

The impact of respiratory disease in New Zealand: 2016 update

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3. EXECUTIVE SUMMARY

Overview

Chronic and serious respiratory illnesses continue to make a substantial contribution to New Zealand's health burden. Respiratory diagnoses accounted for 1 in 10 of all 2015 overnight hospitalisations in New Zealand.

This report covers six respiratory disease indicators: asthma, bronchiectasis, childhood bronchiolitis and pneumonia, chronic obstructive pulmonary disease (COPD), and total respiratory disease. We report incidence, prevalence, risks and determinants, using the most recent available data from the New Zealand Health Survey, and pharmaceutical prescriptions, hospitalisations and mortality datasets, over the period 2000-2015.

Across the study period, hospitalisation rates have increased for bronchiectasis, childhood bronchiolitis and total respiratory disease, remained static for COPD, and declined for asthma and childhood pneumonia. Mortality rates increased for bronchiectasis, remained static for childhood pneumonia and declined for asthma, COPD and total respiratory disease.

Across all respiratory health indicators, by the far the most relentless and disturbing pattern was the high degree of inequality, across both the socio-economic spectrum and different ethnic groups.

All indicators showed inequalities in health by ethnic group. Pacific peoples' respiratory health was consistently poorest across all indicators, followed by Māori; except for COPD, where Māori rates were higher. Asian peoples' rates, however, were generally the same as or lower than the non-Māori, non-Pacific, non-Asian (non-MPA) comparison group.

Inequalities in respiratory hospitalisations by socio-economic deprivation were marked, with differences between the most and least deprived NZDep quintiles ranging from a rate ratio of 2.9 for childhood pneumonia, to 5.2 for childhood bronchiolitis and 5.7 for adult COPD. The effect of deprivation was near exponential: while differences across the first four quintiles were not always significant, all hospitalisation categories showed large and significant differences between the fourth and fifth quintiles.

There were also patterns in hospitalisation difference across age and gender, with all childhood rates higher in boys than girls, while most adult rates were higher in women than in men.

There was a north to south gradient across all indicator conditions except COPD, with Counties Manukau, Lakes and Northland DHBs having the highest total respiratory hospitalisation rates, and also generally having high rates for other indicator conditions.

Total respiratory disease

The 2015 rate of respiratory hospitalisations was 1712.0 per 100,000 people. Total respiratory hospitalisations have been increasing at a rate of 16.4 hospitalisations per year since 2000. However, this increase appears as a two-tier effect – rates remained within the same range from 2000 to 2007, then increased sharply in 2008, and stayed at the higher rate to the end of the study period in 2015. Conversely, mortality rates declined over the same period, from 65.6 per 100,000 people per year in 2000, to 61.4.

Respiratory hospitalisation rates were highest for the children aged under 15 years and adults aged over 65 years. Mortality rates were highest in adults aged over 65.

Respiratory hospitalisation rates were highest for Pacific peoples, with rates 3.1 times higher than for non-MPA. Māori rates were also significantly higher (rate ratio 2.4), while rates for Asian peoples not meaningfully different. These trends were repeated across all age groups, except for Asian peoples, whose rates were lower than non-MPA in all age groups over 15 years. For mortality, however, Māori rates were highest.

There was a significant deprivation gradient in total respiratory hospitalisations and mortality. Hospitalisation rates in the most deprived NZDep quintile were 3.0 times higher than rates in the least deprived quintile, while mortality rates were 2.0 times higher. The deprivation gradient was present for both outcomes in all ethnic groups, but Pacific peoples' hospitalisation rates stood out further: Pacific peoples living in the wealthiest quintile areas had respiratory hospitalisation rates similar to those of non-MPA people in the most deprived quintile areas.

Asthma

Medicated asthma prevalence showed no change during the study period in adults or children. The hospitalisation rate for asthma peaked in 2009 at 210 per 100,000 people, but overall showed no significant change. Asthma mortality rates, however, have declined by a small but significant amount over the study period, sitting at 1.6 deaths per 100,000 in 2013, compared to 1.9 in 2000.

Risks for asthma were consistent across measures. Prevalence, hospitalisation and mortality were significantly higher in Māori, and in more socioeconomically deprived neighbourhoods. In children, all asthma measures were higher for boys, whereas for adults, asthma measured higher for women.

Socio-economic differences in asthma hospitalisation saw rates 3.7 times higher in the most deprived NZDep2006 quintile 9-10, and 2.6 times higher in NZDep2006 quintile 7-8, compared to the wealthiest NZDep2006 quintile. These differences were almost identical to mortality differences. Asthma prevalence showed a deprivation gradient for female children and adults, but not for males.

2015 asthma hospitalisation rates were lower than the national average in all South Island DHBs, and higher than the national average in all North Island DHBs except Waitemata, Hawkes Bay, Taranaki and Capital and Coast; 2013 mortality rates were highest in the Tairāwhiti and Hutt DHBs.

Bronchiectasis

Although bronchiectasis is the rarest of the indicator conditions, the bronchiectasis hospitalisation rate increased by a significant 41% over the study period. Mortality rates also increased.

Being of Māori, Pacific or Asian ethnicity was a significant risk factor for bronchiectasis hospitalisation and death. The greatest disparity in hospitalisations by age and ethnicity was for Māori children aged 15-29 years, whose bronchiectasis hospitalisation rates of 25.7 per 100,000 were 14.5 times higher than for non-MPA. Overall, Pacific peoples were 8.0 times more likely to be hospitalised than non-MPA, Māori were 4.4 times more likely to be hospitalised, and Asian peoples 1.6 times more likely. Mortality differences were similar.

Bronchiectasis also showed strong socio-economic disparity, with hospitalisation rates 3.4 times higher in the most deprived compared to the least deprived neighbourhoods, and mortality rates 2.1 times higher. The hospitalisation rate increase for the most deprived quintile was steepest for Māori.

Childhood bronchiolitis

Childhood bronchiolitis hospitalisation rates increased by nearly a half since 2000. Pacific rates were 4.6 times higher than non-MPA, and Māori rates 3.9 times higher. The rate for the most deprived quintile was 5.2 times the rate of the least deprived quintile. The combined effect of ethnicity and deprivation meant that Māori and Pacific children in the most deprived quintile were at least seven times as likely to be hospitalised as non-MPA children in the wealthiest quintile.

There were few deaths from childhood bronchiolitis, but all 9 deaths between 2004 and 2013 were in NZDep deciles 5-10; and were concentrated in Māori and Pacific children.

Childhood pneumonia

Overall, the outstanding differences in childhood pneumonia rates were for Pacific peoples, and for those in the most deprived quintile. Pacific children's pneumonia rates were 3.6 times higher than the non-MPA rate for hospitalisation, and 7.3 times higher for mortality; Māori children's rates were 2.0 and 5.9 times higher respectively. Hospitalisation rates for Asian children were 1.6 times higher. These differences were greater in children aged under 5 years.

Childhood pneumonia rates were highest in the most deprived areas, with hospitalisation rates 2.9 times higher in the most deprived NZDep quintile than in the least deprived. Over half of deaths were in the most deprived quintile, making the NZDep9-10 mortality rate 17.9 times higher than that of NZDep1-2.

COPD

COPD hospitalisation and mortality rates were lower for men than women in the 45 to 64 year age group, but higher for men in the 65+ age group. COPD rates were highest for Māori, at 3.9 times the non-MPA rate for hospitalisation and 2.2 times the rate for mortality. Pacific peoples' hospitalisation rates were 2.9 times higher, and mortality was 1.9 times higher. Both measures were lowest for Asian peoples.

There was a strong deprivation gradient, with COPD hospitalisation rates 5.7 times higher in the most deprived NZDep quintile than in the least deprived, and mortality rates 2.4 times higher. The gradient was apparent for all ethnic groups.

The highest DHB rates were for Whanganui, and West Coast.

Costs

We estimated the minimum cost burden of respiratory disease to New Zealand to be \$6.16b in 2013. Of this, \$5.68b were indirect costs from mortality and disability affected life years, and the remaining \$482.1m were direct costs from hospitalisations, prescriptions and doctors' visits. We have costed asthma separately, at \$858.2m, with \$128.1m in direct costs, and \$730.1 in indirect costs from work days lost, disability affected life years, and mortality.

While total costs have increased since the last report, the increase comes primarily from rising hospitalisation rates and an increase in the value of a life year.

4. INTRODUCTION

4.1. BACKGROUND

This report was commissioned by the New Zealand Asthma Foundation. The Foundation aims to assist people with asthma and respiratory diseases through contributing to the development of public policy, education and funded research, through advocacy on behalf of all people with respiratory conditions and through raising awareness of respiratory conditions in New Zealand. It aims to reduce hospital admissions caused by asthma and other respiratory conditions by 25%, by 2025.

Respiratory illnesses contribute a large part of New Zealand's total disease burden, collectively accounting for 6.3% of total health loss, almost all from chronic obstructive pulmonary disease (COPD, 3.7%) and asthma (1.6%)¹.

The Asthma & Respiratory Foundation has previously published four reports relevant to the burden of respiratory disease in New Zealand:

- 'Trying to Catch Our Breath – The Burden of Preventable Breathing Diseases in Children and Young People'² (2006) covers asthma, bronchiectasis, pneumonia, pertussis, general smoking-related respiratory illness, bronchiolitis, tuberculosis and obstructive sleep apnoea. Rates reported covered different periods, with the most recent figures given depending on condition, between 1999 and 2004.
- The Burden of Asthma in New Zealand³ (2002) reports mortality to 1994, hospitalisation rates to 1999, and pharmaceutical costs to 2000. Economic costs include data for a similar period (i.e. to 2000).
- Chronic Obstructive Pulmonary Disease and Lung Cancer in New Zealand⁴ (2003) includes data to 2002.
- The Impact of Respiratory Disease in New Zealand: 2014 update⁵ (2015), which this report updates, and refers to as "the previous report".

4.2. AIMS

This report updates analysis from earlier reports in 2002, 2003, 2006 and 2014; and measures indicator respiratory conditions identified in the previous report as markers for changes in levels of respiratory disease in New Zealand.

This report aims to provide key indicator data which can be used as an advocacy tool to assist with raising the profile of respiratory health regionally and nationally; and to guide the Foundation in best use of resources in the future

The Foundation identified six conditions to include in this updated Impact Report. These are:

- Asthma (including asthma and wheeze in preschool children)
- Bronchiectasis
- Childhood bronchiolitis (<5 years)
- Childhood pneumonia (<5 years, 5-14 years)
- Chronic Obstructive Pulmonary Disease (COPD) in older adults (45-64, 65+)
- Total serious respiratory disease (i.e. hospitalisations and death)

Other conditions included in previous reports but not in this report include tuberculosis, pneumonia, pertussis, and lung cancer. Lung cancer makes a large contribution to New Zealand's health burden, but is well-monitored elsewhere. Tuberculosis, pneumonia and pertussis will be included in total respiratory disease but do not individually have sufficient health impact to warrant inclusion in the 2016 report.

The University of Otago originally recommended including obstructive sleep apnoea as an indicator condition, as the Ministry of Health Burden of Disease report includes the condition as a contributor to overall health loss, and also a risk factor for other life-limiting conditions. However, due to the absence of any data on the condition, it was not a viable indicator of respiratory health. No further studies on sleep apnoea have been completed since the last report, but we continue to recommend future reports check for any new data published on obstructive sleep apnoea.

5. INDICATOR SELECTION AND METHODS

5.1. CONDITIONS

All respiratory conditions for monitoring were nominated by the Foundation. The conditions selected had been previously identified as making the largest contribution to New Zealand's respiratory burden⁶. Justification for age groups measured and disease categorisation are included in the 2014 report.

ICD-10 codes used to identify indicator conditions in the hospitalisation and mortality data are included in Appendix 2.

5.2. DATA SOURCES

The primary data sources for this report are administrative datasets, specifically the national pharmaceutical, hospitalisation and mortality data collections. Additional data on asthma was included from the Ministry of Health's published results of the New Zealand Health Survey 2011-2012.

Table 1. Data sources for indicator conditions and risk factors.

Indicator condition	Indicator dataset	Measureable risk factors/determinants
Asthma	NZ Health Survey	Age Sex Ethnicity DHB Region NZDep
All measured indicators	NMDS (Hospitalisations)	
All measured indicators	Mortality Collection	
Total respiratory illness	Pharmaceutical Collection	

5.3. BURDEN

New Zealand's respiratory burden is measured here in three ways: the incidence of illness, the prevalence of illness, and the costs of illness. Incidence and prevalence time trends are reported from 2000, as being a rough average of the final date in earlier reports, and also the date of introduction of the ICD-10 clinical coding system.

Rates have been age-standardised to the 2013 census population. Age standardisation adjusts disease rates to the level they would be if the age distribution of the population was the same either across time, or across ethnic or socio-economic groups. Age standardisation ensures we are comparing like with like: using non-standardised rates can make it look like disease rates are different, when in fact the difference lies in what proportion of the population are in the age-group who have the highest or lowest rates of the disease.

5.3.1. INCIDENCE

Incidence is measured as the number of events per 100,000 of people per year. We have reported the incidence of hospital events and deaths for all indicator conditions. We have also reported the incidence of new cases of severe (i.e. hospitalised) bronchiectasis and COPD.

5.3.2. PREVALENCE

Prevalence measures the percentage of people in the population who have a given condition. Incidence and prevalence differ because incidence measures events, whereas prevalence can also measure chronic conditions. We have measured the prevalence of medicated asthma, bronchiectasis, and COPD.

The prevalence of medicated asthma is reported using Ministry of Health published data from the New Zealand Health Surveys in 2006-07, 2011-12, 2011-13, 2011-14 and 2013/14. The survey questions were “Have you ever been told by a doctor that you have [your child has] asthma?”, combined with any treatment answer to “What treatments do you now have [does your child now have] for asthma?”

Minima of the current prevalence of childhood bronchiectasis and total COPD were estimated as a cumulative count of individuals alive in 2015 who had been hospitalised with the condition since 1988.

5.3.3. COSTS

We report costs for 2013, as this is the most recent year for which mortality data was available.

The cost of asthma to the New Zealand economy was estimated at \$349m in 2000,⁷ and at \$800m in the previous 2014 report.

We have repeated the 2014 method, which used more restricted data than the 2000 report, to measure the private and public costs of asthma and total serious respiratory disease.

Private costs have been estimated using pharmaceutical data. In addition to the “patient contribution” recorded in the data, we assume a corresponding doctor’s visit for each non-repeat prescription. The New Zealand Health Survey 2011/12 found the average cost of a GP visit for a child to be \$21 for the 43% of parents who were charged; the other 57% of visits were free. This data is not available in subsequent New Zealand Health Survey reports, so we have continued with the 2011/12 figures. We therefore assume an average GP visit cost of \$9.45, (43% x \$21). For adults we assume an average cost of \$32.

Public costs have been estimated using pharmaceutical, hospitalisation and mortality data, and additional costs extrapolated from the 2013 New Zealand census, Statistics New Zealand data on the working population, the New Zealand Health Survey and a report on

asthma rates in primary care⁸. Mortality costs are estimated from years of life lost based on average life expectancy at age of death⁹, multiplied by a value per life year of \$167,000. The life year value is estimated from the 2013 NZTA value of a statistical life (\$3.85m) and a 3% discount rate¹⁰.

Hospitalisation costs are summed from all 2013 publicly-funded hospitalisation discharges.

The method for calculating the total cost of pharmaceuticals is described in Telfar Barnard et al 2011¹⁰. The total pharmaceutical cost is the sum across all included prescriptions of:

Retail subsidy + dispensing fee - estimated 2013 Pharmac rebate

The estimated Pharmac rebate for 2013¹¹ was \$139.4m total rebates/\$926.4m expenditure = 15.05%.

The public cost of a doctor's visit was based on Ministry of Health standard GP subsidy of \$31.11 for children aged under 6 years, \$17.78 for children who were, or were children of, community services card (CSC) holders, \$13.33 for CSC adults and non-CSC children 6-17.

As we did not have data on whether patients were CSC holders, we used 2008 figures on numbers of CSCs by category to estimate proportions of people aged 18 to 64, and 65+, with CSCs. We then applied these figures to proportions of people in NZDep deciles, and assigned CSC subsidies to all people aged 6 to 64 in NZDep deciles 8 to 10, and to all people aged 65+ in deciles 6 to 10.

Estimating adult prescription and doctors' visit costs

In 1996/97, there were 126,800 GMS (GP medical subsidy) claims for treating children aged under 16 with asthma, and 106,300 for adults⁷, giving a ratio of 1.19.

The 2013/14 ratio of child to adult asthma prevalence was 15.3/11.0=1.39.

Children aged under 15 were issued with 164,929 first (rather than follow-on/repeat) respiratory prescriptions in 2013, giving a rate of 19.1 prescriptions per 100 people. Applying this rate, reduced by the ratio of child to adult asthma prevalence gives a figure of 462,479 first prescriptions for adults, or 44.1% of adult respiratory prescriptions. Using the same methodology, the 2014 report found a figure of 50.2% for 2011.

The WaiMedCa study in 1994 found that 60.9% of respiratory prescriptions were for asthma.¹²

We have used the lower 44.1% figure as representing a more conservative estimate of adult asthma prescription rates. It is also close to the 43.2% level found if the WaiMedCa 60.9% rate is reduced by the change from the 1996/7 New Zealand Health Survey 15.5% estimate of asthma prevalence¹³ to the 2013/14 level of 11%, so probably provides a better estimate than the 50.2% used in 2011.

Estimating the cost of days off school

The Home Heating study found children with asthma had 2.2 additional days off school per winter, compared to children without asthma¹⁴. Analysis of hospitalisations for the period 2000 to 2007 found the winter, term-time hospitalisation rate for asthma in children under 15 years to be 98% of the rate for non-winter term-time hospitalisations. If the same ratio applies to days off school, 2.2 additional days off school in winter would mean 2.2 additional days off school in non-winter, and a total of 4.4 additional days off school per year. This is a higher estimate than the 1.6 additional days derived from 1993 NZHS figures.¹⁵

We have costed each day off school conservatively, as 8 hours at half the 2013 adult minimum wage of \$13.75/hr.

Cost of days off school=[Asthma prevalence in under 15 year olds] * [Statistics NZ estimated 2013 population under 15 years] * [additional days off school] * [0.5*adult minimum wage]

=0.153 * 870,486 * 4.4 * \$6.875

= \$4,028,846.83

Estimating the cost of days off work

We used the same method to calculate the cost of days off work as used by Nick Wilson in 2000.⁶ As the prevalence of adult asthma has decreased from the 15.2% used in that calculation, to 11.0% in the current adult population, we updated the figures by the increase in the average wage, and the increase in the working age population, then reduced by the change in adult asthma prevalence.

Estimating the cost of Emergency Department and Outpatient visits

We estimated the cost of Emergency Department (ED) and Outpatient (OP) visits by extrapolating from data in the 2014 primary care cohort to the total population. Asthma prevalence in that cohort was 4.8%, and asthma patients averaged 2.17 ED or OP visits each in the study year. The cost of an ED or OP visit was estimated at \$254.85. Working from Statistics New Zealand's estimate of the 2013 resident population, 4,353,192, we estimated the total cost of ED and OP visits to be \$53,247,667. This figure is unchanged from the last report because that report used data for 2013.

Estimating the cost of Years Lost to Disability (YLDs)

In 2001, Holt and Beasley estimated the cost of years lost to disability for asthma to be \$340million³. This figure was based on an estimated 17,000 YLDs at 20% of the \$100,000 value of a life-year lost. The Ministry of Health estimated YLDs from asthma in 2006 to be 13,362. We do not have a more recent figure than 2006, but as asthma prevalence is unchanged since then it represents a better estimate than the 2001 figure. Increasing the 13,362 by the 8.1% increase in the population from 4,027,927 in 2006 census, to the 2013

resident population estimate, takes the 2013 estimate of YLDs to 14,441. With the 2013 value of a life year at \$167,000, and applying the same arbitrary 20% value as Holt and Beasley, the cost of YLDs is estimated at \$482,329,400.

The estimate of YLDs from total respiratory disease in 2006 was 34,581. Allowing for the population increase to 2013 would take this estimate to 37,374. Respiratory hospitalisation rates have increased since 2006, so this should be a conservative estimate. At 20% of \$167,000 per YLD, the YLD cost of total respiratory disease is estimated at \$1,248,291,600.

6. NEW ZEALAND'S RESPIRATORY DISEASE BURDEN

6.1. LITERATURE

Because population prevalence data was available only for asthma and not for other indicator conditions, we conducted a focussed literature review seeking evidence on New Zealand rates and prevalence of the indicator conditions.

Our criteria for inclusion in the review were that the literature report original research measuring the rate or prevalence of the indicator condition (rather than including the rate or prevalence reported from another study) in the age-group(s) included in this report; that the research was conducted in New Zealand after 31 December 1999, and published after 1 January 2014 to exclude papers included in the previous report.

We searched Medline using the search terms "New Zealand" AND ("rate" OR "prevalence") combined with each of the indicator conditions: "asthma OR wheeze"; "bronchiectasis"; "bronchiolitis"; "pneumonia"; "COPD OR 'chronic obstructive pulmonary disease'"; "sleep apnoea"; "respiratory AND (illness OR disease OR condition OR hospitalisations OR mortality OR death)"; with each search limited to publications from 2000 onwards, and limited to humans. There was no need to limit the search by language as all results were published in English.

The search turned up three relevant publications, one each on ever diagnosed asthma, bronchiectasis and COPD. These publications are discussed in the relevant sections, and have been added to the publications summary in the Appendix.

6.2. ASTHMA

6.2.1. PREVALENCE

Published studies of New Zealand asthma prevalence were of limited use for determining long-term trends in asthma rates, as each study measured asthma in different ways and/or across different age groups. Published rates are summarised in Table A 91.

Prevalence for medicated asthma was sourced from the most recently published New Zealand Health Survey data. For current asthma prevalence, data covers the 2014-15 period. The International Study of Asthma and Allergies in Children (ISAAC) last measured New Zealand child asthma rates in 2001-03.¹⁶ Their measures are different to the definition used by the New Zealand Health Survey, so even their most similarly defined measure of prevalence rates, "current wheeze", which was 22.4% in 6-7 year olds, and 27.6% in 13-14 year olds¹⁵, cannot be directly compared with New Zealand Health Survey prevalence figures.

Hansell et al ¹⁷ also measured ever-diagnosed asthma (as opposed to the NZ Health Survey's "medicated asthma" prevalence in the 2003 – 2004 Wellington Respiratory Study, by ten year age group from 25 to 75, ethnicity (NZ European, Māori or Pacific, Other), NZDep2001 top 10% and bottom 50%, and current or ex-smoker. These rates are included in Table A 91.

It should also be noted that diagnostic practice for childhood asthma has changed over the study period. Current guidelines mean children aged under 5 who present with wheeze are now less likely to be diagnosed with asthma than in the past¹⁸, and in particular wheeze in children aged under 3 is now seldom described as asthma.

NZ Health Survey rates for asthma prevalence by age group and sex, and by ethnicity, NZDep2006 quintile and DHB, for children and adults, are shown in Figures 2 to 7.

Trends over time

There were no significant changes in medicated asthma prevalence between 2006-07 and 2011-13, for either children or adults (Table 2 and Table 3).

Table 2. Total child medicated asthma prevalence 2006 – 2015, age-standardised

Year	Total		Boys		Girls	
	%	95% CI	%	95% CI	%	95% CI
2006-07	14.9	(13.5–16.3)	15.5	(13.6–17.7)	14.2	(12.5–16.1)
2011-13	14.1	(12.8–15.4)	16.3	(14.4–18.3)	11.8	(9.7–14.1)
2013/14	15.3	(13.9-16.7)	17.2	(15.1-19.5)	13.2	(11.5-15.2)
2014/15	15.1	(13.4-16.9)	16.5	(14.2-19.1)	13.6	(11.5-16.0)

Table 3. Total adult medicated asthma prevalence 2006 – 2015, age-standardised

Year	Total		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
2002-03*			10.6		16.4	
2006-07	11.5	(10.7–12.2)	9.6	(8.7–10.7)	13.2	(12.1–14.4)
2011-13	11.1	(10.6–11.7)	9.0	(8.3–9.7)	13.2	(12.5–14.0)
2013/14	11.0	(10.2-11.8)	8.5	(7.6-9.4)	13.3	(12.2-14.6)

2014/15	11.0 (10.3-11.7)	9.0 (8.0-10.1)	12.8 (12.0-13.7)
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*N.B 2002-03 rates are only for adults aged 15-44.

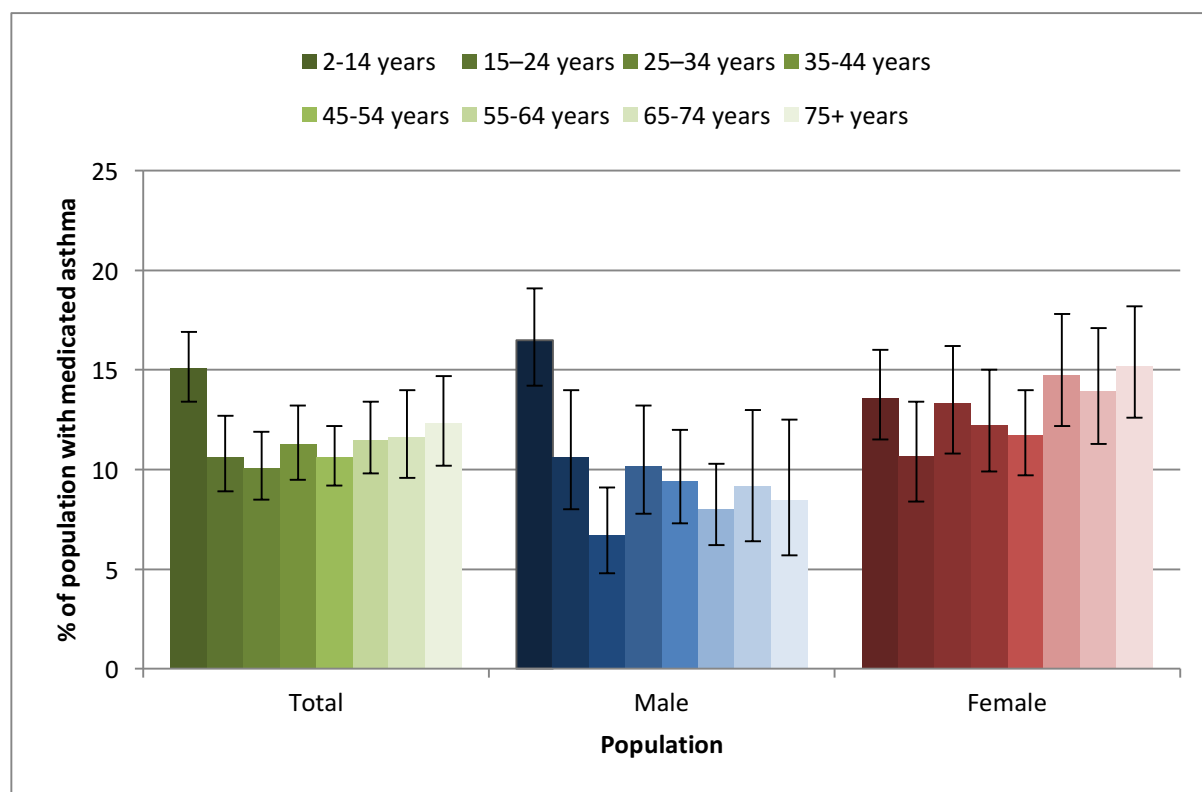
Risks and determinants

Boys had higher medicated asthma prevalence than girls (rate ratio 1.22); but men had lower prevalence than women (rate ratio 0.70).

Medicated asthma prevalence was significantly higher for Māori than for the rest of the population in both children (rate ratio 1.35) and adults (rate ratio 1.51). Prevalence was also higher for the most deprived NZDep2006 quintile than for the least deprived for children (rate ratio 1.39), but was not significantly different for adults.

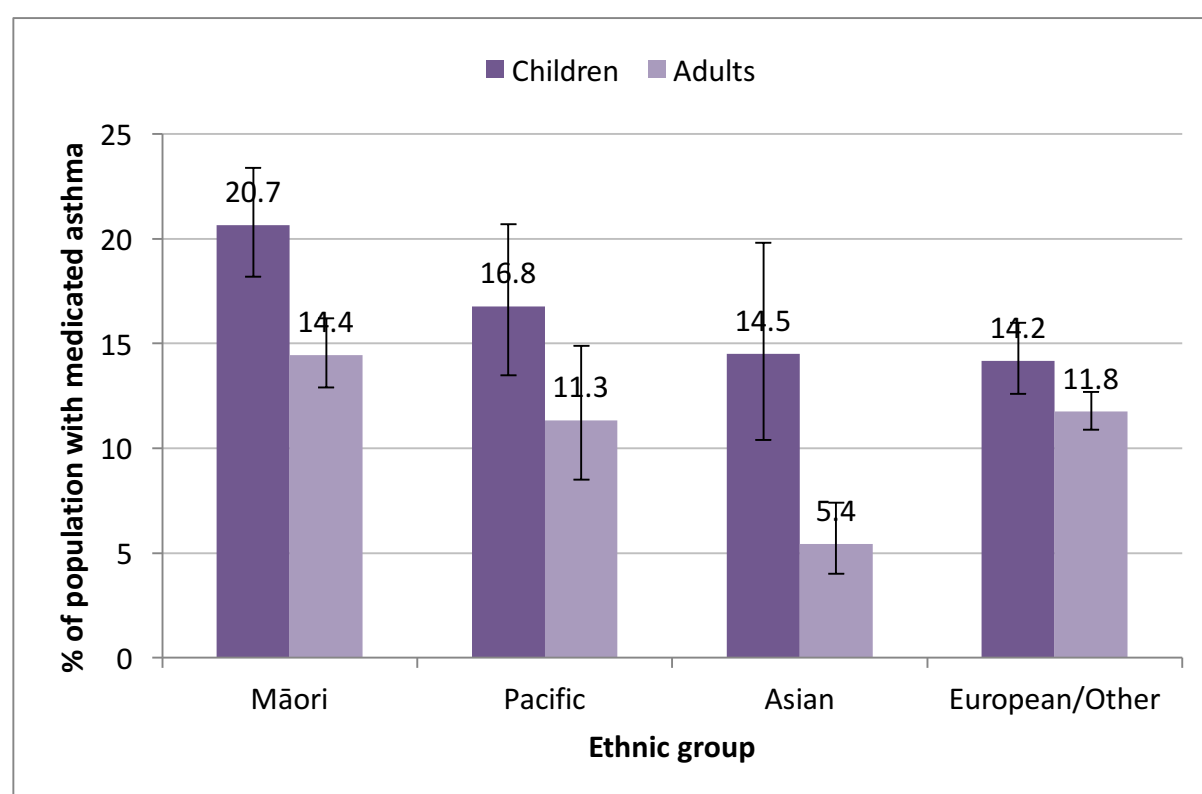
By region, children's medicated asthma rates were significantly higher than the rest of New Zealand in the Northland, Tairāwhiti and Whanganui DHBs and lower in Auckland and Nelson Marlborough, while adult rates were higher in MidCentral and Hutt DHBs, and lower in Auckland and Counties Manukau (Table A 5).

Figure 1. Age-standardised medicated asthma rates by age group and sex, 2013/14.



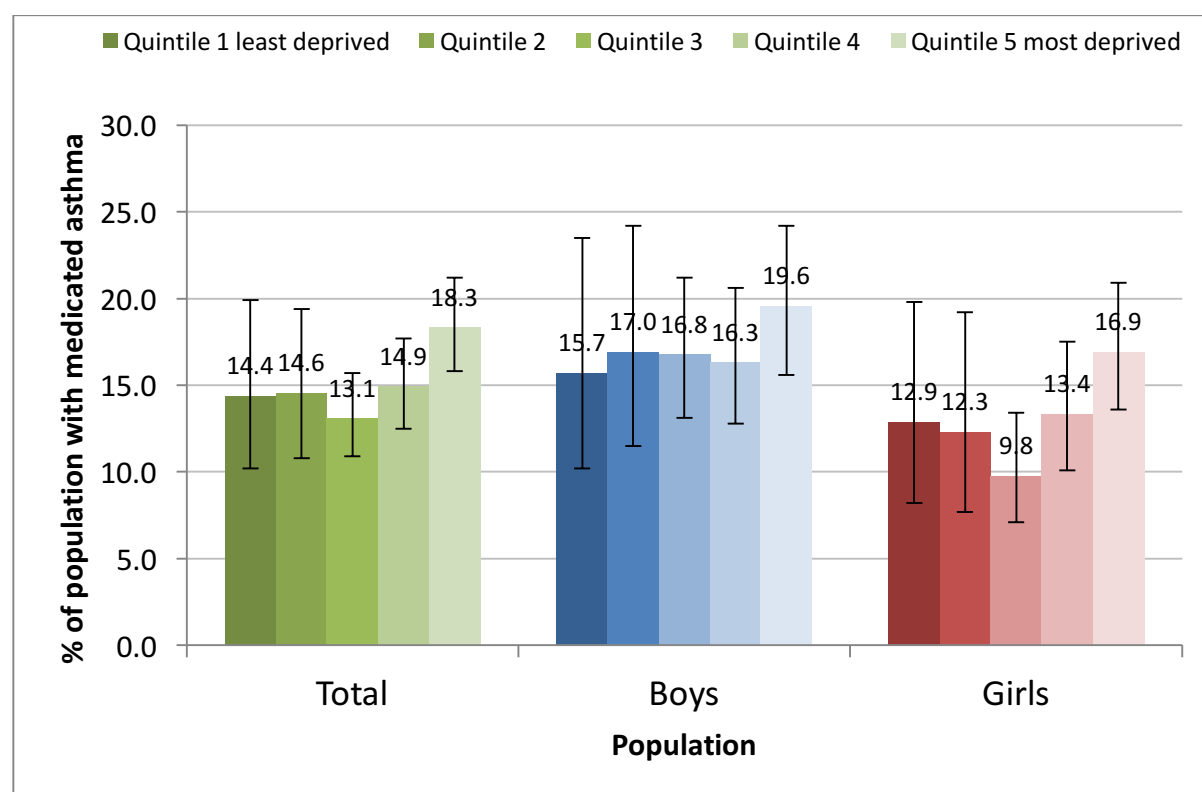
(See Table A 1 for data)

Figure 2. Medicated asthma prevalence by ethnic group 2013/2014, children and adults



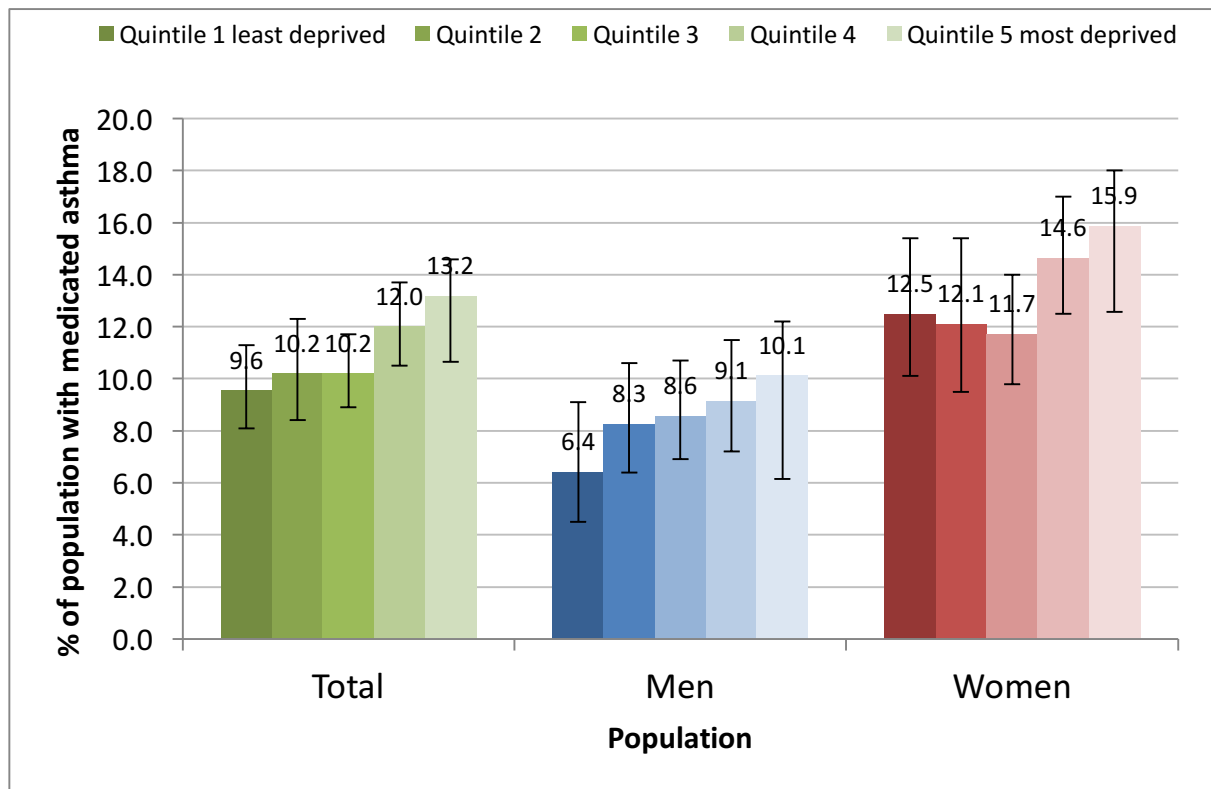
(See Table A 2 for data)

Figure 3. Child medicated asthma prevalence 2013/14 by NZDep2006, unadjusted



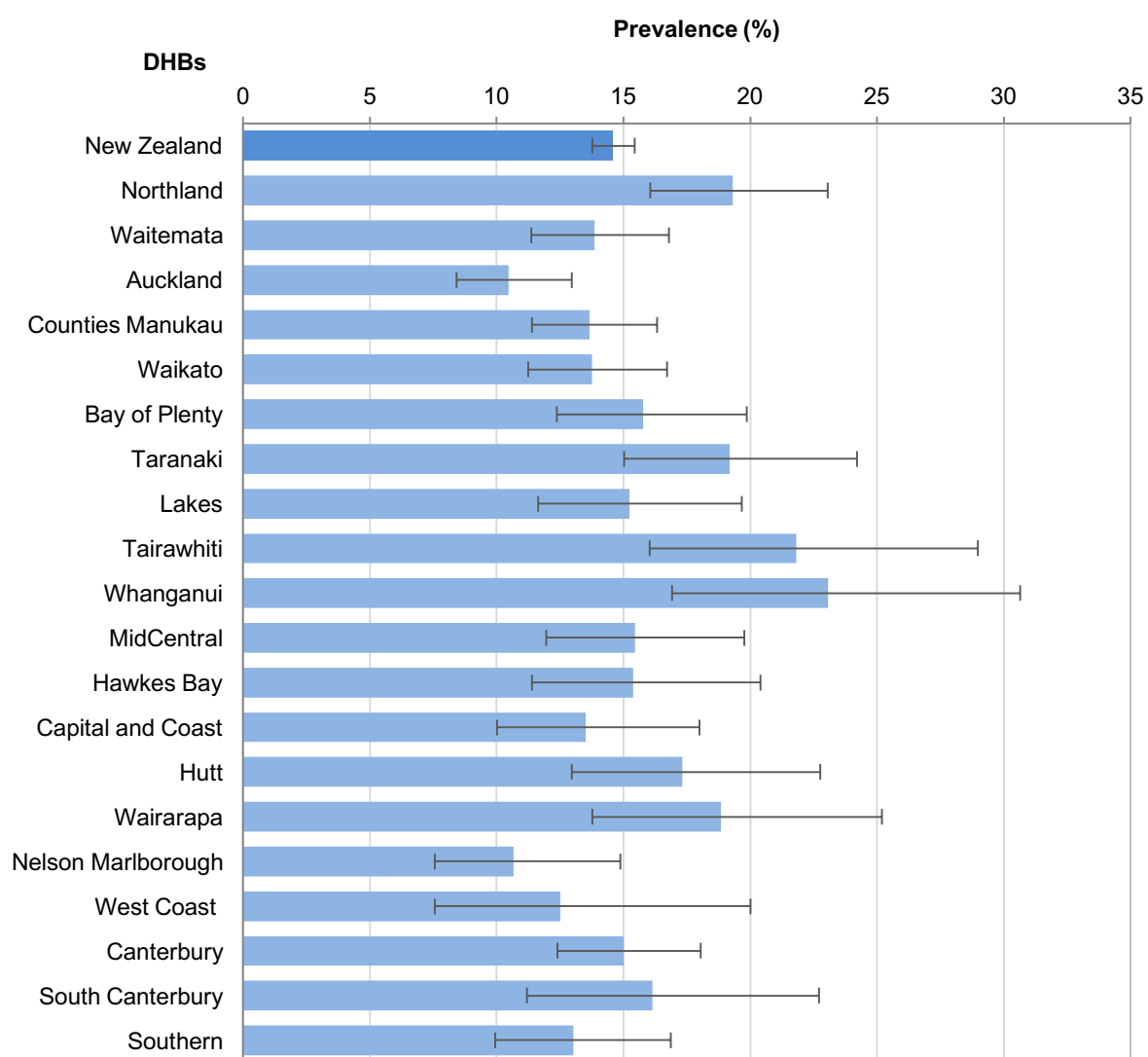
(See Table A 3 for data)

Figure 4. Adult medicated asthma prevalence 2013/14 by NZDep2006, unadjusted



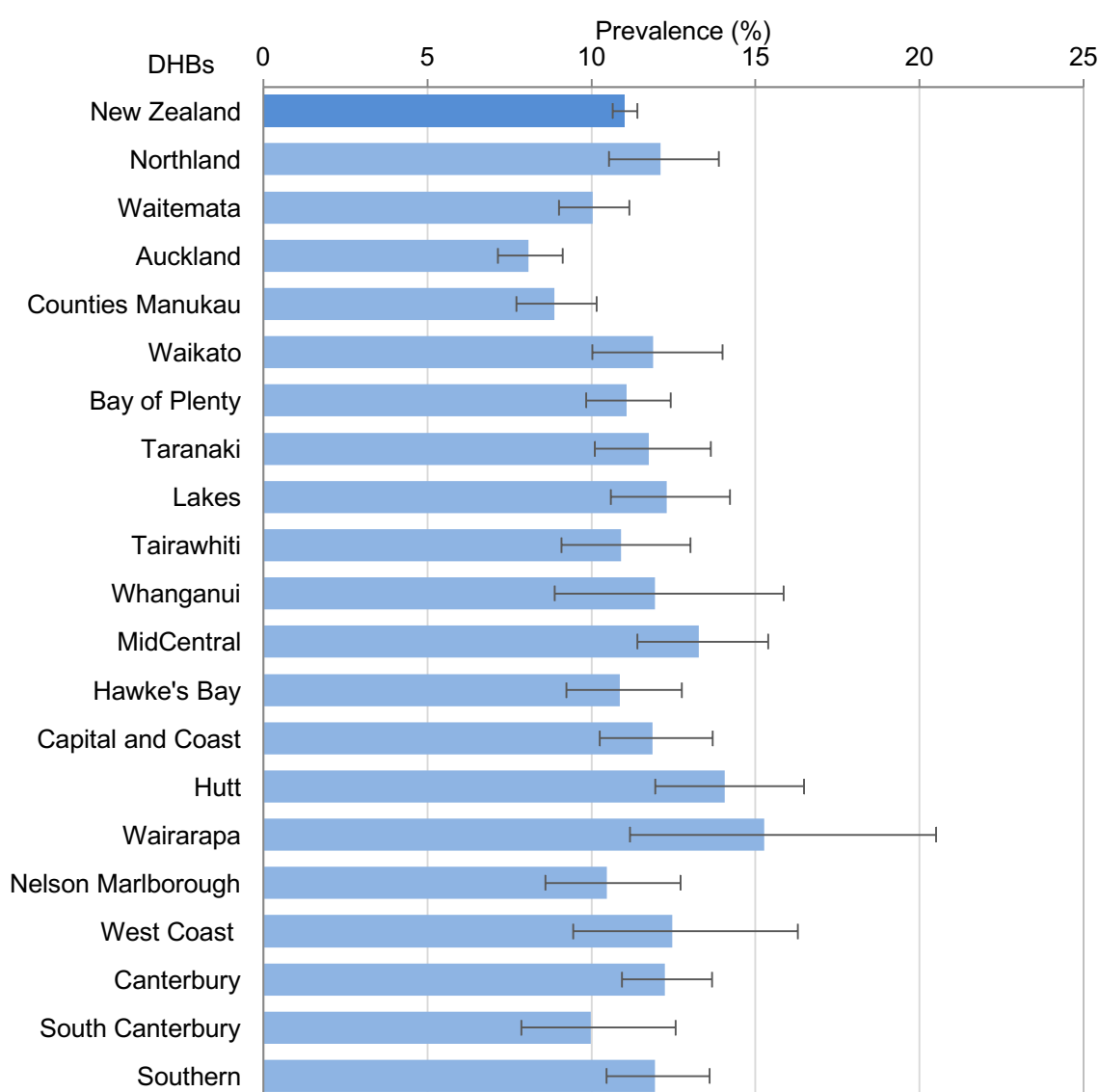
(See Table A 4 for data)

Figure 5. Children's (aged 2-14) medicated asthma prevalence by DHB, 2011-2014, unadjusted.



(See Table A 5 for data)

Figure 6. Adult medicated asthma prevalence by region 2011-2014, age-standardised



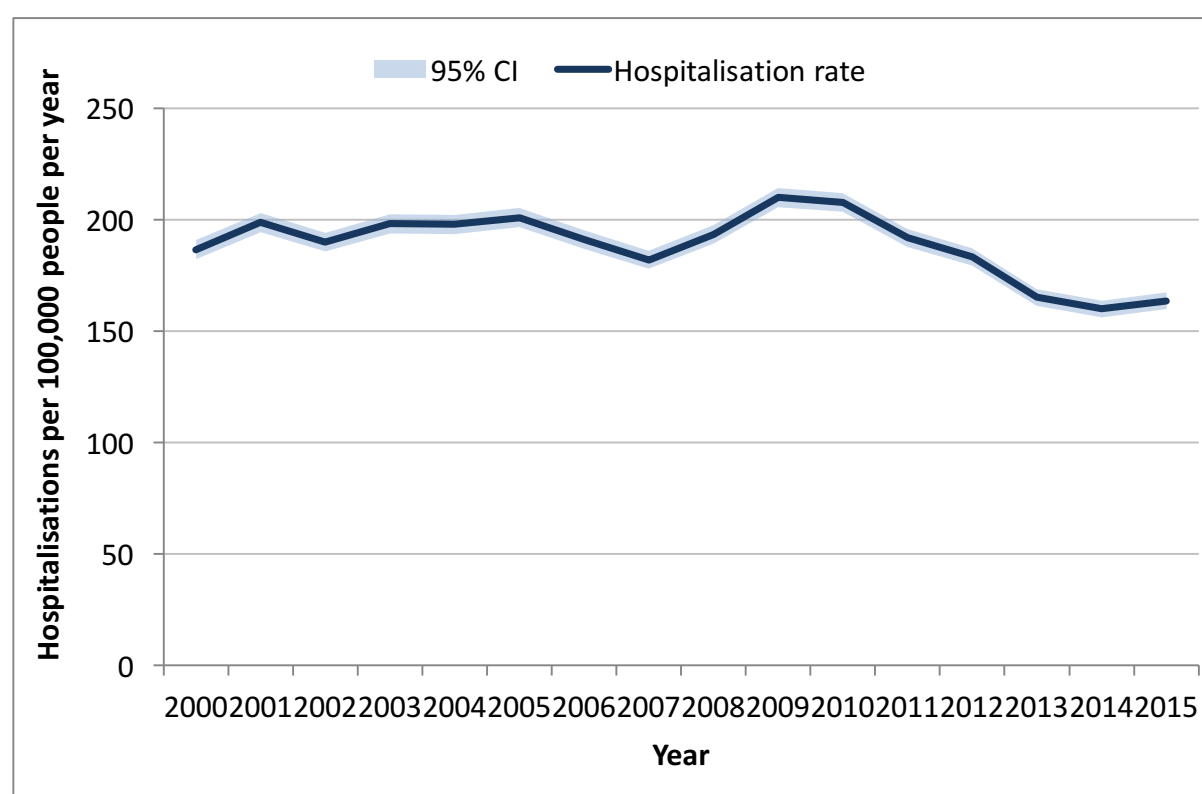
(See Table A 5 for data)

6.2.2. HOSPITALISATIONS

Trends over time

Asthma hospitalisation rates show a small but statistically significant decline over the sixteen years 2000-2015. For the last three years, rates have continued below 170 hospitalisations per 100,000 people per year, while the average 2000 to 2012 was 195, and never dipped below 180 (Figure 7).

Figure 7. Asthma hospitalisations per 100,000 people per year, 2000-2015.



