SURVEILLANCE OF INFECTIOUS INTESTINAL (IID), ZOONOTIC AND VECTORBORNE DISEASE, AND OUTBREAKS of INFECTIOUS DISEASE IN IRELAND

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

A quarterly report by the Health Protection Surveillance Centre in collaboration with the Departments of Public Health

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This is the fourth quarterly report for 2016 produced by the Gastroenteric Unit of the Health Protection Surveillance Centre.

The production of this quarterly report would not be possible without the valuable input and commitment from the Directors of Public Health, Specialists in Public Health Medicine, Surveillance Scientists, Clinical Microbiologists, General Practitioners, Hospital Clinicians, Infection Control, Environmental Health and laboratory personnel, and other professionals who provide the data for the HPSC's surveillance systems.

Note: Data are collected and analysed using the Computerised Infectious Disease Reporting (CIDR) system. The data in this report are provisional and will not be regarded as final until all returns are received and data have been validated.

OUTBREAK SURVEILLANCE

Table 1. General outbreaks of infectious intestinal disease (IID) in Q4, 2016

Month	HSE area	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Disease
Oct	E	Hospital	93	64	30/09/2016	Unknown	Noroviral infection
Oct	W	Nursing home	4	0	11/09/2016	Not Specified	AIG
Oct	E	Comm. Hosp/Long-stay unit	6	0	28/09/2016	P-P & AB	AIG
Oct	MW	Residential institution	13	0	01/10/2016	P-P	Noroviral infection
Oct	W	Hospital	15	0	01/10/2016	P-P	Noroviral infection
Oct	S	Nursing home	17	1	27/09/2016	P-P	AIG
Oct	S	Nursing home	34	2	05/10/2016	P-P	Noroviral infection
Oct	E	Nursing home	7	0	12/10/2016	P-P & AB	AIG
Oct	NE	Nursing home	2		06/10/2016	P-P	Noroviral infection
Oct	E	Comm. Hosp/Long-stay unit	7	0	12/10/2016	P-P & AB	Noroviral infection
Oct	NW	Hospital			15/09/2016	P-P	Noroviral infection
Oct	S	Nursing home	26	0	11/10/2016	P-P	Noroviral infection
Oct	W	Residential institution	20	0	13/10/2016	P-P	Noroviral infection
Oct	S	Hospital	6		15/10/2016	P-P	AIG
Oct	E	Private house	3	0	22/09/2016	P-P	Salmonellosis
Oct	MW	Residential institution	5	0	03/10/2016	P-P	Noroviral infection
Oct	E	Private house	2		11/10/2016	Other	Giardiasis
Oct	NW	Nursing home	23	3	23/10/2016	P-P	Noroviral infection
Oct	S	Childcare facility	4	0	30/09/2016	P-P	Cryptosporidiosis
Oct	S	Nursing home	11	0	14/10/2016	P-P	AIG
Oct	W	Community outbreak	12	0	24/10/2016	P-P	Noroviral infection
Oct	W	Hospital	3	3		P-P	Clostridium difficile
Oct	E	Residential institution			25/10/2016	Unknown	AIG
Oct	M	Hospital	8			P-P & AB	Noroviral infection
Oct	NE	Hospital	4			Unknown	AIG
Nov	E	Restaurant / Cafe	6		31/10/2016	FB	AIG
Nov	SE	Hospital	83		29/10/2016	P-P	Noroviral infection
Nov	NW	Comm. Hosp/Long-stay unit	18	0	01/11/2016	P-P	Noroviral infection
Nov	W	Comm. Hosp/Long-stay unit	5		30/10/2016	P-P	Noroviral infection
Nov	NW	Nursing home	26	0	29/10/2016	P-P & AB	Noroviral infection
Nov	W	Childcare facility	8		10/10/2016	Unknown	VTEC
Nov	E	Nursing home	18	0	05/11/2016	P-P & AB	Noroviral infection
Nov	NW	Residential institution	2	0	08/11/2016	P-P	AIG
Nov	S	Nursing home	21	0	07/11/2016	P-P	Noroviral infection
Nov	NE	Nursing home	6	0	08/11/2016	P-P & AB	AIG
Nov	NE	Other	6		07/11/2016	P-P & AB	AIG
Nov	SE	Residential institution	20		07/11/2016	P-P	AIG
Nov	SE	Comm. Hosp/Long-stay unit	7		08/11/2016	P-P	AIG
Nov	NW	Nursing home	17		11/11/2016	Not Specified	AIG
Nov	NW	Comm. Hosp/Long-stay unit	10	0	29/10/2016	P-P	AIG
Nov	S	Hospital	25	0	11/11/2016	P-P	Noroviral infection
Nov	E	Workplace	25		16/11/2016	Unknown	Noroviral infection
Nov	E	Workplace	50	1	16/11/2016	Unknown	Noroviral infection

