

## Antimicrobial susceptibility of *Salmonella*, 2004

A representative sample of 489 non-typhoidal *Salmonella*, chosen from isolates routinely referred to ESR for serotyping in 2004, were tested for antimicrobial susceptibility. The sample comprised 247 human and 242 animal/environmental isolates.

Resistance to each of the 12 antimicrobials tested is shown in Table 1. Antimicrobial resistance among *Salmonella* remains relatively low, with 92.6% fully susceptible to all 12 antimicrobials. Approximately half (52.8%) of the resistant isolates were multiresistant to  $\geq 3$  antimicrobials.

*Salmonella* from human sources were more likely to be multiresistant than those from other sources (6.1 vs 1.7%) (Table 1). Resistance to ampicillin, co-trimoxazole, sulphonamides, trimethoprim, nalidixic acid and tetracycline was significantly higher ( $P < 0.05$ ) among *Salmonella* isolated from human sources than those isolated from other sources.

Fluoroquinolone (ciprofloxacin)-susceptible strains of *Salmonella* that are resistant to the older-generation quinolone nalidixic acid may be associated with clinical failure or delayed response when fluoroquinolones are used to treat extra-intestinal salmonella infections. While no isolates in 2004 tested resistant to ciprofloxacin, 6.1% of human isolates were nalidixic acid resistant and therefore could fail fluoroquinolone treatment if causing an extra-intestinal infection.

Table 1. Antimicrobial resistance among non-typhoidal *Salmonella*, 2004

Antimicrobial	Percent resistance			P value for significance of any difference in resistance between human and other isolates <sup>1</sup>
	All isolates n = 489	Human isolates n = 247	Animal and environmental isolates n = 242	
Ampicillin	2.7	4.9	0.4	0.0023
Cephalothin	0.2	0.4	0	1.000
Chloramphenicol	1.0	2.0	0	0.0613
Ciprofloxacin	0	0	0	-
Co-amoxiclav	0.2	0.4	0	1.000
Co-trimoxazole	2.0	3.6	0.4	0.0203
Gentamicin	0.4	0.8	0	0.4990
Nalidixic acid	3.3	6.1	0.4	0.0004
Streptomycin	3.9	4.5	3.3	0.5114
Sulphonamides	4.3	6.5	2.1	0.0161
Tetracycline	4.5	6.9	2.1	0.0102
Trimethoprim	2.0	3.6	0.4	0.0203
Multiresistant to $\geq 3$ antimicrobials <sup>2</sup>	3.9	6.1	1.7	0.0114

<sup>1</sup> Chi-square test or Fisher's Exact test as appropriate.

<sup>2</sup> All trimethoprim-resistant isolates were also co-trimoxazole resistant. For estimates of multiresistance, co-trimoxazole and trimethoprim resistance was counted as one resistance.

All *S. Typhi*, *S. Paratyphi A* and *S. Paratyphi B* isolates referred to ESR in 2004 were tested for susceptibility to the same 12 antimicrobials as the non-typhoidal *Salmonella* (Table 2).

One *S. Typhi* isolate, acquired in Cambodia, was multiresistant to ampicillin, chloramphenicol, co-trimoxazole, nalidixic acid, streptomycin, sulphonamides, tetracycline and trimethoprim. Nalidixic acid resistance and streptomycin resistance were the only resistances identified among the other 33 *S. Typhi* isolates.

Four *S. Paratyphi B* var Java isolates were multiresistant to ampicillin, chloramphenicol, streptomycin, sulphonamides and tetracycline.

Table 2. Antimicrobial resistance among *Salmonella Typhi* and *S. Paratyphi*, 2004

Antimicrobial	Percent resistance			
	<i>S. Typhi</i> n = 34	<i>S. Paratyphi A</i> n = 9	<i>S. Paratyphi B</i> n = 4	<i>S. Paratyphi B</i> var Java n = 21
Ampicillin	2.9	0	0	23.8
Cephalothin	0	0	0	0
Chloramphenicol	2.9	0	0	19.1
Ciprofloxacin	0	0	0	0
Co-amoxiclav	0	0	0	0
Co-trimoxazole	2.9	0	0	0
Gentamicin	0	0	0	0
Nalidixic acid	23.5	77.8	0	0
Streptomycin	41.2	11.1	0	23.8
Sulphonamides	2.9	0	0	23.8
Tetracycline	2.9	0	0	23.8
Trimethoprim	2.9	0	0	0