(See Table A 6 for data)

Risks and determinants 2015

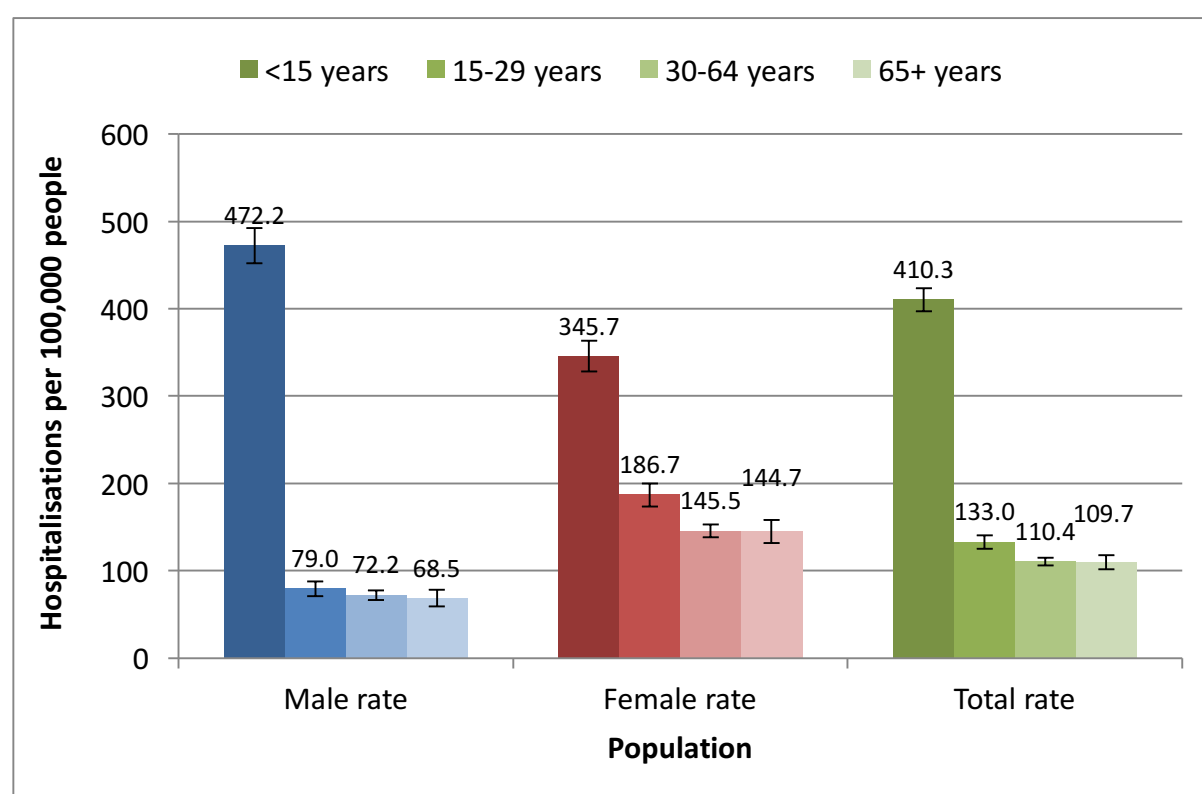
Most risks and determinants in prevalence were magnified in hospitalisation. Asthma hospitalisation rates in children under 15 years were more than 3 times the rates for adults aged 30-64 (rate ratio 3.72). Boys had substantially higher rates than girls (rate ratio 1.37), but men's asthma hospitalisation rates were half or less those of women (Figure 8, Table A 7).

Asthma hospitalisation rates by ethnic group reflect prevalence less clearly. Māori rates were over 3 times higher than European/Other (rate ratio 3.40), Pacific rates were higher again (rate ratio 3.93), and Asian rates were also higher than European/Other (rate ratio 1.37). As these differences do not reflect differences in prevalence, they may indicate a health service gap (Figure 9).

There was a clear socio-economic gradient in asthma hospitalisation (Figure 11), with the most socioeconomically deprived areas having a hospitalisation rate nearly 4 times that of the wealthiest areas (rate ratio 3.71).

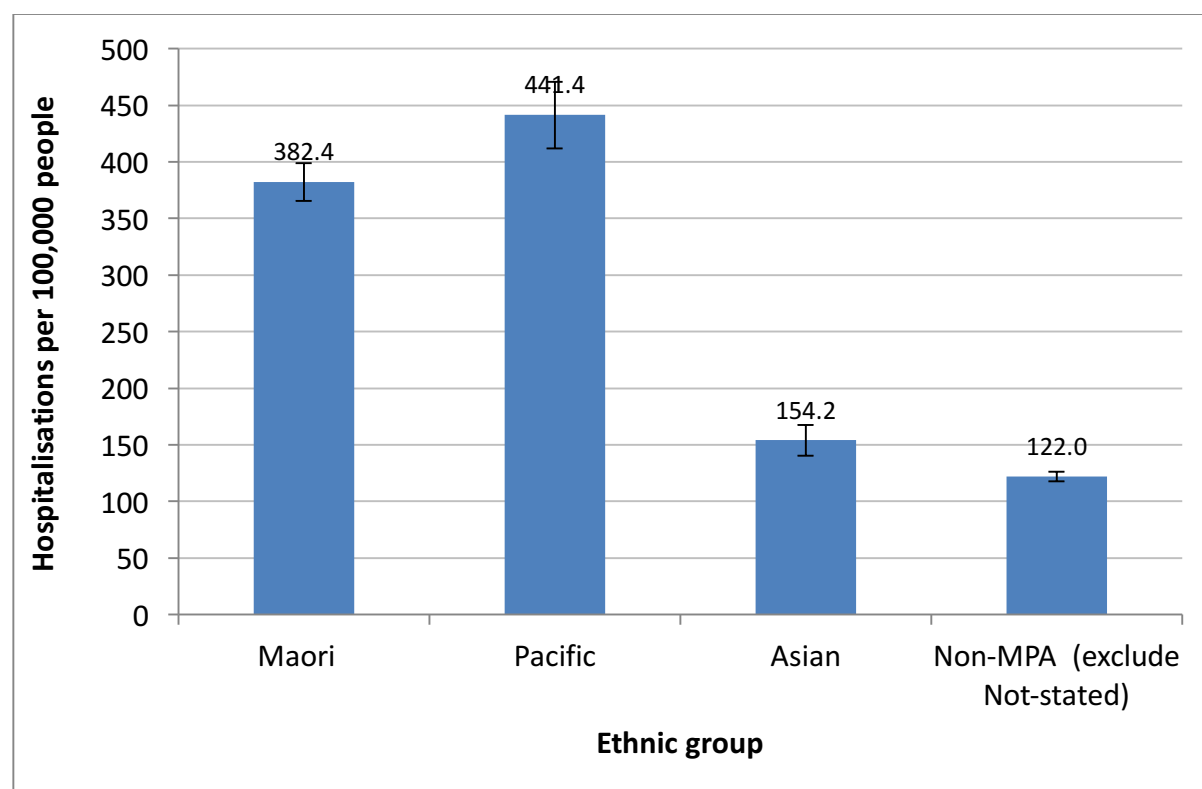
Hospitalisation also showed greater rate variation by DHB than was apparent in prevalence data. 2015 asthma hospitalisation rates were significantly lower than the national average in all South Island DHBs as well as Capital and Coast, and higher in Northland, Waikato, Bay of Plenty, Lakes, Midcentral and Whanganui DHBs (Table A 13).

Figure 8. Asthma hospitalisations per 100,000 people by age group and sex, 2015.



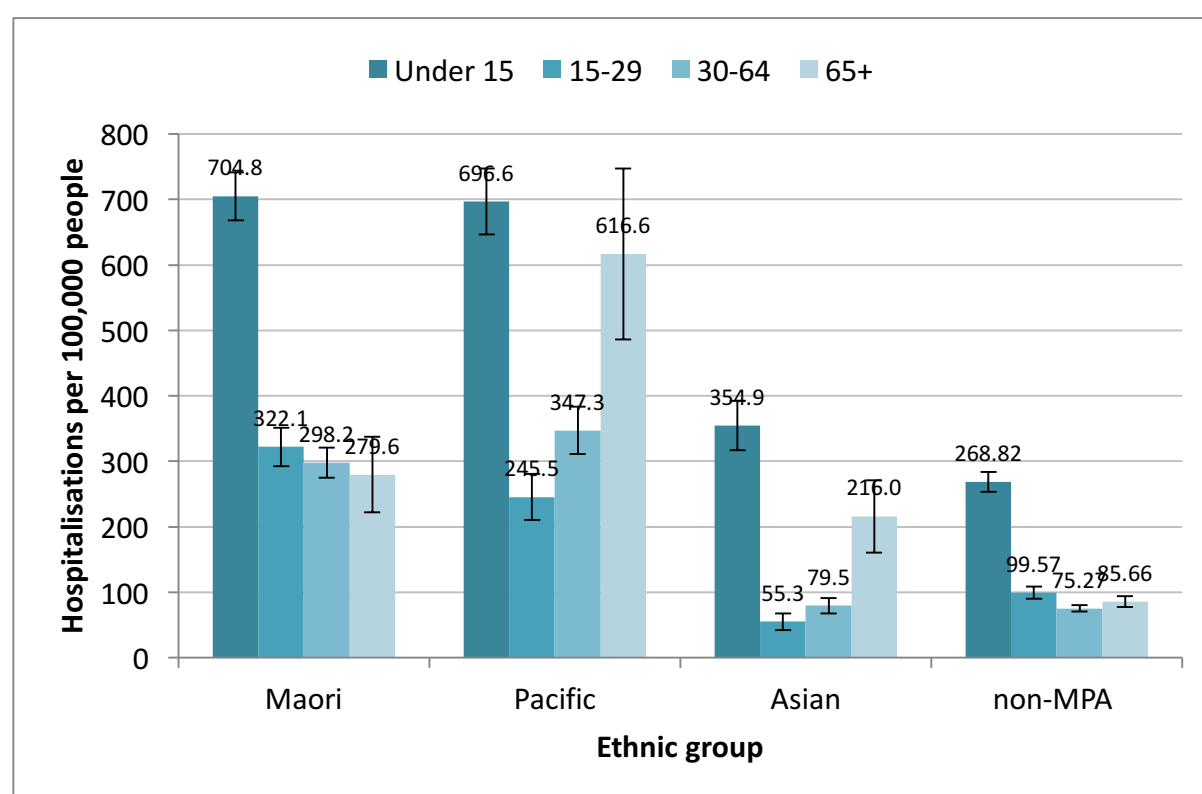
(See Table A 7 and Table A 8 for data)

Figure 9. Asthma hospitalisations per 100,000 people by ethnic group, 2015.



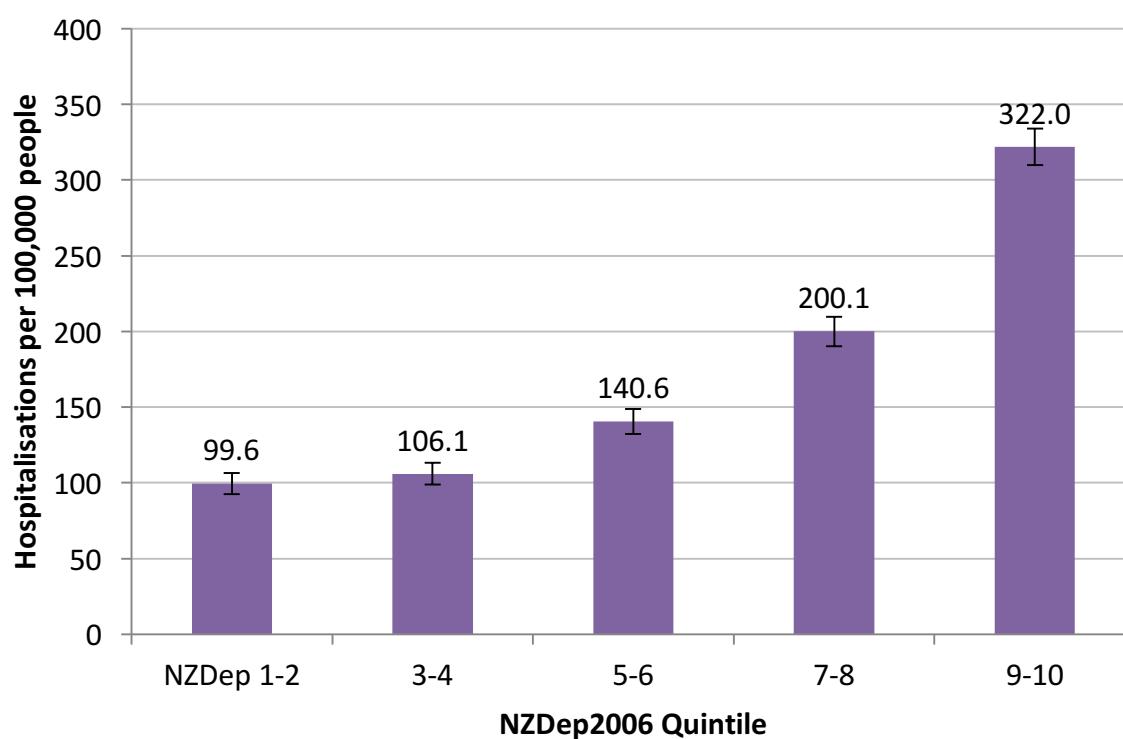
(See Table A 9 for data)

Figure 10. Asthma hospitalisations per 100,000 people by ethnic group and age group, 2015.



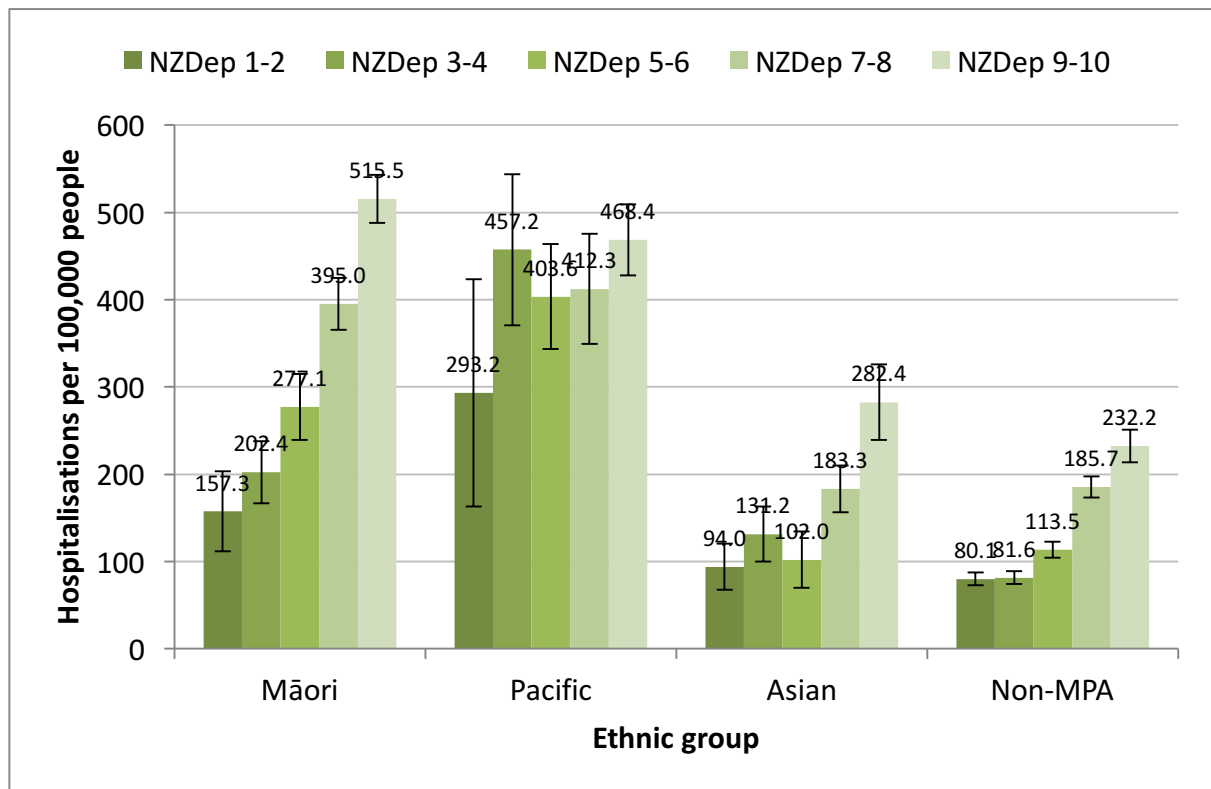
(See Table A 10 for data)

Figure 11. Asthma hospitalisations per 100,000 people by NZDep2006 quintile, 2015, age-adjusted.



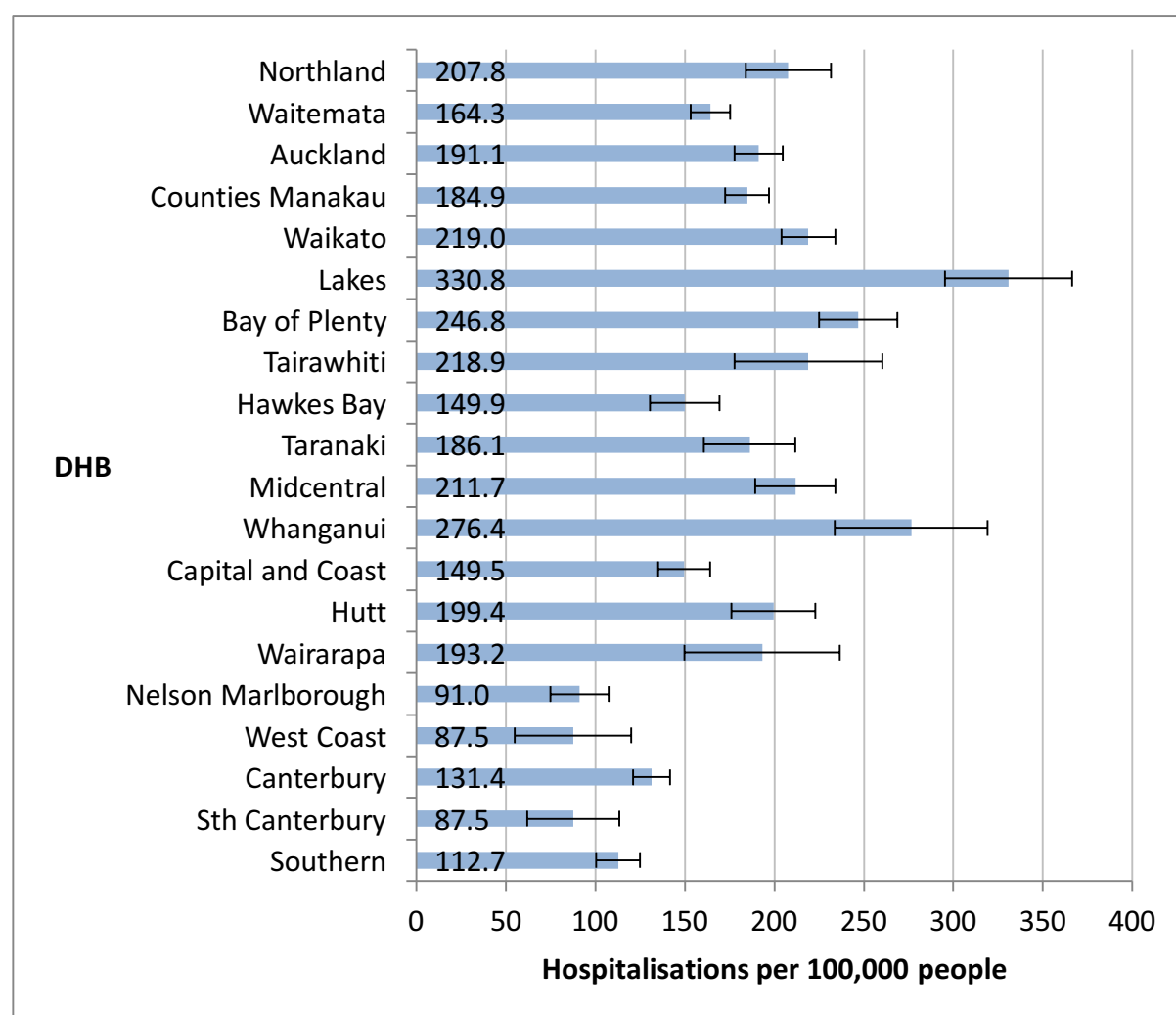
(See Table A 11 for data)

Figure 12. Asthma hospitalisations per 100,000 people by ethnic group and NZDep2006, 2015, age-adjusted.



(See Table A 12 for data)

Figure 13. Asthma hospitalisations per 100,000 people by DHB, 2015.

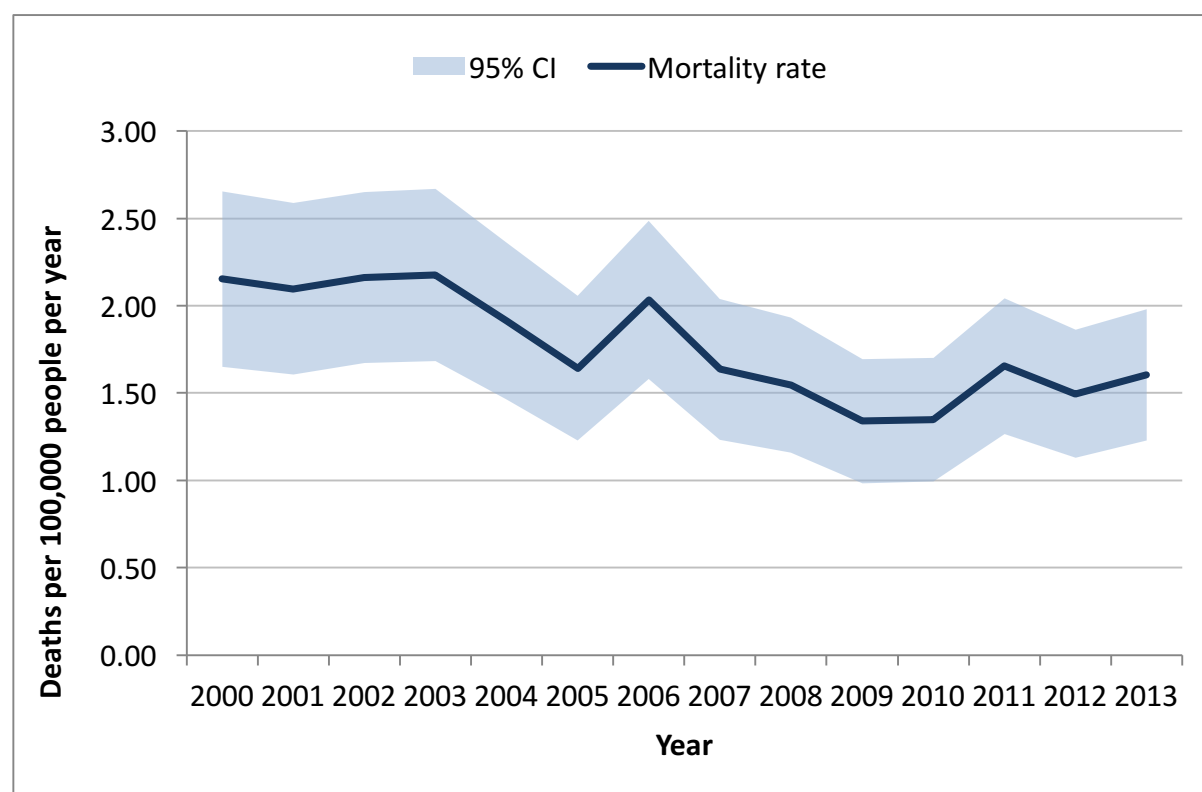


(see Table A 13 for data)

6.2.3. MORTALITY

There were 70 deaths from asthma in 2013. The asthma mortality rate reached its lowest point in 2009/2010. Rates in the seven years 2007-2013 were significantly lower than in the previous seven years.

Figure 14. Asthma mortality rates 2000-2013, age-adjusted.



(See Table A 14 for data)

Risks and determinants 2015

Asthma mortality rates were highest in people aged 65+, and higher in women than in men, though in children aged under 15 mortality rates were higher for boys (rate ratio 1.64) (Figure 15).

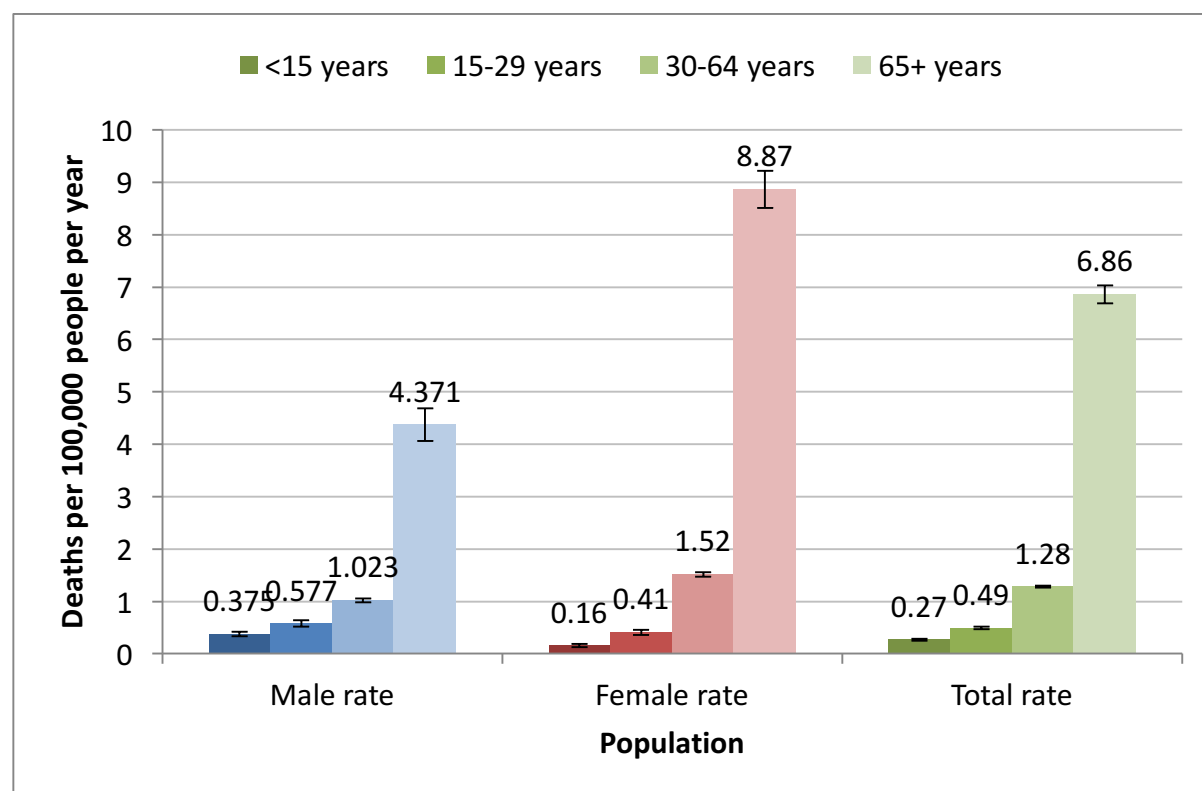
Asthma mortality rates were highest for Māori and Pacific peoples, with rates 5.1 and 4.6 times higher than rates for non-MPA (Figure 16 and Figure 17). Since the previous report, Pacific rates have dropped by 1.3, whereas Māori rates have only dropped by 0.4. As a result, Māori rates are now higher than Pacific rates, whereas Pacific rates were higher than Māori in the previous report

There were socio-economic differences in asthma mortality, with rates 3.7 times higher in the most deprived NZDep2006 quintile 9-10, and 2.7 times higher in NZDep2006 quintile 7-8, compared to the least deprived NZDep2006 quintile (Figure 18). This inequity has

worsened since the previous report. There was insufficient data to measure socioeconomic gradients across ethnic groups (Figure 19).

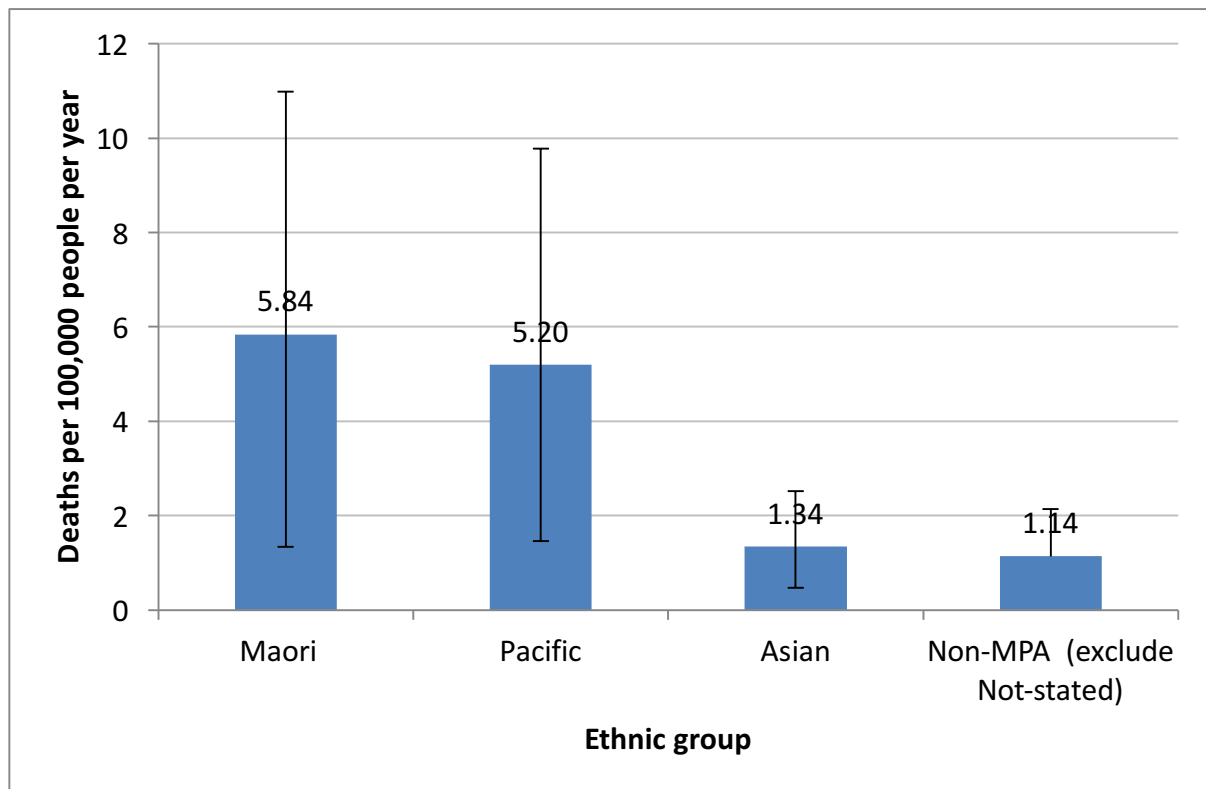
Asthma mortality rates were highest in the Tairāwhiti DHB (Figure 20), and lowest in South Canterbury.

Figure 15. Asthma deaths per 100,000 people by age group and sex, 2008-2013.



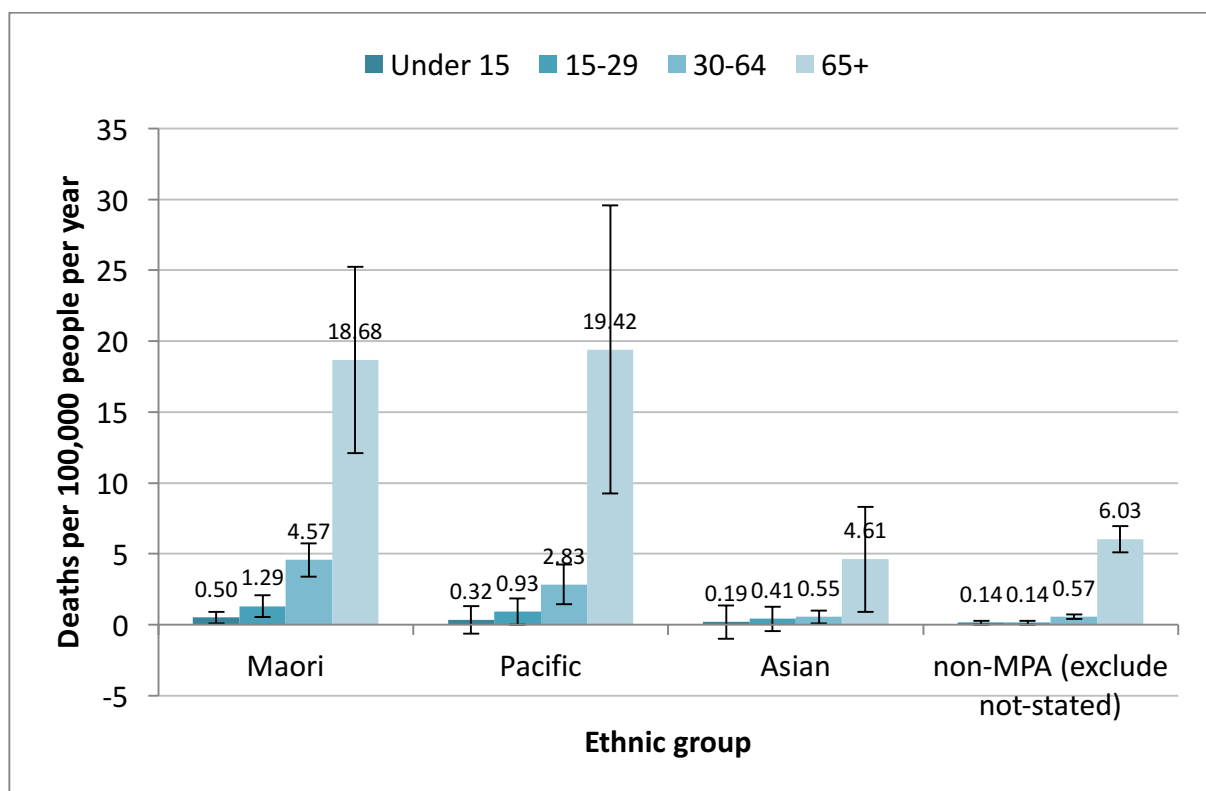
(See Table A 15 and Table A 16 for data)

Figure 16. Asthma mortality per 100,000 people per year by ethnic group, 2008-2013.



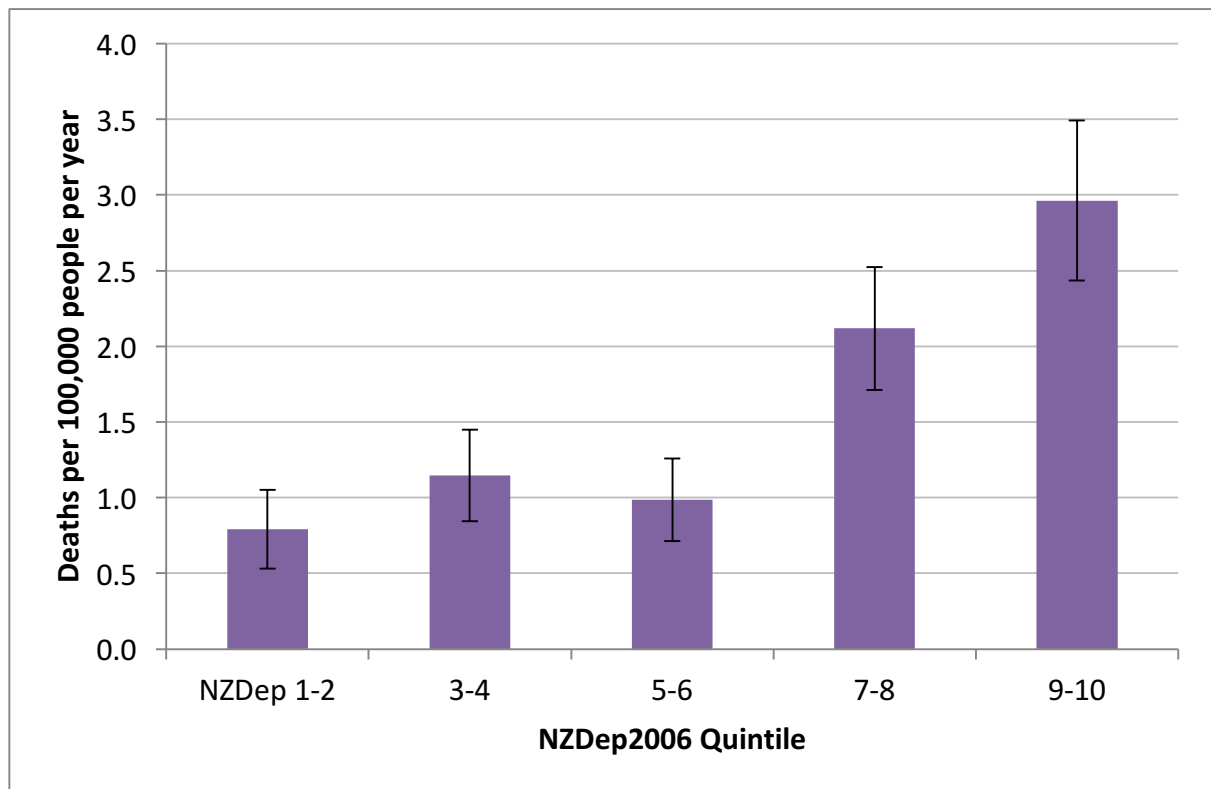
(See Table A 17 for data)

Figure 17. Asthma deaths per 100,000 people per year, by ethnic group and age group, 2008-2013.



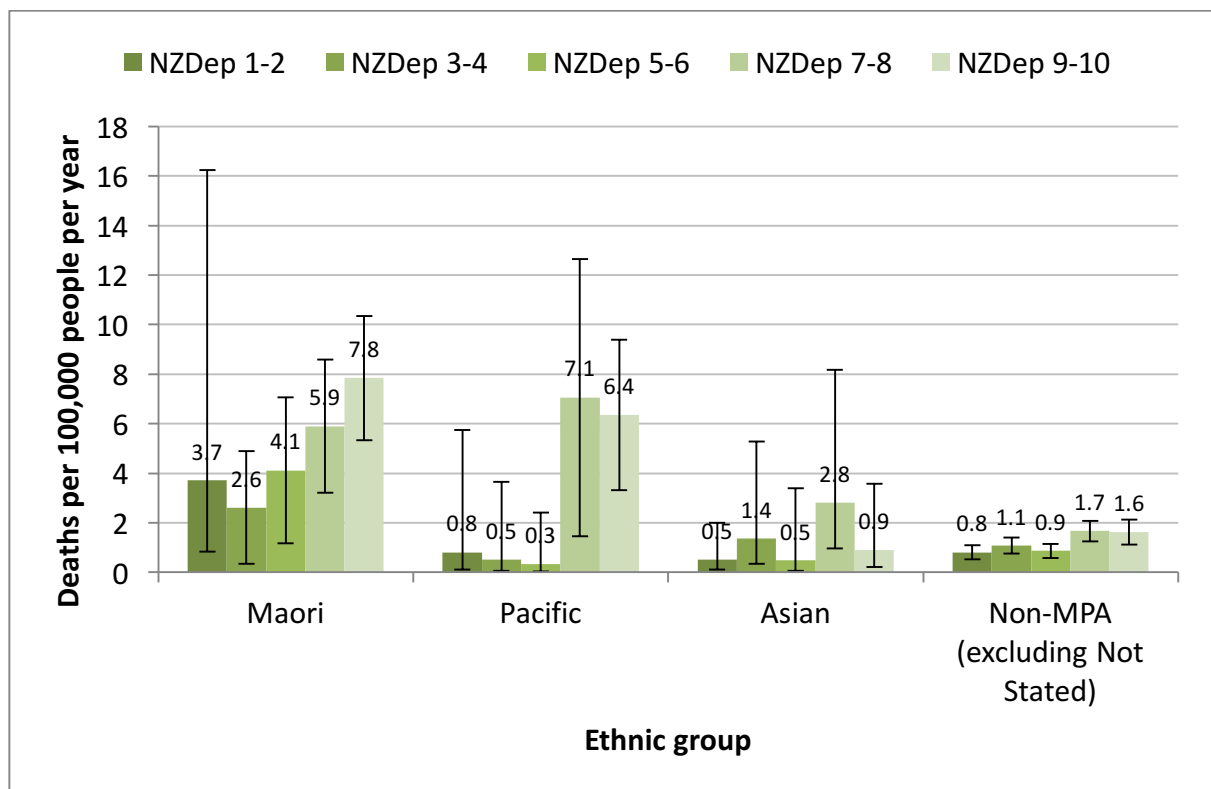
(See Table A 18 for data)

Figure 18. Asthma deaths per 100,000 people by NZDep2006 quintile, 2008-2013, age-adjusted.



(See Table A 19 for data)

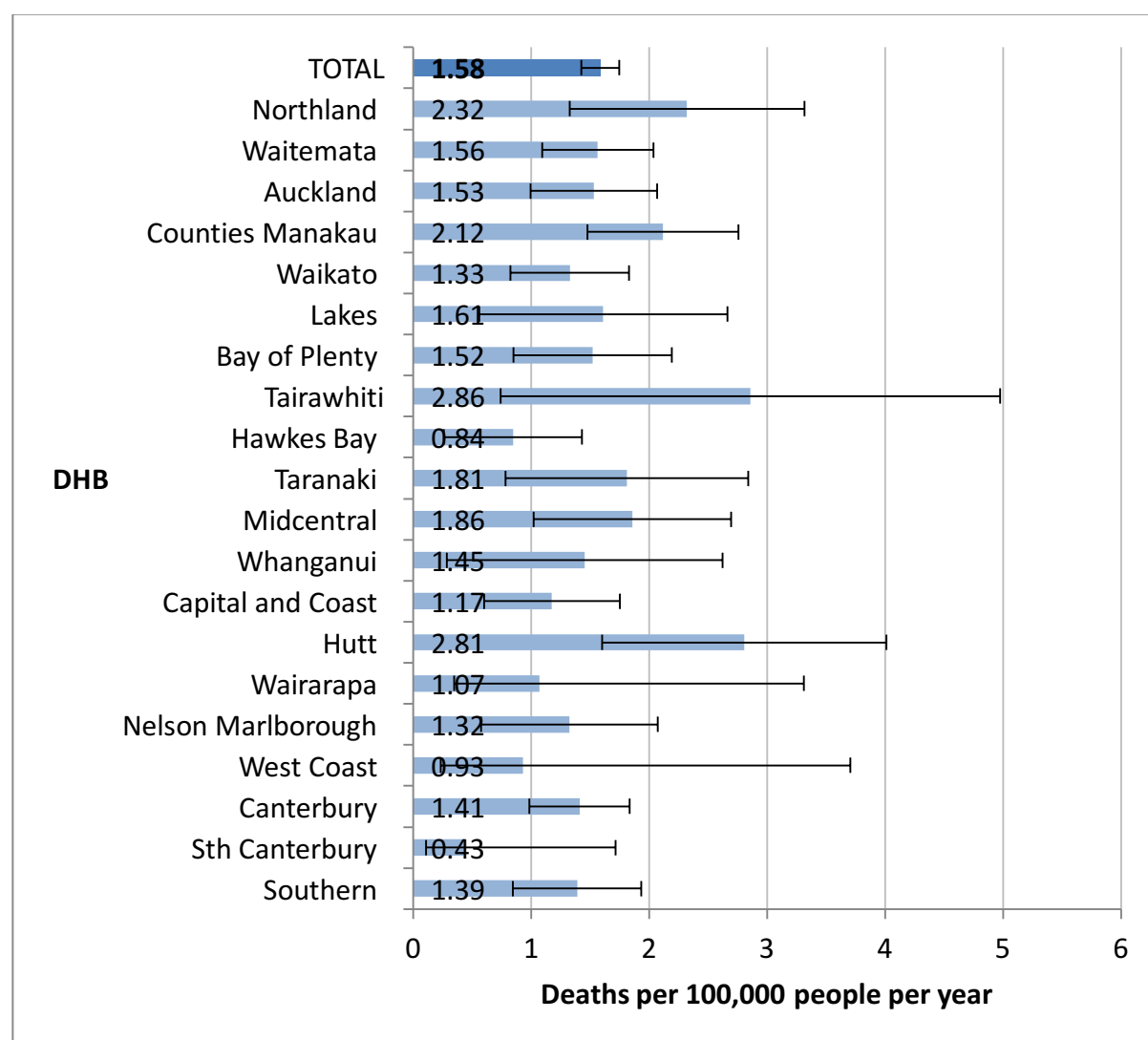
Figure 19. Asthma deaths per 100,000 people by ethnic group and NZDep2006, 2008-2013, age-adjusted.



(See Table A 20 for data)

N.B. Confidence intervals are wide. There was insufficient data to measure socio-economic gradients across ethnic groups.

Figure 20. Asthma deaths per 100,000 people per year, by DHB, 2008-2013, age-adjusted



(see Table A 21 for data)

6.3. BRONCHIECTASIS

6.3.1. PREVALENCE

We estimated the prevalence of severe bronchiectasis in 2015 by identifying living individuals hospitalised with bronchiectasis, as either primary or secondary diagnosis*, since 1988. In 2015 there were 7,258 people previously hospitalised with bronchiectasis, giving a population prevalence of 158 per 100,000 people. Prevalence was highest in Pacific peoples, with a population rate of 686.4 per 100,000, followed by Māori, with 368.2, and Asian

* Previous report included only primary diagnoses.

peoples with 139.4. Non-MPA had the lowest prevalence of severe bronchiectasis, at 102.6 people per 100,000.

6.3.2. INCIDENCE

The New Zealand incidence of new cases of bronchiectasis in children aged under 15 was estimated at 3.7 per 100,000 in 2001/2002¹⁹. “Incidence was highest in Pacific children at 17.8 compared with 4.8 in Māori, 1.5 in NZ European, and 2.4 other per 100,000 per year. Incidence varied significantly by region. The median age at diagnosis was 5.2 years; the majority had symptoms for more than two years.” There were no published studies of prevalence, nor of the incidence of bronchiectasis in New Zealand adults.

We measured the 2015 incidence of new cases of severe bronchiectasis in children aged under 15 by identifying bronchiectasis hospital admissions, and excluding cases where the patient had a previous hospital admission for bronchiectasis since 2000. We improved our methodology from the previous report by including secondary diagnoses. This measure found 99 new cases of bronchiectasis in 2015, an incidence rate of 10.8 per 100,000. Incidence was highest in Pacific children at 24.7 compared with 16.7 in Māori, 3.3 in Asian children, and 5.6 in non-MPA children. Māori and Pacific rates were markedly higher than those measured by Twiss et al in 2001/2002. Rates for Asian and non-MPA were not measured in 2001/2002.

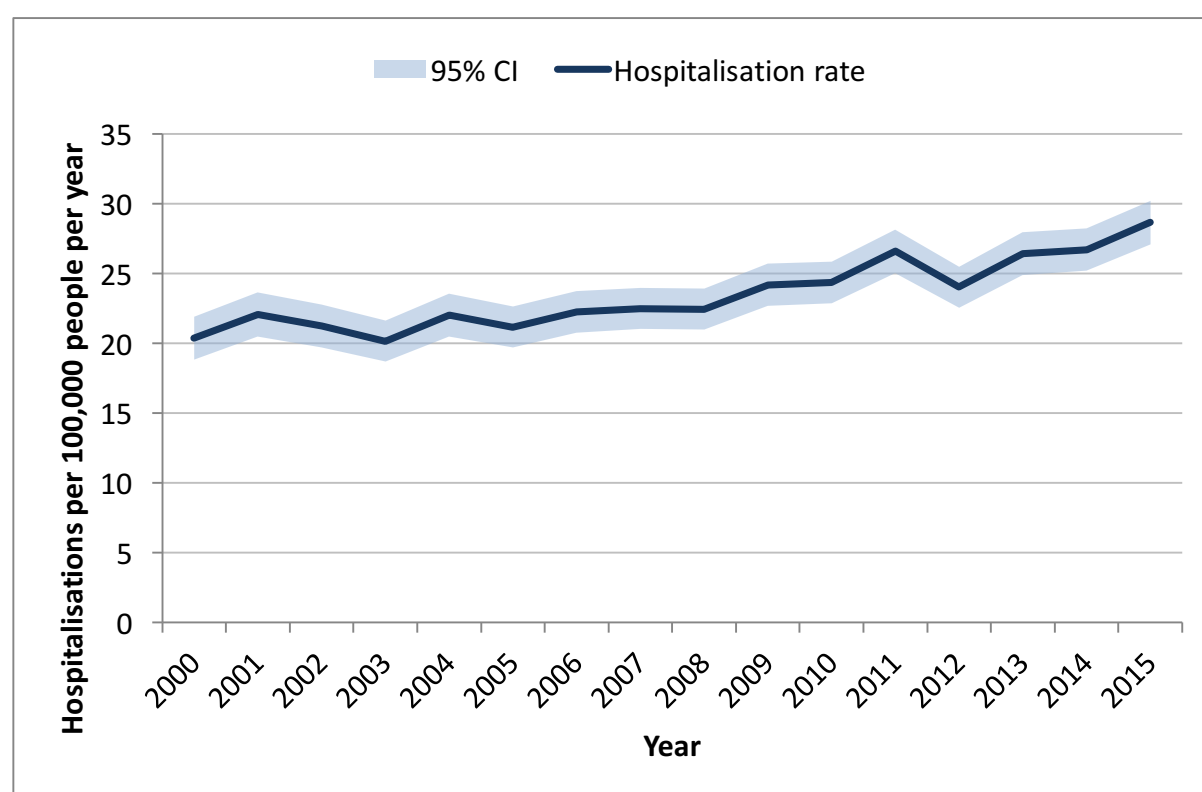
6.3.3. HOSPITALISATIONS

Bibby et al²⁰ reported rates and costs for non-cystic fibrosis bronchiectasis in the total population 2008 to 2013, by age, sex, ethnicity (European/Other, Māori, Pacific), NZDep and DHB. Their study period coincided with part of the time period of the last report, and their results were similar.

Trends over time 2000-2015

Even after adjusting for age, the bronchiectasis hospitalisation rate increased significantly over the study period (see Figure 21). The 2015 rate of 28.6 hospitalisations per 100,000 people represented an increase of 41% over the 2000 rate of 20.4 per 100,000. Personal communication with respiratory specialists suggested that some of this increase may be the result of diagnosing bronchiectasis at increasing earlier ages; this assessment is supported by changes in the age distribution of incidence.

