambulatory, community or primary care) and the hospital (inpatient) settings. Antimicrobial consumption is measured in defined daily doses (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 1,000 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.

3.1 Outpatient Antimicrobial Consumption

The overall outpatient antimicrobial consumption for Ireland in 2012 was 22.9 DID, a marginal increase of 0.8% from the rate of 22.7 DID for 2011. In the latest interim ESAC-Net report (provisional 2012 data), the reported range of outpatient antimicrobial usage among European countries was 11.3 to 39.1 DID. The median for 27 European countries with reliable data was 19.8 DID, with Ireland ranking as the seventh highest.

The underlying trend for outpatient antimicrobial consumption in Ireland (**Figure 1**) has been increasing steadily since 2000. After a short dip in late 2009, the rate has increased to its highest level, although it has remained stable for the last two years. There is still marked seasonal fluctuation in usage, with the highest levels occurring during periods of increased influenza activity.

In Ireland in 2012, outpatient consumption of penicillins accounted for the largest class used (55% of total at 12.5 DID), followed by macrolides (18%, 4.2 DID), tetracyclines (13%, 2.9 DID), cephalosporins (5%, 1.2 DID), sulphonamides (5%, 1.2 DID) and fluoroquinolones (4%, 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 penicillins (54%) at 6.8 DID. Broad-spectrum penicillin (such as amoxicillin) usage was also high at 29% of all penicillins (15.9 DID). See **Table 1** for detailed breakdown by pharmacological drug groups for the 2012 data.

There was considerable variability in the overall outpatient antimicrobial usage at county level (18.5 to 30.8 DID) as shown in **Figure 2**.

3.2 Hospital Antimicrobial Consumption

Forty-one public acute hospitals provided valid antimicrobial usage data for 2012. The median rate of antimicrobial consumption was 87.0 defined daily doses per 100 bed days used (DBD) (range = 27.9 – 126.7). This represents a 5% increase from the previous year's revised rate of 83.1 DBD. The overall rate was 85.9 DBD. These levels are again mid-to-high in Europe.

The largest group of antimicrobials, penicillins (42.5 DBD) accounted for 49% of all inpatient antimicrobial usage, unchanged from 2011. The use of fluoroquinolones such as ciprofloxacin (representing 7% of all inpatient antimicrobial usage) increased by 1%

in 2012 to 5.9 DBD. Consumption of cephalosporins, monobactams and carbapenems (representing 9% of all inpatient antimicrobial usage) increased by 8% in 2012 to 7.5 DBD. Consumption of glycopeptides such as intravenous vancomycin, imidazoles such as intravenous metronidazole and nitrofurans (representing 10% of all inpatient antimicrobial usage) decreased by 3% in 2012 to 8.5 DBD. Consumption of erythromycin and related agents (representing 14% of all inpatient antimicrobial usage) increased by 2% in 2012 to 12.1 DBD. Less frequently used agents in hospitals are tetracyclines, sulphonamides/trimethoprim, aminoglycosides and other systemic antimicrobials; collectively these drugs, representing 11% of all inpatient antimicrobial usage, increased by 6% in 2012 to 9.5 DBD.

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 92.2 DBD) centred around the median for Ireland, while the rate for single specialist facilities (maternity, orthopaedic or paediatric) was much lower (median 56.8 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.

Table 1. Breakdown by pharmacological drug groups for outpatient antimicrobial use in Ireland: DDD per 100,000 population, 2011 and 2012.

	2011	Percent of 2011	2012	Percent of 2012
Penicillins	12.3	54.0%	12.5	54.6%
Narrow spectrum penicillins	1.0	4.4%	1.0	4.4%
Beta-lactamase resistant penicillins	1.0	4.6%	1.0	4.6%
Broad spectrum penicillins	3.6	15.7%	3.7	15.9%
Penicillin with beta-lactamase inhibitor	6.7	29.3%	6.8	29.7%
Macrolides and related drugs	4.2	18.4%	4.2	18.2%
Tetracylines	2.8	12.3%	2.9	12.8%
Cephalosporins and other beta-lactam drugs	1.2	5.3%	1.2	5.2%
First-generation cephalosporins	0.2	0.7%	0.2	0.8%
Second-generation cephalosporins	0.9	4.1%	0.9	4.0%
Third-generation cephalosporins	0.1	0.5%	0.1	0.4%
Quinolones	0.9	4.1%	0.9	3.8%
Sulfonamides and Trimethoprim	1.2	5.2%	1.2	5.0%
Other antibiotics	0.1	0.6%	0.1	0.5%
TOTAL	22.7	100.0%	22.9	100.0%

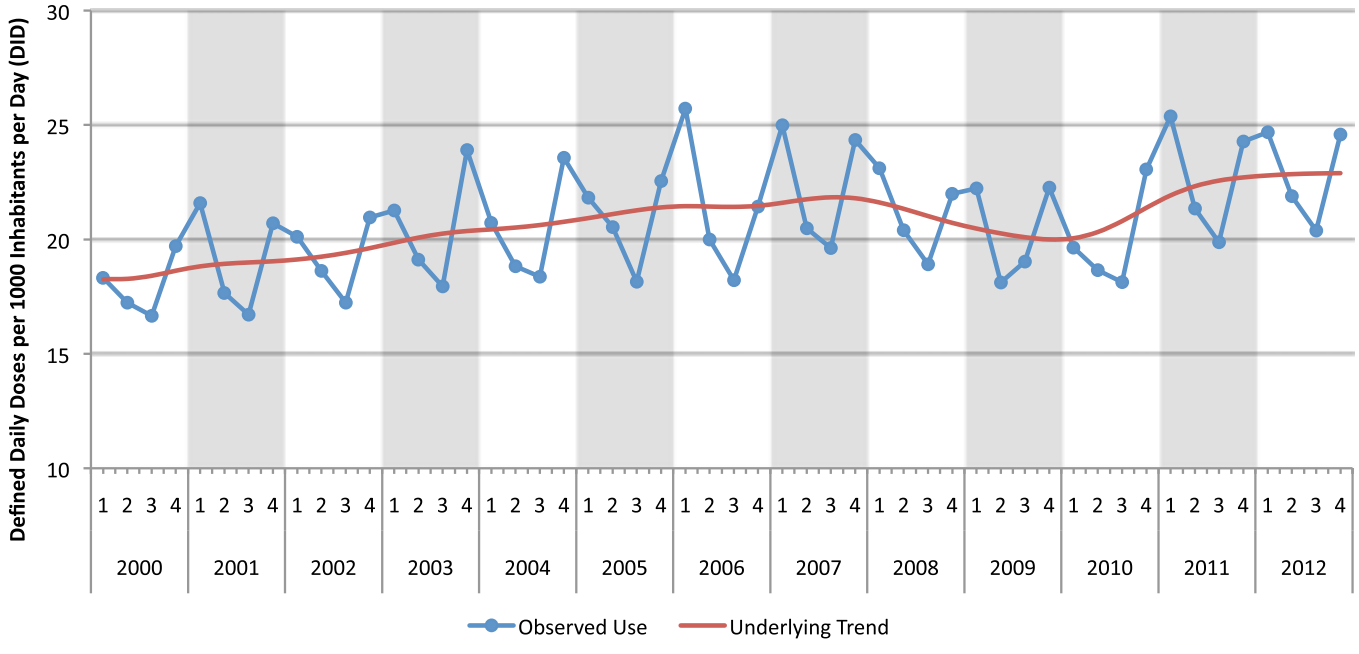

Figure 1. Outpatient antimicrobial consumption in Ireland by quarter, 2000-2012.

The use of intravenously administered specific antimicrobials (those with good oral bioavailability) as a proportion of total use remained unchanged at a median of 7.0% between 2011 and 2012, but has decreased steadily from 9.7% in 2007. This measure reflects patient acuity and also the hospital function. The change in the level of this measure may also reflect local antimicrobial stewardship interventions.

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 those previously published owing to methodological changes.

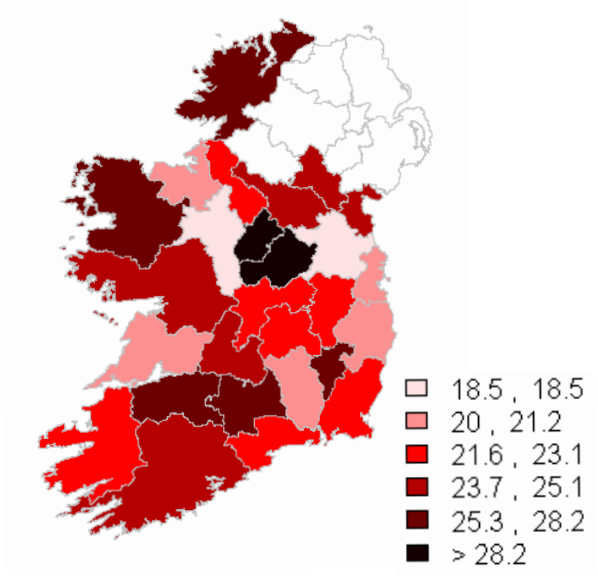

Figure 2. Outpatient antimicrobial consumption in Ireland, by county, in DDD per 100 inhabitants per day for 2012.

9.3.0 Antimicrobial Resistance

Key Points

- In 2012, 2,450 reports of invasive *E. coli* infection were submitted from Ireland to the European Antimicrobial Resistance Surveillance Network (EARS-Net), an increase of 11% from 2,210 reports in 2011. The proportion of *E. coli* isolates displaying resistance to third-generation cephalosporins (10.8%), to ciprofloxacin (25.2%), to aminoglycosides (12.6%) along with those reported to produce extended-spectrum beta-lactamases (8.8%) and to exhibit multi-drug resistance (13.4%) were at their highest levels since surveillance began

- In 2012, there were 1,060 reports of *Staphylococcus aureus* bloodstream infection (BSI), a decrease of 3% from 1,095 reports in 2011. Of these, 242 (22.8%) were meticillin-resistant *S. aureus* (MRSA), a decrease of 8% from 263 reports in 2011. For acute hospitals, the rate of MRSA BSI was 0.060 cases per 1,000 bed days used, a decrease from 0.066 in 2011. Over the same period, the rate of meticillin-susceptible *S. aureus* (MSSA) BSI remained stable at 0.208.

- Enhanced surveillance data revealed that 15% of *S. aureus* BSI were associated with central vascular catheters (CVCs) and 11% with peripheral vascular catheters

- In 2012, there were 392 reports of *Enterococcus faecium* BSI, compared with 364 in 2011. This represents an increase of 8%. Vancomycin-resistant *E. faecium* (VREfm) accounted for 45.4% of reports, which was at its highest level since surveillance began and was the highest proportion among countries reporting to EARS-Net in 2012

- In 2012, there were 345 reports of invasive *Klebsiella pneumoniae* infection compared to 312 in 2011, an increase of 11%. The proportions of *K. pneumoniae* isolates displaying resistance to third-generation cephalosporins (11.9%) and those reported to produce extended-spectrum beta-lactamases (8.8%) were at their highest levels since surveillance began. There were no reports of carbapenem resistant invasive *K. pneumoniae* isolates in 2012

- In 2012, there were 321 reports of invasive *S. pneumoniae* infection compared to 327 in 2011, a decrease of 2%. Of these, 63 (19.6%) were penicillin-non-susceptible *S. pneumoniae* (PNSP), which is similar to the situation in 2011 (n=64; 19.6%). The national rate of invasive pneumococcal infection was 7.0 per 100,000 population, which is comparable to 7.1 in 2011. The numbers of reports and rates of infection in children aged under two years, the target group for the 13-valent pneumococcal conjugate vaccine (PCV13), were broadly similar to those seen in 2011

- Serotype data were available on 306 of 321 invasive pneumococcal isolates (95%) and results indicate good coverage (80%) for the 23-valent polysaccharide (PPV23) vaccines in its target population (adults ≥65 years). Coverage for PCV13 in its target population was broadly similar to 2011

- In 2012, there were 219 reports of invasive *Pseudomonas aeruginosa* infection, compared to 184 in 2011, an increase of 19%. Resistance to piperacillin-tazobactam (17.4%), ceftazidime (15.2%) and meropenem (19.6%) all reached their highest levels since surveillance began

- Enhanced surveillance data were provided on 1,765 cases from nine laboratories, representing 35% of all cases submitted to EARS-Net in 2012

9.3.0.1 European Antimicrobial Resistance Surveillance Network (EARS-Net)

Introduction

In Ireland, 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 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 healthcare-associated infections from those associated with the community. EARS-Net primarily serves as a surveillance system to measure national levels of antimicrobial resistance (AMR). In 2012, all 41 microbiology laboratories participated in EARS-Net, resulting in complete coverage of the Irish population.

