

Meningococcal Disease Report:
June 2009

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By

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1. INTRODUCTION

New Zealand's epidemic of serogroup B meningococcal disease began in mid-1991. In mid-2002 vaccine trials aimed at measuring immunogenicity and the safety of a 'tailor made' vaccine (MeNZB™) targeting New Zealand's epidemic 'strain' were started. In July 2004, provisional licensure was granted for the progressive rollout of MeNZB™ from 6 months to 19 years of age inclusive. The programme commenced in Counties Manukau DHB on 19 July 2004, and was progressively rolled out nationwide during 2005. Administration of the vaccine continues for those requiring completion of their doses.

This report aims to provide timely data on the epidemiology of meningococcal disease against which the effectiveness of the vaccine campaign can be assessed by comparing trends for 2009 against 2005/2006 average and 2007/2008 average for the same period. The initial report (July 2004) compared trends for January to June. Subsequent reports contain monthly updates.

2. METHODS

2.1. Surveillance Methods

Surveillance of meningococcal disease in New Zealand is based on a combination of notification and laboratory data. Meningococcal disease is notifiable to Medical Officers of Health under the Health Act 1956. Data on each case are recorded onto a computerised database (EpiSurv), which is installed in all Public Health Services (PHSs). These data are sent to ESR each week and collated on behalf of the Ministry of Health. Both patient specimens and meningococci or meningococcal DNA obtained from cases of disease are referred to the Meningococcus Reference Laboratory at ESR for confirmation of disease and for characterisation of the invading strain. Additionally, results from any diagnostic testing undertaken in clinical laboratories are actively sought for all notified cases. This information combined with group, PorB type (serotype) and PorA type (subtype), determined at ESR on isolates and identity of meningococcal DNA from patient specimens, are entered into a laboratory database and merged with the EpiSurv database to provide a more complete picture of the disease epidemiology.

Notification and laboratory data are based on information recorded as at 6 July 2009. Any changes made to either database after this date will not be reflected in this report. Excel 2003 was used to analyse the combined dataset. Rates expressed in this report are cumulative (as opposed to annualised). Hence in the initial report, rates were six-monthly, but in subsequent reports (updated monthly), they will be seven-monthly, eight-monthly etc. Therefore direct rate comparisons between the updated reports should not be made. Rates were calculated using 2006 population census data as the denominator for 2005/2006, 2007/2008 and 2009. The 2005/2006 and 2007/2008 results are averaged, rounded to one decimal place. Ethnicity was determined using the prioritised approach. Note: This report uses the 2006 census data which has impacted on ethnicity rates.

Earliest date (earliest of report date, onset date, hospitalisation date, date of death and laboratory dates) was used in this report to determine date of case.

Note: The numbers for 2009 are provisional and subject to change. The occurrence of late notifications and denotifications mean that the total for the year may change.

Case Definition

The case definition in the Ministry of Health's Communicable Disease Control Manual[1] is 'meningococcal disease presents as meningitis or meningococcal Septicaemia. The disease presents as an acute fever, nausea, vomiting, and headache, that may progress rapidly to shock and death. Petechial rash is seen in about 50 percent'. Cases with a clinically compatible illness are classified as confirmed or probable as follows:

Confirmed case: A clinically compatible illness with at least one of the following:

- isolation of *Neisseria meningitidis* from an otherwise sterile body site (blood, CSF, aspirate or skin biopsy); or
- a positive nucleic acid test (NAT) using polymerase chain reaction (PCR) on CSF, blood, serum, or aspirate; or
- detection of Gram-negative intracellular diplococci in CSF, aspirate or skin biopsy; or
- positive meningococcal antigen test on CSF.

Probable case:

- a clinically compatible illness and isolation of *N. meningitidis* from the throat; or
- a clinically compatible illness.

2.2. Laboratory Methods

All meningococci isolated and patient samples (blood and CSF) or DNA recovered from notified cases of meningococcal disease are referred from diagnostic laboratories in New Zealand to the Meningococcus Reference Laboratory (MRL) at ESR. The MRL then undertakes confirmation of the presence of a meningococcus or meningococcal DNA and characterisation to determine the strain type. This includes identification of the capsule group, PorB and PorA types.

Strain typing: The capsular group is identified either by the slide agglutination technique using commercial antisera specific for serogroups A, B, C, X, Y, Z, W135 and 29E or by PCR testing[2]. The PorB outer membrane protein (OMP) type, and the PorA OMP type are determined on isolates using the whole cell ELISA method of serotyping[3] or by PCR followed by sequence analysis[4]. For whole cell analysis the following Monoclonal antibodies (RIVM, The Netherlands, NIBSC, England) are used for detecting PorB antigens 1, 2a, 2b, 4, 14 and 15; and for PorA: P1.1, P1.2, P1.4, P1.5, P1.6, P1.7, P1.9, P1.10, P1.12, P1.13, P1.14, P1.15 and P1.16. Note the sequencing of the *porB* gene is not routinely undertaken.