Month	HSE area	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Disease
Nov	E	Nursing home	8	1	15/11/2016	Unknown	AIG
Nov	SE	Nursing home	9		15/11/2016	P-P & AB	AIG
Nov	SE	Hospital	56		24/10/2016	P-P	Noroviral infection
Nov	SE	Nursing home	11		16/11/2016	P-P	AIG
Nov	NW	Hospital	14		19/11/2016	Not Specified	Noroviral infection
Nov	E	Childcare facility			20/11/2016	Unknown	AIG
Nov	W	Comm. Hosp/Long-stay unit	19		18/11/2016	P-P	Noroviral infection
Nov	W	Hospital	9		17/11/2016	P-P	Noroviral infection
Nov	NW	Hospital			15/11/2016	Not Specified	Noroviral infection
Nov	MW	Nursing home	6	0	20/11/2016	P-P	Noroviral infection
Nov	NW	Comm. Hosp/Long-stay unit	14	0	23/11/2016	P-P & AB	AIG
Nov	NW	Comm. Hosp/Long-stay unit	28	0	22/11/2016	P-P & AB	Noroviral infection
Nov	SE	School	8		21/11/2016	P-P	AIG
Nov	SE	Residential institution	4		22/11/2016	P-P	AIG
Nov	SE	Nursing home	7		20/11/2016	P-P	AIG
Nov	E	Comm. Hosp/Long-stay unit	12		24/11/2016	Unknown	Noroviral infection
Nov	M	Hospital	2			P-P & AB	Noroviral infection
Nov	M	Hospital	4			P-P & AB	AIG
Nov	S	Nursing home	42	1	26/11/2016	P-P	Noroviral infection
Nov	S	Hospital	6		22/11/2016	P-P	Noroviral infection
Nov	S	Hospital	30		25/11/2016	P-P	Noroviral infection
Nov	NW	Comm. Hosp/Long-stay unit	9	0	27/11/2016	P-P & AB	Noroviral infection
Nov	E	Residential institution	8		25/11/2016	Unknown	AIG
Nov	SE	Residential institution	11		22/11/2016	P-P	AIG
Dec	S	Comm. Hosp/Long-stay unit	18	0	27/11/2016	P-P	Noroviral infection
Dec	MW	Comm. Hosp/Long-stay unit	28	0	29/11/2016	P-P	Noroviral infection
Dec	SE	Comm. Hosp/Long-stay unit	10		30/11/2016	P-P	Noroviral infection
Dec	W	Childcare facility	16	0	08/11/2016	P-P	VTEC
Dec	E	Residential institution	14		04/12/2016	Unknown	Noroviral infection
Dec	S	Comm. Hosp/Long-stay unit	18	1	21/11/2016	P-P	Noroviral infection
Dec	MW	Hospital	10	7	05/12/2016	P-P & AB	Noroviral infection
Dec	SE	Nursing home	45	0	04/12/2016	P-P	Noroviral infection
Dec	MW	Comm. Hosp/Long-stay unit	46	0	08/12/2016	P-P & AB	Noroviral infection
Dec	MW	Hospital	24		06/12/2016	P-P	Noroviral infection
Dec	S	Comm. Hosp/Long-stay unit	12	1	02/12/2016	P-P	Noroviral infection
Dec	S	Residential institution			03/12/2016	P-P	Noroviral infection
Dec	NE	Hospital				P-P	Noroviral infection
Dec	NE	Hospital				P-P	Noroviral infection
Dec	SE	Nursing home	5		11/12/2016	P-P	AIG
Dec	NE	Hotel	896			P-P & AB	Noroviral infection
Dec	M	Private house	1	0	26/11/2016	WB	VTEC
Dec	E	Community outbreak	5	4	08/11/2016	P-P	Shiglellosis
Dec	NW	Residential institution	2	0	12/12/2016	Not Specified	AIG
Dec	S	Comm. Hosp/Long-stay unit	22		13/12/2016	P-P	Noroviral infection
Dec	NE	Residential institution	5			P-P & AB	Noroviral infection
Dec	S	Comm. Hosp/Long-stay unit	6	0	10/12/2016	P-P	AIG
Dec	E	Childcare facility	9	0	14/12/2016	P-P & AB	AIG

Month	HSE area	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Disease
Dec	S	Hospital	6			P-P	AIG
Dec	W	Comm. Hosp/Long-stay unit	6	0	20/12/2016	P-P	AIG
Dec	HPSC	Community outbreak	14	3	06/12/2016	FB	Shiglellosis
Dec	NW	Nursing home	8		21/12/2016	P-P	AIG
Dec	SE	Nursing home	17	0	19/12/2016	P-P	Noroviral infection
Dec	NE	Nursing home	4	1	19/12/2016	P-P	Rotavirus
Dec	NW	Hospital	6			Not Specified	AIG
Dec	NE	Hotel	11		27/12/2016	P-P	Noroviral infection
Dec	S	Residential institution	4		27/12/2016	Unknown	Noroviral infection
Dec	S	Residential institution	6	0	12/12/2016	P-P	AIG

P-P denotes Person-to-Person transmission, FB denotes foodborne, WB denotes waterborne; AB denotes airborne; AIG denotes Acute Infectious Gastroenteritis (unspecified); VTEC denotes infection with Verotoxigenic *E. coli;* NK=unknown

* Total numbers ill does not include asymptomatic cases

Table 2. Family outbreaks of infectious intestinal disease (IID) in Q4, 2016

Month	HSE area	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Disease
Oct	M	Private house	4	0	25/09/2016	Unknown	VTEC
Oct	S	Private house	2	1	19/09/2016	WB	VTEC
Oct	SE	Private house	2	1	15/08/2016	P-P	VTEC
Oct	M	Private house	1	0	01/10/2016	Environmental / Fomite	VTEC
Oct	W	Private house	4	0	09/09/2016	P-P	VTEC
Oct	S	Extended family	4		22/09/2016	P-P & FB	VTEC
Oct	S	Private house	1	0	13/09/2016	P-P	VTEC
Oct	S	Private house	1	0	15/09/2016	P-P	VTEC
Oct	S	Private house	2	0	07/09/2016	Unknown	VTEC
Oct	S	Private house	1	0	01/01/2015	Unknown	VTEC
Nov	MW	Private house	6	1	17/10/2016	P-P	VTEc
Nov	S	Private house	3	2	01/10/2016	Unknown	VTEC
Nov	E	Private house	2	0	22/10/2016	P-P	VTEC
Nov	M	Private house	1	1	17/11/2016	Unknown	VTEC
Nov	M	Private house			23/11/2016	Unknown	VTEC
Nov	NW	Private house	1	1	28/10/2016	Unknown	VTEC
Nov	M	Not Specified			26/11/2016	Other	VTEC
Dec	M	Private house			29/11/2016	Unknown	VTEC
Dec	NE	Private house	2	1	18/11/2016	Unknown	VTEC
Dec	E	Private house			01/10/2016	Unknown	Giardiasis
Dec	W	Private house	2	0	07/12/2016	P-P	VTEC

