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Annual Epidemiological Report

January 2019

Salmonella infection in Ireland, 2017

Key Facts

- The 414 cases notified in 2017 were the highest number of salmonellosis cases reported in Ireland since 2008
- International travel is a large contributor to the overall burden of salmonellosis in Ireland (40%), in particular in summer months
- The most common serotypes reported in Ireland and internationally are *S.* Enteritidis and *S.* Typhimurium, with *S.* Typhimurium the more prevalent among cases acquired in Ireland
- The highest reported incidence was in children under five years, with this effect being more pronounced among cases acquired in Ireland
- A large outbreak of *S.* Brandenburg in HSE-E resulted in this serotype being the third most common serotype in Ireland this year. This highlights the continued potential for foodborne outbreaks of salmonellosis
- The introduction of WGS at the NSSLRL has contributed to confirmation of suspected outbreaks and to the identification of outbreaks which may not have been recognised on epidemiological grounds alone
- WGS has also enabled a small cluster of cases in Ireland to be recognised as being part of a much larger EU incident

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Table of Contents

Background

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

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

Methods

Salmonella, typhoid and paratyphoid infections are notifiable diseases in Ireland under the Infectious Disease Regulations and cases should be notified to the Medical Officer of Health. Notifications are reported using the Computerised Infectious Disease Reporting system (CIDR) which is described here. Further information on the process of reporting notifiable infectious diseases is available here. The case definitions in use in 2017 are available here. For this report, data on notified cases reported to CIDR in 2017 were extracted from CIDR as of 3rd October 2018.

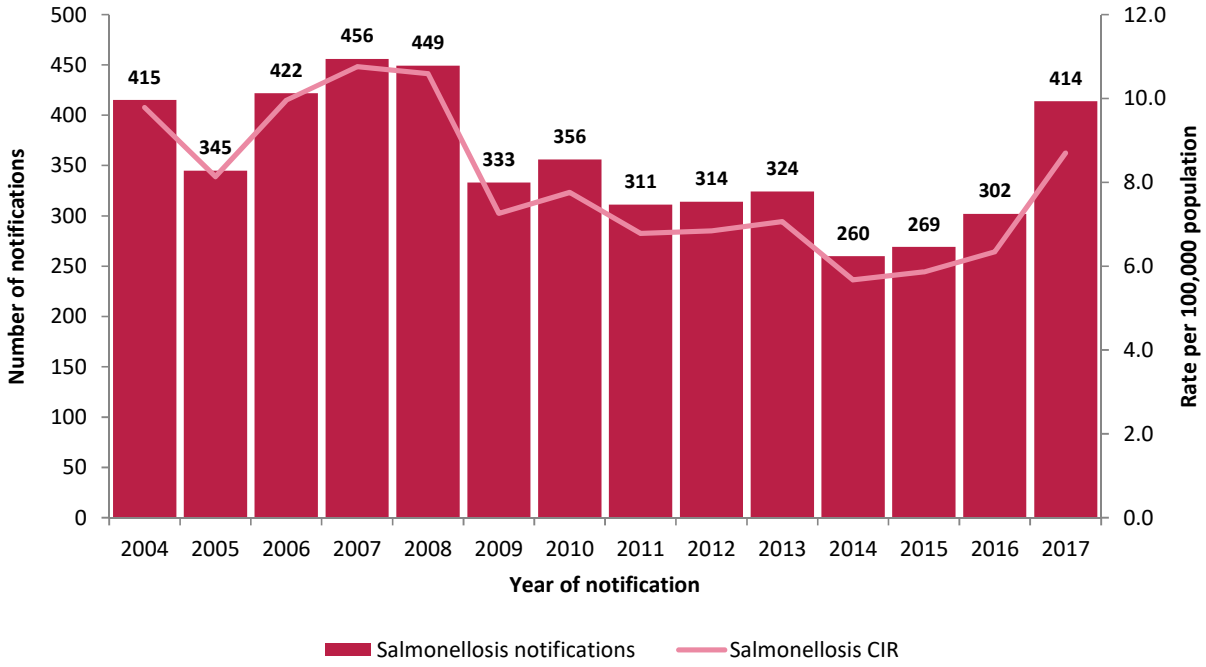
Results

Basic epidemiology

During 2017, 414 cases of salmonellosis were notified (378 confirmed and 36 probable). The 414 cases notified in 2017 represent a 37% increase compared to 2016; if only confirmed cases are compared, the 378 confirmed in 2017 represent a 25% increase on the number in 2016.

