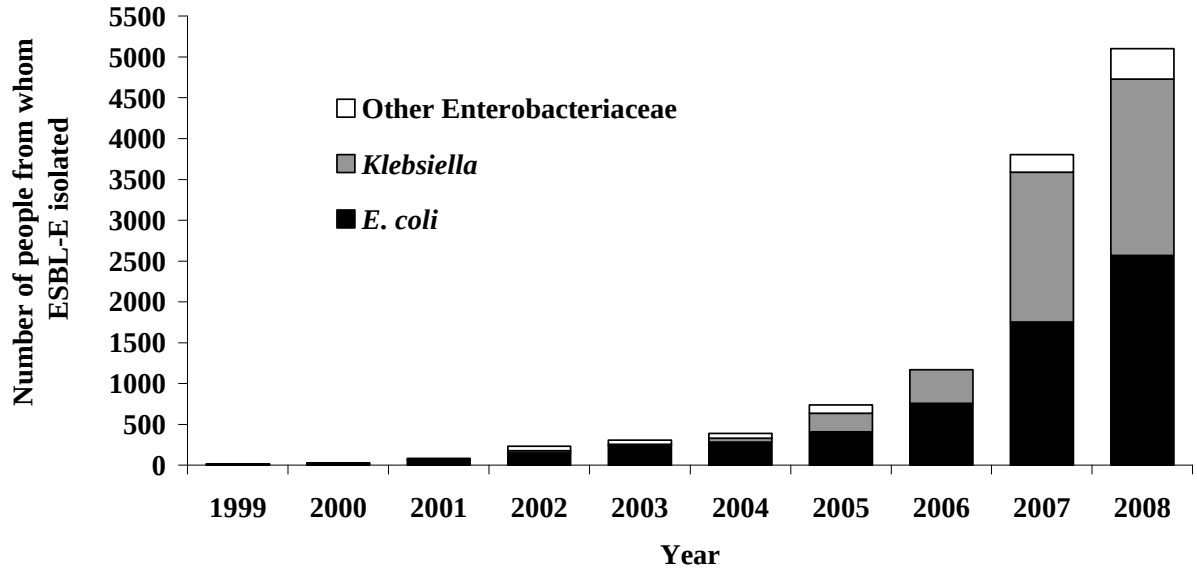
Annual survey of extended-spectrum β-lactamase (ESBL)-producing Enterobacteriaceae, 2008

Up until 2005, national surveillance of ESBL-producing Enterobacteriaceae (ESBL-E) was based on diagnostic laboratories referring all isolates to ESR for confirmation. This continuous surveillance was discontinued in 2005 and replaced with annual surveys.

The 2008 survey was conducted in August 2008. Hospital and community microbiology laboratories throughout New Zealand were asked to refer all ESBL-E isolated during August to ESR. Due to staff shortages, Middlemore Hospital laboratory was unable to refer isolates for the survey. Instead, this laboratory reported the number and species of ESBL-E that they isolated during August. This data has been included when calculating the national and district health board (DHB) incidence rates and the species distribution among ESBL-E. All other analyses (eg, analyses of hospital vs community patients, patient age, and isolations from infected vs colonised sites) included in this report are based only on the ESBL-E isolates referred to ESR for the survey.

During the survey month, 301 ESBL-E isolates were referred. In addition, Middlemore Hospital laboratory reported that they isolated 124 ESBL-E during the month. Duplicate isolates of the same species from the same patient are not included in these counts. This total of 425 ESBL-E equates to an annualised incidence rate of 119.5 people with ESBL-E per 100 000 population; a 32.8% increase on the 2007 rate of 90.0. Figure 1 shows the annual or annualised incidence of ESBL-E over the 10 years 1999 to 2008 and the distribution of ESBLs among *E. coli, Klebsiella* species and other Enterobacteriaceae.

Figure 1. ESBL-producing Enterobacteriaceae, 1999-2008



Data for 1999 to 2005 are based on continuous surveillance of all ESBL-E isolations. Data for 2006 to 2008 are annualised and based on 4-week or 1-month surveys conducted in these years. The 2006 survey only included urinary *E. coli* and *Klebsiella*, therefore the data for 2006 is not directly comparable with that for other years.

The 425 ESBL-E isolates referred or reported in 2008 comprised 214 (50.4%) *Escherichia coli,* 180 (42.4%) *Klebsiella* species, 19 (4.5%) *Enterobacter* species, 7 (1.6%) *Citrobacter* species, 3 (0.7%) *Morganella morganii*, 1 (0.2%) *Raoultella terrigena* and 1 (0.2%) *Serratia fonticola*. Twenty-one patients had two different ESBL-producing species and one patient had three different species.

