Asthma + Respiratory FOUNDATION NZ

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

The impact of respiratory disease in New Zealand: 2018 update

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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 2017 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 2000-2017.

Across the 2000 to 2017 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 between 2000 and 2015 increased for bronchiectasis, remained generally static for childhood pneumonia, asthma and total respiratory disease, and declined for COPD.

While inequalities have generally reduced since the previous report, they continue to be unacceptably high.

All indicators showed inequalities in health by ethnic group. Pacific peoples and Māori shared the highest respiratory health burden. Pacific hospitalisation rates were consistently highest across all indicators except for COPD, where Māori rates were higher. Māori had highest mortality rates for total respiratory disease, asthma and COPD; bronchiectasis and childhood pneumonia mortality rates were highest in Pacific peoples. 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 2.1 for childhood pneumonia, to 3.9 for childhood bronchiolitis and 5.1 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.

The South Island continued to have lower respiratory disease rates than the North Island, but compared to the previous report, the burden of respiratory disease has shifted from the north of the North Island to the centre: Lakes, Whanganui, Waikato and Tairawhiti DHBs had

the highest total respiratory hospitalisation rates, and generally also higher rates for other indicator conditions.

Total respiratory disease

The 2015 rate of respiratory hospitalisations was 1803.5 per 100,000 people. Total respiratory hospitalisations have been increasing at a rate of 17.4 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 have only increased slightly since then. Conversely, mortality rates have not changed meaningfully over the same period, being 65.6 per 100,000 people per year in 2000, and 64.0 in 2017.

Respiratory hospitalisation rates were highest for 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 2.5 times higher than for non-MPA. Māori rates were also significantly higher (rate ratio 2.0), while rates for Asian peoples were significantly higher (rate ratio 0.7). These trends were repeated across all age groups. 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 2.3 times higher than rates in the least deprived quintile, while mortality rates were 1.8 times higher. The deprivation gradient was present for both hospitalisations and deaths in all ethnic groups, but Pacific peoples' hospitalisation rates stood out further: Pacific peoples living in the wealthiest quintile areas had respiratory hospitalisation rates higher than those of non-MPA people in the most deprived quintile areas.

Asthma

Medicated asthma prevalence showed no significant change during the study period in adults or children. The hospitalisation rate for asthma peaked in 2009 at 218 per 100,000 people, and overall declined slightly over the study period. Asthma mortality rates, however, which appeared to be declining in the previous report, have returned to previous higher levels, peaking at 2.0 deaths per 100,000 in 2014.

Risks for asthma were similar across measures. Prevalence, hospitalisation and mortality were all significantly higher for both Māori and Pacific peoples, 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 2.7 times higher in the most deprived NZDep2013 quintile 9-10, and 1.9 times higher in NZDep2013 quintile 7-8, compared to the wealthiest NZDep2013 quintile. These differences were similar to mortality

differences. Asthma prevalence showed a deprivation gradient for female children, but not for female adults, and not for males.

2017 asthma hospitalisation rates were lower than the national average in all South Island DHBs except West Coast, and higher than the national average in all North Island DHBs except Auckland, Waitemata, MidCentral and Capital and Coast; 2015 mortality rates were highest in the Tairawhiti and Lakes DHBs.

Bronchiectasis

Although bronchiectasis is the rarest of the indicator conditions, the bronchiectasis hospitalisation rate increased by a significant 45% over the study period. Mortality rates increased by 88%.

Being of Māori or Pacific ethnicity was a significant risk factor for bronchiectasis hospitalisation and death, and Asian mortality rates were also higher than non-MPA. The greatest disparity in hospitalisations by age and ethnicity was for Pacific peoples aged over 65 years, whose bronchiectasis hospitalisation rates of 490.5 per 100,000 were 5.94 times higher than for non-MPA. Overall, Pacific peoples were 6.2 times more likely to be hospitalised for bronchiectasis than non-MPA, and Māori were 3.8 times more likely to be hospitalised, while Asian peoples rates were not significantly different. Mortality differences were similar for Māori and Pacific, but 1.7 times the non-MPA rate for Asian peoples.

Bronchiectasis also showed strong socio-economic disparity, with hospitalisation rates 2.5 times higher in the most deprived compared to the least deprived neighbourhoods, and mortality rates 1.8 times higher. The hospitalisation rate increase for the most deprived quintile was steepest for Māori.

Childhood bronchiolitis

Childhood bronchiolitis hospitalisation rates have increased by nearly a half since 2000. Pacific rates were 3.5 times higher than non-MPA, and Māori rates 3.2 times higher. The rate for the most deprived quintile was 3.9 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 five times as likely to be hospitalised as non-MPA children in the wealthiest quintile.

There were few deaths from childhood bronchiolitis, but all 7 deaths between 2006 and 2015 were in NZDep deciles 7-10; and all were Māori and/or 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 2.4 times higher than the non-MPA rate for hospitalisation, and 5.6 times higher for mortality; Māori children's rates were 1.6 and 4.1 times higher respectively. Hospitalisation rates for

Asian children were 1.1 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 2.1 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 8.1 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 3.5 times the non-MPA rate for hospitalisation and 2.2 times the rate for mortality. Pacific peoples' hospitalisation rates were 2.7 times higher, and mortality was not significantly different from non-MPA. Both measures were lowest for Asian peoples.

There was a strong deprivation gradient, with COPD hospitalisation rates 5.1 times higher in the most deprived NZDep quintile than in the least deprived, and mortality rates 2.3 times higher. The gradient was apparent for all ethnic groups.

As in the previous report, 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 $7.05b in 2015. Of this, $6.59b were indirect costs from mortality and disability affected life years, and the remaining $465.0m were direct costs from hospitalisations, prescriptions and doctors' visits. We have costed asthma separately, at $1.018b, with $198.3m in direct costs, and $828.2 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, an increase in the value of a life year, and improvements to the costing method.

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 five 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 Zealand[3] (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 Zealand[4] (2003) includes data to 2002.
- The Impact of Respiratory Disease in New Zealand: 2014 update[5] (2015).
- The Impact of Respiratory Disease in New Zealand: 2016 update[6] (2016), 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, 2014 and 2016; 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, total pneumonia, pertussis, and lung cancer. Lung cancer makes a large contribution to New Zealand's health burden, but is well-monitored elsewhere. Tuberculosis, total pneumonia and pertussis are included in total respiratory disease but do not individually have sufficient health impact to warrant inclusion in the 2018 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 regularly collected data on the condition, it was not a viable indicator of respiratory health. The literature search found two new New Zealand studies which included sub-population sleep apnoea prevalence rates, but neither were representative of the general population: Swinbourne et al estimated between 8% (apnoeic episodes) and 38% (snorers) of highly trained team sport athletes could be suffering from OSA[7]; and Humphreys et al found 20% (n=9) of their study's 45 duodenal switch patients also suffered from OSA before surgery. We continue to recommend further research on the New Zealand prevalence of OSA.

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 burden[8]. 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 2016-2017.

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, when the ICD-10 clinical coding system was introduced.

Rates have been age-standardised to Statistics New Zealand population estimates for 2017 (and for 2000 – 2017 in times series data). 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, 2012/13, 2013/14, 2014/15, and 2016/17. 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 2017 who had been hospitalised with the condition since 1988.

5.3.3. COSTS

We report costs for 2015, as this is the most recent year for which mortality data was available. It is important to note that subsequent government funding changes for child GP visits will have reduced the private funding proportion and increased the public funding proportion. The next report will also need to incorporate broader changes to GP funding allocations.

The cost of asthma to the New Zealand economy was estimated at $349m in 2000,[9] at $800m in the 2014 report, and at $858m in the 2016 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; but extended the range of pharmaceuticals included in respiratory costs to include spacers.

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 dispensing date. 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, however the Child Poverty Action Group (CPAG) found in 2013 that the average cost for a child aged 6 to 17 to visit their GP was $24.07 in working hours; $44.16 after hours; and 93% and 94% of practices respectively charged for working hours and after-hours visits.[10] More importantly, however, from 1 July 2015 the Ministry of Health extended a voluntary free visit scheme to the 6 to 12 year age group.

For 2015 we have therefore assumed no GP visit cost for children under 6 years; $24.07 per visit for children aged 6 to 12 years, discounted by 50% to cover the free visit scheme for the second half of the year; and an average GP visit cost of $22.39 (93% x $24.07) for children aged 13 to 15. For adults, in the absence of data on visit cost changes, we assume an average cost of $32, as in the previous report.

Public costs have been estimated using pharmaceutical, hospitalisation and mortality data, and additional costs extrapolated from the Statistics New Zealand data on the working population and total population estimates, the New Zealand Health Survey, and a report on asthma rates in primary care[11]. Mortality costs are estimated from years of life lost based on average life expectancy at age of death[12], multiplied by a value per life year of $176,000. The life year value is estimated from the 2015 NZTA value of a statistical life ($4.06m) and a 3% discount rate[13].

Hospitalisation costs are summed from all 2015 publicly-funded hospitalisation discharges, using the appropriate 2014/15 or 2015/16 Ministry of Health cost weight multiplier.

The method for calculating the total cost of pharmaceuticals is described in Telfar Barnard et al 2011[13]. The total pharmaceutical cost is the sum across all included prescriptions of:

Dispensing fee + retail subsidy - estimated 2015 Pharmac rebate

The estimated Pharmac rebate for 2015[14] was $196.27m total rebates/$987.62m gross expenditure = 19.87%.

The public cost of a doctor's visit was based on the 2016 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 and child prescription and doctors' visit costs

In 1996/97, there were 126,800 GP medical subsidy claims for treating children aged under 16 with asthma, and 106,300 for adults[9], giving a ratio of 1.19.

The 2013/14 ratio of child to adult asthma prevalence was 16.6/10.8=1.54. However, this ratio was unusually high. We have therefore used the three year (2014 – 2016) average of 15.3/11.3=1.35.

Children aged under 15 years were issued with 325,097 initial (rather than follow-on/repeat) respiratory prescriptions in 2015, giving a rate of 35.6 prescriptions per 100 people. Applying this rate, reduced by the ratio of child to adult asthma prevalence gives a figure of 968,400 first prescriptions for adults, or 60.2% of adult initial respiratory prescriptions. Using the same methodology, but a less comprehensive set of respiratory prescriptions, previous reports found figures of 50.2% for 2011, and 44.1% for 2013.

The WaiMedCa study in 1994 found that 60.9% of respiratory prescriptions were for asthma.[15]

We have used the lower 44.1% figure as representing a more conservative estimate of adult asthma prescription rates. It is also closer to the 42.4% 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 prevalence [16] to the 2015/16 level of 10.8%, so potentially provides a better estimate than the 50.2% used in 2011 or the 60.2% found for 2015.

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 asthma[17]. 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.[18]

We have costed each day off school conservatively, as 8 hours at half the 2015 adult minimum wage of $14.75/hr.

Cost of days off school=[Asthma prevalence in under 15 year olds] * [Statistics NZ estimated 2015 population under 15 years] * [additional days off school] *[0.5*adult minimum wage]*8 hours

=0.166 * 913,061 * 4.4 * 0.5 * $14.75 * 8*
= $39,347,086

* The 2014 report erroneously left out the 8 hour multiplier, thus under-reporting the cost of days of school by a factor of 8.

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 10.8% 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 2015 resident population estimate of 4,595,703, we estimated the total cost of ED and OP visits to be

Asthma prevalence * resident population * (ED + OP visits per person) * ED or OP visit cost

= 4.8% * 4,595,703 * 2.17 * $254.85

= $121,993,745[†]

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 $340million[3]. 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 has changed little since then it represents a better estimate than the 2001 figure. Increasing the 13,362 by the 14.1% increase in the population from 4,027,927 in the 2006 census to the 2015 resident population estimate of 4,595,703, takes the 2015 estimate of YLDs to 15.245. With the 2015 value of a life year at $176,000, and applying the same arbitrary 20% value as Holt and Beasley, the cost of YLDs is estimated at $536,641,796.

The estimate of YLDs from total respiratory disease in 2006 was 34,581. Allowing for the population increase to 2015 would take this estimate to 39,456. Respiratory hospitalisation rates have increased since 2006, so this should be a conservative estimate. At 20% of $176,000 per YLD, the YLD cost of total respiratory disease is estimated at $1,388,834,751.

[†] The $53,247,667 figure in the previous report did not include a multiplier for the number of visits per patient.

6. NEW ZEALAND'S RESPIRATORY DISEASE BURDEN

6.1. LITERATURE

As 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 2014 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 eight new relevant publications: one on bronchiolitis; two on sleep apnoea; and five on general respiratory disease. These publications are discussed in the relevant sections.

6.2. ASTHMA

6.2.1. ASTHMA 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 121. There were no new studies reporting asthma prevalence since the previous report.

Prevalence for medicated asthma was sourced from the most recently published New Zealand Health Survey data. For current asthma prevalence, data covers the 2016-17 period. The International Study of Asthma and Allergies in Children (ISAAC) last measured New Zealand child asthma rates in 2001-03.[19] 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 olds[15], cannot be directly compared with New Zealand Health Survey prevalence figures. The Global Asthma Network is currently preparing to undertake Phase I surveillance which will include New Zealand and global measures of asthma prevalence.[20]

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 past[21], and in particular wheeze in children aged under 3 is now seldom described as asthma.

NZ Health Survey measures of asthma prevalence by age group and sex, and by ethnicity, NZDep2013 quintile and DHB, for children and adults, are shown in Figures 2 to 7.

Trends over time 2006/7 – 2016/17

Medicated asthma prevalence declined significantly between 2006/7 and 2016/17 for girls aged under 15 years, from 14.2% of all girls to 11.3%. The change was particularly marked for Māori girls, among whom prevalence dropped from 20.6% to 14.9%. There were no significant changes in prevalence for adults (Table 2 and Table 3).

Table 2. Total child medicated asthma prevalence 2006 – 2017, age-standardised

Year	Total		Boys		Girls	
	%	95% CI	%	95% CI	%	95% CI
2006-07	14.9	(13.6 – 16.3)	15.5	(13.6 – 17.7)	14.2	(12.5 – 16.1)
2011/12	14.0	(12.4 - 15.6)	16.1	(13.9 - 18.5)	11.7	(9.5 - 14.4)
2012/13	14.0	(12.6 – 15.6)	16.1	(14.2 – 18.3)	11.9	(10.2 – 13.9)
2013/14	15.2	(13.8 - 16.6)	17.1	(15.0 - 19.4)	13.1	(11.3 - 15.2)
2014/15	15.1	(13.4 - 16.9)	16.5	(14.2 - 19.1)	13.6	(11.5 - 16.0)
2015/16	16.6	(15.3 - 18.1)	18.5	(16.6 - 20.6)	14.7	(13.0 – 16.6)
2016/17	14.3	(12.8 – 16.0)	17.2	(15.3 – 19.3)	11.3	(9.4 – 13.5)

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	11.3	(10.5 – 12.0)	9.4	(8.4 – 10.4)	13.0	(11.9 – 14.2)
2011/12	11.0	(10.2 – 11.8)	8.6	(7.7 – 9.7)	13.2	(12.2 – 14.3)
2012/13	10.9	(10.2 – 11.6)	8.9	(7.9 – 9.9)	12.8	(11.9 – 13.8)
2013/14	10.8	(10.0 - 11.6)	8.3	(7.4 - 9.3)	13.1	(12.0 - 14.3)
2014/15	11.0	(10.3 - 11.7)	9.0	(8.0 - 10.1)	12.8	(12.0 - 13.7)
2015/16	10.8	(10.3 - 11.4)	8.4	(7.5 - 9.3)	13.1	(12.3 - 14.0)
2016/17	12.0	(11.2 – 12.8)	9.9	(8.8 – 11.1)	14.0	(13.0 – 15.0)

*N.B 2002-03 rates are only for adults aged 15-44.

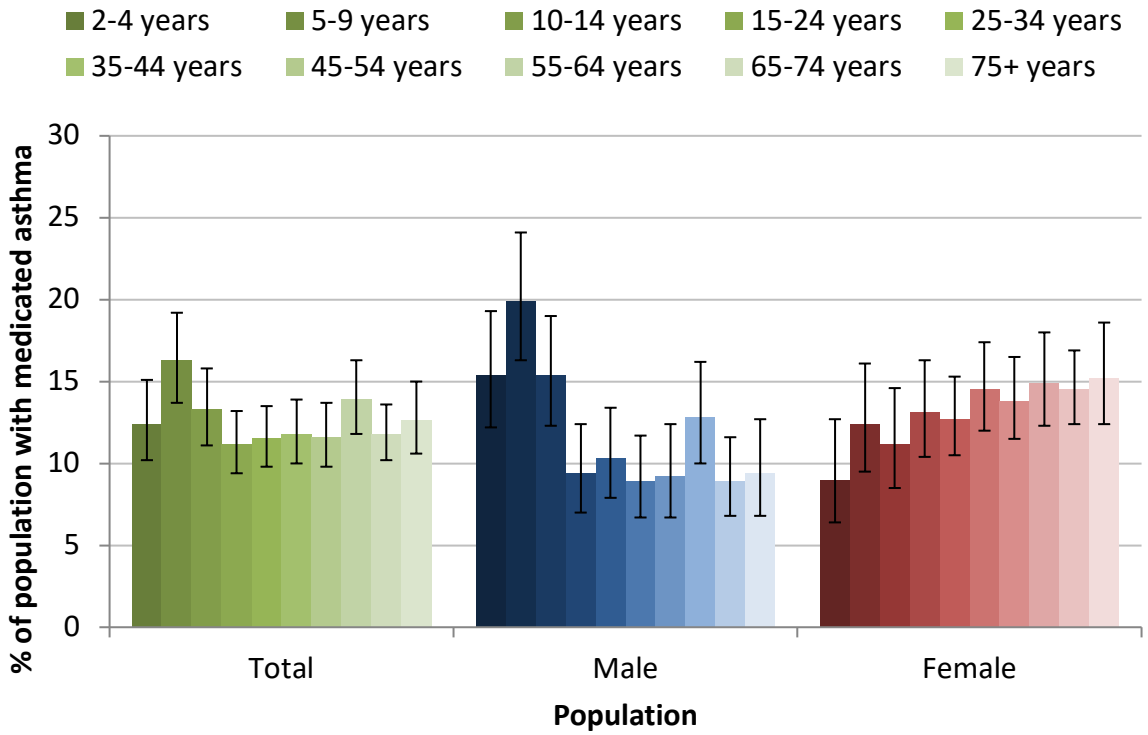
Risks and determinants 2016/17

Boys had higher medicated asthma prevalence than girls (rate ratio 1.53); but men had lower prevalence than women (rate ratio 0.71).

Medicated asthma prevalence was significantly higher for Māori than for the rest of the population in both children (rate ratio 1.36) and adults (rate ratio 1.48). Prevalence was also higher for the most deprived NZDep2013 quintile than for the least deprived for children (rate ratio 1.56), but was not significantly different for adults.

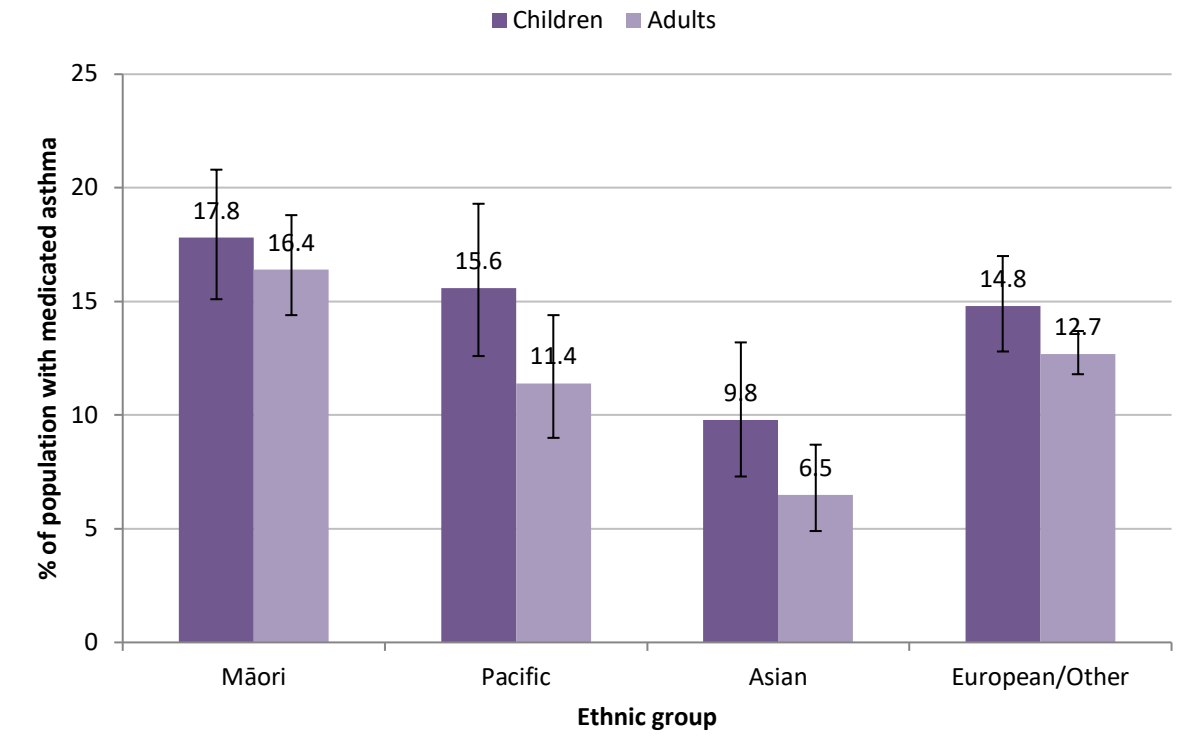
By region, there was no significant difference in children's medicated asthma rates across New Zealand except in Auckland, where the rate was 10.4 compared to the national average of 14.3. Adult rates were higher in Whanganui, MidCentral, Hutt Valley and South Canterbury DHBs, and lower in Waitemata, and Counties Manukau (Table A 5).

Figure 1. Age-standardised medicated asthma rates by age group and sex, 2016/17.