The strain type is defined as, for example for the epidemic strain, B:4:P1.7-2,4 where B is the group, 4 is the PorB type and P1.7-2,4 defines the PorA type. Note the PorA type has two epitopes known as variable regions, which are identified. The 7-2 indicates there is a specific deletion in the VR1 epitope, otherwise defined as P1.7. Monoclonal antibodies do not recognise epitopes with deletions in the variable regions and hence would define this strain as B:4:P1.4.

Multi-locus sequence typing[5] is used to further characterise isolates of interest and when needed restriction fragment length polymorphism (RFLP) analysis of isolates[6] is carried out for the purpose of defining clusters.

B other are isolates that are group B but have PorA types that are distinguished from the epidemic type by serotyping/genotyping.

3. RESULTS

Meningococcal disease figures for January to June 2009 are 44 notified cases with one death reported. The average figures for the same time period in 2007/2008 are 41.5 notified cases and 4.0 deaths, the average for 2005/2006 being 90.5 notified cases and 4.5 deaths.

Meningococcal disease figures for the sixth month of 2009, and the average for the same time period in 2007/2008 and in 2005/2006 are presented below in graph and table format. As rates have been calculated even when the numerators are small, care should be taken when interpreting, most noticeably with the cumulative rate for some DHBs and the case fatality rates.

Figure 1: Meningococcal disease cases by month, 2005/2006 (average), 2007/2008 (average) and January-June 2009

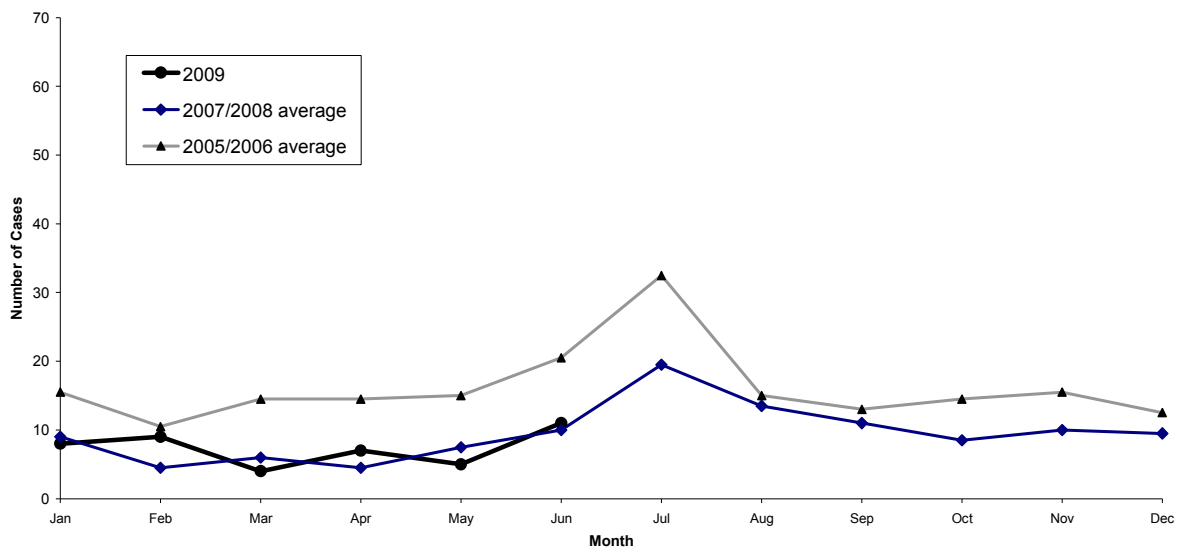


Table 1. Geographic distribution by District Health Board of total and confirmed cases of meningococcal disease and proportion of confirmed to total cases, January-June 2005/2006 (average), 2007/2008 (average) and 2009