P-P denotes Person-to-Person transmission, FB denotes foodborne, WB denotes waterborne; AB denotes airborne; AIG denotes Acute Infectious Gastroenteritis; VTEC denotes infection with Verotoxigenic *E. coli* NK denotes unknown

* Total numbers ill does not include asymptomatic cases

Table 3. Non-IID outbreaks in Q4, 2016

Month	HSE area	Type of outbreak	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Organism
Oct	E	Family	Private house			01/08/2016	Unknown	Suspected Pertussis
Oct	E	Family	Private house	2	0	14/08/2016	P-P	Pertussis
Oct	NE	Family	Private house	4		11/09/2016	P-P	Hepatitis A
Oct	NW	General	Nursing home	15	1	19/09/2016	P-P	Acute respiratory infection
Oct	W	General	Residential institution	5	0	04/10/2016	P-P	Acute respiratory infection
Oct	M	Family	Travel related	3	2	24/09/2016	Unknown	Hepatitis A
Oct	NW	Family	Private house	2		28/07/2016	P-P	MRSA
Oct	SE	General	Travel related	2	2	08/10/2016	Unknown	Hepatitis A
Oct	M	General	Hospital	2		14/10/2016	Unknown	MRSA
Oct	NE	General	Residential institution	6			P-P	Scabies
Oct	W	General	Private house			02/08/2016	P-P	Tuberculosis
Nov	E	General	Hospital			02/10/2016	P-P	VRE
Nov	S	General	Comm. Hosp/Long-stay unit	13	0	25/10/2016	P-P	Influenza
Nov	SE	General	Residential institution	22	3	28/10/2016	P-P	Influenza
Nov	E	General	Private house	2	1	23/06/2016	Unknown	Hepatitis B
Nov	SE	General	Nursing home	15	1	09/11/2016	P-P & AB	Influenza
Nov	SE	Family	Private house	2	0	23/09/2016	P-P	Pertussis
Nov	NW	General	Nursing home	19	0	09/11/2016	P-P & AB	Acute respiratory infection
Nov	NE	General	Hospital	3	3		Unknown	Acinetobacter spp. Colonisation
Nov	NW	General	Comm. Hosp/Long-stay unit	5	0	26/01/2016	Unknown	Acute respiratory infection
Nov	S	General	Comm. Hosp/Long-stay unit	7	0	19/11/2016	P-P & AB	Parainfluenza
Nov	SE	General	Hospital	1			Unknown	CRE
Dec	W	General	Hospital	3	3		P-P	Klebsiella pneumoniae
Dec	S	General	Comm. Hosp/Long-stay unit	36		30/11/2016	P-P & AB	Influenza
Dec	S	General	Comm. Hosp/Long-stay unit	3	0	28/11/2016	P-P	Influenza-like illness
Dec	S	General	Comm. Hosp/Long-stay unit	10	1	30/11/2016	P-P & AB	Human metapneumovirus
Dec	S	General	Comm. Hosp/Long-stay unit	8	0	24/11/2016	P-P & AB	RSV
Dec	S	General	Comm. Hosp/Long-stay unit	5	0	22/11/2016	P-P & AB	Influenza
Dec	E	General	Nursing home	11	2	04/12/2016	P-P & AB	RSV
Dec	SE	General	Hospital	8			P-P	Influenza
Dec	MW	General	Comm. Hosp/Long-stay unit	16	0	06/12/2016	P-P	Influenza
Dec	NW	Family	Private house				P-P	RSV
Dec	NE	General	Nursing home	14	5	05/12/2016	P-P	Influenza
Dec	E	General	Hospital	5		07/12/2016	Unknown	VRE
Dec	E	General	Nursing home	5	0	10/12/2016	P-P & AB	Influenza
Dec	S	General	Residential institution	7	0	04/12/2016	P-P & AB	Human metapneumovirus
Dec	S	General	Comm. Hosp/Long-stay unit	4		08/12/2016	P-P & AB	Influenza-like illness

Month	HSE area	Type of outbreak	Location	No. ill *	No. Hosp.	Date Onset	Suspect mode of transmission	Organism
Dec	MW	General	Comm. Hosp/Long-stay unit	9	2	12/12/2016	P-P & AB	Influenza
Dec	MW	General	University/College			15/04/2016	P-P	Gonnorrhoea
Dec	E	General	Hospital	11	9		P-P & AB	Influenza
Dec	S	General	Hospital	26	2	14/12/2016	P-P	Influenza
Dec	E	General	Hospital	6	6		P-P	Influenza
Dec	S	General	Nursing home	36	0	19/12/2016	P-P	Influenza
Dec	S	General	Nursing home	10	0	19/12/2016	P-P	Influenza
Dec	MW	General	Comm. Hosp/Long-stay unit	2	1	15/12/2016	P-P & AB	Influenza
Dec	S	General	Comm. Hosp/Long-stay unit	14	1	17/12/2016	P-P & AB	Influenza
Dec	S	General	Comm. Hosp/Long-stay unit	5	0	15/12/2016	P-P	Influenza
Dec	E	General	Nursing home	5	2	17/12/2016	P-P & AB	Influenza
Dec	E	General	Nursing home	7	2		P-P & AB	Influenza
Dec	SE	General	Residential institution	12	2	21/12/2016	P-P	Influenza
Dec	MW	General	Comm. Hosp/Long-stay unit			27/12/2016	P-P	Influenza
Dec	NE	General	Nursing home	10	1	26/12/2016	P-P	Influenza
Dec	SE	General	Nursing home	17	1	20/12/2016	P-P	Influenza
Dec	NW	General	Comm. Hosp/Long-stay unit	15		25/11/2016	Not Specified	Influenza
Dec	SE	General	Residential institution	3	1		Not Specified	Acute respiratory infection
Dec	S	General	Nursing home	10	0	29/12/2016	P-P & AB	HMPV & RSV