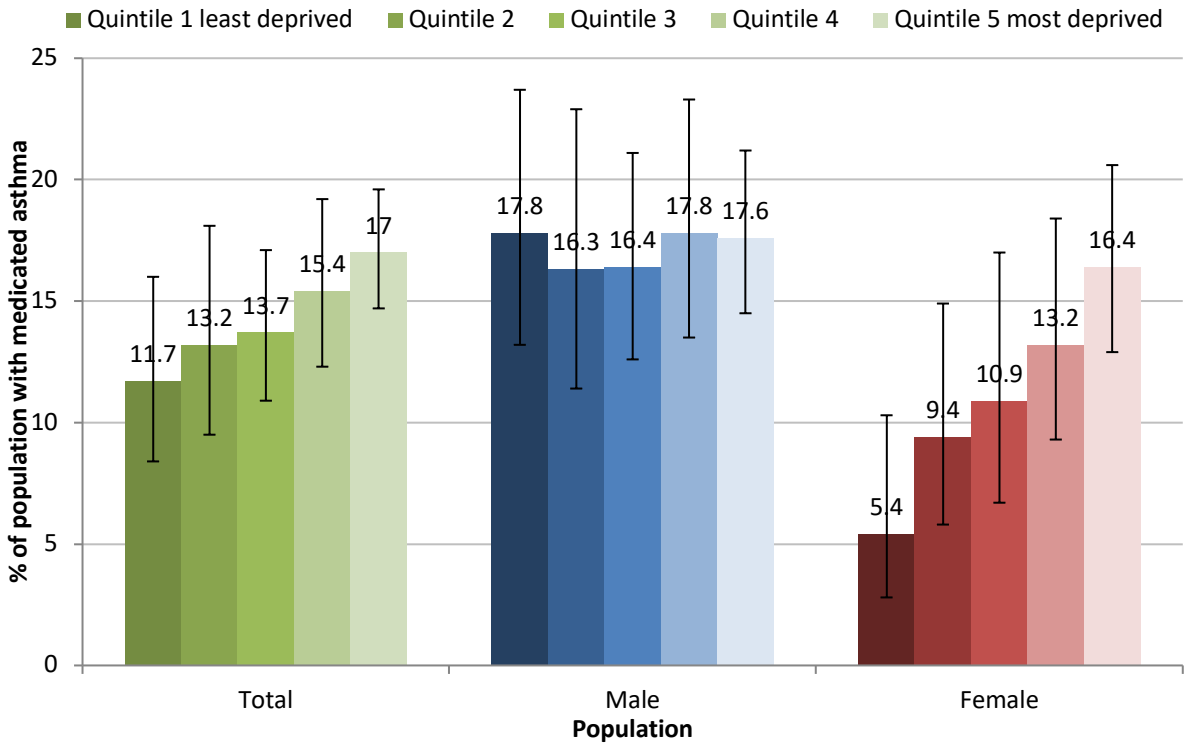
(See Table A 1 for data)

Figure 2. Medicated asthma prevalence by ethnic group 2016/17, children and adults



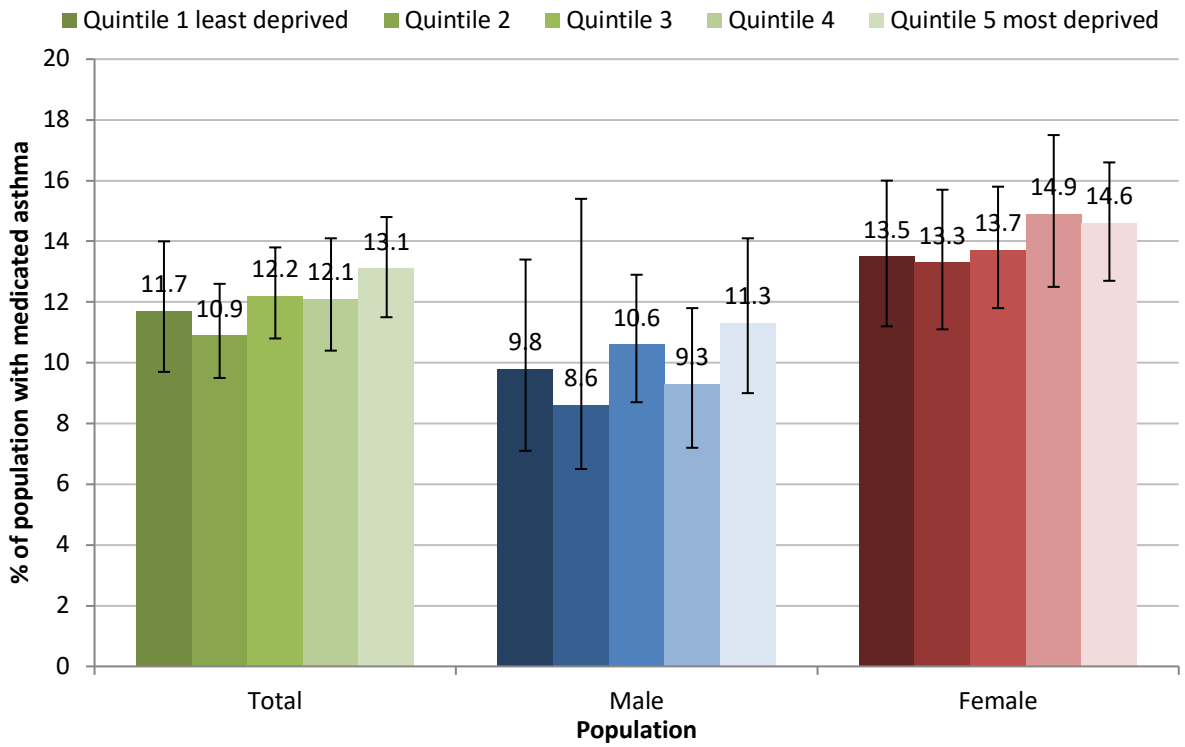
(See Table A 2 for data)

Figure 3. Child medicated asthma prevalence 2016/17 by NZDep2013, unadjusted



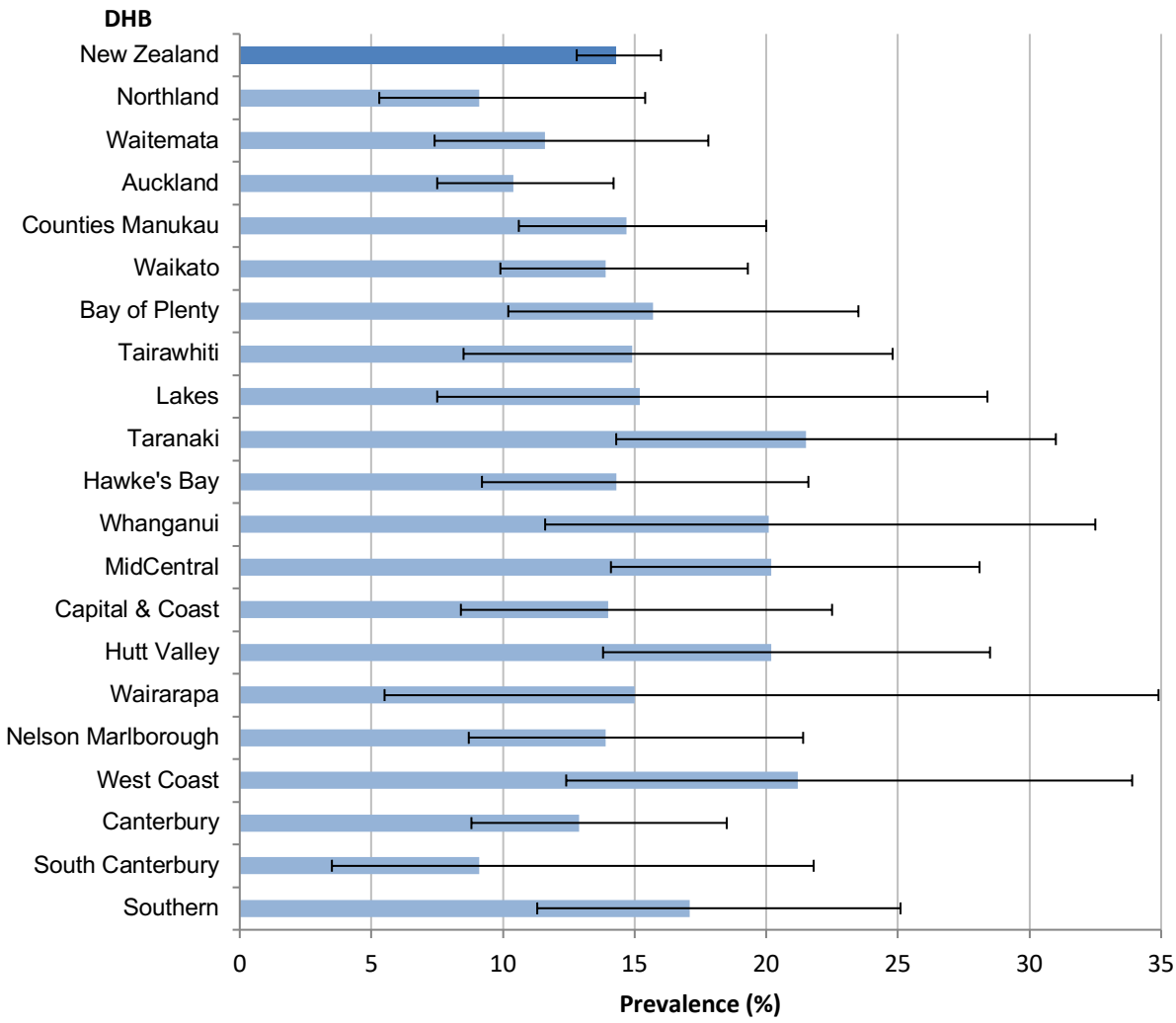
(See Table A 3 for data)

Figure 4. Adult medicated asthma prevalence 2016/17 by NZDep2013, unadjusted



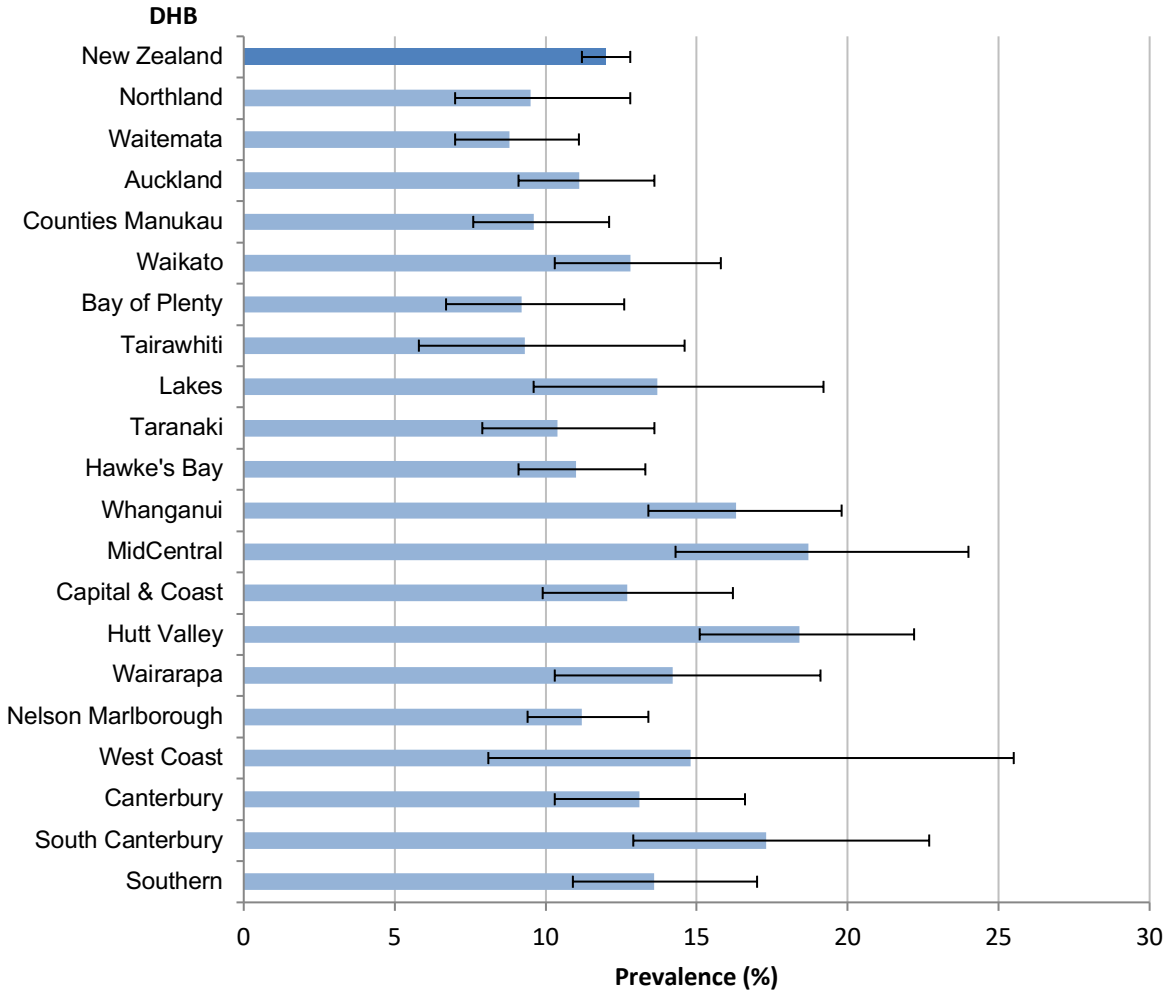
(See Table A 4 for data)

Figure 5. Children's (aged 2-14) medicated asthma prevalence by DHB, 2016/17, unadjusted.



(See Table A 5 for data)

Figure 6. Adult medicated asthma prevalence by region 2016/17, age-standardised



(See Table A 5 for data)

6.2.2. ASTHMA HOSPITALISATIONS

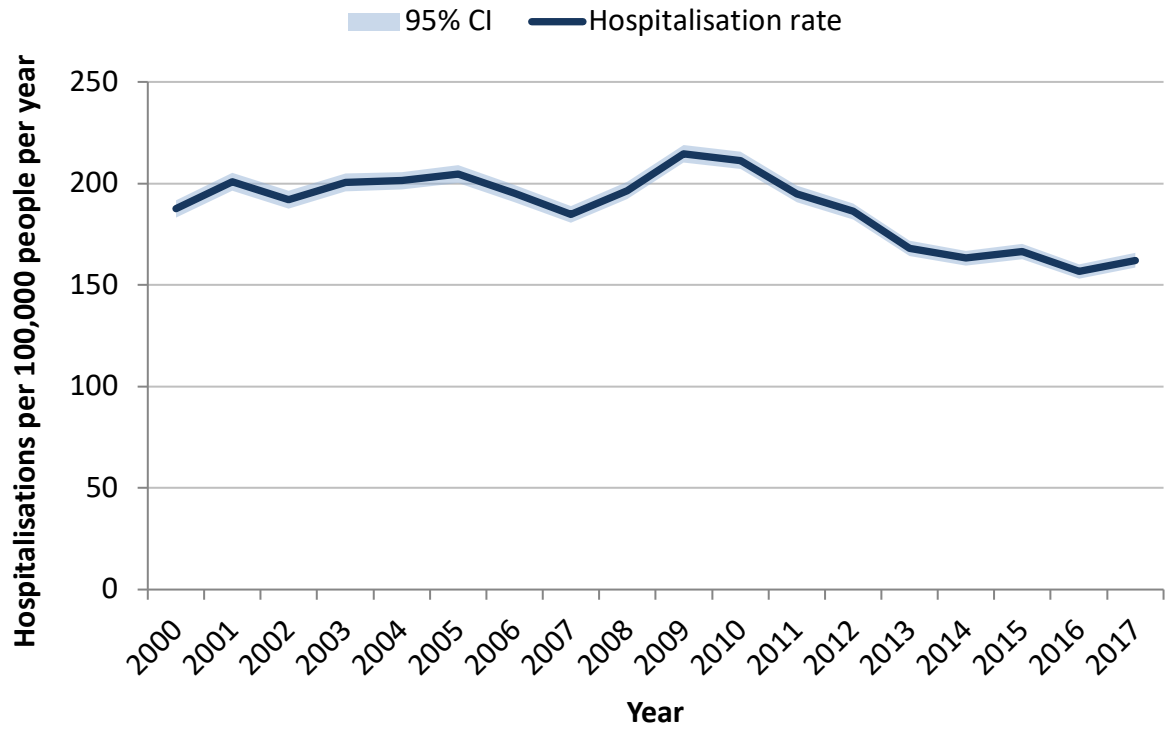
Trends over time 2000 - 2017

Asthma hospitalisation rates show a small but statistically significant decline over the eighteen years 2000-2017. For the last five years, rates have continued below 170 hospitalisations per 100,000 people per year, reaching their lowest point of 157 in 2016. The average from 2000 to 2012 was 198, and never dipped below 180 (Figure 7).

Inequalities (Figure 10) between Pacific and non-Māori/Pacific/Asian (non-MPA) hospitalisation rates appear to have plateaued, while inequalities between Māori and non-MPA continue to rise. Rates for Asian peoples were higher than for non-MPA between 2005 and 2015, but have dropped back below non-MPA rates over the last two years.

Socio-economic inequalities in asthma hospitalisation, which rose between 2000 and 2014, may now be reducing (Figure 13).

Figure 7. Asthma hospitalisations per 100,000 people per year, 2000-2017.



(See Table A 6 for data)

Risks and determinants 2017

Most risks and determinants in prevalence were magnified in hospitalisation. Asthma hospitalisation rates in children under 15 years were nearly 3 times the rates for adults aged 30-64 (rate ratio 2.72). Girls had substantially lower rates than boys (rate ratio 0.78), but women's asthma hospitalisation rates were nearly twice or more those of men (Figure 8, Table A 7).

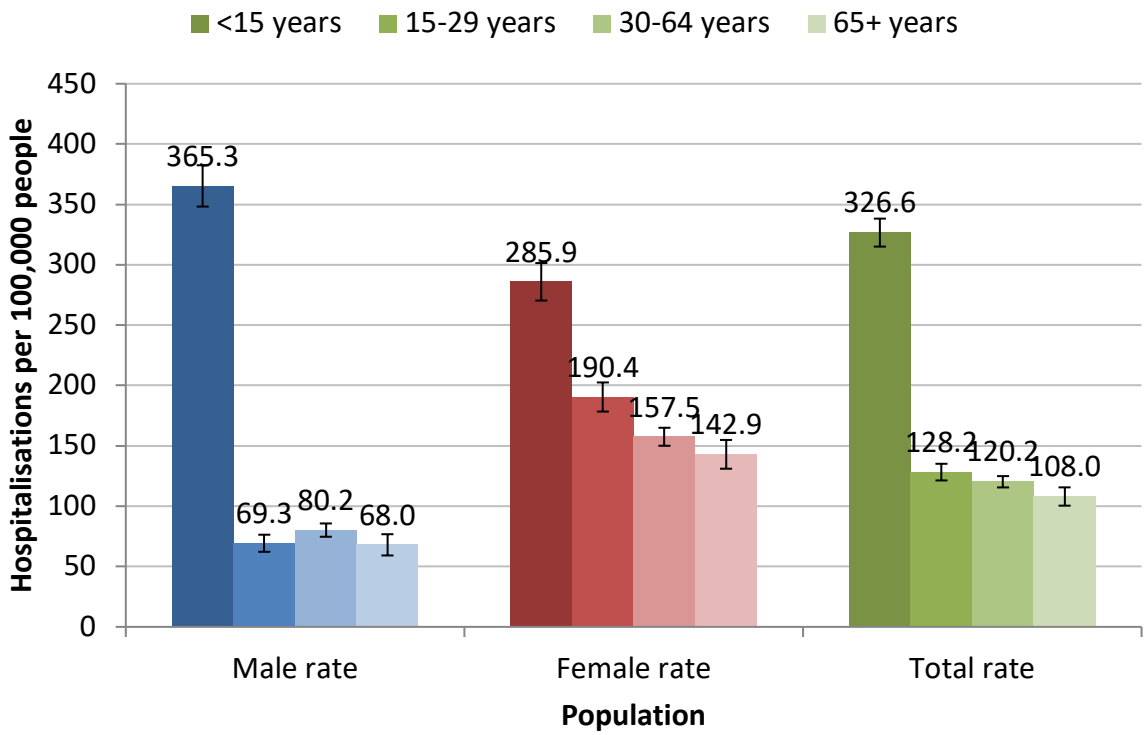
Differences in asthma hospitalisation rates by ethnic group lay in the same direction as prevalence. Māori rates were nearly 3 times higher than non-MPA (rate ratio 2.84), Pacific rates were higher again (rate ratio 3.21), and Asian rates were lower than non-MPA (rate ratio 0.86)(Figure 9).

There was a clear socio-economic gradient in asthma hospitalisation (Figure 12), with the most socioeconomically deprived areas having a hospitalisation rate nearly 3 times that of the wealthiest areas (rate ratio 2.70). Socioeconomic inequalities have pulled back a little over the last two years. This reduction is partly because asthma hospitalisation rates in NZDep 9-10 have decreased, but also because rates in NZDep 1-2 have increased,

Hospitalisation also showed greater rate variation by DHB than was apparent in prevalence data. 2017 asthma hospitalisation rates were lowest in South Canterbury DHB, and also significantly lower than the national average in Waitemata, Capital and Coast, Nelson

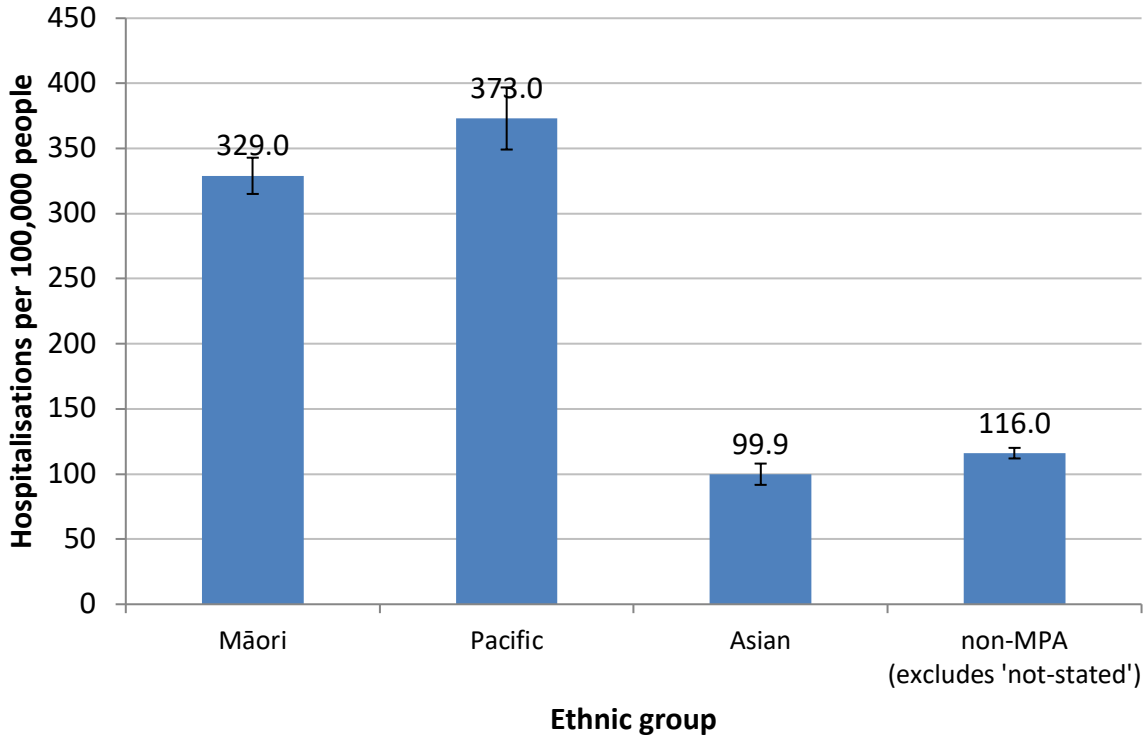
Marlborough, Canterbury and Southern DHBs. Rates were highest in Tairawhiti, and also significantly higher than the national average in Waikato, Lakes, Bay of Plenty, Hawkes Bay, Taranaki, Whanganui and Hutt DHBs (Table A 17).

Figure 8. Asthma hospitalisations per 100,000 people by age group and sex, 2017.



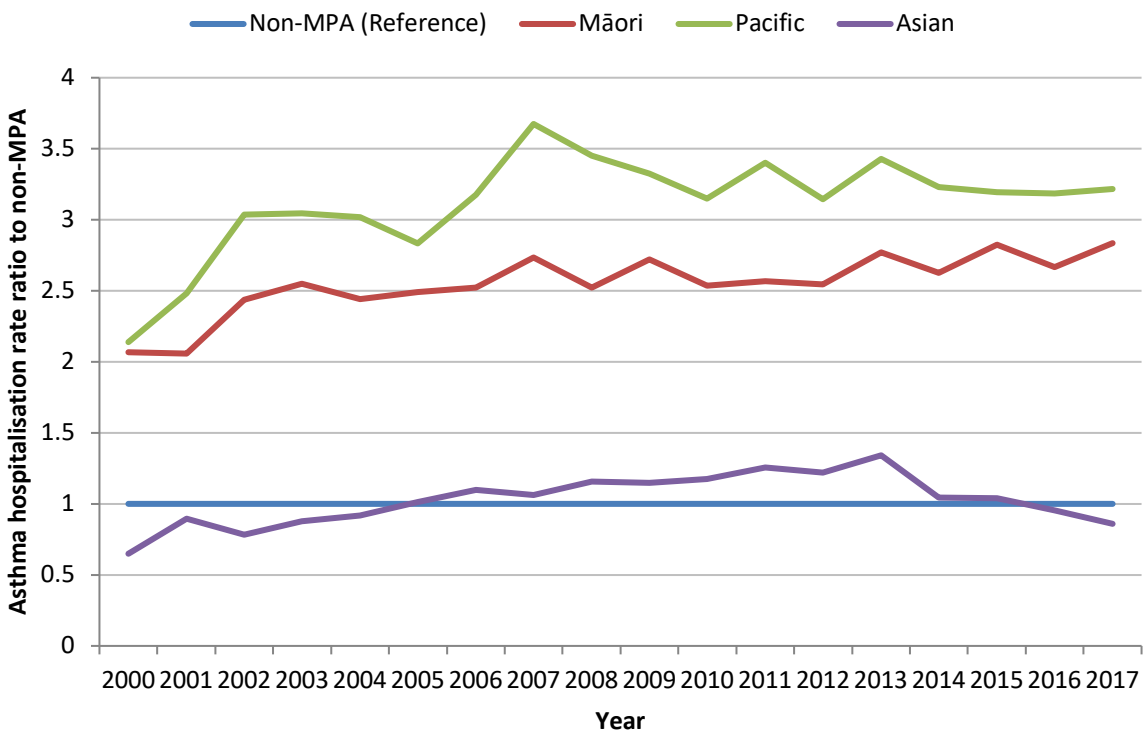
(See Table A 7 and Table A 8 for data)

Figure 9. Asthma hospitalisations per 100,000 people by ethnic group, 2017, age-adjusted.