District Health Board	Jan-Jun 2005/2006 average				Jan-Jun 2007/2008 average				Jan-Jun 2009			
	No. Total ¹	Rate ²	No. Conf ¹	% ³	No. Total ¹	Rate ²	No. Conf ¹	% ³	No. Total	Rate ²	No. Conf	% ³
Northland	3.0	2.0	2.0	66.7	2.5	1.7	2.0	80.0	2	1.3	2	100
Waitemata	7.5	1.6	5.0	66.7	3.5	0.7	3.0	85.7	2	0.4	2	100
Auckland	6.0	1.5	5.5	91.7	4.5	1.1	4.5	100	3	0.7	3	100
Counties Manukau	11.0	2.5	11.0	100	6.0	1.4	5.5	91.7	9	2.1	9	100
Waikato	14.0	4.1	13.0	92.9	3.5	1.0	3.5	100	2	0.6	2	100
Lakes	2.0	2.0	1.0	50.0	0.0	0.0	0.0	-	5	5.1	5	100
Bay of Plenty	4.0	2.1	2.5	62.5	0.0	0.0	0.0	-	2	1.0	2	100
Tairāwhiti	1.0	2.2	1.0	100	1.5	3.4	0.5	33.3	1	2.2	1	100
Taranaki	2.5	2.4	2.5	100	2.0	1.9	2.0	100	1	1.0	1	100
Hawke's Bay	5.0	3.4	3.5	70.0	4.0	2.7	3.5	87.5	2	1.3	1	50.0
Whanganui	0.0	0.0	0.0	-	0.5	0.8	0.5	100	0	0.0	0	-
MidCentral	6.0	3.8	6.0	100	0.0	0.0	0.0	-	1	0.6	1	100
Hutt	1.0	0.7	1.0	100	2.5	1.8	2.5	100	1	0.7	0	0.0
Capital and Coast	6.0	2.3	5.0	83.3	3.5	1.3	3.5	100	6	2.3	5	83.3
Wairarapa	2.0	5.2	1.0	50.0	0.0	0.0	0.0	-	0	0.0	0	-
Nelson Marlborough	2.5	1.9	2.0	80.0	1.0	0.8	1.0	100	0	0.0	0	-
West Coast	0.5	1.6	0.5	100	0.0	0.0	0.0	-	0	0.0	0	-
Canterbury	10.0	2.1	8.5	85.0	4.0	0.9	3.0	75.0	3	0.6	1	33.3
South Canterbury	0.0	0.0	0.0	-	0.5	0.9	0.5	100	0	0.0	0	-
Otago	5.0	2.8	5.0	100	0.0	0.0	0.0	-	2	1.1	2	100
Southland	1.5	1.4	1.5	100	2.0	1.9	2.0	100	2	1.9	1	50.0
New Zealand total	90.5	2.2	77.5	85.6	41.5	1.0	37.5	90.4	44	1.1	38	86.4

1 Average, rounded to one decimal place.

2 Rate per 100 000 population based on 2006 census data.

3 Proportion (%) of total cases who were confirmed.

Table 2. Age distribution of total and confirmed cases of meningococcal disease and proportion of confirmed to total cases, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Age Group	Jan-Jun 2005/2006 average				Jan-Jun 2007/2008 average				Jan-Jun 2009			
	No. Total ¹	Rate ²	No. Conf ¹	% ³	No. Total ¹	Rate ²	No. Conf ¹	% ³	No. Total	Rate ²	No. Conf	% ³
<1	10.0	17.7	8.5	85.0	6.5	11.5	6.0	92.3	11	19.4	10	90.9
1-4	17.0	7.8	15.0	88.2	12.5	5.7	11.0	88.0	10	4.6	9	90.0
5-9	6.5	2.3	4.0	61.5	5.5	1.9	4.5	81.8	4	1.4	4	100
10-14	14.0	4.6	11.0	78.6	2.5	0.8	2.5	100	3	1.0	3	100
15-19	17.0	5.7	16.5	97.1	3.5	1.2	3.5	100	6	2.0	4	66.7
20-29	9.5	1.9	9.0	94.7	3.5	0.7	3.5	100	4	0.8	4	100
30-39	3.5	0.6	2.0	57.1	1.5	0.3	1.0	66.7	1	0.2	1	100
40+	13.0	0.7	11.5	88.5	6.0	0.3	5.5	91.7	5	0.3	3	60.0
Total	90.5	2.2	77.5	85.6	41.5	1.0	37.5	90.4	44	1.1	38	86.4