Overall this corresponds to a crude incidence rate (CIR) of 8.7 per 100,000 population (Figure 1). Prior to this, the annual CIR had been decreasing gradually over the last eight years (from 10.8/100,000 in 2007 to between 5.7 and 6.3 in the last three years).

Figure 1: Annual number of notifications and crude incidence rate per 100,000, Ireland 2017



Data source: CIDR

The highest CIR in 2017 was reported in HSE-E (11.2 per 100,000), the excess compared to last year being largely due to a single large outbreak described below. Relatively high CIRs were also reported in HSE-M (10.0 per 100,000) and HSE-SE (9.6 per 100,000). The lowest CIRs were in HSE-NW (4.7 per 100,000), HSE-NE (6.1/100,000) and HSE-S (6.6 per 100,000).

Similar to 2016, the highest age-specific incidence rate was in children under 5 years of age (17.8/100,000). This is likely to be influenced by clinicians more readily seeking clinical samples in that age group. The next highest rates were in the 20-24 years age group (12.1 per 100,000), 25-24 years age group (11.4 per 100,000) and in the 55-64 years age group (11.4 per 100,000). The lowest age specific rate was observed in the 5-9 year age group (4.8/100,000).The male to female ratio was highest in children under 5 (2.0:1) and adults 55-64 years (2.0:1), and lowest in adults 20-24 years (0.5:1).

Disease severity

Diarrhoea was the most common symptom (96% of cases) among notified cases in 2017 (Table 1), followed by abdominal pain (85%). Bloody diarrhoea occurred among 27% of cases. Median duration of illness was seven days (range 1-35 days), based on observations for 190 cases. Thirty-five per cent of cases (124/357) were hospitalised.

Table 1: Disease severity of notified *Salmonella* cases in Ireland, 2017

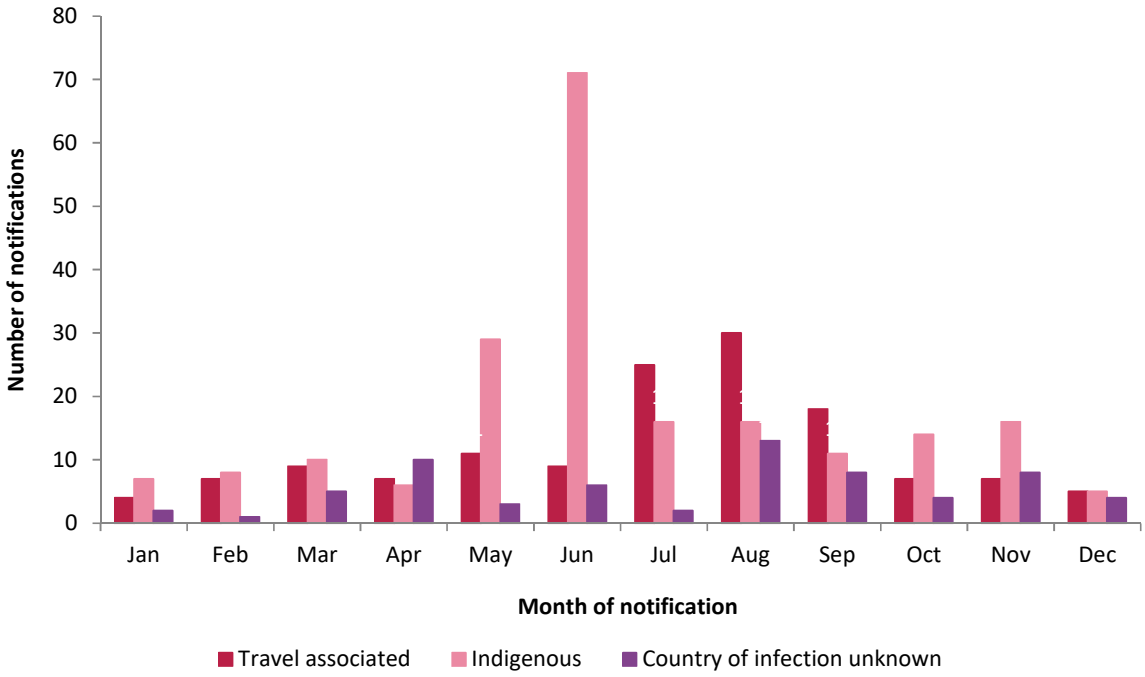
Symptom/disease feature	Number with Symptom	Number without Symptom	Number symptom Unknown	Percentage of cases with symptom (among known)
Diarrhoea	302	13	99	96%
Bloody diarrhoea	78	212	124	27%
Vomiting	129	177	108	42%
Nausea	178	94	142	65%
Abdominal pain	215	38	161	85%
Fever	185	97	132	65%
Headache	60	140	214	30%
Myalgia	63	130	221	33%