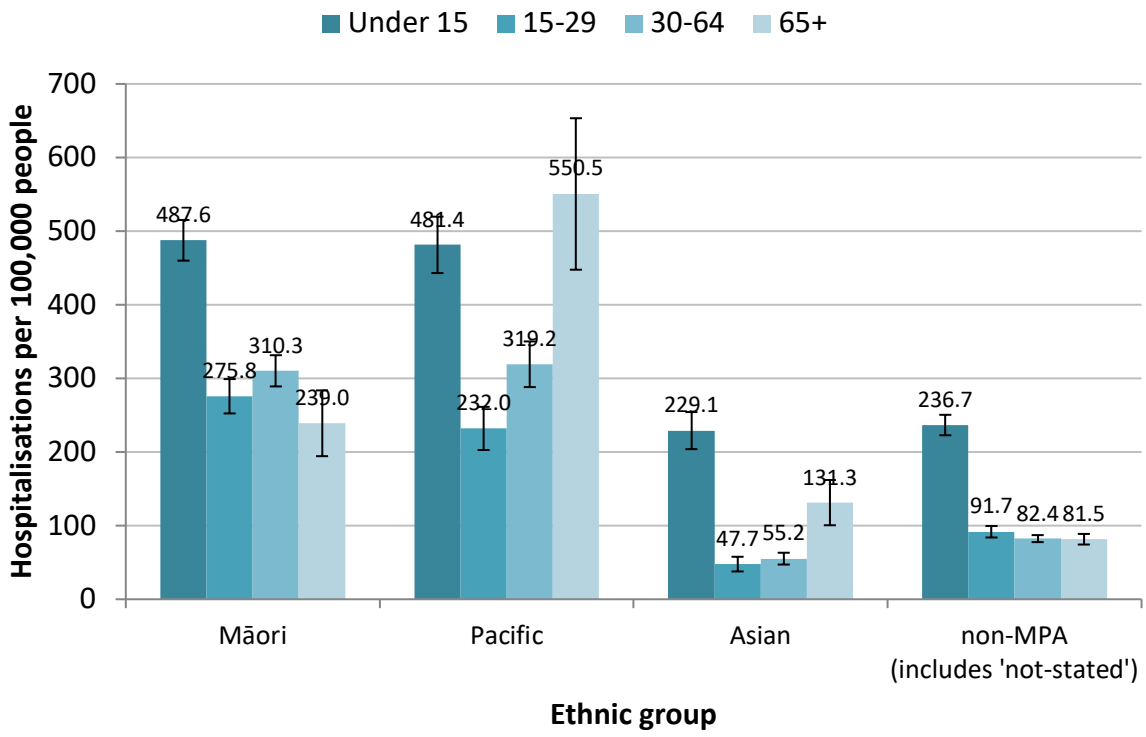
(See Table A 9 for data)

Figure 10. Asthma hospitalisations rates relative to non-MPA by ethnic group, 2000 – 2017, age-adjusted.



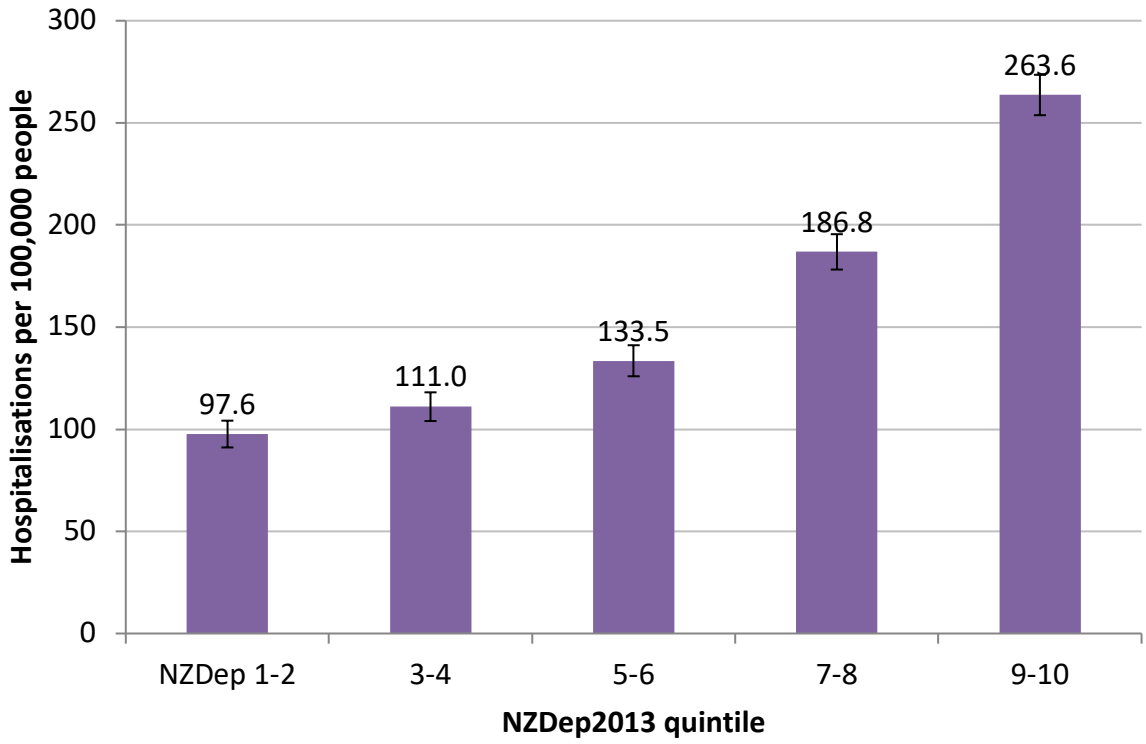
(See Table A 10 and Table A 11 for data)

Figure 11. Asthma hospitalisations per 100,000 people by ethnic group and age group, 2017.



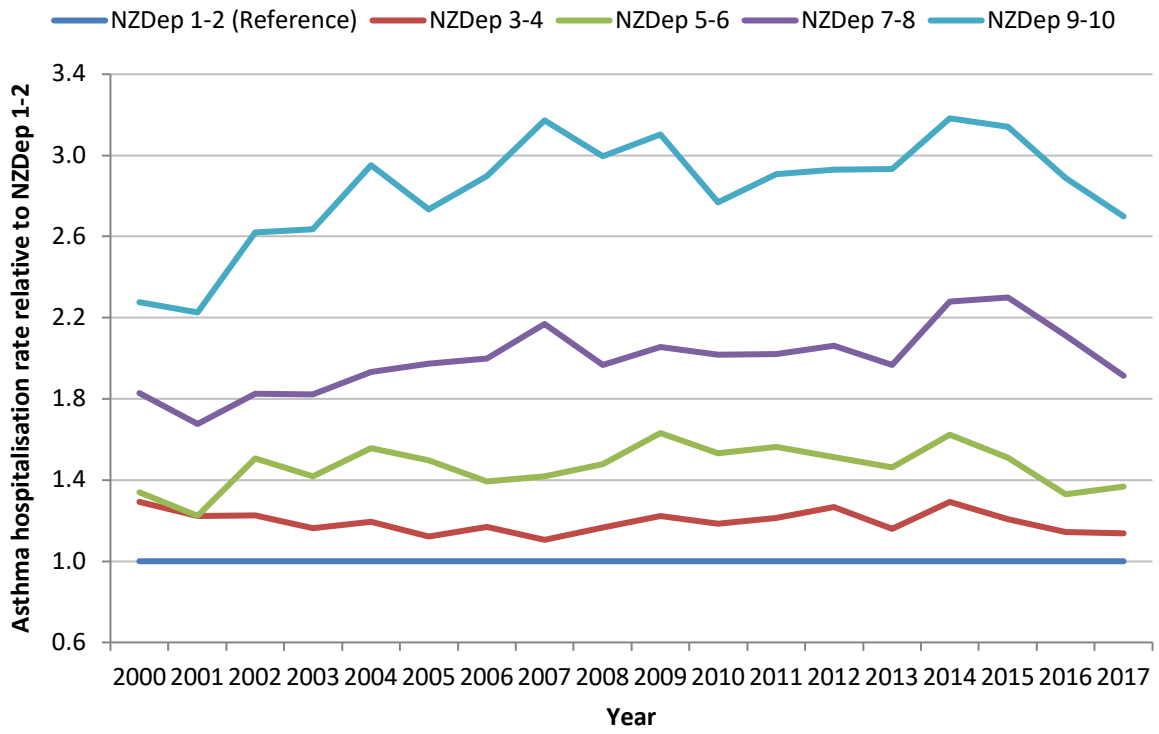
(See Table A 12 for data)

Figure 12. Asthma hospitalisations per 100,000 people by NZDep2013 quintile, 2017, age-adjusted.



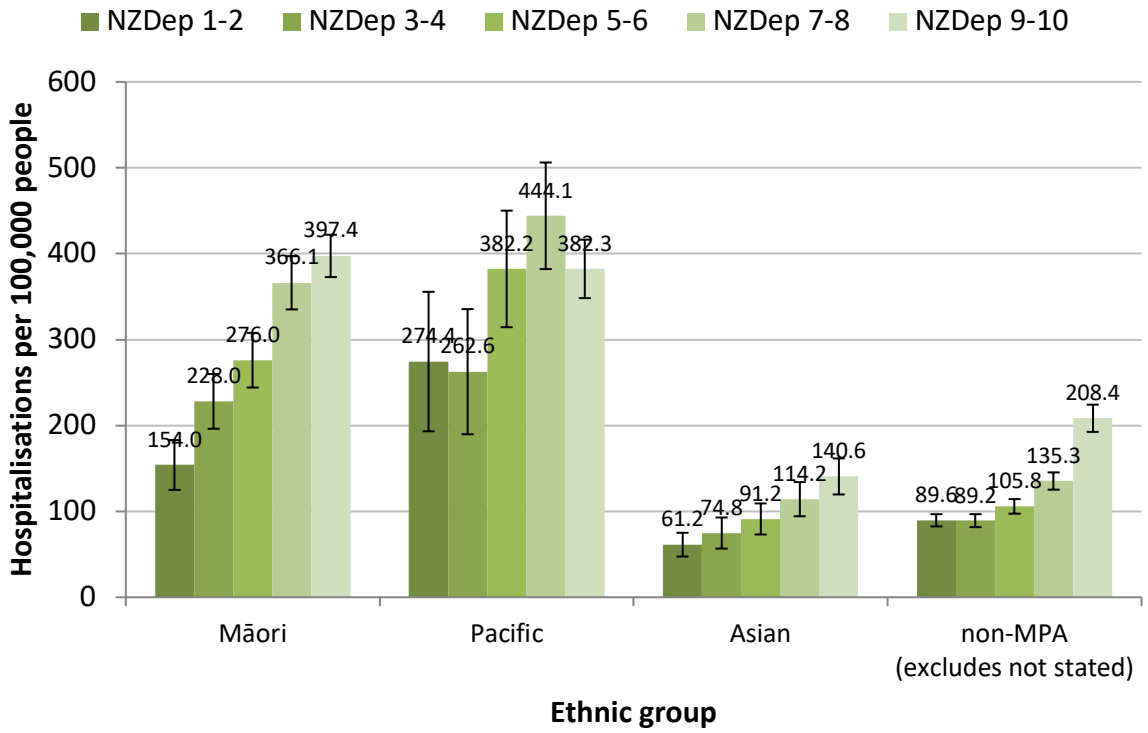
(See Table A 13 for data)

Figure 13. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile, 2000 - 2017, age-adjusted.



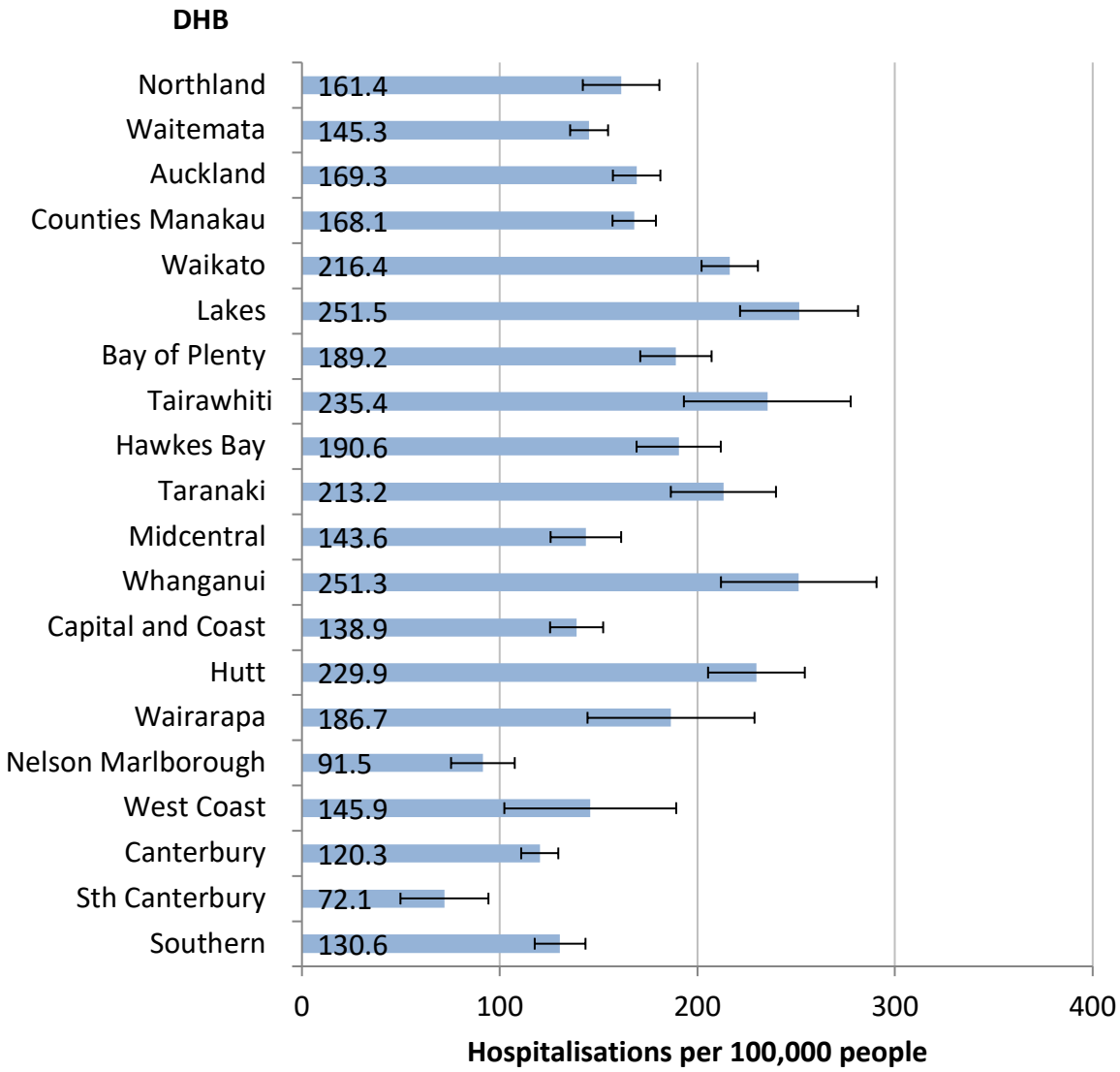
(See Table A 14 and Table A 15 for data)

Figure 14. Asthma hospitalisations per 100,000 people by ethnic group and NZDep2013, 2017, age-adjusted.



(See Table A 16 for data)

Figure 15. Asthma hospitalisations per 100,000 people by DHB, 2017.



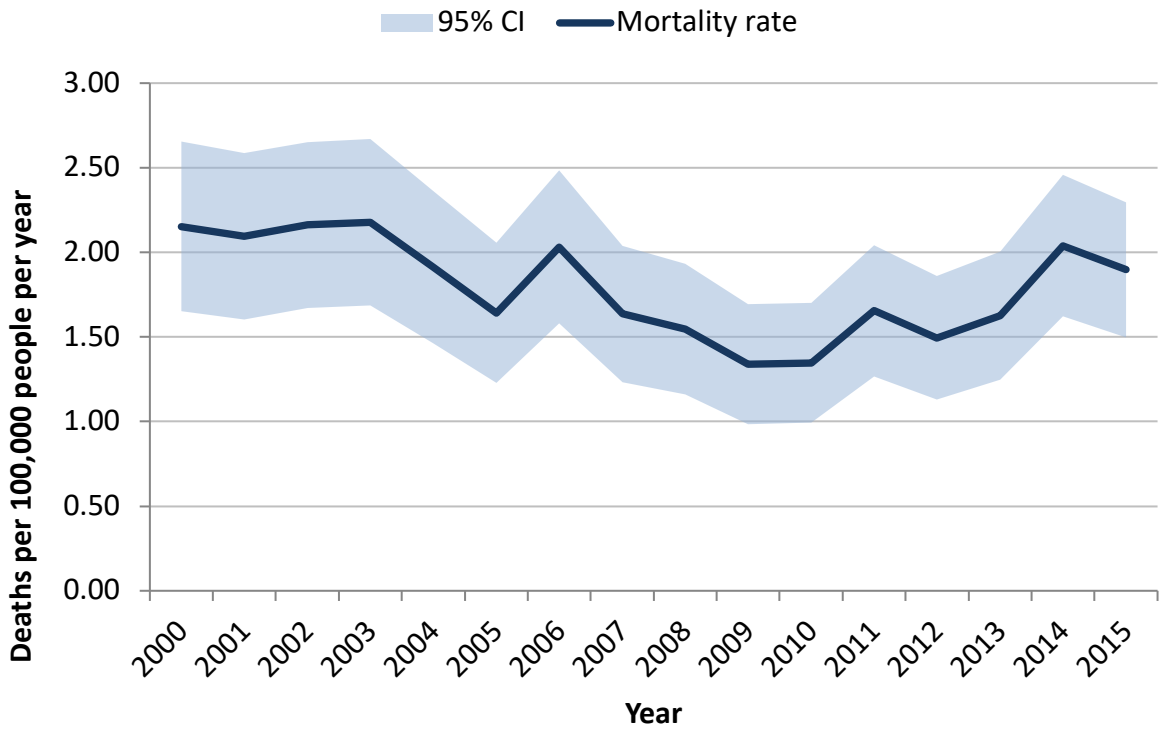
(see Table A 17 for data)

6.2.3. ASTHMA MORTALITY

Trends over time 2000 - 2015

There were 87 deaths from asthma in 2015. The asthma mortality rate reached its lowest point in 2009/2010. Rates in the seven years 2007-2015 were significantly lower than in the previous seven years, but mortality rates in 2014 and 2015 were higher than in the previous seven years.

Figure 16. Asthma mortality rates 2000-2015, age-adjusted.



(See Table A 18 for data)

Risks and determinants 2010 - 2015

Asthma mortality rates were highest in people aged 65+, and significantly higher in women than in men for the 30 to 64 years and 65 and over age groups (Figure 17).

Asthma mortality rates were highest for Māori and Pacific peoples, with rates 4.26 and 3.20 times higher than rates for non-MPA (Figure 18 and Figure 19). Since the previous report, Pacific rates have dropped by 1.28 and Māori rates have dropped by 0.62, whereas Asian and non-MPA rates have risen by 0.14 and 0.09 respectively. As in the last report, Pacific rates are declining faster than Māori rate.

There were socio-economic differences in asthma mortality, with rates 2.16 times higher in the most deprived NZDep2013 quintile 9-10, and 1.78 times higher in NZDep2013 quintile 7-8, compared to the least deprived NZDep2013 quintile 1-2 (Figure 20). This inequity has

improved since the previous report. There was insufficient data to measure socioeconomic gradients across ethnic groups (Figure 21).

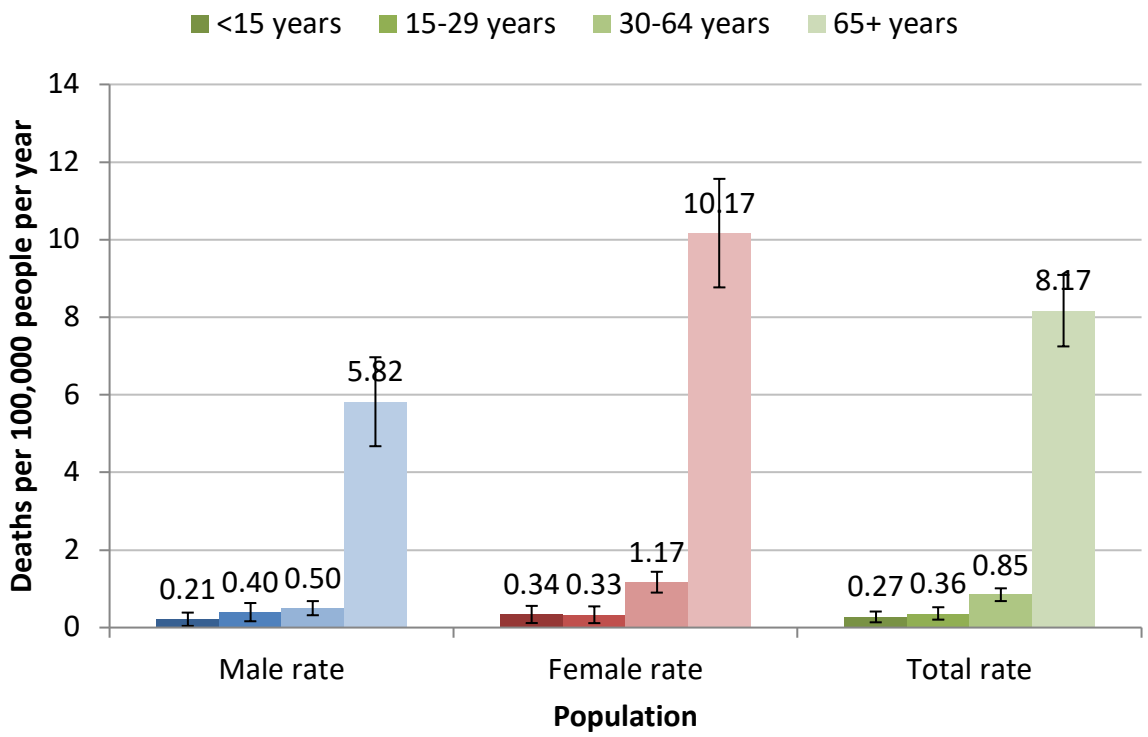
For both ethnicity and socioeconomic status, inequalities are lower in this report than in previous reports (Table 4).

Asthma mortality rates were highest in the MidCentral DHB (Figure 22), followed by Northland and Lakes, and lowest in West Coast and South Canterbury DHBs.

Table 4. Ethnic and socioeconomic inequalities in asthma mortality over time.

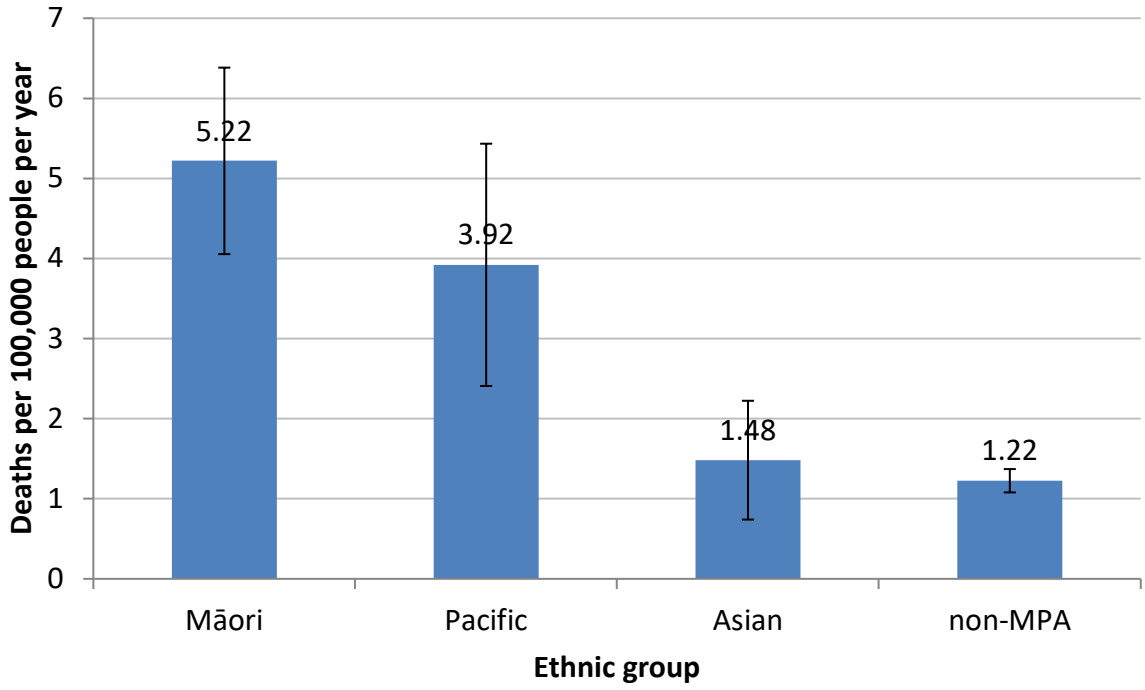
Report year	Mortality time period	RR (95% CI)		
		Māori vs non-MPA	Pacific vs non-MPA	NZDep 9-10 vs 1-2
2014	2006-2011	4.83 (4.23-5.51)	5.82 (4.81-7.04)	3.15 (2.65-3.73)
2016	2008-2013	5.86 (4.23-5.51)	5.59 (4.81-7.04)	3.74 (3.12-4.49)
2018	2010-2015	4.26 (3.77-4.82)	3.20 (2.63-3.89)	2.16 (1.84-2.53)

Figure 17. Asthma deaths per 100,000 people by age group and sex, 2010-2015.