1 Average, rounded to one decimal place.

2 Rate per 100 000 population based on 2006 census data.

3 Proportion (%) of total cases who were confirmed.

Table 3. Meningococcal disease cases less than two years of age, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Age (months)	Jan-Jun 2005/2006 average				Jan-Jun 2007/2008 average				Jan-Jun 2009			
	Total cases		Confirmed cases		Total cases		Confirmed cases		Total cases		Confirmed cases	
	No. ¹	Cum % ² (n=90.5)	No. ¹	Cum % ² (n=77.5)	No. ¹	Cum % ² (n=41.5)	No. ¹	Cum % ² (n=37.5)	No.	Cum % ² (n=44)	No.	Cum % ² (n=38)
<1	0.5	0.6	0.5	0.6	0.0	0.0	0.0	0.0	1	2.3	1	2.6
1	1.5	2.2	1.5	2.6	1.0	2.4	1.0	2.7	1	4.5	1	5.3
2	1.5	3.9	0.5	3.2	1.0	4.8	1.0	5.3	1	6.8	1	7.9
3	1.0	5.0	0.5	3.9	0.5	6.0	0.5	6.7	2	11.4	2	13.2
4	0.5	5.5	0.5	4.5	0.0	6.0	0.0	6.7	1	13.6	1	15.8
5	0.5	6.1	0.5	5.2	1.5	9.6	1.5	10.7	1	15.9	1	18.4
6	0.5	6.6	0.5	5.8	0.0	9.6	0.0	10.7	0	15.9	0	18.4
7	1.0	7.7	1.0	7.1	1.5	13.3	1.0	13.3	2	20.5	1	21.1
8	0.5	8.3	0.5	7.7	0.0	13.3	0.0	13.3	0	20.5	0	21.1
9	0.5	8.8	0.5	8.4	0.5	14.5	0.5	14.7	1	22.7	1	23.7
10	1.0	9.9	1.0	9.7	0.5	15.7	0.5	16.0	0	22.7	0	23.7
11	1.0	11.0	1.0	11.0	0.0	15.7	0.0	16.0	1	25.0	1	26.3
12	1.0	12.2	0.5	11.6	0.5	16.9	0.5	17.3	0	25.0	0	26.3
13	0.5	12.7	0.5	12.3	1.0	19.3	0.5	18.7	1	27.3	1	28.9
14	1.5	14.4	1.5	14.2	0.5	20.5	0.5	20.0	1	29.5	1	31.6
15	0.5	14.9	0.5	14.8	1.5	24.1	1.5	24.0	0	29.5	0	31.6
16	1.0	16.0	1.0	16.1	1.0	26.5	1.0	26.7	0	29.5	0	31.6
17	0.0	16.0	0.0	16.1	0.5	27.7	0.5	28.0	0	29.5	0	31.6
18	0.5	16.6	0.5	16.8	1.0	30.1	0.5	29.3	0	29.5	0	31.6
19	0.0	16.6	0.0	16.8	0.0	30.1	0.0	29.3	0	29.5	0	31.6
20	0.0	16.6	0.0	16.8	0.5	31.3	0.5	30.7	0	29.5	0	31.6
21	0.5	17.1	0.5	17.4	0.5	32.5	0.5	32.0	0	29.5	0	31.6
22	0.5	17.7	0.5	18.1	0.0	32.5	0.0	32.0	0	29.5	0	31.6
23	0.0	17.7	0.0	18.1	0.0	32.5	0.0	32.0	0	29.5	0	31.6
Total	16.0		14.0		13.5		12.0		13		12	

1 Average, rounded to one decimal place.

2 Cumulative percentage of cases in all age groups.

Table 4. Meningococcal disease cases by District Health Board and age group, January-June 2005/2006 (average), 2007/2008 (average), 2007/2008 (average) and 2009