Figure 21. Bronchiectasis hospitalisations per 100,000 people per year, 2000-2015.



(See Table A 22 for data)

Risks and determinants

Bronchiectasis hospitalisation rates were highest in the elderly, with 108.7 hospitalisations per 100,000 people aged 65+. Females rates were higher than males in all age groups.

Being of non-NZ European ethnicity was a significant risk factor for bronchiectasis hospitalisation. Pacific peoples were 8.0 times more likely to be hospitalised than NZ European/Other, Māori were 4.4 times more likely to be hospitalised, and Asian peoples 1.6 times more likely (Figure 23). Ethnic inequalities in hospitalisation rates have increased since the last report for both Māori and Pacific peoples.

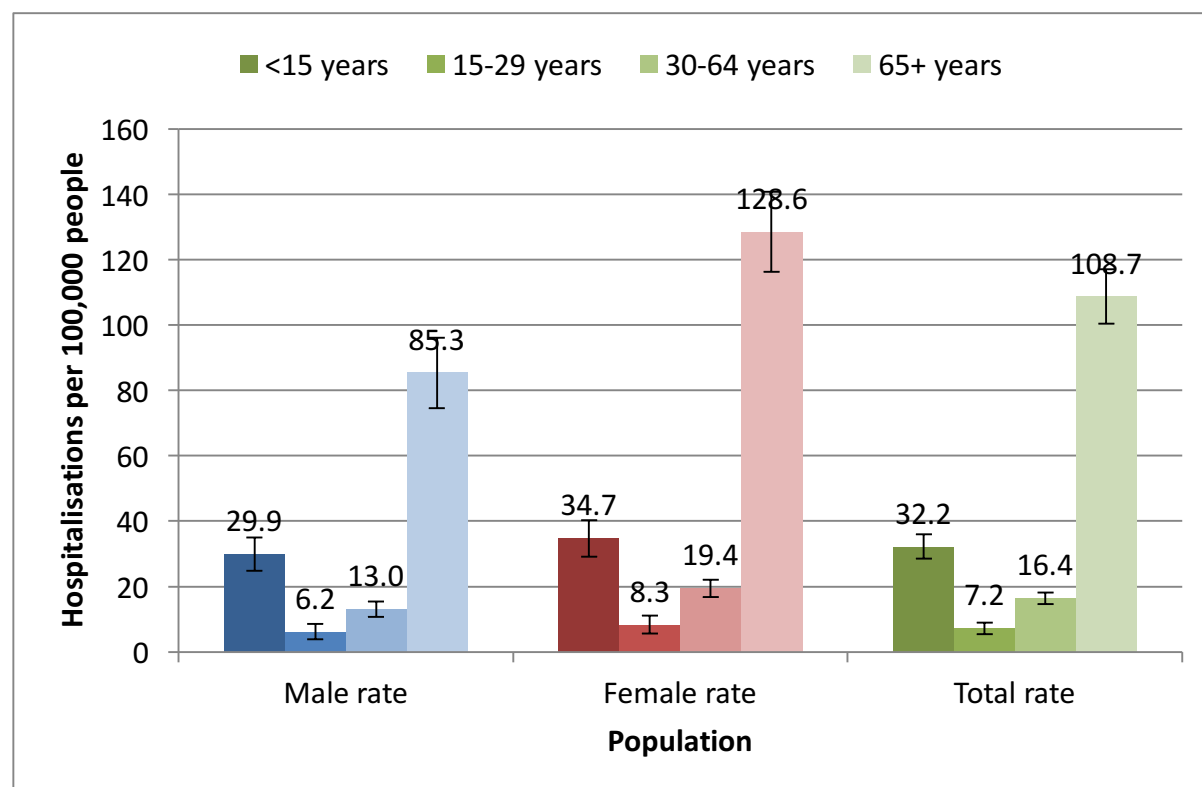
For Asian peoples, rates for children under 15 years were similar to non-MPA, but higher for older age groups, whereas for Māori and Pacific peoples the disparity showed across all age-groups. The greatest disparity by age and ethnicity was for Māori youth and young adults aged 15 to 29 years, whose bronchiectasis hospitalisation rates of 25.7 per 100,000 were 14.5 times higher than for non-MPA (Figure 24).

Bronchiectasis hospitalisations also showed strong socio-economic disparity. While rates increased gradually across the first four NZDep2013 quintiles, there was a steep increase in difference for the people living in the most deprived (NZDep 9-10) neighbourhoods, whose hospitalisation rate was not only 3.4 times higher than the wealthiest neighbourhoods, but nearly twice as high as the next most deprived NZDep 7-8 neighbourhoods (Figure 25).

The pattern of increasing rates with increasing deprivation was apparent across all ethnic groups, but the steep increase in the most deprived quintile was particularly marked for Māori (Figure 26).

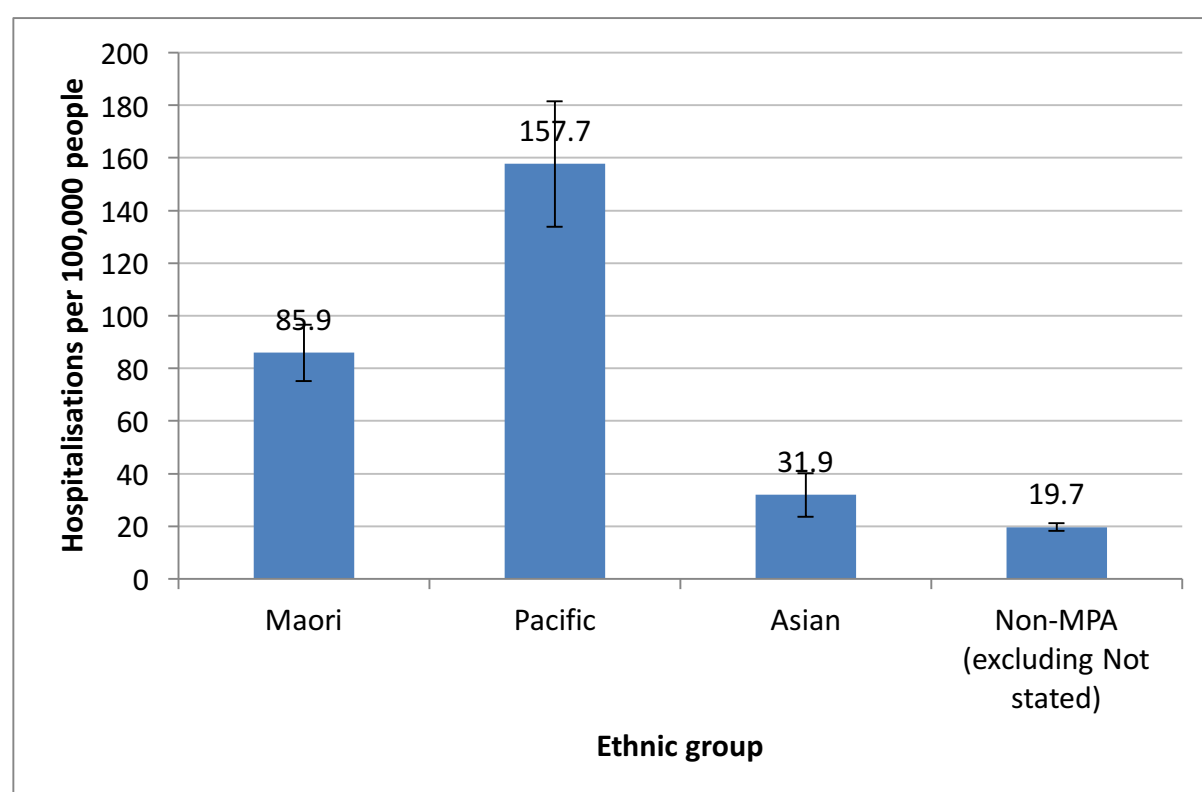
As with other respiratory illnesses, there was a rough north to south gradient in bronchiectasis hospitalisations. The highest rates were in Counties Manukau (52.1 per 100,000 people), Northland (48.6) and Auckland (48.1), compared to the national rate of 28.6 (Figure 27).

Figure 22. Bronchiectasis hospitalisations per 100,000 people by age group and sex, 2015.



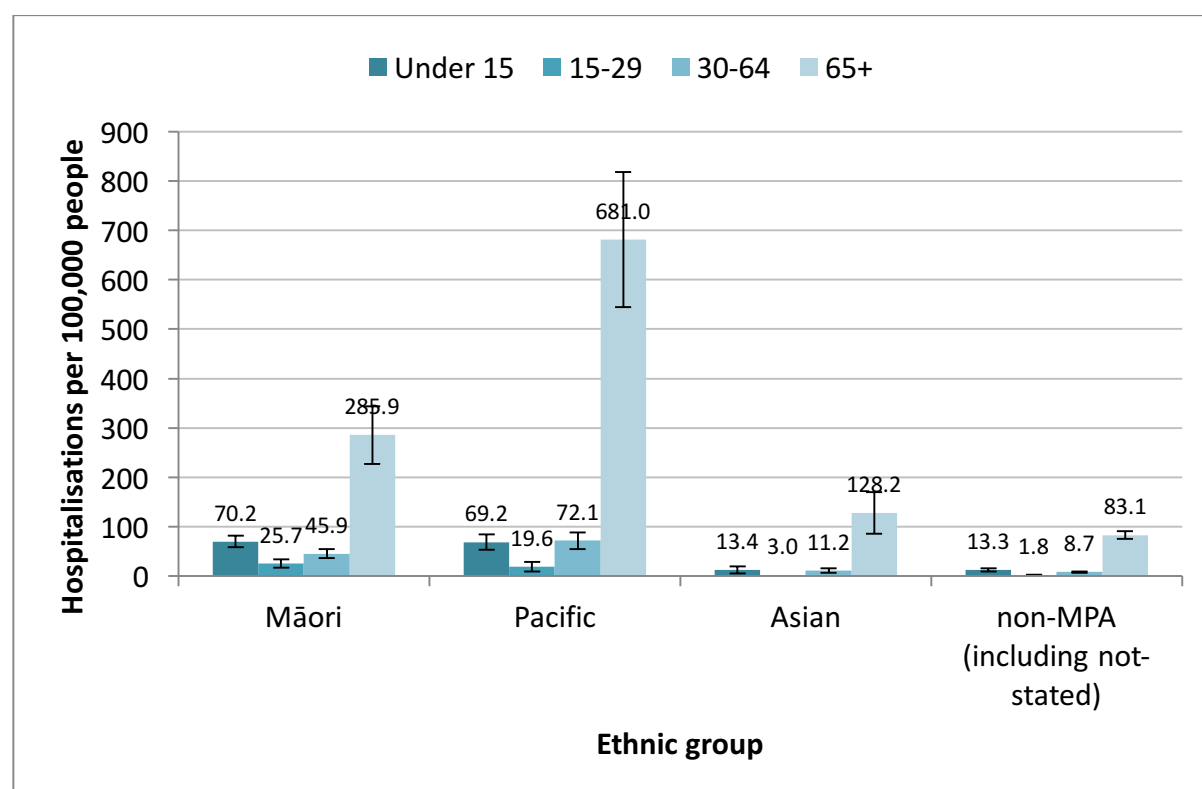
(See Table A 23 and Table A 24 for data)

Figure 23. Bronchiectasis hospitalisations per 100,000 people by ethnic group, 2015.



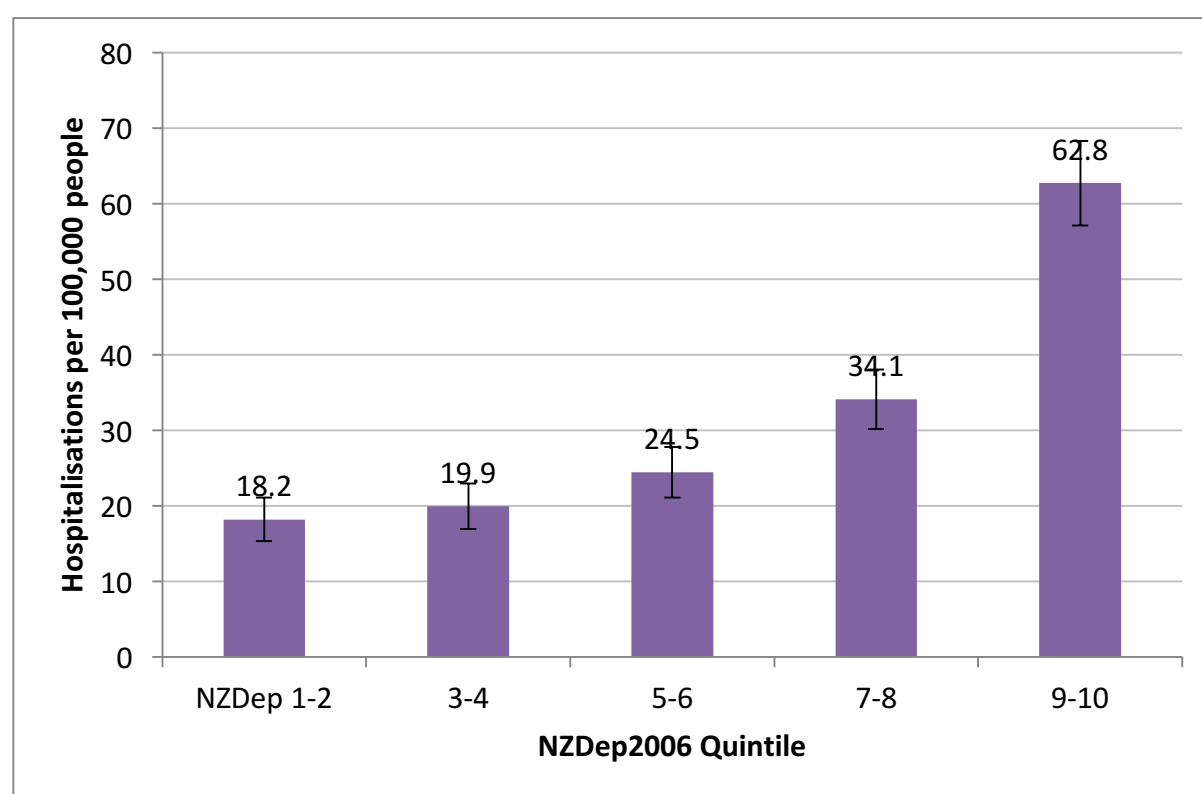
(See Table A 25 for data)

Figure 24. Bronchiectasis hospitalisations per 100,000 people by ethnic group and age group, 2015.



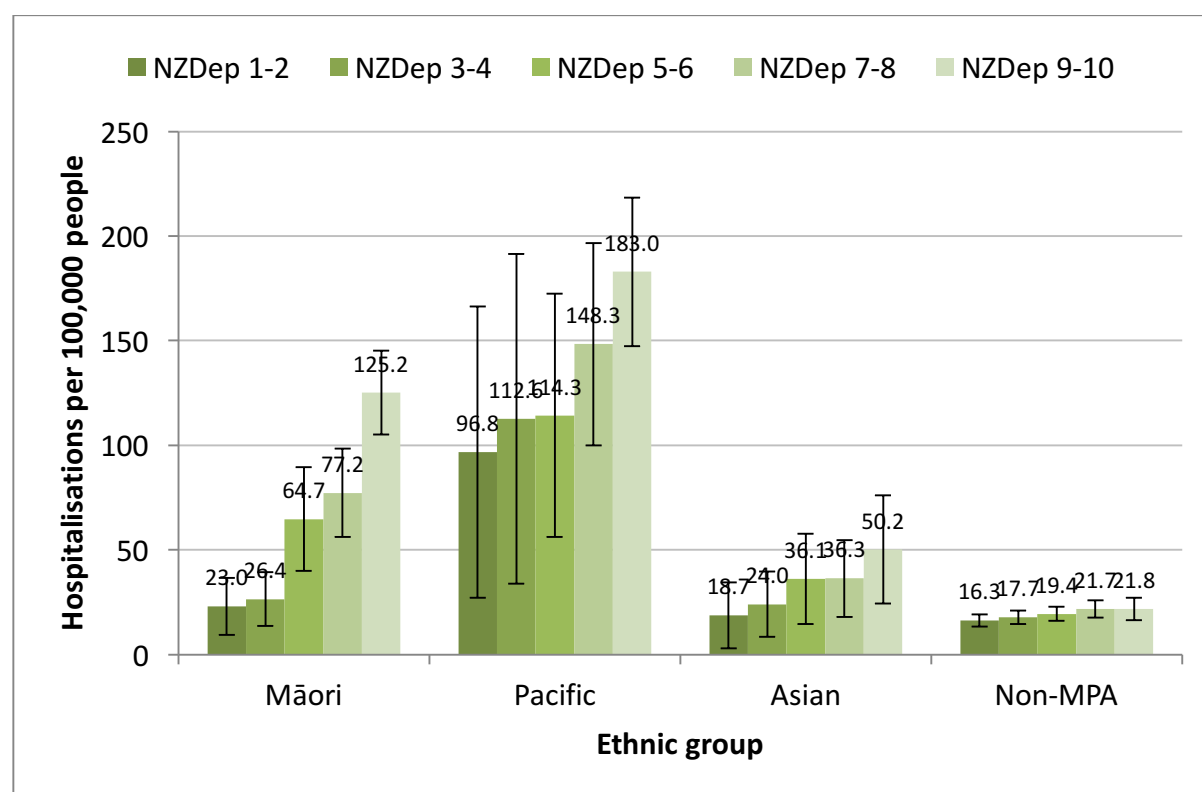
(See Table A 26 for data)

Figure 25. Bronchiectasis hospitalisations per 100,000 people by NZDep2006 quintile, 2015, age-adjusted.



(See Table A 27 for data)

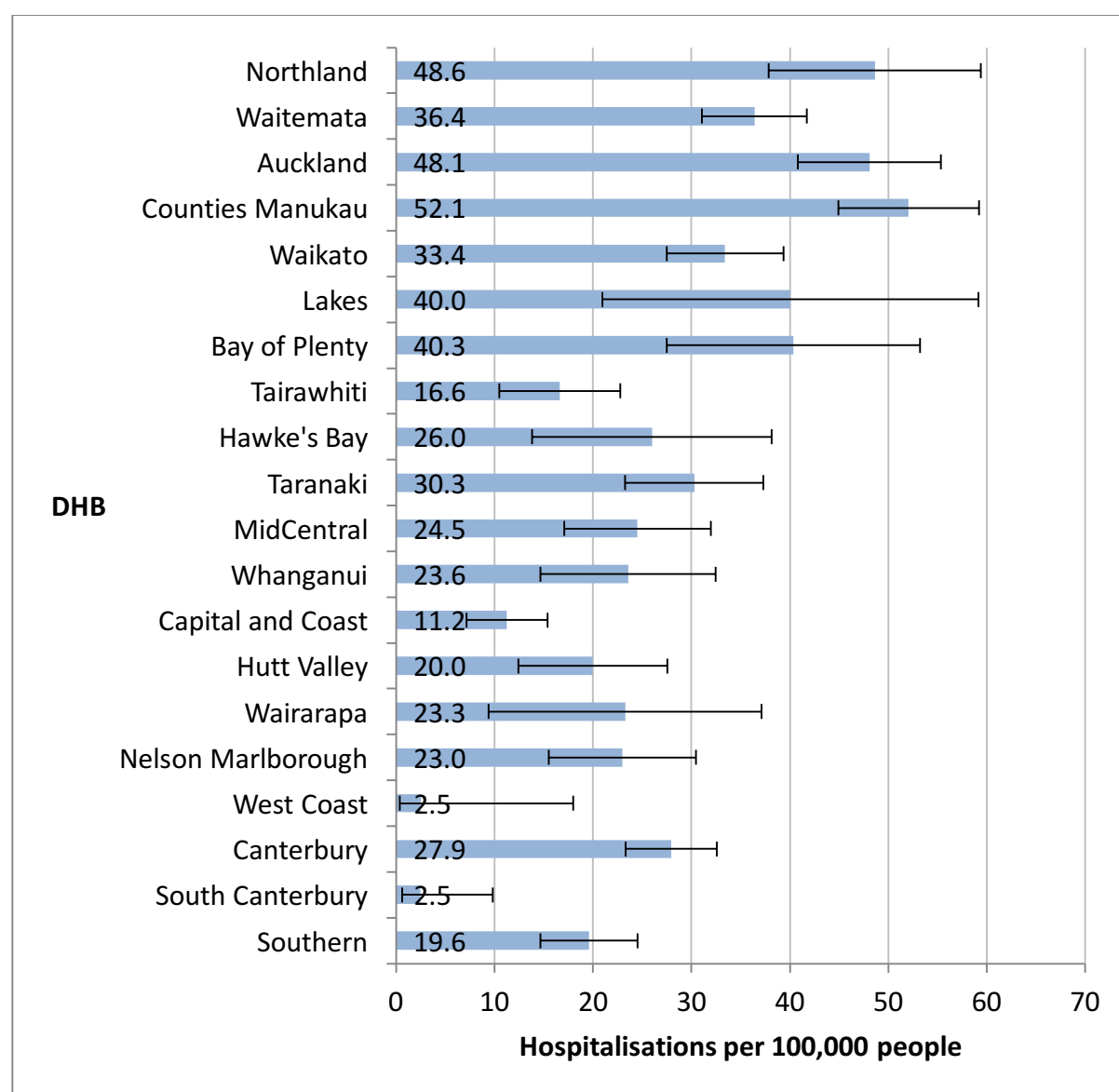
Figure 26. Bronchiectasis hospitalisations per 100,000 people by ethnic group and NZDep2006, 2015, age-adjusted.



(See Table A 28 for data)

N.B. Confidence intervals are wide for Māori, Pacific and Asian ethnic groups. Please see the associated text for interpretation.

Figure 27. Bronchiectasis hospitalisations per 100,000 people by DHB, 2015.

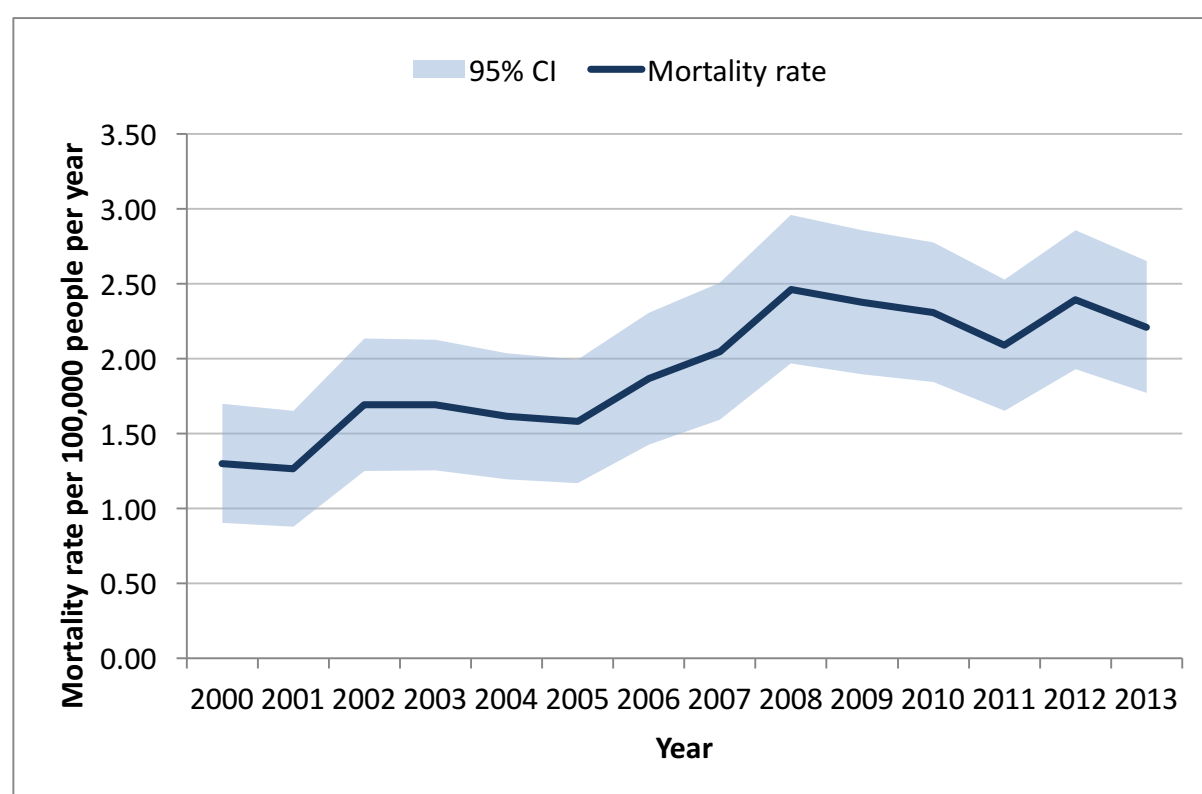


(see Table A 29 for data)

6.3.4. MORTALITY

Bronchiectasis mortality increased significantly over the study period, from 42 deaths per year in 2000-2001, to 96 deaths in 2013. This represented an age-adjusted increase of 0.09 deaths per 100,000 people per year.

Figure 28. Bronchiectasis mortality rates 2000-2013, age-adjusted.



(See Table A 30 for data)

Risks and determinants

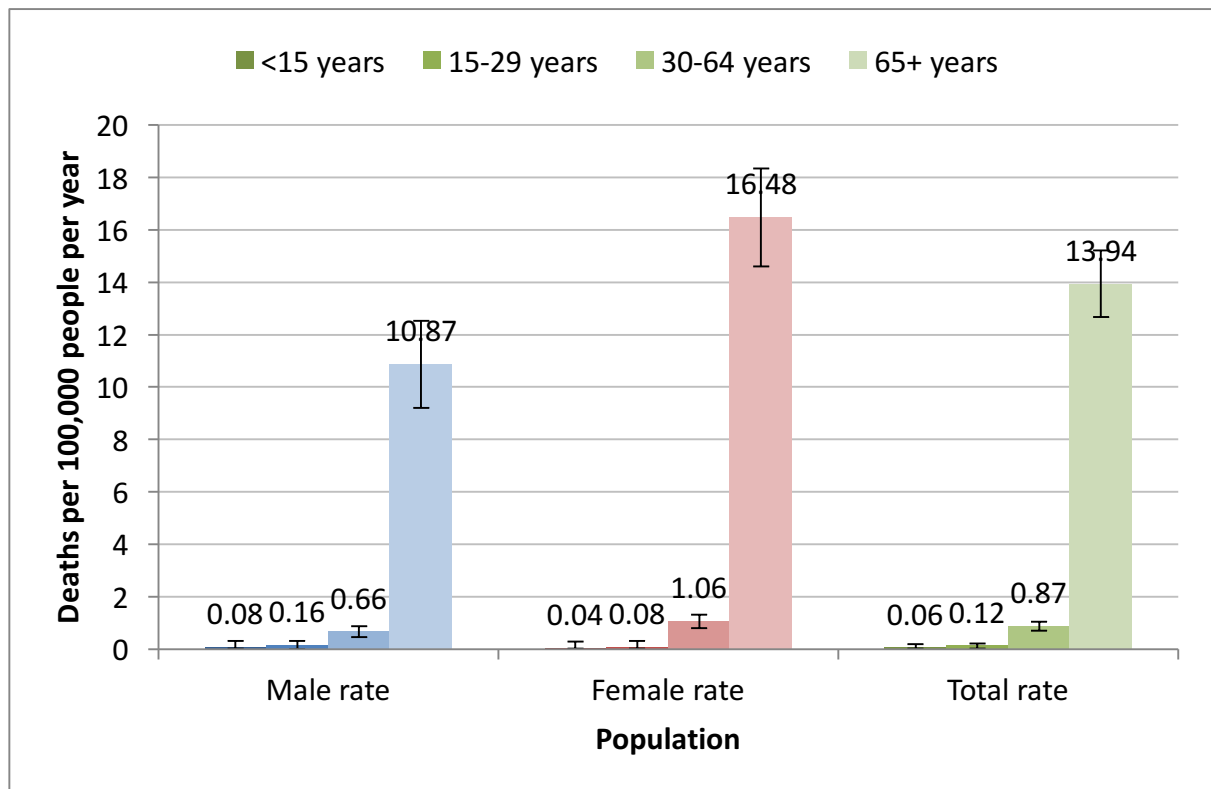
Bronchiectasis mortality rates were highest in people aged 65+, and were significantly higher in women than in men for people aged 30 and over (Figure 29).

Bronchiectasis mortality was highest for Pacific peoples, with rates 6.85 times higher than for non-MPA. Rates were also significantly higher for Māori, (rate ratio 4.17) and Asian peoples (rate ratio 2.29) (Figure 30). Most of the difference lay in differences in rates in the two older age groups (Figure 31).

There were socio-economic differences in bronchiectasis mortality. Mortality rates increased gradually across the first four NZDep2006 quintiles, then increased markedly for the most deprived quintile. Rates for NZDep2006 9-10 were 2.1 times higher than in the least deprived quintile (Figure 32). However, the gradient was not apparent when rates were broken down by ethnicity (Figure 33).

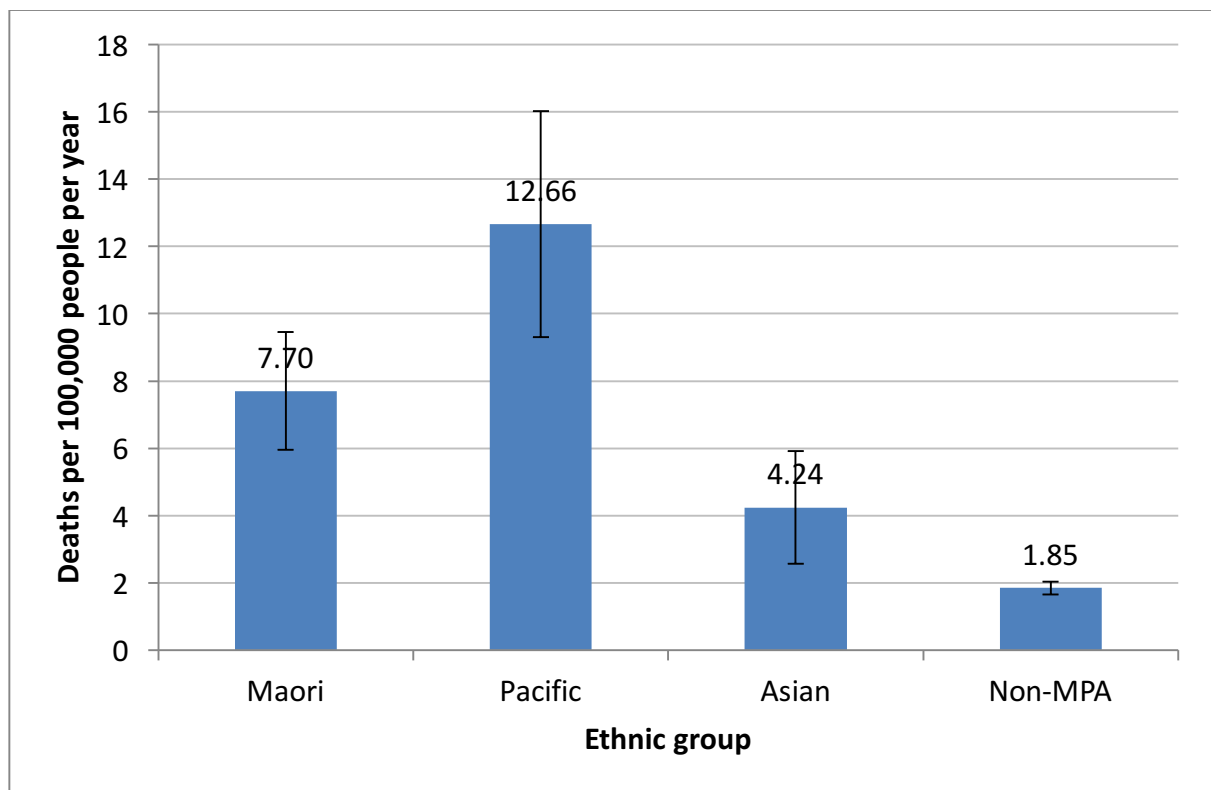
Bronchiectasis mortality rates were highest, and significantly higher than the national rate, in Counties Manukau, Auckland and Tairāwhiti DHBs, and lowest in Wairarapa, where there were no deaths due to bronchiectasis over the 2008 to 2013 study period (Figure 34). Rates were also lower than average in 7 other DHBs.

Figure 29. Bronchiectasis deaths per 100,000 people by age group and sex, 2008-2013.



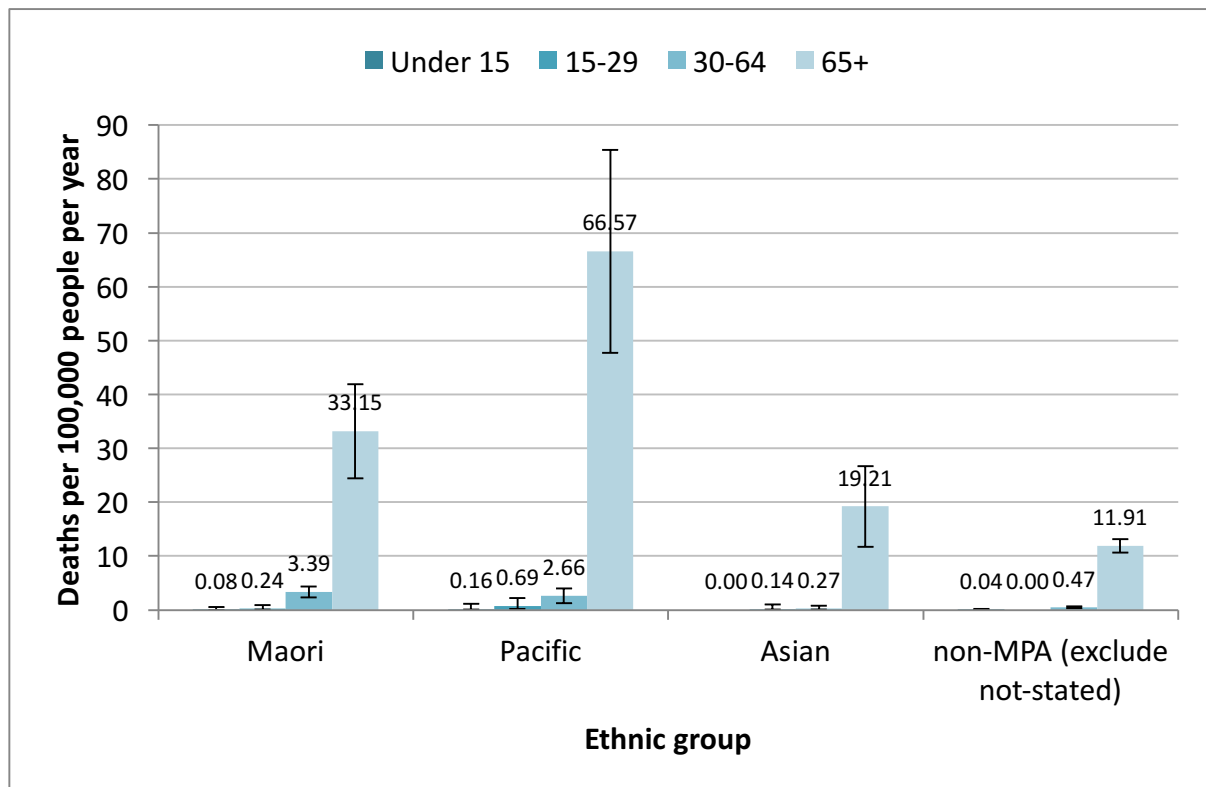
(See Table A 31 and Table A 32 for data)

Figure 30. Bronchiectasis mortality per 100,000 people per year by ethnic group, 2008-2013.



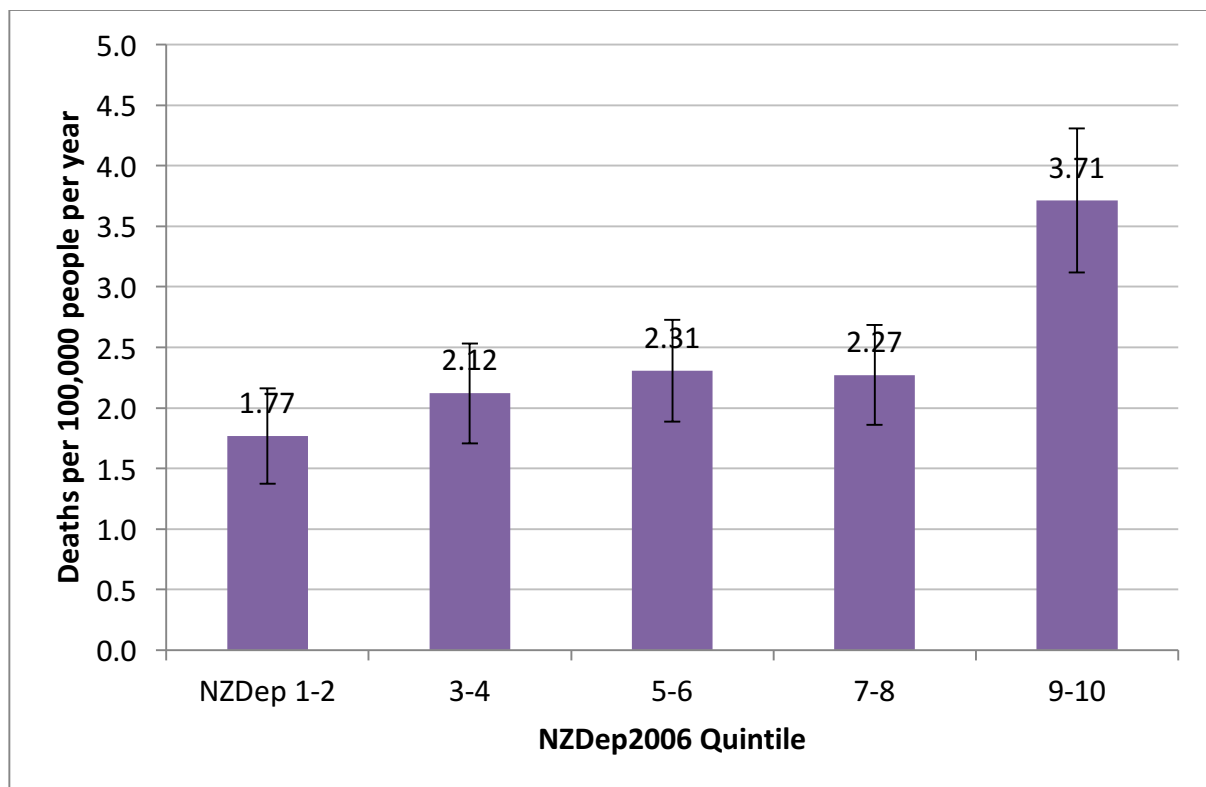
(See Table A 33 for data)

Figure 31. Bronchiectasis deaths per 100,000 people per year, by ethnic group and age group, 2008-2013.



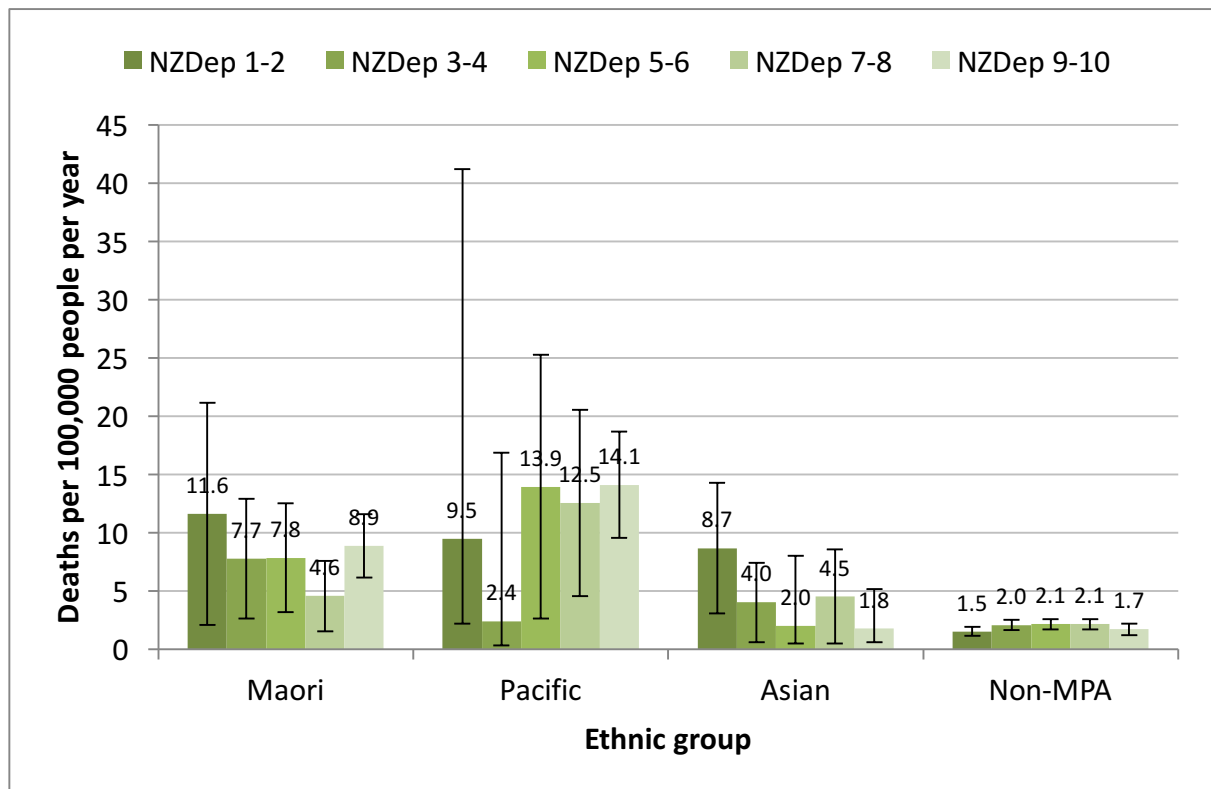
(See Table A 34 for data)

Figure 32. Bronchiectasis deaths per 100,000 people by NZDep2006 quintile, 2008-2013, age-adjusted.



(See Table A 35 for data)

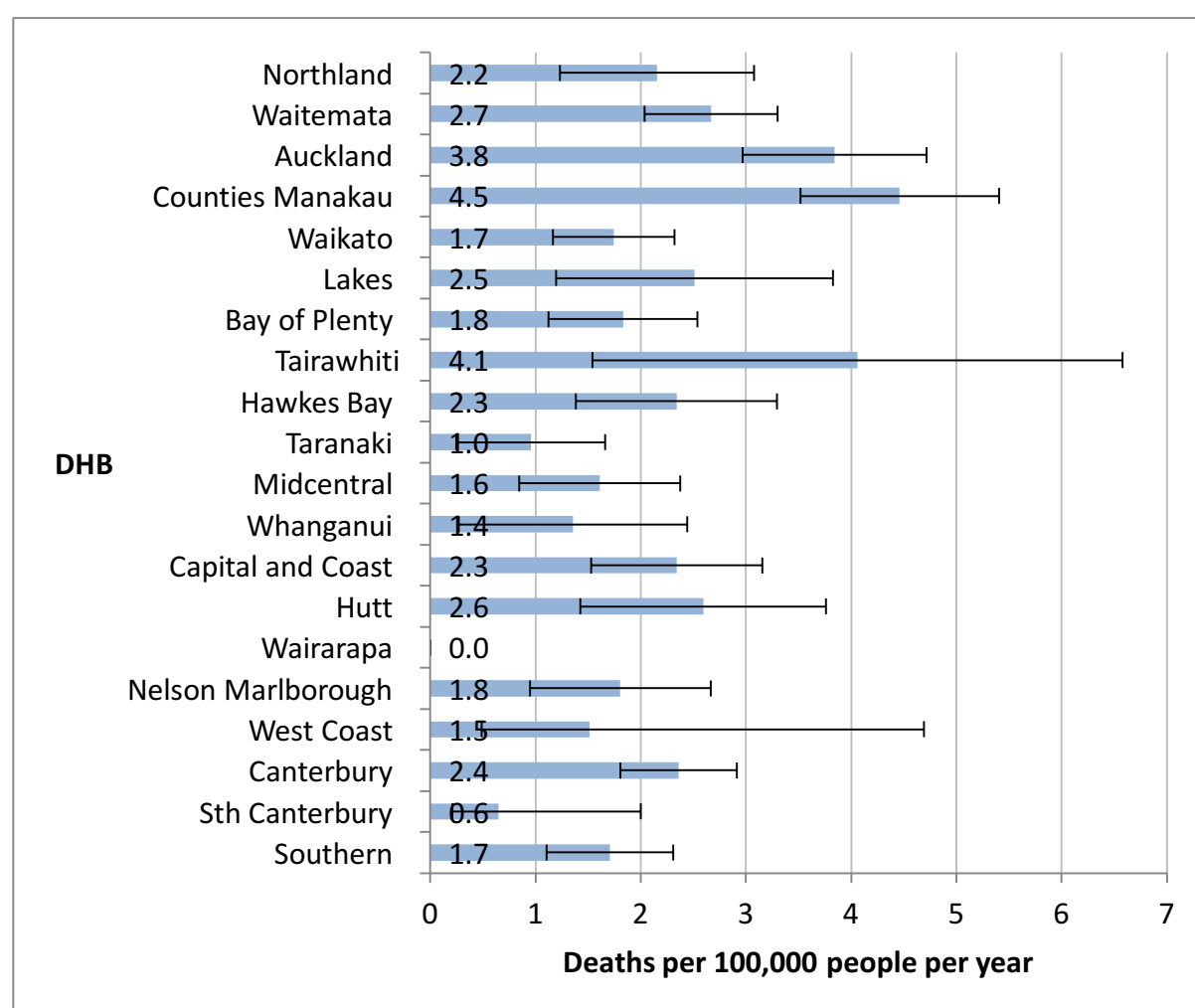
Figure 33. Bronchiectasis deaths per 100,000 people by ethnic group and NZDep2006, 2008-2013, age-adjusted.



(See Table A 36 for data)

N.B. Confidence intervals are too wide to establish a trend across quintiles for Māori, Pacific or Asian ethnic groups.

Figure 34. Bronchiectasis deaths per 100,000 people per year, by DHB, 2006-2011, age-adjusted



(see Table A 37 for data)

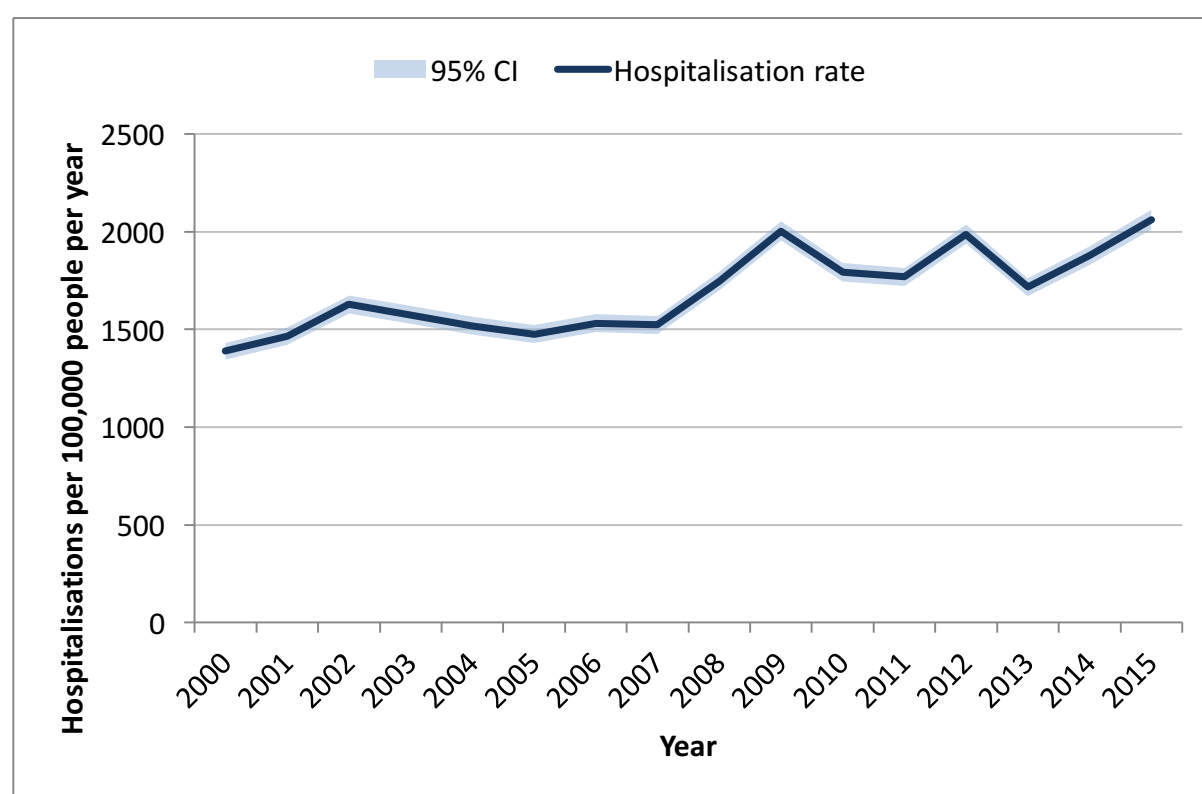
6.4. CHILDHOOD BRONCHIOLITIS

6.4.1. HOSPITALISATIONS

Trends over time 2000-2013

Childhood bronchiolitis hospitalisation rates have increased significantly over the study period (see Figure 35), by an estimated 37 hospitalisations per year. The overall hospitalisation rate has increased by nearly a half over the study period.

