3.6 Salmonella

Summary

Number of confirmed cases, 2010: 349
Number of probable cases, 2010: 7
Crude incidence rate, 2010: 8.4/100,000

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 this is not common in Ireland and is almost invariably travel-associated.

Notification data (CIDR)

There were 356 cases of salmonellosis in reported in 2010. Of these, 349 were laboratory confirmed with an additional seven probable cases that were not laboratory confirmed. The national crude incidence rate (CIR) for salmonellosis in 2010 was 8.4 per 100,000 population which was a slight increase compared to 2009 (7.9/100,000) as shown in figure 1. Figure 2 illustrates the regional variation in CIR during 2010. The highest CIR occurred in HSE-M (18.3/100,000), representing an increase of 9.5 per 100,000 population compared to 2009. This was the only region to experience a significant increase in the regional CIR during 2010. The lowest CIR occurred in HSE-S (6.4/100,000), which remains stable compared to 5.6 per 100,000 population during 2009. The largest decrease in regional CIR during 2010 was observed in HSE-NW, with a decrease of 3.4 per 100,000 population.

The female:male ratio for 2010 was 0.96:1.05. In terms of age distribution, 21.1% 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 (22.3/100,000 in females and 27.2/100,000 in males) in both sexes (figure 3).

The seasonality of salmonellosis notifications in Ireland during 2010 is shown in figure 4, with the highest number of notifications occurring between May and October. A peak in indigenous notifications was observed during May due to an outbreak of *S.* Infantis

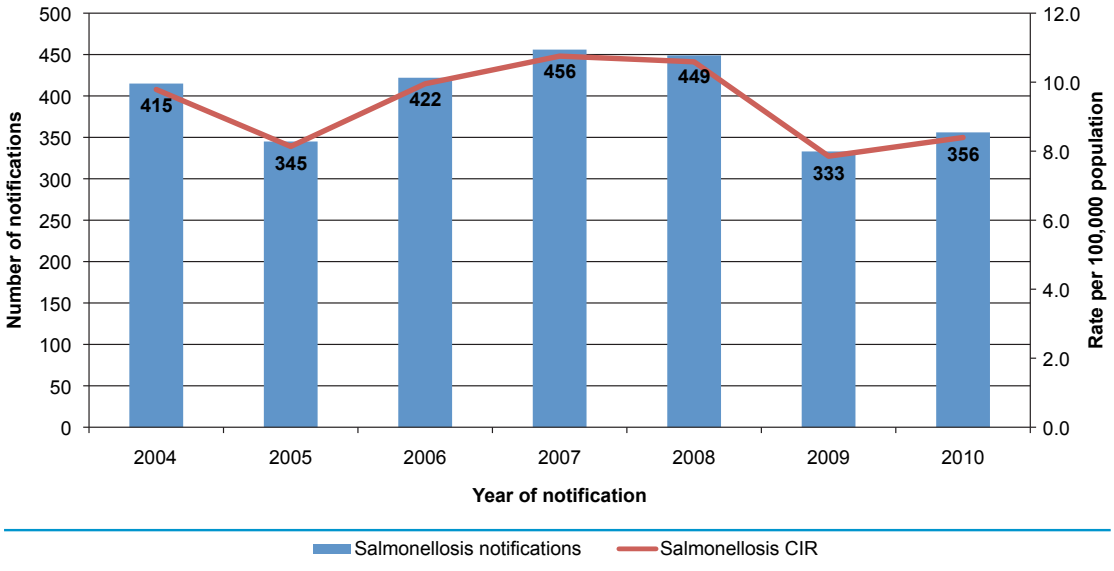

Figure 1. Salmonellosis notifications and crude incidence rate per 100,000 population by year of notification (CIDR)

while the peaks observed during August to October were largely due to travel associated salmonellosis notifications. These are anticipated seasonal increases that correlate with peak holiday periods and resultant increase of people travelling abroad.

Of the 356 cases notified on CIDR during 2010, travel history was provided for 277 cases (77.8%). Of the 277 cases where travel history was reported, 149 (53.8%) of salmonellosis cases were indigenous to Ireland and 128 cases (46.2%) 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=23), Thailand (n=13) and Turkey (n=8). When serotyping data are analysed by travel history, 30.5% of all travel associated cases are *S.* Enteritidis whereas 45.6% of cases indigenous to Ireland are *S.* Typhimurium (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 2010, the NSSLRL analysed 363 human *Salmonella* isolates referred for further typing, identifying 62 serotypes. Table 2 presents the most dominant serotypes detected during 2010. *S.* Typhimurium* (n=132) was the most common serotype, followed by *S.* Enteritidis (n=70).