Escherichia coli

In 2012, there were 2,450 reports of invasive *E. coli* infection (2,447 from blood and three from CSF) from 2,388 patients, an increase of 10.9% from 2,210 reports in 2011. **Table 1** displays 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)] by year since 2004.

Of the 2,441 isolates for which 3GC susceptibility testing data was reported, 264 (10.8%) were resistant to 3GCs, of which 195 were reported as extended spectrum beta lactamase (ESBL)-positive and 64 as ESBL-negative. Just over one quarter (25.2%); 616 of 2,441 were ciprofloxacin resistant; and 236 (9.7%) of 2,437 were gentamicin-resistant [307 (12.6%) of 2,437 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)].

In 2012, 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=143, P<0.0001).

The proportion of invasive *E. coli* isolates with 3GC resistance in Ireland is moderately-high levels (10 to <25%) on the EARS-Net European map (**Figure 2**). Also, 2012 data resulted in a colour change for Ireland on the EARS-Net European map from yellow in 2011 (5 to <10% 3GC resistance) to orange (10 to <25% 3GC resistance). With regard to 3GC, ciprofloxacin and aminoglycoside resistance Ireland ranks 18th, 12th and 13th, respectively, out of 30 countries reporting to EARS-Net in 2012.

ESBLs are enzymes that confer resistance to most penicillins and cephalosporins (including 3GCs). ESBL-producing bacteria (including *E. coli* and *K. pneumoniae*) are often resistant to other classes of antimicrobials and have emerged as important causes of infections both in hospitals and the community. ESBLs were detected in 215 (8.8%) of 2,444 isolates tested. In 2012, 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=161, P<0.0001).

Of 2,428 isolates tested against all four "indicator" antimicrobials, 326 (13.4%), from 46 hospitals/ institutions, were identified as multi-drug resistant (MDR), which is defined as resistance to three or more of these indicator antimicrobials, a slight increase from 13.0% in 2011. In 2012, MDR *E. coli* was at its highest level since surveillance began. Between 2009 and 2012, the trend in MDR was upwards, which was highly significant (Chi^2 trend=10.97, P=0.0009).

- 114 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (105 ESBL-positive, 9-negative)
- 85 with resistance to ampicillin, 3GCs and ciprofloxacin (70 ESBL-positive, 14 -negative)
- 124 with resistance to ampicillin, ciprofloxacin and aminoglycosides (7 ESBL-positive, 117 -negative)
- Three with resistance to ampicillin, 3GCs and aminoglycosides (two ESBL-positive, one -negative)

Females were slightly more likely (1.05-times) to have an invasive *E. coli* infection than males (z=1.31, P=0.19). The frequency of invasive *E. coli* infection increased with age, with the majority of infections (n=1,840; 75%) occurring in adults over 60 years. The median age was 72 years (95%CI, 71-73).

Staphylococcus aureus

In 2012, there were 1,060 reports of *S. aureus* bloodstream infection (BSI) from 1,038 patients, a decrease of 3.2% from 1,095 reports in 2011. Of these, 242 (22.8%) were meticillin resistant *S. aureus* (MRSA) (**Table 1**). This represents the lowest annual proportion since surveillance began in 1999. In 2010, the proportion was 24.4%, which was the first time MRSA accounted for <25% of *S. aureus* BSI in Ireland, and thus marked a change from red to orange on the EARS-Net European map. This is the sixth successive year in which a decrease has been observed and the overall downward trend over this time period is highly significant (Chi^2_{trend}=196.6, P<0.0001) (**Figure 3**). Overall, there was an 8% reduction in the number of MRSA BSI reports compared with 2011 (242 vs. 263). The total number of meticillin-susceptible *S. aureus*

Table 1. Summary of EARS-Net data by pathogen and year, 2004-2012

Pathogen	2004	2005	2006	2007	2008	2009	2010	2011	2012
Number laboratories by year-end	40	41	42	44	42	43	40†	41††	41
E. coli									
Number of isolates	1256	1445	1656	1785	1926	2064	2170	2210	2450
Ampicillin-R*	65.0%	67.6%	70.7%	68.3%	70.4%	68.7%	68.4%	71.9%	69.6%
3GC-R*	2.6%	4.1%	4.2%	6.7%	7.4%	7.5%	8.3%	9.3%	10.8%
ESBL-producers*	1.1%	2.4%	2.5%	4.1%	5.0%	5.8%	6.1%	7.5%	8.8%
Ciprofloxacin-R*	12.6%	17.3%	21.5%	22.1%	23.3%	22.3%	23.6%	23.8%	25.2%
Gentamicin-R*	5.7%	8.5%	7.7%	9.9%	10.2%	7.7%	9.4%	8.7%	9.7%
Gentamicin/Amikacin/Tobramycin-R*	6.1%	8.6%	8.6%	10.6%	11.0%	9.3%	11.8%	12.2%	12.6%
Carbapenem‡-R*	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
MDR*	5.6%	7.7%	9.0%	11.4%	12.1%	10.4%	11.7%	13.0%	13.4%
Number laboratories by year-end	41	42	42	44	43	43	40†	41††	41
S. aureus									
Number of isolates	1323	1424	1412	1393	1303	1309	1251	1095	1060
Number Meticillin-R (or MRSA)	553	592	592	536	439	355	305	263	242
Meticillin-R (or MRSA)	41.8%	41.6%	41.9%	38.5%	33.7%	27.1%	24.4%	24.0%	22.8%
Number VISA	0	0	2	1	0	0	0	0	0
VISA*	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Number laboratories by year-end	40	41	42	44	42	43	40†	41††	41
E. faecium									
Number of isolates	187	224	265	330	406	397	392	364	392
Ampicillin-R*	95.7%	92.3%	93.9%	93.1%	95.1%	92.9%	95.6%	95.9%	92.9%
Vancomycin-R	23.2%	31.7%	37.1%	33.4%	35.7%	38.3%	39.3%	37.4%	45.4%
HLG-R*	58.0%	51.4%	44.3%	35.2%	28.1%	39.1%	39.6%	36.8%	39.3%
MDR*	18.5%	25.6%	25.6%	22.7%	16.2%	26.7%	24.9%	21.1%	20.3%
Number laboratories by year-end			36	39	41	42	40†	41††	41
K. pneumoniae									
Number of isolates			217	244	310	323	326	312	345
Ampicillin-R*			97.7%	99.2%	99.7%	99.7%	99.1%	100.0%	98.5%
3GC-R*			10.2%	9.9%	11.4%	11.2%	10.5%	8.0%	11.9%
ESBL-producers*			8.6%	3.7%	7.7%	8.2%	5.0%	5.6%	8.8%
Ciprofloxacin-R*	No data	No data	15.3%	18.1%	12.8%	13.0%	10.5%	13.2%	11.9%
Gentamicin-R*			7.8%	9.9%	10.7%	11.1%	6.8%	7.4%	9.9%
Gentamicin/Amikacin/Tobramycin-R*			9.2%	11.1%	10.7%	11.1%	7.1%	8.3%	9.6%
Carbapenem‡-R*			0.0%	0.6%	0.0%	0.0%	0.0%	1.6%	0.3%
MDR*			11.2%	11.9%	10.6%	11.9%	8.0%	8.4%	9.9%
Number laboratories by year-end	41	42	42	44	42	43	40†	41††	41
S. pneumoniae									
Number of isolates	400	401	407	438	447	356	314	327	321
Penicillin-NS*	10.3%	11.7%	15.7%	17.4%	23.1%	20.2%	18.2%	19.6%	19.6%
of which: HLR	1.8%	3.0%	2.9%	5.7%	6.0%	5.6%	4.8%	6.1%	4.0%
Int	7.0%	8.7%	12.5%	11.0%	16.8%	13.8%	12.7%	13.5%	15.6%
Erythromycin-R*	14.4%	12.1%	16.1%	16.4%	16.7%	17.3%	15.7%	18.9%	16.9%
%Penicillin-NS/Erythromycin-R	3.1%	3.2%	7.4%	7.9%	10.2%	11.9%	12.6%	13.8%	12.2%
Number laboratories by year-end	40	41	42	44	42	43	40†	41††	41
E. faecalis									
Number of isolates	242	290	294	280	301	289	298	265	298
Ampicillin-R*	0.8%	3.5%	4.5%	2.2%	0.7%	2.1%	2.0%	0.8%	4.0%
Vancomycin-R	1.3%	2.5%	3.7%	2.9%	3.7%	0.7%	0.3%	4.9%	3.0%
HLG-R*	41.3%	44.4%	42.4%	36.9%	30.5%	36.7%	29.7%	29.1%	32.9%
Number laboratories by year-end			36	39	41	42	40†	41††	41
P. aeruginosa									
Number of isolates			128	177	199	248	222	184	219
Piperacillin/tazobactam-R*			9.4%	12.6%	9.7%	8.9%	10.0%	2.8%	17.4%
Ceftazidime-R*			10.6%	11.8%	8.7%	11.8%	9.2%	8.2%	15.2%
Imipenem/meropenem-R*	No data	No data	11.8%	12.2%	9.3%	10.2%	8.3%	12.0%	19.6%
Ciprofloxacin-R*			18.0%	22.9%	21.8%	12.1%	13.2%	12.6%	20.6%
Gentamicin-R*			10.2%	13.3%	9.0%	7.7%	8.7%	6.5%	11.9%
MDR*			9.5%	12.4%	11.1%	6.4%	6.5%	4.0%	13.0%

MRSA, Meticillin-Resistant S. aureus; VISA, Vancomycin-Intermediate S. aureus
R, Resistant; NS, Non-Susceptible [includes isolates with intermediate (Int) and high-level resistance (HLR)]
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
† In 2010, 3 laboratories stopped processing blood cultures, however coverage of acute hospitals remained at 100%
†† In Q3 2011, one additional laboratory started reporting data
‡ Carbapenems include imipenem, meropenem and ertapenem

(MSSA) BSI reports decreased by 1.7% in 2012 compared to 2011 (818 vs. 832).

Despite the decrease in numbers and proportion of MRSA, Ireland still had one of the higher proportions of MRSA in Europe in 2012 (see http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx for European data, including EARS-Net tables, charts and maps) (**Figure 4**). Ireland ranked 12th out of 30 countries reporting to EARS-Net. All of the countries with higher MRSA proportions than Ireland are in Southern and Central/Eastern Europe.

No MRSA isolates with reduced susceptibility to vancomycin were detected by the National MRSA Reference Laboratory in 2012.