District Health Board	Jan-Jun 2005/2006 average										Jan-Jun 2007/2008 average										Jan-Jun 2009					
	<1	1-4	5-9	10-14	15-19	20-29	30+	Total	<1	1-4	5-9	10-14	15-19	20-29	30+	Total	<1	1-4	5-9	10-14	15-19	20-29	30+	Total		
Northland	0.5	2.0	0.0	0.5	0.0	0.0	0.0	3.0	0.5	0.5	0.0	0.5	0.0	0.0	1.0	2.5	1	0	0	0	1	0	0	2		
Waitemata	2.0	1.0	0.5	0.5	1.5	1.0	1.0	7.5	0.0	1.5	0.5	0.5	0.5	0.0	0.5	3.5	0	0	0	0	1	0	1	2		
Auckland	0.5	1.5	0.0	0.5	1.5	0.5	1.5	6.0	0.5	1.0	1.0	0.5	0.0	1.0	0.5	4.5	0	0	0	1	0	1	1	3		
Counties Manukau	1.5	1.5	1.5	1.5	2.5	1.5	1.0	11.0	1.5	2.5	1.5	0.0	0.0	0.0	0.5	6.0	4	3	1	1	0	0	0	9		
Waikato	2.0	1.5	0.5	2.0	3.0	2.0	3.0	14.0	1.5	1.5	0.5	0.0	0.0	0.0	0.0	3.5	1	0	0	0	0	0	1	2		
Lakes	0.5	0.5	0.0	1.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	2	2	0	1	0	0	5		
Bay of Plenty	0.0	1.5	0.5	0.0	0.0	0.0	2.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1	0	0	1	0	0	2		
Tairāwhiti	0.0	0.5	0.0	0.0	0.0	0.5	0.0	1.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	1.5	0	1	0	0	0	0	0	1		
Taranaki	0.5	0.5	0.0	1.0	0.5	0.0	0.0	2.5	0.5	0.5	0.0	0.0	0.5	0.5	0.0	2.0	1	0	0	0	0	0	0	1		
Hawke's Bay	0.0	1.5	1.0	1.5	0.0	0.5	0.5	5.0	0.0	1.5	0.5	0.5	0.5	0.0	1.0	4.0	0	1	0	0	1	0	0	2		
Whanganui	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0	0	0	0	0	0	0	0		
MidCentral	1.0	0.5	0.5	1.5	1.5	0.5	0.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	1	0	0	0	0	1		
Hutt	0.0	0.0	0.0	0.5	0.0	0.0	0.5	1.0	0.5	0.0	0.0	0.5	0.0	0.0	1.5	2.5	1	0	0	0	0	0	0	1		
Capital and Coast	0.0	1.0	1.0	1.0	1.0	0.0	2.0	6.0	0.5	0.5	0.0	0.0	1.0	0.5	1.0	3.5	2	0	0	0	0	2	2	6		
Wairarapa	0.0	0.0	0.0	1.0	1.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0		
Nelson																										
Marlborough	0.0	0.5	0.0	0.0	0.0	1.0	1.0	2.5	0.0	0.5	0.5	0.0	0.0	0.0	0.0	1.0	0	0	0	0	0	0	0	0		
West Coast	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0		
Canterbury	0.5	3.0	1.0	0.5	1.5	1.5	2.0	10.0	0.0	1.0	0.5	0.0	0.5	1.5	0.5	4.0	1	1	0	0	0	0	1	3		
South Canterbury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0	0	0	0	0	0	0	0		
Otago	1.0	0.0	0.0	0.5	2.0	0.5	1.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1	0	1	0	0	0	2		
Southland	0.0	0.0	0.0	0.5	0.5	0.0	0.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	1.0	2.0	0	0	0	0	1	1	0	2		
NZ Total	10.0	17.0	6.5	14.0	17.0	9.5	16.5	90.5	6.5	12.5	5.5	2.5	3.5	3.5	7.5	41.5	11	10	4	3	6	4	6	44		

1 Average, rounded to one decimal place.

Table 5. Numbers and age-standardised incidence rates by ethnicity for cases of meningococcal disease and proportion of confirmed to total cases, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Ethnicity	Jan-Jun 2005/2006 average				Jan-Jun 2007/2008 average				Jan-Jun 2009			
	No. Total ¹	Cum Rate ²	No. Conf ¹	% ³	No. Total ¹	Cum Rate ²	No. Conf ¹	% ³	No. Total	Cum Rate ²	No. Conf	% ³
European	50.5	2.1	41.0	81.2	18.5	0.8	17.5	94.6	18	0.8	13	72.2
Maori ⁴	21.0	2.5	19.5	92.9	11.5	1.4	10.0	87.0	11	1.1	10	90.9
Pacific ⁵	15.0	4.9	13.0	86.7	8.0	2.6	6.5	81.3	10	3.3	10	100
Other	2.5	0.6	2.5	100	3.0	0.8	3.0	100	1	0.4	1	100
Unknown	1.5		1.5	100	0.5		0.5	100	4		4	100
Total	90.5	2.4	77.5	85.6	41.5	1.0	37.5	90.4	44	1.1	38	86.4

1 Average, rounded to one decimal place.

2 Cumulative rate per 100 000 direct standardised to age distribution of the total NZ population (based on 2006 census data).

3 Proportion (%) of total cases who were confirmed.

4 Rate is calculated using mixed Maori ethnicity.

5 Rate is calculated using mixed Pacific ethnicity (excluding Maori).

Table 6. Meningococcal disease cases by strain type, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Strain Type	Jan-Jun 2005/2006 average		Jan-Jun 2007/2008 average		Jan-Jun 2009	
	No. ¹	% ²	No. ¹	% ²	No.	% ²
Epidemic Strain	48.5	64.2	17.0	49.3	20	57.1
B Other	12.0	15.9	13.5	39.1	11	31.4
C	10.5	13.9	0.5	1.4	3	8.6
W, Y, Z	4.5	6.0	3.5	10.1	1	2.9
Total with determined strain	75.5	100	34.5	100	35	100
Confirmed but awaiting strain result	0.5		1.0		2	
DNA positive, type not determined	1.5		2.0		1	
Probable	13.0		4.0		6	
Total with undetermined strain	15.0		7.0		9	
Grand total	90.5		41.5		44	

1 Average, rounded to one decimal place.

2 Proportion (%) of cases where a strain has been determined.

Table 7. Meningococcal disease cases by strain type, July-June: 2007, 2008 and 2009

Strain Type	Jul 06-Jun 07		Jul 07-Jun 08		Jul 08-Jun 09	
	No.	Rate ¹	No.	Rate ¹	No.	Rate ¹
Epidemic Strain	63	1.6	43	1.1	49	1.2
B Other	28	0.7	34	0.8	30	0.7
C	16	0.4	10	0.2	11	0.3
W, Y, Z	8	0.2	7	0.2	9	0.2
Total with defined strain	115	2.9	94	2.3	99	2.5
Total confirmed with strain undetermined	10	0.2	8	0.2	8	0.2
Grand total	125	3.1	102	2.5	107	2.7

¹ Cumulative rate per 100 000 based on 2006 census data.