Figure 35. Childhood bronchiolitis hospitalisations per 100,000 people per year, 2000-2015.



(See Table A 38 for data)

Risks and determinants

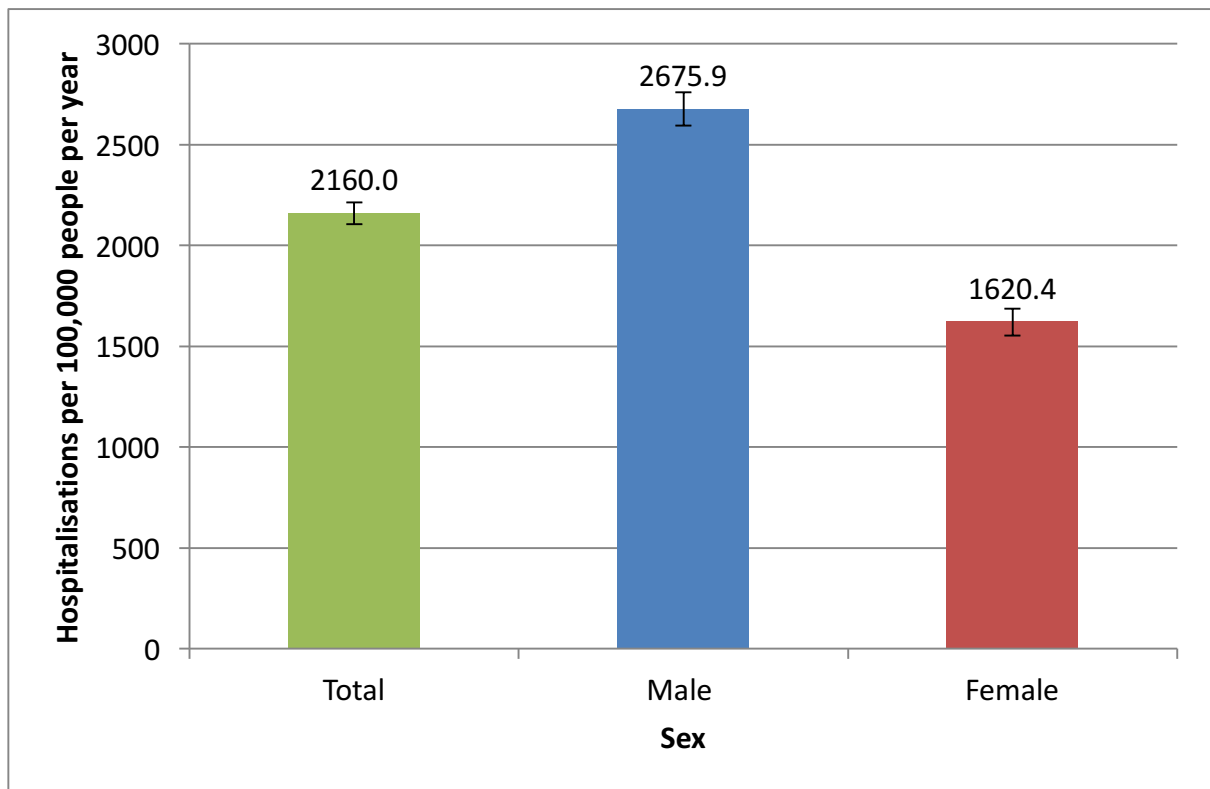
As with other childhood respiratory illness, bronchiolitis hospitalisation rates were higher for boys than for girls (rate ratio 1.65) (Figure 36).

Rates were lowest for non-MPA children, at 955.7 per 100,000, highest for Pacific children, at 4806.1 per 100,000, and also high for Māori, at 4118.3, and Asian at 1025.0 per 100,000 children (Figure 37). These differences were significant: Pacific rates were 5.0 times higher than non-MPA, Māori rates 4.3 times higher, and Asian rates 1.1 times higher than non-MPA rates.

As with bronchiectasis, the deprivation gradient was exponential rather than linear. There were 3161 bronchiolitis hospitalisations for children in the most deprived neighbourhoods, making their rates 5.2 times the 439 hospitalisations in the least deprived neighbourhoods (Figure 38). NZDep 9-10 rates were significantly higher than NZDep 1-2 for all ethnic groups. The combined effect of ethnicity and deprivation meant that Māori and Pacific children in the most deprived quintile were more than seven times as likely to be hospitalised as NZ European/Other children in the wealthiest quintile (Figure 39).

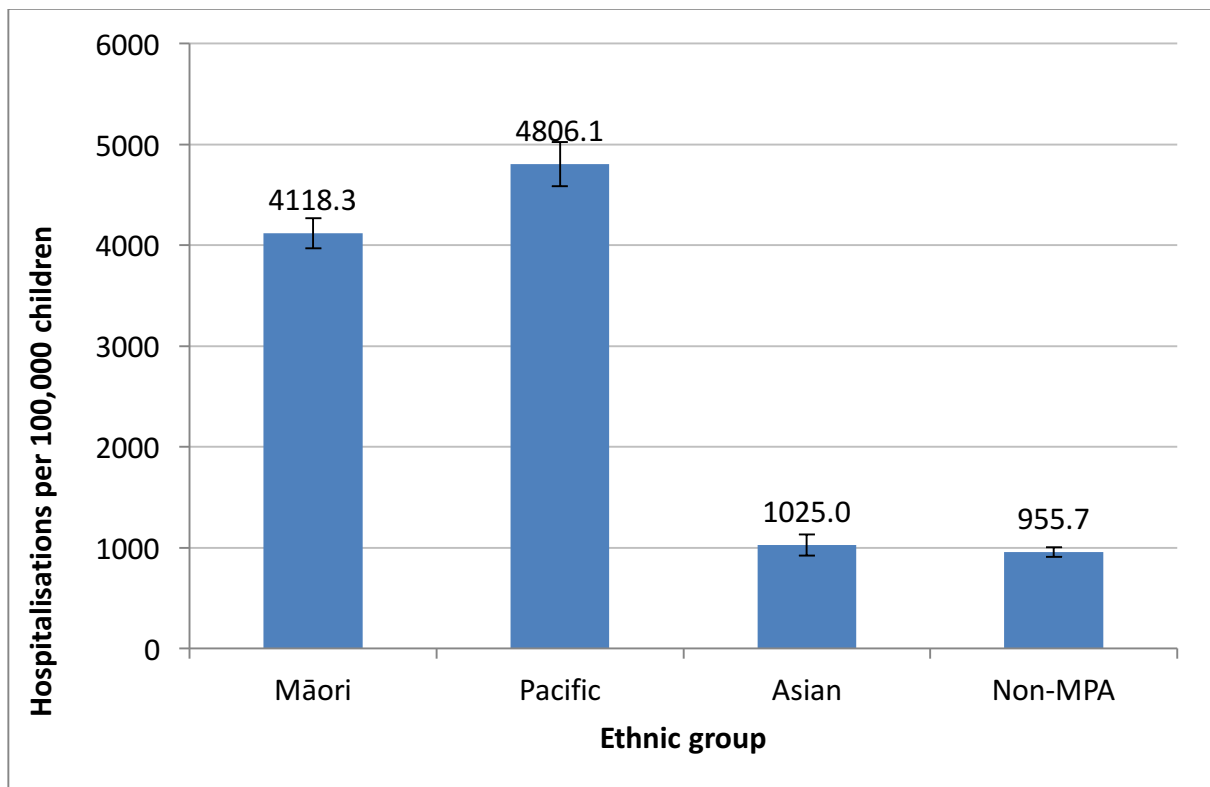
Across DHBs, childhood bronchiolitis rates were highest in Lakes, Northland and Counties Manukau and lowest in West Coast, South Canterbury and Nelson Marlborough (Figure 40).

Figure 36. Childhood bronchiolitis hospitalisations per 100,000 people by sex, 2015.



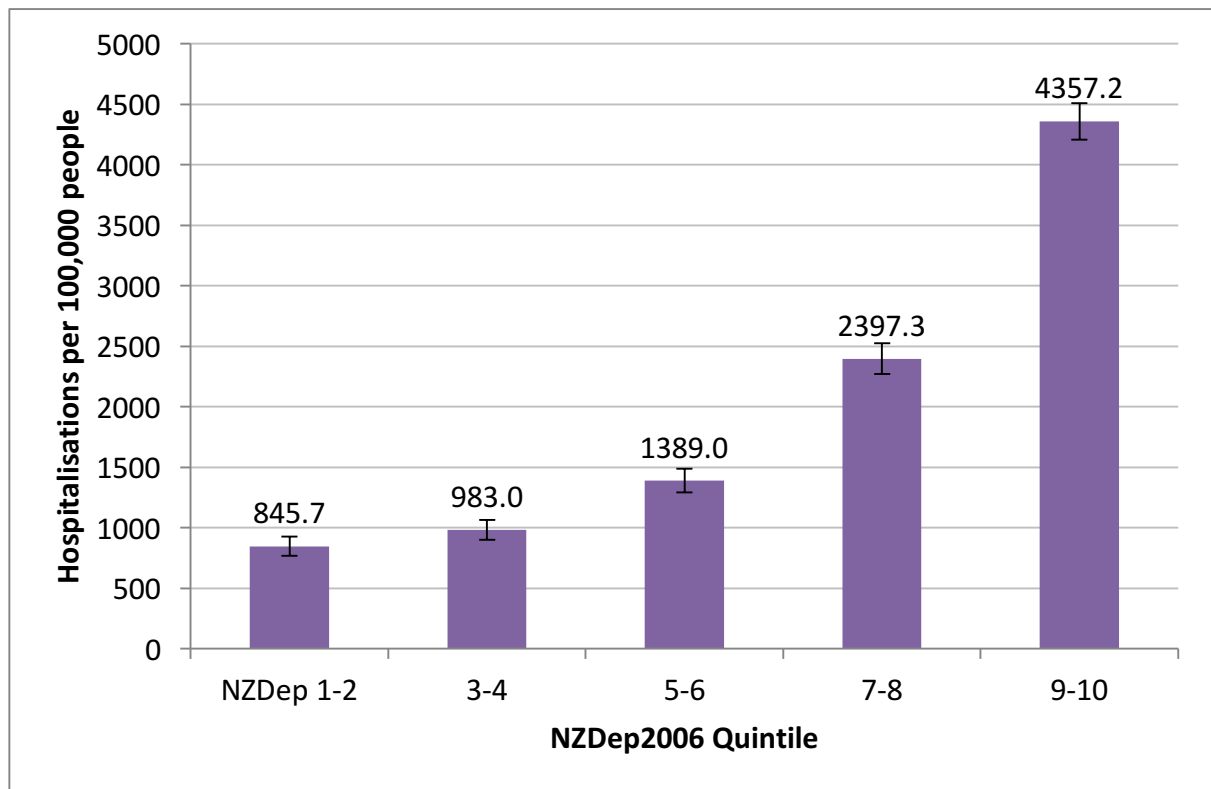
See Table A 39 for data

Figure 37. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2015.



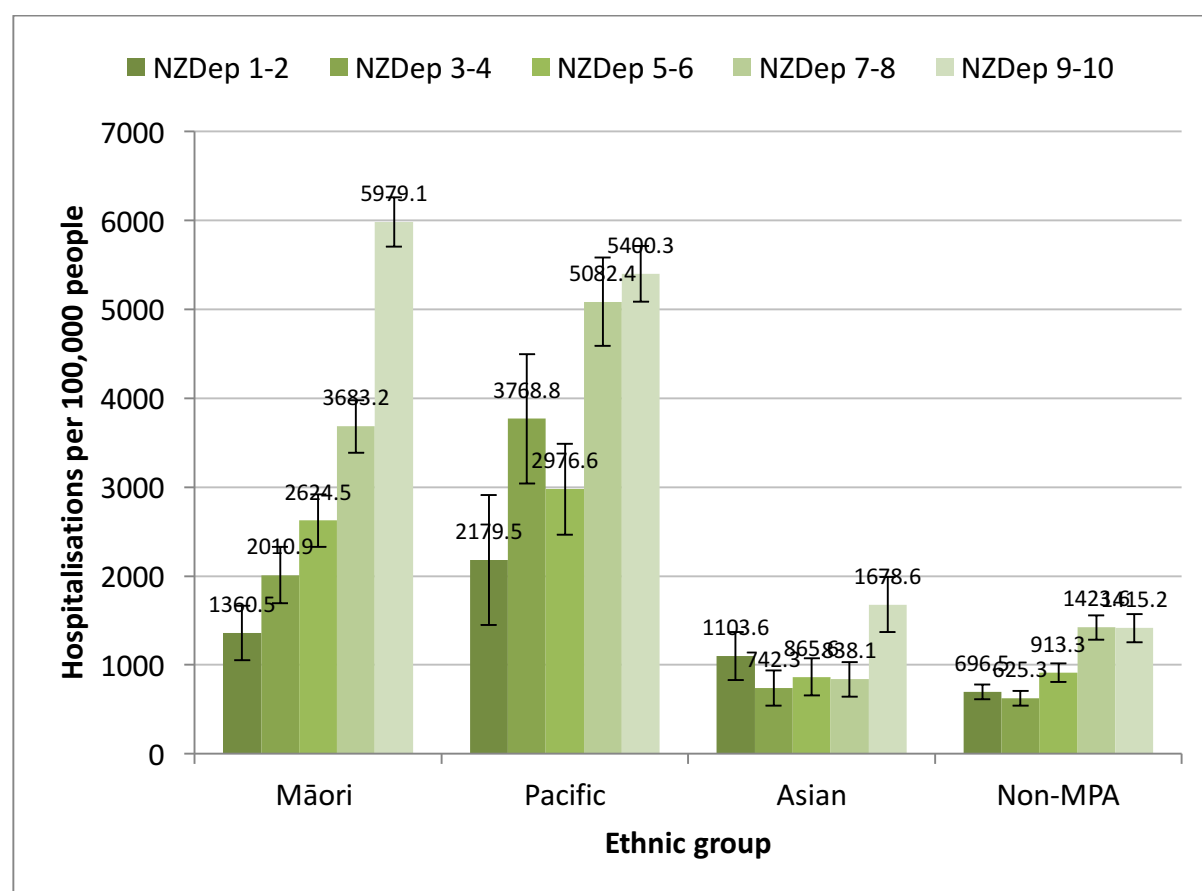
(See Table A 40 for data)

Figure 38. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2006 quintile, 2015, age-adjusted.



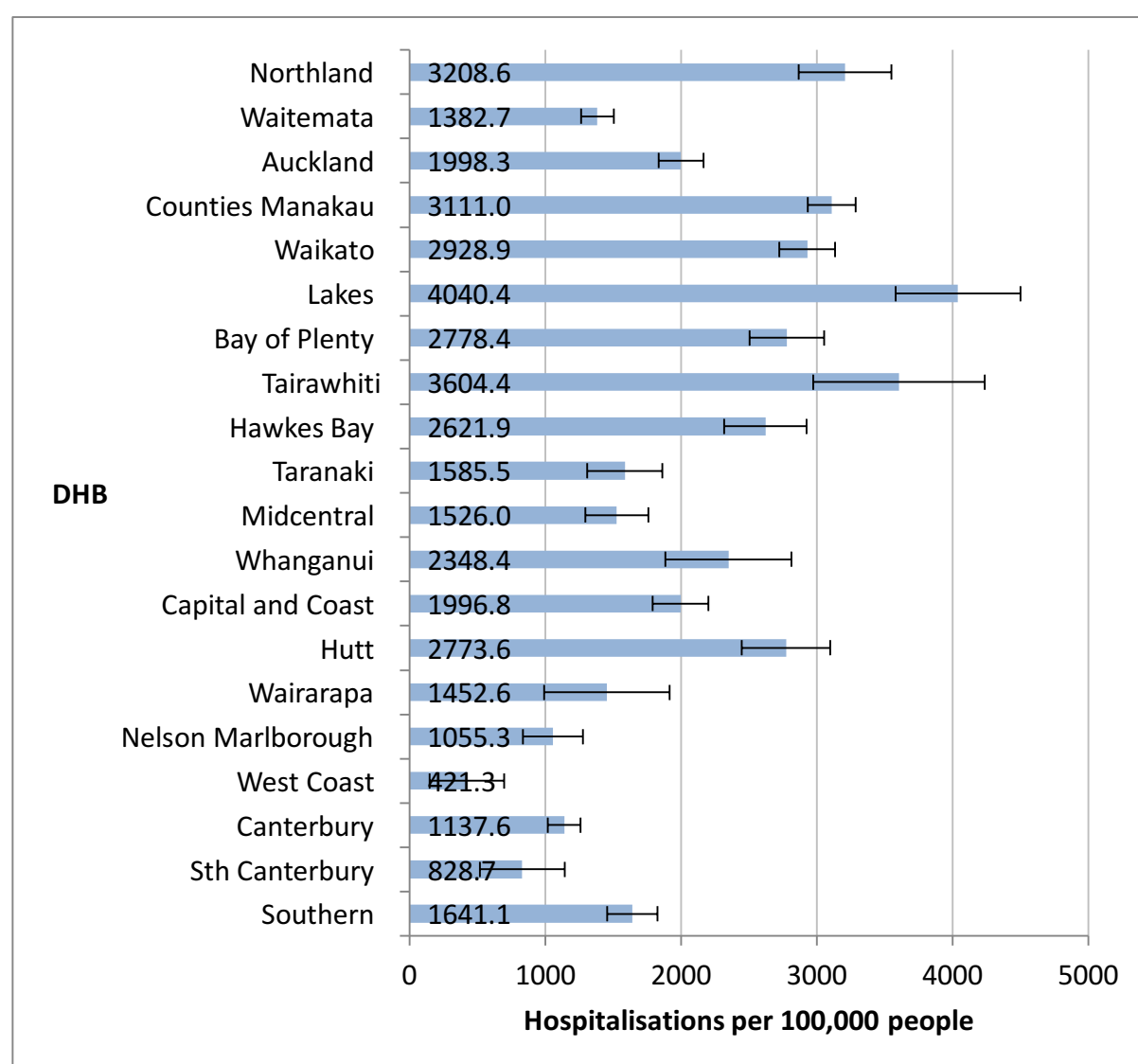
(See Table A 41 for data)

Figure 39. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group and NZDep2006, 2015, age-adjusted.



(See Table A 42 for data)

Figure 40. Childhood bronchiolitis hospitalisations per 100,000 people by DHB, 2015.

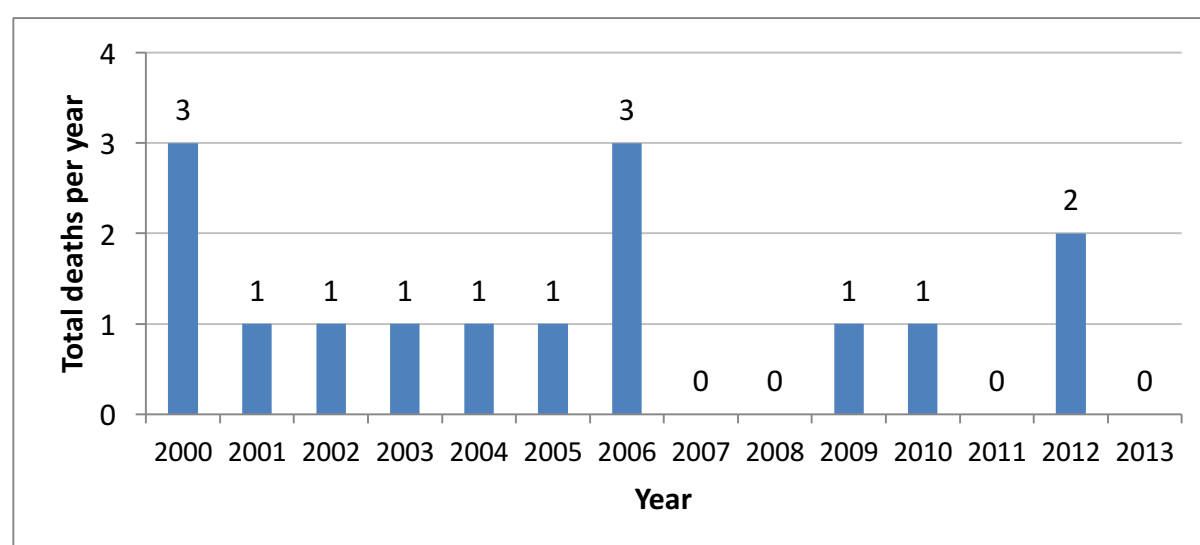


(see Table A 43 for data)

6.4.2. MORTALITY

Deaths from childhood bronchiolitis were rare, totalling 15 over the period 2000-2013.

Figure 41. Childhood bronchiolitis mortality numbers 2000-2013.



Risks and determinants

There was no significant trend year on year, but the death rate in the seven years 2007 to 2013 was significantly less than in the first seven years of the study period, 2000 to 2006.

The rest of this section covers the 9 deaths over the ten years 2004-2013. As the number of deaths was so small, little analysis is possible.

Of the 9 childhood bronchiolitis deaths between 2004 and 2013, 4 were boys and 5 girls; there was therefore no significant difference in rates by sex.

Four of the deaths were Māori, five were Pacific children, and one was non-MPA. There were no deaths among Asian children. Māori children's mortality was thus 8.7 times higher than non-MPA, and Pacific children's mortality was 20.4 times higher.

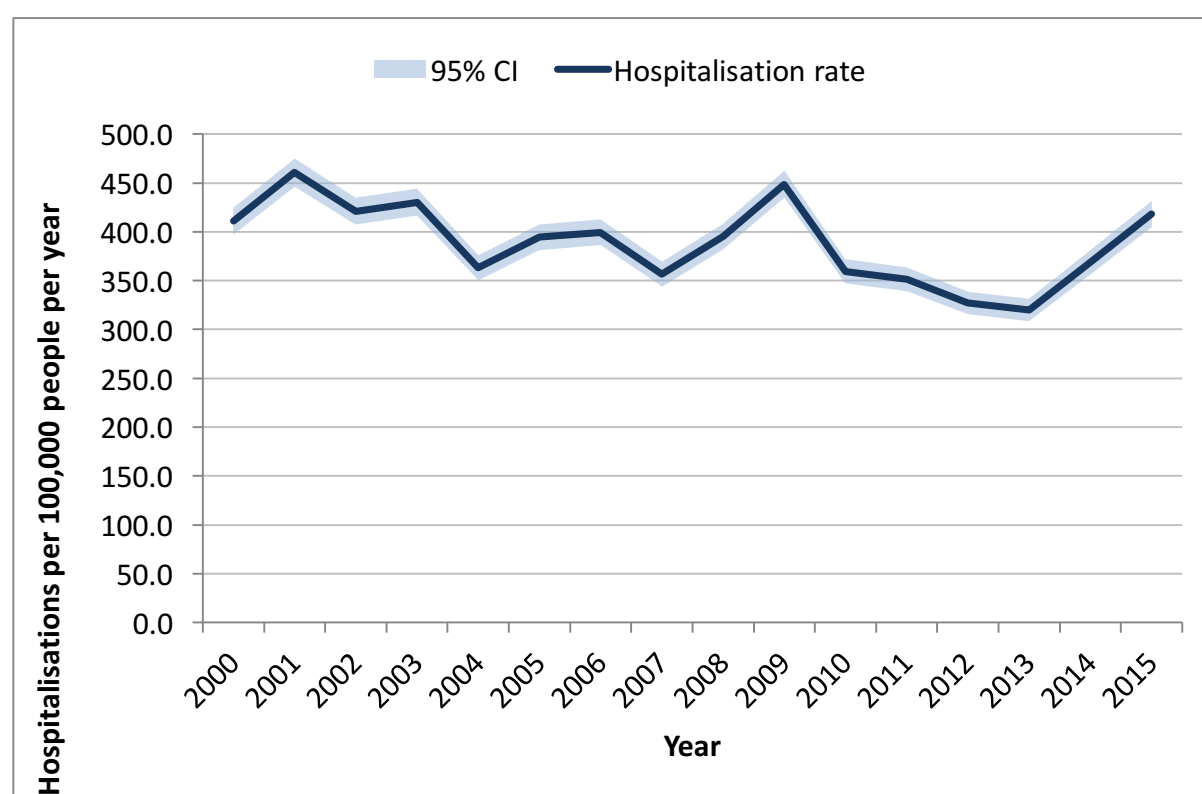
Seven of the deaths were in NZDep 9-10, one in NZDep 7-8, and one in NZDep 5-6. There were no deaths in NZDep 1-4.

Three of the deaths were in Waikato DHB, three were in Counties Manukau, and there was one each in Waitemata, Auckland and Canterbury DHBs.

6.5. CHILDHOOD PNEUMONIA

6.5.1. HOSPITALISATIONS

Figure 42. Childhood pneumonia hospitalisations per 100,000 people per year, 2000-2015.



(See Table A 44 for data)

Trends over time

While child hospitalisations have declined over the study period, by 4.7 hospitalisations per 100,000 children per year, the rate of decline found in the previous report (7.45) was not maintained, and the 418.1 hospitalisations per 100,000 children per year in 2015 was higher than the 410.8 rate in 2000 (Figure 42).

Risks and determinants

Childhood pneumonia showed only a small overall difference between male and female rates, though there differences by sex varied within age sub-groups: boys under 5 years had significantly higher hospitalisation rates than girls (rate ratio 1.11), but there was no significant difference in rates for children aged 5 to 14 years (Figure 43).

Pacific children had the highest childhood pneumonia rates, at 983 hospitalisations per 100,000 children. This rate was 3.6 times higher than the non-MPA rate of 272 hospitalisations per 100,000. Rates for Māori children were 2.0 times higher, while rates for Asian children were 1.6 times higher (Figure 44).

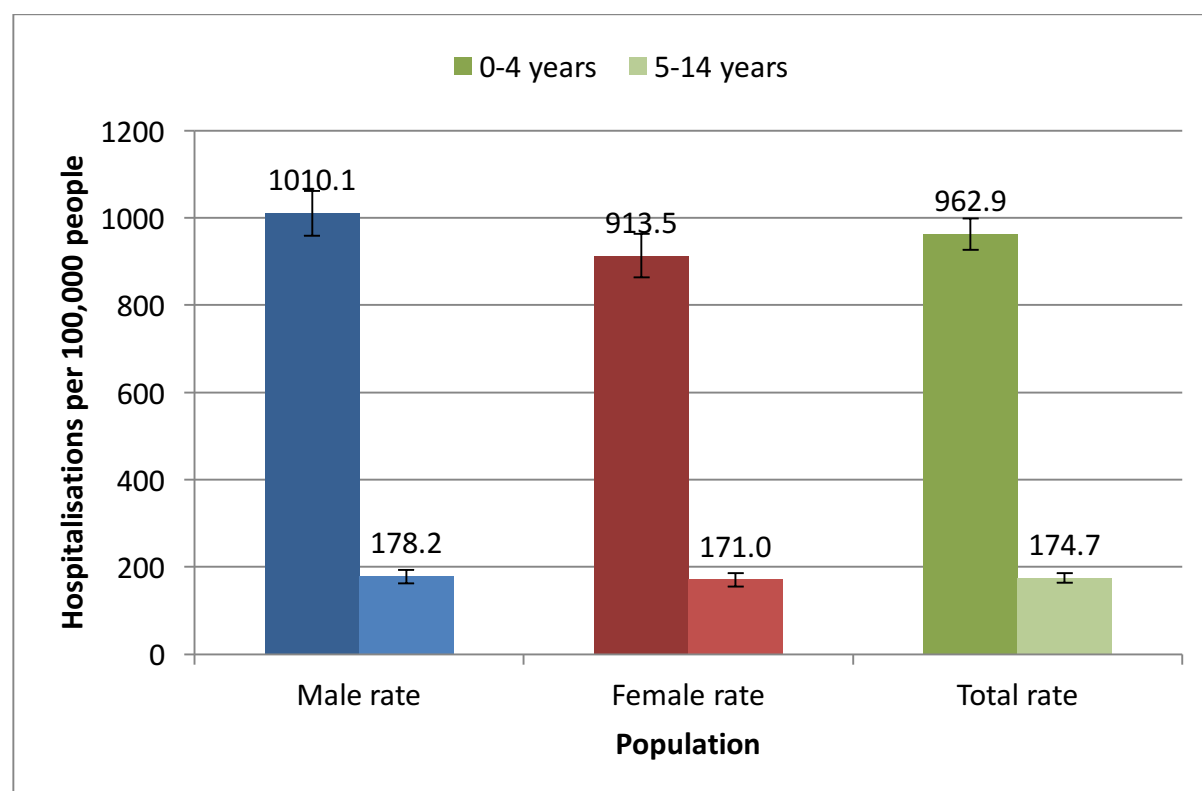
For Māori and Pacific children, these differences were more pronounced for children aged under 5 years (Figure 45).

Child pneumonia rates were highest in the most deprived areas, with rates 2.9 times higher in the most deprived NZDep quintile than in the least deprived (Figure 46).

Over both ethnicity and deprivation, the outstanding differences in childhood pneumonia rates were for Māori, and for those in the most deprived quintile. There was no significant difference in rates across the first four NZDep quintiles for Pacific or Asian children (Figure 47).

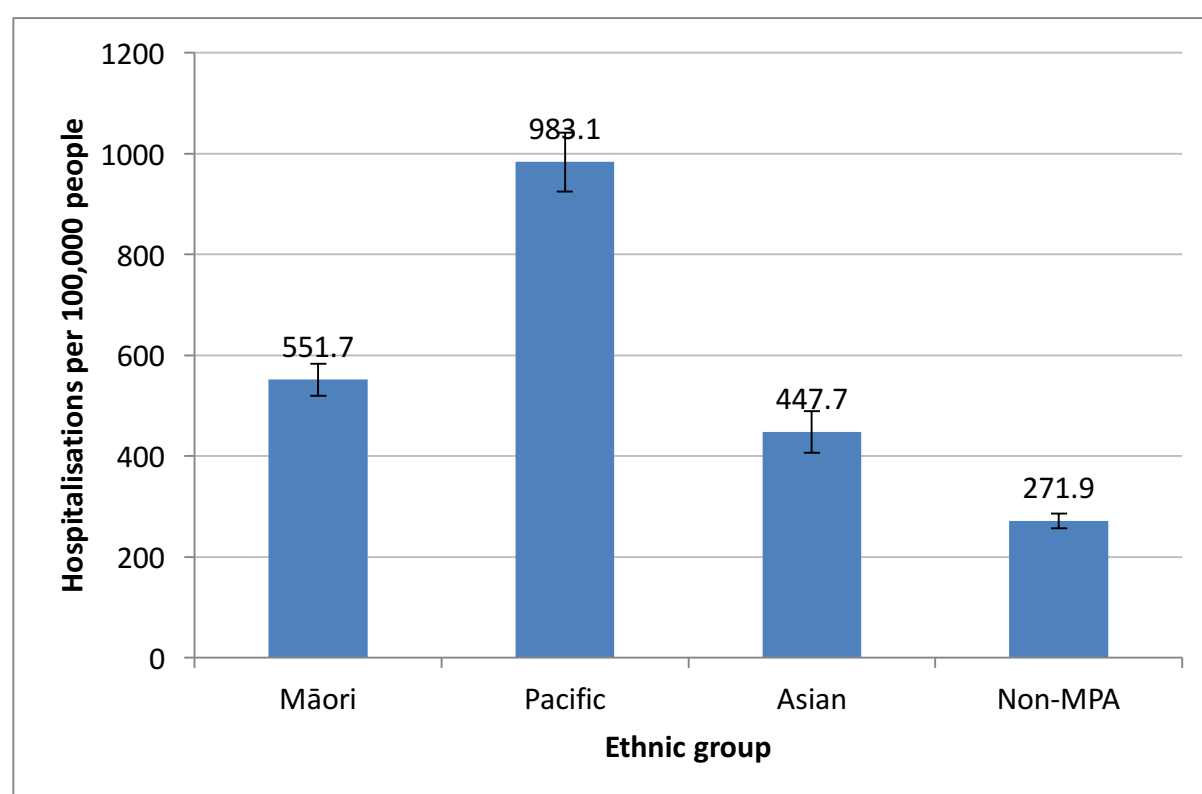
Across DHBs, the highest childhood pneumonia rates were in Auckland, Northland and Counties Manukau. Rates were lower than average across the South Island (Figure 48).

Figure 43. Childhood pneumonia hospitalisations per 100,000 people by age group and sex, 2015.



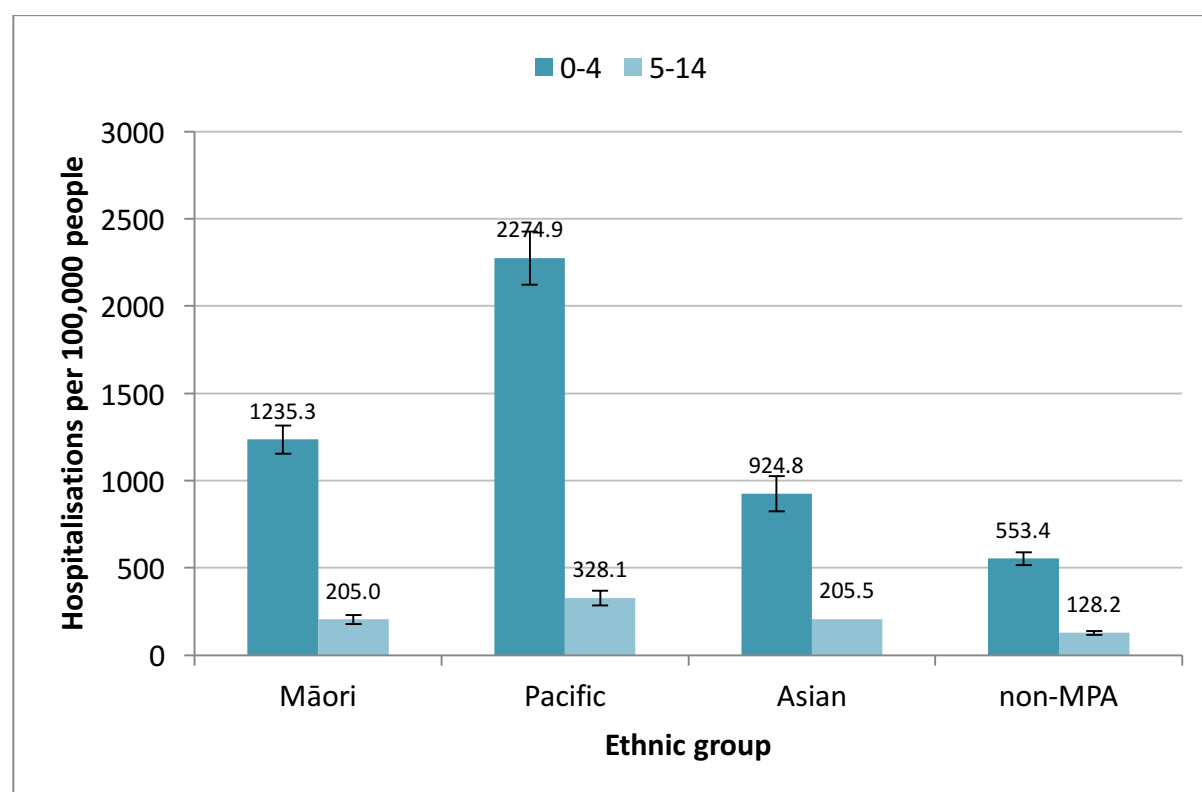
(See Table A 45 and Table A 46 for data)

Figure 44. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2015.



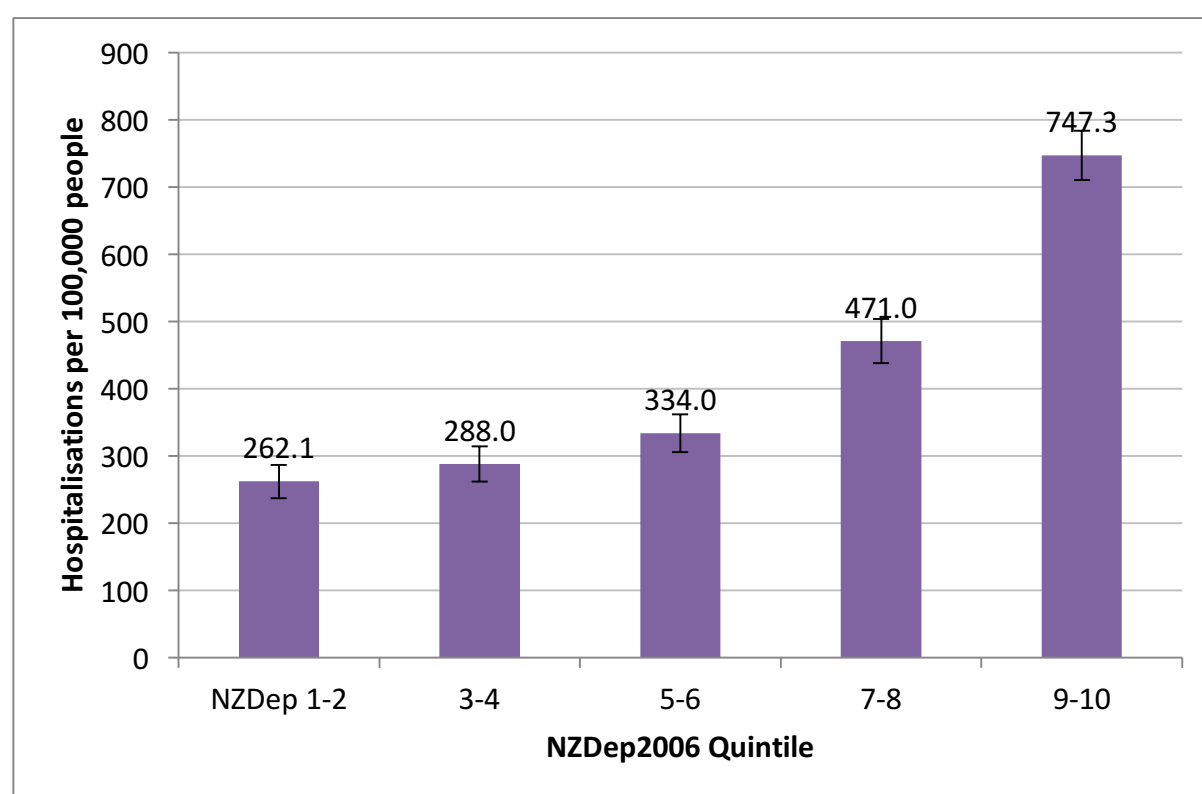
(See Table A 47 for data)

Figure 45. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and age group, 2015.



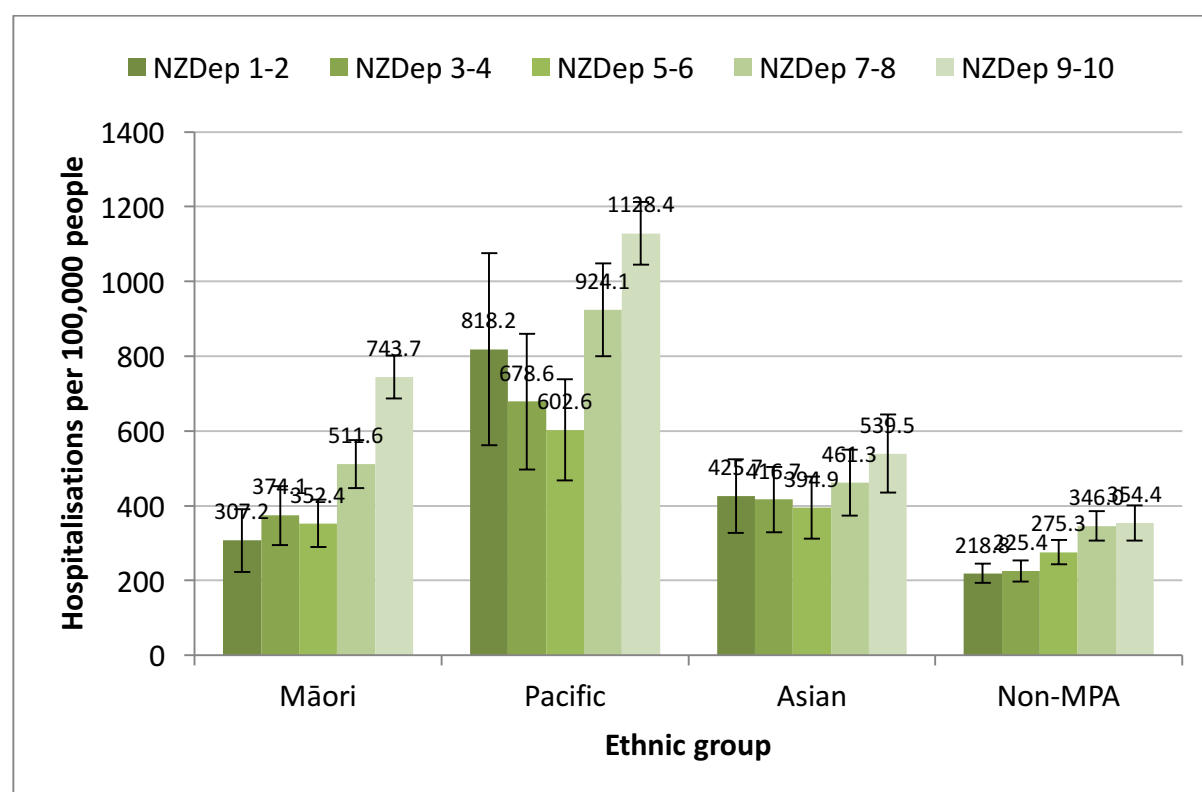
(See Table A 48 for data)

Figure 46. Childhood pneumonia hospitalisations per 100,000 people by NZDep2006 quintile, 2015, age-adjusted.



(See Table A 49 for data)

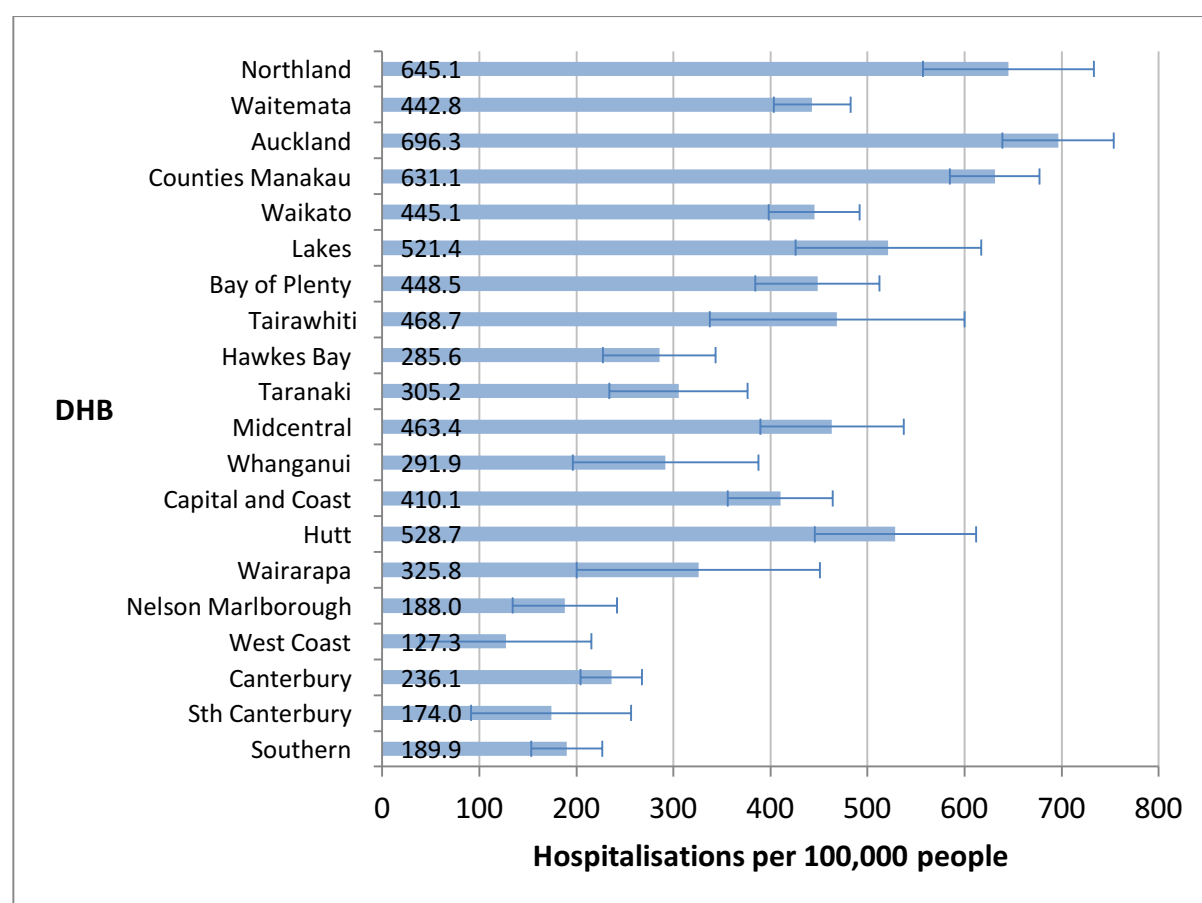
Figure 47. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and NZDep2013, 2015, age-adjusted.



(See Table A 50 for data)

N.B. Confidence intervals are wide. The most deprived quintile (NZDep 9-10) had high rates for all ethnic groups, but differences in rates between other quintiles were not statistically significant.

Figure 48. Childhood pneumonia hospitalisations per 100,000 people by DHB, 2015.



(see Table A 51 for data)

6.5.2. MORTALITY

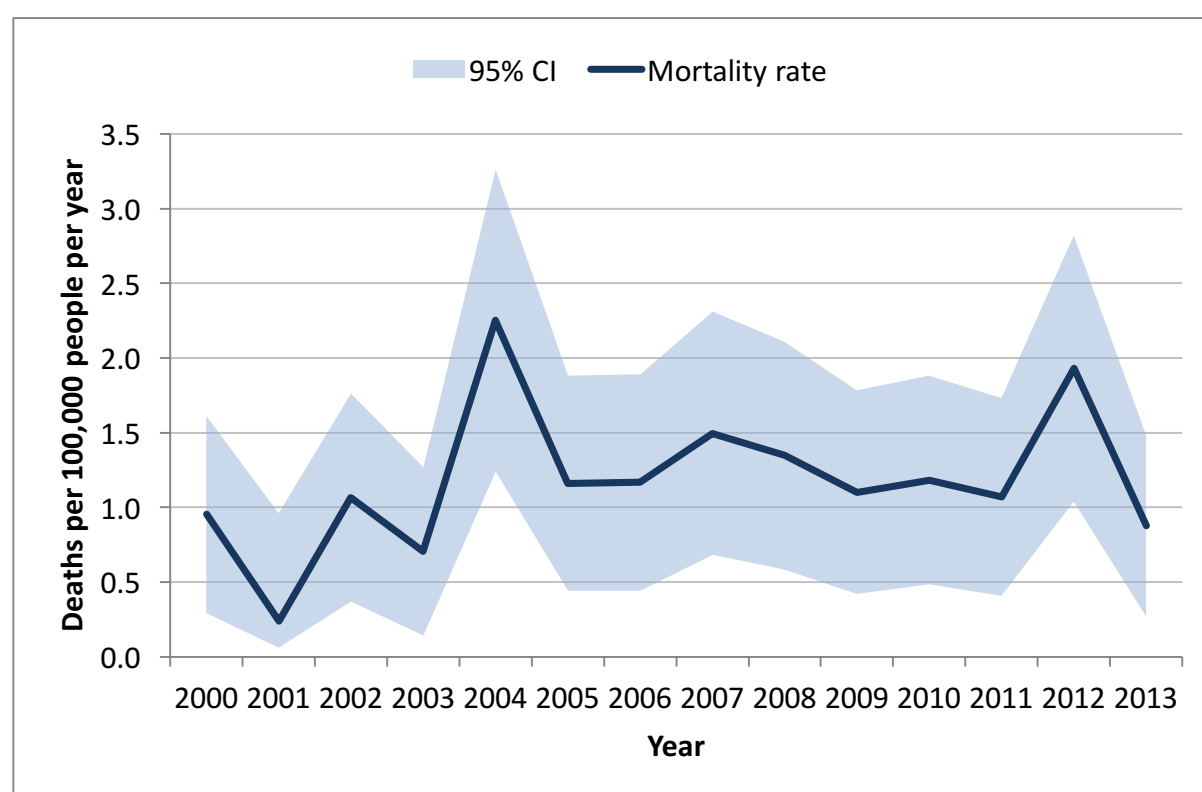
Mortality from childhood pneumonia showed no significant trend over the study period (Figure 49).

Risks and determinants

Pneumonia mortality rates for children aged under 5 years were 1.27 times higher in boys than in girls, while rates for children 5-14 were 2.00 times higher in boys (Figure 50).

There was extreme inequality in the distribution of childhood pneumonia mortality by ethnicity. Rates for non-MPA and Asian peoples were 0.5 and 0.7 deaths per 100,000 people per year. Rates for Māori and Pacific peoples were 3.1 and 2.8 deaths respectively per 100,000 people per year, making rates 5.9 times higher for Māori and 7.3 times higher for Pacific peoples (Figure 51). In absolute numbers, this meant that across the 121 deaths between 2004 and 2013, 63 deaths were Māori, 41 Pacific, 6 Asian and 26 were non-MPA.

Figure 49. Childhood pneumonia mortality rates 2000-2013, age-adjusted.