The rate of MRSA BSI for all acute hospitals in 2012 was 0.060 cases per 1,000 bed days used, representing a decrease from 0.066 in 2011, whilst the rate of MSSA BSI remained stable at 0.208 [Rates are calculated taking into account denominator data (bed days used) obtained from the Business Intelligence Unit at the Health Services Executive for all acute public hospitals and directly from the private hospitals where available, where both numerator (*S. aureus* BSI numbers) and denominator data have been provided].

Males were approximately 2.1-times more likely to get an invasive *S. aureus* infection (2.3-times for MRSA, z=6.72, P=0.0001; 2.1-times for MSSA, z=10.84, P<0.0001) than females (z=12.73, P<0.0001). The frequency of invasive *S. aureus* infection increased with age, with the majority of infections (n=623; 59%) occurring in adults over 60 years. The median age for patients with an MRSA infection was 73 years (95%CI, 69-76) while the median age for patients with MSSA was 61 years (95%CI, 59-63). This was considered to be a significant difference as the confidence intervals did not overlap.

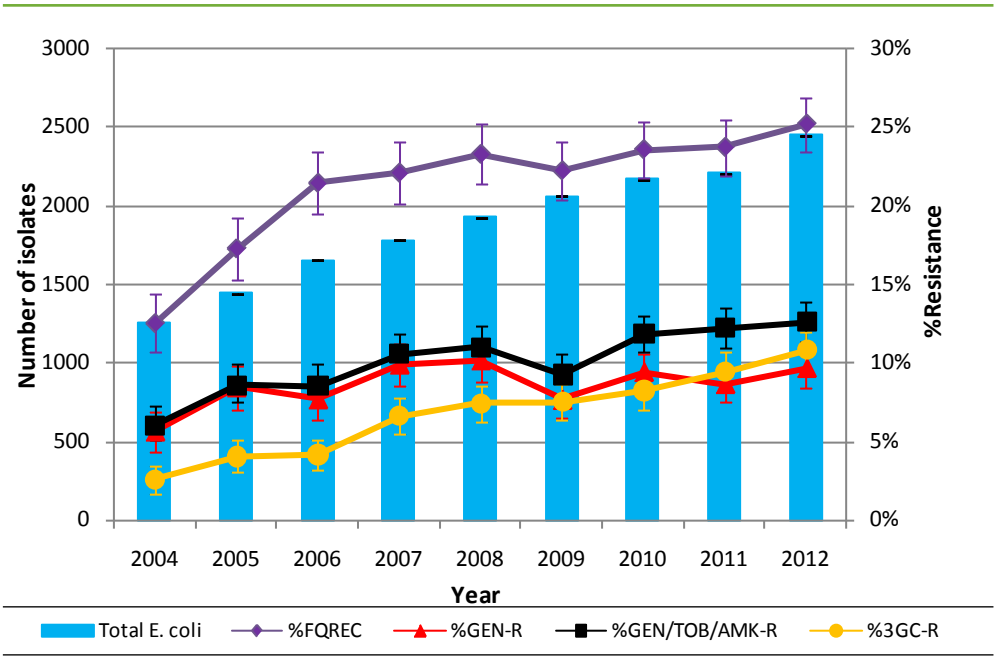

Figure 1. Trends for E. coli. Total numbers & percentage resistance to 3GCs, ciprofloxacin/ofloxacin (CIP/OFX), gentamicin (GEN), any aminoglycoside: gentamicin/amikacin/tobramycin (GEN/AMK/TOB), and percentage ESBL-positive with 95% confidence intervals.

Table 2. Age and gender breakdown of patients by organism with major resistance profiles (data from laboratories participating in enhanced surveillance for 2012). Proportion of isolates detected <48 hours and >5 days post-admission is also shown.

		Total for 2012	Percent female	Mean age in years	Detected <48 hours after admission	Detected >5 days after admission
Staphylococcus aureus	*Meticillin Resistant (MRSA)*	**75**	**32%**	**68.3**	**56%**	**36%**
	Meticillin Susceptible	*250*	*34%*	*58.7*	*66%*	*20%*
Streptococcus pneumoniae	*Penicillin non-Susceptible*	*31*	*35%*	*57.6*	*65%*	*26%*
	Penicillin Susceptible	*108*	*40%*	*63.2*	*79%*	*8%*
Enterococci	*Vancomycin Resistant*	*67*	*40%*	*67.4*	*19%*	*70%*
	Vancomycin Sensitive	*179*	*40%*	*66.1*	*34%*	*50%*
Escherichia coli	*Fluoroquinolone Resistant*	*225*	*43%*	*72*	*60%*	*28%*
	Fluoroquinolone Susceptible	*637*	*58%*	*68.3*	*68%*	*16%*
Klebsiella pneumoniae		*122*	*47%*	*63.9*	*45%*	*41%*
Pseudomonas aeruginosa		*71*	*45%*	*67.9*	*55%*	*32%*

Enterococcus faecium

In 2012, there were 392 reports of *E. faecium* BSI from 386 patients, an increase of 8% from 364 reports in 2011. **Table 1** displays the annual proportions of *E. faecium* isolates resistant to the three "indicator" antimicrobials (ampicillin, vancomycin and high-level gentamicin) by year since 2004.

Of the 392 invasive *E. faecium* isolates, 178 (45.4%) were resistant to vancomycin. The proportion of isolates that were vancomycin-resistant *E. faecium* (VREfm) increased from 37.4% in 2011, which was a significant finding (Chi^2=5.03; P=0.025). Of 389 isolates with reported susceptibility test results for high-level gentamicin, 153 (39.3%) were resistant (**Figure 5**).

Since 2008, Ireland has had by far the highest proportion of VREfm in Europe. This remained the case in 2012, with the next highest proportions reported by Portugal (23%), Greece (18%) and Germany (16%) (**Figure 6**).

Of 389 isolates tested against the three "indicator" antimicrobials, 79 (20.3%) isolates from 20 hospitals were resistant to all three and therefore classed as MDR. This represents a slight decrease from 21.1% in 2011.

Males were approximately 1.6-times more likely to have an invasive *E. faecium* infection than females (z=4.67, P=<0.0001). The frequency of invasive *E. faecium* infection increased with age with the majority of infections (n=277; 71%) occurring in adults over 60 years. The median age was 69 years (95%CI, 67-71).

Klebsiella pneumoniae

In 2012, there were 345 reports of invasive *K. pneumoniae* infection (343 from blood and two from CSF) from 338 patients, an increase of 11% from 312 reports in 2011). **Table 1** displays the proportion of *K. pneumoniae* isolates resistant to the four "indicator" antimicrobials (as for *E. coli* above) plus carbapenems (imipenem, meropenem or ertapenem) since 2004. Forty-one (11.9%) of 344 isolates were resistant to 3GCs, 30 of which were ESBL-positive and 10 were ESBL-negative; 41 (11.9%) of 345 were ciprofloxacin-resistant; and 33 (9.6%) of 345 were gentamicin-resistant [34 (9.9%) of 345 were aminoglycoside-resistant (i.e. resistant to gentamicin, tobramycin or amikacin)].

Between 2011 and 2012, resistance to 3GCs and gentamicin/aminoglycosides increased. In 2012, resistance to 3GCs was at its highest level since surveillance began.

Five isolates were reported as ampicillin-susceptible, an unusual finding, as *K. pneumoniae* are regarded as inherently resistant to this antimicrobial.

ESBLs were detected in 30 (8.8%) of 342 isolates tested, representing an increase from 5.6% in 2011.

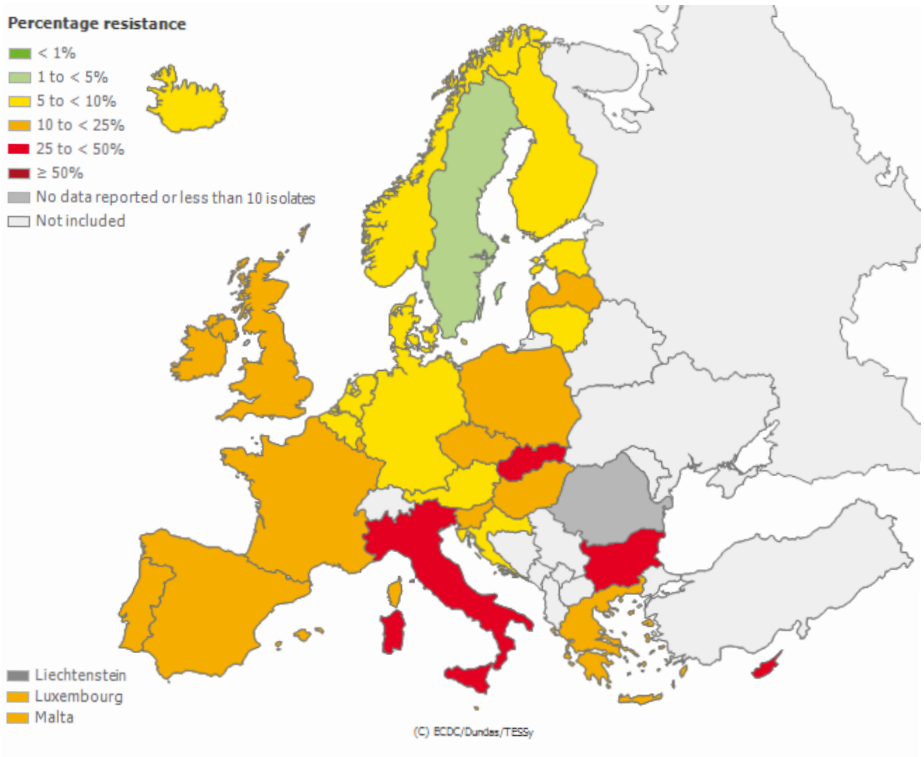

Figure 2. Distribution of third generation cephalosporin (3GC) resistant E. coli in EARS-Net countries in 2012. Map downloaded from ECDC's TESSy database on 16/10/2013: http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.as

In 2012, ESBL-production was at its highest level since surveillance began.

No carbapenem-resistant invasive *K. pneumoniae* isolates (termed carbapenem-resistant *Enterobacteriaceae*, or CRE) were reported in 2012. In 2011, four invasive *K. pneumoniae* CRE isolates were reported due to carbapenemase production: three OXA-48 from one hospital and one KPC from another hospital. These carbapenemase-producing CRE isolates were the first reports of invasive infection due to these organisms in Ireland.

Thirty-four, or 9.9%, of 343 isolates tested against all four "indicator" antimicrobials from 21 hospitals were identified as MDR, an increase from 8.4% in 2011:

- 19 with resistance to ampicillin, 3GCs, ciprofloxacin and aminoglycosides (18 ESBL-positive, one -negative)
- Five with resistance to ampicillin, 3GCs and ciprofloxacin (3 ESBL-positive, one -negative)
- Five with resistance to ampicillin, 3GCs and gentamicin (all ESBL-positive)
- Five with resistance to ampicillin, ciprofloxacin and aminoglycosides (all ESBL-negative)

The number with resistance to all four "indicator" antimicrobials increased from 16 in 2011 to 19 in 2012. Antimicrobial resistance levels among *K. pneumoniae* isolates in Ireland have been among the lowest in Europe, with Ireland ranking 26th and 25th out of 30 countries in 2012 for 3GC and fluoroquinolone resistance, respectively. However, between 2011 and 2012, aminoglycoside resistance in Ireland has increased from 7.6% (ranking 24th highest of 29 countries) to 12.6% (ranking 13th of 30 countries).

Males were approximately 1.4-times more likely to have an invasive *K. pneumoniae* infection than females (z=3.00, P=0.003). The frequency of invasive *K. pneumoniae* infection increased with age with the majority of infections (n=216; 63%) occurring in adults over 60 years. The median age was 65 years (95%CI, 63-67).