P-P denotes Person-to-Person transmission, WB denotes waterborne; AB denotes airborne; IDU denotes Injecting Drug Use; NK denotes unknown; CRE denotes Carbapenemresistant Enterobacteriaceae

* Total numbers ill does not include asymptomatic cases

Since July 2001, outbreaks have been reported to HPSC. Preliminary information is provided by a public health professional when the outbreak is first notified. Further information is provided by the lead investigator once more complete data are available. The data requested includes information on the source of reporting of the outbreak, the extent of the outbreak, mode of transmission, location, pathogen involved, laboratory investigation, morbidity and mortality data, suspect vehicle and factors contributing to the outbreak. The data provided are crucial in providing information on the reasons why the outbreak occurred, the factors that lead to the spread of disease and the lessons that can be learnt to prevent further such outbreaks.

Since the 1st January 2004, with the amendment to the Infectious Diseases Regulations (2003), there is a statutory requirement for medical practitioners and clinical directors of a diagnostic laboratory to notify to the medical officer of health 'any unusual clusters or changing patterns of any illness, and individual cases thereof, that may be of public health concern'.

Tables 1 and 2 present a line listing of all general and family outbreaks of IID reported to HPSC in the fourth quarter of 2016. There were 100 general and 21 family IID outbreaks reported during this period, resulting in at least 2,308 people being ill.

Norovirus (n=54) was responsible for the most general outbreaks of IID (54%), followed by Acute infectious gastroenteritis (n=36).

The most common cause of family outbreaks of IID was VTEC (n=20) [95%]. The was also one family outbreak of giardiasis in Q4 2016. (Table 2).

Seventy-eight general IID outbreaks were transmitted person-to-person/person-to-person & airborne (78%). Eighty-two general IID outbreaks (82%) were reported to have occurred in healthcare settings, i.e. hospitals or residential institutions, during this period.

There were fifty-six non-IID outbreaks reported during Q4 2016 (Table 3). The most common cause of non IID outbreaks was during this period was influenza (n=25) [44%], all of which occurred in healthcare settings, i.e. hospitals or residential institutions.

Table 4 outlines the outbreak rate per HSE-area for outbreaks notified during Q4 2016.

Table 4. Number of Infectious Disease Outbreaks by HSE Area, Q4 2016

HSE Area	No. of outbreaks	Rate per 100,000 population
E	31	2.0
M	12	4.0
MW	13	3.0
NE	16	4.0
NW	22	9.0
SE	24	5.0
S	42	6.0
W	16	4.0
Total	**176**	**4.0**

NOTIFICATIONS OF INFECTIOUS INTESTINAL, ZOONOTIC AND VECTORBORNE DISEASE

The number of notifications of infectious intestinal, zoonotic and vectorborne disease by HSE-Area for the fourth quarter of 2016 is shown in Table 5.

Table 5. Infectious intestinal, zoonotic and vectorborne disease notifications Q4, 2016 by HSE-Area

Infectious Intestinal Disease	E	M	MW	NE	NW	SE	S	W	Total
Bacillus cereus foodborne infection/intoxication	0	0	0	0	0	0	0	0	**0**
Botulism	0	0	0	0	0	0	0	0	**0**
Campylobacter infection	182	39	34	29	19	74	60	52	**489**
Cholera	0	0	0	0	0	0	0	0	**0**
Clostridium perfringens (type A) food-borne disease	0	0	0	0	0	0	0	0	**0**
Cryptosporidiosis	15	7	3	2	3	10	15	1	**56**
Giardiasis	15	2	2	0	0	11	6	9	**45**
Listeriosis	1	0	0	0	0	0	0	0	**1**
Noroviral infection	280	22	39	87	30	24	44	24	**550**
Paratyphoid	~	~	~	~	~	~	~	~	**0**
Rotavirus infection[a1]	85	28	36	37	18	24	19	31	**278**
Salmonellosis	31	6	5	6	3	6	7	5	**69**
Shigellosis	14	2	0	1	1	3	4	1	**26**
Staphylococcal food poisoning	0	0	0	0	0	0	0	0	**0**
Typhoid	~	~	~	~	~	~	~	~	**0**
Verotoxigenic *Escherichia coli* infection[b]	19	17	16	10	6	19	35	34	**156**
Yersiniosis	0	0	0	0	0	0	0	0	**0**
Zoonotic Disease									
Anthrax	0	0	0	0	0	0	0	0	**0**
Brucellosis	0	0	0	1	0	1	0	0	**2**
Echinococcosis	0	0	0	0	0	0	0	1	**1**
Leptospirosis	6	0	5	2	0	1	1	1	**16**
Plague	0	0	0	0	0	0	0	0	**0**
Q Fever	0	0	0	0	0	0	0	0	**0**
Rabies	0	0	0	0	0	0	0	0	**0**
Toxoplasmosis	0	0	0	0	0	0	2	1	**3**
Trichinosis	0	0	0	0	0	0	0	0	**0**
Vectorborne Disease									
Chikungunya disease	0	0	0	0	0	0	0	0	**0**
Dengue	2	0	0	1	0	1	0	0	**4**
Lyme disease (neuroborreliosis)	1	1	1	0	0	0	4	0	**7**
Malaria	12	0	0	3	0	1	1	0	**17**
Typhus	0	0	0	0	0	0	0	0	**0**
West Nile fever [c]	0	0	0	0	0	0	0	0	**0**
Zika Virus Infection	~	~	~	~	~	~	~	~	**1**

[1] Since March 2013, norovirus and rotavirus notifications from HSE-East are based on laboratory testing results rather than patient episodes. Notifications from HSE-E may also refer to area of laboratory testing rather than area of patient residence.