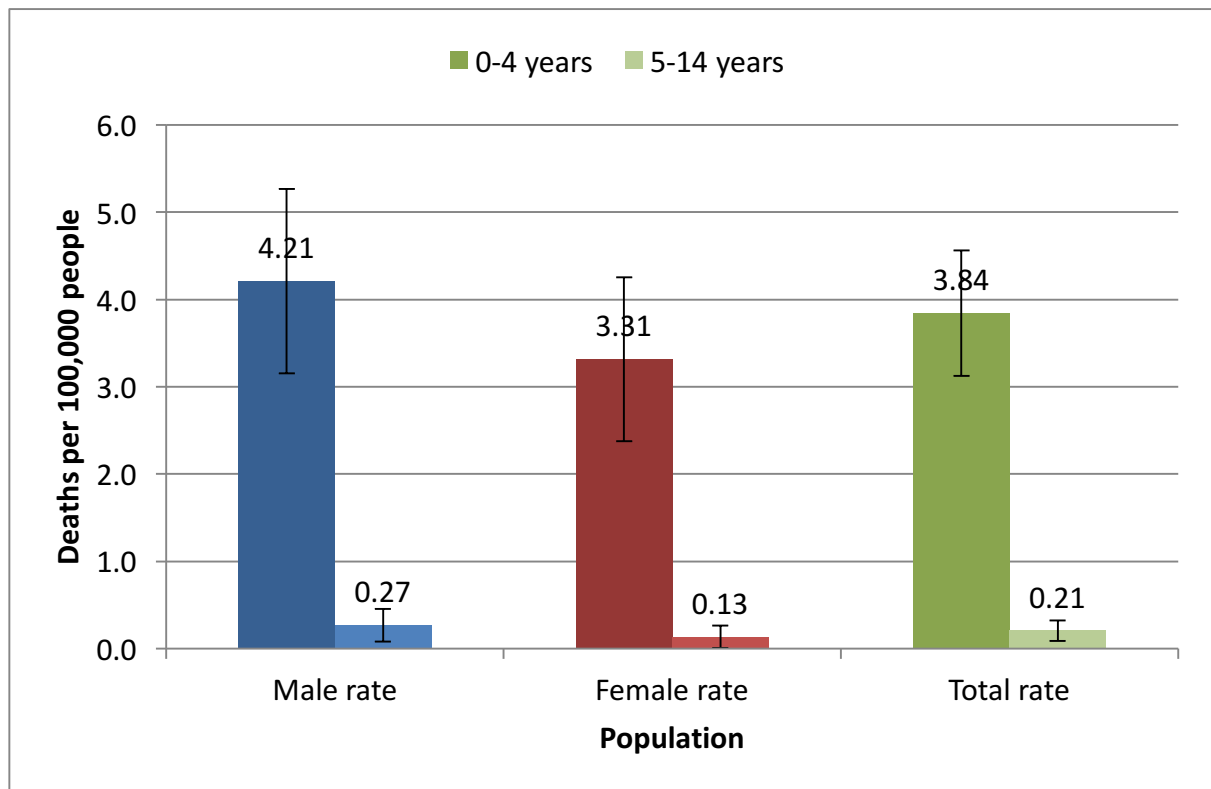
(See Table A 52 for data)

N.B. Confidence intervals are wide. The peak and trough in 2004 and 2001 respectively are significantly different from each other, but not from other years.

Socio-economic inequalities were even more marked. There was a clear trend of higher mortality with increasing deprivation. Over half of all deaths were in the most deprived quintile (Figure 52), for whom the mortality rate was 17.9 times higher than in the least deprived quintile. This difference has worsened markedly since the last report, when the difference was already high at 11.9.

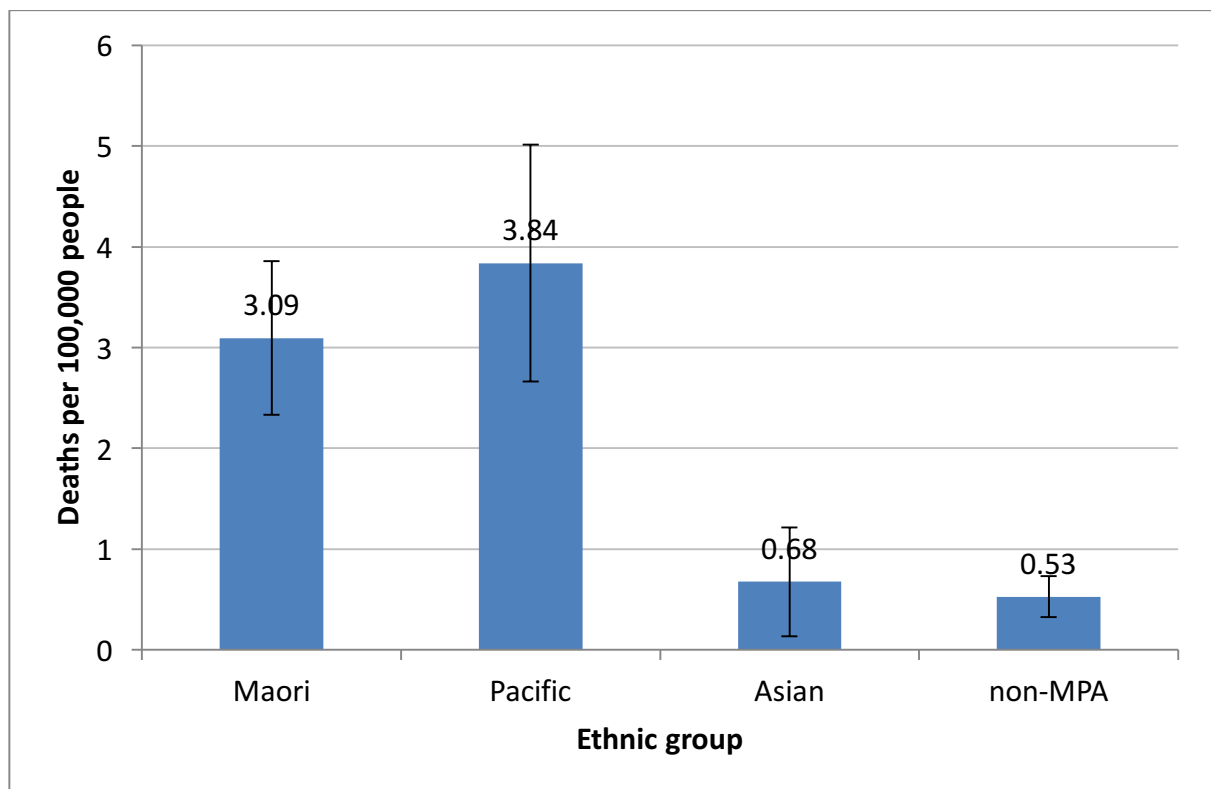
Childhood pneumonia mortality rates were highest, and significantly higher than the national average, in Counties Manukau, Bay of Plenty, Taranaki, Northland and Waikato DHBs (Figure 53).

Figure 50. Childhood pneumonia deaths per 100,000 people by age group and sex, 2004-2013.



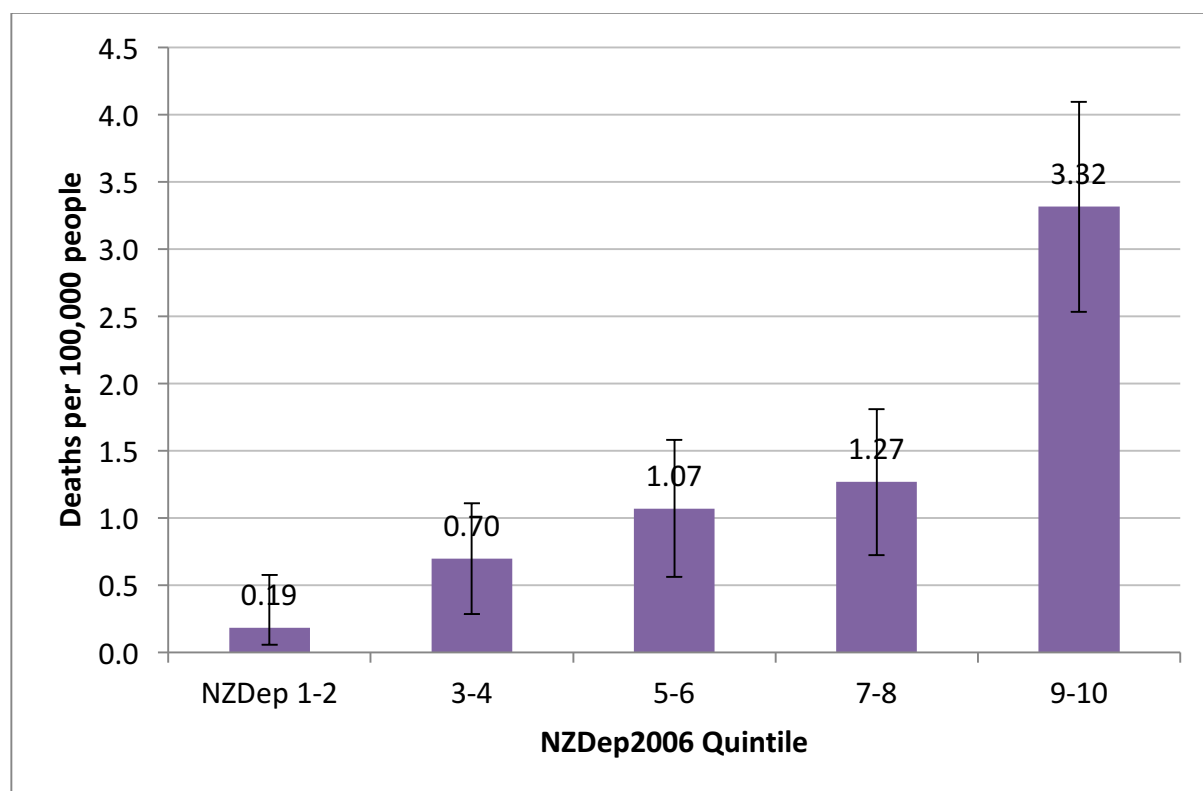
(See Table A 53 and Table A 54 for data)

Figure 51. Childhood pneumonia mortality per 100,000 people per year by ethnic group, 2004-2013.



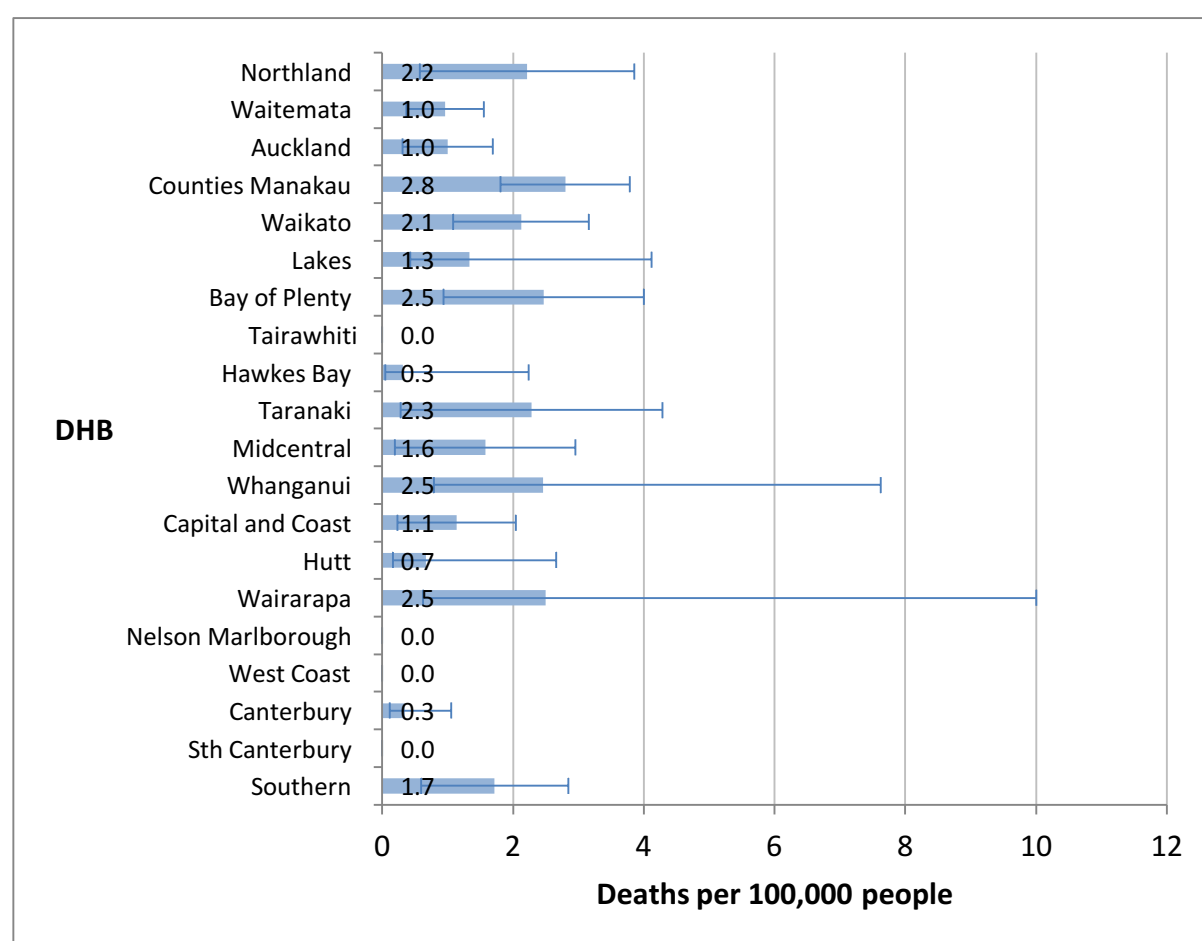
(See Table A 55 for data)

Figure 52. Childhood pneumonia deaths per 100,000 people by NZDep2006 quintile, 2004-2013, age-adjusted.



(See Table A 56 for data)

Figure 53. Childhood pneumonia deaths per 100,000 people per year, by DHB, 2004-2013, age-adjusted



(see Table A 57 for data)

6.6. COPD IN OLDER ADULTS (40+ YEARS)

6.6.1. PREVALENCE

The 2003/4 prevalence of COPD in adults aged 40 and over was estimated to be 14.2%^{21 22}. This estimate used the “Global Initiative for Chronic Obstructive Lung Disease” (GOLD) definition for COPD.

A 2014 report on the burden of asthma and COPD in New Zealand reported that of 122,953 patients aged 45+ in their primary care cohort, 1871 or 2.3% were identified as having diagnosed and recently medicated COPD.⁷

There were no other studies of the incidence or prevalence of adult COPD during the study period.

We estimated the 2015 prevalence of severe COPD by identifying people who had been hospitalised with COPD as a primary or secondary diagnosis between 1988 and 2015, and excluding those deceased by 31 December 2015. This method identified 36,958 New

Zealanders living with COPD at the end of 2015[†], giving a total population prevalence of 0.80%. Age-standardised population prevalence was highest for Māori, at 2.06%, followed by Pacific, at 1.77%, and trailed by non-MPA and Asian peoples at 0.64% and 0.32% respectively. Age-standardised prevalence was 11% higher for men (0.91%) than women (0.81%). 96% of cases people with COPD in 2015 were over the age of 45, making the population prevalence of ever-hospitalised COPD 1.9% in people aged 45 and over.

The average age of Māori with COPD was 63.4, compared with 66.2 for Pacific peoples, 69.7 for Asian peoples, and 73.3 for non-MPA.

Note that this measure includes only those hospitalised for COPD since 1988, and will not include those who have been able to effectively manage their COPD in the community and primary care. However, it is included here to provide a reference for future updates, bearing in mind that the 1.7% prevalence in adults aged 40 and over represented 12% of the 2003/4 GOLD-defined prevalence, though the 1.9% prevalence in adults aged 45 and over was 83% of the prevalence found in the 2014 primary care cohort.

6.6.2. INCIDENCE

We estimated the 2015 incidence of severe COPD by identifying COPD hospital admissions in 2015 where the patient had not previously been hospitalised with COPD (since 1988, the start of data availability). There were 5,319 new cases of COPD in 2015, a total incidence rate of 114 per 100,000 people. Rates were highest for Māori, at 359 per 100,000, followed by Pacific at 236, and lower for non-MPA, at 105, and Asian peoples, at 97. Average age of onset was 70.4 years, and was earliest for Māori and Pacific, at 62.6 and 62.5 years respectively, followed by Asian, at 66.7 years, and latest for non-MPA, at 73.1 years.

6.6.3. HOSPITALISATIONS

It should be noted that COPD hospitalisations may include cases of misdiagnosed bronchiectasis, and vice versa. Bronchiectasis hospitalisations are less common than COPD: if all bronchiectasis hospitalisations were in fact misdiagnosed COPD, it would increase the COPD rates by about 88 hospitalisations per 100,000 people per year (2012), about 6.9% of the total COPD burden. However, although the actual proportion of misdiagnoses is unknown, it is unlikely to be so large.

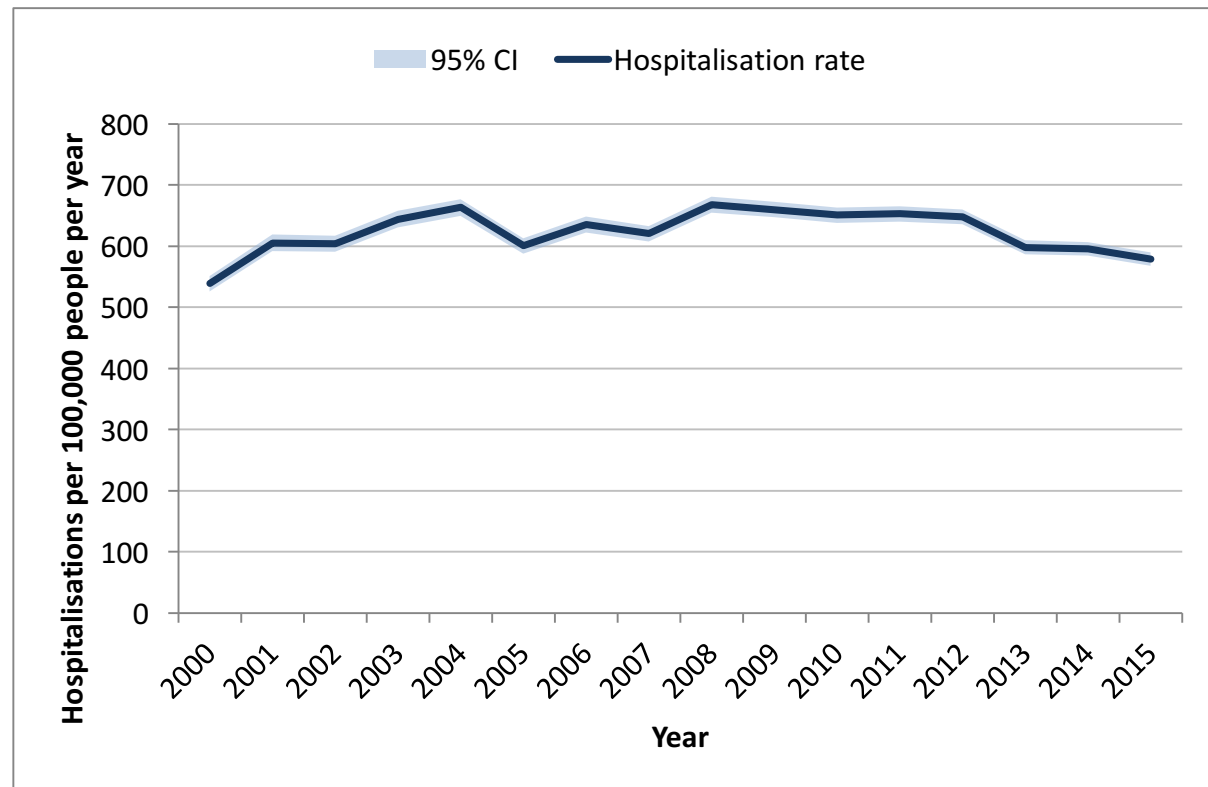
Since the last report, Milne and Beasley²³ reported the number, distribution and cost of hospital admissions for COPD in the total population 2008 to 2013, as well as in the population 15 years and over, by ethnic group (European/Other, Māori, Pacific), NZDep, DHB and rural/urban. The time period of their publication covered a subsection of the time period measured the last report, and their results are not meaningfully different.

[†] People over 105 were excluded as likely duplicate records.

Trends over time

Although rates in 2000 were lower than in subsequent years, there was no significant trend in COPD hospitalisation rates over the study period (Figure 54).

Figure 54. COPD hospitalisations in adults aged 40+, per 100,000 people per year, 2000-2015.



(See Table A 58 for data)

Risks and determinants

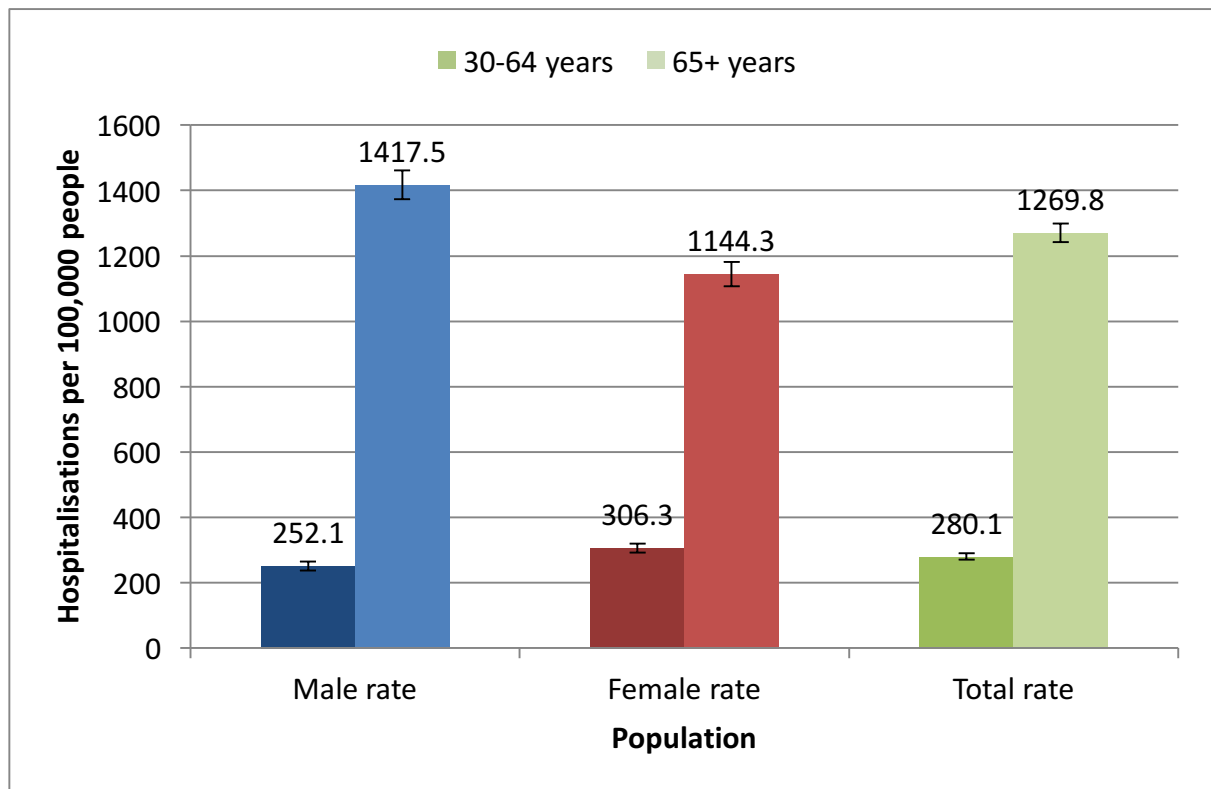
COPD hospitalisation rates were lower for men than women in the 45 to 64 year age group (rate ratio 0.8), but higher in the 65+ age group (rate ratio 1.2) (Figure 55).

COPD rates were highest for Māori, at 3.7 times the non-MPA rate, and Pacific peoples (rate ratio 2.8), and lowest for Asian peoples (rate ratio 0.4) (Figure 56).

There was a strong deprivation gradient, with COPD rates 5.7 times higher in the most deprived NZDep quintile than in the least deprived (Figure 58). The gradient persisted across Māori, Asian and non-MPA ethnic groups, but Pacific peoples had a two-tier effect, with rates similar across the first three NZDep quintiles, and increasing over the two most deprived quintiles (Figure 59).

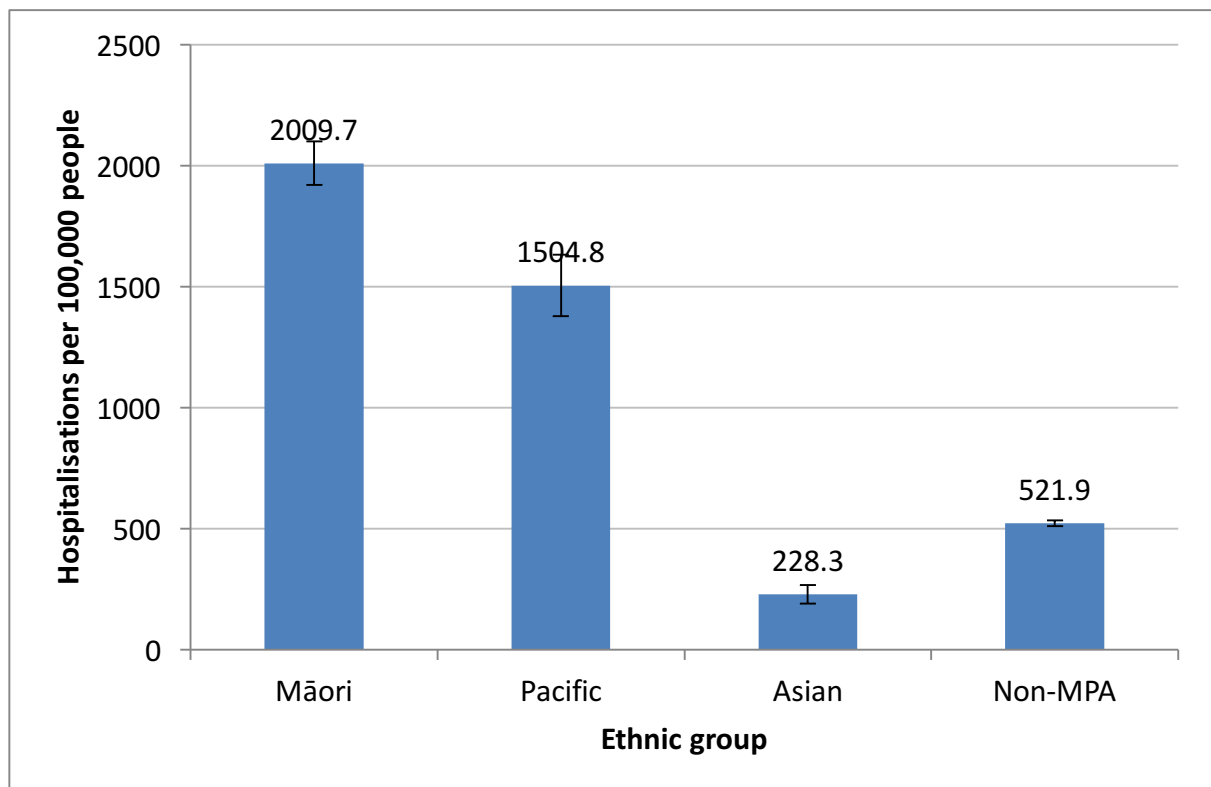
COPD hospitalisation rates were highest in Whanganui and West Coast, and lowest in South Canterbury (Figure 60).

Figure 55. COPD hospitalisations in adults aged 40+, per 100,000 people, by age group and sex, 2015.



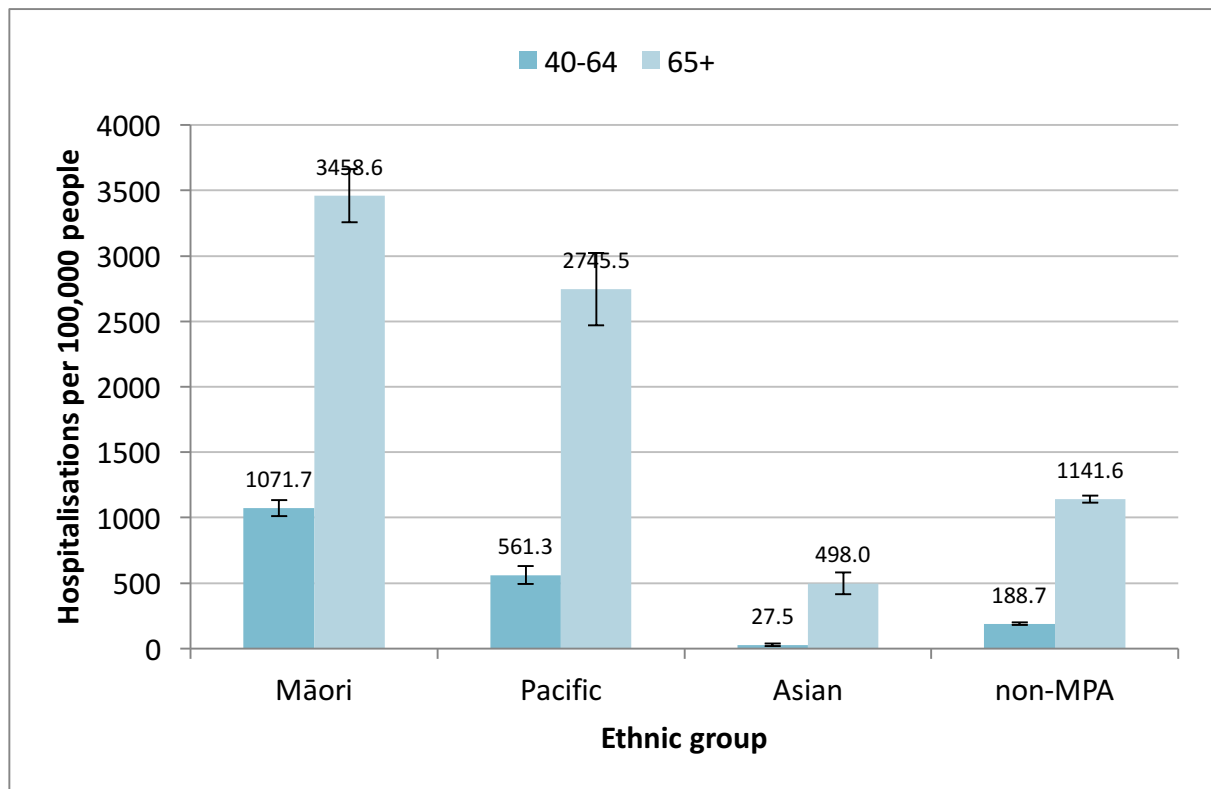
(See Table A 59 and Table A 60 for data)

Figure 56. COPD hospitalisations in adults aged 40+, per 100,000 people, by ethnic group, 2015.



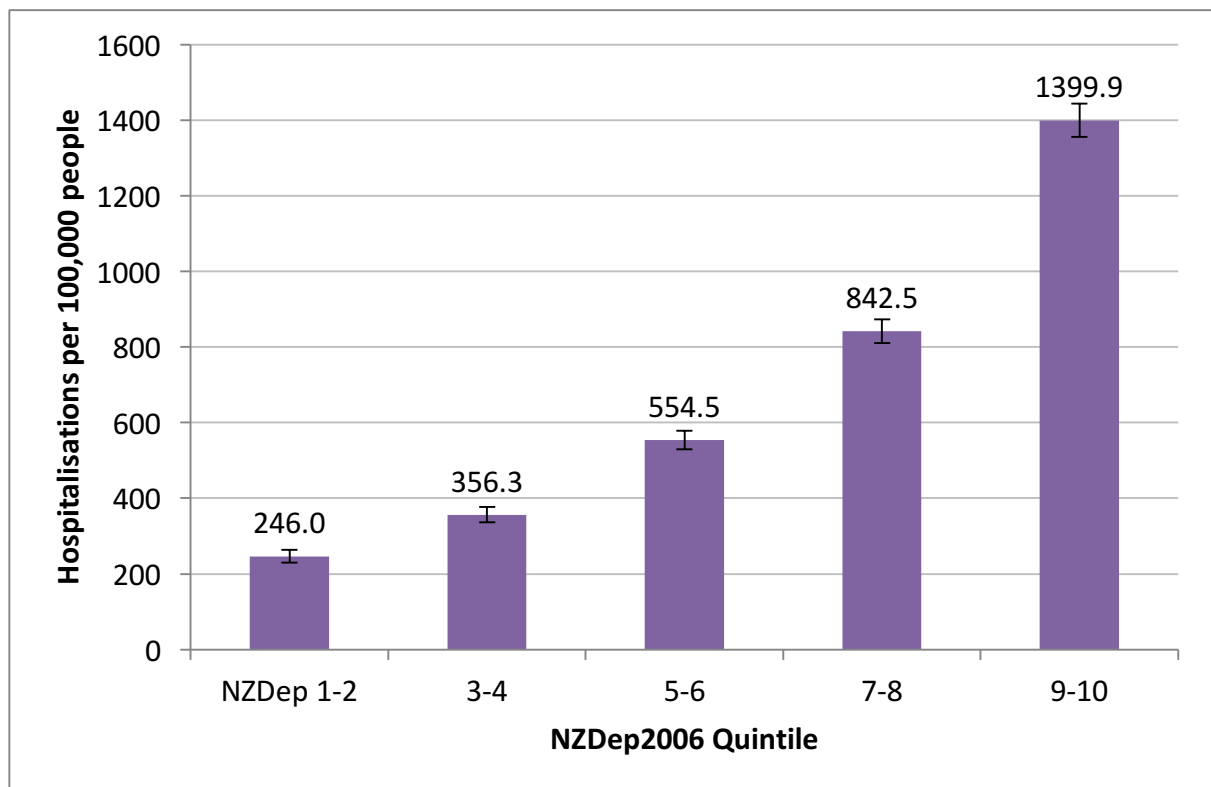
(See Table A 61 for data)

Figure 57. COPD hospitalisations in adults aged 40+, per 100,000 people, by ethnic group and age group, 2015.



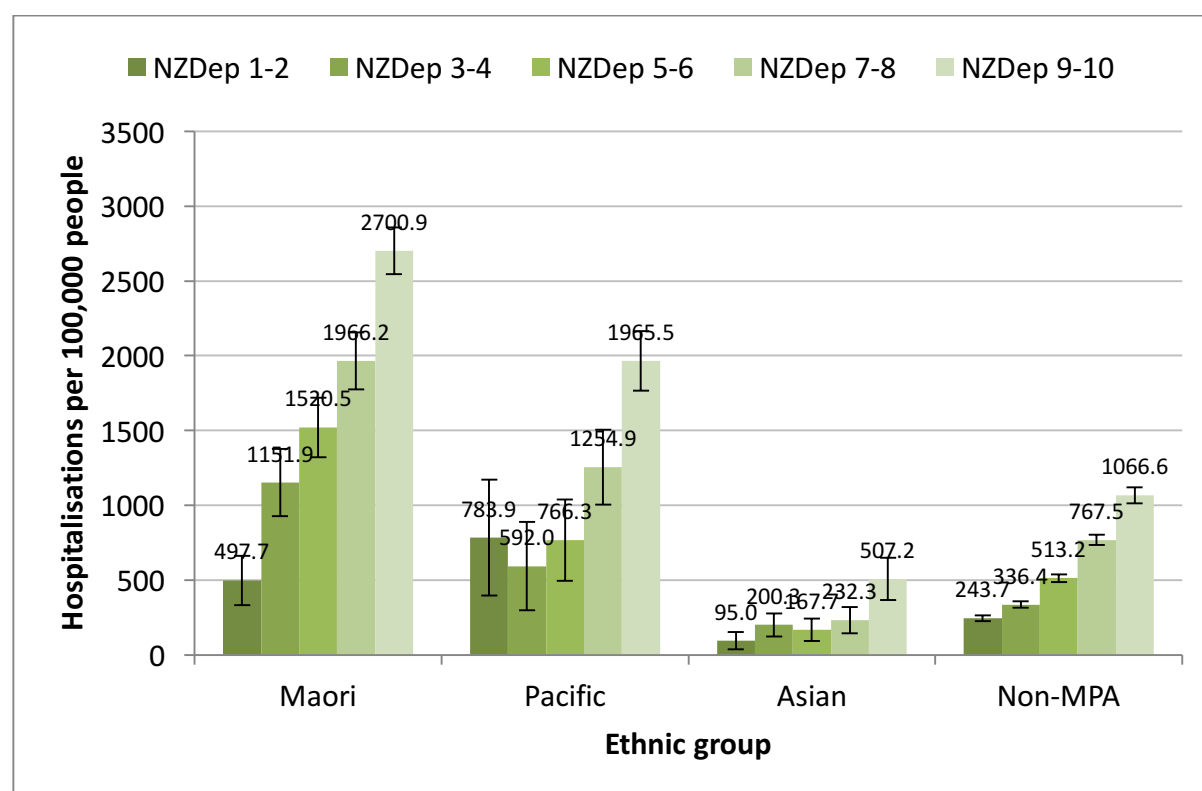
(See Table A 62 for data)

Figure 58. COPD hospitalisations in adults 40+, per 100,000 people, by NZDep2006 quintile, 2015, age-adjusted.



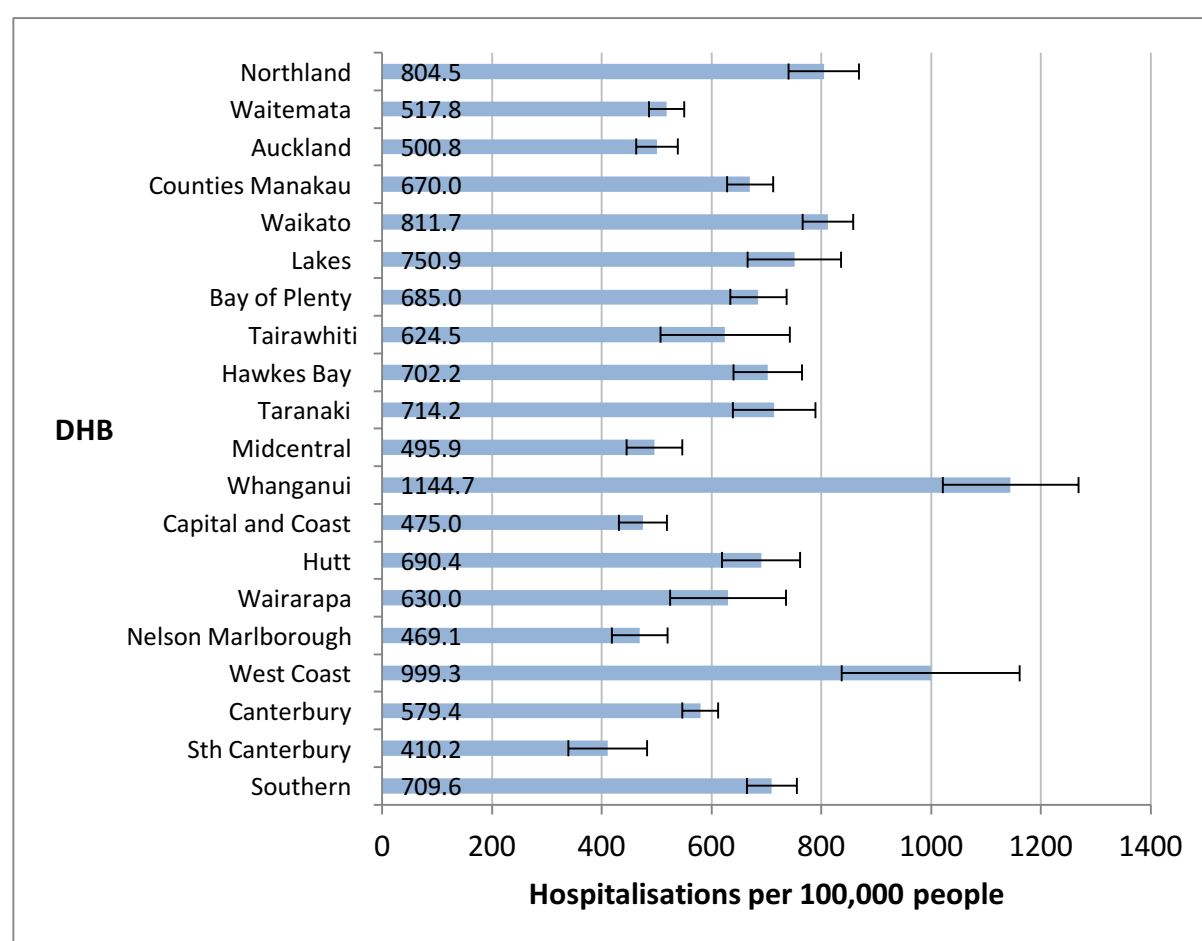
(See Table A 63 for data)

Figure 59. COPD hospitalisations in adults aged 40+, per 100,000 people, by ethnic group and NZDep2013, 2015, age-adjusted.



(See Table A 64 for data)

Figure 60. COPD hospitalisations in adults aged 40+, per 100,000 people, by DHB, 2015.



(see Table A 65 for data)

6.6.4. MORTALITY

Mortality due to COPD declined over the study period, from an age-adjusted 111.9 deaths per 100,000 in 2000, to 83.5 deaths per 100,000 in 2013. This represented a decline of 3.05 deaths per 100,000 people per year. If this trend were to continue, we would see COPD eliminated as a cause of death by 2042.

Risks and determinants

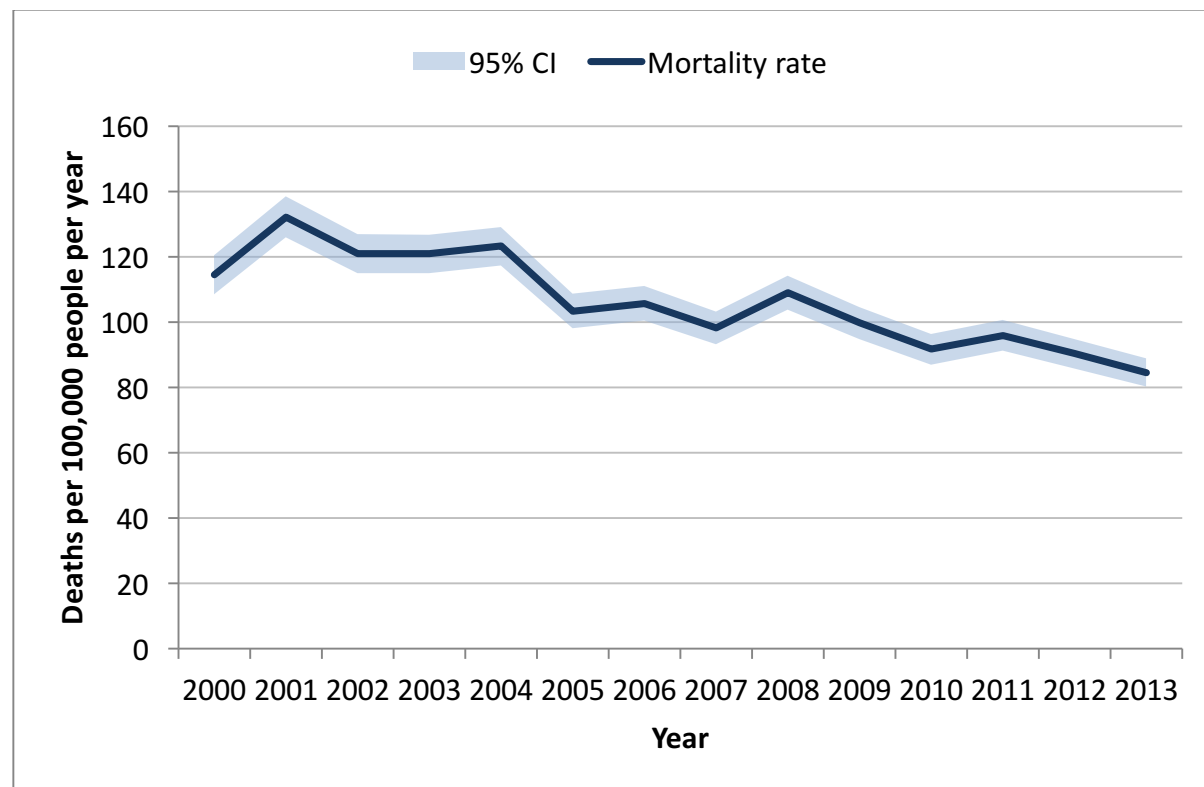
COPD mortality rates were similar for men and women in the 45-64 years age group, but higher in men than in women in the 65+ years age group (Figure 62).

COPD mortality rates were highest in Māori, whose rate of 190.7 deaths per 100,000 people per year was 2.24 (95% CI 2.04-2.41) times higher than 85.1 rate for non-MPA. Pacific rates were 1.85 times higher than non-MPA. However, the COPD mortality rate for Asian peoples was half that of non-MPA (Figure 63). These patterns were exaggerated in the 45-64 year age group (Figure 64).

COPD mortality rates also increased with increasing socio-economic deprivation, with deaths in NZDep2006 quintile 9-10 occurring at 2.37 times the rate in quintile 1-2 (Figure 65). Increasing COPD mortality with increasing deprivation was apparent across all ethnic groups (Figure 66).

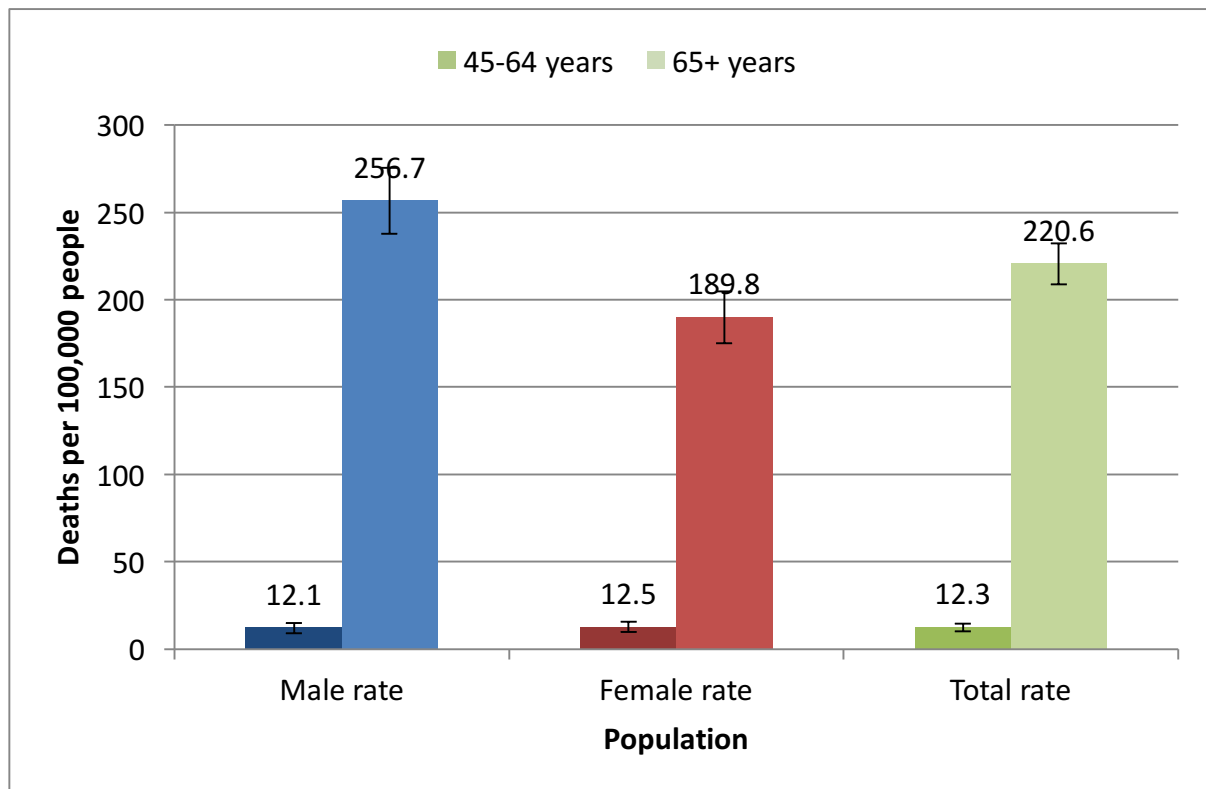
Adult COPD mortality rates for 2013 were highest in West Coast, Tairāwhiti, and Lakes DHBs, and lowest in Waitemata.

Figure 61. Adult COPD mortality rates 2000-2013, age-adjusted.