Streptococcus pneumoniae

In 2012, there were 321 reports of invasive *S. pneumoniae* infection (315 from blood and six from CSF) from 319 patients, a decrease of 1.8% from 327 reports in 2011. **Table 1** displays the annual proportions of *S. pneumoniae* isolates non-susceptible/resistant to penicillin and erythromycin by year since 2004.

Penicillin-non-susceptible *S. pneumoniae* (PNSP) accounted for 19.6% (n=63) of all isolates tested against penicillin (n=321) in 2012 (**Table 1**). Of the 63 PNSP isolates, 48 were intermediately-resistant (Int) with a minimum inhibitory concentration (MIC) to penicillin between 0.1-1.0mg/L and 15 were high-level resistant (HLR) with a MIC >1.0mg/L to penicillin. Fifty-three (16.9%) of 313 isolates were resistant to erythromycin. Between 2011 and 2012, the proportion of PNSP in Ireland remained stable at 19.6% (**Figure 7**). The proportion of isolates that displayed HLR to penicillin decreased from 6.1% in 2011 to 4.7% in 2012. In 2012, Ireland had one of the highest proportions of PNSP (ranking 9th out of 30 countries, and 5th out of 21 countries reporting 50 isolates or more).

Comparison of *S. pneumoniae* susceptibility data between Ireland and other countries reporting to EARS-Net is increasingly problematic due to the possibility of different interpretive criteria being applied to the susceptibility testing data in different countries (and indeed by different laboratories within

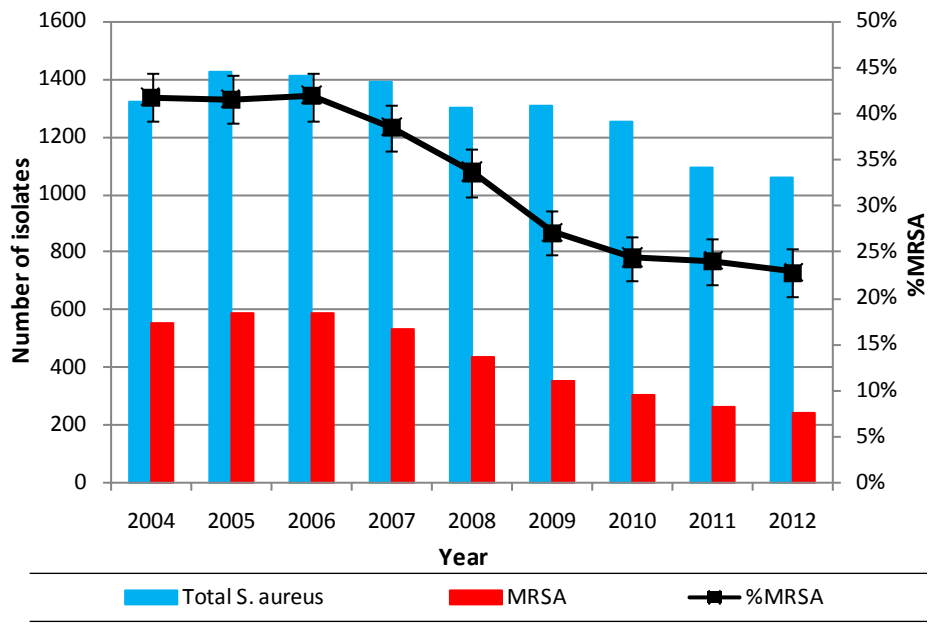

Figure 3. Trends for S. aureus. Total numbers of S. aureus/MRSA and percentage MRSA with 95% confidence intervals

the same country). Irish microbiology laboratories are currently in the process of changing over to the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines. By the end of 2012, 15 laboratories had completed the switch over from the American Clinical Laboratory Standards Institute (CLSI) guidelines. CLSI provides three sets of breakpoints for interpreting penicillin susceptibility of *S. pneumoniae* isolates: meningitis, non-meningitis and oral; while 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 to facilitate a more meaningful analysis of the data. This approach also permits a relatively consistent approach for comparing historical data.

Moderately-high levels of erythromycin resistance were seen in *S. pneumoniae* in 2012 (with Ireland ranking 16th out of 30 countries, and 11th out of 20 countries reporting 50 isolates or more), similar to the situation observed in much of Southern and Central/Eastern Europe.

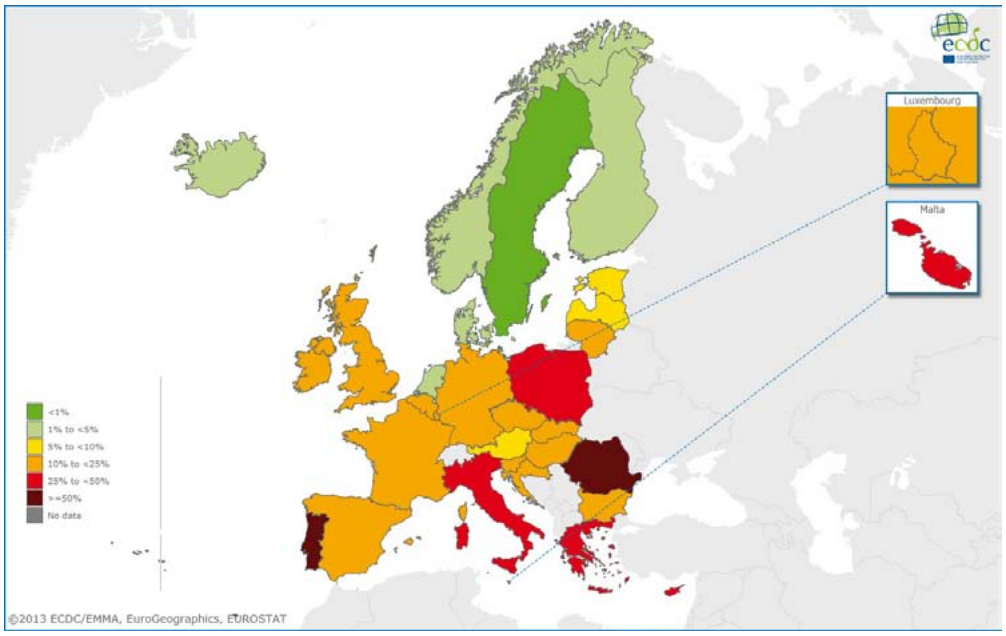

Figure 4. Distribution of MRSA in EARS-Net countries in 2012. Map obtained from ECDC on 16/10/2013: http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

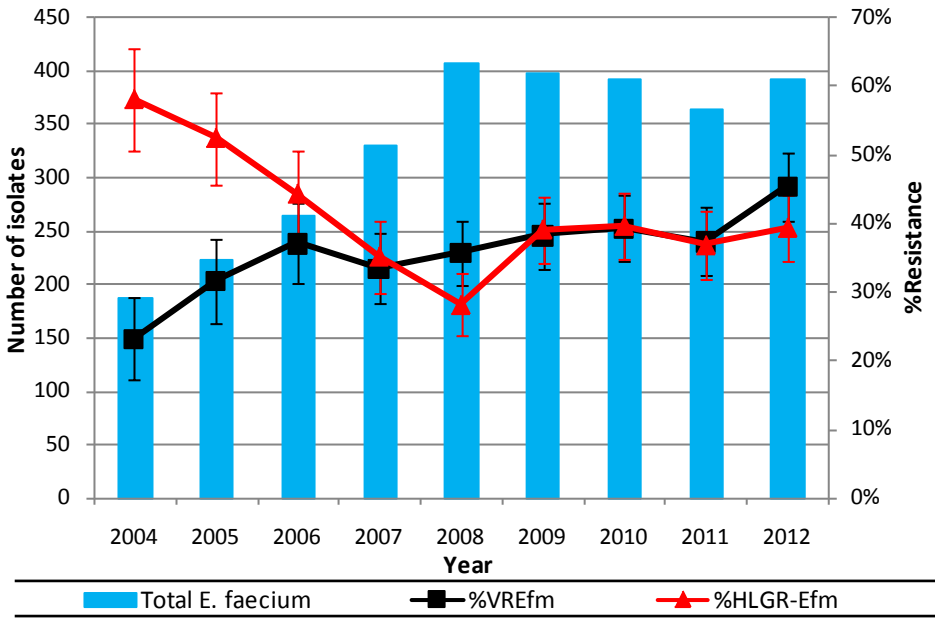

Figure 5. Trends for E. faecium. Total numbers of E. faecium and percentage resistance to high-level gentamicin (HLG) and vancomycin (VAN) with 95% confidence intervals

Of isolates tested against both penicillin and erythromycin (n=312), 38 (12.2%) were simultaneously PNSP (29 Int, 9 HLR) and erythromycin-resistant in 2012. Prior to the introduction of the 7-valent pneumococcal conjugate vaccine (PCV7) into the childhood immunisation schedule in September 2008, a national pilot project was established early in 2007 as a result of 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. From September 2010, PCV7 was replaced with PCV13. For 2012, serotype data were available on 306 pneumococcal isolates from all 30 laboratories that reported pneumococcal isolates to EARS-Net in 2012, representing 95% of all pneumococcal isolates reported. Overall, 243 (79%) isolates belonged to serotypes covered by the pneumococcal polysaccharide vaccine (PPV23; target population: adults ≥65 years and at risk groups), while 158 (52%) were covered by the conjugate vaccine (PCV13; target population: children <2 years). From adults aged ≥65 years, 138 of 172 (80%) isolates were covered by PPV23, while from children <2 years, 6 of 13 (46%) isolates were covered by PCV13 (compared with 7 of 13 isolates, or 56%, in 2011). Of the 63 PNSP isolates for which serotyping data were available, 18 of 28 (64%) from adults ≥65 years were covered by PPV23 while three of the four isolates from children <2 years were covered by PCV13. On-going surveillance of the predominant serotypes is required as strains with serotypes other than those in the vaccine have been reported to increase in prevalence following the introduction of conjugate vaccines in other countries. Hence the need for a fully resourced national pneumococcal reference facility.

The rate of invasive pneumococcal disease (IPD) in Ireland in 2012 was estimated to be 7.0 cases per 100,000 population, comparable to 7.1 in 2011 (note: both rates calculated using the 2011 census data). The highest rates of IPD were observed in children <1 year (12.4 cases per 100,000) and adults aged 65-74 years (21.7 cases per 100,000), 75-79 years (44.1 cases per 100,000) and ≥80 years (53.7 cases per 100,000) (**Figure 8**). The rates in all age groups were broadly similar to the data for 2011 with the exception of the 75-79 year age group, which increased from 31.4 cases per 100,000.

Males were approximately 1.1-times more likely to have an invasive *S. pneumoniae* infection than females, but this was not significant (z=0.84, P=0.4). The frequency of invasive *S. pneumoniae* infection increased with age with the majority of infections (n=210; 65%) occurring in adults over 60 years. The median age was 68 years (95%CI, 65-71).

Enterococcus faecalis

In 2012, there were 298 reports of *E. faecalis* BSI from 298 patients, an increase of 12% from 265 reports in 2011. **Table 1** displays the annual proportions of *E. faecalis* isolates resistant to the three "indicator" antimicrobials (as for *E. faecium* above) by year since 2004.

Nine (3.0%) of 298 isolates were resistant to vancomycin (vancomycin resistant *E. faecalis* – VREfa) and 95 (32.9%) of 289 isolates were resistant to high-level gentamicin.