Human salmonellosis (*S. enterica*) is a notifiable disease. The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) in Ireland was established in 2000 in the Dept. of Medical Microbiology, University College Hospital, Galway. This laboratory accepts *S. enterica* isolates from all clinical and food laboratories in Ireland for serotyping, phage typing and antimicrobial sensitivity testing. Table 6 shows the number of salmonellosis notifications by HSE-Area and month for the fourth quarter of 2016. Comparison of trends with previous years is shown in Figure 1.

Table 6. Salmonellosis notifications by HSE-Area and month, Q4 2016

Month	E	M	MW	NE	NW	SE	S	W	Total
Oct	13	2	2	2	2	4	1	3	**29**
Nov	12	2	1	2	1	2	4	2	**26**
Dec	6	2	2	2	0	0	2	0	**14**
Total	**31**	**6**	**5**	**6**	**3**	**6**	**7**	**5**	**69**

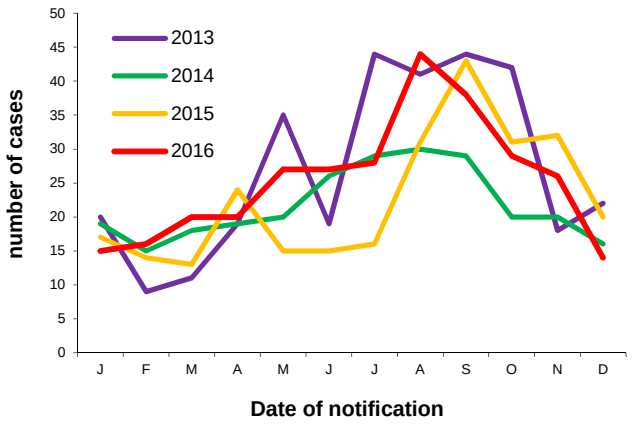

Figure 1. Seasonal distribution of human salmonellosis notifications, 2013 to end Q4 2016

Table 7 shows the serotypes for the *Salmonella* isolates typed by the NSSLRL in the fourth quarter of 2016 by HSE area (n=73). The commonest human serotypes reported were *S.* Enteritidis (n=21, 29%) and *S.* Typhimurium[†] (n=17, 23%).

Table 8 shows the serotype distribution of confirmed *Salmonella* notifications by travel status this quarter among salmonellosis notifications on CIDR. 37% (n=25) were travel-associated, 38% (n=26) were indigenous and for 17 cases, the country of infection was unknown/not specified.

Outbreaks of salmonellosis

There was one general outbreak of salmonellosis notified in Q4 2016 (Tables 1 &2).

Table 7. Serotypes of human *S. enterica* isolates referred to NSSLRL Q4 2016

Serotype	E	M	MW	NE	NW	SE	S	W	Total
4,[5],12:i:-	4	1	1	0	1	0	2	0	9
Agama	1	0	0	0	0	0	0	0	1
Agona	2	0	0	0	0	0	0	0	2
Anatum	0	0	0	1	0	0	0	0	1
Apapa	0	0	0	0	0	1	0	0	1
Bovismorbificans	0	0	0	0	0	1	0	0	1
Braenderup	2	0	0	0	0	1	1	0	4
Bredeney	0	0	0	0	0	0	1	0	1
Cerro	1	0	0	0	0	0	0	0	1
Chester	0	1	0	0	0	0	0	0	1
Emek	0	0	0	0	0	1	0	0	1
Enteritidis	10	2	0	2	0	2	2	3	21
Hadar	0	0	0	0	0	1	0	0	1
Infantis	1	0	1	1	1	0	0	0	4
Java	1	0	0	0	0	0	0	0	1
Kentucky	1	0	0	0	0	0	0	1	2
Manhattan	1	0	0	0	0	0	0	0	1
Napoli	0	0	1	0	0	0	0	0	1
Newport	1	0	0	0	0	0	0	0	1
Nima	0	1	0	0	0	0	0	0	1
Saintpaul	1	0	0	0	0	0	0	0	1
Stanley	0	0	0	1	0	1	1	0	3
Tennessee	0	0	1	0	0	0	0	0	1
Typhi	0	0	0	0	0	0	0	1	1
Typhimurium	5	0	0	1	0	1	0	1	8
Unnamed	2	0	0	0	0	0	0	0	2
Weltevreden	1	0	0	0	0	0	0	0	1
Grand Total	**34**	**5**	**4**	**6**	**2**	**9**	**7**	**6**	**73**

Data Source: NSSLRL

Table 8. Confirmed *Salmonella* notifications by serotype and travel status, Q4 2016 [n(%)]

Serotype	Indigenous	Travel-associated	Unk/not specified	Total
***S.* Enteritidis**	4 (15%)	12 (48%)	3 (18%)	**19 (28%)**
S.* Typhimurium	7 (27%)	3 (12%)	6 (35%)	**16 (24%)**
Other	13 (50%)	8 (32%)	8 (47%)	**29 (42%)**
***Salmonella* spp**	2 (8%)	2 (8%)	0 (0%)	**4 (6%)**
Total	**26 (100%)**	**25 (100%)**	**17 (100%)**	**68 (100%)**

Note: Data source CIDR. Travel status is inferred from *Country of Infection* variable on CIDR. Note excludes probable notifications

* Includes monophasic S.Typhimurium 4,5,12:i:-

S. Typhi and S. Paratyphi

There were no cases of typhoid or paratyphoid reported to CIDR in Q4 2016.

Outbreaks of S. Typhi and S. Paratyphi

There were no outbreaks of typhoid or paratyphoid notified in Q4 2016.

[†] includes 9 cases of monophasic *S.*Typhimurium 4,5,12:i:-

VEROTOXIGENIC *E. COLI* (VTEC)

Verotoxigenic *E. coli* (VTEC) became a notifiable disease on January 1st 2012. Previously, VTEC were notified under the category of Enterohaemorrhagic *E. coli* between 2004 and 2011.