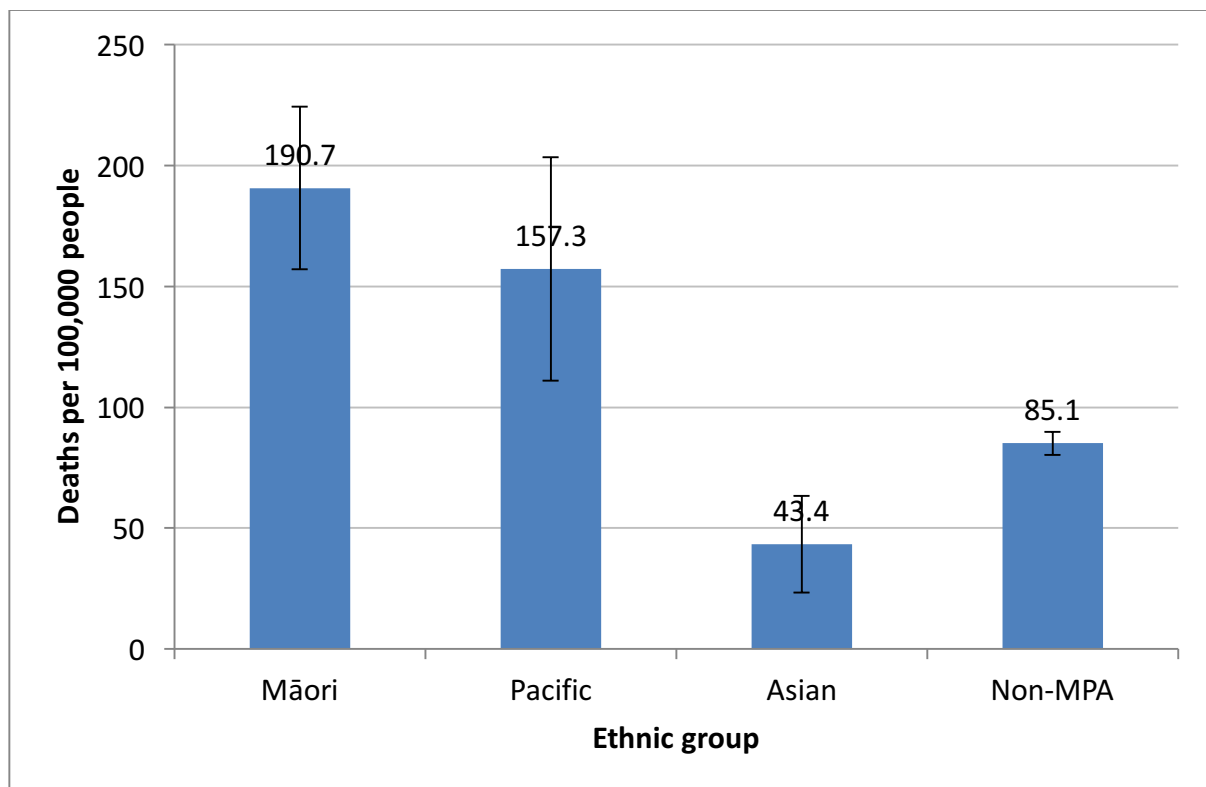
(See Table A 66 for data)

Figure 62. Adult COPD deaths per 100,000 people by age group and sex, 2013.



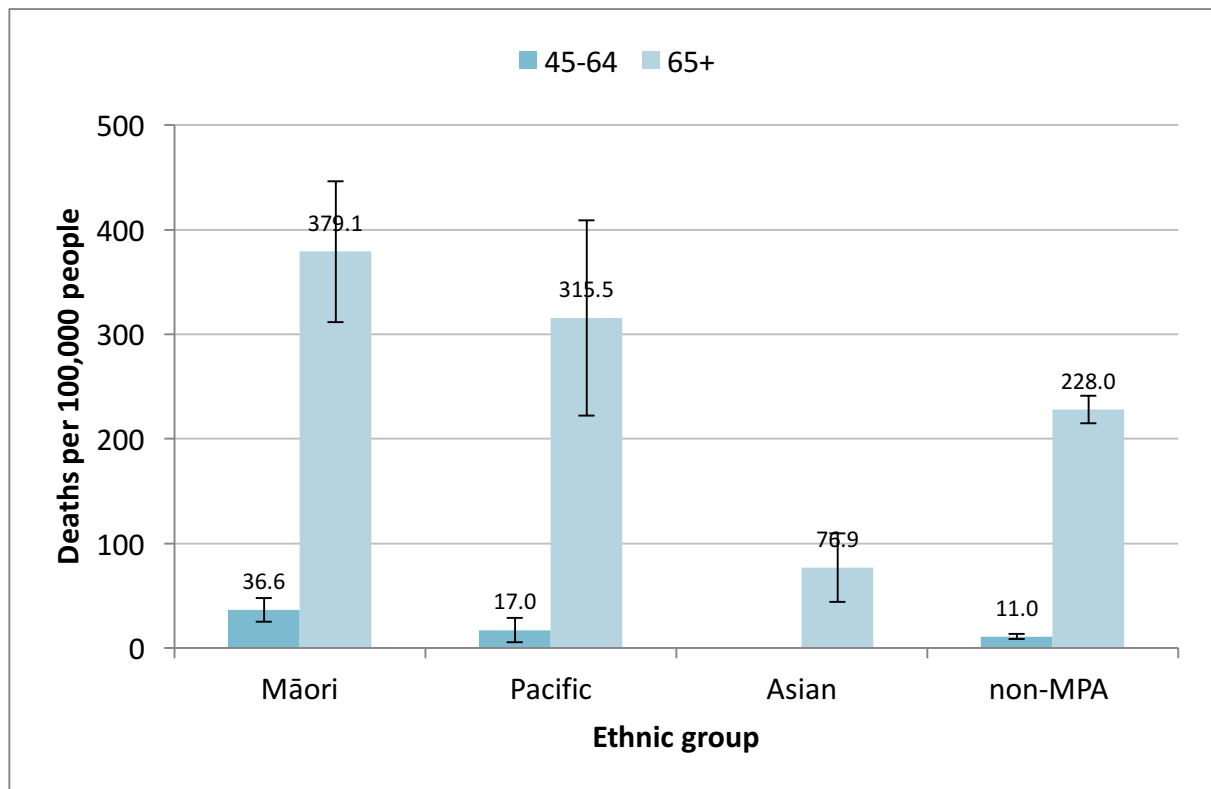
(See Table A 67 and Table A 68 for data)

Figure 63. Adult COPD mortality per 100,000 people per year by ethnic group, 2013.



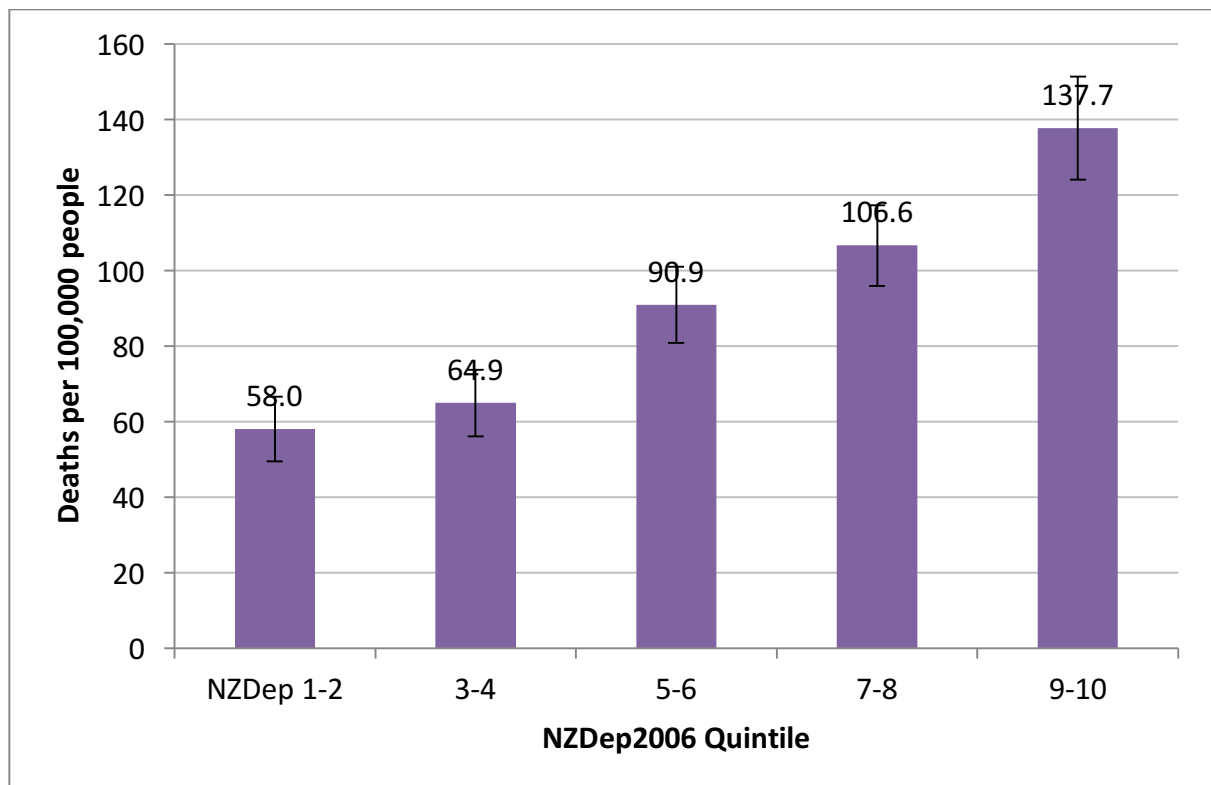
(See Table A 69 for data)

Figure 64. Adult COPD deaths per 100,000 people per year, by ethnic group and age group, 2013.



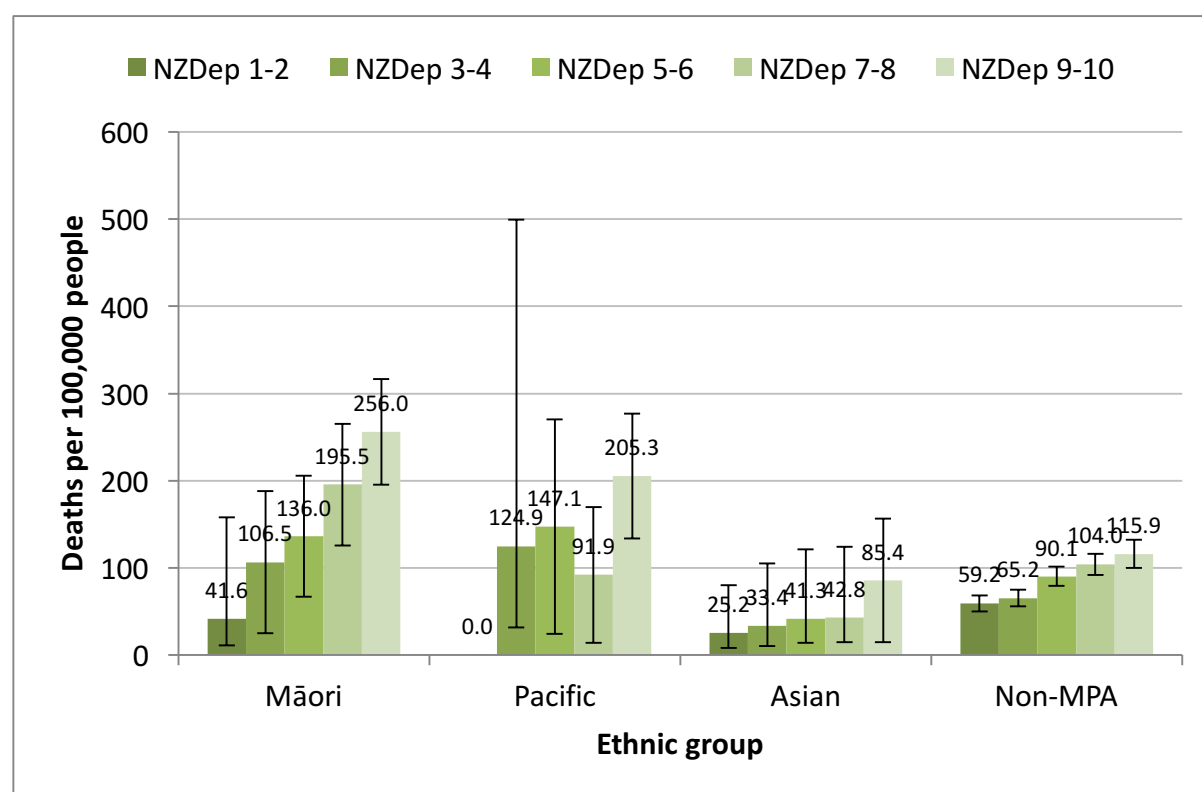
(See Table A 70 for data).

Figure 65. Adult COPD deaths per 100,000 people by NZDep2006 quintile, 2013, age-adjusted.



(See Table A 71 for data)

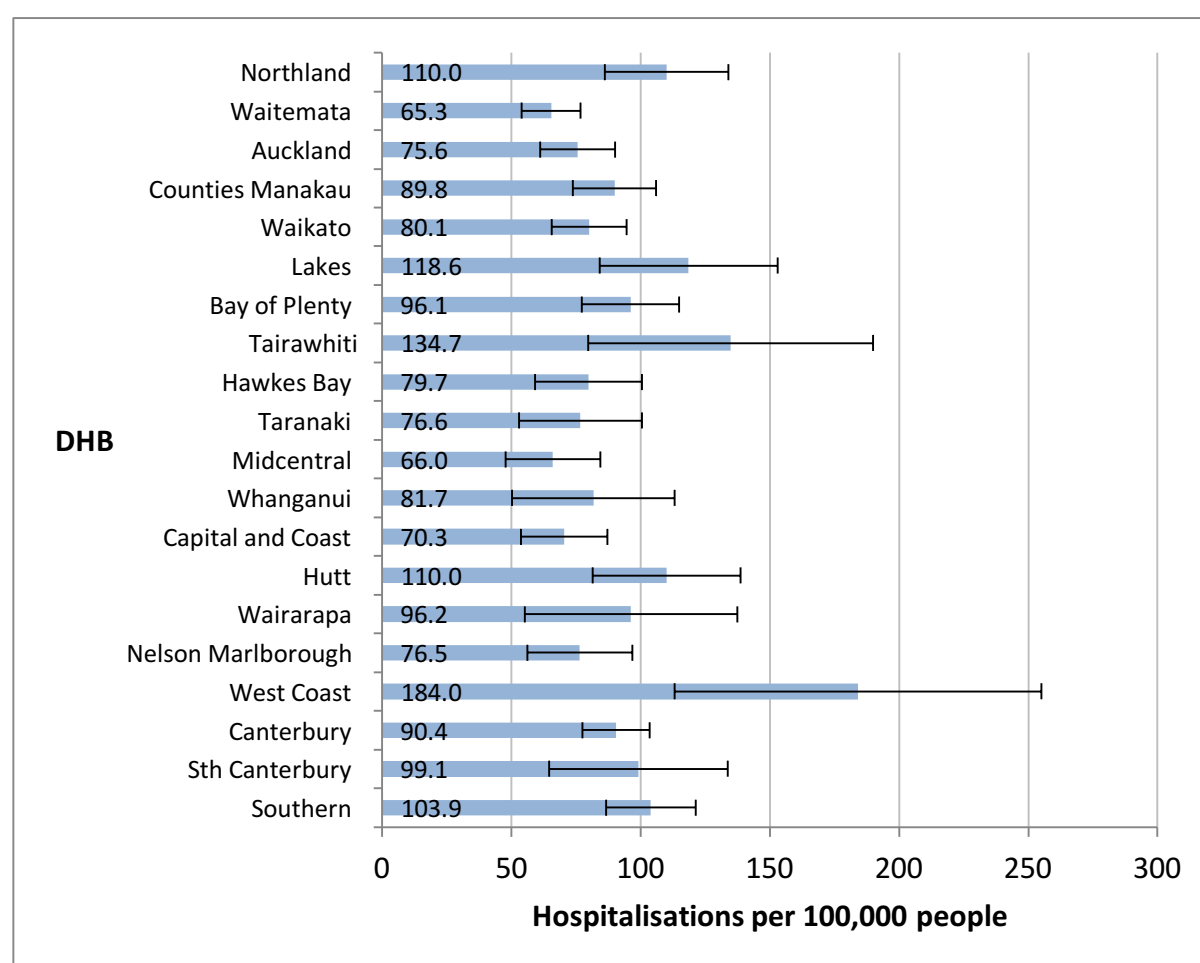
Figure 66. Adult COPD deaths per 100,000 people by ethnic group and NZDep2013, 2013, age-adjusted.



(See Table A 72 for data)

N.B. Confidence intervals were wide for Māori, Pacific and Asian ethnic groups. Trends of increasing mortality with increasing socioeconomic deprivation were not statistically significant for Pacific peoples.

Figure 67. Adult COPD deaths per 100,000 people per year, by DHB, 2013, age-adjusted



(see Table A 73 for data)

6.7. TOTAL SERIOUS RESPIRATORY DISEASE

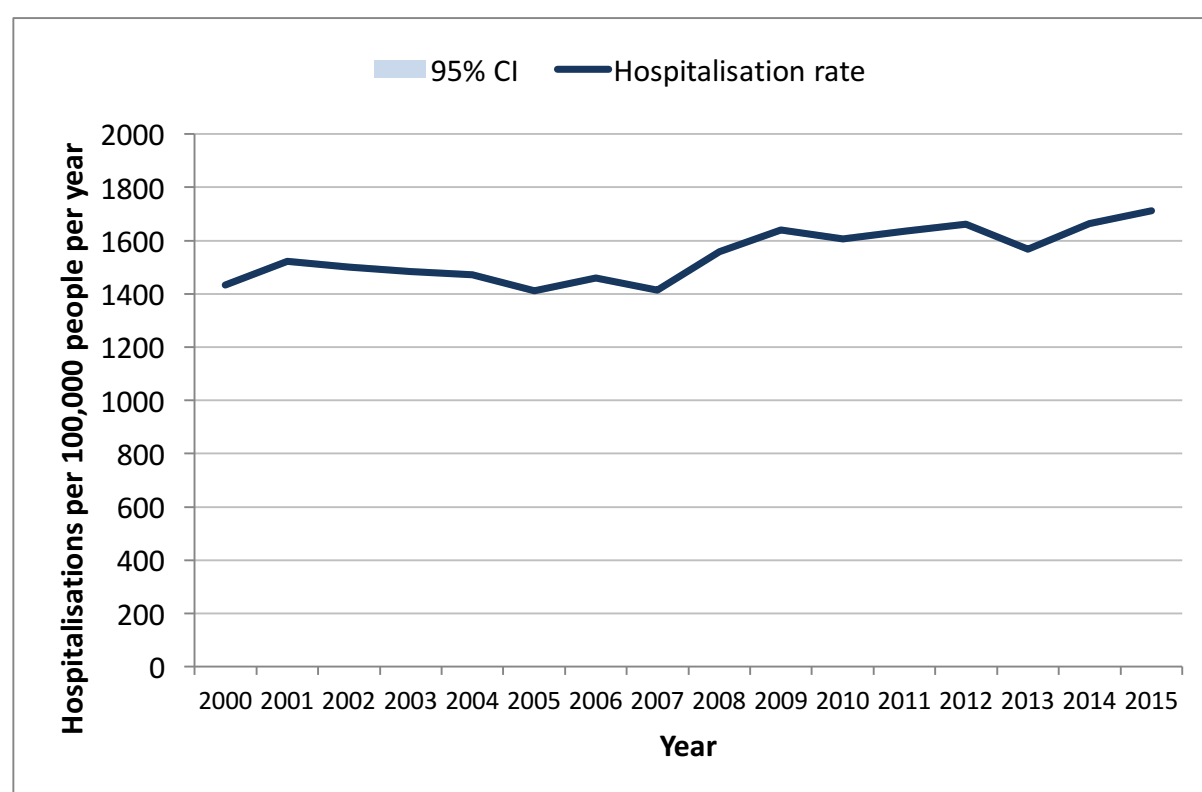
6.7.1. HOSPITALISATIONS

Trends over time 2000-2013

The 2013 rate of respiratory hospitalisations was 1563.1 per 100,000 people. Total respiratory hospitalisations have been increasing at a rate of 14.3 hospitalisations per year over the study period. However, this increase appears as a two-tier effect – rates remained within the same range from 2000 to 2007, then increased sharply in 2008, and stayed at the higher rate to the end of the study period in 2013. The arrival of influenza A(H1N1) in 2009 may have contributed to the rate remaining high, but cannot be responsible for the original increase in 2008 (Figure 68).

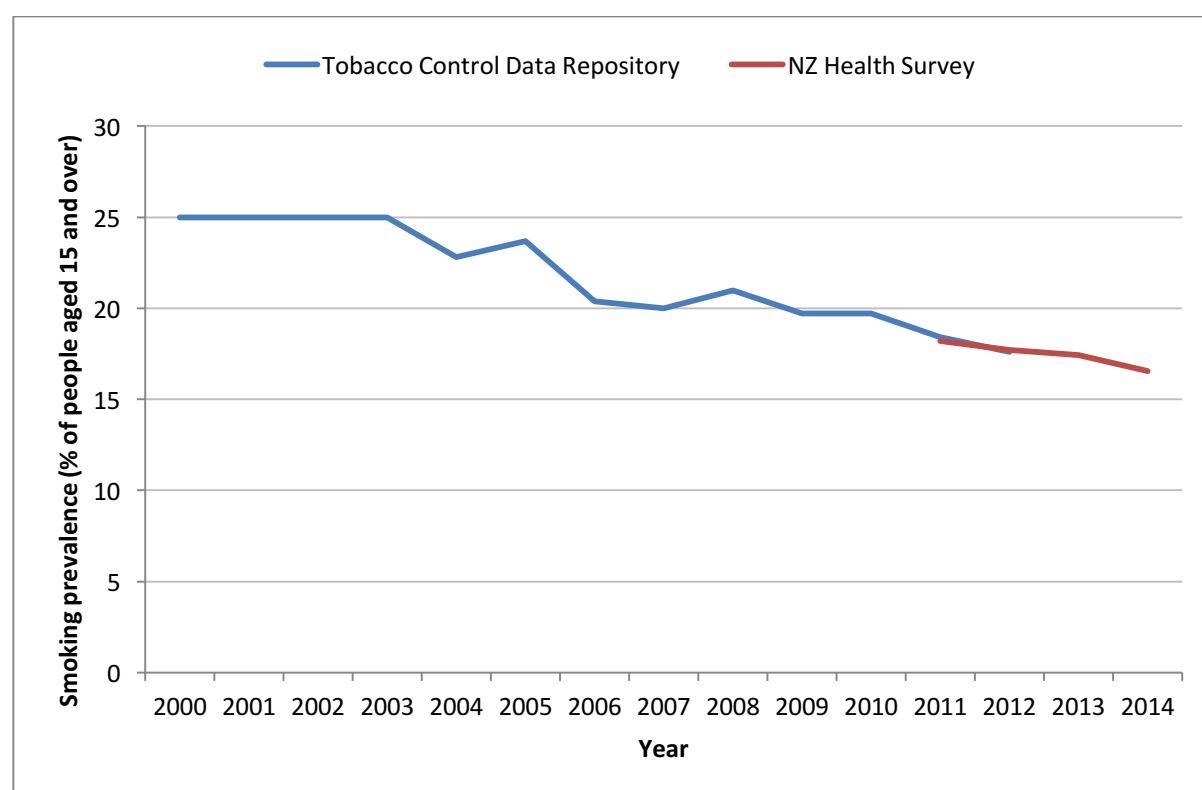
This increase has occurred despite a drop in tobacco smoking prevalence over a similar period (2000 – 2013/14) from 25% to 16.5%.²⁴

Figure 68. Total respiratory hospitalisations per 100,000 people per year, 2000-2015.



(See Table A 74 for data)

Figure 69. New Zealand smoking prevalence 2000-2014/15.



Data sourced from Tobacco Control Data Repository, <http://www.tcddata.org.nz/TobaccoSectorOverview.aspx>, accessed 11 August 2016, and New Zealand Health Survey data for 2011/12, 2012/13, 2013/14 and 2014/15.

Risks and determinants

Respiratory hospitalisation rates were highest for the young (children aged under 15 years) and the elderly (adults aged over 65 years). Rates were higher for males than females in the young and the elderly, but higher for females than males in both age groups for adults aged 15 to 64 (Figure 70).

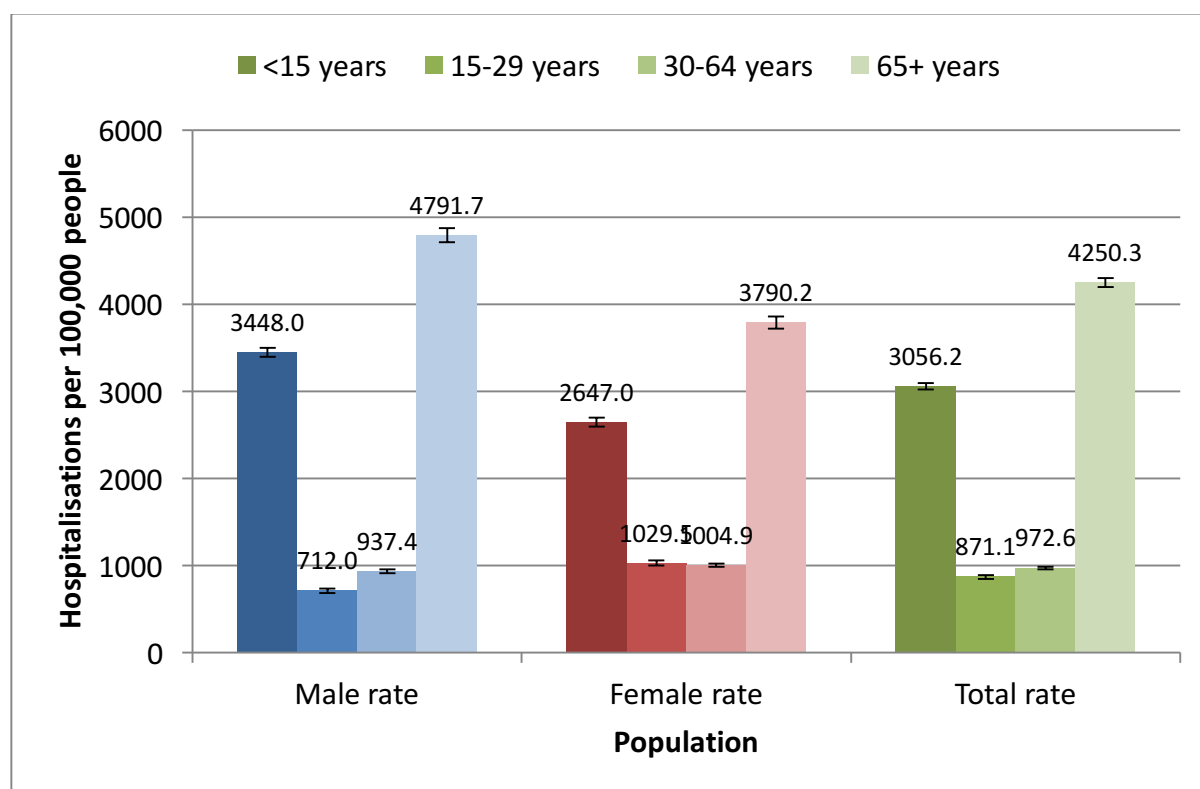
Respiratory hospitalisation rates were highest for Pacific peoples, with rates 3.1 times higher (95%CI 2.6-2.7) than for non-MPA. Māori rates were also significantly higher (rate ratio 2.4), but not meaningfully different for Asian peoples. These trends were repeated across all age groups (Figure 72).

There was a significant deprivation gradient in total respiratory hospitalisations, with rates in the most deprived NZDep quintile 3.0 times higher than rates in the least deprived quintile (Figure 73).

The deprivation gradient was present for all ethnic groups. However, the lowest Pacific rate, in the wealthiest quintile, was not significantly different from rates for non-MPA in the most deprived quintile: Pacific peoples living in all but the wealthiest areas have poorer respiratory outcomes than non-MPA people in even the most deprived areas (Figure 74).

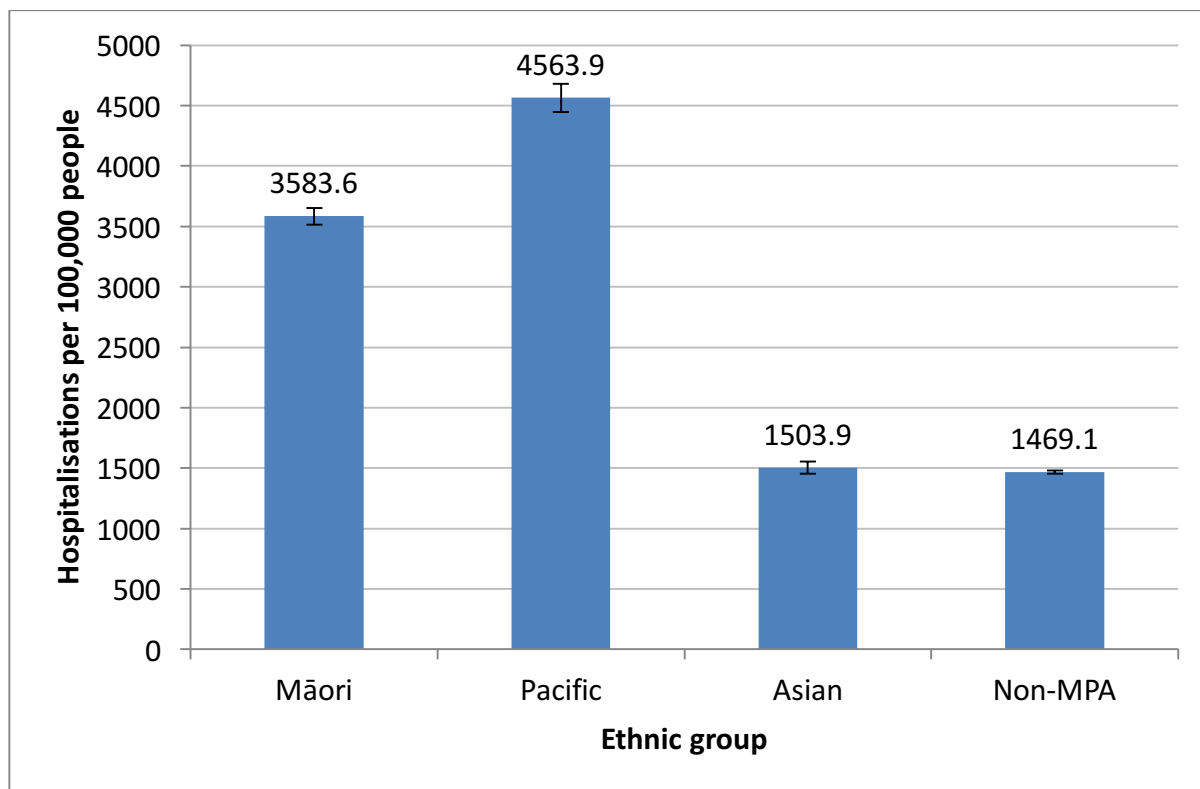
Total respiratory hospitalisation rates were highest in Counties Manukau, Lakes and Northland DHBs and lowest in Nelson Marlborough (Figure 75).

Figure 70. Total respiratory hospitalisations per 100,000 people by age group and sex, 2015.



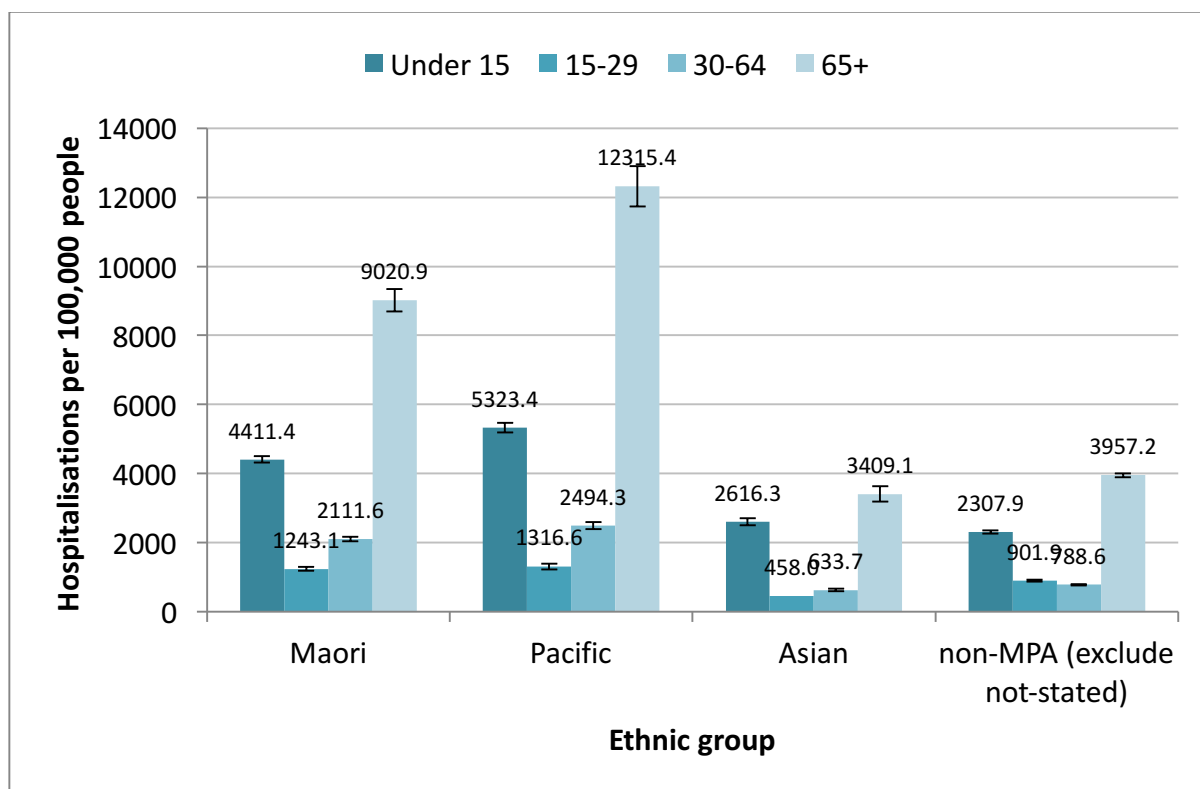
(See Table A 75 and Table A 76 for data)

Figure 71. Total respiratory hospitalisations per 100,000 people by ethnic group, 2015.



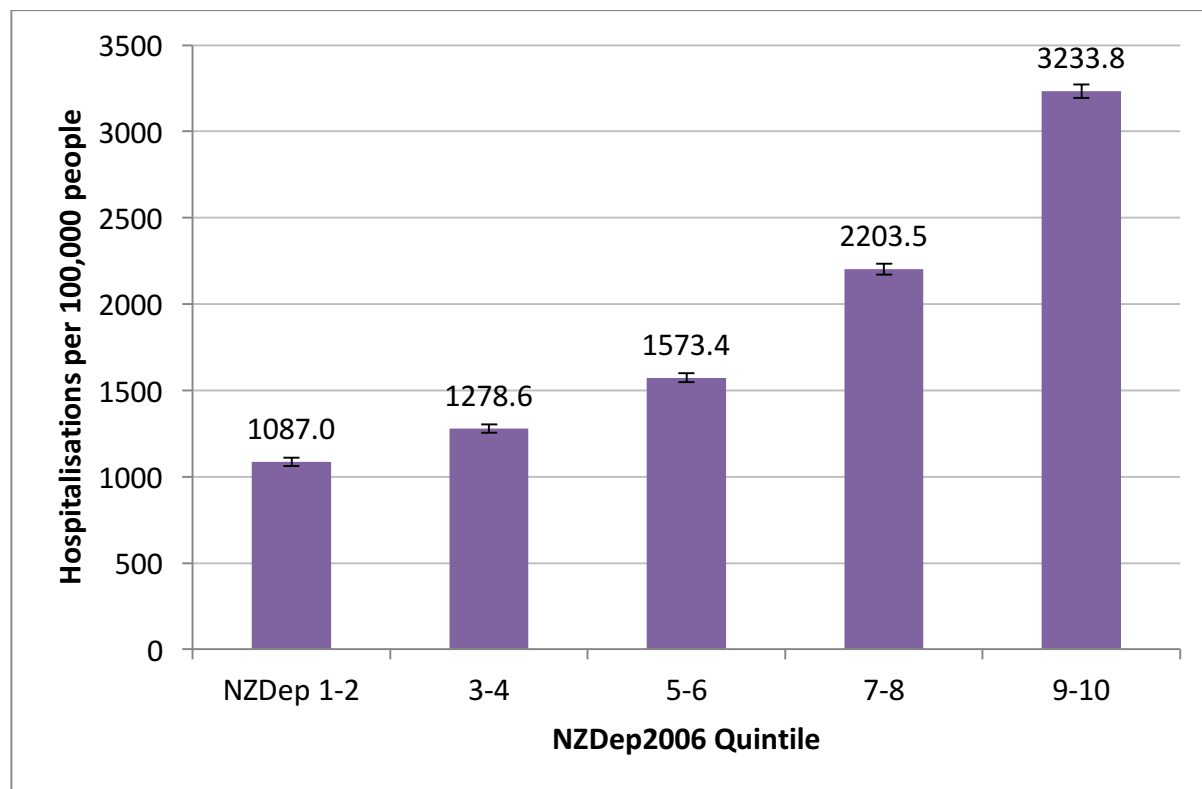
(See Table A 77 for data)

Figure 72. Total respiratory hospitalisations per 100,000 people by ethnic group and age group, 2015.



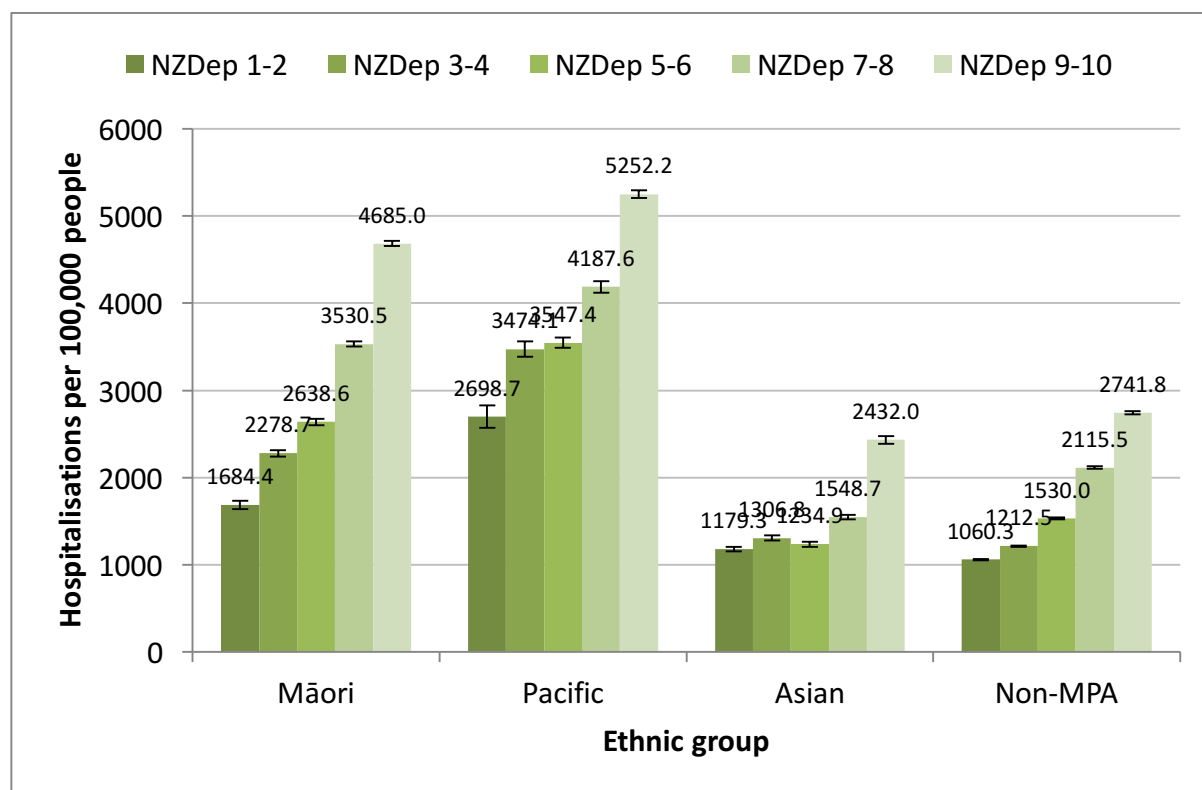
(See Table A 78 for data)

Figure 73. Total respiratory hospitalisations per 100,000 people by NZDep2013 quintile, 2015, age-adjusted.



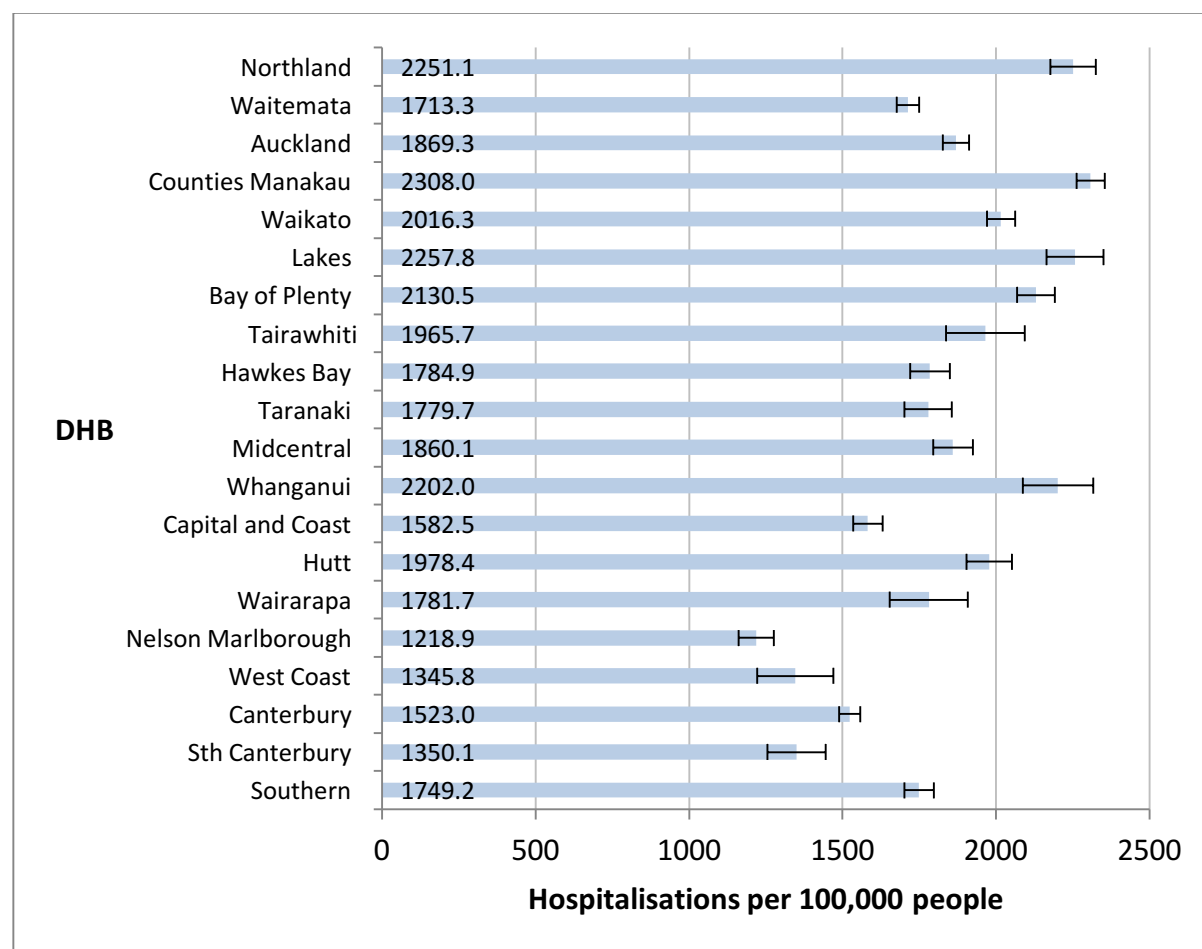
(See Table A 79 for data)

Figure 74. Total respiratory hospitalisations per 100,000 people by ethnic group and NZDep2006, 2015, age-adjusted.



(See Table A 80 for data)

Figure 75. Total respiratory hospitalisations per 100,000 people by DHB, 2015.

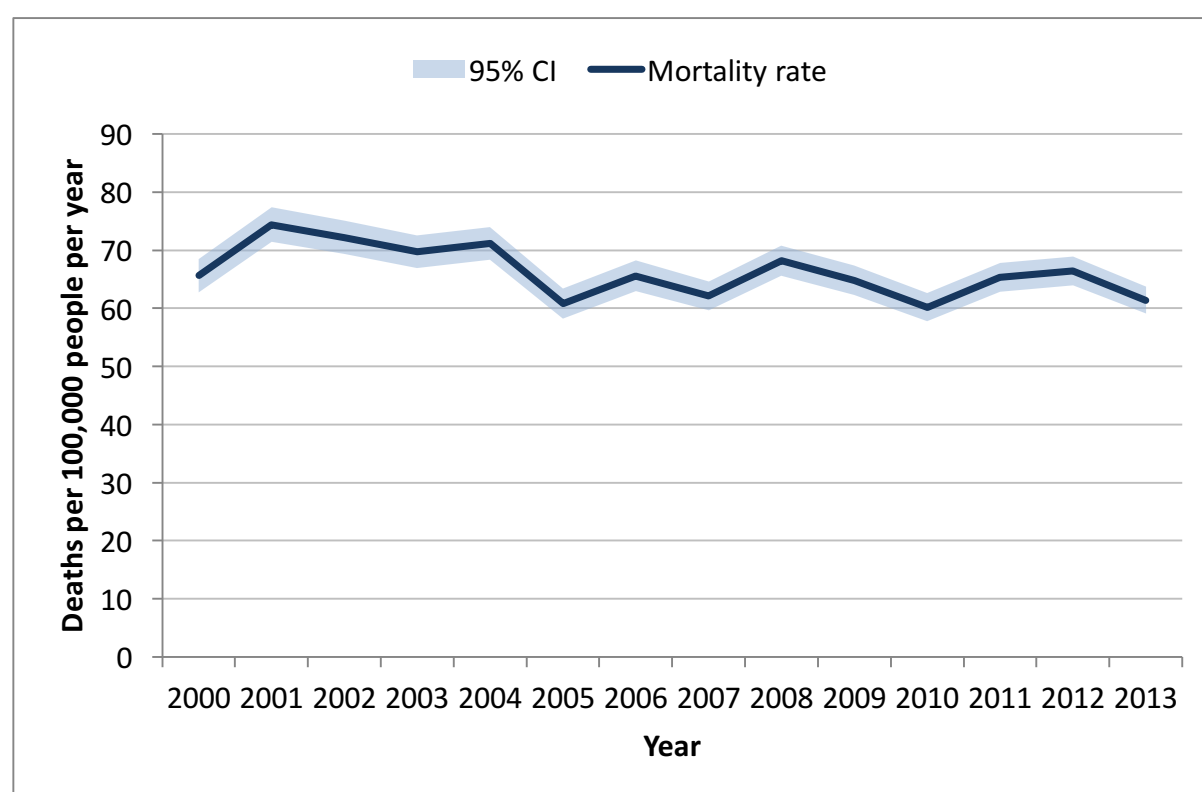


(see Table A 81 for data)

6.7.2. MORTALITY

Respiratory disease was the cause of 2663 deaths in 2013. Overall rates of respiratory disease have declined slightly, from 65.6 deaths per 100,000 people in 2000, to 61.4 deaths per 100,000 people. This decline was part of an overall trend of 0.62 less deaths per 100,000 people per year.

Figure 76. Total respiratory mortality rates 2000-2013, age-adjusted.



(See Table A 82 for data)

Risks and determinants

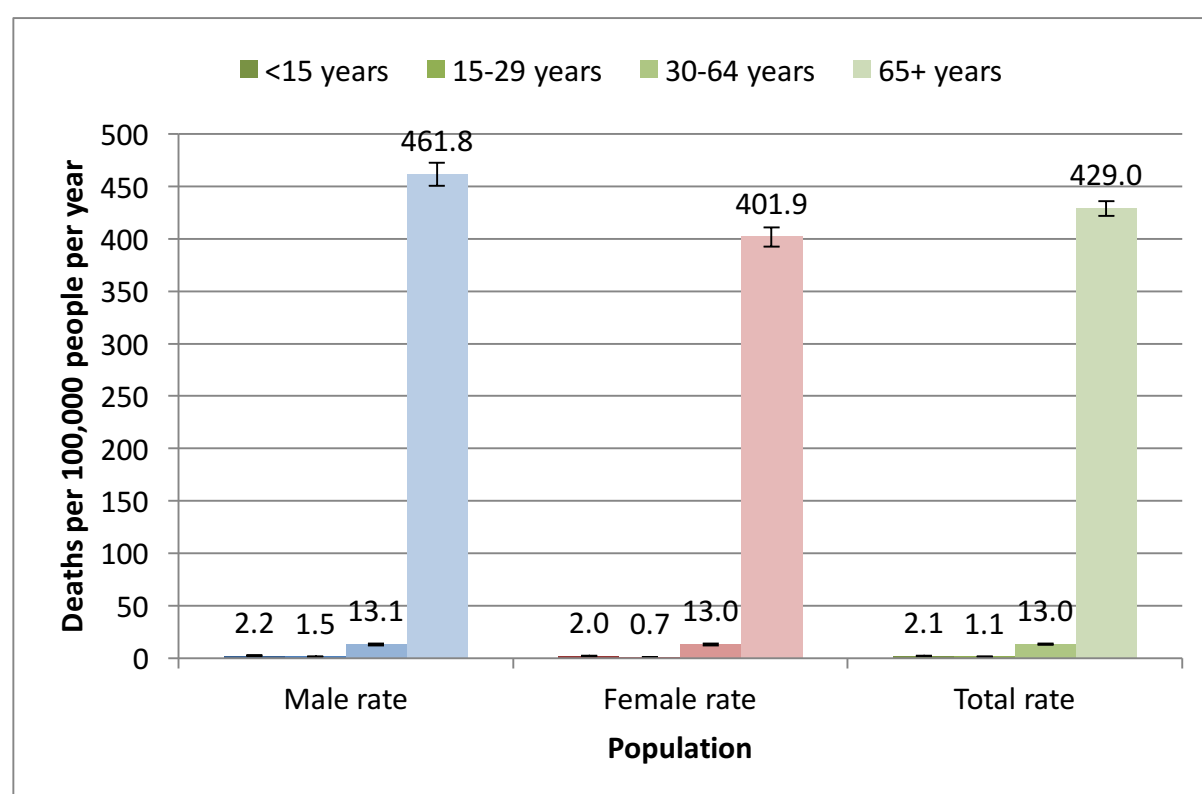
Over the period 2008 – 2013, mortality rates due to any respiratory disease were 33.0 times higher in people aged 65+ than in adults aged 30-64. Mortality rates were higher in males than females in people under 30 and over 65 years, but not significantly different in adults aged 30-64 (Figure 77).