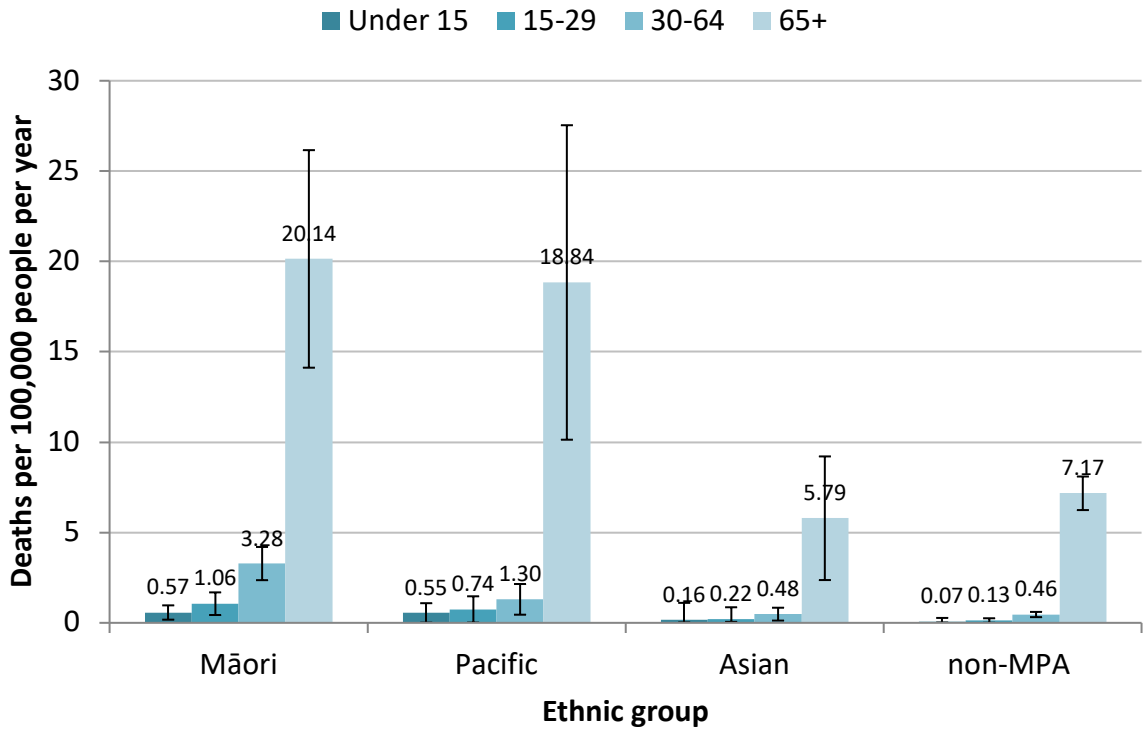
(See Table A 19 and Table A 20 for data)

Figure 18. Asthma mortality per 100,000 people per year by ethnic group, 2010-2015.



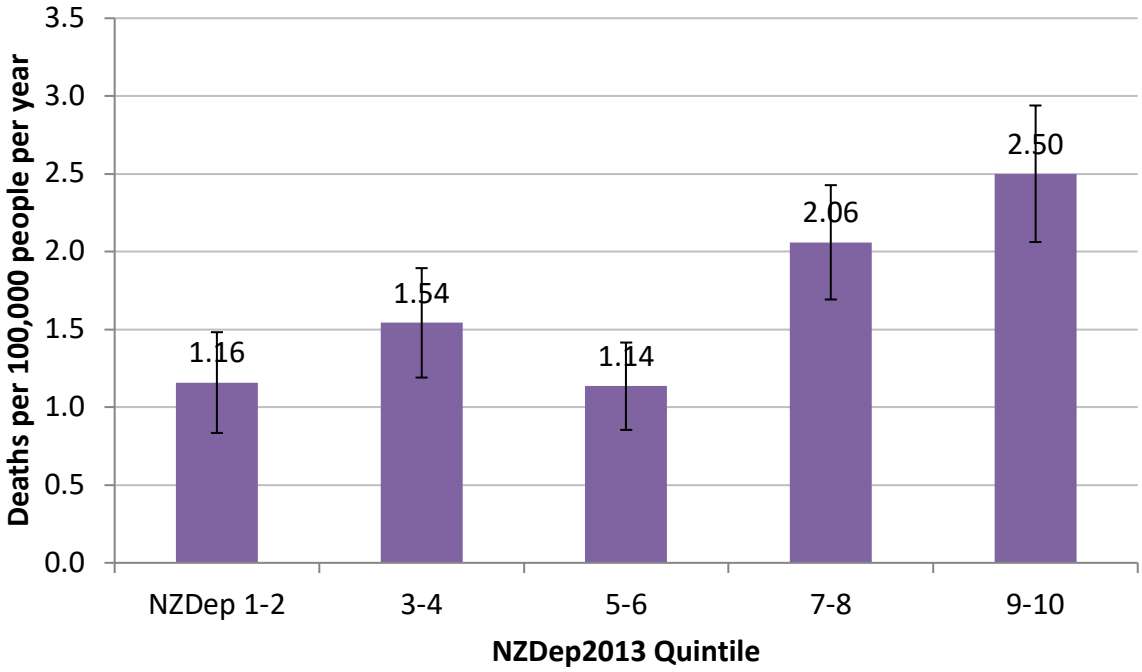
(See Table A 21 for data)

Figure 19. Asthma deaths per 100,000 people per year, by ethnic group and age group, 2010-2015.



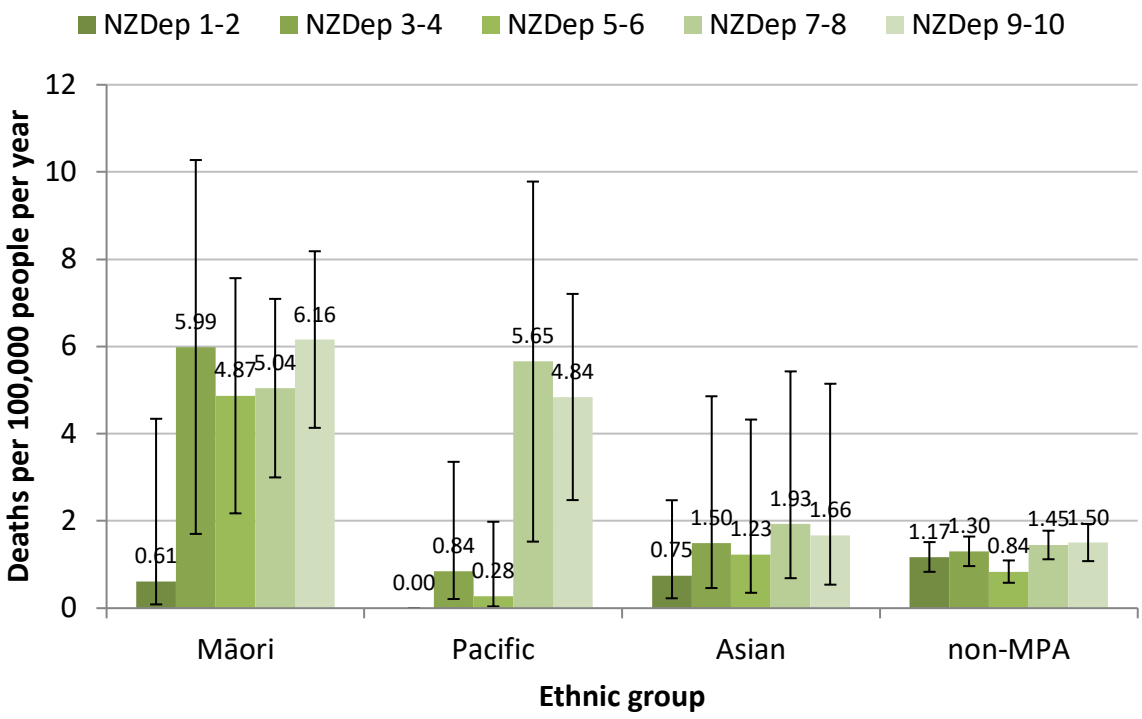
(See Table A 22 for data)

Figure 20. Asthma deaths per 100,000 people by NZDep2013 quintile, 2010-2015, age-adjusted.



(See Table A 23 for data)

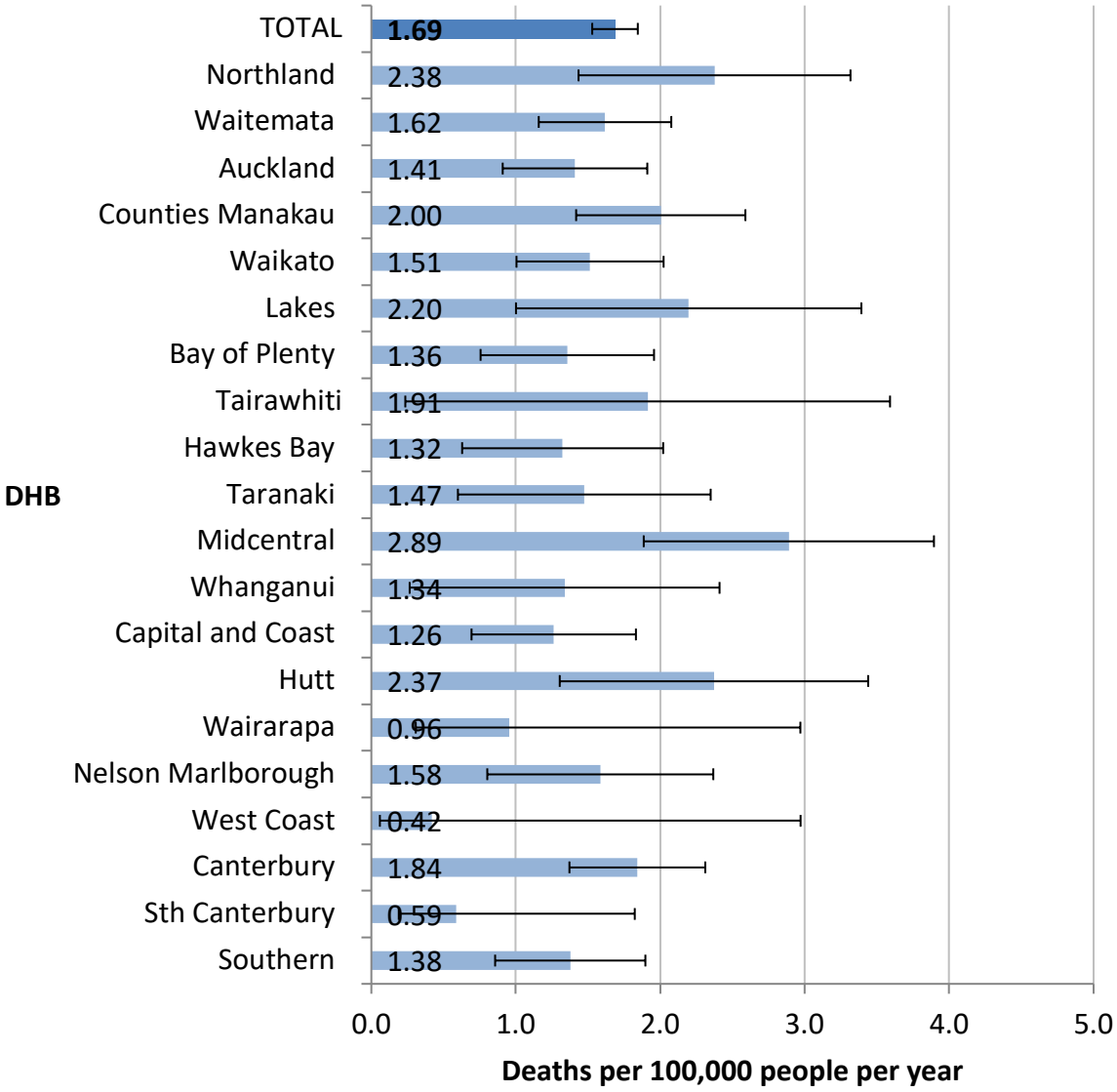
Figure 21. Asthma deaths per 100,000 people by ethnic group and NZDep2013, 2010-2015, age-adjusted.



(See Table A 24 for data)

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

Figure 22. Asthma deaths per 100,000 people per year, by DHB, 2010-2015, age-adjusted



(see Table A 25 for data)

6.3. BRONCHIECTASIS

6.3.1. BRONCHIECTASIS PREVALENCE

We estimated the prevalence of severe bronchiectasis in 2017 by identifying living individuals hospitalised with bronchiectasis, as either primary or secondary diagnosis‡, since 1988. On 1 July 2017 there were 8366 people previously hospitalised with bronchiectasis, giving a population prevalence of 180 per 100,000 people. Prevalence was highest in Pacific peoples, with an age-standardised population rate of 789.5 per 100,000 (rate ratio 6.30

‡ 2013 report included only primary diagnoses.

compared to non-MPA), followed by Māori, with 420.1 (rate ratio 3.75 compared to non-MPA). There was no significant difference between the 135.3 rate for Asian peoples and the 119.3 rate for non-MPA (Table A 28).

There was also a strong socio-economic gradient, with people in the most deprived NZDep quintile having 2.98 times higher bronchiectasis prevalence than people in the least deprived NZDep quintile (Table A 29).

Severe bronchiectasis prevalence was highest in Counties Manukau DHB, where prevalence was 358.1 cases per 100,000 people; and lowest in South Canterbury, with 70.2 cases per 100,000 people (Table A 30).

6.3.2. BRONCHIECTASIS INCIDENCE

New Zealand incidence of new cases of bronchiectasis in children aged under 15 was estimated at 3.7 per 100,000 in 2001/2002[22]. "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 2017 incidence of new cases of severe bronchiectasis in children aged under 15 by identifying hospital admissions with bronchiectasis as a primary or secondary diagnosis, and excluding cases where the patient had a previous hospital admission for bronchiectasis since 2001. This measure found 123 new cases of bronchiectasis in 2017, compared to 104 in 2016 and 102 in 2015. The 2017 incidence rate was 13.2 per 100,000. Incidence was highest in Pacific children at 28.0 compared with 17.7 in Māori, 4.6 in Asian children, and 8.8 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.

Hospitalised bronchiectasis incidence in children aged under 15 years increased with increasing socioeconomic deprivation, with incidence in children in the NZDep 9-10 quintile 2.41 times higher than in NZDep 1-2.

The findings of higher incidence in Māori and Pacific peoples, and of an economic gradient, are consistent with the findings of Bibby et al 2015.[23]

6.3.3. BRONCHIECTASIS HOSPITALISATIONS

Trends over time 2000 - 2017

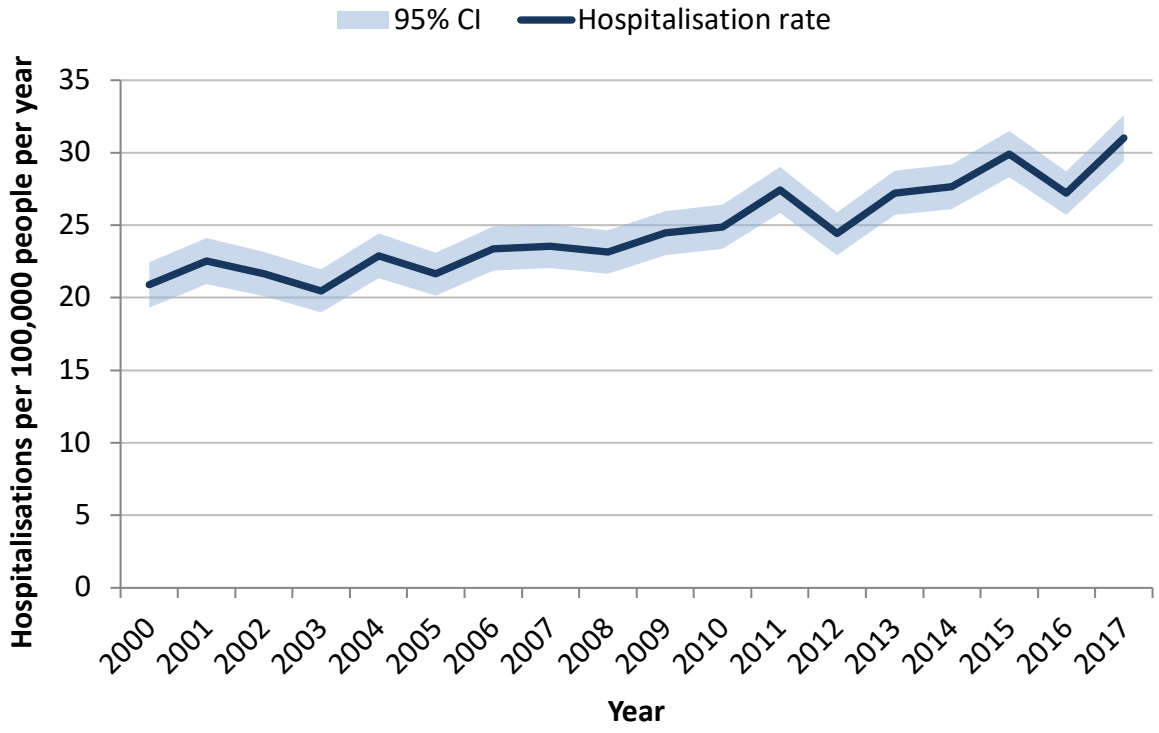
Even after adjusting for age, the bronchiectasis hospitalisation rate increased significantly over the study period (see Figure 23). The 2017 rate of 31.0 hospitalisations per 100,000

people represented an increase of 49% over the 2000 rate of 20.9 per 100,000. The increase has been highest in children aged under 15 years, and adults aged 65 years and over. 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.

Although ethnic inequalities continue, and bronchiectasis rates continue to rise for all ethnic groups (Table A 36), the 2000 – 2017 study period has seen an overall reduction in ethnic inequalities in bronchiectasis hospitalisation (Figure 27); though for Māori, inequality reductions between 2010 and 2014 were lost again in the last three years. 2017 was the first year in the study period to see Asian bronchiectasis rates dip below those of non-MPA.

Socio-economic disparities show no clear pattern over the study period (Figure 30).

Figure 23. Bronchiectasis hospitalisations per 100,000 people per year, 2000-2017.



(See Table A 31 for data)

Risks and determinants 2017

Bronchiectasis hospitalisation rates were highest in the elderly, with 104.7 hospitalisations per 100,000 people aged 65+. Female rates were higher than males in age groups over 15 years, but the difference was not statistically significant for the 30 – 64 years age group. Male rates were higher in children aged under 15 years (Figure 25).

Bronchiectasis hospitalisation rates also varied by ethnicity (Figure 26). Pacific peoples were 6.23 times more likely to be hospitalised, and Māori 3.75 times more likely to be

hospitalised, than non-MPA. Asian peoples' hospitalisation rates were not significantly different from non-MPA.

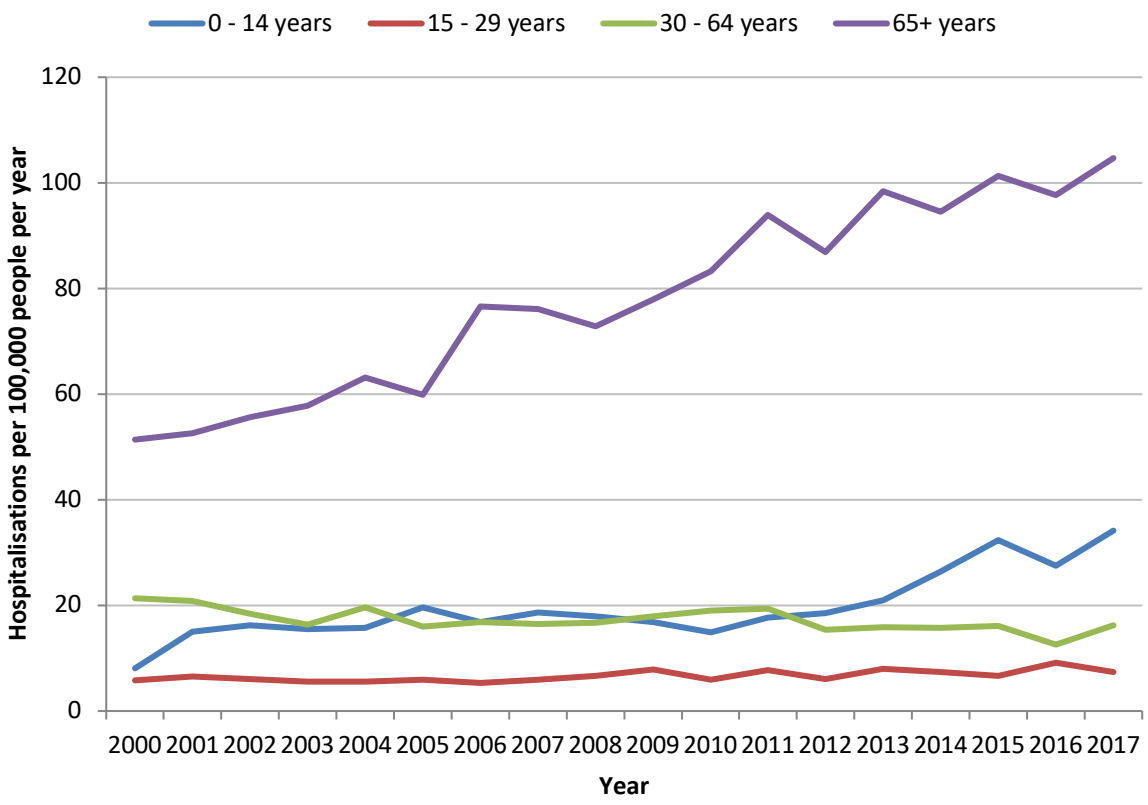
Māori and Pacific hospitalisation rate disparities showed across all age-groups. The highest rate ratio disparity by age and ethnicity was for Pacific youth and young adults aged 15 to 29 years, whose bronchiectasis hospitalisation rates of 21.2 per 100,000 were 5.11 times higher than the rate of 4.1 per 100,000 for non-MPA (Figure 28).

Bronchiectasis hospitalisations also showed strong socio-economic disparity. While there was only a gentle trend of increasing bronchiectasis hospitalisation with increasing deprivation across the first four NZDep quintiles, there was a steep increase in difference for the people living in the most deprived (NZDep 9-10) neighbourhoods: the hospitalisation rate for NZDep 9-10 was not only 2.5 times higher than for NZDep 1-2, it was also twice as high as the next most deprived NZDep 7-8 neighbourhoods (Figure 29). Bronchiectasis hospitalisation rates have risen across all NZDep quintiles (Figure 30), and there has been no clear trend in socio-economic inequalities across the study period (Table A 41).

For Māori, there was a two-step difference in socio-economic disparities in bronchiectasis hospitalisation rates: rates in the middle three quintiles were roughly 3 times as high as NZDep 1-2; while rates in NZDep 9-10 were nearly 6 times as high (RR 5.8). Pacific rates showed no overall trend across NZDep quintiles, though rates in NZDep 3-4, 5-6 and 9-10 were all higher than in NZDep 1-2 (Figure 31). There was no significant trend for Asian or non-MPA.