One hundred and fifty-six cases of VTEC were notified this quarter, the regional distribution of which is shown in Table 9. This compares with 152 VTEC cases notified in Q4 2015 and 197 in Q4 2014 (figure 2).

Table 9 shows the number of VTEC cases reported by case classification and HSE-area and Table 10 shows the number of VTEC cases by serogroup and month, Q4 2016.

Table 9. Number VTEC notified by case classification and HSE-area, Q4 2016

Case classification	E	M	MW	NE	NW	SE	S	W	Total
Confirmed	19	15	14	10	6	19	27	30	**140**
Probable	0	2	2	0	0	0	6	4	**14**
Possible	0	0	0	0	0	0	2		**2**
Total	**19**	**17**	**16**	**10**	**6**	**19**	**35**	**34**	**156**

Table 10. VTEC notified by serogroup and month, Q4 2016

Month	O157	O26	Other	Total
Oct	27	11	35	**73**
Nov	16	9	26	**51**
Dec	4	15	13	**32**
Total	**47**	**35**	**74**	**156**

Eight VTEC cases notified this quarter were reported as having developed HUS –two were infected with VTEC O26, two with VTEC O157, one with VTEC O145, two with VTEC ungroupable strains, and two were reported as possible VTEC cases on clinical criteria only.

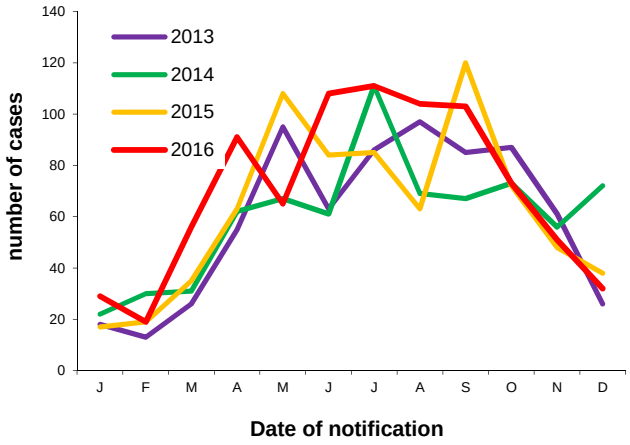

Figure 2. Seasonal distribution of VTEC cases notified 2013 to end Q4 2016

The HSE-DML Public Health Laboratory at Cherry Orchard Hospital, Dublin provides a national *E. coli* O157 and non-O157 diagnostic service for clinical samples, including *E. coli* serotyping, verotoxin detection and VTEC molecular typing. Table 11 shows the *vt* types of VTEC cases notified in Q4 2016.

Table 11. Verotoxin typing profiles of *E. coli* referred to the HSE DML Public Health Laboratory, Cherry Orchard Hospital in Q4 2016

Serogroup	*vt1*	*vt2*	*vt1+vt2*	Not spec.	Total
O157	0	25	18	4	**47**
O26	11	4	19	1	**35**
Other	26	22	15	11	**74**
Total	**37**	**51**	**52**	**16**	**156**

Data Source: PHL Cherry Orchard

Outbreaks of VTEC infection

During this quarter, three general and twenty family outbreaks of VTEC infection were reported (Tables 1 & 2).

CAMPYLOBACTER

Human campylobacteriosis became a notifiable disease on January 1st 2004. Prior to this, human campylobacter infection was notified under the category of 'Food Poisoning (bacterial other than Salmonella)'. The notifications for the fourth quarter of 2016 are shown in Table 12. There were 489 cases of campylobacteriosis notified in Q4 2016 compared to 477 in the same period in 2015 and 550 in Q4 2014 (Figure 3).

Table 12. *Campylobacter* notifications by HSE-Area and month, Q4 2016

Month	E	M	MW	NE	NW	SE	S	W	Total
Oct	62	16	11	10	6	34	29	22	**190**
Nov	77	12	14	12	9	28	25	21	**198**
Dec	43	11	9	7	4	12	6	9	**101**
Total	**182**	**39**	**34**	**29**	**19**	**74**	**60**	**52**	**489**

Outbreaks of *Campylobacter* infection

There were no outbreaks of campylobacteriosis reported in Q4 2016 (Tables 1 and 2).

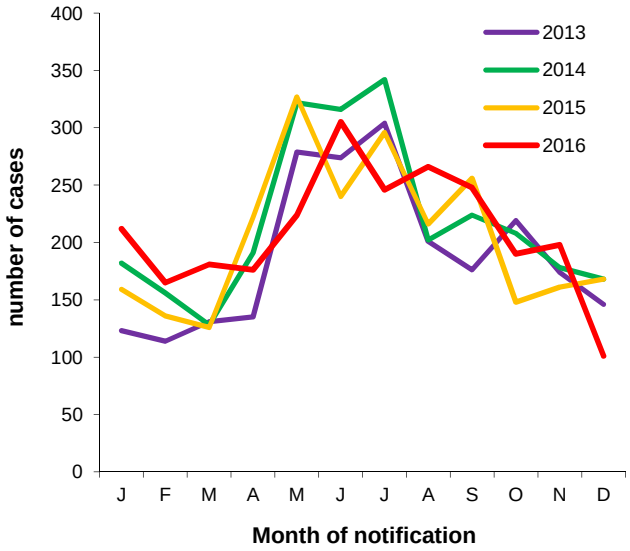

Figure 3. Seasonal distribution of *Campylobacter* notifications 2013 to end Q4 2016

CRYPTOSPORIDIUM

Human cryptosporidiosis became a notifiable disease on January 1st 2004. Prior to this, cryptosporidiosis was notifiable in Ireland only in young children under the category 'Gastroenteritis in Children Under 2'. In Q4 2016, 56 cases of cryptosporidiosis were notified (Table 13), compared to 72 in the same period in 2015 and 32 in Q4 2014 (Figure 4).