Data source: CIDR

Foreign travel as a risk factor for salmonellosis in Ireland

Country of infection was reported for 84% of notifications in 2017. Where country of infection was reported, 40% of cases were travel-associated (139/348). Travel-associated cases peaked between July and September coinciding with the peak summer holiday period. The distribution of non-travel-associated cases was strongly affected by a single large outbreak May-June. Excluding these outbreak cases, non-travel associated cases had a less pronounced seasonal variation with elevated numbers of cases between May and November (Figure 2).

Figure 2: Salmonellosis notifications by month of notification and country of infection, 2017



Data source: CIDR

Among travel associated cases (n=129), the most common countries of infection reported were Spain (n=38), Thailand (n=11), Vietnam (n=10) and Portugal (n=10). 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.

As might be expected, cases who acquired their disease in Ireland or other parts of Europe were younger than cases who acquired their disease following long-haul travel (Table 2). Disease acquired in Ireland was more commonly caused by *S*. Typhimurium and monophasic Typhimurium strains (35%) than by *S*. Enteritis strains (9%), with other strains making up the remaining 52% of cases. By contrast, disease acquired in Europe was most commonly associated with *S*. Enteritidis (48%), followed by other strains (28%), with *S*. Typhimurium and monophasic Typhimurium strains accounting for 24% of cases. For cases associated with acquisition in the rest of the world, non-Enteritis, non-Typhimurium cases predominated (55%), with *S*. Enteritidis and *S*. Typhimurium (incl. monophasic Typhimurium) strains each accounting for 23% of cases (Table 2).

Table 2: Salmonellosis notifications acquired in Ireland, Europe and Rest of the World by age group, serotype and quarter, 2017

Characteristic		Ireland	Europe	Rest of the world	Unknown /Not Specified	Total
Age group	<15 yrs	55	17	8	18	98
	15-44 yrs	75	32	44	23	174
	45-64 yrs	49	21	10	15	95
	65+ yrs	30	6	1	10	47
Serotype	Typhimurium	32	5	7	10	54
	4,[5],12:i:-	28	13	7	7	55
	Enteritidis	16	36	14	17	83
	Other	94[a]	21	34	29	178
	Not specified*	39	1	1	3	44
Quarter	Q1	25	5	15	8	53
	Q2	106	12	15	19	152
	Q3	43	49	24	33	139
	Q4	35	10	9	16	70
Total		**209**	**76**	**63**	**66**	**414**

Data source: CIDR

*includes 8 confirmed cases reported as *S. sp* and 36 probable cases linked to *S.* Brandenburg outbreak

[a]includes 25 *S.* Brandenburg linked to *S.* Brandenburg outbreak

Animal contact as a risk factor

Contact with pets (in particular exotics like snakes and turtles), contact with pet food (e.g. frozen rodents), contact with wildlife (e.g. hedgehogs), and contact with cattle, have all been associated with an increased risk of salmonellosis, especially in children. In 2017, 40% (103/262) of salmonellosis cases reported contact with pets (only one of which was a

reptile), 7% (16/241) reported contact with farm animals, 4% (5/133) reported contact with wildlife, and 16% (33/216) reported contact with pet feed (none with frozen feeder rodents).