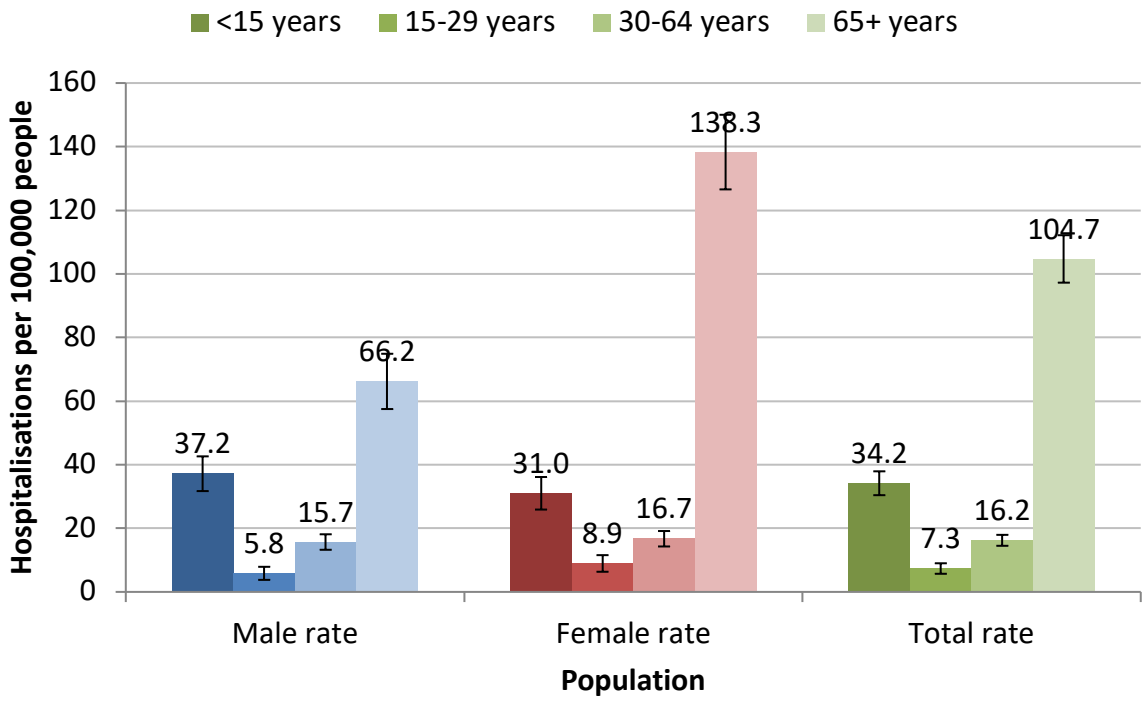
As with other respiratory illnesses, there was a rough north to south gradient in bronchiectasis hospitalisations. The highest rates were in Counties Manukau (53.5 per 100,000 people), Lakes (46.0), Auckland (41.6) and Northland (40.6), compared to the national rate of 31.0 (Figure 32).

Figure 24. Bronchiectasis hospitalisations per 100,000 people per year by age group, 2000-2017.



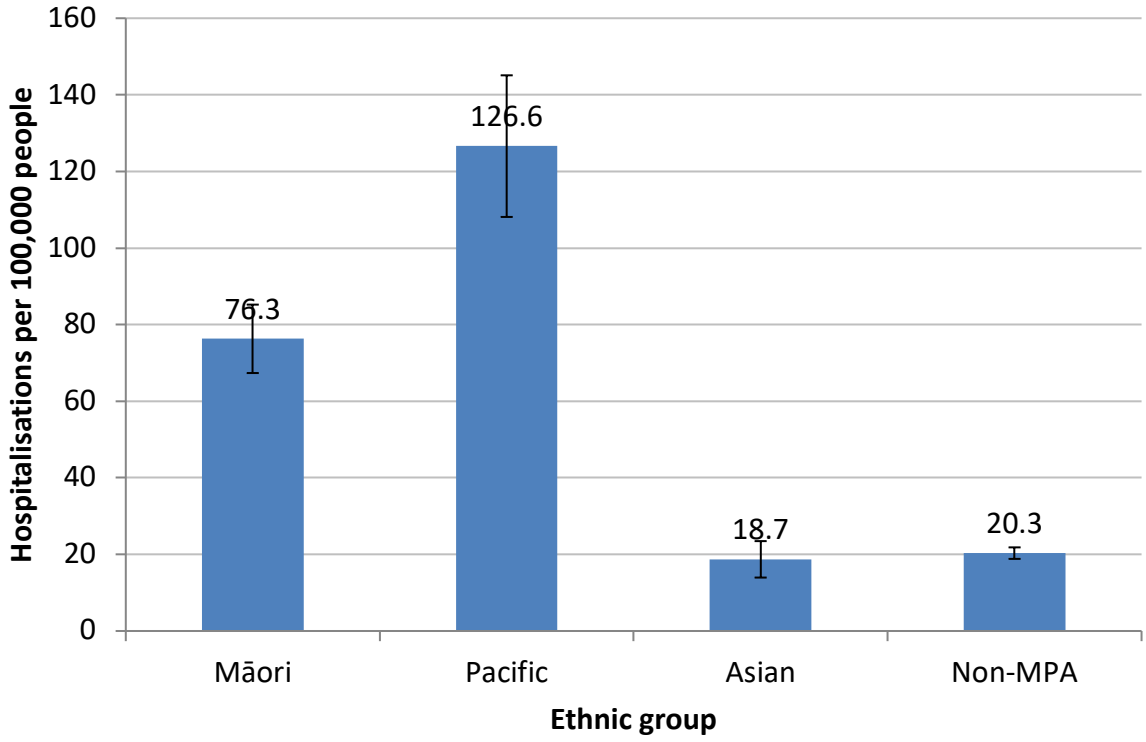
See Table A 32 for data.

Figure 25. Bronchiectasis hospitalisations per 100,000 people by age group and sex, 2017.



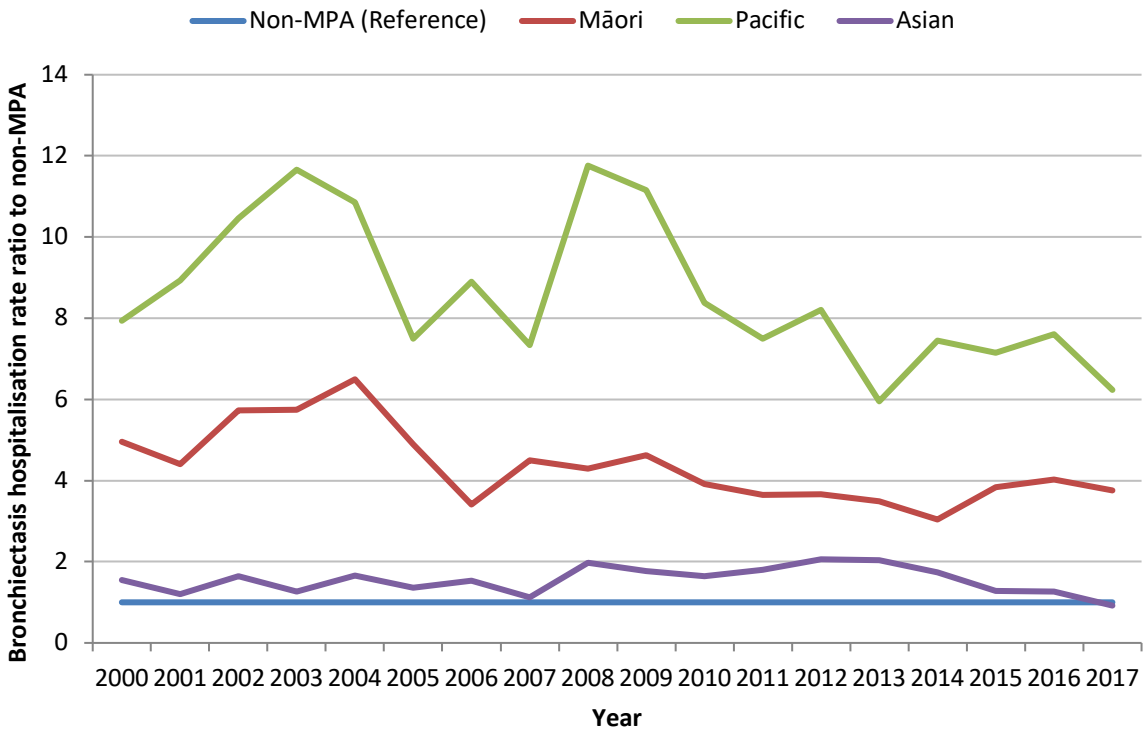
(See Table A 33 and Table A 34 for data)

Figure 26. Bronchiectasis hospitalisations per 100,000 people by ethnic group, 2017.



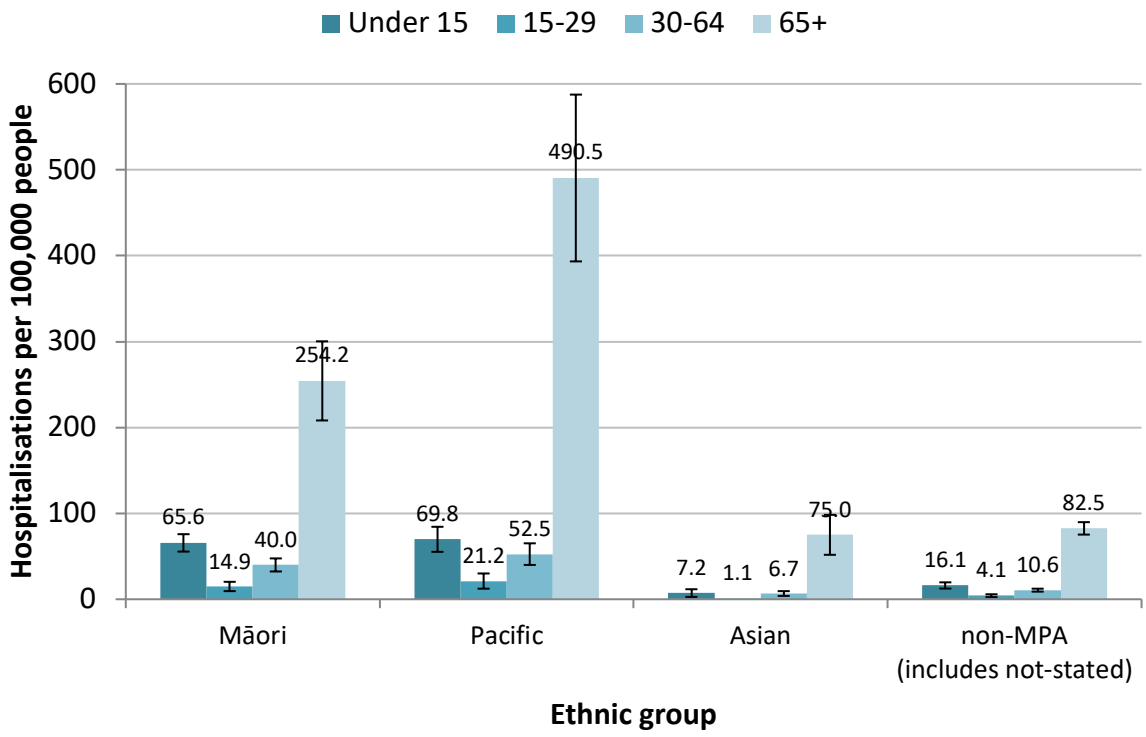
(See Table A 35 for data)

Figure 27. Bronchiectasis hospitalisation rate ratios to non-MPA by ethnic group, 2000 – 2017, age-adjusted.



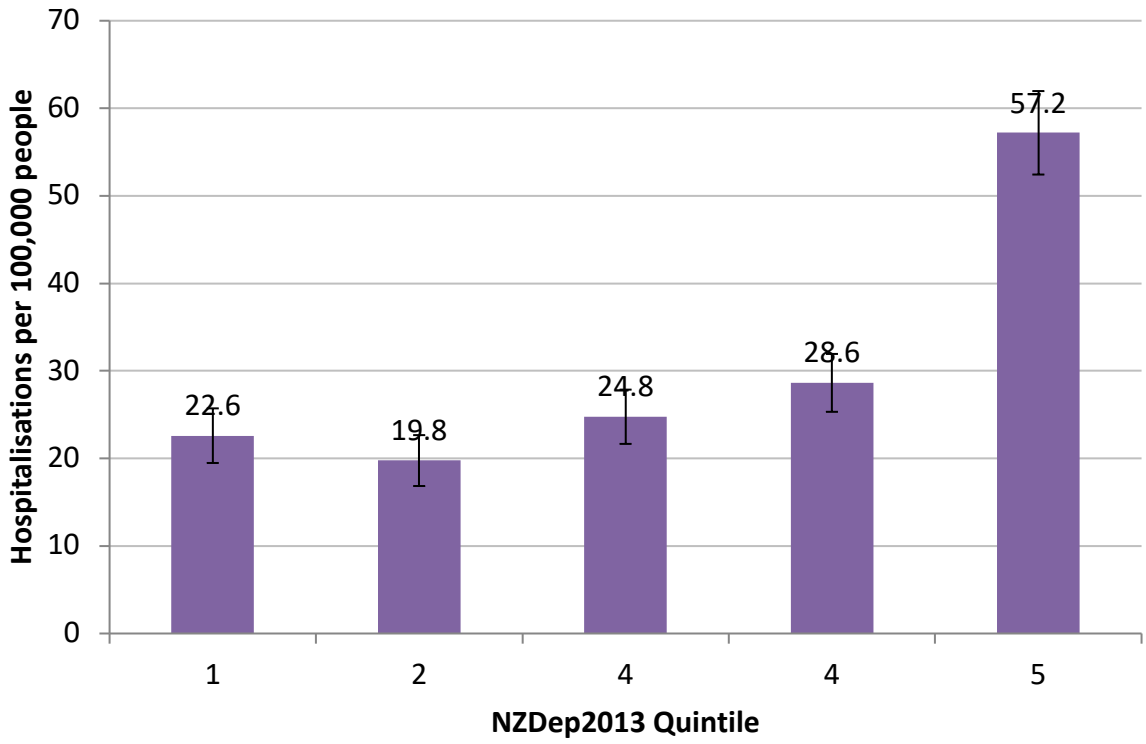
(See Table A 36and Table A 37 for data)

Figure 28. Bronchiectasis hospitalisations per 100,000 people by ethnic group and age group, 2017.



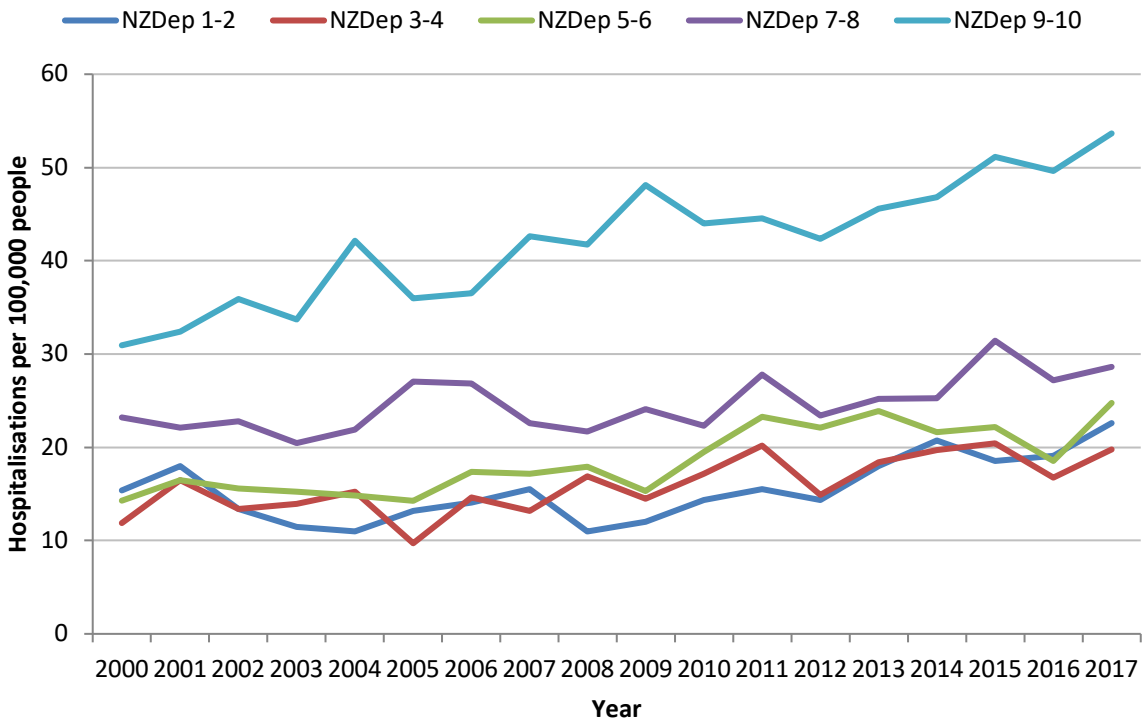
(See Table A 38 for data)

Figure 29. Bronchiectasis hospitalisations per 100,000 people by NZDep2013 quintile, 2017, age-adjusted.



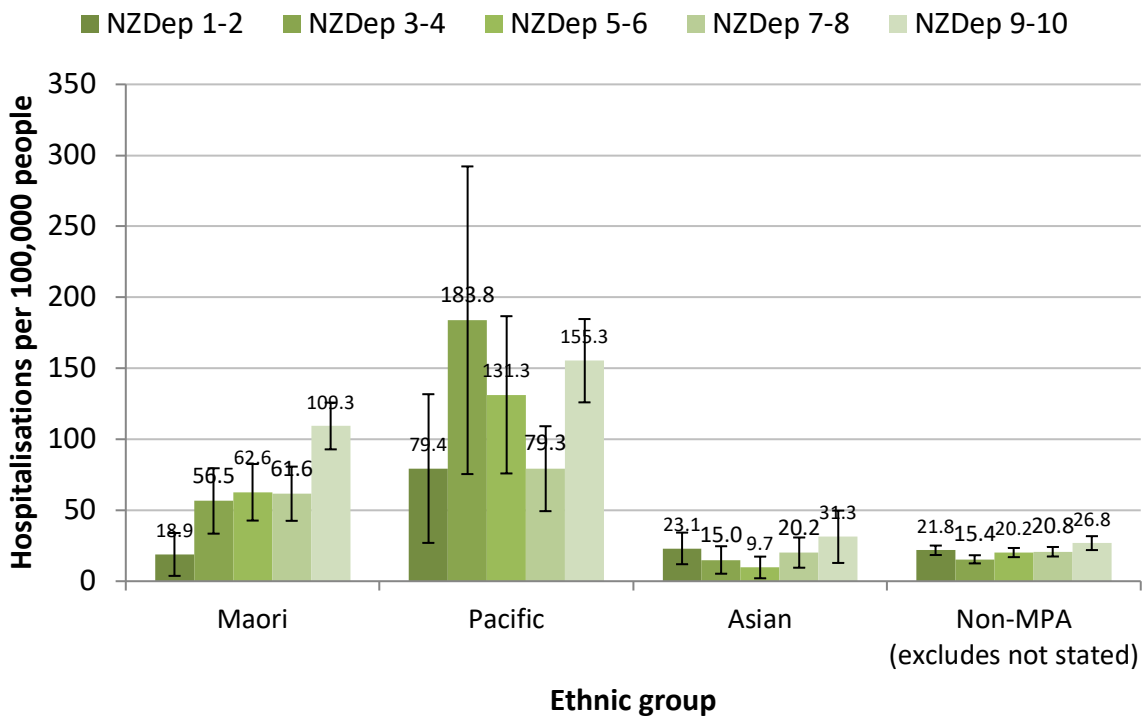
(See Table A 39 for data)

Figure 30. Bronchiectasis hospitalisations per 100,000 people by NZDep2013 quintile, 2000 - 2017, age-adjusted.



See Table A 40 for data.

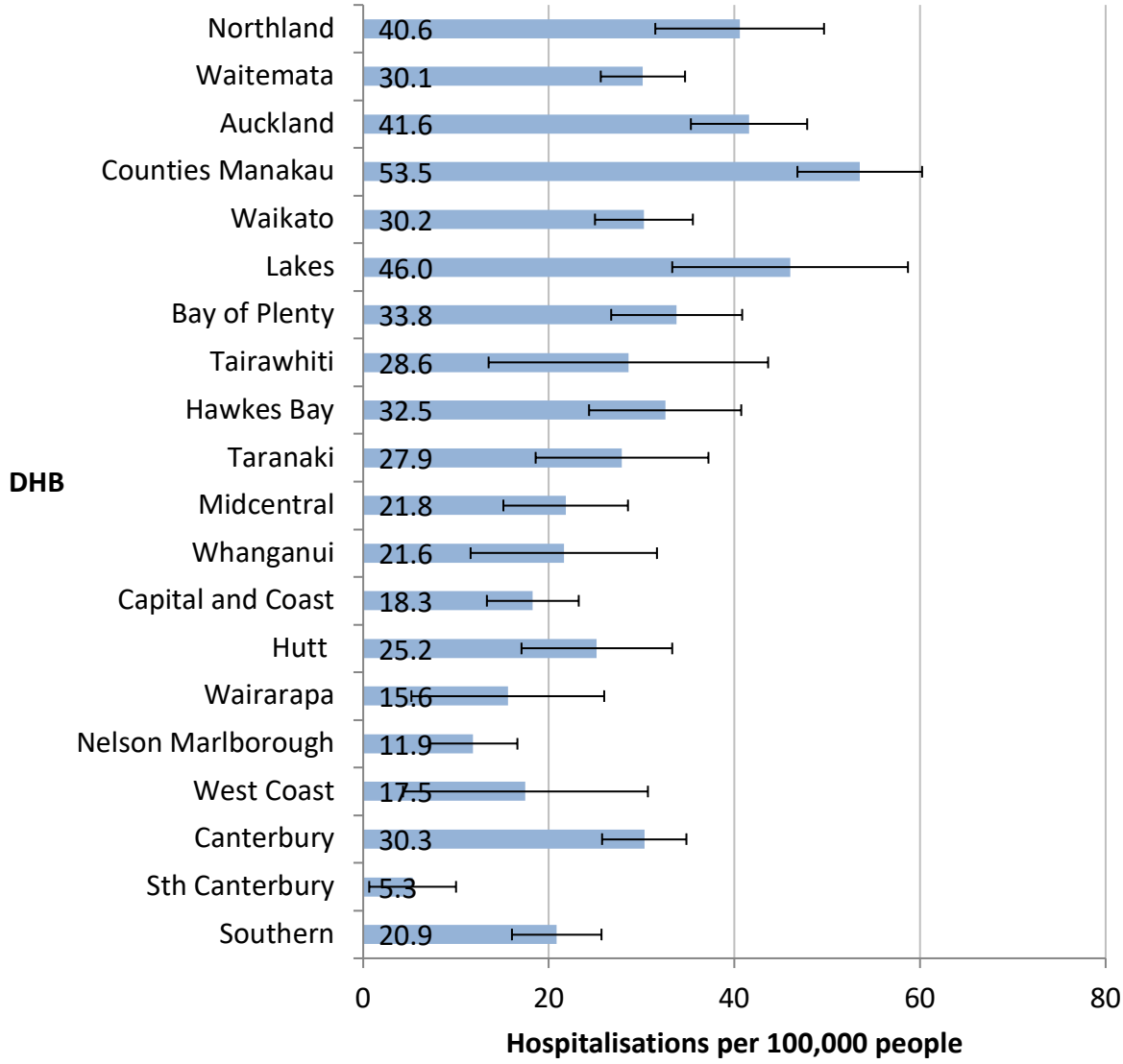
Figure 31. Bronchiectasis hospitalisations per 100,000 people by ethnic group and NZDep2013, 2017, age-adjusted.



(See Table A 42 for data)

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

Figure 32. Bronchiectasis hospitalisations per 100,000 people by DHB, 2017.



(see Table A 43 for data)

6.3.4. BRONCHIECTASIS MORTALITY

Trends over time 2000 - 2015

Bronchiectasis mortality increased significantly over the study period, from 42 deaths per year in 2000-2001, to 116 deaths in 2015. This represented an age-adjusted increase of 0.08 deaths per 100,000 people per year.

Risks and determinants 2010 - 2015

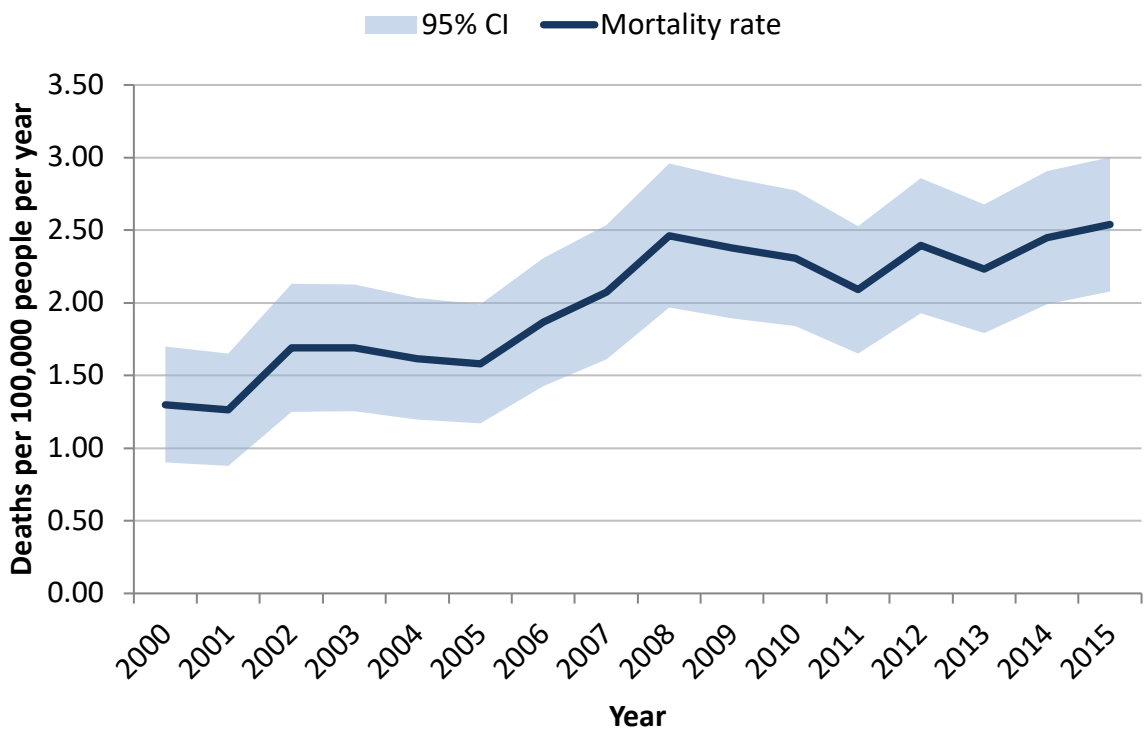
Bronchiectasis mortality rates were highest in people aged 65+, and were significantly higher in women than in men for people aged 30 and over (Figure 34).