The NSSLRL conducted phage typing analysis on all 132 *S.* Typhimurium and all 70 *S.* Enteritidis isolates. Phage types DT8 (21.2%), DT104 (19.7%), DT193 (13.6%), Untypable (11.4%) and DT104b (10.6%) were the commonest phage types observed among *S.* Typhimurium isolates while phage types PT14b (24.3%), PT1 (20.0%) and PT4 (12.9%) were the dominant types observed among *S.* Enteritidis isolates.

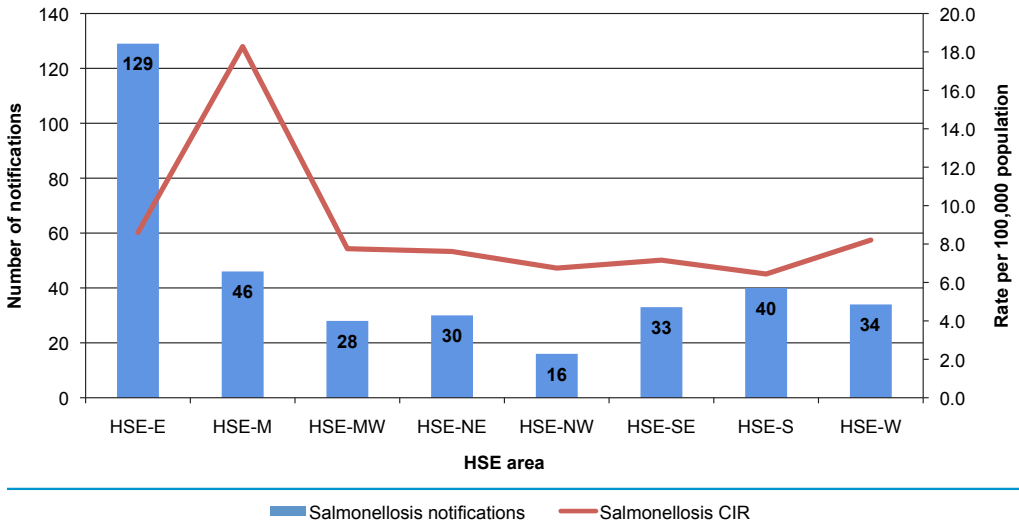

Figure 2. Salmonellosis notifications and crude incidence rate per 100,000 population by HSE area, 2010 (CIDR)

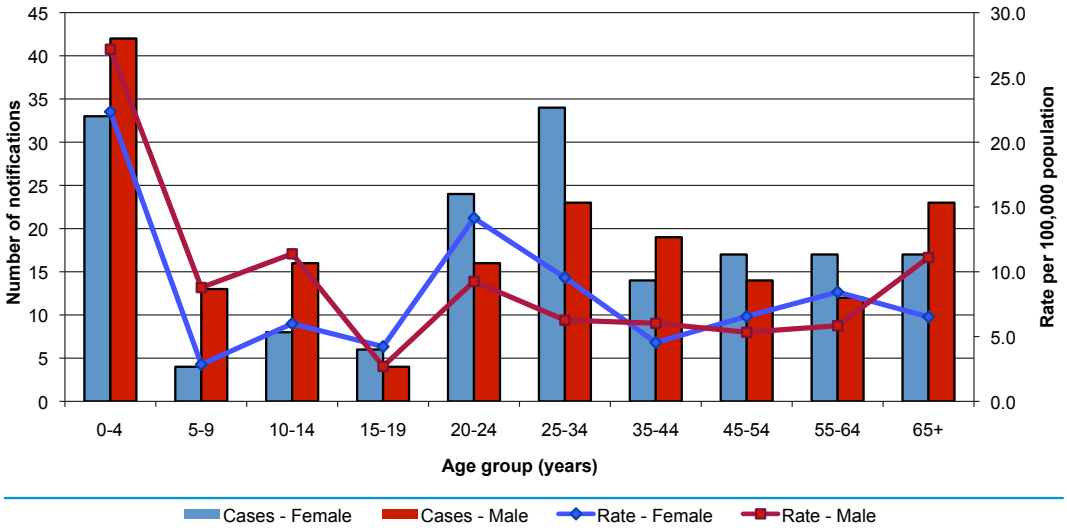

Figure 3. Salmonellosis notifications and age specific incidence rate per 100,000 population by age group (years) and sex, 2010 (CIDR)