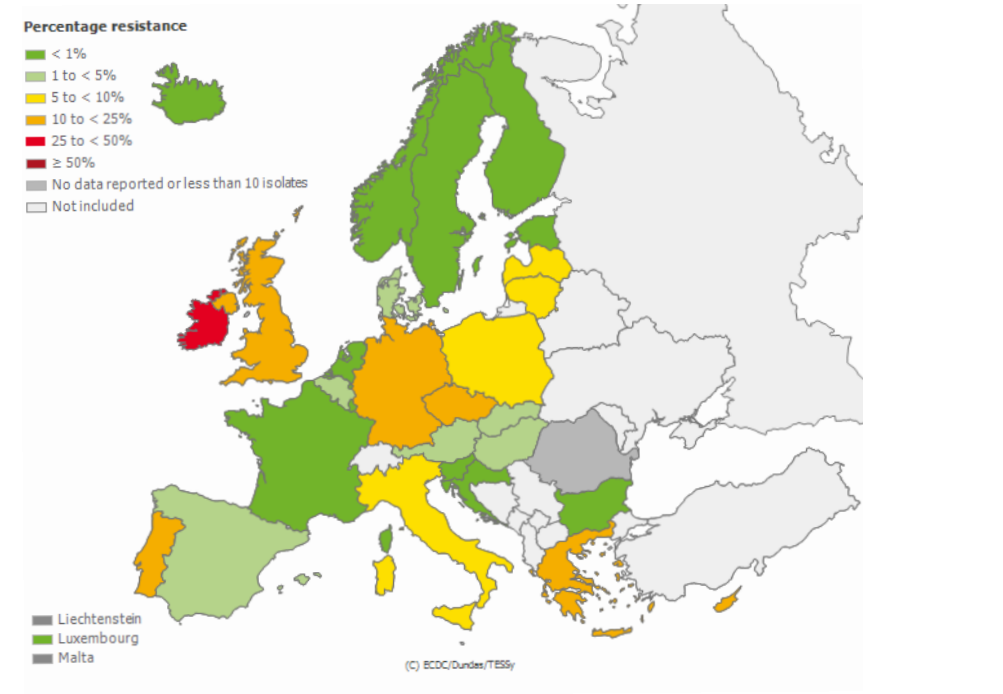

Figure 6. Distribution of vancomycin-resistant E. faecium in EARS-Net countries in 2012. Map downloaded from ECDC's TESSy database on 16/10/2013: http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

The highest proportion of VREfa in Ireland (4.9%) was reported in 2011. In 2012, Ireland had the second highest proportion of VREfa in Europe after Greece (7.9%).

Twelve isolates were reported as ampicillin-resistant, which suggests that these isolates were either misidentified as *E. faecalis* or misclassified as ampicillin-resistant, as resistance to ampicillin is rare in *E. faecalis*. Males were approximately two times more likely to have an invasive *E. faecalis* infection than females (z=6.15, P<0.0001). The frequency of invasive *E. faecalis* infection increased with age with the majority of infections (n=197; 66%) occurring in adults over 60 years. The median age was 68 years (95%CI, 66-72).

Pseudomonas aeruginosa

In 2012, there were 219 reports of invasive *P. aeruginosa* infection (217 from blood and two from CSF) from 219 patients, an increase of 19% from 184 reports in 2011. **Table 1** displays 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] since 2006.

Thirty-eight (17.4%) of 219 isolates were resistant to piperacillin-tazobactam; 33 (15.2%) of 217 were resistant to ceftazidime; 42 (19.4%) of 216 were resistant to imipenem or meropenem; 45 (20.6%) of 218 were resistant to ciprofloxacin; and 26 (11.9%) of 218 were resistant to gentamicin [no additional isolates were resistant to the other aminoglycosides (amikacin or tobramycin)].

In 2012, resistance to all five indicator antimicrobials increased, with resistance to piperacillin-tazobactam, ceftazidime and meropenem reaching their highest levels since surveillance began.

Twenty-eight (13.0%) of 215 isolates tested against all five "indicator" antimicrobials, from 14 hospitals, which was the highest since surveillance began:

- Four with resistance to all five required antimicrobials
- 11 with resistance to four of the five required antimicrobials
- 13 with resistance to three of the five required antimicrobials

Antimicrobial resistance levels among *P. aeruginosa* isolates in Ireland have been increasing in comparison with other European countries, with Ireland ranking between 16th and 20th out of 30 countries for all five indicator antimicrobials.
Males were approximately 1.6-times more likely to have an invasive *P. aeruginosa* infection than females (significant; z=3.63, P<0.001). The frequency of invasive *P. aeruginosa* infection increased with age with the majority of infections (n=155; 71%) occurring in adults over 60 years. The median age was 71 years (95%CI, 68-73).

Enhanced EARS-Net Surveillance

The enhanced EARS-Net surveillance programme was established in 2004 and involves voluntary participation by hospitals that provide additional demographic, risk factor and clinical data on invasive pathogens causing BSI. In 2012, there were 1,765 individual records (cases or isolates under the EARS-Net definition) submitted

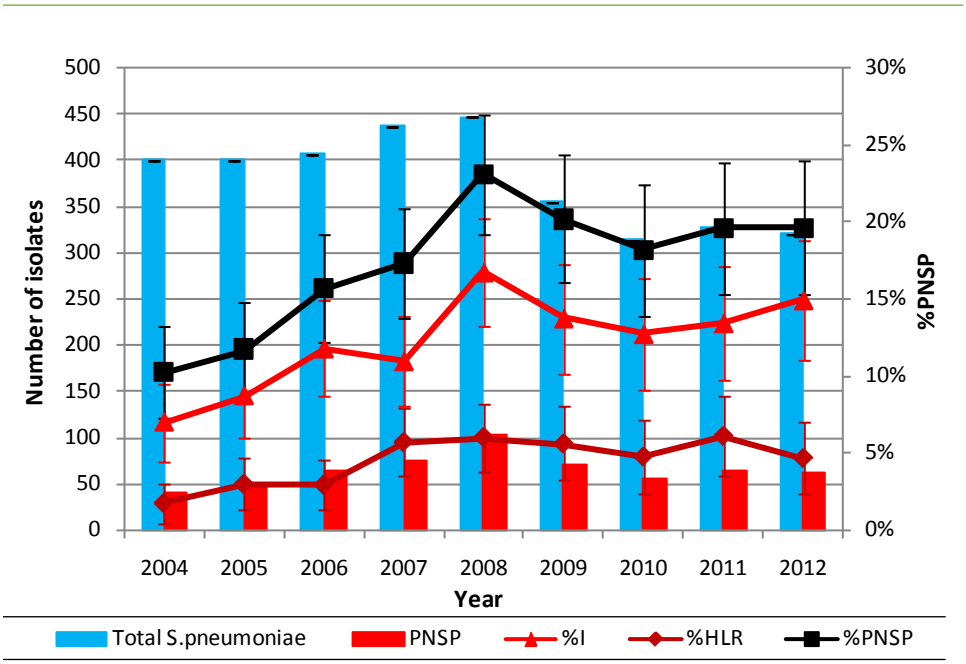

Figure 7. Trends for S. pneumoniae. Total numbers of S. pneumoniae/PNSP and percentage PNSP with 95% confidence intervals. HLR = High-level resistant; I = Intermediate resistance

from nine participating laboratories. The total number of records thus far for 2012 represents 35% of the total core EARS-Net dataset. Demographic and other basic data for the major resistance profiles of EARS-Net pathogens are shown in **Table 2**.

1. ***S. aureus* BSI**
   - Of the *S. aureus* BSI, 69% of MRSA and 61% of MSSA were classified as healthcare-associated in 2012
   - Between 2010 and 2012, there was an annual reduction in the proportion of *S. aureus* BSI due to central vascular catheter (CVC) infection (23% to 15%). However, there was an increase in the proportion of *S. aureus* BSI due to peripheral vascular catheter infection (6% to 11%)
   - The most common reported risk factors for *S. aureus* BSI were; recent surgery, malignancy and stay in an intensive care unit
   - Endocarditis, abscess & septic arthritis were the most commonly recorded clinical features

2. **Enterococcal BSI**
   - Of the enterococcal BSI, the majority of vancomycin resistant (83%) and vancomycin sensitive (73%) were healthcare-associated
   - The commonest primary sources of enterococcal BSI were CVCs and intra-abdominal/ gastrointestinal tract infections
   - Between 2010 and 2012, there was an increase in VRE bloodstream infection due to a CVC infection

3. **Pneumococcal BSI**
   - For penicillin non-susceptible *S. pneumoniae* (PNSP), the proportion of isolates that were detected within two days after admission decreased from 95% in 2011 to 65% in 2012. For penicillin susceptible *S. pneumoniae* (PSSP) this also decreased from 93% in 2011 to 79% in 2012. Between 2011 and 2012, the proportion of isolates that were detected after five days post-admission increased from 0% to 26% for PNSP and from 5% to 8% for PSSP. These changes have resulted in an increasing proportion of PNSP BSI in particular, being classed as "acquired in the reporting hospital" (5% in 2011 to 32% in 2012). However, the overall number of PNSP BSI isolates for which there is enhanced information is small and these results must be interpreted with caution
   - Respiratory tract infection remains the most common source of pneumococcal BSI
   - Of pneumococcal BSI, 5% were associated with meningitis

4. ***E. coli*, *K. pneumoniae* and *P. aeruginosa* BSI**
   - The majority of fluoroquinolone resistant *E. coli*, *K. pneumoniae* and *P. aeruginosa* BSI were healthcare-associated, in contrast to 43% of fluoroquinolone susceptible *E. coli* BSI
   - The most common source of *E. coli* BSI was urinary tract infection, with 5% associated with the presence of a urinary catheter
   - The most common source of *K. pneumoniae* BSI was intra-abdominal/gastro intestinal tract, followed by urinary tract infection
   - The most common source of *P. aeruginosa* BSI was respiratory tract infection

For further details, go to the HPSC website: www.hpsc.ie and click on "Topics A-Z", then "Enhanced Bacteraemia Surveillance

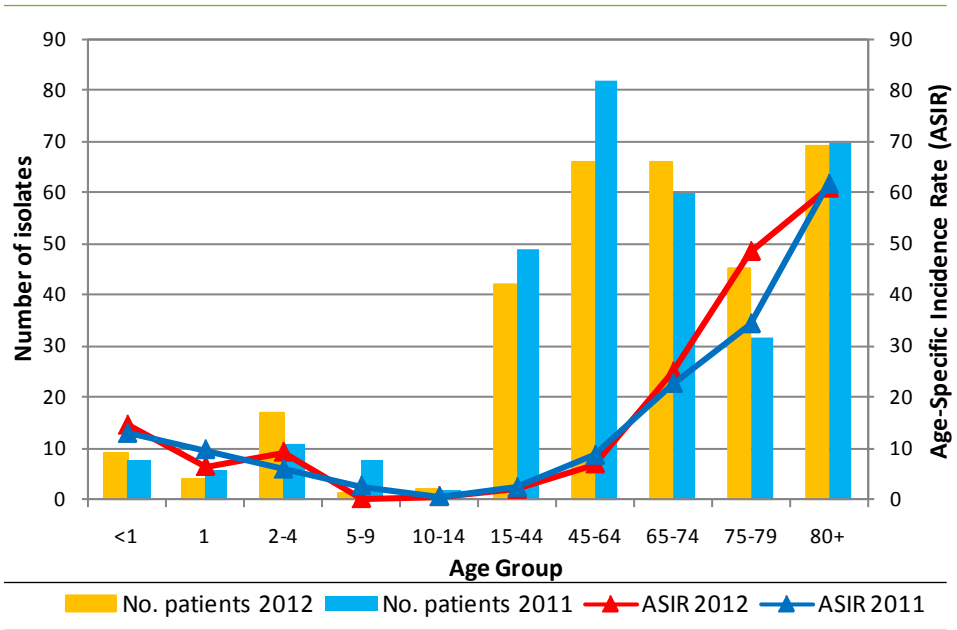

Figure 8. Numbers and age-specific incidence rates of patients with invasive S. pneumoniae infection in 2012 compared with 2011

Conclusion
Ongoing monitoring of trends in Ireland's EARS-Net surveillance data provides important information.
A welcome trend is the continued decrease in the proportion of *S. aureus* BSI due to MRSA for the sixth consecutive year to the lowest level yet (22.8%) in 2012. However, antimicrobial resistance to key antimicrobials in invasive infections caused by the *Enterobacteriaceae* (*E. coli, K. pneumoniae*), *P. aeruginosa* and *Enterococcus faecium* continues to increase, reaching the highest levels yet in 2012. Indeed, for 2012, Ireland had the highest proportion of VREfm (45.4%) of any EARS-Net country.