Table 8. Epidemic strain meningococcal disease by region, July-June: 2007, 2008 and 2009

Region	Jul 06-Jun 07		Jun 07-June 08		Jul 08-Jun 09	
	No.	Rate ¹	No.	Rate ¹	No.	Rate ¹
Northern	35	2.4	11	0.7	15	1.0
Midland	12	1.5	11	1.4	13	1.7
Central	6	0.7	13	1.6	15	1.9
Southern	10	1.0	8	0.8	6	0.6
Grand total	63	1.6	43	1.1	49	1.2

¹ Cumulative rate per 100 000 based on 2006 census data.

Table 9. Epidemic strain meningococcal disease by age group, July-June: 2007, 2008 and 2009

Age group (years)	Jul 06-Jun 07		Jul 07-Jun 08		Jul 08-Jun 09	
	No.	Rate ¹	No.	Rate ¹	No.	Rate ¹
0-4	30	10.9	22	8.0	25	9.1
5-19	14	1.6	13	1.5	11	1.2
20+	19	0.7	8	0.3	13	0.5
Grand total	63	1.6	43	1.1	49	1.2

¹ Cumulative rate per 100 000 based on 2006 census data.

Table 10. Epidemic strain meningococcal disease by ethnicity, July-June: 2007, 2008 and 2009

Ethnicity	Jul 06-Jun 07		Jul 07-Jun 08		Jul 08-Jun 09	
	No.	Rate ¹	No.	Rate ¹	No.	Rate ¹
European	26	1.1	14	0.6	15	0.6
Maori ²	25	2.9	17	2.1	19	2.1
Pacific Peoples ³	11	4.2	6	1.6	11	4.1
Other	1	0.2	4	1.0	1	0.4
Unknown	0		2		3	
Grand total	63	1.6	43	1.1	49	1.2

¹ Cumulative rate per 100 000 direct standardised to age distribution of the total NZ population (based on 2006 census data).

² Rate is calculated using mixed Maori ethnicity.

³ Rate is calculated using mixed Pacific people ethnicity (excluding Maori).

Table 11. Meningococcal disease cases by District Health Board and strain type, January-June 2005/2006 (average), 2007/2008 (average) and 2009

District Health Board	Jan-Jun 2005/2006 average						Jan-Jun 2007/2008 average						Jan-Jun 2009					
	Epidemic Strain		Group C		Other ¹		Epidemic Strain		Group C		Other ¹		Epidemic Strain		Group C		Other ¹	
	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³
Northland	1.0	50.0	0.0	0.0	1.0	50.0	1.5	75.0	0.0	0.0	0.5	25.0	1	50.0	0	0.0	1	50.0
Waitemata	4.5	90.0	0.0	0.0	0.5	10.0	1.0	33.3	0.0	0.0	2.0	66.7	1	50.0	0	0.0	1	50.0
Auckland	3.5	63.6	0.5	9.1	1.5	27.3	1.5	33.3	0.5	11.1	2.5	55.6	2	100	0	0.0	0	0.0
Counties Manukau	5.0	47.6	2.0	19.0	3.5	33.3	3.5	63.6	0.0	0.0	2.0	36.4	2	25.0	2	25.0	4	50.0
Waikato	9.0	69.2	2.0	15.4	2.0	15.4	2.0	57.1	0.0	0.0	1.5	42.9	0	0.0	0	0.0	2	100
Lakes	1.0	100	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	5	100	0	0.0	0	0.0
Bay of Plenty	1.5	60.0	1.0	40.0	0.0	0.0	0.0	-	0.0	-	0.0	-	2	100	0	0.0	0	0.0
Tairāwhiti	1.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	100	1	100	0	0.0	0	0.0
Taranaki	1.5	60.0	0.5	20.0	0.5	20.0	1.0	50.0	0.0	0.0	1.0	50.0	1	100	0	0.0	0	0.0
Hawke's Bay	2.5	71.4	0.5	14.3	0.5	14.3	2.0	66.7	0.0	0.0	1.0	33.3	0	0.0	0	0.0	1	100
Whanganui	0.0	-	0.0	-	0.0	-	0.0	0.0	0.0	0.0	0.5	100	0	-	0	-	0	-
MidCentral	4.0	72.7	1.0	18.2	0.5	9.1	0.0	-	0.0	-	0.0	-	0	0.0	0	0.0	1	100
Hutt	0.5	50.0	0.0	0.0	0.5	50.0	1.0	40.0	0.0	0.0	1.5	60.0	0	-	0	-	0	-
Capital and Coast	2.0	44.4	0.5	11.1	2.0	44.4	1.0	40.0	0.0	0.0	1.5	60.0	4	80.0	0	0.0	1	20.0
Wairarapa	1.0	100	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0	-	0	-	0	-
Nelson																		
Marlborough	1.5	75.0	0.0	0.0	0.5	25.0	0.0	0.0	0.0	0.0	1.0	100	0	-	0	-	0	-
West Coast	0.5	100	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0	-	0	-	0	-
Canterbury	5.0	62.5	1.0	12.5	2.0	25.0	1.5	60.0	0.0	0.0	1.0	40.0	0	0.0	1	100	0	0.0
South Canterbury	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0	-	0	-	0	-
Otago	2.5	50.0	1.0	20.0	1.5	30.0	0.0	-	0.0	-	0.0	-	1	100	0	0.0	0	0.0
Southland	1.0	66.7	0.5	33.3	0.0	0.0	1.0	66.7	0.0	0.0	0.5	33.3	0	0.0	0	0.0	1	100
New Zealand total	48.5	64.2	10.5	13.9	16.5	21.9	17.0	49.3	0.5	1.4	17.0	49.3	20	57.1	3	8.6	12	34.3