Respiratory mortality rates were highest in Māori, just over double the rate for non-MPA (rate ratio 2.07; and also higher for Pacific peoples (rate ratio 1.59). However, the rate for Asian peoples was markedly less than that of non-MPA (rate ratio 0.58) (Figure 78).

Respiratory mortality rates also increased with increasing socio-economic deprivation. Rates for the most deprived quintile were nearly twice as high as rates for the least deprived quintile (rate ratio 1.96) (Figure 80). The deprivation gradient was clear for Māori, Pacific and non-MPA, but not significant for Asian peoples (Figure 81).

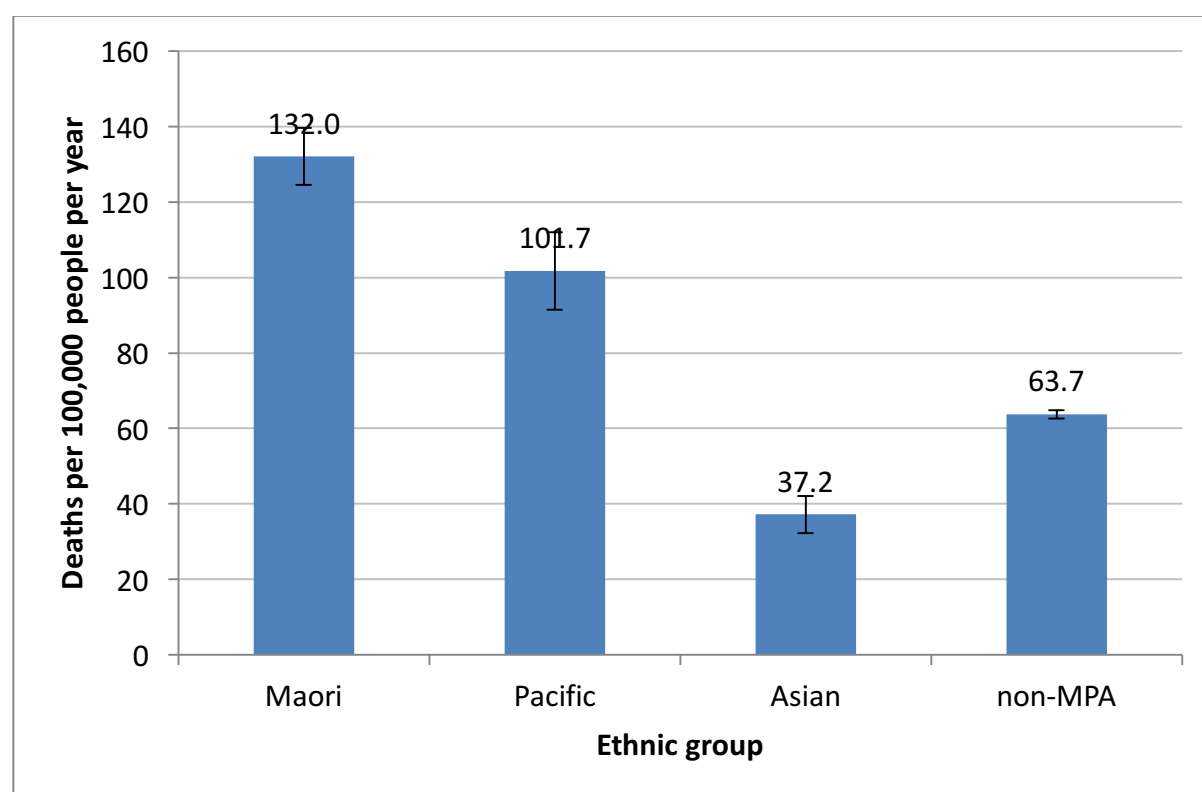
Total respiratory mortality rates were highest in the Lakes DHB, and also significantly higher than the national average in the Northland, Waikato, Tairāwhiti, Whanganui, Hutt, Wairarapa, West Coast and Southern DHBs (Figure 82).

Figure 77. Total respiratory deaths per 100,000 people by age group and sex, 2008-2013.



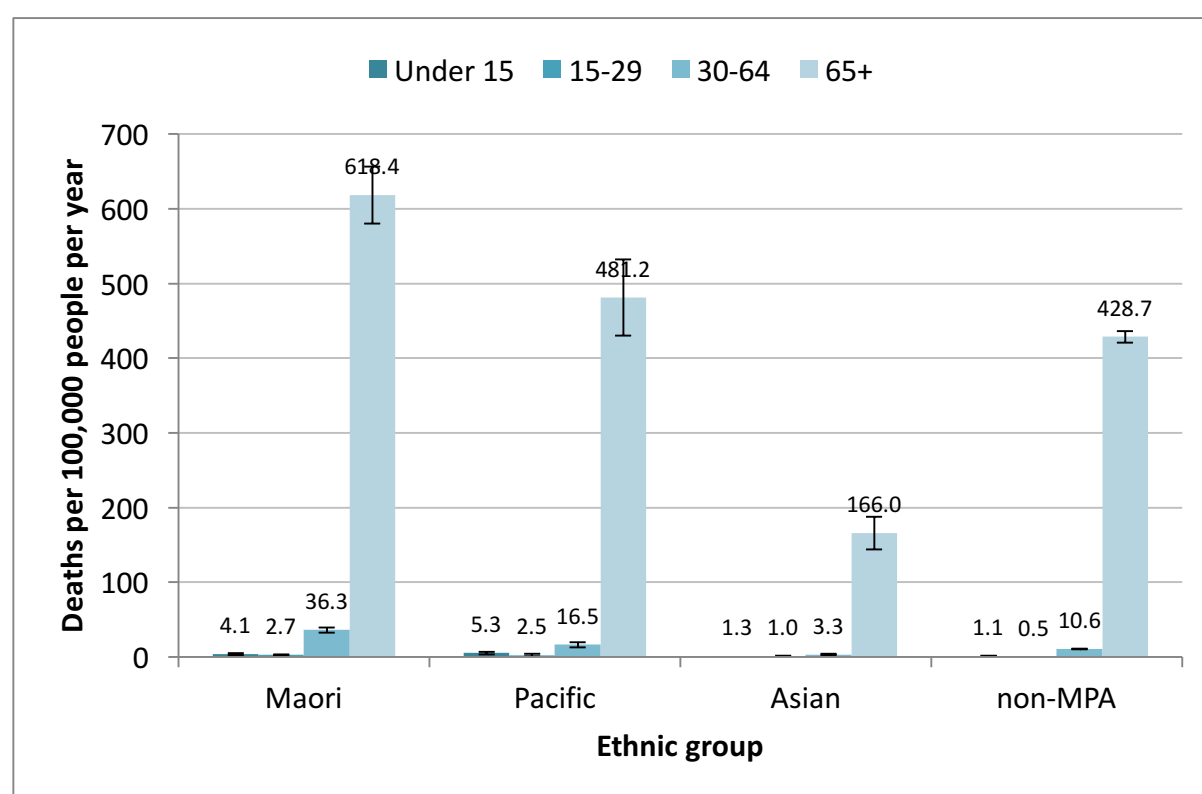
(See Table A 83 and Table A 84 for data)

Figure 78. Total respiratory mortality per 100,000 people per year by ethnic group, 2008-2013.



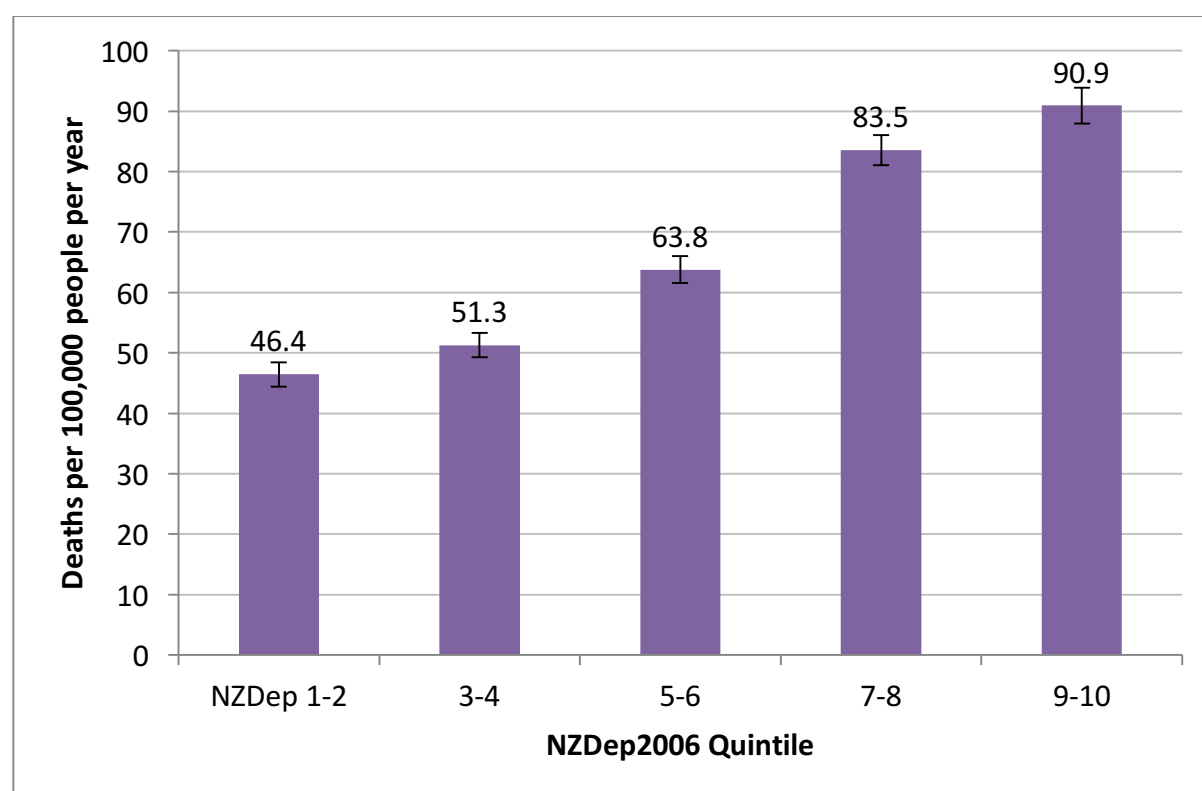
(See Table A 85 for data)

Figure 79. Total respiratory deaths per 100,000 people per year, by ethnic group and age group, 2008-2013.



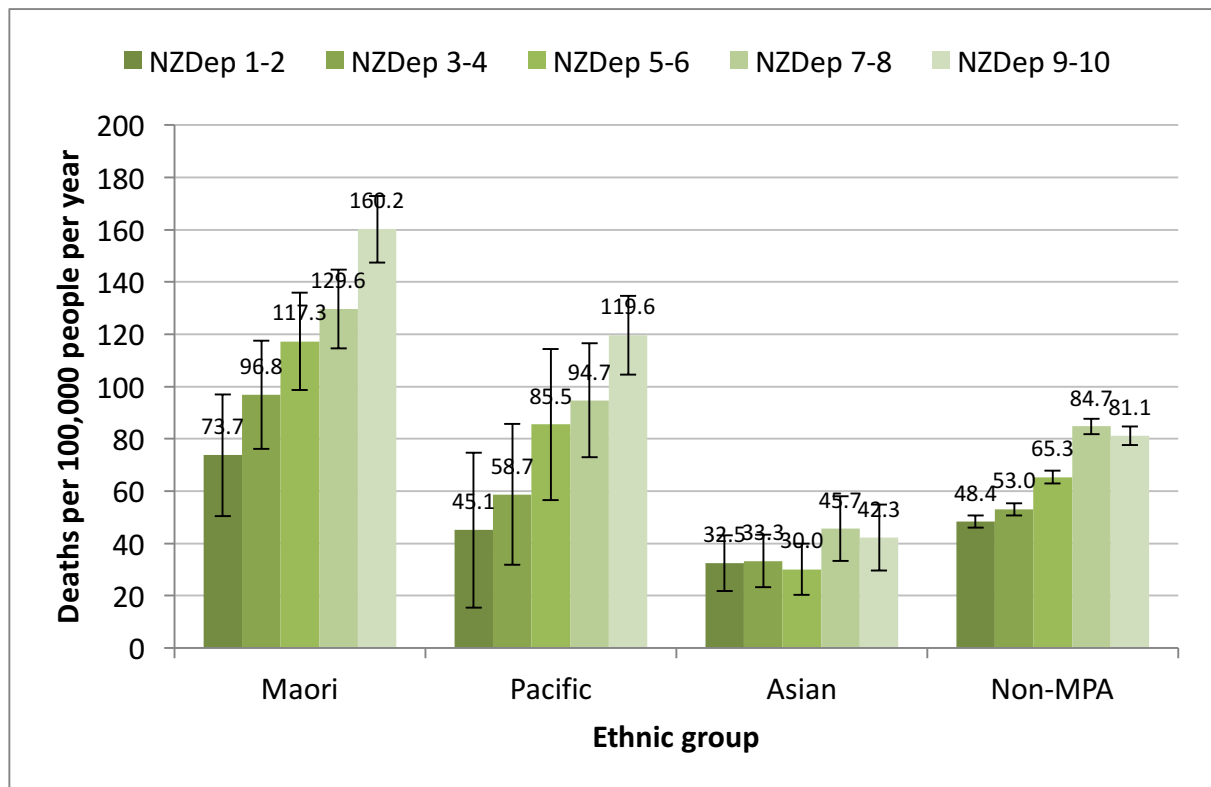
(See Table A 86 for data)

Figure 80. Total respiratory deaths per 100,000 people by NZDep2006 quintile, 2008-2013, age-adjusted.



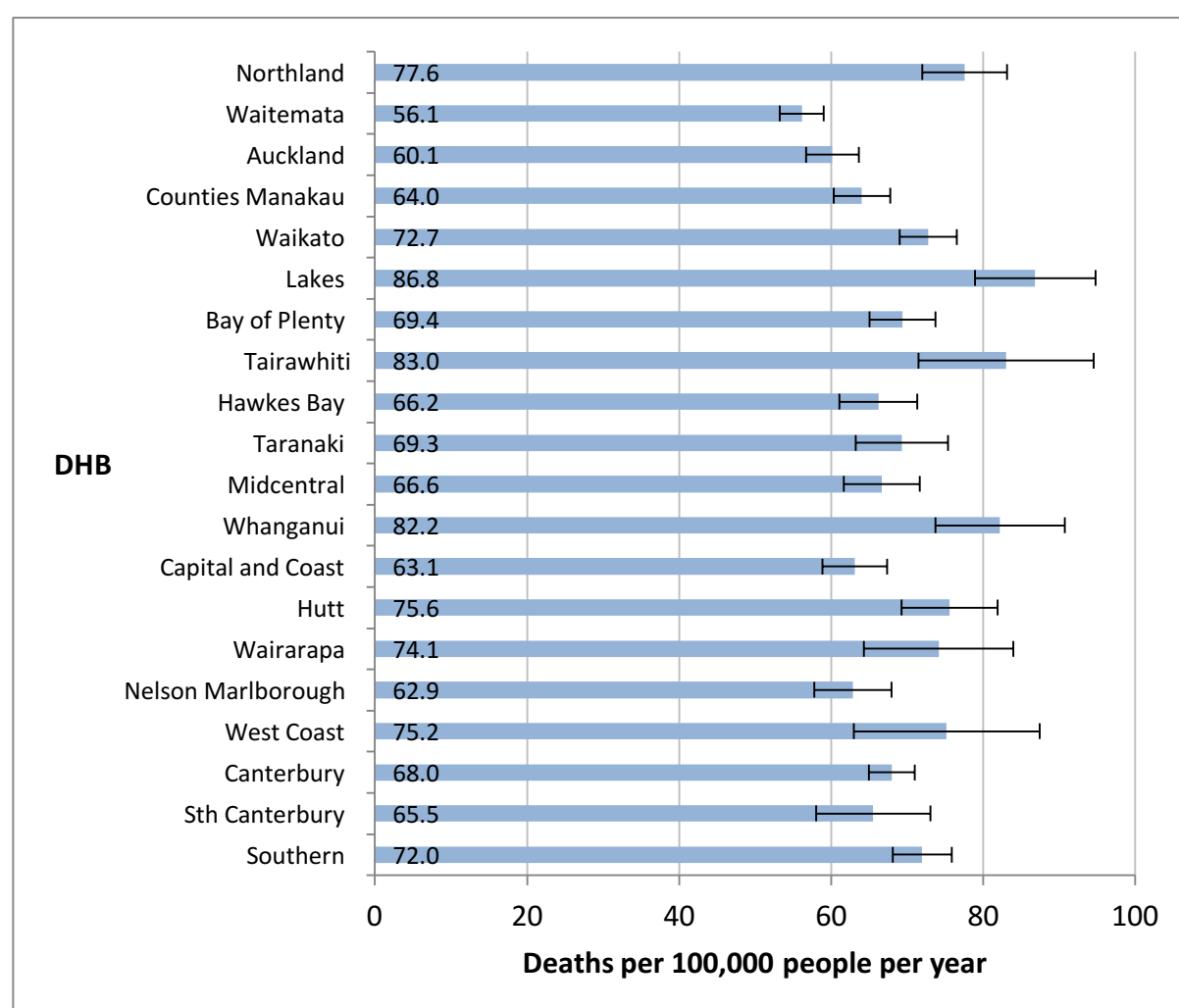
(See Table A 87 for data)

Figure 81. Total respiratory deaths per 100,000 people by ethnic group and NZDep2006, 2008-2013, age-adjusted.



(See Table A 88 for data)

Figure 82. Total respiratory deaths per 100,000 people per year, by DHB, 2008-2013, age-adjusted



(see Table A 89 for data)

6.8. COST SUMMARY

The total cost of respiratory (ICD-10 Chapter 10) deaths in 2013 was \$4,431,241,448.38, from 26,534 life years lost.

The total cost of asthma (J45 and J46) deaths in 2013 was \$236,445,279.47, from 1416 life years lost

The total cost of respiratory (ICD-10 Chapter 10) hospitalisations in 2013 was \$362,772,002.07.

The total cost of asthma (J45 and J46) hospitalisations in 2013 was \$16,892,985.82.

The total cost to New Zealand (whether paid by patients or the State) of respiratory prescriptions in 2013 was \$74,263,822.00

Combining public and private costs of doctors' visits for any respiratory condition, we estimate a minimum total cost of \$45,085,297.14

The cost of doctors' visits for asthma, for adults aged 15+ was estimated at \$17,489,840, and the cost of prescriptions was estimated at \$30,960,380.

Costs for work days lost, ED and OP visits and YLDs were calculated as outlined in the method section.

Therefore, across all costs, we estimate the minimum total cost of asthma and respiratory disease to the New Zealand economy to be:

	Childhood (0-14) asthma	Adult (15+) asthma	Total asthma
Work days lost	\$4,028,847	\$7,291,061	\$11,319,908
Doctors' visits:	\$5,425,797	\$17,489,840	\$22,915,637
Prescriptions:	\$4,058,879	\$30,960,380	\$35,019,259
ED and OP visits:			\$53,247,667
Hospitalisations:	\$7,004,981	\$9,888,005	\$16,892,986
YLDs			\$482,329,400
<u>Mortality:</u>	<u>\$37,773,730</u>	<u>\$198,671,549</u>	<u>\$236,445,279</u>
TOTAL:	\$58,292,234	\$264,300,835	\$858,170,136

	All respiratory
Doctors' visits:	\$45,085,297
Prescriptions:	\$74,263,822
Hospitalisations:	\$362,772,002
YLDs:	\$1,248,291,600
<u>Mortality:</u>	<u>\$4,431,241,448</u>
TOTAL:	\$6,161,653,169

These are minimum costs. They do not include the direct cost of emergency department visits, nor the indirect costs of the long-term impact of interrupted schooling. Costs for total respiratory disease do not include work days lost or emergency department and outpatient visits.

Since the last report, some costs have increased while others have decreased.

The cost of work-days lost due to adult asthma has decreased due to a decrease in the average weekly wage used for calculations, and a small drop in adult asthma prevalence, between 2011 and 2013.

The cost of doctors' visits attributed to asthma has decreased for adults due to a change in the percentage of respiratory prescriptions attributed to asthma.

The cost of asthma hospitalisations has reduced because asthma hospitalisation numbers dropped between 2011 and 2013. The cost of child asthma mortality has increased dramatically because no children died of asthma in 2011, while three children died in 2013.

7. RECOMMENDATIONS

1. **Urgent** new and extended programmes are needed to reduce the **severe** ethnic and socio-economic inequalities in respiratory disease.
2. The high concentration of respiratory disease in Counties Manukau; in Māori and Pacific peoples; and in the most socio-economically deprived neighbourhoods, suggest that targeted programmes could be effective in reducing not only inequalities, but also overall rates of respiratory disease.
3. We recommend research into the current national prevalence of obstructive sleep apnoea, in order to better estimate its impact on national health outcomes.

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9. APPENDIX 1 DATA TABLES

9.1. ASTHMA

9.1.1. PREVALENCE

Table A 1. Age-standardised medicated asthma rates by age-group and sex, 2014/15

Population group	Total		Male		Female		M vs F	
	%	95% CI	%	95% CI	%	95% CI	RR	95% CI
Total children <15 years	15.1	(13.4–16.9)	16.5	(14.2–19.1)	13.6	(11.5–16.0)	1.22	(0.99–1.50)
2–4 years	13.9	(11.4–16.9)	17.3	(13.0–22.5)	10.3	(7.8–13.7)		
5–9 years	16.2	(13.8–18.8)	17.1	(14.2–20.4)	15.2	(11.8–19.3)		
10–14 years	14.7	(12.2–17.6)	15.4	(11.8–19.9)	13.9	(10.8–17.8)		
Total adults	11.0	(10.3–11.7)	9.0	(8.0–10.1)	12.8	(12.0–13.7)	0.70	(0.61–0.81)
15–24 years	10.6	(8.9–12.7)	10.6	(8.0–14.0)	10.6	(8.4–13.4)		
25–34 years	10.0	(8.5–11.9)	6.7	(4.8–9.1)	13.3	(10.8–16.2)		
35–44 years	11.2	(9.5–13.2)	10.2	(7.8–13.2)	12.2	(9.9–15.0)		
45–54 years	10.6	(9.2–12.2)	9.4	(7.3–12.0)	11.7	(9.7–14.0)		
55–64 years	11.5	(9.8–13.4)	8.0	(6.2–10.3)	14.7	(12.2–17.8)		
65–74 years	11.6	(9.6–14.0)	9.1	(6.4–13.0)	13.9	(11.3–17.1)		
75+ years	12.3	(10.2–14.7)	8.5	(5.7–12.5)	15.2	(12.6–18.2)		

Table A 2. Medicated asthma prevalence by ethnic group 2014/15, children and adults

Population group	Children		RR* to rest of population	Adults		RR* to rest of population
	%	95% CI		%	95% CI	
Total	15.1	(13.4–16.9)		11.0	(10.3–11.7)	
Māori	18.6	(16.1–21.4)	1.35 (1.14–1.60)	15.3	(13.8–16.9)	1.51 (1.35–1.69)

Pacific	15.4 (11.5–20.3)	1.03 (0.77–1.36)	9.9 (7.8–12.5)	0.90 (0.72–1.14)
Asian	14.1 (10.3–19.0)	0.91 (0.66–1.26)	4.9 (3.4–6.8)	0.42 (0.30–0.61)
European/Other	14.6 (12.7–16.8)	Not given	11.7 (10.9–12.5)	Not given

*Rate ratios are age and sex adjusted.

Table A 3. Child medicated asthma prevalence 2014/15 by NZDep2006, unadjusted

NZDep quintile	Total		Boys		Girls	
	%	95% CI	%	95% CI	%	95% CI
1-2	13.1	(9.3–18.1)	16.5	(12.0–22.1)	9.3	(4.7–17.6)
3-4	11.8	(9.0–15.5)	13.5	(9.3–19.4)	10.3	(6.8–15.2)
5-6	17.5	(14.3–21.4)	19.1	(14.0–25.5)	15.7	(10.9–21.9)
7-8	16.7	(14.0–19.7)	16.9	(13.0–21.5)	16.4	(12.6–21.2)
9-10	16.4	(14.0–19.2)	16.6	(13.5–20.2)	16.3	(13.0–20.2)
Age-adjusted rate ratio 9-10 vs 1-2	1.39	(0.96–2.02)	1.06	(0.65–1.73)	1.97	(1.09–3.56)

Table A 4. Adult medicated asthma prevalence 2014/15 by NZDep2006, unadjusted

NZDep quintile	Total		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
1-2	11.3	(9.5–13.3)	11.1	(8.3–14.6)	11.5	(9.2–14.1)
3-4	10.1	(8.6–11.8)	7.8	(5.9–10.2)	12.3	(10.0–14.9)
5-6	10.5	(9.2–12.0)	8.5	(6.6–10.9)	12.4	(10.7–14.4)
7-8	10.8	(9.3–12.6)	7.8	(6.0–10.2)	13.4	(11.4–15.7)
9-10	12.3	(11.1–13.6)	9.7	(8.0–11.8)	14.6	(13.0–16.4)
Age and ethnicity adjusted rate ratio 9-10 vs 1-2	1.05	(0.85–1.30)	0.72	(0.44–1.18)	1.33	(1.02–1.73)

Table A 5. Children (aged 2-14) and adult (aged 15+) medicated asthma prevalence by DHB 2011-2013

District Health Boards (DHB)	Unadjusted prevalence (2011-13)	
	Children	Adults

	%	(95% CI)	%	(95% CI)
New Zealand	14.6	(13.8–15.4)	11.0	(10.6–11.4)
Northland	19.3	(16.1–23.1)	12.1	(10.5–13.9)
Waitemata	13.9	(11.4–16.8)	10.0	(9.0–11.2)
Auckland	10.5	(8.4–13.0)	8.1	(7.1–9.1)
Counties-Manukau	13.7	(11.4–16.3)	8.9	(7.7–10.2)
Waikato	13.8	(11.3–16.7)	11.9	(10.0–14.0)
Bay of Plenty	15.8	(12.4–19.9)	11.1	(9.8–12.4)
Taranaki	19.2	(15.0–24.2)	11.7	(10.1–13.6)
Lakes	15.2	(11.7–19.7)	12.3	(10.6–14.2)
Tairāwhiti	21.8	(16.0–29.0)	10.9	(9.1–13.0)
Whanganui	23.1	(16.9–30.6)	11.9	(8.9–15.9)
MidCentral	15.5	(12.0–19.8)	13.3	(11.4–15.4)
Hawkes Bay	15.4	(11.4–20.4)	10.9	(9.2–12.7)
Capital and Coast	13.5	(10.0–18.0)	11.9	(10.3–13.7)
Hutt	17.3	(13.0–22.8)	14.1	(12.0–16.5)
Wairarapa	18.8	(13.8–25.2)	15.3	(11.2–20.5)
Nelson-Marlborough	10.7	(7.6–14.9)	10.5	(8.6–12.7)
West Coast	12.5	(7.6–20.0)	12.5	(9.4–16.3)
Canterbury	15.0	(12.4–18.0)	12.2	(10.9–13.7)
South Canterbury	16.2	(11.2–22.7)	10.0	(7.9–12.6)

Southern	13.0 (10.0–16.9)	11.9 (10.5–13.6)
Bold values were statistically significantly different from the NZ rate (p<0.05). Rates are unadjusted.		

Data source: Ministry of Health New Zealand Health Survey data tables.

9.1.2. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 6. Asthma hospitalisations, rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	7487	194.1	186.5	(182.3-190.8)
2001	8006	206.3	198.7	(194.3-203.1)
2002	7675	194.4	189.9	(185.6-194.2)
2003	8131	201.9	198.1	(193.8-202.5)
2004	8216	201.0	197.9	(193.6-202.2)
2005	8381	202.7	200.9	(196.5-205.2)
2006	8048	192.3	191.0	(186.8-195.2)
2007	7755	183.6	181.9	(177.9-186)
2008	8337	195.7	193.3	(189.2-197.5)
2009	9180	213.4	210.0	(205.7-214.3)
2010	9187	211.2	207.7	(203.4-211.9)
2011	8520	194.3	191.8	(187.7-195.9)
2012	8160	185.1	183.3	(179.3-187.3)
2013	7371	165.9	165.2	(161.4-168.9)
2014	7207	159.8	159.9	(156.2-163.6)
2015	7466	162.5	163.5	(159.8-167.2)
Trend 2000 -2015		-1.76 (-3.25 - -0.25), p=0.025		

Table A 7. 2015 asthma hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	RR	95% CI
<15	3552	410.3	(396.8-423.8)	2088	472.2	(452-492.5)	1464	345.7	(328-363.4)	1.37	(1.32-1.41)
15-29	1123	133.0	(125.2-140.7)	333	79.0	(70.5-87.5)	790	186.7	(173.7-199.7)	0.42	(0.4-0.45)
30-64	2125	110.4	(105.7-115.1)	665	72.2	(66.7-77.6)	1460	145.5	(138.1-153)	0.50	(0.47-0.52)

65+	666	109.71 (101.4-118)	191	68.5 (58.8-78.2)	475	144.7 (131.7-157.8)	0.47 (0.44-0.51)
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Table A 8. 2015 asthma hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	3.72	(3.62-3.81)	6.54	(6.27-6.83)	2.38	(2.29-2.46)
15-29	1.20	(1.16-1.25)	1.09	(1.03-1.17)	1.28	(1.23-1.34)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	0.99	(0.95-1.04)	0.95	(0.88-1.03)	0.99	(0.95-1.05)

Table A 9. 2015 asthma hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	2636	440.4	382.4	(365.8-398.9)	3.13	(3.05-3.22)
Pacific	1356	458.2	441.4	(411.9-471)	3.62	(3.49-3.75)
Asian	648	137.4	154.2	(140.7-167.7)	1.26	(1.21-1.32)
Non-MPA	3082	113.7	122.0	(117.7-126.4)	1.00	Baseline

Table A 10. 2015 asthma hospitalisation rates by ethnic group and age.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	1426	704.8	(668.3-741.4)	735	696.6	(646.2-746.9)	345	354.9	(317.5-392.4)	1220	268.8	(253.7-283.9)
15-29	464	322.1	(292.8-351.4)	188	245.5	(210.4-280.7)	73	55.3	(42.6-67.9)	451	99.6	(90.4-108.8)
30-64	656	298.2	(275.3-321)	347	347.3	(310.8-383.8)	171	79.5	(67.6-91.4)	977	75.3	(70.5-80)
65+	90	279.6	(221.9-337.4)	86	616.6	(486.3-746.9)	59	216.0	(160.9-271.1)	434	85.7	(77.6-93.7)

Table A 11. 2015 asthma hospitalisation rates by NZDep2006 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	742	85.0	87.9	(81.5-94.3)	1.00	Baseline
3-4	863	101.1	103.9	(97-110.9)	1.18	(1.13-1.24)
5-6	1118	133.4	136.0	(128.1-144)	1.55	(1.48-1.62)
7-8	1857	223.7	225.7	(215.4-236)	2.57	(2.46-2.68)
9-10	2870	344.5	325.9	(313.8-338)	3.71	(3.56-3.86)

Table A 12. 2015 asthma hospitalisation rates by ethnic group and NZDep quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	96	176	306	633	1423
	Rate (raw)	186.0	254.4	313.7	457.8	589.0
	Rate (age adj'd)	157.3	202.4	277.1	395.0	515.5
	95%CI	(121.9-192.7)	(170.4-234.3)	(241.5-312.6)	(360.8-429.3)	(484.8-546.2)
Pacific	Hosp_Num	49	111	145	290	754
	Rate (raw)	332.2	481.8	413.5	468.0	468.3
	Rate (age adj'd)	293.2	457.2	403.6	412.3	468.4
	95%CI	(200.3-386)	(355.5-559)	(321.8-485.3)	(356.5-468.1)	(424.8-512.1)
Asian	Hosp_Num	79	112	92	169	195
	Rate (raw)	97.1	111.9	90.7	162.6	230.2
	Rate (age adj'd)	94.0	131.2	102.0	183.3	282.4
	95%CI	(73.1-114.9)	(104.4-158.1)	(77.6-126.5)	(152.3-214.2)	(231.9-333)
NZ European/ Other	Hosp_Num	526	487	598	825	640
	Rate (raw)	75.1	77.2	104.7	167.9	210.1
	Rate (age adj'd)	80.1	81.6	113.5	185.7	232.2
	95%CI	(73.1-87.1)	(74.2-88.9)	(0-122.7)	(172.7-198.6)	(213.7-250.7)

Table A 13. 2015 asthma hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	306	201.7	207.8	(184.1-231.5)
Waitemata	865	164.6	164.3	(153.4-175.3)
Auckland	792	181.5	191.1	(177.6-204.6)
Counties Manakau	903	192.4	184.9	(172.7-197.1)
Waikato	806	224.3	219.0	(203.9-234.1)
Lakes	338	344.2	330.8	(295.4-366.2)
Bay of Plenty	495	240.3	246.8	(224.9-268.7)
Tairāwhiti	109	249.7	218.9	(177.6-260.2)
Hawkes Bay	233	153.6	149.9	(130.6-169.3)
Taranaki	205	186.8	186.1	(160.6-211.7)
Midcentral	342	210.4	211.7	(189.2-234.2)
Whanganui	164	272.8	276.4	(233.8-319)
Capital and Coast	414	145.9	149.5	(135-164)
Hutt	281	203.1	199.4	(176.1-222.8)
Wairarapa	78	189.7	193.2	(149.9-236.5)

Nelson Marlborough	123	89.8	91.0	(74.7-107.4)
West Coast	28	87.1	87.5	(54.9-120.1)
Canterbury	616	127.8	131.4	(121-141.8)
Sth Canterbury	46	82.7	87.5	(61.8-113.2)
Southern	321	107.9	112.7	(100.3-125)

9.1.3. MORTALITY

Table A 14. Asthma mortality rates and age-adjusted rates 2000-2013.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	72	1.87	2.15	(1.65 - 2.66)
2001	71	1.83	2.10	(1.60 - 2.59)
2002	76	1.92	2.16	(1.67 - 2.65)
2003	76	1.89	2.18	(1.68 - 2.67)
2004	70	1.71	1.91	(1.46 - 2.36)
2005	61	1.48	1.64	(1.23 - 2.06)
2006	78	1.86	2.03	(1.58 - 2.49)
2007	64	1.52	1.64	(1.23 - 2.04)
2008	62	1.46	1.55	(1.16 - 1.93)
2009	55	1.28	1.34	(0.98 - 1.69)
2010	56	1.29	1.35	(0.99 - 1.7)
2011	70	1.60	1.66	(1.27 - 2.04)
2012	64	1.45	1.49	(1.13 - 1.86)
2013	70	1.58	1.60	(1.23 - 1.98)
Trend 2000 -2011		-0.06 (-0.09 - -0.04), p<0.001		

Table A 15. Asthma mortality rates and rate ratios by age group and sex, 2008-2013.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	13	0.3	(0.1-0.4)	6	0.2	(0-0.4)	7	0.3	(0.1-0.5)	0.82	(0.48-1.39)
15-29	21	0.4	(0.2-0.6)	13	0.5	(0.2-0.8)	8	0.3	(0.1-0.5)	1.64	(1.07-2.51)
30-64	123	1.1	(0.9-1.3)	43	0.8	(0.6-1)	80	1.4	(1.1-1.7)	0.58	(0.48-0.69)
65+	220	6.7	(5.8-7.5)	72	4.8	(3.7-5.9)	148	8.2	(6.9-9.5)	0.59	(0.51-0.67)

Table A 16. Asthma mortality rate ratios by age group and sex, 2008-2013.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.23	(0.17-0.3)	0.29	(0.19-0.43)	0.20	(0.14-0.29)
15-29	0.39	(0.31-0.49)	0.66	(0.49-0.9)	0.24	(0.17-0.33)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	6.13	(5.5-6.82)	6.09	(5.07-7.31)	6.01	(5.27-6.86)

Table A 17. Asthma mortality rates and rate ratios by ethnic group, 2008-2013.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	106	3.0	5.8	(4.5-7.2)	5.86	(4.23-5.51)
Pacific	36	2.1	5.2	(3.2-7.2)	5.59	(4.81-7.04)
Asian	16	0.6	1.3	(0.5-2.2)	1.60	(0.86-1.54)
Non-MPA	222	1.4	1.1	(1-1.3)	1.00	Baseline

Table A 18. Asthma mortality rates by ethnic group and age, 2008-2013

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	6	0.5	(0.1-0.9)	2	0.3	(0.1-1.3)	1	0.2	(0-1.4)	4	0.1	(0-0.3)
15-29	11	1.3	(0.5-2.1)	4	0.9	(0-1.8)	3	0.4	(0.1-1.3)	4	0.1	(0-0.3)
30-64	58	4.6	(3.4-5.7)	16	2.8	(1.4-4.2)	6	0.5	(0.1-1)	45	0.6	(0.4-0.7)
65+	31	18.7	(12.1-25.3)	14	19.4	(9.2-29.6)	6	4.6	(0.9-8.3)	169	6.0	(5.1-6.9)

Table A 19. Asthma mortality rates NZDep2006 quintile, 2008-2013.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	36	0.7	0.8	(0.5-1.1)	1.00	Baseline
3-4	56	1.1	1.1	(0.8-1.4)	1.45	(1.18-1.78)
5-6	50	1.0	1.0	(0.7-1.3)	1.25	(1.01-1.54)
7-8	107	2.2	2.1	(1.7-2.5)	2.68	(2.23-3.22)
9-10	122	2.5	3.0	(2.4-3.5)	3.74	(3.12-4.49)

Table A 20. Asthma mortality rates by ethnic group and NZDep quintile, 2008-2013.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	3	7	12	29	55
	Rate (raw)	0.5	0.9	1.1	1.8	1.9
	Rate (age adj'd)	3.7	2.6	4.1	5.9	7.8
	95%CI	(0.8-16.2)	(0.3-4.9)	(1.2-7.1)	(3.2-8.6)	(5.3-10.4)
Pacific	Hosp_Num	1	1	1	8	24
	Rate (raw)	0.6	0.4	0.3	1.1	1.3
	Rate (age adj'd)	0.8	0.5	0.3	7.1	6.4
	95%CI	(0.1-5.7)	(0.1-3.6)	(0-2.4)	(1.5-12.7)	(3.3-9.4)
Asian	Hosp_Num	2	4	1	4	3
	Rate (raw)	0.2	0.4	0.1	0.4	0.3
	Rate (age adj'd)	0.5	1.4	0.5	2.8	0.9
	95%CI	(0.1-2)	(0.4-5.3)	(0.1-3.4)	(1-8.2)	(0.2-3.6)
NZ European/ Other	Hosp_Num	31	44	36	66	42
	Rate (raw)	0.4	0.6	0.5	1.1	1.1
	Rate (age adj'd)	0.8	1.1	0.9	1.7	1.6
	95%CI	(0.5-1.1)	(0.8-1.4)	(0.6-1.1)	(1.3-2.1)	(1.1-2.1)

Table A 21. Asthma mortality rates by DHB, 2008-2013.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	21	2.36	2.32	(1.3-3.2)
Waitemata	43	1.42	1.56	(0.9-1.8)
Auckland	32	1.27	1.53	(0.9-1.9)
Counties Manakau	44	1.63	2.12	(1.6-3)
Waikato	27	1.29	1.33	(0.8-1.7)
Lakes	9	1.53	1.61	(1.3-4)
Bay of Plenty	20	1.66	1.52	(1.4-3)
Tairāwhiti	7	2.65	2.86	(2-7.4)
Hawkes Bay	8	0.89	0.84	(0.5-1.8)
Taranaki	12	1.87	1.81	(0.7-2.8)
Midcentral	19	1.97	1.86	(1.2-2.9)
Whanganui	6	1.63	1.45	(0.3-2.7)
Capital and Coast	16	0.97	1.17	(0.6-1.8)
Hutt	21	2.55	2.81	(1.2-3.2)
Wairarapa	3	1.25	1.07	(0.3-3.2)

Nelson Marlborough	12	1.50	1.32	(0.7-2.4)
West Coast	2	1.05	0.93	(0.5-4.4)
Canterbury	42	1.48	1.41	(0.9-1.8)
Sth Canterbury	2	0.61	0.43	(0-1.5)
Southern	25	1.43	1.39	(0.4-1.3)

9.2. BRONCHIECTASIS

9.2.1. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 22. Bronchiectasis hospitalisations, rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	701	18.2	20.4	(18.8 - 21.9)
2001	776	20.0	22.1	(20.5 - 23.7)
2002	768	19.5	21.2	(19.7 - 22.8)
2003	747	18.5	20.2	(18.7 - 21.6)
2004	830	20.3	22.0	(20.5 - 23.5)
2005	806	19.5	21.2	(19.7 - 22.6)
2006	867	20.7	22.2	(20.8 - 23.7)
2007	897	21.2	22.5	(21 - 24)
2008	906	21.3	22.4	(21 - 23.9)
2009	991	23.0	24.2	(22.7 - 25.7)
2010	1014	23.3	24.4	(22.9 - 25.9)
2011	1126	25.7	26.6	(25.1 - 28.2)
2012	1038	23.5	24.0	(22.6 - 25.5)
2013	1162	26.2	26.4	(24.9 - 28)
2014	1201	26.6	26.7	(25.2 - 28.2)
2015	1315	28.6	28.7	(27.1 - 30.2)
Trend 2000 -2015		0.49 (0.36 - 0.61), p<0.001		

Table A 23. 2015 bronchiectasis hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	279	32.2	(28.4-36)	132	29.9	(24.8-34.9)	147	34.7	(29.1-40.3)	0.86	(0.77-0.96)
15-29	61	7.2	(5.4-9)	26	6.2	(3.8-8.5)	35	8.3	(5.5-11)	0.75	(0.58-0.95)
30-64	315	16.4	(14.6-18.2)	120	13.0	(10.7-15.4)	195	19.4	(16.7-22.2)	0.67	(0.6-0.75)
65+	660	108.7	(100.4-117)	238	85.3	(74.5-96.2)	422	128.6	(116.3-140.9)	0.66	(0.61-0.72)

Table A 24. 2015 bronchiectasis hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	1.97	(1.82-2.13)	2.29	(2.03-2.58)	1.79	(1.61-1.98)
15-29	0.44	(0.39-0.5)	0.47	(0.39-0.58)	0.43	(0.36-0.51)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	6.64	(6.23-7.09)	6.55	(5.89-7.29)	6.62	(6.09-7.18)

Table A 25. 2015 bronchiectasis hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	372	62.1	85.9	(75.1-96.7)	4.37	(4.07-4.69)
Pacific	255	86.2	157.7	(133.9-181.5)	8.02	(7.38-8.71)
Asian	76	16.1	31.9	(23.5-40.2)	1.62	(1.42-1.85)
Non-MPA	640	23.6	19.7	(18.1-21.2)	1.00	Baseline

Table A 26. 2015 bronchiectasis hospitalisation rates by ethnic group and age.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	142	70.2	(58.6-81.7)	73	69.2	(53.3-85.1)	13	13.4	(6.1-20.6)	66	13.3	(10.1-16.5)
15-29	37	25.7	(17.4-34)	15	19.6	(9.7-29.5)	4	3.0	(0.1-6)	9	1.8	(0.6-2.9)
30-64	101	45.9	(37-54.9)	72	72.1	(55.4-88.7)	24	11.2	(6.7-15.6)	122	8.7	(7.2-10.3)
65+	92	285.9	(227.5-344.3)	95	681.0	(544.1-817.9)	35	128.2	(85.7-170.6)	444	83.1	(75.4-90.8)

Table A 27. 2015 bronchiectasis hospitalisation rates by NZDep2006 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	156	17.9	18.2	(15.3-21.1)	1.00	Baseline
3-4	169	19.8	19.9	(16.9-22.9)	1.10	(0.98-1.22)
5-6	207	24.7	24.5	(21.1-27.8)	1.34	(1.21-1.49)
7-8	286	34.5	34.1	(30.1-38.1)	1.87	(1.7-2.06)
9-10	496	59.5	62.8	(57.2-68.3)	3.45	(3.16-3.76)

Table A 28. 2015 bronchiectasis hospitalisation rates by ethnic group and NZDep quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	13	20	35	78	226
	Rate (raw)	25.2	28.9	35.9	56.4	93.5
	Rate (age adj'd)	23.0	26.4	64.7	77.2	125.2
	95%CI	(9.5-36.5)	(13.6-39.2)	(39.9-89.4)	(56.1-98.4)	(105.1-145.2)
Pacific	Hosp_Num	9	10	18	53	165
	Rate (raw)	61.0	43.4	51.3	85.5	102.5
	Rate (age adj'd)	96.8	112.6	114.3	148.3	183.0
	95%CI	(27.1-166.4)	(33.7-191.5)	(56.1-172.4)	(100-196.6)	(147.5-218.5)
Asian	Hosp_Num	9	11	16	18	22
	Rate (raw)	11.1	11.0	15.8	17.3	26.0
	Rate (age adj'd)	18.7	24.0	36.1	36.3	50.2
	95%CI	(3-34.4)	(8.5-39.6)	(14.5-57.8)	(18-54.7)	(24.4-76)
NZ European/ Other	Hosp_Num	126	129	142	144	98
	Rate (raw)	18.0	20.4	24.9	29.3	32.2
	Rate (age adj'd)	16.9	18.6	20.5	23.4	25.5
	95%CI	(13.9-19.9)	(15.4-21.8)	(17.1-24)	(19.4-27.4)	(20.1-30.9)

Table A 29. 2015 bronchiectasis hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	80	52.7	49	(37.9-59.4)
Waitemata	179	34.1	36	(31.1-41.8)
Auckland	171	39.2	48	(40.8-55.4)
Counties Manakau	212	45.2	52	(44.9-59.2)
Waikato	123	34.2	33	(27.5-39.3)
Lakes	17	38.9	40	(21-59.1)
Bay of Plenty	38	38.7	40	(27.5-53.2)

Tairāwhiti	28	18.5	17	(10.4-22.8)
Hawkes Bay	18	29.9	26	(13.8-38.2)
Taranaki	73	35.4	30	(23.3-37.3)
Midcentral	42	25.8	25	(17.1-31.9)
Whanganui	27	24.6	24	(14.7-32.5)
Capital and Coast	29	10.2	11	(7.1-15.4)
Hutt	27	19.5	20	(12.4-27.5)
Wairarapa	11	26.8	23	(9.4-37.1)
Nelson Marlborough	37	27.0	23	(15.5-30.4)
West Coast	1	3.1	3	(0.4-18)
Canterbury	139	28.8	28	(23.3-32.6)
Sth Canterbury	2	3.6	2	(0.6-9.8)
Southern	61	20.5	20	(14.6-24.5)

9.2.1. MORTALITY

Table A 30. Bronchiectasis mortality rates and age-adjusted rates 2000-2013.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	42	1.09	1.30	(0.9 - 1.7)
2001	42	1.08	1.26	(0.9 - 1.6)
2002	57	1.44	1.69	(1.2 - 2.1)
2003	58	1.44	1.69	(1.3 - 2.1)
2004	57	1.39	1.62	(1.2 - 2)
2005	57	1.38	1.58	(1.2 - 2)
2006	69	1.65	1.87	(1.4 - 2.3)
2007	77	1.82	2.05	(1.6 - 2.5)
2008	95	2.23	2.46	(2 - 3)
2009	94	2.18	2.38	(1.9 - 2.9)
2010	94	2.16	2.31	(1.8 - 2.8)
2011	87	1.98	2.09	(1.7 - 2.5)
2012	102	2.31	2.39	(1.9 - 2.9)
2013	96	2.16	2.21	(1.8 - 2.7)
Trend 2000 -2013		0.09	(0.06 – 0.11), p<0.001	

Table A 31. Bronchiectasis mortality rates and rate ratios by age group and sex, 2008-2013.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	3	0.1	(0-0.2)	2	0.1	(0-0.3)	1	0.0	(0-0.3)	1.91	(0.6-6.12)
15-29	6	0.1	(0-0.2)	4	0.2	(0-0.3)	2	0.1	(0-0.3)	2.01	(0.88-4.59)
30-64	98	0.9	(0.7-1)	36	0.7	(0.4-0.9)	62	1.1	(0.8-1.3)	0.63	(0.51-0.76)
65+	461	13.9	(12.7-15.2)	163	10.9	(9.2-12.5)	298	16.5	(14.6-18.4)	0.66	(0.6-0.72)

Table A 32. Bronchiectasis mortality rate ratios by age group and sex, 2008-2013.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.07	(0.04-0.12)	0.11	(0.06-0.23)	0.04	(0.01-0.1)
15-29	0.14	(0.09-0.21)	0.24	(0.15-0.4)	0.08	(0.04-0.15)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	16.11	(14.49-17.9)	16.46	(13.81-19.6)	15.62	(13.68-17.84)

Table A 33. Bronchiectasis mortality rates and rate ratios by ethnic group, 2008-2013.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	101	2.9	7.7	(5.9-9.4)	4.17	(3.69-4.7)
Pacific	67	4.0	12.7	(9.3-16)	6.85	(5.97-7.86)
Asian	29	1.2	4.2	(2.6-5.9)	2.29	(1.88-2.79)
Non-MPA	372	2.3	1.8	(1.7-2)	1.00	Baseline

Table A 34. Bronchiectasis mortality rates by ethnic group and age, 2008-2013

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	1	0.1	(0-0.6)	1	0.2	(0-1.1)	0	0.0	n/a	1	0.0	(0-0.3)
15-29	2	0.2	(0.1-0.9)	3	0.7	(0.2-2.2)	1	0.1	(0-1)	0	0.0	n/a
30-64	43	3.4	(2.4-4.4)	15	2.7	(1.3-4)	3	0.3	(0.1-0.8)	37	0.5	(0.3-0.6)
65+	55	33.1	(24.4-41.9)	48	66.6	(47.7-85.4)	25	19.2	(11.7-26.7)	334	11.9	(10.6-13.2)

Table A 35. Bronchiectasis mortality rates NZDep2006 quintile, 2008-2013.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	79	1.5	1.8	(1.4-2.2)	1.00	Baseline
3-4	102	2.0	2.1	(1.7-2.5)	1.20	(1.04-1.38)
5-6	116	2.4	2.3	(1.9-2.7)	1.31	(1.14-1.5)
7-8	119	2.4	2.3	(1.9-2.7)	1.29	(1.12-1.48)
9-10	150	3.1	3.7	(3.1-4.3)	2.10	(1.84-2.4)

Table A 36. Bronchiectasis mortality rates by ethnic group and NZDep quintile, 2008-2013.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Deaths	9	11	16	11	54
	Rate (raw)	1.6	1.4	1.4	0.7	1.9
	Rate (age adj'd)	11.6	7.7	7.8	4.6	8.9
	95%CI	(2.1-21.2)	(2.6-12.9)	(3.2-12.5)	(1.5-7.6)	(6.1-11.6)
Pacific	Deaths	2	1	7	11	45
	Rate (raw)	1.3	0.4	1.8	1.5	2.4
	Rate (age adj'd)	9.5	2.4	13.9	12.5	14.1
	95%CI	(2.2-41.2)	(0.3-16.9)	(2.6-25.2)	(4.5-20.5)	(9.6-18.7)
Asian	Deaths	11	6	2	5	4
	Rate (raw)	1.3	0.6	0.2	0.5	0.4
	Rate (age adj'd)	8.7	4.0	2.0	4.5	1.8
	95%CI	(3-14.3)	(0.6-7.4)	(0.5-8)	(0.5-8.6)	(0.6-5.2)
NZ European/ Other	Deaths	58	84	91	92	47
	Rate (raw)	0.7	1.1	1.3	1.6	1.3
	Rate (age adj'd)	1.5	2.0	2.1	2.1	1.7
	95%CI	(1.1-1.9)	(1.6-2.5)	(1.7-2.6)	(1.7-2.6)	(1.2-2.2)

Table A 37. Bronchiectasis mortality rates by DHB, 2008-2013.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	21	2.3	2.2	(1.2-3.1)
Waitemata	69	2.3	2.7	(2-3.3)
Auckland	75	3.0	3.8	(3-4.7)
Counties Manukau	88	3.3	4.5	(3.5-5.4)
Waikato	35	1.7	1.7	(1.2-2.3)
Bay of Plenty	14	2.4	2.5	(1.2-3.8)
Taranaki	26	2.2	1.8	(1.1-2.5)
Lakes	10	3.8	4.1	(1.5-6.6)

Tairāwhiti	23	2.6	2.3	(1.4-3.3)
Whanganui	7	1.1	1.0	(0.2-1.7)
MidCentral	17	1.8	1.6	(0.8-2.4)
Hawke's Bay	6	1.6	1.4	(0.3-2.4)
Capital and Coast	32	1.9	2.3	(1.5-3.2)
Hutt Valley	19	2.3	2.6	(1.4-3.8)
Wairarapa	0	0.0	0.0	(0-0)
Nelson Marlborough	17	2.1	1.8	(0.9-2.7)
West Coast	3	1.6	1.5	(0.5-4.7)
Canterbury	70	2.5	2.4	(1.8-2.9)
South Canterbury	3	0.9	0.6	(0.2-2)
Southern	31	1.8	1.7	(1.1-2.3)

9.3. CHILDHOOD BRONCHIOLITIS

9.3.1. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 38. Childhood bronchiolitis hospitalisations, rates and age-adjusted rates 2000-2015.