Bronchiectasis mortality was highest for Pacific peoples, with rates 6.34 times higher than for non-MPA. Rates were also significantly higher for Māori, (rate ratio 3.91) and Asian peoples (rate ratio 1.72) (Figure 35). Most of the difference was due to in differences in rates in the two older age groups (Figure 36).

There were socio-economic differences in bronchiectasis mortality. While mortality rates were similar across the first four NZDep2013 quintiles, rates for the most deprived quintile NZDep2013 9-10 were nearly double (RR 1.8) those in the first four quintiles (Figure 37). However, gradients within ethnic groups were more complex. There was no socio-economic gradient in the non-MPA ethnic group, and possible gradients for Māori and Pacific were not statistically significant. Mortality rates for Asian peoples appeared, if anything, to decline with increasing deprivation, though again this trend was not significant. (Figure 38).

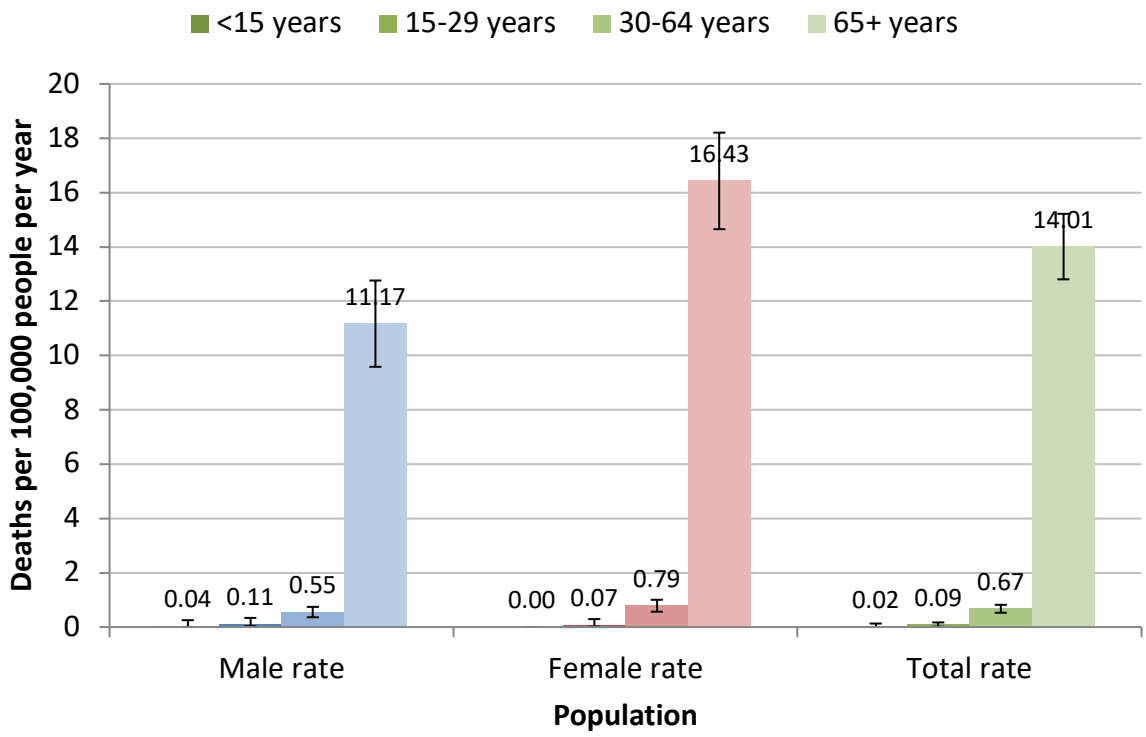
Bronchiectasis mortality rates were highest, and significantly higher than the national rate, in Tairawhiti, Counties Manukau, Auckland and Lakes DHBs, and lowest in Wairarapa, Whanganui and Taranaki (Figure 39). Rates were also significantly below the national average in four other DHBs.

Figure 33. Bronchiectasis mortality rates 2000-2015, age-adjusted.



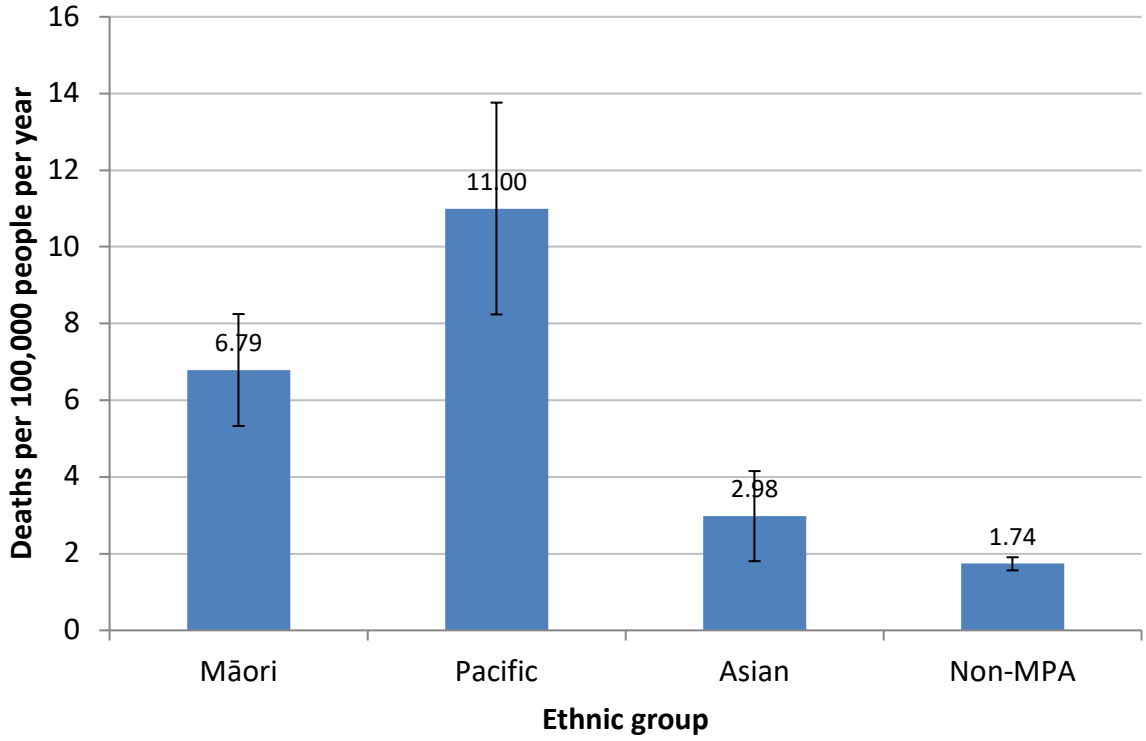
(See Table A 44 for data)

Figure 34. Bronchiectasis deaths per 100,000 people by age group and sex, 2010-2015.



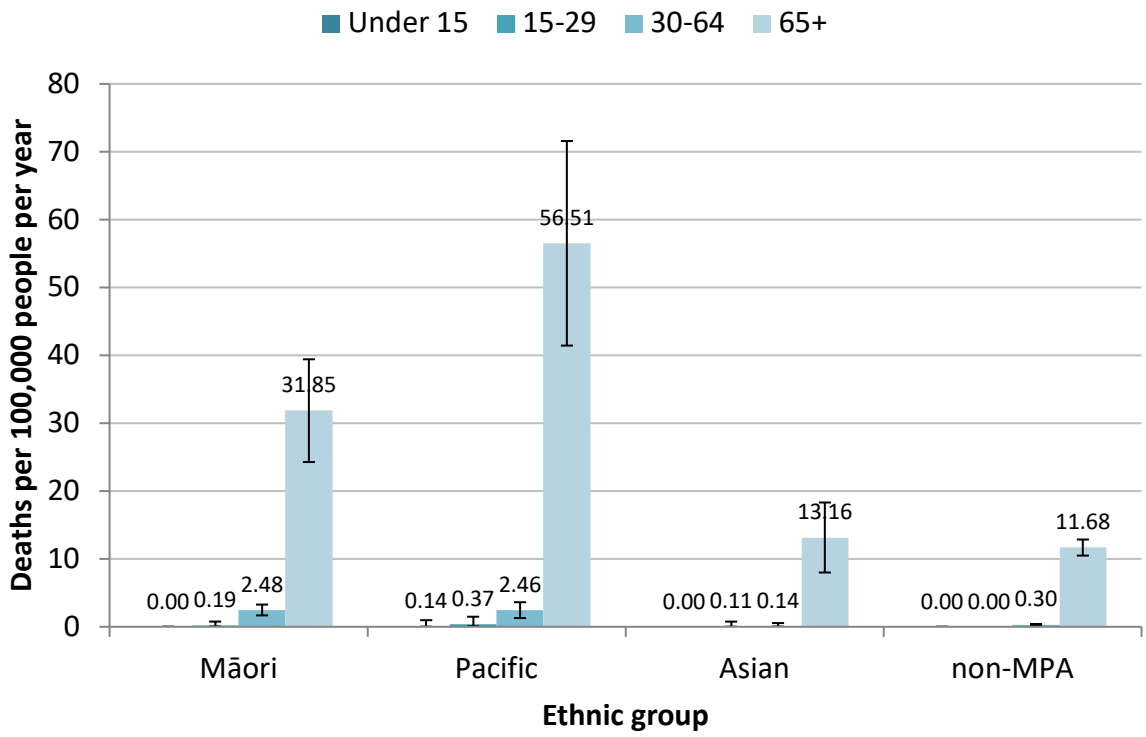
(See Table A 45 and Table A 46 for data)

Figure 35. Bronchiectasis mortality per 100,000 people per year by ethnic group, 2010-2015.



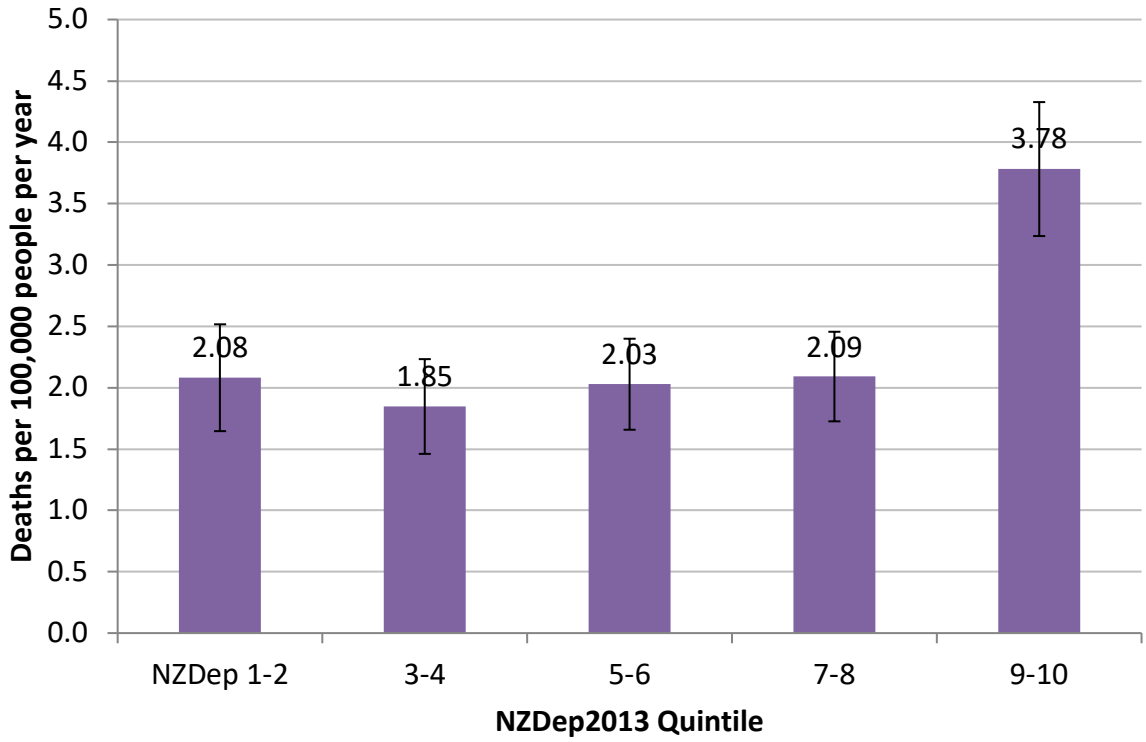
(See Table A 47 for data)

Figure 36. Bronchiectasis deaths per 100,000 people per year, by ethnic group and age group, 2010-2015.



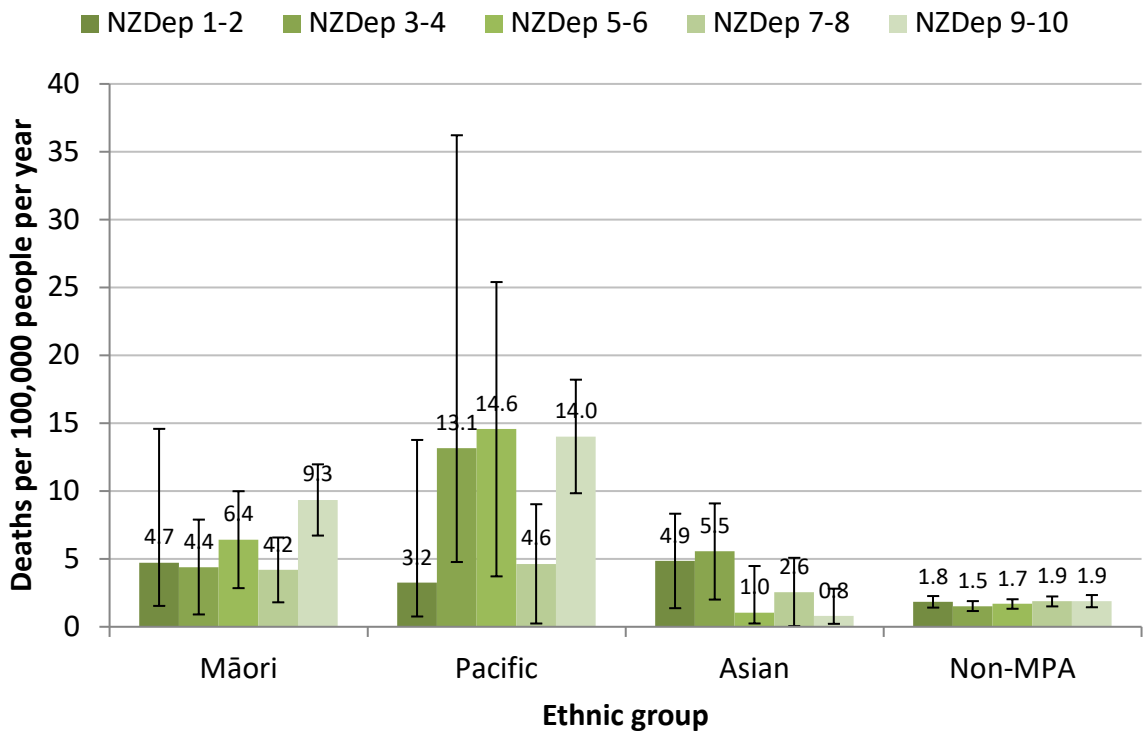
(See Table A 48 for data)

Figure 37. Bronchiectasis deaths per 100,000 people by NZDep2013 quintile, 2010-2015, age-adjusted.



(See Table A 49 for data)

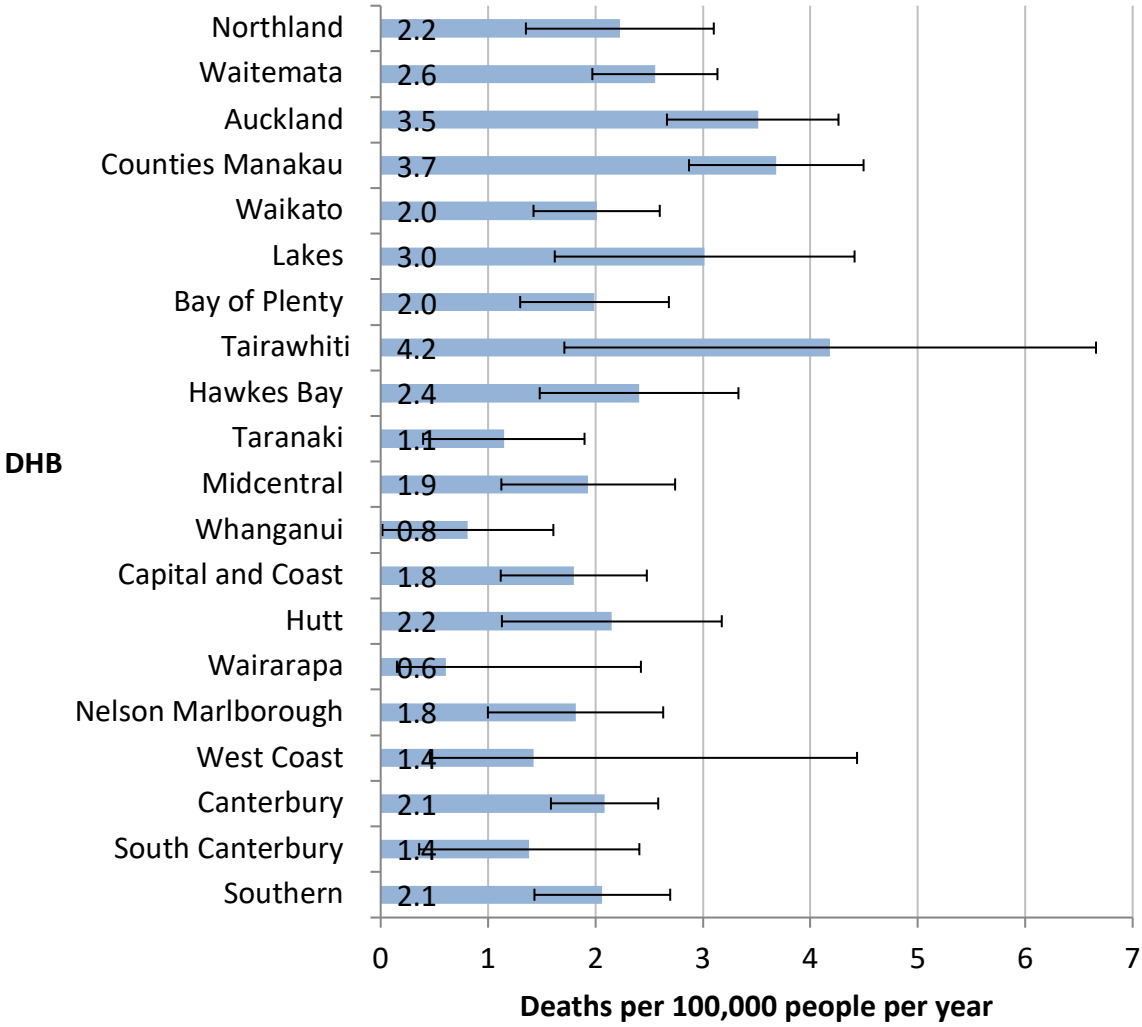
Figure 38. Bronchiectasis deaths per 100,000 people by ethnic group and NZDep2013, 2010-2015, age-adjusted.



(See Table A 50 for data)

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

Figure 39. Bronchiectasis deaths per 100,000 people per year, by DHB, 2010-2015, age-adjusted



(see Table A 51 for data)

6.4. CHILDHOOD BRONCHIOLITIS

6.4.1. CHILDHOOD BRONCHIOLITIS HOSPITALISATIONS

New research

Schlapbach et al[24] reported combined Australian and New Zealand bronchiolitis intensive care unit (ICU) admissions in infants younger than 24 months over the period 2002 to 2014. Results were not disaggregated by country so are not necessarily indicative of the situation in New Zealand alone, but are included here for interest. They report a significant and dramatic increase in admissions over the study period, from 58.5 admissions per 100,000 population in 2002, to 125.3 in 2014, and a resulting increase in proportion of paediatric ICU cases from 19.5% to 30.7% over the same period. Severe bronchiolitis was found to result in

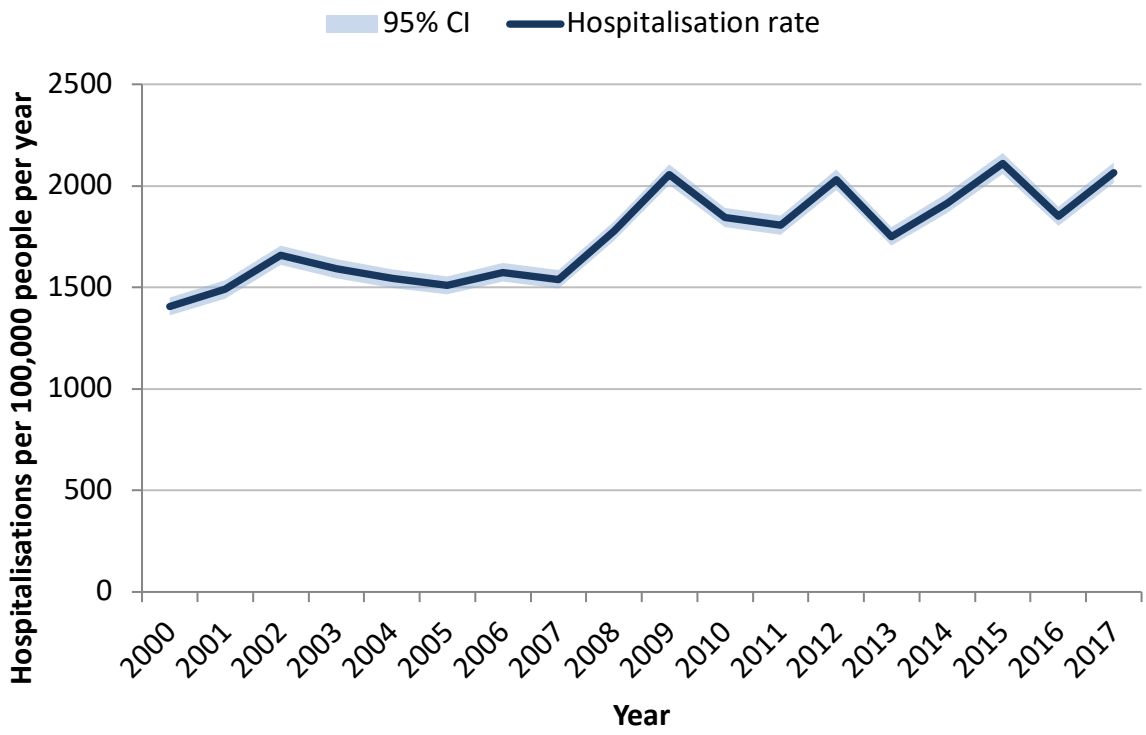
over US$30m in direct costs across the two countries, and to account for over a quarter of non-elective paediatric ICU admissions in infants.

Trends over time 2000 - 2017

Childhood bronchiolitis hospitalisation rates have increased significantly over the study period (see Figure 40), by an estimated 34.7 hospitalisations per year. The overall hospitalisation rate has increased by nearly a half over the study period.

Ethnic disparities have reduced slightly since 2009, however the reduction is primarily due to the continued increase in rates for non-MPA rather than a meaningful decrease in rates for Māori or Pacific peoples (Figure 43). Socio-economic inequalities increased between 2000 and 2003, and have reduced slightly since then, but remain high overall (Figure 45).

Figure 40. Childhood bronchiolitis hospitalisations per 100,000 people per year, 2000-2017.