1 Other includes: non epidemic group B, W, Y, Z.

2 Average, rounded to one decimal place.

3 Proportion (%) of cases where a strain type has been determined for each DHB.

Table 12. Meningococcal disease cases by age group and strain type, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Age Group	Jan-Jun 2005/2006 average						Jan-Jun 2007/2008 average						Jan-Jun 2009					
	Epidemic Strain		Group C		Other ¹		Epidemic Strain		Group C		Other ¹		Epidemic Strain		Group C		Other ¹	
	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³	No. ²	% ³
<1	3.0	35.3	1.0	11.8	4.5	52.9	3.5	58.3	0.0	0.0	2.5	41.7	5	50.0	1	10.0	4	40.0
1-4	10.5	70.0	1.0	6.7	3.5	23.3	6.0	57.1	0.5	4.8	4.0	38.1	5	62.5	1	12.5	2	25.0
5-9	2.5	62.5	0.5	12.5	1.0	25.0	1.0	22.2	0.0	0.0	3.5	77.8	3	75.0	0	0.0	1	25.0
10-14	7.0	66.7	2.5	23.8	1.0	9.5	1.5	60.0	0.0	0.0	1.0	40.0	1	50.0	1	50.0	0	0.0
15-19	10.0	66.7	2.0	13.3	3.0	20.0	0.5	20.0	0.0	0.0	2.0	80.0	2	50.0	0	0.0	2	50.0
20-29	7.0	77.8	1.5	16.7	0.5	5.6	2.5	83.3	0.0	0.0	0.5	16.7	1	33.3	0	0.0	2	66.7
30-39	1.5	75.0	0.0	0.0	0.5	25.0	1.0	100	0.0	0.0	0.0	0.0	1	100	0	0.0	0	0.0
40+	7.0	60.9	2.0	17.4	2.5	21.7	1.0	22.2	0.0	0.0	3.5	77.8	2	66.7	0	0.0	1	33.3
Total	48.5	64.2	10.5	13.9	16.5	21.9	17.0	49.3	0.5	1.4	17.0	49.3	20	57.1	3	8.6	12	34.3

1 Other includes: non epidemic group B, W, Y, Z.

2 Average, rounded to one decimal place.

3 Proportion (%) of cases where a strain type has been determined for each DHB.

Table 13. Meningococcal disease cases by basis for diagnosis, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Basis for diagnosis¹	Jan-Jun 2005/2006 average		Jan-Jun 2007/2008 average		Jan-Jun 2009	
	No.²	%³	No.²	%³	No.	%³
Isolation of <i>N. meningitidis</i> from blood and/or CSF or any other sterile site	52.5	58.0	27.0	65.1	27	61.4
PCR test	25.0	27.6	10.5	25.3	11	25.0
Gram-negative diplococci in CSF	0.0	0.0		0.0	0	0.0
Confirmed –subtotal	77.5	85.6	37.5	90.4	38	86.4
Clinical criteria and a positive throat swab	0.0	0.0	0.0	0.0	0	0.0
Clinical criteria	13.0	14.4	4.0	9.6	6	13.6
Probable –subtotal	13.0	14.4	4.0	9.6	6	13.6
Total	90.5	100	41.5	100	44	100