Table 13. Cryptosporidiosis notifications by HSE-Area and month, Q4 2016

Month	E	M	MW	NE	NW	SE	S	W	Total
Oct	8	2	0	0	1	3	8	0	**22**
Nov	5	3	1	1	1	6	4	0	**21**
Dec	2	2	2	1	1	1	3	1	**13**
Total	**15**	**7**	**3**	**2**	**3**	**10**	**15**	**1**	**56**

Outbreaks of cryptosporidiosis

There was one general outbreak of cryptosporidiosis reported in quarter 4 2016. (Tables 1 and 2).

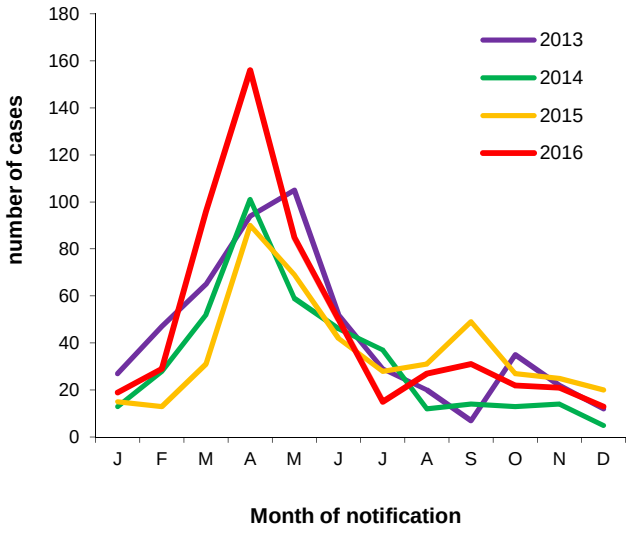

Figure 4. Seasonal distribution of cryptosporidiosis notifications 2013 to end Q4 2016

NOROVIRUS

Human noroviral infection became a notifiable disease on January 1st 2004. Since March 2013, norovirus notifications from HSE-East are based on laboratory testing results rather than patient episodes. Notifications from HSE-E may also refer to area of laboratory testing rather than area of patient residence.

There were 550 cases notified in the fourth quarter of 2016 (Table 14). These data are certainly an under-ascertainment of the true burden of disease due to this pathogen.

Table 14. Norovirus notifications by HSE-Area and month, Q4 2016

Month	E	M	MW	NE	NW	SE	S	W	Total
Oct	57	5	3	7	12	4	4	12	**104**
Nov	76	10	8	3	17	18	21	9	**162**
Dec	147	7	28	77	1	2	19	3	**284**
Total	**280**	**22**	**39**	**87**	**30**	**24**	**44**	**24**	**550**

Norovirus outbreaks

Norovirus or suspect viral aetiology is the commonest cause of outbreaks of acute gastroenteritis in Ireland. In the fourth quarter of 2016, there were fifty-four outbreaks confirmed as being caused by this virus, involving at least ,942 people becoming ill, as outlined in tables 1 & 2. The seasonal trend is outlined in figure 5.

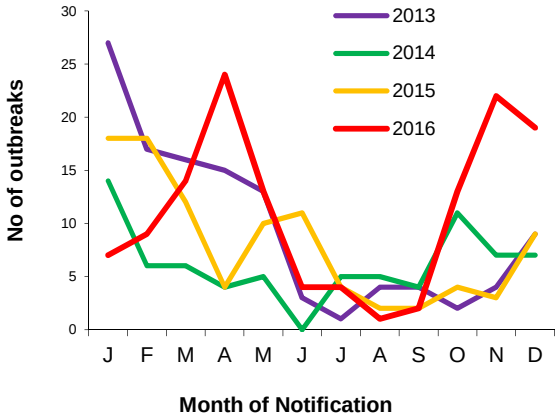

Figure 5. Seasonal distribution of confirmed norovirus outbreaks, 2013 to end Q4 2016

SHIGELLA

On January 1st 2004, infection with *Shigella* spp. became notifiable as 'Shigellosis'. Prior to this, it was notifiable as 'Bacillary Dysentery'.

During Q4 2016, twenty-six cases of shigellosis were notified (Table 5). This compares with fourty-one cases notified in Q4 2015 and twenty-three in Q4 2014.

Six cases were travel related and the county of infection was reported as Ireland for a futher thirteen cases. The country of infection was reported as unknown/not specified for the remaining seven cases.

Table 15: Species and serotype distribution of Q4 2016 human *Shigella* isolates referred to the NSSLRL

Serotype	Number of isolates
Shigella sonnei	13
Shigella flexneri 2a	5
Shigella flexneri 3b	1
Shigella flexneri 6	1
Shigella dysenteriae	2
Not specified	1
Total	**23**

Data Source: NSSLRL

Outbreaks of shigellosis

There were two general outbreaks of shigellosis notified in Q4 2016, (Table 1).

GIARDIA

Human giardiasis became a notifiable disease on January 1st 2004. Prior to this, giardiasis was notifiable in Ireland only in young children under the category 'gastroenteritis in children under 2 years'.

During Quarter 4, 2016, forty-five cases of giardiasis were notified (Table 5); this compares with 52 cases notified in Q4 2015 and 17 in Q4 2014.

Thirteen cases were reported to have acquired their illness abroad. Country of infection was reported as Ireland for sixteen cases and 'not specified' or 'unknown' for the remaining sixteen cases.

Outbreaks of giardiasis

There was one family outbreak and one general outbreak of giardiasis notified in Q4 2016. (Tables 1 & 2).

LISTERIA

Human listeriosis became a notifiable disease on January 1st 2004. Prior to this, listeriosis was notified under the category of 'Food Poisoning (bacterial other than Salmonella)' or 'Bacterial Meningitis' as appropriate.

