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

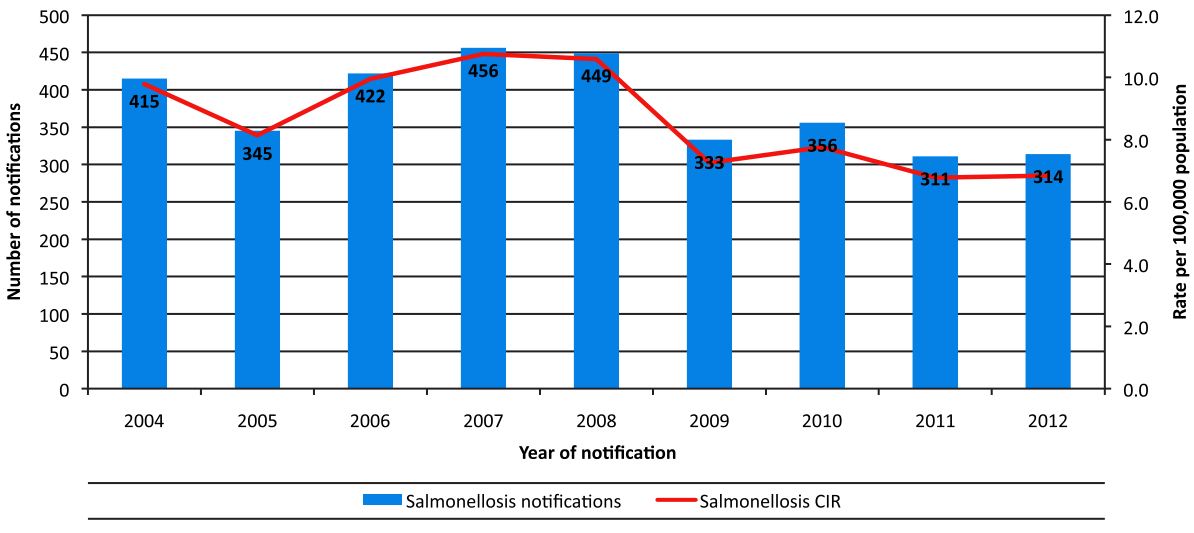

Figure 1: Salmonellosis notifications and crude incidence rate per 100,000 population by year of notification (CIDR)

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

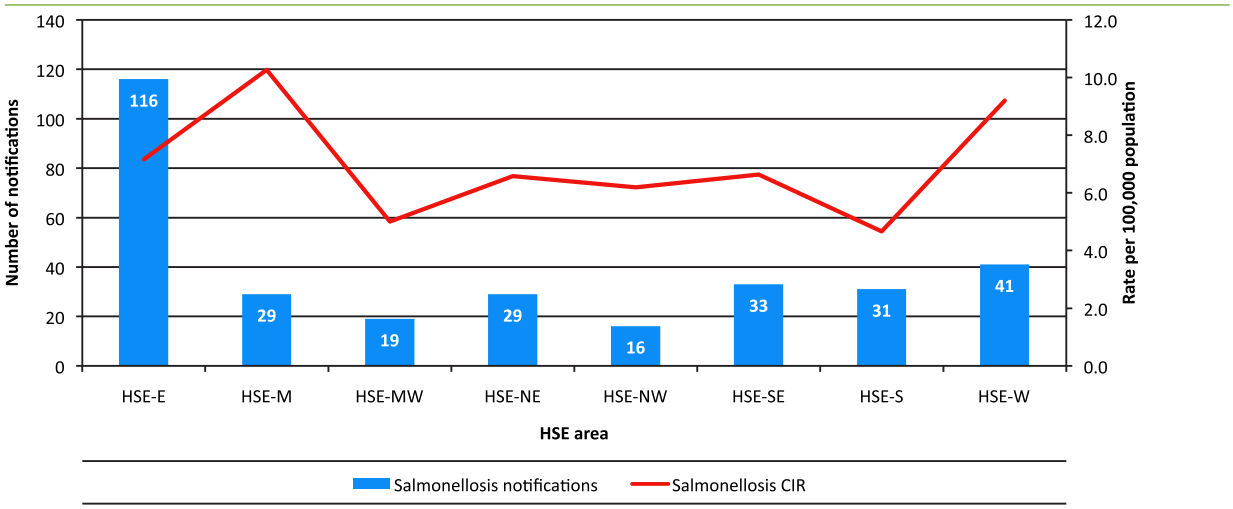

Figure 2: Salmonellosis notifications and crude incidence rate per 100,000 population by HSE area, 2012 (CIDR)