(See Table A 52 for data)

Risks and determinants 2017

As with other childhood respiratory illness, bronchiolitis hospitalisation rates were higher for boys than for girls (rate ratio 0.64) (Figure 41).

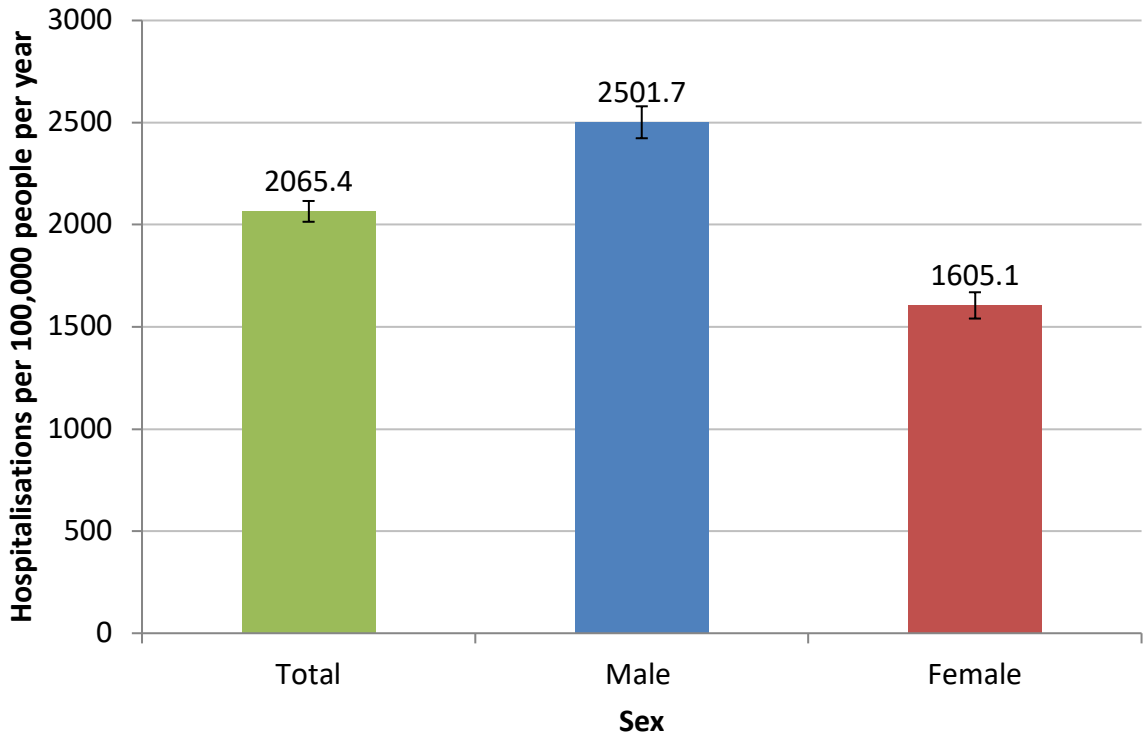
Rates were lowest for non-MPA children, at 1127.1 per 100,000, highest for Pacific children, at 3967.6 per 100,000, and also high for Māori, at 3561.4, while Asian rates were lower, at 677.0 per 100,000 children (Figure 42). These differences were significant: Pacific rates were

3.4 times higher than non-MPA, Māori rates 3.1 times higher, and Asian rates 0.6 times lower than non-MPA rates.

As with bronchiectasis, the deprivation gradient was exponential rather than linear. There were 2994 bronchiolitis hospitalisations for children in the most deprived neighbourhoods, making their rates 3.9 times the 454 hospitalisations in the least deprived neighbourhoods (Figure 44). 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 five times as likely to be hospitalised as NZ non-MPA children in the wealthiest quintile (Figure 46).

Across DHBs, childhood bronchiolitis rates were highest in Tairawhiti, Lakes, Waikato and Northland, and lowest in South Canterbury, West Coast, Canterbury and Nelson Marlborough (Figure 47).

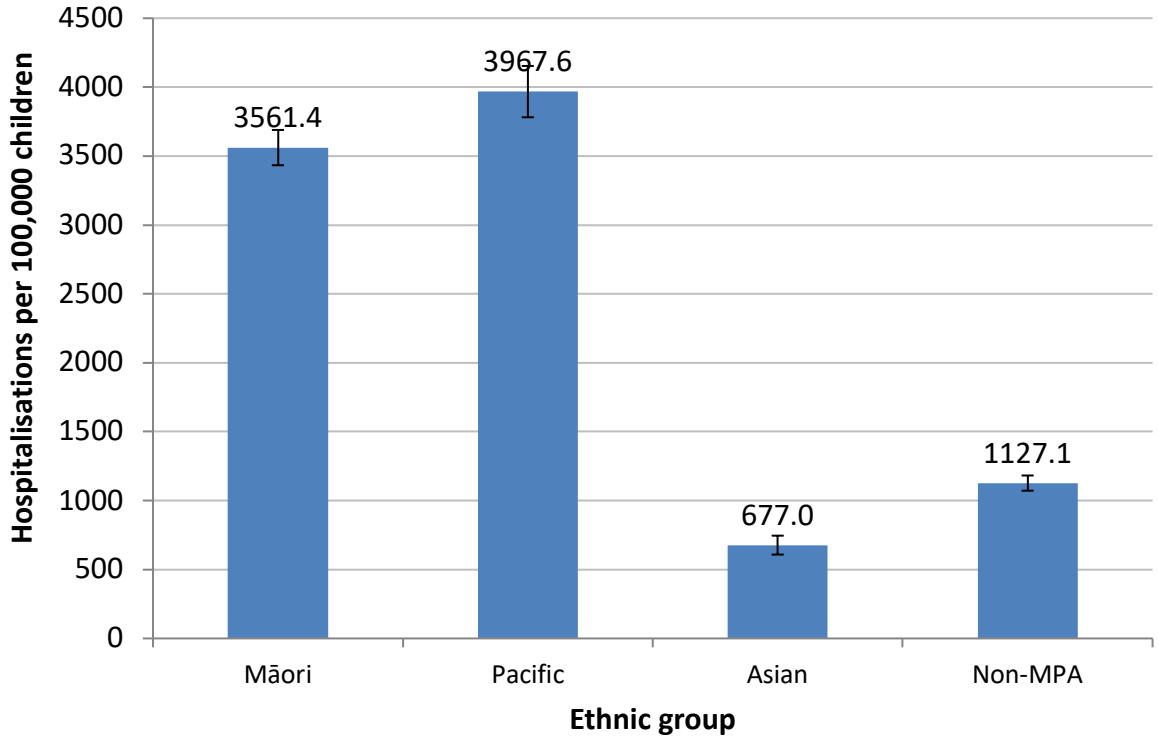
Figure 41. Childhood bronchiolitis hospitalisations per 100,000 people by sex, 2017.



See

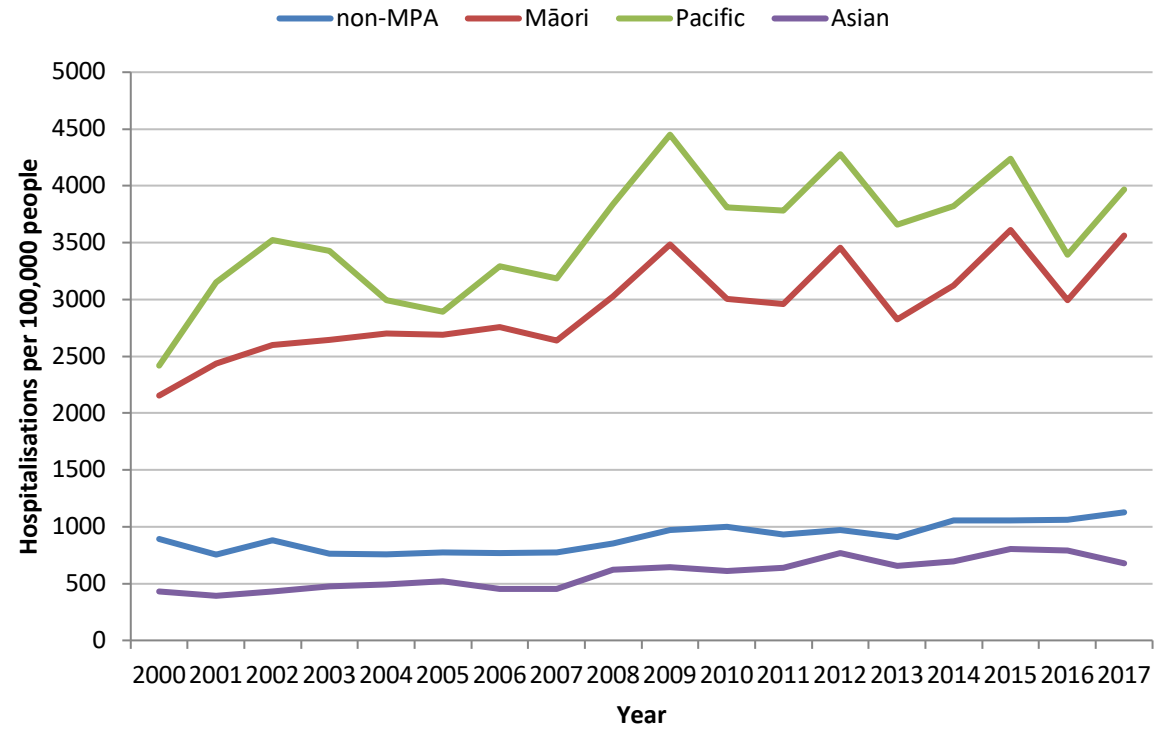
Table A 53 for data

Figure 42. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2017.



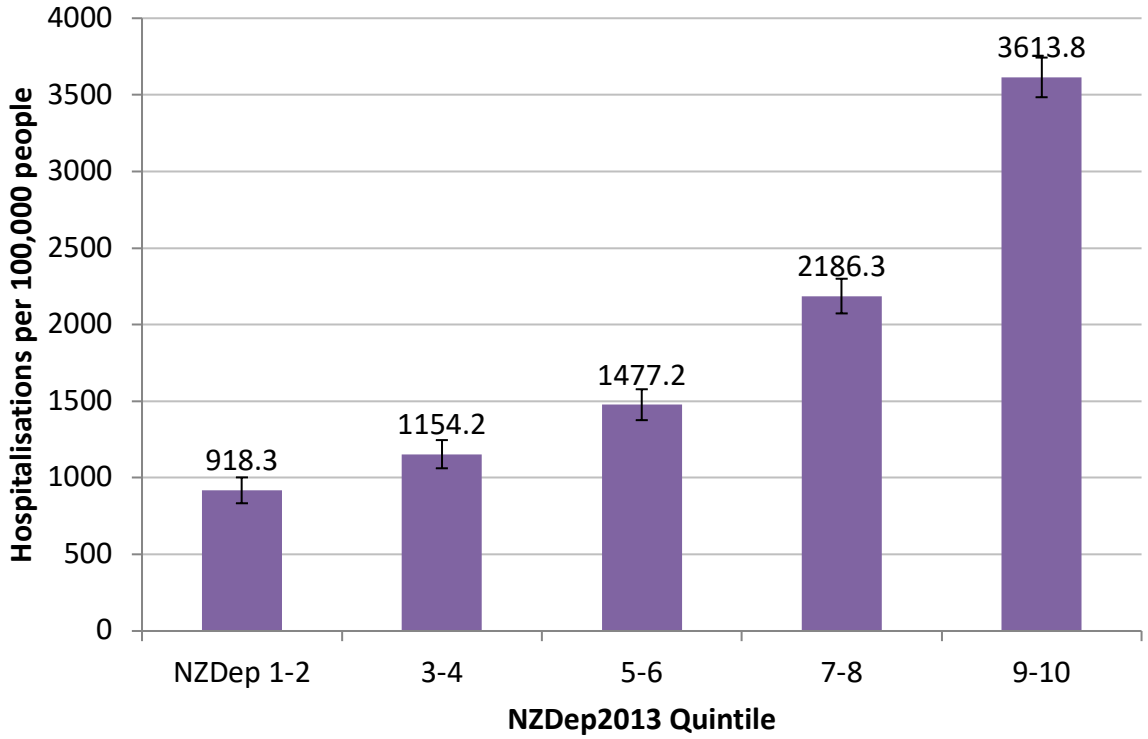
(See Table A 54 for data)

Figure 43. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2000 - 2017.



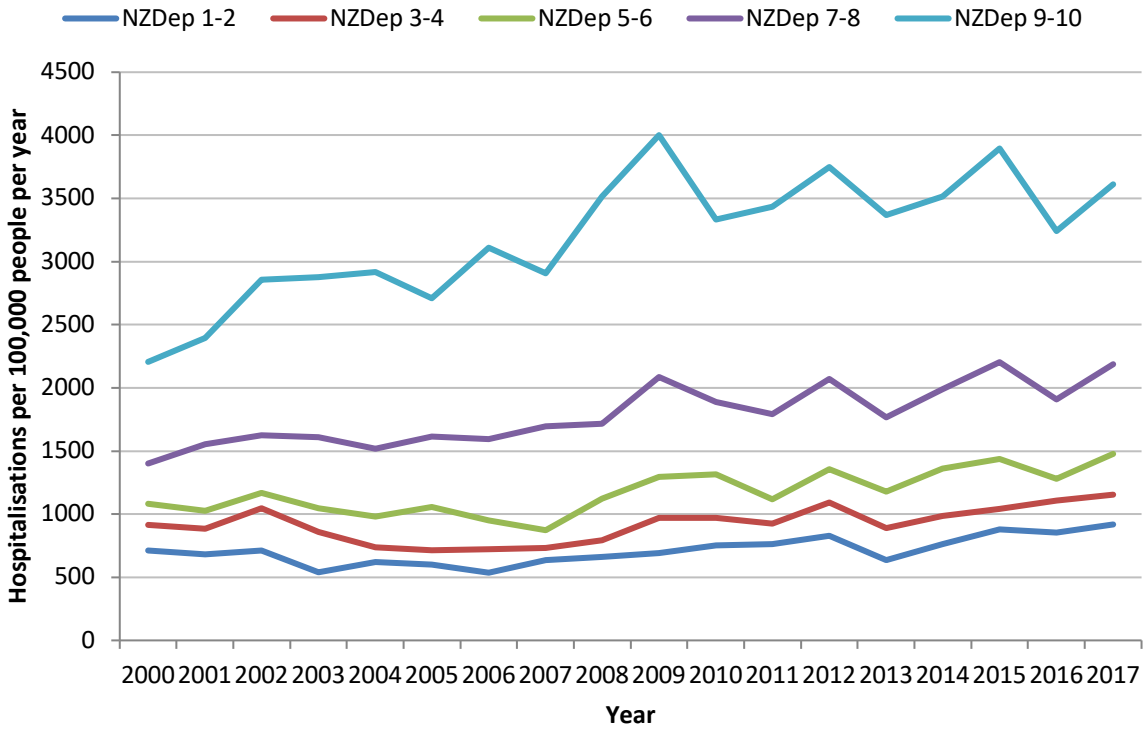
See Table A 55 and Table A 56 for data.

Figure 44. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2013 quintile, 2017.



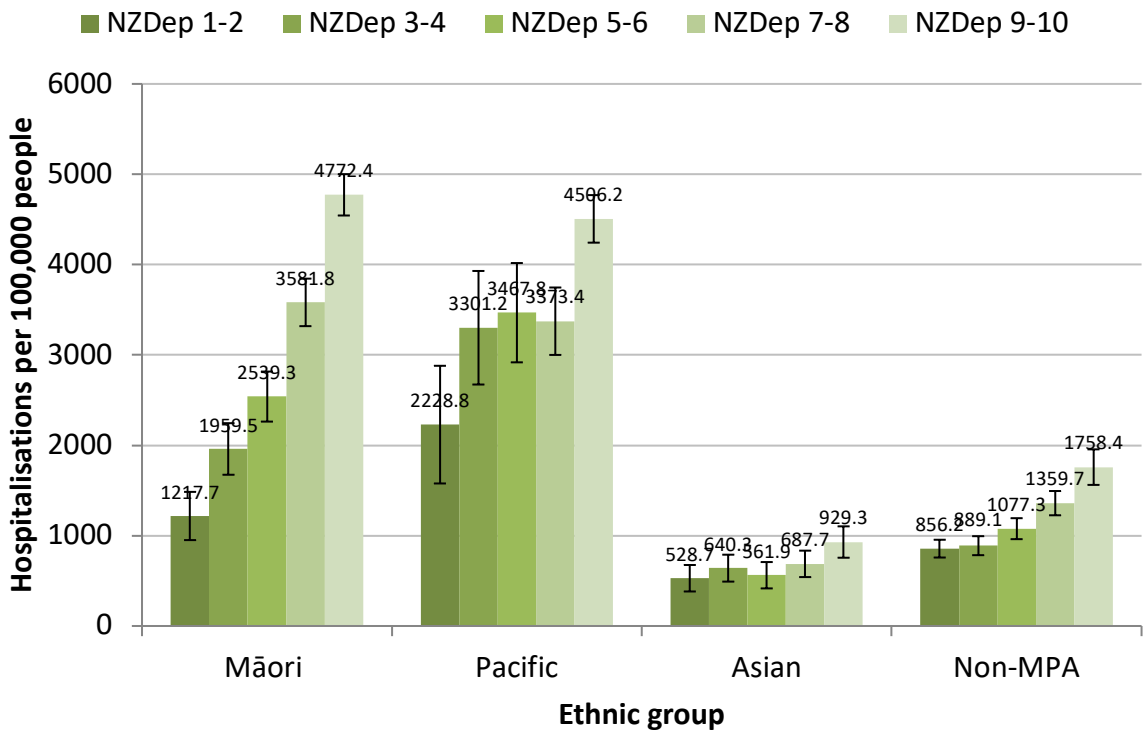
(See Table A 57 for data)

Figure 45. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2013 quintile, 2000 - 2017.



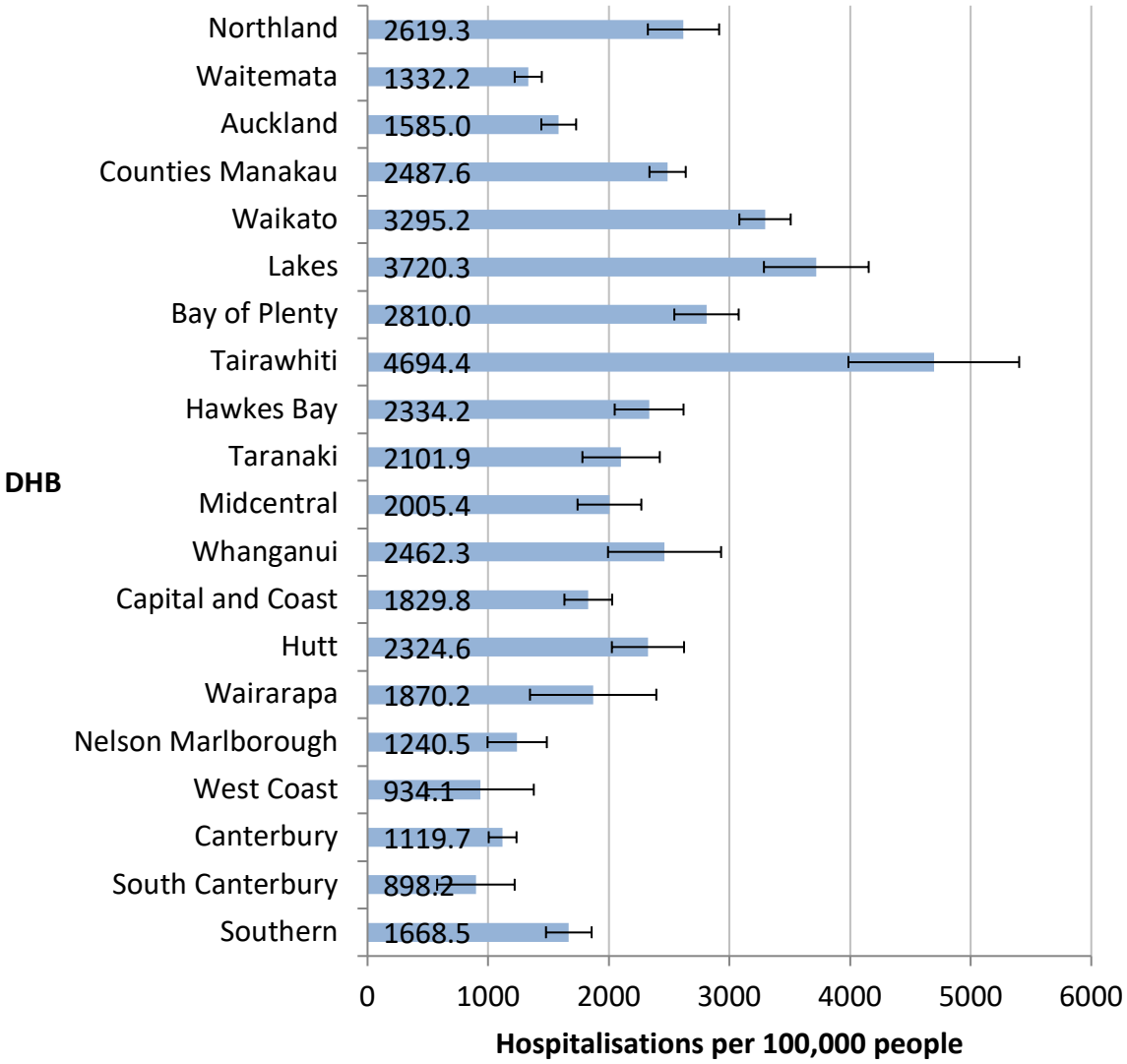
See Table A 58 and Table A 59 for data.

Figure 46. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group and NZDep2013, 2017.



(See Table A 60 for data)

Figure 47. Childhood bronchiolitis hospitalisations per 100,000 people by DHB, 2017.



(see Table A 61 for data)

6.4.2. CHILDHOOD BRONCHIOLITIS MORTALITY

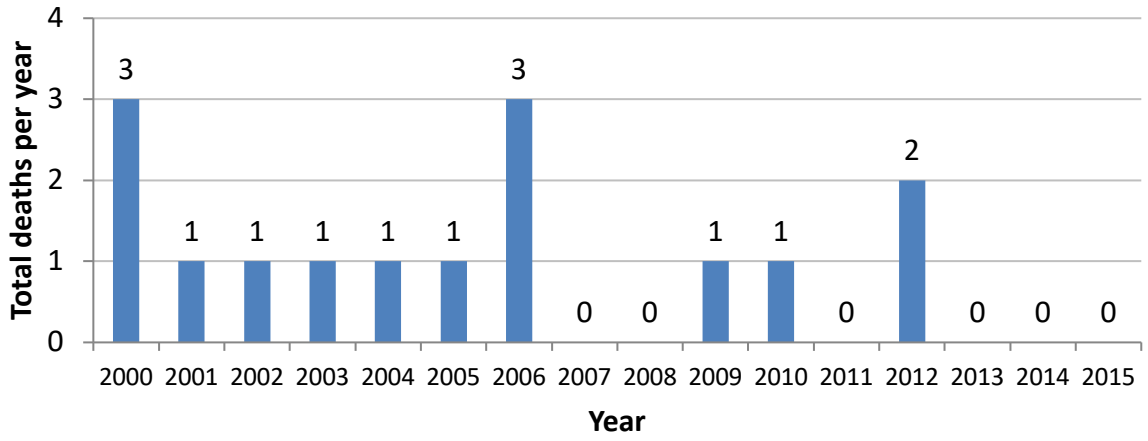
Trends over time 2000 - 2015

Deaths from childhood bronchiolitis were rare, totalling 15 over the period 2000-2015. There were no new child deaths from bronchiolitis since the previous report.

Risks and determinants 2006 - 2015

With no new deaths since the last report, the reduction in deaths over the study period has just reached statistical significance, with raw numbers reducing by 0.11 deaths per year (95%CI -0.21 – 0.00, p=0.043). The pleasing absence of deaths means there is no new information on risks and determinants since the previous report. Between 2006 and 2015, all seven deaths were Māori and/or Pacific children, in NZDep2013 deciles 7 to 10.

Figure 48. Childhood bronchiolitis mortality numbers 2000-2015.