Improvements in infection prevention and control resources and interventions, along with hospital antimicrobial stewardship programmes, have probably contributed to reducing the burden of MRSA BSI in Ireland since 2006. The introduction of pneumococcal conjugate vaccines into the childhood immunisation programme since September 2008 has already resulted in a reduction in the burden of invasive pneumococcal disease in children. Despite these successes, the issue of antimicrobial resistance remains a major problem in Ireland. In addition, the increasing number of reported invasive infections due to multi-drug resistant bacteria is of particular concern. It should also be noted that antimicrobial resistance is an issue for other bacterial species (not captured within the EARS-Net surveillance) as well as for infections occurring at sites other than blood and/or CSF (not captured within the EARS-Net surveillance). Whilst EARS-Net surveillance data on key pathogens from invasive infections is extremely valuable in comparing antimicrobial resistance at a national level, it is likely to underestimate the true burden of infections caused by drug-resistant pathogens.

Data collected through the enhanced EARS-Net surveillance programme are particularly useful in informing infection prevention and control programmes both nationally and in those hospitals that participate in the enhanced EARS-Net surveillance scheme.

Infections caused by antimicrobial resistant bacteria result in excess patient mortality, morbidity and costs to the healthcare system. Rising levels of resistance 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 health service. To this end, it is vital that recommendations and guidelines produced by the HSE/RCPI AMR and HCAI Clinical Advisory Group 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 October 2013**.
For further details of EARS-Net and antimicrobial resistance in Ireland see www.hpsc.ie
European data are available at http://ecdc.europa.eu/en/activities/surveillance/EARS-Net/Pages/Database.aspx

9.3.0.2 Enhanced Surveillance of Carbapenem resistant *Enterobacteriaceae* (CRE) in Ireland

Key points:

- In 2012, enhanced surveillance data was received on 32 CRE cases. This represented a small decrease compared with 2011, when enhanced surveillance data was received on 37 CRE cases (out of a total of 39 cases reported that year)
- Six patients (19%) had a history of hospitalisation abroad – UK (4 VIM-type CRE, all of whom were cared for in the same UK hospital) and India (2 NDM-type CRE with no epidemiological links)
- The clinical significance of the CRE isolate was reported for 30 patients (94%), representing colonisation in the majority (n=27) and CRE infection was reported for three patients

Carbapenem resistant *Enterobacteriaceae* (CRE) are multiple-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 antibiotic therapy may be lacking. Most CRE produce carbapenemase, an enzyme that breaks down the carbapenem class of antibiotics (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 2012, 32 confirmed cases of carbapenemase-producing CRE and three CRE outbreaks were reported;

1. Two KPC outbreaks, both reported from acute hospitals, affecting seven and three patients, respectively
2. One OXA-48 outbreak, which occurred in a long-term care facility affecting two residents

Completed enhanced surveillance forms were received from eight laboratories on 32 patients, 18 of whom were male (56%). The average age was 50 years (range: 1 to 95 years). At the time of CRE detection, 22 patients

(68%) were hospitalised, eight were in the community (25%) and two were nursing home residents. Of the 22 hospitalised patients, nine (41%) had been admitted from home, five (23%) were transfers from another acute hospital and the source of admission was not provided for the remaining eight patients. Of the five patients who had been transferred from another acute hospital, three were repatriated from hospitals abroad; UK (2) and India (1).

At the time of CRE detection, 10 patients (31%) were already known to be colonised or infected with one or more other multi-drug resistant organisms (MDRO). Six patients (19%) had a history of recent hospitalisation abroad; UK (4) and India (2).

Fifteen patients (47%) reported no foreign travel in the last 12 months and the travel history was unknown for nine patients (28%). Eight patients reported a history of foreign travel within the past 12 months:

- UK – Five patients; VIM (4) and KPC (1). Four of those had been hospitalised in UK
- India; Two patients with NDM-1. Both had been hospitalised in India
- Philippines; One patient with KPC who had not been hospitalised whilst abroad

Two patients had no identifiable risk factors for CRE colonisation or infection and risk factor data was not provided for six patients. Of the remaining 24 patients, 14 (58%) had more than one risk factor. Reported risk factors included; Hospitalisation in the past 12 months (21; 88%), history of surgery in the past six months (6; 25%), history of admission to intensive care in the last 12 months (4; 17%). Eleven patients (46%) had underlying co-morbidities [chronic lung disease, diabetes mellitus, urological abnormality or immunocompromise].

Of the 32 patients, antimicrobial exposure history prior to isolation of CRE was provided for 23 (72%), which included the majority of the 22 hospitalised patients (n=19; 86%). Fourteen patients had received more than one antimicrobial class.

- β lactam - β lactamase inhibitor combination agents; 19 (83%)
- Cephalosporins; 8 (35%)
- Fluoroquinolones; 6 (26%)
- Carbapenems; 4 (17%)
- Aminoglycosides; 3 (13%)

The clinical significance of the CRE isolate was reported for 30 patients (94%), representing colonisation in the majority (n=27). CRE infection was reported for three patients, with two cases of urinary tract infection and one case of respiratory tract infection.

The majority of CRE (21; 66%) were detected from screening rectal swabs or faeces. Eight isolates were detected from urine (25%), two from superficial swabs and one from intra-abdominal pus.
Outcome was reported for only one of the eight non-hospitalised patients (survived) and for 16 of the 24 hospitalised patients (66%). Of those, eleven (68%) were discharged home, two (13%) remained inpatients at the time the surveillance form was returned and it is not known whether or not those CRE colonised patients subsequently went on to develop CRE infection later in the hospital admission. Three patients died (19%). For one of the three deaths, the patient was reported to have had CRE infection. The potential contribution of CRE to patient death was not collected.

Of the eleven patients who were discharged home, length-of-stay could be calculated for nine. The median length-of-stay was 26 days (range: 12 to 120 days). *Klebsiella pneumoniae* accounted for 23 and *K. oxytoca* for one CRE isolate. There were six cases of *E. coli* CRE and one case each of *E. cloacae* and *C. freundii* CRE reported.

The reported carbapenemase enzyme types reported in 2012 were; KPC (14 cases), OXA-48 (8 cases), NDM-1 (6 cases) and VIM (4 cases).

- Carbapenems; Reported minimum inhibitory concentrations for meropenem and ertapenem ranged from 1.5 to >32 mg/L
- Gentamicin; Reported on all 32 isolates, with 13 resistant (40%)
- Amikacin; Reported on 26 isolates, with 16 resistant (62%) and four with intermediate susceptibility
- Fluoroquinolones; Reported on 28 isolates, with 23 resistant (82%)
- Tigecycline; Reported on 25 isolates; with 10 resistant (40%) and five with intermediate susceptibility
- Colistin; Reported on 20 isolates, with one resistant (5%)

No case of carbapenemase-producing infection of blood or CSF was reported in Ireland in 2012. In 2012, 25 of 29 EARS-Net countries reported one or more case of invasive carbapenem resistant *K. pneumoniae* infection, with 13 countries reporting five or more cases. In 2012, the proportions of invasive *K. pneumoniae* isolates with carbapenem resistance were highest in Greece (62%) and Italy (31%). This clearly illustrates that this is an evolving problem throughout Europe. Increases in the prevalence of CRE are largely related to overuse of broad spectrum antimicrobials and suboptimal infection prevention and control practices, particularly in hospital and long-term care settings. Prudent antimicrobial stewardship and aggressive infection prevention and control interventions are required to prevent transmission of carbapenemase-producing *Enterobacteriaceae*.
In response to the emergence of CRE, screening

guidelines were issued in 2011. Subsequently, Irish guidelines for the prevention and control of multi-drug resistant organisms, excluding MRSA, in the healthcare setting have been developed under the auspices of the Royal College of Physicians of Ireland (RCPI) Clinical Advisory Group on Healthcare-Associated Infections and Antimicrobial Resistance. Latest available information on CRE in Ireland and the guidelines are available on the HPSC website at the following link:
http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/CarbapenemResistantEnterobacteriaceaeCRE/

10

Computerised Infectious Disease Reporting System (CIDR)

10. Computerised Infectious Disease Reporting (CIDR)

Summary

- 2012 represented the first full year of CIDR operation following the completion of national rollout in 2011
- The number of active CIDR users in 2012 was 230
- Laboratory notifications of sexually transmitted infections diseases through CIDR from the end of 2012 now allow more timely analysis and reporting of case-based disaggregate data for these diseases
- New CIDR infrastructure improves energy efficiency and system manageability

CIDR Operations

Sexually Transmitted Infections Notified from Laboratories using CIDR

The expansion of the schedule of notifiable diseases in 2011 and the use of CIDR to manage these from the beginning of 2012 was followed up at the end of 2012 by a further expansion through the notification of case-based laboratory-identified notifiable sexually transmitted infections using CIDR. This will enable more timely analysis and reporting of these diseases. This was a major achievement, building on many years of work, since STI notifications had previously been made on an aggregate basis that was not timely. It is anticipated that this will significantly increase the volume of infectious disease notifications made through CIDR over coming years.

New Technical Architecture for CIDR

2012 saw the migration of CIDR to a new virtualised infrastructure. This has allowed the number of servers supporting the CIDR system (production, disaster recovery, test, training and development) to be reduced from 20 to 6 servers, significantly reducing the energy required to run this equipment. It also enables more efficient use of this hardware. Improved resilience and management are provided by the ability to more easily backup and restore CIDR environments and to be able to promote new developments more easily as well as allowing additional hardware resources to be readily added if required by an increased load associated by a major outbreak or pandemic.

Governance and Communications

The National CIDR Steering Group continued to provide guidance and oversight of CIDR through 2012 and met by teleconference on three occasions during the year. The wider National CIDR User Group convened on four occasions through the year, also by teleconference, to discuss the ongoing use of CIDR and associated developments.

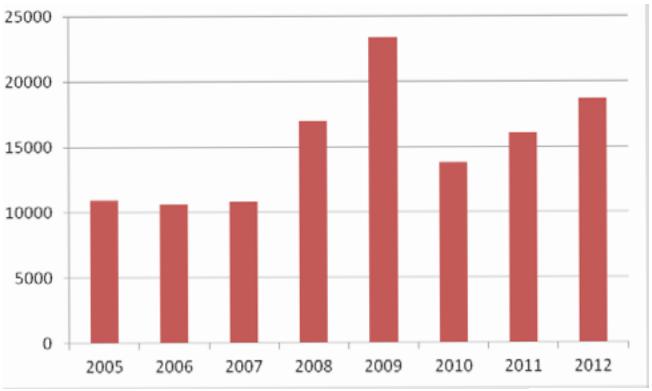

Figure 1. The volume of statutory infectious disease notifications in CIDR per year since 2005 when national implementation commenced.