The patients from whom ESBL-E were isolated were categorized as hospital patients if they were in a healthcare facility (including emergency department, outpatient clinic or residential-care facility) when ESBL-E was isolated or had been in a healthcare facility in the previous 3 months. All other patients were categorized as community patients. The majority of the ESBL-E (67.1%, 202 of 301) were isolated from patients categorized as hospital patients. A much larger proportion of the ESBL-producing *Klebsiella* than *E. coli* were from patients categorized as hospital patients (85.9 vs 51.2%). These proportions of hospital patients are likely to be underestimates due to the ESBL-E reported by Middlemore Hospital laboratory not being included in this analysis. These ESBL-E could not be included as information on whether they were isolated from hospital or community patients was not available, but the majority are likely to have been from hospital patients.

Table 1. Comparison of ESBL-producing Enterobacteriaceae from infected and colonised sites, 2008[1]

	Number (row %)	
	ESBL-E from infected sites n=131	**ESBL-E from colonised sites n=136**
Species		
E. coli	90 (60.0)	60 (40.0)
Klebsiella species	35 (37.2)	59 (62.8)
other species	6 (26.1)	17 (73.9)
Isolated from:		
hospital patients[2]	66 (35.9)	118 (64.1)
community patients[2]	65 (78.3)	18 (21.7)
Isolation site		
blood	3 (100)	0
faeces	0	117 (100)
urine	107 (86.3)	17 (13.7)
wound	12 (85.7)	2 (14.3)
other	9 (100)	0

1 The 124 ESBL-E reported by Middlemore Hospital laboratory are not included, as information on whether the ESBL-E were from infected or colonised sites was not available for these ESBL-E. In addition, among the 301 ESBL-E referred for the survey, information on whether the ESBL-E was isolated from an infected or colonised site was only reported for 267 isolates. The remaining 34 isolates are not included in this analysis.

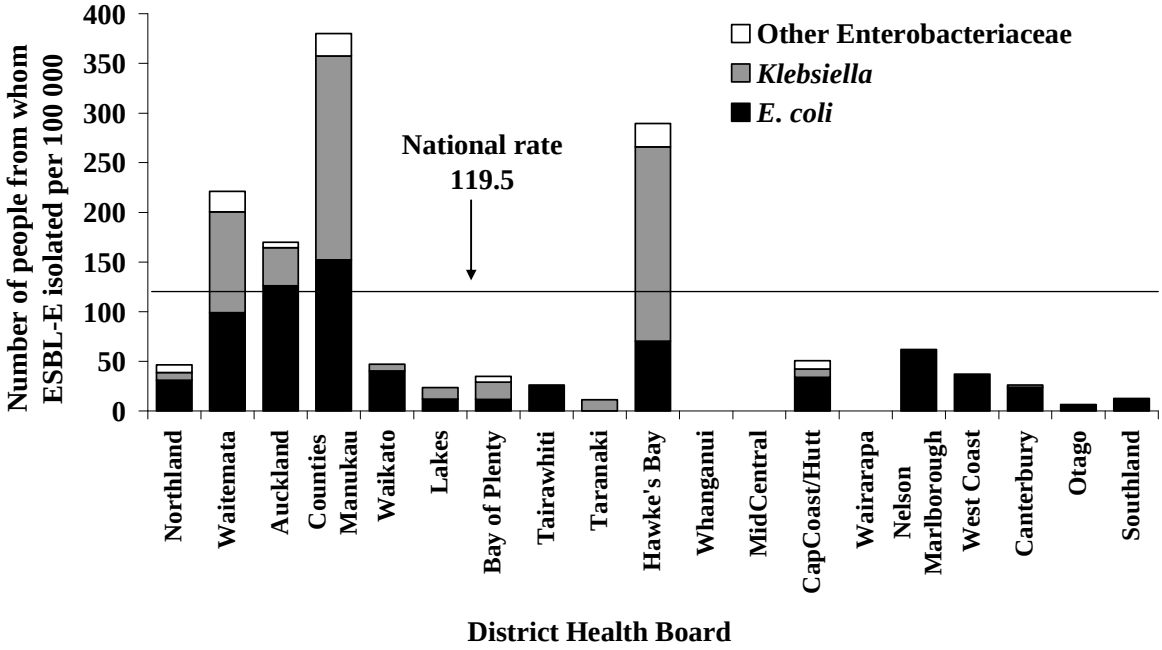
2 Patients were categorized as hospital patients if they were in a healthcare facility (including emergency department, outpatient clinic or residential-care facility) when ESBL-E was isolated or had been in a healthcare facility in the previous 3 months. All other patients were categorized as community patients.

The age distribution among the patients with ESBL-E was: 7.6% were ≤15 years old, 38.9% were 15-64 years and 53.5% were ≥65 years. ESBL-producing *Klebsiella* were more likely to be isolated from older patients than *E. coli*, with 64.2% of *Klebsiella* isolated from patients ≥65 years of age compared to 47.1% of *E. coli*.