Year	n	Rate	
		Raw	95% CI
2000	3937	1389.2	(1345.8 - 1432.5)
2001	4119	1465.9	(1421.1 - 1510.7)
2002	4576	1627.7	(1580.5 - 1674.8)
2003	4438	1574.7	(1528.3 - 1621)
2004	4323	1518.7	(1473.4 - 1564)
2005	4198	1476.5	(1431.8 - 1521.2)
2006	4382	1532.2	(1486.8 - 1577.5)
2007	4464	1523.0	(1478.4 - 1567.7)
2008	5263	1748.3	(1701 - 1795.5)
2009	6156	2003.8	(1953.8 - 2053.9)
2010	5636	1793.0	(1746.2 - 1839.8)
2011	5616	1769.0	(1722.8 - 1815.3)
2012	6275	1987.5	(1938.3 - 2036.6)
2013	5356	1717.1	(1671.1 - 1763)
2014	5800	1878.2	(1829.8 - 1926.5)
2015	6308	2063.1	(2012.1 - 2114)
Trend 2000 -2015	37.0	(23.0-51.0), p<0.000	

Table A 39. 2015 childhood bronchiolitis hospitalisation rates and rate ratios by sex

Total			Male			Female			M v F	
n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
6308	2160.0	(2106.7-2213.3)	3995	2676	(2592.9-2758.8)	2313	1620.4	(1554.3-1686.4)	1.65	(1.61-1.69)

Table A 40. 2015 childhood bronchiolitis hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate		RR	95%CI
		Raw	95% CI		
Māori	2927	4118.3	(3969.1-4267.5)	4.31	(4.18-4.44)
Pacific	1819	4806.1	(4585.2-5026.9)	5.03	(4.87-5.2)
Asian	368	1025.0	(920.3-1129.8)	1.07	(1.02-1.13)
Non-MPA	1549	955.7	(908.1-1003.3)	1.00	Baseline

Table A 41. 2013 childhood bronchiolitis hospitalisation rates by NZDep2006 quintile.

	n	Rate (raw)	95% CI	RR	95% CI
NZDep 1-2	439	845.7	(766.6-924.8)	1.00	Baseline
3-4	527	983.0	(899-1066.9)	1.16	(1.09-1.24)
5-6	773	1389.0	(1291-1486.9)	1.64	(1.55-1.74)
7-8	1396	2397.3	(2271.5-2523)	2.83	(2.69-2.99)
9-10	3161	4357.2	(4205.3-4509.1)	5.15	(4.91-5.41)

Table A 42. 2015 childhood bronchiolitis hospitalisation rates by ethnic group and NZDep quintile.

	Māori			Pacific			Asian			non-MPA		
NZDep quintile	n	Rate (raw)	95%CI	n	Rate (raw)	95%CI	n	Rate (raw)	95%CI	n	Rate (raw)	95%CI
1-2	76	1360.5	(1054.7-1666.4)	34	2179	(1446.9-2912.1)	64	1104	(833.2-1374)	277	696	(614.5-778.5)
3-4	158	2010.9	(1697.4-2324.5)	103	3769	(3040.9-4496.6)	54	742	(544.3-940.2)	232	625	(544.8-705.7)
5-6	301	2624.5	(2328-2921)	131	2977	(2466.9-3486.3)	67	866	(658.4-1072.9)	312	913	(812-1014.7)
7-8	598	3683.2	(3388-3978.4)	401	5082	(4584.9-5579.8)	70	838	(641.8-1034.5)	415	1424	(1286.7-1560.6)
9-10	1788	5979.1	(5702-6256.3)	1148	5400	(5087.9-5712.7)	113	1679	(1369.1-1988)	309	1415	(1257.4-1573)

Table A 43. 2015 childhood bronchiolitis hospitalisation rates by DHB.

DHB	n	Rate (raw)	95%CI
Northland	342	3208.6	(2868.5-3548.6)
Waitemata	514	1382.7	(1263.2-1502.3)
Auckland	561	1998.3	(1832.9-2163.7)
Counties Manukau	1192	3111.0	(2934.4-3287.6)
Waikato	769	2928.9	(2721.8-3135.9)
Lakes	125	3604.4	(2972.5-4236.3)

Bay of Plenty	296	4040.4	(3580.1-4500.7)
Tairāwhiti	286	2621.9	(2318.1-2925.8)
Hawke's Bay	98	2348.4	(1883.5-2813.4)
Taranaki	389	2778.4	(2502.3-3054.5)
MidCentral	167	1526.0	(1294.5-1757.4)
Whanganui	125	1585.5	(1307.5-1863.4)
Capital and Coast	365	1996.8	(1792-2201.7)
Hutt Valley	276	2773.6	(2446.4-3100.8)
Wairarapa	38	1452.6	(990.7-1914.5)
Nelson Marlborough	87	1055.3	(833.6-1277.1)
West Coast	9	421.3	(146.1-696.6)
Canterbury	343	1137.6	(1017.2-1258)
South Canterbury	27	828.7	(516.1-1141.3)
Southern	299	1641.1	(1455.1-1827.2)

CHILDHOOD PNEUMONIA

9.3.2. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 44. Childhood pneumonia hospitalisations, rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	3513	399.8	410.8	(397.2 - 424.4)
2001	3909	445.6	460.6	(446.1 - 475)
2002	3572	404.3	421.1	(407.3 - 434.9)
2003	3650	410.1	430.3	(416.3 - 444.3)
2004	3107	347.9	363.4	(350.6 - 376.2)
2005	3391	380.9	394.5	(381.2 - 407.7)
2006	3428	385.9	399.5	(386.2 - 412.9)
2007	3119	350.0	356.6	(344.1 - 369.1)
2008	3525	393.6	395.2	(382.1 - 408.2)
2009	4062	450.8	448.6	(434.8 - 462.4)
2010	3305	363.9	359.5	(347.3 - 371.8)
2011	3256	357.5	351.3	(339.2 - 363.4)
2012	3027	332.7	327.2	(315.5 - 338.9)
2013	2937	323.2	319.7	(308.2 - 331.3)
2014	3375	370.4	368.8	(356.3 - 381.2)
2015	3814	417.1	418.1	(404.8 - 431.4)
Trend		-4.71		
2000 -2015		(-8.93- -0.49), p=0.031		

Table A 45. 2015 childhood pneumonia hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	2812	962.9	(927.3-998.5)	1508	1010.1	(959.1-1061)	1304	913.5	(863.9-963.1)	1.11	(1.07-1.15)
5-14	1002	174.7	(163.9-185.5)	522	178.2	(162.9-193.5)	480	171.0	(155.7-186.3)	1.04	(0.98-1.11)

Table A 46. 2015 childhood pneumonia hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	5.51	(5.32-5.71)	5.67	(5.4-5.95)	5.34	(5.08-5.62)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 47. 2015 childhood pneumonia hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	1147	566.9	551.7	(519.7-583.6)	2.03	(1.95-2.11)
Pacific	1083	1026.4	983.1	(924.5-1041.7)	3.62	(3.48-3.76)
Asian	458	471.2	447.7	(406.7-488.8)	1.65	(1.56-1.73)
Non-MPA	1327	266.7	271.9	(257.3-286.5)	1.00	Baseline

Table A 48. 2015 childhood pneumonia hospitalisation rates by ethnic group and age.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<5	878	1235.3	(1153.6-1317.1)	861	2274.9	(2122.9-2426.8)	332	924.8	(825.3-1024.2)	897	553.4	(517.2-589.7)
5-14	269	205.0	(180.5-229.5)	222	328.1	(284.9-371.2)	126	205.5	(169.7-241.4)	430	128.2	(116.1-140.3)

Table A 49. 2015 childhood pneumonia hospitalisation rates by NZDep2006 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	431	244.1	262.1	(237.3-287)	1.00	Baseline
3-4	464	282.1	288.0	(261.8-314.2)	1.10	(1.03-1.17)
5-6	545	338.5	334.0	(305.9-362)	1.27	(1.2-1.35)
7-8	794	491.5	471.0	(438.2-503.8)	1.80	(1.7-1.9)
9-10	1572	779.3	747.3	(710.4-784.3)	2.85	(2.71-3)

Table A 50. 2015 childhood pneumonia hospitalisation rates by ethnic group and NZDep quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	52	87	118	242	646
	Rate (raw)	296.9	375.3	362.5	530.9	774.5
	Rate (age adj'd)	307.2	374.1	352.4	511.6	743.7
	95%CI	(223.7-390.8)	(295.5-452.7)	(288.8-416.1)	(447.1-576.1)	(686.3-801.1)
Pacific	Hosp_Num	39	54	76	212	698
	Rate (raw)	784.1	697.9	630.0	983.5	1179.6
	Rate (age adj'd)	818.2	678.6	602.6	924.1	1128.4
	95%CI	(561.1-1075.3)	(497.6-859.7)	(466.9-738.2)	(799.6-1048.6)	(1044.6-1212.2)
Asian	Hosp_Num	73	88	87	107	102
	Rate (raw)	422.6	425.4	416.9	507.7	590.1
	Rate (age adj'd)	425.7	416.7	394.9	461.3	539.5
	95%CI	(328.1-523.4)	(329.6-503.8)	(311.7-478)	(373.4-549.3)	(434.3-644.7)
NZ European/ Other	Hosp_Num	281	254	278	292	220
	Rate (raw)	201.9	218.3	275.9	357.6	369.9
	Rate (age adj'd)	218.8	225.4	275.3	346.0	354.4
	95%CI	(193-244.5)	(197.7-253.2)	(242.9-307.6)	(306.3-385.8)	(307.5-401.3)

Table A 51. 2015 childhood pneumonia hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	207	632.0	645.1	(557.2-733.1)
Waitemata	484	448.2	442.8	(403.4-482.3)
Auckland	570	721.5	696.3	(639.1-753.5)
Counties Manukau	716	633.0	631.1	(584.9-677.3)
Waikato	346	445.9	445.1	(398.2-492)
Lakes	49	456.6	468.7	(337.4-600)
Bay of Plenty	114	514.0	521.4	(425.7-617.1)
Tairāwhiti	93	281.7	285.6	(227.5-343.6)
Hawke's Bay	36	289.6	291.9	(196.6-387.3)
Taranaki	189	434.3	448.5	(384.5-512.5)
MidCentral	151	459.9	463.4	(389.5-537.3)
Whanganui	71	306.5	305.2	(234.2-376.3)
Capital and Coast	220	414.1	410.1	(355.9-464.3)
Hutt Valley	155	531.7	528.7	(445.4-611.9)
Wairarapa	26	319.0	325.8	(200.5-451.2)
Nelson Marlborough	47	181.3	188.0	(134.2-241.8)
West Coast	8	130.1	127.3	(39.1-215.6)

Canterbury	212	234.9	236.1	(204.3-267.9)
South Canterbury	17	167.8	174.0	(91.3-256.6)
Southern	103	189.3	189.9	(153.2-226.6)

9.3.1. MORTALITY

Table A 52. Childhood pneumonia mortality rates and age-adjusted rates 2000-2013.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	8	0.91	0.95	(0.29 - 1.61)
2001	2	0.23	0.24	(0.06 - 0.96)
2002	9	1.02	1.07	(0.37 - 1.76)
2003	6	0.67	0.70	(0.14 - 1.27)
2004	19	2.13	2.25	(1.24 - 3.26)
2005	10	1.12	1.16	(0.44 - 1.88)
2006	10	1.13	1.17	(0.44 - 1.89)
2007	13	1.46	1.50	(0.68 - 2.31)
2008	12	1.34	1.35	(0.58 - 2.11)
2009	10	1.11	1.10	(0.42 - 1.78)
2010	11	1.21	1.18	(0.48 - 1.88)
2011	10	1.10	1.07	(0.41 - 1.73)
2012	18	2.0	1.9	(1.04 - 2.82)
2013	8	0.9	0.9	(0.27 - 1.48)
Trend 2000 -2013		0.04 (-0.03 - 0.11), p=0.289		

Table A 53. Childhood pneumonia mortality rates and rate ratios by age group and sex, 2004-2013.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	109	3.8	(3.1-4.6)	61	4.2	(3.2-5.3)	48	3.3	(2.4-4.3)	1.27	(1.06-1.53)
5-14	12	0.2	(0.1-0.3)	8	0.3	(0.1-0.5)	4	0.1	(0-0.3)	2.00	(1.12-3.58)

Table A 54. Childhood pneumonia hospitalisation age group rate ratios by sex, 2004-2013.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	18.68	(13.99-24.93)	15.70	(10.99-22.44)	24.71	(15.07-40.51)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 55. Childhood pneumonia mortality rates and rate ratios by ethnic group, 2004-2013.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	63	3.1	3.1	(2.3-3.9)	5.87	(4.7-7.32)
Pacific	41	4.0	3.8	(2.7-5)	7.28	(5.73-9.23)
Asian	6	0.7	0.7	(0.1-1.2)	1.28	(0.83-1.97)
Non-MPA	26	0.5	0.5	(0.3-0.7)	1.00	Baseline

Table A 56. Childhood pneumonia mortality rates NZDep2006 quintile, 2004-2013.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	3	0.2	0.2	(0.1-0.6)	1.00	Baseline
3-4	11	0.7	0.7	(0.3-1.1)	3.76	(2.02-6.99)
5-6	17	1.1	1.1	(0.6-1.6)	5.78	(3.18-10.49)
7-8	21	1.3	1.3	(0.7-1.8)	6.84	(3.8-12.31)
9-10	69	3.4	3.3	(2.5-4.1)	17.89	(10.2-31.38)

Table A 57. Childhood pneumonia mortality rates by DHB, 2004-2013.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	7	2.07	2.21	(0.6-3.9)
Waitemata	10	0.94	0.96	(0.4-1.5)
Auckland	8	1.03	1.00	(0.3-1.7)
Counties Manakau	31	2.75	2.80	(1.8-3.8)
Waikato	16	2.07	2.12	(1.1-3.2)
Lakes	3	1.30	1.33	(0.4-4.1)
Bay of Plenty	10	2.30	2.47	(0.9-4)
Tairāwhiti	0	0.00	0.00	(0-0)
Hawkes Bay	1	0.30	0.32	(0-2.2)
Taranaki	5	2.18	2.29	(0.3-4.3)
Midcentral	5	1.50	1.58	(0.2-3)
Whanganui	3	2.29	2.46	(0.8-7.6)
Capital and Coast	6	1.14	1.13	(0.2-2)
Hutt	2	0.67	0.67	(0.2-2.7)
Wairarapa	2	2.45	2.49	(0.6-10)
Nelson Marlborough	0	0.00	0.00	(0-0)
West Coast	0	0.00	0.00	(0-0)
Canterbury	3	0.33	0.34	(0.1-1.1)
Sth Canterbury	0	0.00	0.00	(0-0)
Southern	9	1.66	1.72	(0.6-2.8)

9.3.1. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 58. COPD hospitalisations in adults aged 45+, rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	6859	532.7	538.5	(525.6 - 551.3)
2001	7906	600.0	605.4	(591.9 - 618.8)
2002	8064	596.3	603.8	(590.6 - 617.1)
2003	8772	631.3	643.9	(630.4 - 657.4)
2004	9262	648.4	663.5	(649.9 - 677)
2005	8577	584.4	600.5	(587.8 - 613.3)
2006	9299	615.8	635.5	(622.6 - 648.5)
2007	9319	601.3	620.3	(607.7 - 633)
2008	10275	646.7	668.1	(655.2 - 681.1)
2009	10388	638.6	659.7	(647 - 672.4)
2010	10521	632.4	650.8	(638.4 - 663.3)
2011	10837	638.4	652.8	(640.5 - 665.1)
2012	11065	639.6	647.9	(635.8 - 660)
2013	10487	594.4	597.9	(586.4 - 609.3)
2014	10770	597.0	595.5	(584.2 - 606.7)
2015	10775	584.5	578.7	(567.7 - 589.6)
Trend 2000 -2015			1.09	(-3.21 – 5.40), p=0.595

Table A 59. 2015 COPD in adults aged 45+ hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
45-64	3067	280.1	(270.2-290)	1334	252.1	(238.6-265.6)	1733	306.3	(291.9-320.7)	0.82	(0.8-0.85)
65+	7708	1269.8	(1241.4-1298.1)	3953	1417.5	(1373.3-1461.7)	3755	1144.3	(1107.7-1180.9)	1.24	(1.21-1.27)

Table A 60. 2015 COPD in adults aged 45+ hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
45-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	4.53	(4.44-4.63)	5.62	(5.46-5.79)	3.74	(3.63-3.84)

Table A 61. 2015 COPD in adults aged 45+ hospitalisation rates and rate ratios by ethnic group.

Total	n	Rate	RR	95%CI
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Ethnicity		Raw	Age adj'd	95% CI	
Māori	2315	1603.8	2009.7	(1919.3-2100.1)	3.85 (3.76-3.95)
Pacific	647	1061.0	1504.8	(1377.9-1631.7)	2.88 (2.76-3.01)
Asian	163	129.9	228.3	(189.5-267.2)	0.44 (0.4-0.48)
Non-MPA	7688	558.7	521.9	(510.3-533.6)	1.00 Baseline

Table A 62. 2015 COPD in adults aged 45+ hospitalisation rates by ethnic group and age.

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
45-64	1202	1071.7	(1011.1-1132.3)	264	561.3	(493.6-629)	27	27.5	(17.1-37.9)	1588	188.7	(179.4-197.9)
65+	1113	3458.6	(3255.4-3661.8)	383	2745.5	(2470.6-3020.5)	136	498.0	(414.3-581.7)	6100	1141.6	(1112.9-1170.2)

Table A 63. 2015 COPD in adults aged 45+ hospitalisation rates by NZDep2013 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	828	213.1	246.0	(229.1-263)	1.00	Baseline
3-4	1223	338.3	356.3	(336.3-376.3)	1.45	(1.39-1.51)
5-6	1898	561.4	554.5	(529.6-579.5)	2.25	(2.17-2.35)
7-8	2857	892.7	842.5	(811.5-873.5)	3.42	(3.3-3.56)
9-10	3951	1407.5	1399.9	(1356.3-1443.6)	5.69	(5.49-5.9)

Table A 64. 2015 COPD in adults aged 45+ hospitalisation rates by ethnic group and NZDep2013 quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	40	129	270	504	1364
	Rate (raw)	316.6	777.2	1180.9	1531.2	2308.0
	Rate (age adj'd)	497.7	1151.9	1520.5	1966.2	2700.9
	95%CI	(333.3-662.1)	(927.6-1376.2)	(1321.4-1719.7)	(1775.7-2156.8)	(2544.3-2857.4)
Pacific	Hosp_Num	17	18	37	112	462
	Rate (raw)	502.4	363.6	518.6	892.3	1403.4
	Rate (age adj'd)	783.9	592.0	766.3	1254.9	1965.5
	95%CI	(397.2-1170.7)	(296.6-887.3)	(494.5-1038)	(1005-1504.9)	(1766.8-2164.3)
Asian	Hosp_Num	12	31	25	32	63
	Rate (raw)	45.6	105.7	93.7	131.5	337.0
	Rate (age adj'd)	95.0	200.3	167.7	232.3	507.2
	95%CI	(36.7-153.3)	(122.1-278.6)	(94-241.4)	(143.8-320.7)	(367.3-647)
NZ European/ Other	Hosp_Num	751	1035	1549	2188	2057
	Rate (raw)	224.9	349.0	581.5	935.6	1381.0
	Rate (age adj'd)	249.8	346.6	532.9	807.6	1190.5

95%CI	(231.8-267.8)	(325.5-367.7)	(506.3-559.5)	(773.2-842)	(1138-1242.9)
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Table A 65. 2015 COPD in adults aged 45+ hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	605	848.9	804.5	(740.2-868.8)
Waitemata	1002	492.9	517.8	(485.7-549.9)
Auckland	681	457.3	500.8	(463.1-538.6)
Counties Manakau	992	612.4	670.0	(628-712)
Waikato	1190	828.4	811.7	(765.5-857.8)
Lakes	302	750.3	750.9	(666.1-835.7)
Bay of Plenty	693	745.0	685.0	(633.7-736.3)
Tairāwhiti	108	621.3	624.5	(506.6-742.4)
Hawkes Bay	492	737.5	702.2	(640.1-764.3)
Taranaki	351	746.3	714.2	(639.3-789.1)
Midcentral	362	528.6	495.9	(444.7-547.1)
Whanganui	333	1210.7	1144.7	(1021.1-1268.4)
Capital and Coast	464	449.9	475.0	(431.7-518.3)
Hutt	362	664.4	690.4	(619.2-761.5)
Wairarapa	136	687.6	630.0	(524-736)
Nelson Marlborough	326	493.0	469.1	(418.1-520.1)
West Coast	146	969.8	999.3	(836.8-1161.8)
Canterbury	1177	586.0	579.4	(546.3-612.6)
Sth Canterbury	127	461.1	410.2	(338.5-481.9)
Southern	926	739.0	709.6	(663.9-755.4)

9.4. COPD IN OLDER ADULTS

9.4.1. MORTALITY

Table A 66. COPD in adults 45+ mortality rates and age-adjusted rates 2000-2013.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	1441	111.9	114.6	(108.6 - 120.5)
2001	1709	129.7	132.2	(125.9 - 138.5)
2002	1597	118.1	121.0	(115 - 126.9)
2003	1641	118.1	120.9	(115 - 126.8)
2004	1705	119.4	123.3	(117.4 - 129.2)
2005	1471	100.2	103.4	(98.1 - 108.7)
2006	1540	102.0	105.7	(100.4 - 111)

2007	1471	94.9	98.2	(93.2 - 103.2)
2008	1671	105.2	109.0	(103.7 - 114.2)
2009	1563	96.1	99.7	(94.8 - 104.7)
2010	1482	89.1	91.7	(87.1 - 96.4)
2011	1590	93.7	96.0	(91.3 - 100.7)
2012	1538	88.9	90.4	(85.8 - 94.9)
2013	1474	83.5	84.6	(80.2 - 88.9)
Trend 2000 -2013			-3.05	(-3.99 - -2.11), p<0.001

Table A 67. COPD in adults aged 45+ mortality rates and rate ratios by age group and sex, 2013.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
45-64	135	12.3	(10.2-14.4)	64	12.1	(9.1-15.1)	71	12.5	(9.6-15.5)	0.96	(0.82-1.14)
65+	1339	220.6	(208.8-232.4)	716	256.7	(237.9-275.6)	623	189.8	(174.9-204.8)	1.35	(1.28-1.42)

Table A 68. COPD in adults aged 45+ age group mortality rate ratios by sex, 2013.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
45-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	17.89	(16.42-19.49)	21.23	(18.75-24.03)	15.13	(13.43-17.04)

Table A 69. COPD in adults aged 45+ mortality rates and rate ratios by ethnic group, 2013.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	163	112.9	190.7	(157.2-224.3)	2.24	(2.05-2.45)
Pacific	52	85.3	157.3	(111.1-203.5)	1.85	(1.6-2.14)
Asian	21	16.7	43.4	(23.4-63.4)	0.51	(0.41-0.64)
Non-MPA	1241	96.1	85.1	(80.4-89.9)	1.00	Baseline

Table A 70. COPD in adults aged 45+ mortality rates by ethnic group and age, 2013.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
45-64	41	36.6	(25.4-47.7)	8	17.0	(5.2-28.8)	0			86	11.0	(8.6-13.3)
65+	122	379.1	(311.8-446.3)	44	315.5	(222.3-408.7)	21	76.9	(44-109.8)	1155	228.0	(214.8-241.1)

Table A 71. COPD in adults aged 45+ mortality rates by NZDep2006 quintile, 2013.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	177	45.6	58.0	(49.4-66.6)	1.00	Baseline
3-4	211	58.4	64.9	(56.1-73.7)	1.12	(1.01-1.23)
5-6	311	92.0	90.9	(80.8-101)	1.57	(1.43-1.71)
7-8	385	120.3	106.6	(95.9-117.3)	1.84	(1.69-2)
9-10	390	138.9	137.7	(124-151.3)	2.37	(2.18-2.59)

Table A 72. COPD in adults aged 45+ mortality rates by ethnic group and NZDep quintile, 2013.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	3	8	18	39	95
	Rate (raw)	23.7	48.2	78.7	118.5	160.7
	Rate (age adj'd)	41.6	106.5	136.0	195.5	256.0
	95%CI	(11-157.7)	(24.8-188.2)	(66.7-205.4)	(125.5-265.5)	(195.7-316.4)
Pacific	Hosp_Num	0	2	6	6	38
	Rate (raw)	0.0	40.4	84.1	47.8	115.4
	Rate (age adj'd)	0.0	124.9	147.1	91.9	205.3
	95%CI	(0-0)	(31.2-499.3)	(24-270.2)	(13.7-170)	(134-276.7)
Asian	Hosp_Num	3	3	4	4	7
	Rate (raw)	11.4	10.2	15.0	16.4	37.4
	Rate (age adj'd)	25.2	33.4	41.3	42.8	85.4
	95%CI	(8-79.7)	(10.6-105.3)	(14.1-120.9)	(14.7-124.2)	(14.3-156.5)
NZ European/ Other	Hosp_Num	170	198	284	336	253
	Rate (raw)	50.9	66.8	106.6	143.7	169.9
	Rate (age adj'd)	61.0	68.3	94.6	109.7	128.2
	95%CI	(51.8-70.2)	(58.8-77.8)	(83.6-105.6)	(97.9-121.6)	(112.1-144.2)

Table A 73. COPD in adults aged 45+ mortality rates by DHB, 2013.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	81	113.7	110.0	(86-134.1)
Waitemata	124	61.0	65.3	(53.8-76.8)
Auckland	104	69.8	75.6	(61-90.2)
Counties Manakau	121	74.7	89.8	(73.7-106)
Waikato	117	81.5	80.1	(65.6-94.6)
Lakes	46	114.3	118.6	(84.2-152.9)
Bay of Plenty	101	108.6	96.1	(77.3-114.9)
Tairāwhiti	23	132.3	134.7	(79.6-189.9)

Hawkes Bay	57	85.4	79.7	(59-100.4)
Taranaki	40	85.0	76.6	(52.8-100.4)
Midcentral	50	73.0	66.0	(47.7-84.4)
Whanganui	26	94.5	81.7	(50.2-113.1)
Capital and Coast	68	65.9	70.3	(53.6-87)
Hutt	57	104.6	110.0	(81.4-138.6)
Wairarapa	21	106.2	96.2	(55.1-137.4)
Nelson Marlborough	54	81.7	76.5	(56-96.9)
West Coast	26	172.7	184.0	(113-255)
Canterbury	188	93.6	90.4	(77.5-103.4)
Sth Canterbury	32	116.2	99.1	(64.7-133.6)
Southern	138	110.1	103.9	(86.5-121.2)

9.5. TOTAL SERIOUS RESPIRATORY DISEASE

9.5.1. HOSPITALISATIONS

N.B. All rates are per 100,000 people

Table A 74. Total respiratory hospitalisations, rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	53442	1385.3	1433.2	(1420.9 - 1445.5)
2001	57125	1472.1	1522.3	(1509.6 - 1534.9)
2002	57008	1443.8	1500.9	(1488.4 - 1513.3)
2003	57032	1416.2	1484.8	(1472.5 - 1497.1)
2004	57218	1399.8	1472.1	(1460 - 1484.3)
2005	55782	1349.4	1411.0	(1399.2 - 1422.8)
2006	58275	1392.6	1458.6	(1446.7 - 1470.5)
2007	57574	1363.1	1413.9	(1402.3 - 1425.5)
2008	64482	1513.7	1558.2	(1546.1 - 1570.3)
2009	69193	1608.2	1638.8	(1626.5 - 1651)
2010	69029	1586.6	1606.9	(1594.9 - 1618.9)
2011	71120	1622.3	1635.8	(1623.7 - 1647.8)
2012	73045	1657.1	1662.6	(1650.5 - 1674.6)
2013	69474	1564.0	1566.8	(1555.1 - 1578.4)
2014	74904	1660.9	1663.7	(1651.8 - 1675.7)
2015	78333	1704.5	1712.0	(1700 - 1724)
Trend 2000 -2015			16.41	(9.30-23.51), p<0.001

Table A 75. 2015 total respiratory hospitalisation rates and rate ratios by age group and sex

	Total			Male			Female			M v F	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	26455	3056.1592	(3019.3-3093)	15246	3448.0	(3393.2-3502.7)	11209	2647.0	(2598-2696)	1.30	(1.29-1.32)
15-29	7357	871.08592	(851.2-891)	3001	712.0	(686.6-737.5)	4356	1029.5	(998.9-1060.1)	0.69	(0.68-0.71)
30-64	18720	972.56403	(958.6-986.5)	8638	937.4	(917.6-957.1)	10082	1004.9	(985.3-1024.5)	0.93	(0.92-0.95)
65+	25801	4250.3315	(4198.5-4302.2)	13363	4791.7	(4710.5-4873)	12438	3790.2	(3723.6-3856.9)	1.26	(1.25-1.28)

Table A 76. 2015 total respiratory hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	3.14	(3.11-3.17)	3.68	(3.63-3.73)	2.63	(2.6-2.67)
15-29	0.90	(0.88-0.91)	0.76	(0.74-0.78)	1.02	(1.01-1.04)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	4.37	(4.33-4.41)	5.11	(5.05-5.18)	3.77	(3.72-3.82)

Table A 77. 2015 total respiratory hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	18265	3051.3	3583.6	(3516.1-3651.1)	2.44	(2.41-2.46)
Pacific	10835	3661.2	4563.9	(4446.7-4681.2)	3.11	(3.07-3.15)
Asian	5442	1153.7	1503.9	(1453.8-1554)	1.02	(1.01-1.04)
Non-MPA	45462	1545.2	1469.1	(1455.3-1482.9)	1.00	Baseline

Table A 78. 2015 total respiratory hospitalisation rates by ethnic group and age.

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	8925	4411.4	(4319.9-4502.9)	5617	5323.4	(5184.1-5462.6)	2543	2616.3	(2514.6-2717.9)	10474	2307.9	(2263.7-2352.1)
15-29	1791	1243.1	(1185.5-1300.7)	1008	1316.6	(1235.3-1397.8)	605	458.0	(421.5-494.5)	4085	901.9	(874.2-929.6)
30-64	4646	2111.6	(2050.9-2172.3)	2492	2494.3	(2396.3-2592.2)	1363	633.7	(600-667.3)	10237	788.6	(773.4-803.9)
65+	2903	9020.9	(8692.7-9349)	1718	12315.4	(11733-12897.8)	931	3409.1	(3190.1-3628.1)	20049	3957.2	(3902.4-4012)

Table A 79. 2015 total respiratory hospitalisation rates by NZDep2006 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	8906	1019.8	1087.0	(1064.2-1109.8)	1.00	Baseline
3-4	10603	1242.1	1278.6	(1254.2-1303)	1.18	(1.16-1.19)
5-6	13135	1567.6	1573.4	(1546.5-1600.4)	1.45	(1.43-1.47)

7-8	18619	2243.3	2203.5	(2171.7-2235.2)	2.03	(2-2.05)
9-10	26884	3226.9	3233.8	(3194.5-3273.1)	2.98	(2.94-3.01)

Table A 80. 2015 total respiratory hospitalisation rates by ethnic group and NZDep quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	694	1287	2111	4149	9987
	Rate (raw)	1344.8	1860.2	2164.1	3000.8	4133.6
	Rate (age adj'd)	1684.4	2278.7	2638.6	3530.5	4685.0
	95%CI	(1500.7-1868.1)	(2108-2449.4)	(2491.2-2786)	(3392.1-3668.9)	(4567.3-4802.7)
Pacific	Hosp_Num	334	664	931	2182	6692
	Rate (raw)	2264.3	2881.9	2655.1	3521.0	4156.1
	Rate (age adj'd)	2698.7	3474.1	3547.4	4187.6	5252.2
	95%CI	(2334.5-3062.9)	(3130.3-3817.9)	(3225-3869.7)	(3951.5-4423.7)	(5077.6-5426.8)
Asian	Hosp_Num	784	992	921	1175	1552
	Rate (raw)	963.9	991.4	908.0	1130.4	1832.4
	Rate (age adj'd)	1179.3	1306.8	1234.9	1548.7	2432.0
	95%CI	(1079.3-1279.3)	(1208.2-1405.4)	(1130.7-1339.1)	(1432.5-1664.8)	(2276.7-2587.3)
NZ European/ Other	Hosp_Num	7081	7719	9215	11374	9355
	Rate (raw)	1010.7	1223.6	1613.0	2315.0	3070.9
	Rate (age adj'd)	1060.3	1212.5	1530.0	2115.5	2741.8
	95%CI	(1035.1-1085.5)	(1185.1-1240)	(1498.1-1562)	(2074.8-2156.2)	(2683.1-2800.6)

Table A 81. 2015 total respiratory hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	3659	2412.2	2251.1	(2177-2325.2)
Waitemata	8734	1661.9	1713.3	(1677.3-1749.3)
Auckland	7396	1695.0	1869.3	(1826-1912.5)
Counties Manakau	10285	2191.6	2308.0	(2262.3-2353.6)
Waikato	7423	2065.9	2016.3	(1970.4-2062.2)
Lakes	2283	2324.9	2257.8	(2164.9-2350.7)
Bay of Plenty	4705	2284.0	2130.5	(2068.8-2192.2)
Tairāwhiti	904	2071.0	1965.7	(1836.7-2094.6)
Hawkes Bay	2888	1903.8	1784.9	(1719.4-1850.4)
Taranaki	2068	1884.2	1779.7	(1702.6-1856.8)
Midcentral	3162	1945.1	1860.1	(1795-1925.2)
Whanganui	1444	2401.9	2202.0	(2087.1-2316.9)
Capital and Coast	4211	1484.3	1582.5	(1534.4-1630.6)
Hutt	2713	1960.6	1978.4	(1903.8-2052.9)

Wairarapa	786	1911.9	1781.7	(1654.4-1909)
Nelson Marlborough	1788	1305.2	1218.9	(1161.2-1276.6)
West Coast	455	1415.2	1345.8	(1221.2-1470.4)
Canterbury	7325	1519.1	1523.0	(1488-1557.9)
Sth Canterbury	822	1477.9	1350.1	(1254.7-1445.5)
Southern	5279	1774.9	1749.2	(1701.8-1796.6)

9.5.1. MORTALITY

Table A 82. Total respiratory mortality rates and age-adjusted rates 2000-2011.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	2060	53.4	65.6	(62.8 - 68.5)
2001	2407	62.0	74.4	(71.4 - 77.4)
2002	2391	60.6	72.2	(69.3 - 75.1)
2003	2358	58.6	69.7	(66.9 - 72.5)
2004	2469	60.4	71.2	(68.4 - 74)
2005	2162	52.3	60.9	(58.3 - 63.4)
2006	2395	57.2	65.6	(63 - 68.2)
2007	2328	55.1	62.1	(59.6 - 64.7)
2008	2623	61.6	68.2	(65.6 - 70.8)
2009	2558	59.5	64.8	(62.3 - 67.3)
2010	2439	56.1	60.2	(57.8 - 62.6)
2011	2718	62.0	65.3	(62.9 - 67.8)
2012	2829	64.2	66.5	(64 - 68.9)
2013	2663	59.9	61.4	(59.1 - 63.7)
Trend 2000 -2013		-0.62 (-1.16 - -0.09), p=0.026		

Table A 83. Total respiratory mortality rates and rate ratios by age group and sex, 2006-2011.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	109	2.1	(1.7-2.5)	59	2.2	(1.7-2.8)	50	2.0	(1.4-2.5)	1.13	(0.94-1.35)
15-29	54	1.1	(0.8-1.4)	36	1.5	(1-1.9)	18	0.7	(0.4-1.1)	2.01	(1.53-2.65)
30-64	1475	13.0	(12.4-13.7)	713	13.1	(12.1-14)	762	13.0	(12-13.9)	1.01	(0.96-1.06)
65+	14192	429.0	(422-436.1)	6927	461.8	(450.9-472.7)	7265	401.9	(392.6-411.1)	1.15	(1.13-1.17)

Table A 84. Total respiratory mortality rate ratios by age group and sex, 2008-2013.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.16	(0.15-0.18)	0.17	(0.15-0.19)	0.15	(0.13-0.17)
15-29	0.08	(0.07-0.1)	0.11	(0.09-0.13)	0.06	(0.04-0.07)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	32.95	(32.1-33.82)	35.31	(34.01-36.65)	30.99	(29.89-32.13)

Table A 85. Total respiratory mortality rates and rate ratios by ethnic group, 2008-2013.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	1558	44.6	132.0	(124.4-139.5)	2.07	(2.01-2.13)
Pacific	484	28.7	101.7	(91.4-111.9)	1.59	(1.52-1.68)
Asian	266	10.7	37.2	(32.3-42.1)	0.58	(0.55-0.62)
Non-MPA	13560	77.4	63.7	(62.7-64.8)	1.00	Baseline

Table A 86. Total respiratory mortality rates by ethnic group and age, 2008-2013

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	49	4.1	(2.9-5.2)	33	5.3	(3.5-7.2)	7	1.3	(0.3-2.3)	34	1.1	(0.7-1.5)
15-29	23	2.7	(1.6-3.8)	11	2.5	(1-4.1)	7	1.0	(0.2-1.7)	15	0.5	(0.2-0.7)
30-64	460	36.3	(32.9-39.6)	93	16.5	(13.1-19.8)	36	3.3	(2.2-4.3)	894	10.6	(9.9-11.3)
65+	1026	618.4	(580.5-656.2)	347	481.2	(430.6-531.9)	216	166.0	(143.8-188.1)	12617	428.7	(421.2-436.2)

Table A 87. Total respiratory mortality rates NZDep2006 quintile, 2008-2013.

NZDep quintile	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	1996	39.1	46.4	(44.4-48.5)	1.00	Baseline
3-4	2465	49.3	51.3	(49.3-53.3)	1.10	(1.07-1.14)
5-6	3239	65.9	63.8	(61.6-66)	1.37	(1.34-1.41)
7-8	4426	90.7	83.5	(81-86)	1.80	(1.75-1.85)
9-10	3668	74.8	90.9	(88-93.9)	1.96	(1.91-2.01)

Table A 88. Total respiratory mortality rates by ethnic group and NZDep quintile, 2008-2013.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	53	112	205	373	815
	Rate (raw)	9.3	14.1	18.2	23.0	28.5
	Rate (age adj'd)	73.7	96.8	117.3	129.6	160.2
	95%CI	(50.5-97)	(76.2-117.4)	(98.7-135.9)	(114.7-144.6)	(147.4-172.9)
Pacific	Hosp_Num	11	22	43	91	312
	Rate (raw)	7.0	8.7	11.1	12.6	16.9
	Rate (age adj'd)	45.1	58.7	85.5	94.7	119.6
	95%CI	(15.5-74.7)	(31.7-85.7)	(56.5-114.5)	(72.9-116.4)	(104.4-134.7)
Asian	Hosp_Num	44	50	44	60	56
	Rate (raw)	5.2	4.8	4.1	5.4	6.2
	Rate (age adj'd)	32.5	33.3	30.0	45.7	42.3
	95%CI	(21.8-43.2)	(23.2-43.4)	(20.3-39.8)	(33.3-58)	(29.6-54.9)
NZ European/ Other	Hosp_Num	1889	2283	2953	3909	2503
	Rate (raw)	22.6	30.0	42.9	66.1	66.8
	Rate (age adj'd)	50.3	55.6	68.7	89.7	90.3
	95%CI	(48-52.6)	(53.3-57.9)	(66.3-71.2)	(86.8-92.5)	(86.7-93.9)

Table A 89. Total respiratory mortality rates by DHB, 2008-2013.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	753	83.6	77.6	(72-83.1)
Waitemata	1439	47.6	56.1	(53.2-59)
Auckland	1158	45.9	60.1	(56.7-63.6)
Counties Manakau	1164	43.0	64.0	(60.3-67.8)
Waikato	1448	69.1	72.7	(69-76.5)
Lakes	462	78.4	86.8	(78.9-94.8)
Bay of Plenty	996	82.8	69.4	(65.1-73.7)
Tairāwhiti	199	75.3	83.0	(71.5-94.5)
Hawkes Bay	648	72.0	66.2	(61.1-71.3)
Taranaki	499	77.7	69.3	(63.2-75.4)
Midcentral	694	72.0	66.6	(61.7-71.6)
Whanganui	360	98.1	82.2	(73.7-90.7)
Capital and Coast	846	51.2	63.1	(58.8-67.4)
Hutt	547	66.4	75.6	(69.2-81.9)
Wairarapa	218	91.1	74.1	(64.3-84)
Nelson Marlborough	591	73.8	62.9	(57.8-67.9)
West Coast	146	76.7	75.2	(63-87.4)

Canterbury	2007	70.5	68.0	(65-70.9)
Sth Canterbury	294	89.5	65.5	(58-73)
Southern	1326	75.7	72.0	(68.1-75.8)

10. APPENDIX 2 INDICATOR DEFINITIONS

ICD-10 codes defining indicator conditions:

- Asthma:
 - J45 Asthma
 - J46 Status asthmaticus
- Bronchiectasis:
 - J47 Bronchiectasis
 - Q33.4 Congenital bronchiectasis
- Bronchiolitis:
 - J21 Bronchiolitis
- Childhood pneumonia
 - J10.0 Influenza with pneumonia, other influenza virus identified
 - J11.0 Influenza with pneumonia, virus not identified
 - J12 Viral pneumonia, not elsewhere classified
 - J13 Pneumonia due to *Streptococcus pneumoniae*
 - J14 Pneumonia due to *Haemophilus influenzae*
 - J15 Bacterial pneumonia, not elsewhere classified
 - J16 Pneumonia due to other infectious organisms, not elsewhere classified
 - J17* Pneumonia in diseases classified elsewhere
 - J18 Pneumonia, organism unspecified
- COPD:
 - J40-42 with previous or subsequent J43 or J44 hospitalisation
 - J43 Emphysema
 - J44 COPD
- Total serious respiratory disease:
 - All ICD-10 Chapter 10 (J-codes)

11. APPENDIX 3 LITERATURE SEARCH RESULTS

Table A 90. Literature search publication numbers and filtering

Condition	Medline publications returned	Remaining after abstract screening	Remaining after full text screening
Asthma	115	12	8
Bronchiectasis	8	2	1
Childhood bronchiolitis	7	0	0
Childhood pneumonia	39	3	0
COPD in adults	24	3	1
OSA	8	2	0
Total respiratory	97	1	0

Table A 91. Asthma prevalence in published studies

(Bold: new since last report)

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/prevalence
Cohet et al 2004 ²⁵	2002	Greater Wellington	2539 controls	6-7 years; all	Wheezing ever	44.5%
					Wheezing last 12 months	24.3%
					More than one wheezing attack in past 12 months	24.0%
					Night waking in past 12 months	14.8%
					Severe wheeze in past 12 months	4.1%
					Asthma ever	32.8%
					Exercise wheeze	16.9%
					Night cough in past 12 months	30.8%
Bates et al 2013 ²⁶	2008-2010	Rotorua	1637	18-65 years; all	current asthma, defined as: "ever been diagnosed by a doctor as having asthma", plus either wheeze in the last 12 months or current use of asthma medication.	16.7%
					Wheeze or whistling	28.5%
					Woken with chest tightness	14.7%
					Shortness of breath at rest	9.7%
					Woken by shortness of breath	8.7%
					Woken by coughing	23.3%
					Ever asthma diagnosis	24.2%
					Current asthma treatment	13.1%
Crampton et al 2004 ²⁷	2001-2002	All New Zealand	10 506 GP visits	All; all	"For profit" GP visit for asthma	5.0%
					"Not for profit" GP visit for asthma	9.1%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
Douwes et al 2007 ²⁸ N.B. High (23.2%) smoking rate in population	Not stated	Rural, lower half North Island	1328	25-49 years; all	Woken by shortness of breath in past 12 months	12.9%
					Wheeze in past 12 months	25.4%
					Asthma medication in past 12 months	11.0%
					Asthma ever	23.3%
					Doctor diagnosed asthma ever	22.2%
Hansell et al 2014 ¹⁷	2003-2004	Greater Wellington	1017	24-74 years; all;	Asthma ever diagnosed	23.9%
Ellison-Loschmann et al 2009 ¹⁶ and various; aka ISAAC III	2001-2003	All New Zealand	10873	6-7 years; all (extrapolated)	Wheezing ever	40.9%
					Current wheeze	22.4%
					>=4 wheezing attacks	7.2%
					Night waking from wheeze	13.3%
					Speech-limiting wheeze	3.7%
					Asthma ever	30.3%
					Exercise wheeze	16.0%
					Night cough	28.2%
			13317	13-14 years; all (extrapolated)	Wheezing ever	46.5%
					Current wheeze	27.6%
					>=4 wheezing attacks	6.4%
					Night waking from wheeze	11.2%
					Speech-limiting wheeze	6.2%
					Asthma ever	33.4%
Eng et al 2010 ²⁹ , Eng et al 2011 ³⁰	2004-2006	All New Zealand	2903	20-64 years; all	Woken by shortness of breath in past 12 months	9.7%
					Asthma attack in past 12 months	8.7%
					Currently taking asthma medication	9.5%
					Current asthma	17.1%
					Wheeze in past 12 months	23.7%
					Ever had asthma	21.4%
					Doctor-diagnosed asthma	19.7%
					Adult-onset asthma	9.3%
					Doctor-diagnosed adult-onset asthma	8.5%
Watson et al 2013 ³¹		Northern New Zealand	369	18 months; European & Polynesian (not disaggregated)	Wheeze in the last 12 months	118/369= 32.0%