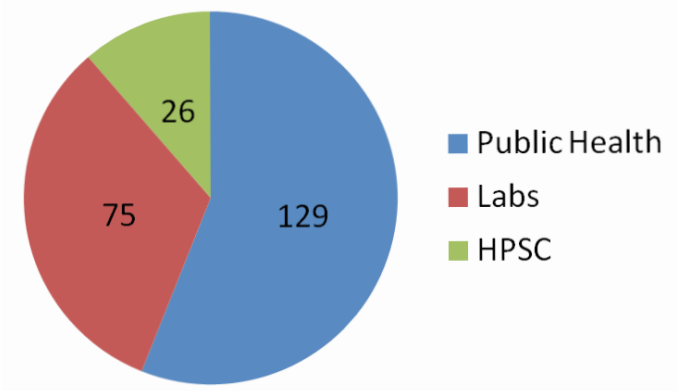

Figure 2. The number of users of the CIDR system in Departments of Public Health, in diagnostic and reference laboratories, and in HPSC in 2012 (total=230).

Appendix 1
Notifiable Infectious Diseases in Ireland

Notes:

Figures for the year 2012 presented in this appendix were extracted from the Computerised Infectious Disease Reporting (CIDR) system in August 2013. These figures may differ from those published previously due to ongoing updating of notification data on CIDR and also due to the addition of new notifiable diseases on January 1st 2012 along with the introduction of revised versions of case definitions of certain diseases at that time.

Figures on EARS-Net pathogens and certain sexually transmitted infections (specifically, ano-genital warts, chancroid, *Chlamydia trachomatis*, gonorrhoea, granuloma inguinale, herpes simplex (genital), lymphogranuloma venereum, non-specific urethritis and trichomoniasis) are not presented here, since these diseases were not reported via the CIDR system during 2012; 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 2012) 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*

Table A1.1. List of notifiable infectious diseases and their respective causative pathogens (relevant to 2012) under Infectious Diseases (Amendment) (No. 3) Regulations 2011 (S.I. No. 452 of 2011)
Continued

Infectious Disease	Causative Pathogen(s)
Rabies	Rabies virus
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, 2010-2012 and crude incidence rates of diseases, 2012

Infectious Disease	2010	2011	2012	CIR* 2012
Bacterial meningitis (not otherwise specified)	42	35	29	0.63
Botulism	0	1	0	0.00
Brucellosis	2	1	2	0.04
Campylobacter infection	1660	2427	2388	52.05
Chickenpox - hospitalised cases	NA	NA	80	-
***Clostridium difficile* infection†**	1693	1848	1824	-
Creutzfeldt Jakob disease	3	7	5	0.11
Cryptosporidiosis	294	428	556	12.12
Cytomegalovirus infection (congenital)	NA	NA	8	0.17
Dengue fever	NA	NA	7	0.15
Echinococcosis	1	0	0	0.00
Giardiasis	57	57	54	1.18
***Haemophilus influenzae* disease (invasive)**	28	44	41	0.89
Hepatitis A (acute)	46	19	30	0.65
Hepatitis B (acute and chronic)	640	522	580	12.64
Hepatitis C	1226	1255	1036	22.58
Human immunodeficiency virus infection	NA	NA	341	7.43
Influenza (seasonal & pandemic)‡	275	2077	743	16.19
Legionellosis§	11	7	15	0.33
Leptospirosis	17	16	15	0.33
Listeriosis	10	7	11	0.24
Lyme disease	NA	NA	8	0.17
Malaria	82	61	65	1.42
Measles	403	267	103	2.24
Meningococcal disease	114	94	66	1.44
Mumps	292	165	163	3.55
Noroviral infection	1926	990	1705	37.16
Paratyphoid	5	2	5	0.11
Pertussis	114	229	458	9.98
Q fever	9	5	6	0.13
Respiratory syncytial virus infection	NA	NA	1972	42.98
Rotavirus infection	2501	2451	2652	57.80
Rubella	23	4	9	0.20
Salmonellosis	356	310	314	6.84
Shigellosis	60	42	29	0.63
Streptococcus group A infection (invasive)	68	67	122	2.66
Streptococcus group B infection (invasive)**	NA	NA	77	-
***Streptococcus pneumoniae* infection (invasive)**	391	425	427	9.31
Syphilis‖	NA	NA	561	12.23
Tetanus	0	0	1	0.02
Toxoplasmosis	36	32	36	0.78
Tuberculosis¶	NA	414	366	7.98
Typhoid	8	14	8	0.17
Typhus	0	1	0	0.00
Verotoxigenic *Escherichia coli* infection	199	284	554	12.07
Viral encephalitis	22	23	18	0.39
Viral meningitis	168	220	235	5.12
Yersiniosis	3	6	2	0.04
Total	**12785**	**15265**	**17727**	

NA: Indicates that data not available in CIDR for the diseases and years indicated above

*CIR, Crude incidence rate per 100,000 total population

†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; cases under two years of age are not notifiable; *C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here

‡Includes cases caused by the influenza A (H1N1) 2009 pandemic, which lasted from 25/04/2009 – 10/08/2010

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

‖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

¶Tuberculosis only notifiable in CIDR since 2011

**Streptococcus group B infection (invasive) infections in infants <90 days old or stillborn infants

Table A1.3 Number of notifiable infectious diseases by HSE area, 2012

Infectious Disease	HSE -E	HSE -M	HSE -MW	HSE -NE	HSE -NW	HSE -SE	HSE -S	HSE -W	Total
Bacterial meningitis (not otherwise specified)	10	1	4	0	5	3	2	4	29
Brucellosis	*	*	*	*	*	*	*	*	2
Campylobacter infection	818	187	244	200	112	286	368	173	2388
Chickenpox - hospitalised cases	43	2	4	7	1	11	6	6	80
Clostridium difficile infection†	939	48	161	89	65	188	163	171	1824
Creutzfeldt Jakob disease	2	0	0	0	0	0	3	0	5
Cryptosporidiosis	34	53	85	53	50	98	85	98	556
Cytomegalovirus infection (congenital)	8	0	0	0	0	0	0	0	8
Dengue fever	4	0	0	0	1	1	0	1	7
Giardiasis	19	6	4	1	1	4	13	6	54
Haemophilus influenzae disease (invasive)	18	1	4	4	2	6	4	2	41
Hepatitis A (acute)	13	1	1	2	3	2	7	1	30
Hepatitis B (acute and chronic)	361	25	32	41	8	31	47	35	580
Hepatitis C	762	35	24	48	19	33	79	36	1036
Human immunodeficiency virus infection††	-	-	-	-	-	-	-	-	341
Influenza	302	71	61	84	71	61	48	45	743
Legionellosis §	7	0	3	1	0	0	0	4	15
Leptospirosis	5	2	2	2	0	0	1	3	15
Listeriosis	1	1	0	2	1	0	2	4	11
Lyme disease	0	0	3	0	2	0	2	1	8
Malaria	34	5	1	6	4	6	5	4	65
Measles	24	0	2	5	3	0	64	5	103
Meningococcal disease	18	4	8	9	2	12	6	7	66
Mumps	71	9	6	12	12	15	16	22	163
Noroviral infection	915	84	169	212	55	75	75	120	1705
Paratyphoid	3	0	0	1	0	0	0	1	5
Pertussis	159	13	13	21	74	54	79	45	458
Q fever	1	1	1	0	0	1	2	0	6
Respiratory syncytial virus infection	925	153	140	147	159	280	54	114	1972
Rotavirus infection	465	296	218	196	215	462	469	331	2652
Rubella	5	1	0	0	0	0	1	2	9
Salmonellosis	116	29	19	29	16	33	31	41	314
Shigellosis	14	0	0	1	1	3	9	1	29
Streptococcus group A infection (invasive)	51	7	8	11	5	16	14	10	122
Streptococcus group B infection (invasive)	49	1	5	7	0	1	9	5	77
Streptococcus pneumoniae infection (invasive)	115	21	40	28	29	113	48	33	427
Syphilis	412	19	43	21	11	27	3	25	561
Tetanus	*	*	*	*	*	*	*	*	1
Toxoplasmosis	16	0	5	3	2	2	7	1	36
Tuberculosis	150	27	21	24	14	25	73	32	366
Typhoid	6	0	0	0	0	0	2	0	8
Verotoxigenic *Escherichia coli* infection	55	82	87	31	38	23	150	88	554
Viral encephalitis	6	1	3	2	0	2	3	1	18
Viral meningitis	130	10	12	17	8	27	14	17	235
Yersiniosis	*	*	*	*	*	*	*	*	2

* Data not reported to HSE area level when total number in Ireland <5 cases
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases
†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here
††HIV figures are not broken down HSE area

Table A1.4 Number of notifiable infectious diseases by HSE region, 2012

Infectious Disease	Dublin Mid-Leinster	Dublin North-East	South	West	Total
Bacterial meningitis (not otherwise specified)	10	1	5	13	29
Brucellosis	*	*	*	*	2
Campylobacter infection	766	439	654	529	2388
Chickenpox - hospitalised cases	29	23	17	11	80
***Clostridium difficile* infection†**	666	410	351	397	1824
Creutzfeldt Jakob disease	2	0	3	0	5
Cryptosporidiosis	76	64	183	233	556
Cytomegalovirus infection (congenital)	5	3	0	0	8
Dengue fever	3	1	1	2	7
Giardiasis	19	7	17	11	54
***Haemophilus influenzae* disease (invasive)**	10	13	10	8	41
Hepatitis A (acute)	13	3	9	5	30
Hepatitis B (acute and chronic)	216	211	78	75	580
Hepatitis C	465	380	112	79	1036
Human immunodeficiency virus infection	-	-	-	-	341
Influenza	224	233	109	177	743
Legionellosis §	3	5	0	7	15
Leptospirosis	6	3	1	5	15
Listeriosis	2	2	2	5	11
Lyme disease	0	0	2	6	8
Malaria	27	18	11	9	65
Measles	20	9	64	10	103
Meningococcal disease	14	17	18	17	66
Mumps	55	37	31	40	163
Noroviral infection	694	517	150	344	1705
Paratyphoid	2	2	0	1	5
Pertussis	133	60	133	132	458
Q fever	1	1	3	1	6
Respiratory syncytial virus infection	733	492	334	413	1972
Rotavirus infection	637	320	931	764	2652
Rubella	5	1	1	2	9
Salmonellosis	103	71	64	76	314
Shigellosis	9	6	12	2	29
Streptococcus group A infection (invasive)	41	28	30	23	122
Streptococcus group B infection (invasive)	30	27	10	10	77
***Streptococcus pneumoniae* infection (invasive)**	82	82	161	102	427
Syphilis	337	115	30	79	561
Tetanus	*	*	*	*	1
Toxoplasmosis	9	10	9	8	36
Tuberculosis	110	91	98	67	366
Typhoid	3	3	2	0	8
Verotoxigenic *Escherichia coli* infection	120	48	173	213	554
Viral encephalitis	7	2	5	4	18
Viral meningitis	92	65	41	37	235
Yersiniosis	*	*	*	*	2

*Data not reported to HSE regional level when total number in Ireland <5 cases
†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases
††HIV figures are not broken down HSE region