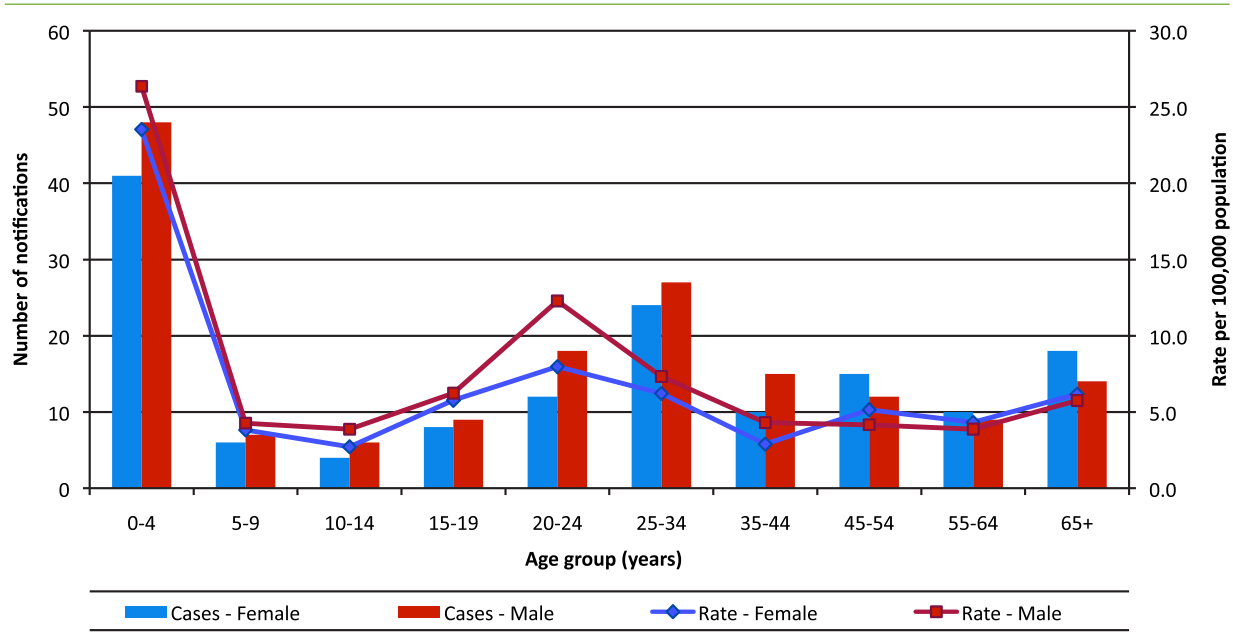

Figure 3: Salmonellosis notifications and age specific incidence rate per 100,000 population by age group (years) and sex, 2012 (CIDR)

*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.

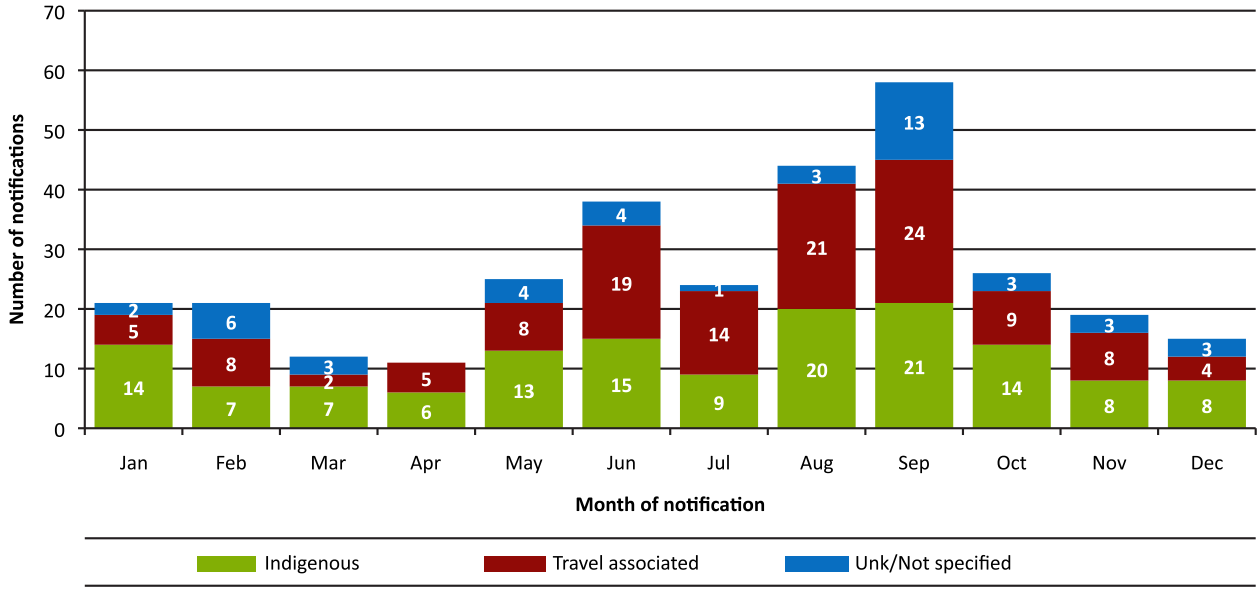

Figure 4: Salmonellosis notifications by month of notification and travel history, 2012 (CIDR)

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***

References:
1. National *Salmonella* Reference Laboratory of Ireland, Annual Report for 2012. Available at: http://www.nuigalway.ie/research/salmonella_lab/reports.html
2. De Jong B and Ekdahl K. *The comparative burden of salmonellosis in the European Union member states, associated and candidate countries.* BMC Public Health 2006, 6:4. Available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC1352352/pdf/1471-2458-6-4.pdf
3. Garvey P and McKeown P. *Four Irish cases associated with international outbreak of Salmonella Newport.* HPSC, 2012. Epi-Insight, vol. 12, issue 13. Available at: http://ndsc.newsweaver.ie/epiinsight/162neqaeisp?a=1&p=21897305&t=17517774

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