Of the 363 human isolates analysed by the NSSLRL, 189 (52.1%) were fully susceptible to all antimicrobials tested. The remaining 174 isolates exhibited some degree of antimicrobial resistance. The three commonest resistance patterns[§] seen were isolated resistance to nalidixic acid (Na, n=38, 10.5%), resistance to ampicillin, streptomycin, sulphadiazine and tetracycline (ASSuT, n=27, 7.4%) followed by ampicillin, chloramphenicol, streptomycin, sulphadiazine and tetracycline (ACSSuT, n=26, 7.2%). Over 96% of human isolates with a resistance profile of ACSSuT or ASSuT were *S.* Typhimurium while 73.7% of human isolates with a resistance profile of Na were *S.* Enteritidis. One isolate each of *S.* Concord and *S.* Worthington were resistant to nine antibiotics tested; three *S.* Concord and one isolate each of *S.* Infantis, *S.* Newport and *S.* Unnamed were resistant to eight antibiotics tested while four *S.* Typhimurium, and one isolate each of *S.* Enteritidis, *S.* Infantis and *S.* Kentucky were resistant to seven antibiotics tested. Please refer to the NSSLRL's Annual Report 2010 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 16 outbreaks of *Salmonella* during 2010 which remains stable compared to the number of salmonellosis outbreaks reported in 2009. These outbreaks resulted in 87 cases of illness, one death and an associated hospitalisation rate of 41.4% (n=36 cases). Table 3 outlines the number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode during 2010.

There were 11 family outbreaks during 2010, six of which were in private houses, three occurred across extended families and two were travel associated. Of the two travel associated family outbreaks, one reported exposure in Spain and the other reported exposure in the Bahamas. Four family outbreaks were reported as food-borne transmission, four as person to person transmission and two as animal contact. Transmission was unknown for the remaining outbreak. Of the four food-borne outbreaks, suspected food items reported included raw milk[2], imported eggs and a catered meal. Of the outbreaks linked with animal contact, both reported reptile contact.

There were five general outbreaks during 2010, two of which were national outbreaks in community locations, one was a national travel related outbreak and the remaining two were local outbreaks occurring in a private house and a community location.

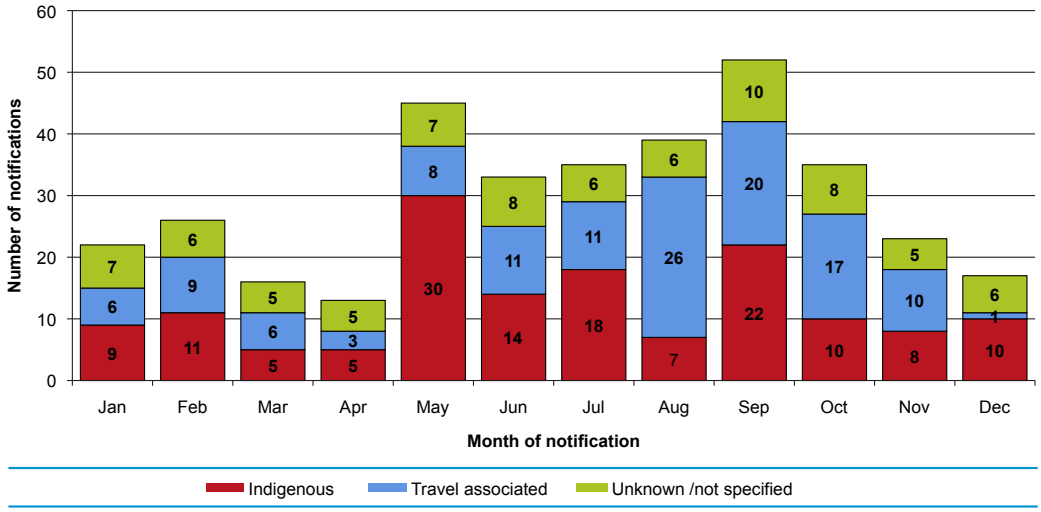

Figure 4. Salmonellosis notifications by month of notification and travel history, 2010 (CIDR)

Table 1. Percentage of Salmonellosis notifications by serotype and travel history, 2010 (CIDR)

Salmonella serotype	Travel associated	Indigenous	Travel history unknown	Total
***S.* Enteritidis (%)**	30.5	8.1	19.0	18.5
***S.* Typhimurium (%)**	11.7	45.6	40.5	32.3
Other serotypes (%)	57.0	43.0	39.2	47.2
Serotype not specified (%)	0.8	3.4	1.3	2.0
All serotypes (n)	**128**	**149**	**79**	**356**
All serotypes (%)	**36.0**	**41.9**	**22.2**	**100.0**

* This includes 19 *S.* Typhimurium isolates with serotype 4,5,12:1
[§] Where A= Ampicillin, C= Chloramphenicol, Na = Naladixic acid, S= Streptomycin, Su= Sulphonamide and T= Tetracycline

