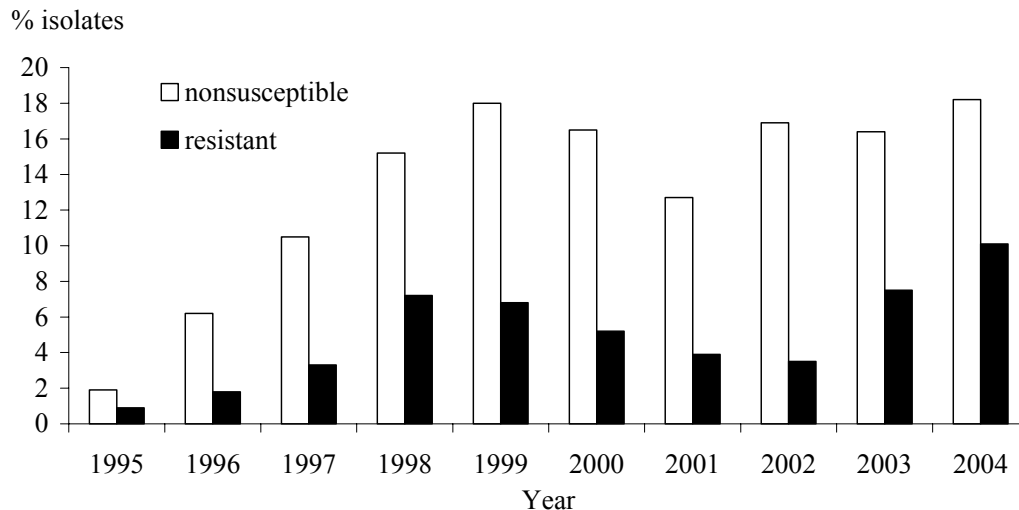


## Antimicrobial susceptibility of invasive *Streptococcus pneumoniae*, 2004

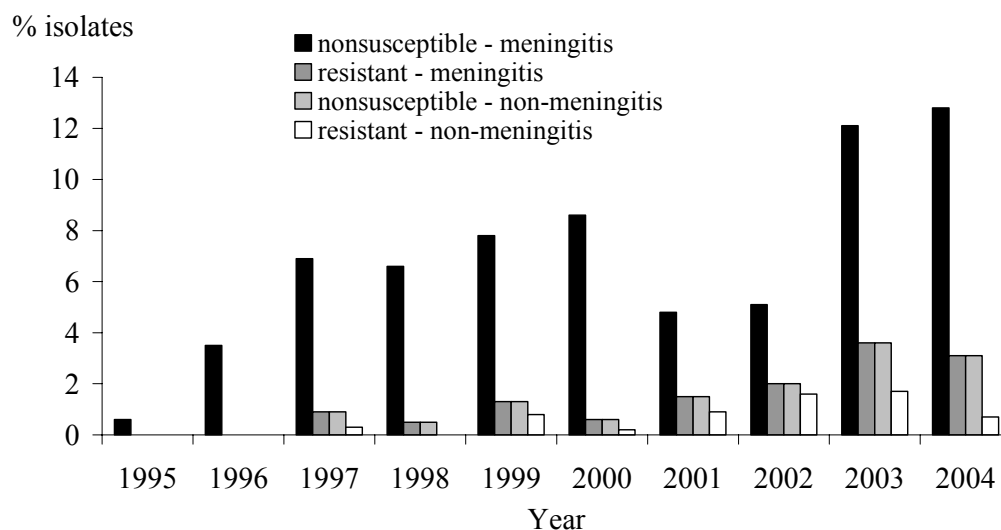
The antimicrobial susceptibility of all 545 viable invasive isolates of *S. pneumoniae* referred to ESR in 2004 was tested. 18.2% (99) were categorised as penicillin nonsusceptible (MIC  $\geq 0.12$  mg/L): 10.1% (55) as resistant (MIC  $\geq 2$  mg/L) and 8.1% (44) as intermediate (MIC 0.12-1 mg/L). Penicillin resistance increased significantly in 2003 and 2004, following four successive years of declining resistance between 1999 and 2002 (Figure 1).