There was one (adult) case of listeriosis notified in Q4 2016, compared to five cases in quarter 4 2015 and two in quarter 4 2014.

No isolates were referred for typing to NSSLRL this quarter (Table 16).

Table 16: Serotypes of Q4 2016 human *Listeria* isolates referred to the NSSLRL

Serotype	Number of isolates
n/a	n/a

Data Source: NSSLRL

ROTAVIRUS INFECTION

Prior to 2004, rotavirus cases were notified under the "Gastroenteritis in children under two years" disease category. From 2004 to 2010, rotavirus was notifiable in all age groups under the "Acute Infectious Gastroenteritis" (AIG) disease category, until it became notifiable as a disease in its own right under the Infectious Diseases (Amendment) Regulations 2011 (S.I. No. 452 of 2011). Since March 2013, rotavirus notifications from HSE-East are based on laboratory testing results rather than patient episodes. Notifications from HSE-E may also refer to area of laboratory testing rather than area of patient residence.

Rotavirus notifications for the fourth quarter of 2016 are shown in Table 17 and Figure 6.

Table 17. Rotavirus infection by HSE-Area and month, Q4 2016

Month	E	M	MW	NE	NW	SE	S	W	Total
Oct	20	7	7	10	2	10	9	15	**80**
Nov	28	15	10	11	12	7	2	9	**94**
Dec	37	6	19	16	4	7	8	7	**104**
Total	**85**	**28**	**36**	**37**	**18**	**24**	**19**	**31**	**278**

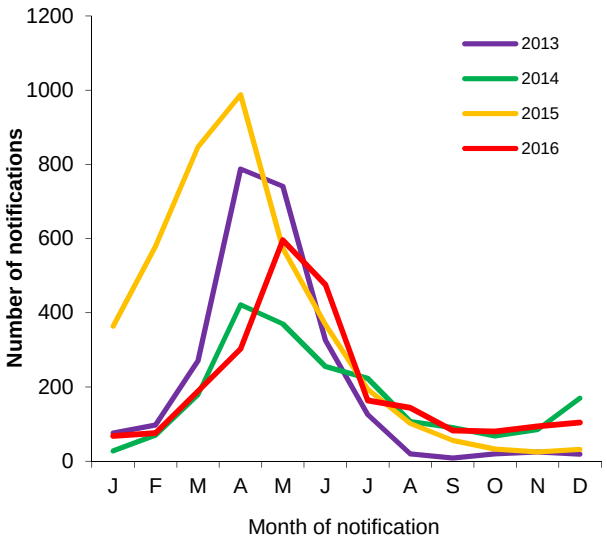

Figure 6. Seasonal distribution of rotavirus notifications, 2013 to end Q4 2016

Outbreaks of rotavirus

There was one general outbreak of rotavirus notified this quarter (Table 2).

FOODBORNE INTOXICATIONS

Bacillus cereus foodborne infection/intoxication, botulism, *Clostridium perfringens* (type A) food-borne disease and staphylococcal food poisoning became notifiable diseases on January 1st 2004. Prior to this, these diseases were notified under the category of 'Food Poisoning (bacterial other than Salmonella)'.

There were no cases of foodborne infection/intoxication notified this quarter.

NON-IID ZOONOTIC DISEASES

Non-IID zoonoses now notifiable include: anthrax, brucellosis, echinococcosis, leptospirosis, plague, Q fever, toxoplasmosis, trichinosis and rabies. The Q4 2016 notifications of these zoonotic diseases are reported by HSE-Area in Table 5.

Three cases of toxoplasmosis were notified in this quarter. This compares with six cases notified in the same period in 2015 and two cases in Q4 2014.

There were sixteen cases of leptospirosis notified in Q4 2016. This compares with six cases in Q4 2015 and eight in Q4 2014.

Seven cases were reported to have acquired their infection occupationally, five as a result of recreational leisure water contact and the source of infection was unknown for the four remaining cases.

There was one case of echinococcosis and two cases of brucellosis notified in Q4 2016.

There were no cases of trichinosis or Q Fever notified this quarter.

MALARIA

Malaria has been a notifiable disease for many years. The Q4 2016 notifications are reported in Table 5 by HSE-Area.

Seventeen cases of malaria were notified in Q4 2016. This compares with eighteen cases reported in Q4 2015 and nineteen in Q4 2014.

Sixteen cases were reported as *P. falciparum,* and one as *P. ovale* this quarter.

Two cases were exposed in Sub-Saharan Africa and country of infection is unknown/not specified for the remaining fifteen cases this quarter.

The reason for travel for one case was reported as 'visiting family in country of origin'.
The reason for travel was not specified/unknown for the remaining sixteen cases.

OTHER NOTIFIABLE VECTORBORNE DISEASES

Under Infectious Diseases (Amendment) Regulations 2011 (S.I. No. 452 of 2011) (Sept 2011), Chikungunya disease, Dengue, Lyme disease (neuroborreliosis) and West Nile fever were made notifiable. The Q4 2016 notifications are reported in Table 5 by HSE-Area.

There were seven cases of Lyme disease (neuroborreliosis) reported in Q4 2016.

There were four cases of Dengue fever reported this quarter. One case was associated with travel to South America and one with travel to SE Asia. The country of infection was unknown/not specified for the remaining two cases.

There were no notifications of Chikungunya disease or West Nile fever this quarter.

Zika virus infection is a notifiable disease in Ireland under the Infectious Diseases (Amendment) Regulations 2016 (S.I. No. 276 of 2016). All medical practitioners and laboratories are required to notify cases of Zika virus infection to the Medical Officer of Health. A full suite of guidance for health care professionals and the general public, including travel advice, is available at www.hpsc.ie

One case of Zika virus infection was notified during Q4 2016 and was associated with travel to an affected area.

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