1 Each case is represented only once in the table.

2 Average, rounded to one decimal place.

3 Proportion (%) of total cases.

Table 14. Case-fatality rates for meningococcal disease cases by District Health Board, age, ethnicity, and group, January-June 2005/2006 (average), 2007/2008 (average) and 2009

Features of case and infecting organism	Jan-Jun 2005/2006 average		Jan-Jun 2007/2008 average		Jan-Jun 2009	
	No. fatalities ¹	Case fatality rate (%)	No. Fatalities ¹	Case fatality rate (%)	No. fatalities	Case fatality rate (%)
Northland	0.0	0.0	0.0	0.0	0	0.0
Waitemata	0.0	0.0	0.0	0.0	0	0.0
Auckland	0.0	0.0	0.0	0.0	0	0.0
Counties Manukau	2.0	18.2	0.5	8.3	0	0.0
Waikato	0.0	0.0	0.0	0.0	0	0.0
Lakes	0.0	0.0	0.0	-	0	0.0
Bay of Plenty	0.5	12.5	0.0	-	0	0.0
Tairāwhiti	0.0	0.0	0.0	0.0	0	0.0
Taranaki	0.0	0.0	0.5	25.0	0	0.0
Hawke's Bay	0.5	10.0	0.5	12.5	0	0.0
Whanganui	0.0	-	0.0	0.0	0	-
MidCentral	0.5	8.3	0.0	-	0	0.0
Hutt	0.0	0.0	0.5	20.0	0	0.0
Capital and Coast	0.0	0.0	0.0	0.0	0	0.0
Wairarapa	0.0	0.0	0.0	-	0	-
Nelson Marlborough	0.0	0.0	0.5	50.0	0	-
West Coast	0.0	0.0	0.0	-	0	-
Canterbury	1.0	10.0	1.0	25.0	0	0.0
South Canterbury	0.0	-	0.0	0.0	0	-
Otago	0.0	0.0	0.0	-	1	50.0
Southland	0.0	0.0	0.5	25.0	0	0.0
<1 year	0.5	5.0	1.5	23.1	0	0.0
1-4 years	0.0	0.0	1.0	8.0	0	0.0
5-9 years	0.5	7.7	0.5	9.1	0	0.0
10-14 years	0.0	0.0	0.0	0.0	1	33.3
15-19 years	0.0	0.0	0.0	0.0	0	0.0
20-29 years	0.5	5.3	0.5	14.3	0	0.0
30-39 years	0.5	14.3	0.0	0.0	0	0.0
40+ years	2.5	19.2	0.5	8.3	0	0.0
European	1.0	2.0	2.5	13.5	1	5.6
Maori	0.5	2.4	0.5	4.3	0	0.0
Pacific	1.0	6.7	0.5	6.3	0	0.0
Other	1.5	60.0	0.5	16.7	0	0.0
Unknown	0.5	33.3	0.0	0.0	0	0.0
Epidemic Strain	2.0	4.1	2.0	11.8	0	0.0
B Other	0.0	0.0	0.5	3.7	0	0.0
C	2.0	19.0	0.0	0.0	0	0.0
Other	0.5	11.1	0.5	14.3	0	0.0
Confirmed but awaiting strain result/not done	0.0	-	0.5	50.0	1	50.0
Confirmed by gramneg - no organism	0.0	0.0	0.0	-	0	-
DNA positive, type not determined	0.0	0.0	0.0	0.0	0	0.0
Probable	0.0	0.0	0.5	12.5	0	0.0
Total	4.5	5.0	4.0	9.6	1	2.3

¹ Average, rounded to one decimal place.

REFERENCES

1. Ministry of Health, *Communicable Disease Control Manual*. 1998.
2. Bennett D. E. and Cafferkey M. T, *Consecutive use of two multiplex PCR-based assays for simultaneous identification and determination of capsular status of nine common Neisseria meningitidis serogroups associated with invasive disease*. J Clin Microbiol, 2006. 44: p. 1127-31.
3. Abdillahi H and Poolman JT, *Whole-cell ELISA for typing Neisseria meningitidis with monoclonal antibodies*. FEMS Microbiol Lett, 1987. 48: p. 367 - 371.
4. Saunders NB, Zollinger WD, and Rao VB, *A rapid and sensitive PCR strategy employed for amplification and sequencing of the porA gene of Neisseria meningitidis*. Gene, 1993. 137: p. 153-162.
5. Maiden M. C., et al., *Multilocus sequence typing: a portable approach to the identification of clones within populations of pathogenic microorganisms*. Proc Natl Acad Sci USA, 1998. 95: p. 3140-5.
6. Bygraves J. A. and Maiden M. C. J., *Analysis of the clonal relationships between strains of Neisseria meningitidis by pulsed field gel electrophoresis*. J Gen Microbiol, 1992. 138: p. 523-531.