National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) data

The National *Salmonella*, *Shigella* and *Listeria* Reference Laboratory (NSSLRL) based in Galway has been providing reference services nationally since 2000. In 2017, the NSSLRL analysed 389 human *Salmonella* isolates referred for further typing, 268 of which were non-typhoidal *salmonellas*.

The top 10 serotypes reported in 2017 are displayed in Table 3. As usual, *S*. Enteritidis and *S*. Typhimurium (including monophasic Typhimurium) were the most common serotypes. Due to the large outbreak in HSE-E described below, *S*. Brandenburg was the third most common serotype in 2017.

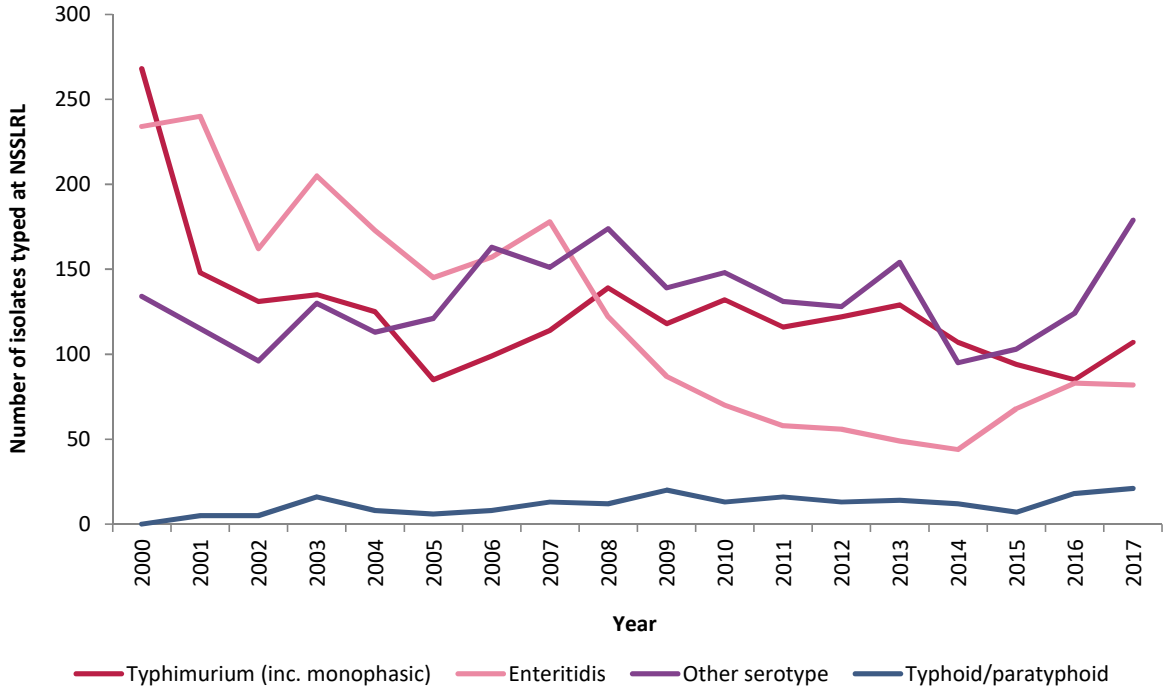
Table 3: Top ten Salmonella serovars in Ireland, 2017

Serotype	Number of human isolates
Enteritidis	82
4,5,12:i:-	58
Typhimurium	49
Brandenburg	36
Newport	17
Typhi	15
Unnamed	10
Stanley	9
Infantis	9
Agona	8

Data source: NSSLRL

Figure 3 shows the distribution of serotypes over the period 2000-2017. The number of cases due to *S*. Enteritidis were almost the same as in 2016, while those due to *S*. Typhimurium and other serotypes increased by 21% and 31% respectively.