Figure 1. Penicillin resistance and nonsusceptibility among pneumococci from invasive disease, 1995-2004



Applying the CLSI/NCCLS meningitis interpretive standards, 12.8% (70) of the 545 invasive isolates were categorised as cefotaxime nonsusceptible (MIC  $\geq 1$  mg/L): 3.1% (17) as resistant (MIC  $\geq 2$  mg/L) and 9.7% (53) as intermediate (MIC 1 mg/L). Applying the non-meningitis interpretive standards, 3.1% (17) were categorised as cefotaxime nonsusceptible (MIC  $\geq 2$  mg/L): 0.7% (4) as resistant (MIC  $\geq 4$  mg/L) and 2.4% (13) as intermediate (MIC 2 mg/L). Trends in cefotaxime resistance and nonsusceptibility since 1995 are shown in Figure 2, and indicate a trend of increasing resistance to 3rd-generation cephalosporins, although no increase was evident in 2004.

Figure 2. Cefotaxime resistance and nonsusceptibility among pneumococci from invasive disease, 1995-2004



The rates of resistance to other antibiotics among the 545 invasive isolates tested in 2004 included 2.8% chloramphenicol resistance, 38.7% co-trimoxazole resistance, 8.4% erythromycin resistance, and 7.9% tetracycline resistance. All isolates were vancomycin susceptible.

The majority of the penicillin-nonsusceptible isolates belonged to the capsular types usually associated with penicillin resistance (see table below). During the years 2000 to 2003, serotype 19F was the predominant capsular antigen type among penicillin-resistant isolates, while the prevalence of serotype 9V declined after being the prevalent penicillin-resistant serotype until 2000 (Figure 3). However, in 2004, 9V was again the prevalent type among penicillin-resistant and nonsusceptible isolates. Serotype 19F remains the most common type among cefotaxime-resistant isolates. The majority of these cefotaxime-resistant serotype 19F isolates belong to a strain which is multiresistant to penicillin, cefotaxime, co-trimoxazole, erythromycin and tetracycline.

Distribution of capsular types among penicillin-nonsusceptible and cefotaxime-nonsusceptible invasive pneumococcal isolates, 2004

Capsular antigen type	Number (% <sup>1</sup> ) isolates			
	Penicillin		Cefotaxime	
	Nonsusceptible MIC ≥0.12 mg/L	Resistant MIC ≥2 mg/L	Nonsusceptible <sup>2</sup> MIC ≥1 mg/L	Resistant <sup>2</sup> MIC ≥2 mg/L
9V	34 (34.7)	21 (38.2)	25 (35.7)	1 (5.9)
19F	16 (16.3)	14 (25.5)	14 (20.0)	9 (52.9)
14	13 (13.3)	8 (14.6)	12 (17.1)	5 (29.4)
6B	15 (15.3)	6 (10.9)	11 (15.7)	0
23F	8 (8.2)	5 (9.1)	5 (7.1)	1 (5.9)
19A	6 (6.1)	1 (1.8)	1 (1.4)	1 (5.9)
Others	6 <sup>3</sup> (3.1)	0	2 <sup>4</sup> (2.9)	0
Total	98 <sup>5</sup>	55	70	17

<sup>1</sup> Percentage of the nonsusceptible or resistant isolates

<sup>2</sup> Based on meningitis interpretive standards

<sup>3</sup> One serotype 6A, one serogroup 9, one serogroup 15, three non-typable

<sup>4</sup> One serogroup 29 and one non-typable

<sup>5</sup> Only 98 of the 99 penicillin-nonsusceptible isolates were typed

Figure 3. Capsular antigen type distribution among penicillin-resistant pneumococci from invasive disease, 1995-2004

