



Salmonellosis in Ireland, 2001

**Barbara Foley (NDSC), Martin Cormican (INSRL),
& Paul McKeown (NDSC)**

**National Disease Surveillance Centre
25-27 Middle Gardiner Street, Dublin 1**

Introduction

Salmonella is a bacterial zoonotic pathogen that is a relatively common cause of foodborne illness in Ireland and worldwide. At present there are over 2,500 known serotypes of *Salmonella*. In recent years, two serotypes, namely, *S. enterica* serotype Enteritidis and *S. enterica* serotype Typhimurium have accounted for the majority of cases of human salmonellosis.

Salmonellosis presents as an acute enterocolitis, with sudden onset of headache, abdominal pain, diarrhoea, nausea and occasionally vomiting. Fever is almost always present. Dehydration, especially amongst vulnerable populations such as infants, the immunocompromised and the elderly, may be severe. *S. Typhi* and *S. Paratyphi* can cause enteric fever, a severe systemic life threatening condition, but this is very rare in Ireland and mainly travel-associated.

A wide range of domestic and wild animals, as well as humans can act as the reservoir for this pathogen, although chronic carriage is rare in humans.

Prevention, surveillance and control of *Salmonella* infections is of major public health importance. Measures have been implemented from farm to fork in an attempt to control spread of this zoonotic agent.

Materials and Methods

The Interim National Salmonella Reference Laboratory (INSRL) was established in 2000 in the Department of Medical Microbiology, University College Hospital, Galway. This laboratory accepts *S. enterica* isolates from all clinical and food laboratories for serotyping, phage typing and antimicrobial sensitivity testing.

This report reviews data available from the Interim National Salmonella Reference Laboratory (INSRL) and weekly clinical notifications for the year 2001. These data enable us to provide an overview of the epidemiology and burden of disease caused by *Salmonella* infections in Ireland today.

Results

INSRL data

Demographic information

There were 543 clinical isolates of *S. enterica* referred to INSRL in 2001. The male: female ratio was 1:1. The age groups and sex of those affected are shown in Table 1 below.

Table 1. Age group of clinical isolates of *S. enterica* (n=665) referred to INSRL, 2001.

Age Group (Years)	No. of Isolates (%)	Male	Female	Unknown
0-4	104 (19)	46	49	9
5-14	76 (14)	40	36	0
15-24	92 (17)	38	53	1
25-34	72 (13)	29	37	6
35-44	48 (9)	18	29	1
45-54	39 (7)	20	19	0
55-64	27 (5)	9	17	1
65+	41 (8)	23	17	1
Not Known (NK)	44 (8)	21	18	5
Total	543	244	275	24

Seasonality

There was a marked seasonality in the number of human cases reported in 2001 with a sharp peak seen in late August (see Figure 1 below).

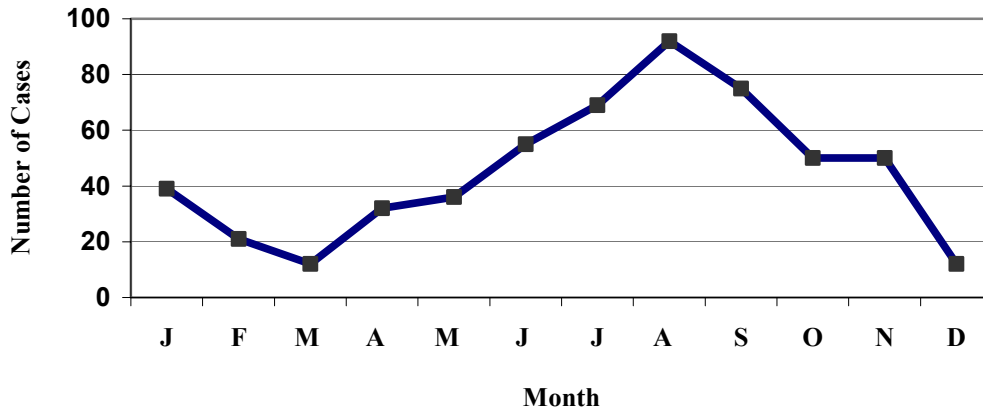


Figure 1. Isolates of *Salmonella enterica* referred to INSRL by month, 2001.

(Note: month refers to the date the isolate was received in the reference laboratory).

Serotyping, phage typing and antibiotic susceptibility results

The breakdown of *Salmonella* serotypes by health board is shown in Table 2. The total figures and crude incidence rates (CIR) are also presented. It should be noted however that health board location refers to the location of the clinical laboratory that the isolate was sent to, and may not correspond with the geographic location of the cases.

Table 2. Serotypes of *Salmonella enterica* by health board, 2001.