Table A1.5 Number of notifiable infectious diseases by age group (years), 2012

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)	15	0	1	1	3	2	2	1	3	1	0	29
Brucellosis	0	1	0	0	0	1	0	0	0	0	0	2
Campylobacter infection	558	162	105	116	205	342	242	216	153	283	6	2388
Chickenpox - hospitalised cases	38	11	1	1	3	6	2	5	3	8	2	80
Clostridium difficile infection†	33	14	8	24	31	107	89	99	215	1201	3	1824
Creutzfeldt Jakob disease	0	0	0	0	0	0	0	2	0	3	0	5
Cryptosporidiosis	303	129	45	18	19	19	12	3	3	5	0	556
Cytomegalovirus infection (congenital)	7	1	0	0	0	0	0	0	0	0	0	8
Dengue fever	0	0	0	0	1	3	1	1	1	0	0	7
Giardiasis	6	6	1	1	1	16	10	5	4	4	0	54
Haemophilus influenzae disease (invasive)	6	3	0	4	1	1	4	1	4	17	0	41
Hepatitis A (acute)	5	7	4	1	2	5	2	0	3	1	0	30
Hepatitis B (acute and chronic)	0	1	3	15	63	250	152	61	25	10	0	580
Hepatitis C	8	13	7	6	48	335	348	168	82	19	2	1036
Human immunodeficiency virus infection	1	4	0	6	32	142	99	43	11	3	0	341
Influenza	99	48	28	21	22	86	94	51	49	238	7	743
Legionellosis §	0	0	0	0	0	0	2	0	3	10	0	15
Leptospirosis	0	0	0	0	3	0	4	4	4	0	0	15
Listeriosis	2	0	0	0	0	1	0	0	1	7	0	11
Lyme disease	0	2	0	0	0	1	0	3	0	2	0	8
Malaria	2	5	1	0	2	7	30	14	2	2	0	65
Measles	28	11	28	26	4	1	5	0	0	0	0	103
Meningococcal disease	40	5	2	7	1	2	1	5	0	3	0	66
Mumps	25	18	9	21	25	25	16	5	11	6	2	163
Noroviral infection	192	14	17	8	27	78	72	79	155	1048	15	1705
Paratyphoid	0	0	0	0	0	4	1	0	0	0	0	5
Pertussis	234	37	45	18	7	27	36	35	6	11	2	458
Q fever	0	0	0	0	0	0	2	1	0	3	0	6
Respiratory syncytial virus infection	1914	13	6	2	3	8	1	7	6	10	2	1972
Rotavirus infection	2559	49	14	1	2	0	5	3	2	12	5	2652
Rubella	4	1	1	1	0	1	1	0	0	0	0	9
Salmonellosis	89	13	10	17	30	51	25	27	19	32	1	314
Shigellosis	2	0	1	0	3	10	4	6	2	1	0	29
Streptococcus group A infection (invasive)	20	6	1	1	4	12	19	10	7	42	0	122
Streptococcus group B infection (invasive)	77	0	0	0	0	0	0	0	0	0	0	77
Streptococcus pneumoniae infection (invasive)	45	10	3	4	4	18	29	28	64	222	0	427
Syphilis	0	0	0	6	43	199	159	95	37	19	3	561
Tetanus	0	0	1	0	0	0	0	0	0	0	0	1
Toxoplasmosis	1	0	0	2	2	20	7	3	1	0	0	36
Tuberculosis	2	2	6	21	26	79	68	57	46	57	2	366
Typhoid	0	1	1	0	1	3	2	0	0	0	0	8
Verotoxigenic *Escherichia coli* infection	249	62	27	13	17	38	61	18	24	42	3	554
Viral encephalitis	3	0	0	0	0	1	0	5	4	5	0	18
Viral meningitis	131	10	4	12	12	37	21	5	1	2	0	235
Yersiniosis	0	0	1	0	0	1	0	0	0	0	0	2
Total	**6698**	**659**	**381**	**374**	**647**	**1939**	**1628**	**1066**	**951**	**3329**	**55**	**17727**

†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.6 Number of notifiable infectious diseases by gender, 2012

Infectious Disease	Male	Female	Unknown	Total
Bacterial meningitis (not otherwise specified)	10	19	0	29
Brucellosis	2	0	0	2
Campylobacter infection	1315	1068	5	2388
Chickenpox - hospitalised cases	50	29	1	80
Clostridium difficile infection†	718	1105	1	1824
Creutzfeldt Jakob disease	3	2	0	5
Cryptosporidiosis	291	265	0	556
Cytomegalovirus infection (congenital)	4	3	1	8
Dengue fever	3	4	0	7
Giardiasis	31	23	0	54
Haemophilus influenzae disease (invasive)	20	21	0	41
Hepatitis A (acute)	13	17	0	30
Hepatitis B (acute and chronic)	332	234	14	580
Hepatitis C	686	343	7	1036
Human immunodeficiency virus infection	244	97	0	341
Influenza	295	444	4	743
Legionellosis §	8	7	0	15
Leptospirosis	11	4	0	15
Listeriosis	4	7	0	11
Lyme disease	4	4	0	8
Malaria	39	26	0	65
Measles	47	56	0	103
Meningococcal disease	37	29	0	66
Mumps	77	86	0	163
Noroviral infection	766	939	0	1705
Paratyphoid	5	0	0	5
Pertussis	211	247	0	458
Q fever	5	1	0	6
Respiratory syncytial virus infection	1133	837	2	1972
Rotavirus infection	1419	1227	6	2652
Rubella	5	4	0	9
Salmonellosis	165	149	0	314
Shigellosis	18	11	0	29
Streptococcus group A infection (invasive)	59	63	0	122
Streptococcus group B infection (invasive)	24	37	16	77
Streptococcus pneumoniae infection (invasive)	221	206	0	427
Syphilis	437	111	13	561
Tetanus	1	0	0	1
Toxoplasmosis	13	23	0	36
Tuberculosis	219	146	1	366
Typhoid	6	2	0	8
Verotoxigenic *Escherichia coli* infection	243	311	0	554
Viral encephalitis	6	12	0	18
Viral meningitis	130	103	2	235
Yersiniosis	0	2	0	2
Total	**9330**	**8324**	**73**	**17727**

†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here
§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Table A1.7 Number of notifiable infectious diseases by case classification, 2012

Infectious Disease	Confirmed	Probable	Possible	Total
Bacterial meningitis (not otherwise specified)	12	5	12	29
Brucellosis	2	0	0	2
Campylobacter infection	2387	1	0	2388
Chickenpox - hospitalised cases	57	0	23	80
***Clostridium difficile* infection†**	1824	0	0	1824
Creutzfeldt Jakob disease	5	0	0	5
Cryptosporidiosis	554	2	0	556
Cytomegalovirus infection (congenital)	8	0	0	8
Dengue fever	7	0	0	7
Giardiasis	54	0	0	54
***Haemophilus influenzae* disease (invasive)**	41	0	0	41
Hepatitis A (acute)	28	2	0	30
Hepatitis B (acute and chronic)	580	0	0	580
Hepatitis C	1036	0	0	1036
Human immunodeficiency virus infection	341	0	0	341
Influenza	676	52	15	743
Legionellosis §	15	0	0	15
Leptospirosis	15	0	0	15
Listeriosis	11	0	0	11
Lyme disease	8	0	0	8
Malaria	65	0	0	65
Measles	26	53	24	103
Meningococcal disease	60	0	6	66
Mumps	43	0	120	163
Noroviral infection	1699	6	0	1705
Paratyphoid	5	0	0	5
Pertussis	264	56	138	458
Q fever	5	1	0	6
Respiratory syncytial virus infection	1972	0	0	1972
Rotavirus infection	2652	0	0	2652
Rubella	0	1	8	9
Salmonellosis	309	5	0	314
Shigellosis	29	0	0	29
Streptococcus group A infection (invasive)	118	4	0	122
Streptococcus group B infection (invasive)	77	0	0	77
***Streptococcus pneumoniae* infection (invasive)**	347	0	80	427
Syphilis	525	36	0	561
Tetanus	0	1	0	1
Toxoplasmosis	36	0	0	36
Tuberculosis	281	28	57	366
Typhoid	8	0	0	8
Verotoxigenic *Escherichia coli* infection	413	139	2	554
Viral encephalitis	18	0	0	18
Viral meningitis	220	11	4	235
Yersiniosis	2	0	0	2
Total	**16835**	**403**	**489**	**17727**

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 2012

†*C. difficile* figures in the *C. difficile* chapter are presented by quarter rather than using the 2012 epidemiological calendar year as shown here

§Legionellosis figures include both Legionnaires' disease and Pontiac fever cases

Explanatory Notes
Glossary of Terms

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 2011, notification data were inputted directly by areas using the system. For areas not yet on CIDR, data were forwarded weekly to HPSC for input to CIDR. Enhanced surveillance was undertaken for certain diseases and these data collated on CIDR. Outbreak data were also collated on CIDR using the same process outlined above. Since 4th May 2008, new cases of *Clostridium difficile*-associated disease (CDAD) were notified on CIDR under the category 'acute infectious gastroenteritis' (AIG). Weekly Reports on infectious disease notifications (including a separate report for AIG with the emphasis on *C. difficile*) 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 July and October 2012. These figures may differ from those previously published due to ongoing updating of data on CIDR.

Data on the notifiable infectious diseases not yet on CIDR were collated as follows:

National Tuberculosis Surveillance System (NTBSS)

TB notification data (including enhanced information) for 2010 were collated in the regional Departments of Public Health, where data were entered on the Epi2000 NTBSS database. Each HSE Area provided finalised 2010 data (with outcome information). Data were validated and cleaned with each area and the national data were collated. Validation of the 2010 TB data was concluded during September 2012.

Sexually Transmitted Infections (STIs)

Clinicians and laboratories notified their respective Departments of Public Health of probable and confirmed cases of STIs. Data for 2010 and 2011 were collated and analysed by Departments of Public Health and aggregated data were reported to HPSC. National data were collated on an MS Access database, analysis preformed and reports produced by HPSC.

Case-based syphilis records have been collated nationally since 2000. Case-based syphilis data provided by some clinicians is a subset of aggregate syphilis notification data. Forms are completed by Departments of Public Health in conjunction with the clinician and are then forwarded to HPSC. An MS Access database was used at HPSC for collation and analysis of the national syphilis case-based data.

Since 1st May, 2011, the Computerised Infectious Disease Reporting (CIDR) system has been used to record notifications of syphilis, thereby allowing the replacement of the case-based and aggregate syphilis databases previously in use in Departments of Public Health and at 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 general practices (located in all HSE-Areas and representing 5.7% 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.

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 ICU and influenza-associated deaths were reported weekly to the European Centre for Disease Prevention and Control (ECDC).

HIV

HIV and AIDS surveillance in Ireland is voluntary and anonymised and operates in co-operation with laboratories, clinicians and Departments of Public Health. In 2011, clinicians completed surveillance forms on newly diagnosed HIV cases, AIDS cases and AIDS related deaths and forwarded these to the appropriate Department of Public Health who in turn forwarded them to HPSC where national data were collated on an MS Access database. Bi-annual analysis of these data were performed at HPSC and reports produced.

Immunisation Uptake

Each HSE Area maintains a childhood immunisation database. In 2011, 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.

European Antimicrobial Resistance Surveillance Network (EARS-Net)

Data were collected by participating EARS-Net (formerly the European Antimicrobial Resistance Surveillance System, EARSS) laboratories in 2011 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 stored at the HSPC in an MS Access database, and interpreted using the WHO Anatomical Therapeutic Chemicals index (www.whocc.no/atcddd/) in line with European Surveillance of Antimicrobial Consumption (ESAC) methodology. 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.
- **Healthcare associated infections in long term care facilities (HALT):** Participating Long Term Care Facilities (LTCFs) of the HALT project were asked to survey residents on one day only, thereby providing a snapshot of HCAI and antimicrobial use on that particular day. Data was entered by each LTCF onto a standalone Access-based IT tool developed by ECDC and sent to HPSC for analysis.
- Data were also collected on the total volume of alcohol-based hand rub used per hospital per year/ quarter, excluding 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 2009-2011 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 2011 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 Diseases Reporting
DoHC	Department of Health and Children
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 Organisation

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