Information on whether the ESBL-E was causing infection or colonizing was reported for 267 (88.7%) of the ESBL-E isolates referred for the survey, of which 131 (49.1%) were from infections. Table 1 compares the distribution of species, hospital and community patients and isolation sites for ESBL-E from infected sites with those from colonised sites. While the majority of the *E. coli* were from infected sites, the reverse was the case for *Klebsiella*. This most likely reflects the screening that occurs in hospitals, as part of measures to control the transmission of these organisms, and the fact that ESBL-producing *Klebsiella* are more likely than *E. coli* to be associated with hospital patients.

Figure 2 shows the incidence of ESBL-E in each district health board (DHB) area. The highest annualised incidence rates, and rates above the national rate of 119.5 per 100 000, occurred in the Counties Manukau (380.2 per 100 000), Hawke's Bay (289.6), Waitemata (221.2) and Auckland (169.8) DHBs. Nine of the ESBL-E were from overseas patients and they are not included in the DHB analyses.

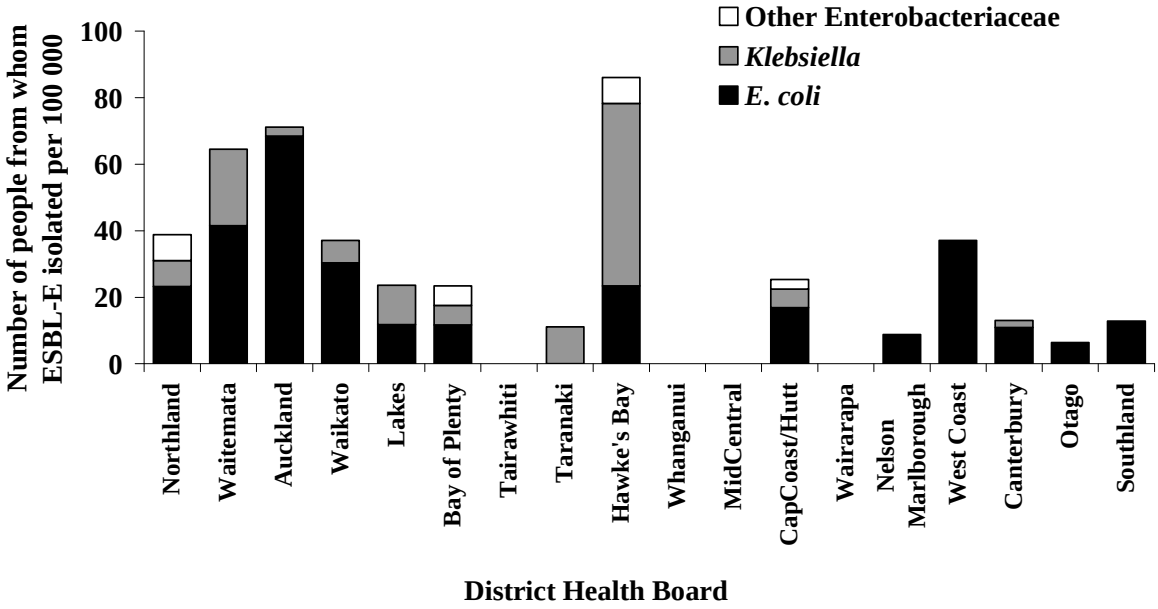
Figure 2. Annualised incidence of ESBL-producing Enterobacteriaceae by DHB, 2008



Data for the Capital and Coast and Hutt DHBs are combined, and data for the Canterbury and South Canterbury DHBs are combined.

As the DHB incidence rates can be skewed by different rates of screening undertaken in different DHB areas, Figure 3 presents annualised DHB incidence rates based only on ESBL-E that were from infections. Counties Manukau DHB was excluded from this analysis as the ESBL-E reported by Middlemore Hospital laboratory were not categorized according to whether they were from an infected or colonised site.

Figure 3. Annualised incidence of ESBL-producing Enterobacteriaceae infections by DHB, 2008



Data for the Capital and Coast and Hutt DHBs are combined, and data for the Canterbury and South Canterbury DHBs are combined. Counties Manukau DHB is not included as information on whether the ESBL-E reported by Middlemore Hospital laboratory were from infected or colonised sites was not available.

The specific ESBL types, clonality and antimicrobial susceptibility of the ESBL-E referred for the 2008 survey was not investigated. The ESBL types and clonality among ESBL-producing *E. coli* and *Klebsiella* was fully investigated and reported in the report on the 2006 survey (see http://www.surv.esr.cri.nz/PDF_surveillance/Antimicrobial/ESBLIdentification_2006.pdf). The ESBL types and clonality among ESBL-E other than *E. coli* and *Klebsiella*, and the antimicrobial susceptibility of all ESBL-E, was investigated and reported in the report on the 2007 survey (see http://www.surv.esr.cri.nz/PDF_surveillance/Antimicrobial/ESBL/ESBL_2007.pdf).