Serotype	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
Abony	1	0	0	0	0	0	0	0	1
Agona	0	0	0	1	0	0	1	0	2
Albany	0	0	0	0	0	0	1	0	1
Anatum	1	0	0	0	0	0	0	0	1
Argentina	0	0	0	1	0	0	0	0	1
Bareilly	1	0	0	0	0	0	0	0	1
Braenderup	1	0	0	0	0	0	0	1	2
Brandenburg	2	0	2	0	0	0	0	0	4
Bredeney	3	0	1	0	0	4	2	1	11
Cerro	0	1	0	0	0	0	0	0	1
Coeln	0	0	0	0	0	1	0	0	1
Corvallis	0	0	0	0	0	0	0	1	1
Derby	1	0	0	0	0	0	1	1	3
Dublin	6	2	0	0	0	2	2	0	12
Enteritidis	94	13	15	6	15	25	62	18	248
Garba	1	0	0	0	0	0	0	0	1
Haardt	0	0	0	0	0	0	0	1	1
Hadar	0	0	0	1	0	0	1	2	4
Haifa	1	0	0	0	0	0	0	0	1
Hato	0	0	0	0	0	0	0	1	1
Heidelberg	1	2	0	0	0	2	1	1	7
Hofit	0	0	0	0	0	0	0	1	1
Infantis	1	0	0	0	0	1	0	0	2
Java	1	0	0	0	0	0	1	0	2
Johannesburg	0	0	0	0	0	2	0	0	2
Kentucky	2	0	0	1	0	0	0	1	4
Limete	1	0	0	0	0	0	0	0	1
Mbandaka	1	0	0	0	0	0	0	0	1
Mikawasima	0	1	0	0	0	0	0	0	1
Molade	0	0	0	0	0	0	0	1	1
Newington	2	0	0	0	0	0	0	0	2
Newport	3	0	0	1	0	0	0	0	4
Othmarschen	2	0	0	0	0	0	0	0	2
Paratyphi B	0	0	1	0	0	0	0	0	1
Putten	1	1	0	0	0	0	0	0	2
Rissen	1	0	0	0	0	0	0	0	1
Rostock	0	0	0	1	0	0	0	0	1
Saintpaul	3	0	0	0	0	0	0	0	3
Schwarzengrund	0	0	0	0	0	0	0	1	1
Senftenberg	1	0	0	0	0	0	0	0	1
Stanley	3	0	0	0	0	0	0	1	4
Stanleyville	1	0	0	0	1	0	0	0	2
Typhi	7	0	0	0	0	0	0	2	9
Typhimurium	58	19	21	14	9	12	25	7	165
Uganda	1	1	0	0	0	0	0	1	3
Unnamed	1	0	0	1	0	0	0	1	3
Veneziana	0	0	0	0	0	0	1	0	1
Virchow	8	3	1	1	0	2	0	1	16
Wein	0	0	0	0	0	0	0	1	1
Zanzibar	0	0	1	0	0	0	0	0	1
Total	211	43	42	28	25	51	98	45	543
CIR	16.3	20.9	13.2	9.1	11.9	13.0	17.9	12.8	15.0

CIR = Crude incidence rate / 100,000 population

In 2001 *S. Enteritidis* took over from *S. Typhimurium* as the predominant serotype associated with human salmonellosis in Ireland (see Table 3 below). The next most commonly isolated serotypes were *S. Virchow* and *S. Dublin*. There were nine isolates of *S. Typhi* detected in 2001, all associated with travel-abroad.

Table 3. Serotypes of *S. enterica* referred to INSRL.

	1998	1999	2000	2001
S. Enteritidis	60 (8)	155 (33)	239 (36)	248 (46)
S. Typhimurium	578 (80)	200 (42)	286 (43)	165 (30)
S. Bredeney	15 (2)	55 (12)	24 (4)	11 (2)
S. Kentucky	14 (2)	12 (3)	15 (3)	4 (1)
All other serotypes	54 (7)	52 (11)	101 (15)	115 (21)
Total	721	474	665	543

Antimicrobial resistance

The antimicrobial susceptibilities of the most commonly isolated serotypes in 2001 are presented in Table 4. High levels of resistance were found among *S. Typhimurium* isolates, particularly *S. Typhimurium* DT104. Many of these isolates were found to be resistant to at least five antimicrobial agents, viz. ampicillin, chloramphenicol, streptomycin, sulphonamide and tetracycline (ACSSuT).

Table 4. Antimicrobial susceptibilities of human *Salmonella enterica* serotypes isolated in Ireland in 2001.

<i>Serotype</i>	<i>N</i>	<i>Amp</i>	<i>Chl</i>	<i>Strep</i>	<i>Sulph</i>	<i>Tet</i>	<i>Trim</i>	<i>Nal</i>
S. Enteritidis	248	7	0.4	5	7	12	2	24
S. Typhimurium	165	65	59	63	65	65	28	2
S. Virchow	16	6	0	0	6	6	12	69
S. Dublin	12	0	0	8	0	0	0	0
S. Bredeney	11	0	0	18	18	18	0	0
S. Heidelberg	7	29	0	0	0	0	0	14
S. Stanley	4	0	0	75	75	75	25	50
S. Kentucky	4	0	0	0	0	0	0	0

Results**Clinical notification data**

Salmonellosis is a notifiable disease. Medical practitioners are legally obliged to report all suspected cases. Information on trends in salmonellosis notifications shows that the crude incidence rate rose in the 1990s to peak in 1998, and has been steadily decreasing

since then (Figure 2). The total number of notifications in 2001 was 433 compared to 640 in 2000, and 960 in 1999.