Figure 3: Annual number of Salmonella isolates referred to NSSLRL by serotype in Ireland, 2000-2017



Data source: NSSLRL

More detail on the typing of human *Salmonella* isolates and their resistance to antimicrobials is reported in the National *Salmonella*, *Shigella* & *Listeria* Reference Laboratory of Ireland, Annual Report for 2017[1]. This report also details new developments in relation to the use of whole genome sequencing (WGS) during 2017 and 2018.

Outbreaks and clusters of salmonellosis

During 2017, four general outbreaks of salmonellosis were reported, the largest of which was reported in HSE-E. Thirty five confirmed and 37 probable cases of *S.* Brandenburg were identified associated with several parties which obtained buffet food from the same catering premises.[2] Five persons were hospitalised and one person died –an inquest is pending.

A small outbreak of two cases of *Salmonella* Enteritidis was reported by HSE-W associated with a restaurant/café.

The remaining two general outbreaks (one *S.* Newport[3] and one monophasic Typhimurium) were identified at the NSSLRL on the basis of clustering by WGS, and were associated with travel to Spain. In both instances, the cases were linked loosely with particular geographic locations but cases did not report common exposures such as the same accommodation or using the same restaurants, and the causes of the outbreaks were not established.

A further cluster of four cases of *S.* Enteritidis this year were identified on WGS to be linked to a wider salmonellosis outbreak at European level associated with Polish eggs.[4]

In addition, nine family outbreaks were notified, seven comprising two cases each and two comprising three cases each. Three were foreign-travel related while the remainder were reported as associated with private houses. Three of the nine were reported due to person-to-person transmission, one due to foodborne transmission and one due to animal contact; the transmission routes for the remainder were unknown.

Typhoid/Paratyphoid:

In 2017 sixteen cases of typhoid were notified. Most were associated with travel to Asia, principally India (n=7), Pakistan (n=2) and Bangladesh (n=1), two were associated with West Africa. Country of infection was reported as Ireland for two cases and as not specified for two cases. Four cases occurred in children aged 15 years or less. Six paratyphoid cases were notified. Five were adults and one was a child. Four were associated with travel to Asia.

Discussion

The 414 cases notified in 2017 were the highest number of salmonellosis cases reported in Ireland since 2008. The increase was due largely to the occurrence of a single large outbreak of *S*. Brandenburg outbreak in the HSE-E with 71 notified cases (35 of which were laboratory confirmed). This outbreak also explains much of the large increase in the number of non-Enteritidis non-Typhimurium cases reported this year. There was also a 20% increase in the number of Typhimurium cases this year. However, the overall incidence in of salmonellosis in Ireland remains low compared to other parts of Europe. [5]

The occurrence of travel-associated cases of salmonellosis is a large contributor to the overall burden of salmonellosis in Ireland, in particular in summer months. The overall burden of disease acquired in Ireland is disproportionally associated with children less than 15 years and adults more than 65 years. Moreover, in 2017, cases due to *S.* Typhimurium (including monophasic Typhimurium) were four times more common among indigenous cases than *S*. Enteritidis. With poultry and eggs a well-known source of human *S*. Enteritidis infections internationally, the well-established National *Salmonella* Control Programme in poultry in Ireland likely contributes to the lower risk of acquiring *S.* Enteritidis infection in Ireland.

The introduction of WGS at the NSSLRL was successful at recognising two travel-related *Salmonella* outbreaks linked with Spain but the size of these outbreaks provided insufficient power to detect a source or vehicle of infection. WGS was also successful at enabling a cluster of four cases (two of which were travel-related) to be linked to an ongoing outbreak at European level.[2] The fact that a high proportion of Irish salmonellosis cases are travel-related likely makes some, which are actually part of outbreaks, appear to be sporadic when viewed in isolation in the Irish dataset, and thus collaboration with European

colleagues is key to finding potential internationally-linked cases, and enabling potential sources to be identified.

Further information available on HPSC website

Further information about salmonellosis is available at http://www.hpsc.ie/a-z/gastroenteric/salmonellosis/

Publications on salmonellosis in Ireland available at http://www.hpsc.ie/a-z/gastroenteric/salmonellosis/publications/

Acknowledgements

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