One national general outbreak of *S.* Typhimurium DT8 was reported which was associated with duck egg exposure. Thirty-five people were reported ill in total, 18 (51%) of which were reported to have been admitted to hospital for their illness and one case died. Salmonellosis was not considered to be the cause of death in this case. The cases were dispersed across seven of the eight HSE-areas, with onset dates ranging from mid August 2009 to the end of February 2011. Descriptive and microbiological evidence pointed towards duck eggs as being the most likely source of these infections. Exposure to duck eggs explained 72% of cases. Trace-back investigations identified *S.* Typhimurium from several egg-laying duck flocks which were indistinguishable or closely related on molecular typing to the strains producing human illness. Press releases were issued to the public, and point of sale notices were distributed to duck egg retailers, advising consumers to handle and cook duck eggs appropriately. A series of control measures were also taken by the Department of Agriculture including restriction of infected duck flocks, development of a code of practice for duck egg producers, and introduction of legislation (S.I. No. 565 of 2010), the 'Diseases of Animals Act 1966 (Control of Salmonella in Ducks) Order 2010'. This Order now sets down a legal basis for the control of salmonellosis in ducks and duck eggs.[3,4]

One national general outbreak of *S.* Java, consisting of four associated cases during a two week period, was detected by NSSLRL during 2010. No history of recent travel was reported by the cases and the route of transmission remains unknown for this outbreak.

One national general outbreak was caused by *S.* Typhimurium and resulted in four cases of illness, two of whom were hospitalised. All cases reported a history of recent travel to Spain.

One local general outbreak in HSE-NE was caused by *S.* Montevideo with five confirmed cases, two of whom were hospitalised and two of whom died. The cause of death was not salmonellosis in one case and the cause of death for the other deceased case was not known. Mode of transmission was reported as unknown for this outbreak.

Table 2. Number and percentage of human Salmonella isolates by serotype, NSSLRL 2010

Salmonella serotype	Number of isolates	*% Isolates*
Typhimurium†	132	*36.4*
Enteritidis	70	*19.3*
Infantis	17	*4.7*
Unnamed‡	10	*2.8*
Newport	8	*2.2*
Typhi	8	*2.2*
Braenderup	7	*1.9*
Dublin	7	*1.9*
Java	7	*1.9*
Montevideo	7	*1.9*
Saintpaul	7	*1.9*
Other	83	*22.9*
Total	**363**	*100.0*

Table 3. Number of salmonellosis outbreaks and number ill by outbreak location and outbreak transmission mode, 2010 (CIDR)

Location	Animal contact		Food-borne**		Person-to-person ††		Unknown		Total	
	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	No. ill	No. outbreaks	**No. ill**
Community out-break	0	0	1	33	0	0	2	7	**3**	**40**
Extended family	0	0	2	8	1	2	0	0	**3**	**10**
Private house	2	4	2	17	3	8	0	0	**7**	**29**
Travel related	0	0	1	2	0	0	2	6	**3**	**8**
Total	**2**	**4**	**6**	**60**	**4**	**10**	**4**	**13**	**16**	**87**

† This includes 19 (14.4%) *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
†† Includes 1 outbreak reported as Person to Person and Animal contact

One local general outbreak in HSE-M was caused by *S.* Infantis and resulted in 15 cases of illness, two of whom were hospitalised. This outbreak was reported as food-borne transmission associated with a catered party in a private house.

Typhoid/Paratyphoid:
The number of *S.* Typhi and *S.* Paratyphi cases diagnosed in Ireland remains elevated when compared to previous years. In 2010 there were eight cases of *S.* Typhi reported and five cases of *S.* Paratyphi. Four of the *S.* Typhi had known recent travel history to India, two to Bangladesh and one each to Nepal and Guinea. In the five *S.* Paratyphi cases one had known recent travel history to Bangladesh, one to Pakistan and one to the US. One further case reported travel in Asia. The remaining paratyphoid case's travel history was unknown.

References:

1. National *Salmonella* Reference Laboratory of Ireland, Annual Report for 2010. Available at: http://www.nuigalway.ie/research/salmonella_lab/downloads/nsrl_annual_report_2010.pdf
2. Nolan C., O'Mahony D., Conlon M., Ward M., Byrne W. *Two human cases of Salmonella typhimurium DT104 linked with raw milk consumption.* Epi-Insight. Volume 12 issue 5. May 2011. Available at: http://ndsc.newsweaver.ie/epiinsight/3clhhu7y1nltx2boyfzyr4
3. McKeown P. et al. *Update on a nationwide Salmonella Typhimurium DT8 outbreak associated with duck eggs* Epi-Insight. Volume 11 issue 10. October 2010. Available at: http://ndsc.newsweaver.ie/epiinsight/1396a5zi5wd3xr2ilfu0iz
4. Garvey P. et al. *Two new cases linked with nationwide 'duck egg' outbreak of Salmonella Typhimurium DT8.* Epi-Insight. Volume 12 issue 4. April 2010. Available at: http://ndsc.newsweaver.ie/epiinsight/3zg0ibihqqw87nh5ab6w5b