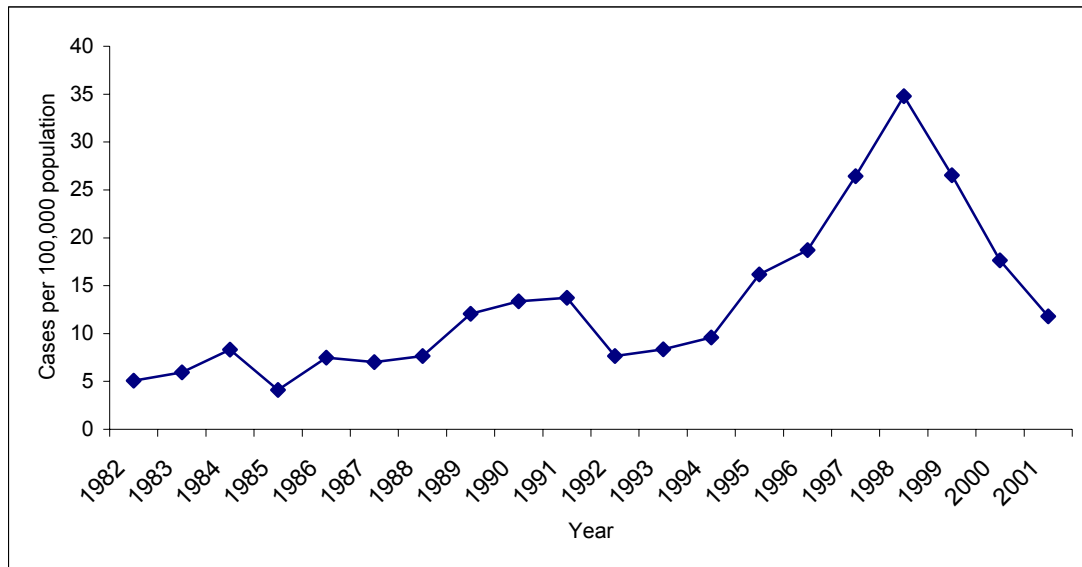


Figure 2. Crude rate of Salmonellosis in Ireland per 100,000 population 1982-2001.

Discussion

Salmonella remains an important enteric pathogen and is responsible for a significant burden of human illness as evident from the data presented in this report.

The detailed typing laboratory data being generated by the National Salmonella Reference Laboratory is enabling us to monitor salmonella trends more accurately and is providing us with detailed information regarding the epidemiology of this pathogen in Ireland.

Analysis of the serotyping results reveals that in 2001, *S. Enteritidis* was the predominant serotype, followed by *S. Typhimurium*. This was a change from the results of the previous three years and now mirrors the trend seen in the UK and the rest of Europe with *S. Enteritidis* being the commonest serotype.

Detailed serotyping, phage and molecular typing, in conjunction with antibiogram profiling of all *Salmonella* isolates has also proved invaluable for tracing of isolates through the food chain and enables outbreaks to be detected in a timely fashion. In 2001 a number of clusters of unusual *Salmonella* strains were detected by the reference lab in this way e.g. a small cluster of *S. Typhimurium* phage type U310 isolates.

Analysis of the 2001 INSRL dataset has again emphasised the scale of the problem of antimicrobial resistance amongst *Salmonella* isolates, particularly *S. Typhimurium* DT104. This is now recognised as a global problem and to this end the NDSC Strategy

for Antimicrobial Resistance in Ireland (SARI) strategy ¹ is endeavouring to tackle this problem.

The incidence rates of human salmonellosis have declined significantly in the past number of years. The number of outbreaks and number of people infected with *S. Enteritidis*, *S. Typhimurium* or *S. Kentucky* are lower in Ireland than in the England, Northern Ireland or Scotland. This has coincided with an overall decrease in the incidence of salmonellosis at EU level. The DAFRD Salmonella monitoring programme, the Bord Bia Egg Quality Assurance scheme and education campaigns targeting consumers and catering establishments may all have contributed to this downward trend. In addition, better detection methods for *Salmonella* and other zoonotic agents are enabling us to implement faster and more effective control and elimination strategies.

Control of zoonotic agents, including *Salmonella spp*, is now a priority at EU level particularly with the advent of the new European Food Safety Authority. The first Irish Zoonosis Report will be published later this year, and for the first time reports trends on zoonoses in Ireland, merging animal, food and clinical data.

Acknowledgements

We wish to sincerely thank Prof. Martin Cormican and all of his staff in the National Salmonella Reference Laboratory, UCHG for providing the data for this report and also the clinical and food microbiology laboratories that send *Salmonella* isolates to INSRL for analysis. In addition, we would like to acknowledge the Departments of Public Health and Community Care areas for providing the clinical notification data.

References

1. Available at: <http://www.ndsc.ie> (SARI.pdf).