6.5. CHILDHOOD PNEUMONIA

6.5.1. CHILDHOOD PNEUMONIA HOSPITALISATIONS

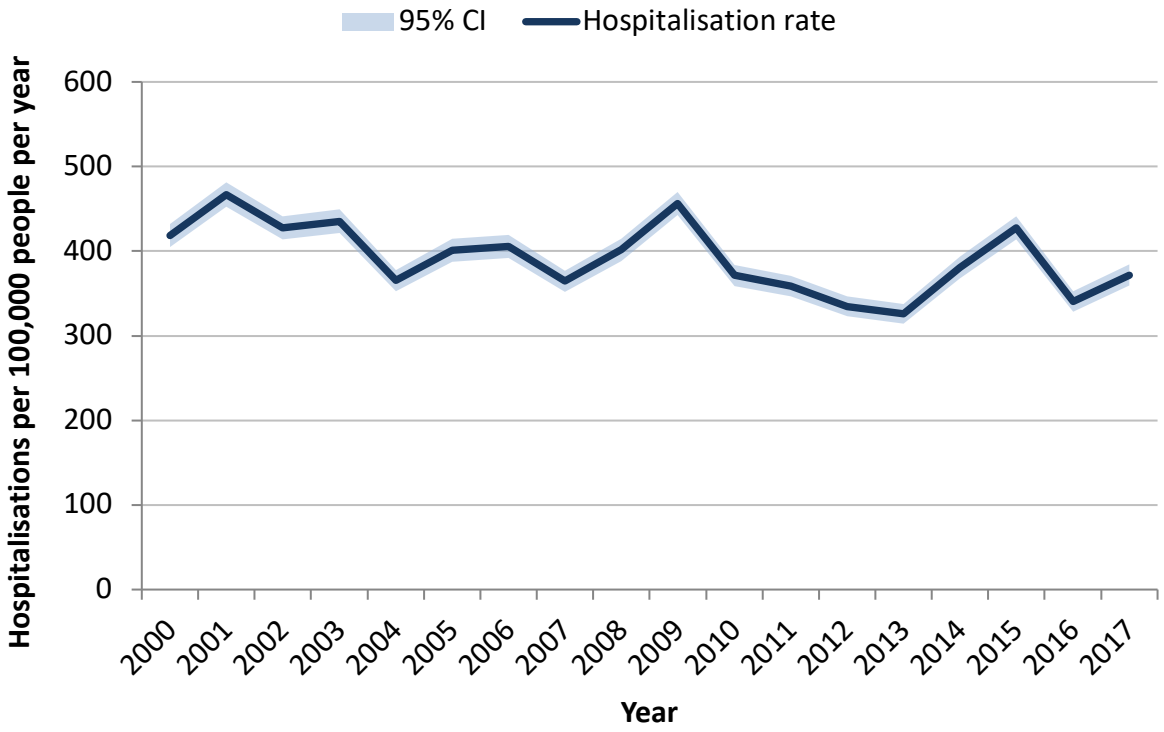
Trends over time 2000 - 2017

While childhood pneumonia hospitalisations declined over the study period, by 4.4 hospitalisations per 100,000 children per year, that decline occurred over the period 2000 – 2014, and since 2013 rates have plateaued or increased, though the 2017 rate of 371.8 hospitalisations per 100,000 children per year is still less than the study period average of 391.8. (Figure 49).

Ethnic disparities in childhood pneumonia rates have decreased for Māori and Pacific children over the study period, and the improvement came as Māori and Pacific rates have declined while non-MPA rates have shown no significant change (Figure 52). Of concern, however, is the increase between 2000 and 2017 in childhood pneumonia rates among Asian children. Asian children's childhood pneumonia rates have increased by 41% over the study period, from an average of 220 hospitalisations per 100,000 children per year in 2000 – 2004, to 311 in 2013 – 2017. This increase has also seen Asian rates shift from being lower than non-MPA rates between 2000 and 2006, to being higher than non-MPA rates from 2007 -2017.

Socio-economic disparities in childhood pneumonia hospitalisations have decreased over the study period, as rates have fallen faster in the most deprived quintiles than in the least deprived quintiles. Nonetheless, NZDep 9-10 areas continue to have hospitalisation rates more than double those of NZDep 1-2 areas (Figure 55).

Figure 49. Childhood pneumonia hospitalisations per 100,000 people per year, 2000-2017.



(See Table A 62 for data)

Risks and determinants 2017

Childhood pneumonia showed only a small and non-significant overall difference between male and female rates, though differences by sex varied within age sub-groups: girls under 5 years had significantly lower hospitalisation rates than boys (rate ratio 0.95), but there was no significant difference in rates for children aged 5 to 14 years (Figure 50).

Pacific children had the highest childhood pneumonia rates, at 649.3 hospitalisations per 100,000 children. This rate was 2.4 times higher than the non-MPA rate of 271.8 hospitalisations per 100,000. Rates for Māori children were 1.6 times higher, while rates for Asian children were 1.1 times higher (Figure 51).

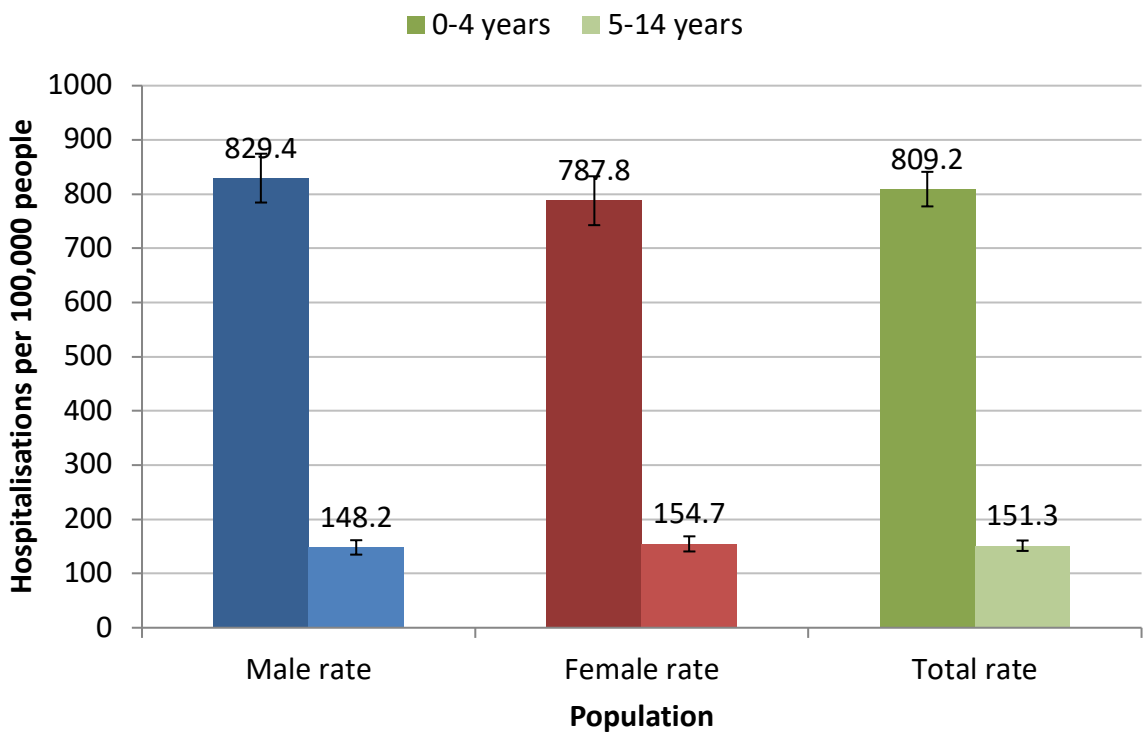
For Māori and Pacific children, these differences were more pronounced for children aged under 5 years (Figure 53).

Childhood pneumonia rates were highest in the most deprived areas, with rates 2.1 times higher in the most deprived NZDep quintile than in the least deprived (Figure 54).

Over both ethnicity and deprivation, Māori children had the strongest socioeconomic gradient in childhood pneumonia rates; the highest overall rate was for Pacific children in the most deprived NZDep quintile. There was no socioeconomic gradient for Asian children. non-MPA children childhood pneumonia rates showed a less pronounced socioeconomic gradient, with rates only significantly higher in the NZDep 7-8 and 9-10. (Figure 56).

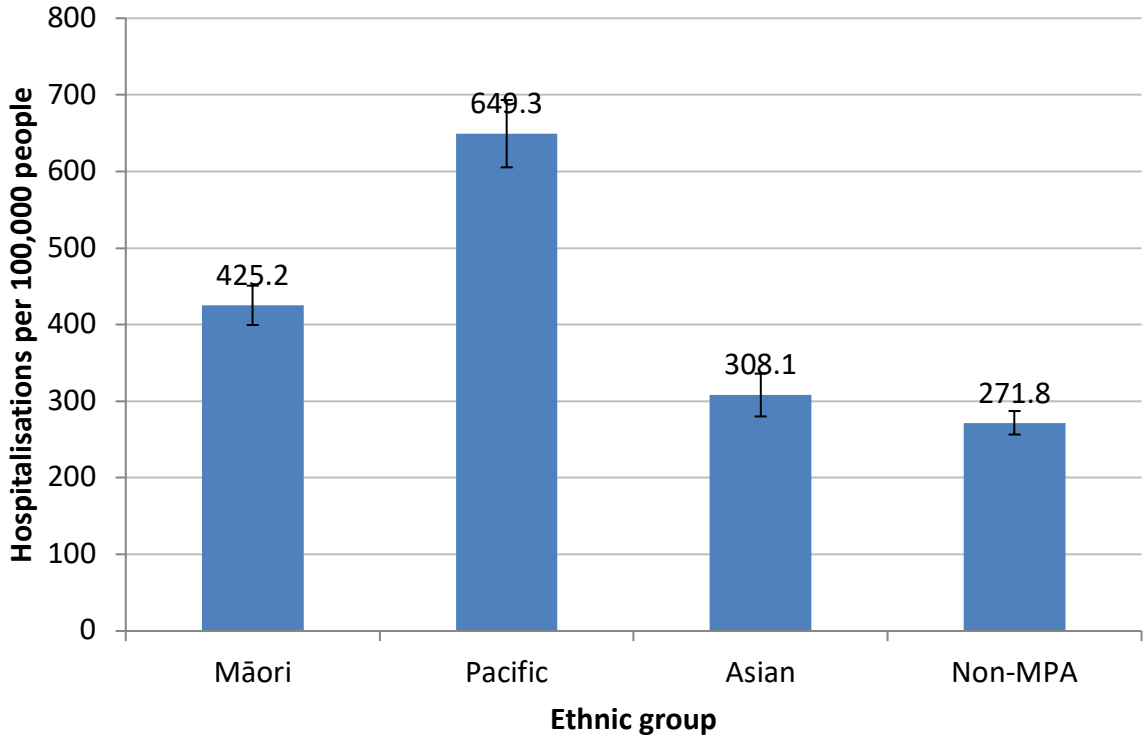
Across DHBs, the highest childhood pneumonia rates were in Lakes, Northland, and Auckland. Rates were lowest in South Canterbury, Southern and Nelson Marlborough, and also lower than average in Hawkes Bay, Canterbury, Capital and Coast, and MidCentral DHBs (Figure 57).

Figure 50. Childhood pneumonia hospitalisations per 100,000 people by age group and sex, 2017.



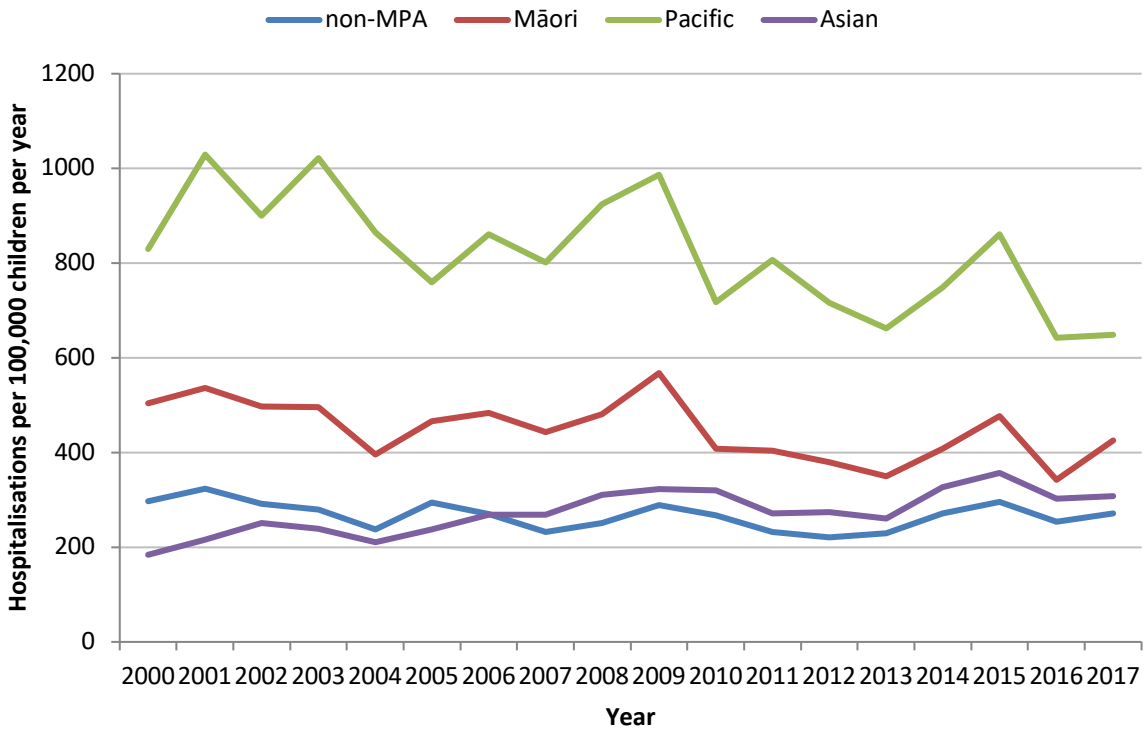
(See Table A 63 and Table A 64 for data)

Figure 51. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2017, age-adjusted.



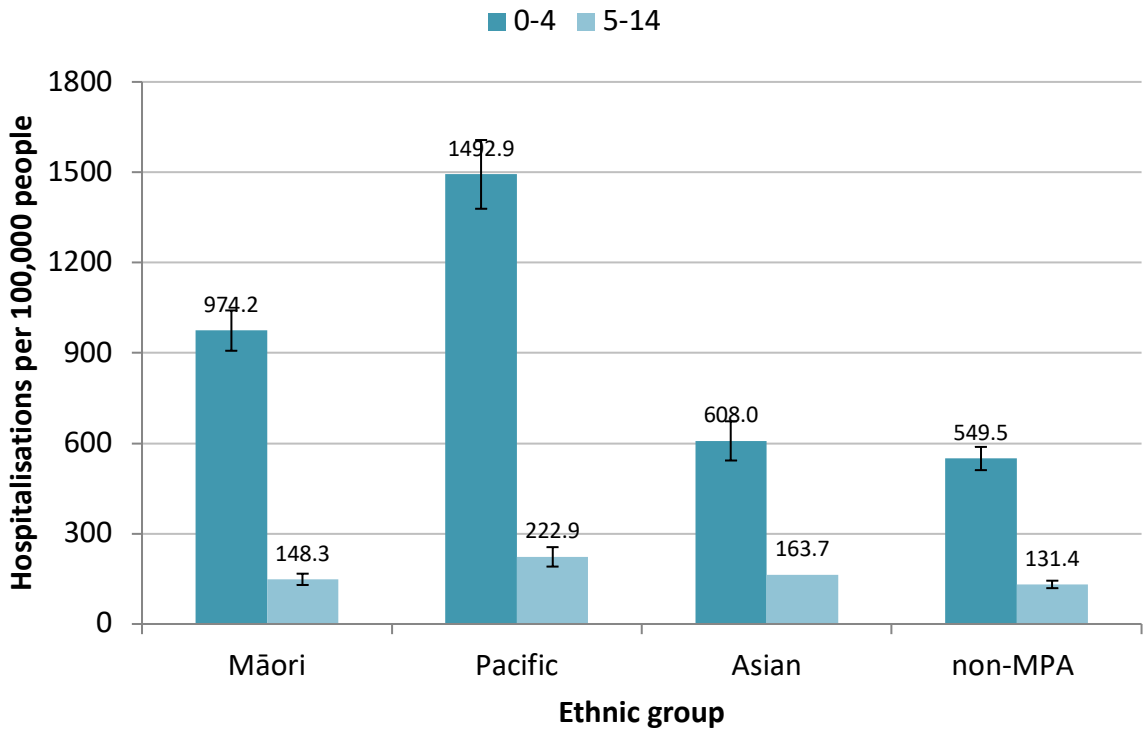
(See Table A 65 for data)

Figure 52. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2000 – 2017, age-adjusted.



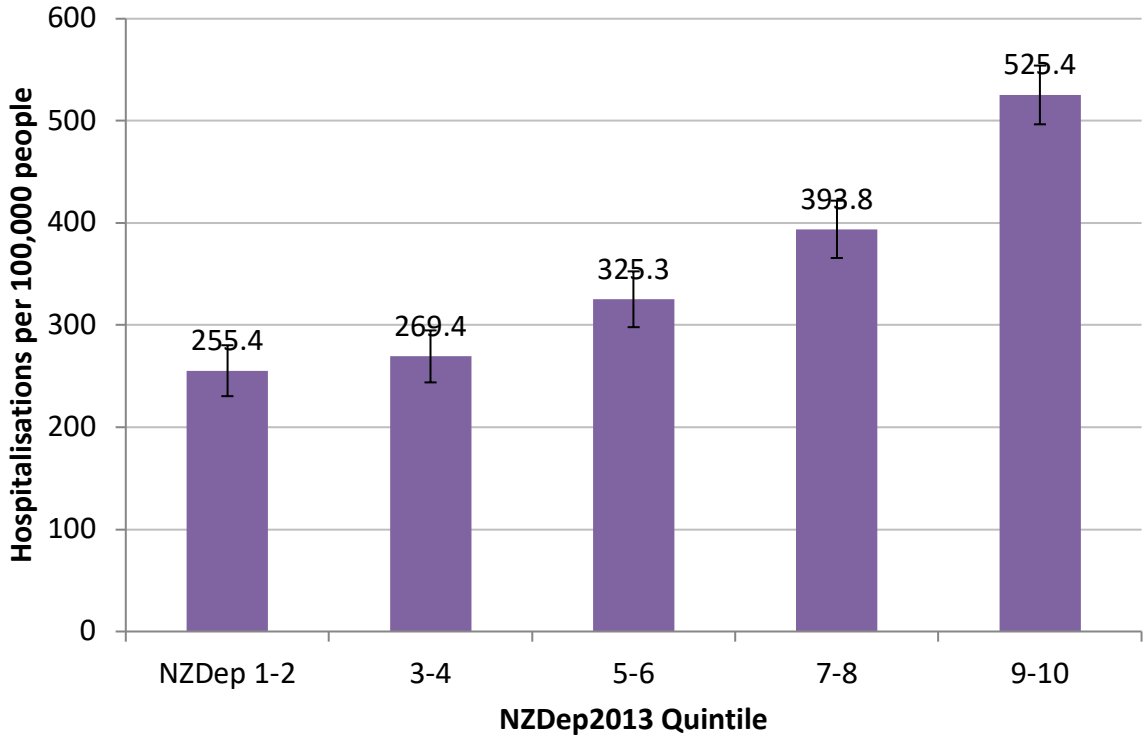
See Table A 66 and Table A 67 for data.

Figure 53. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and age group, 2017.



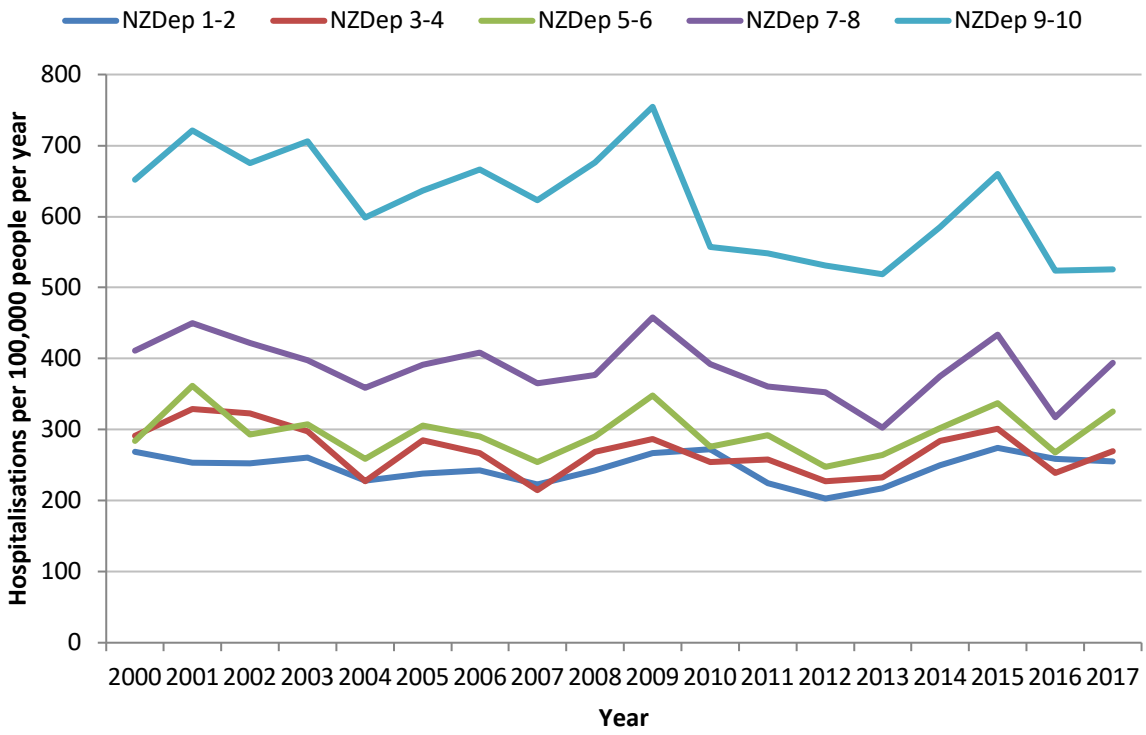
(See Table A 68 for data)

Figure 54. Childhood pneumonia hospitalisations per 100,000 people by NZDep2013 quintile, 2017, age-adjusted.



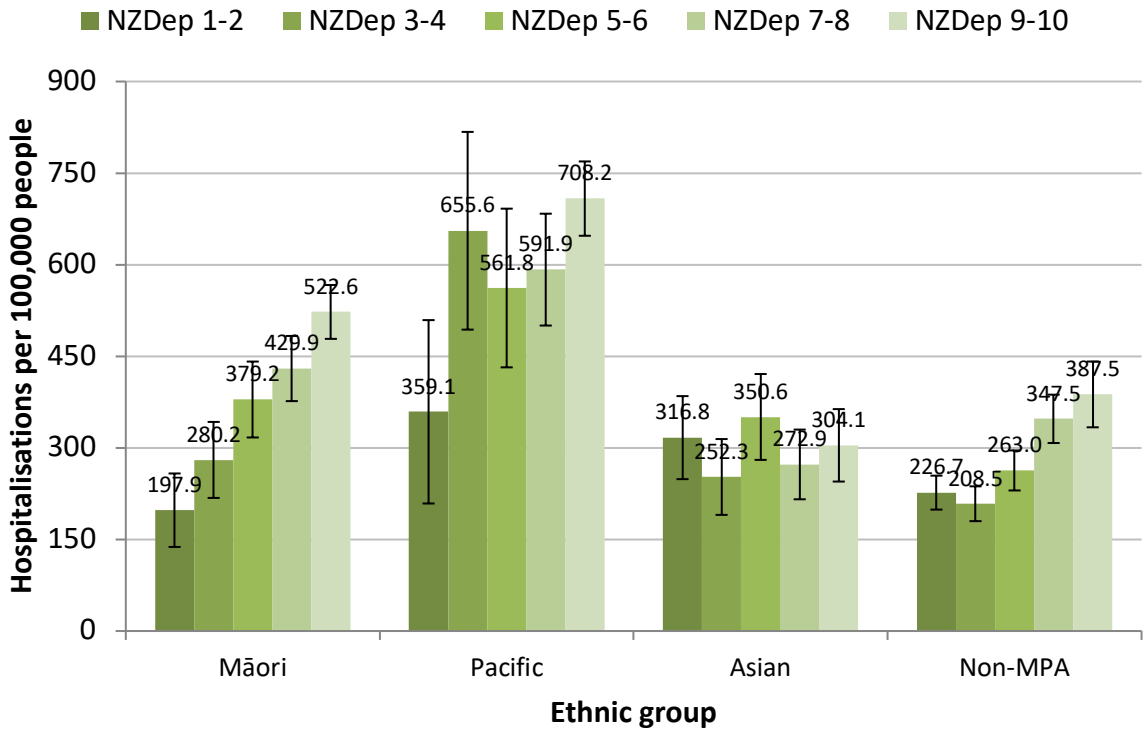
(See Table A 69 for data)

Figure 55. Childhood pneumonia hospitalisations per 100,000 people by NZDep2013 quintile, 2000 - 2017, age-adjusted.



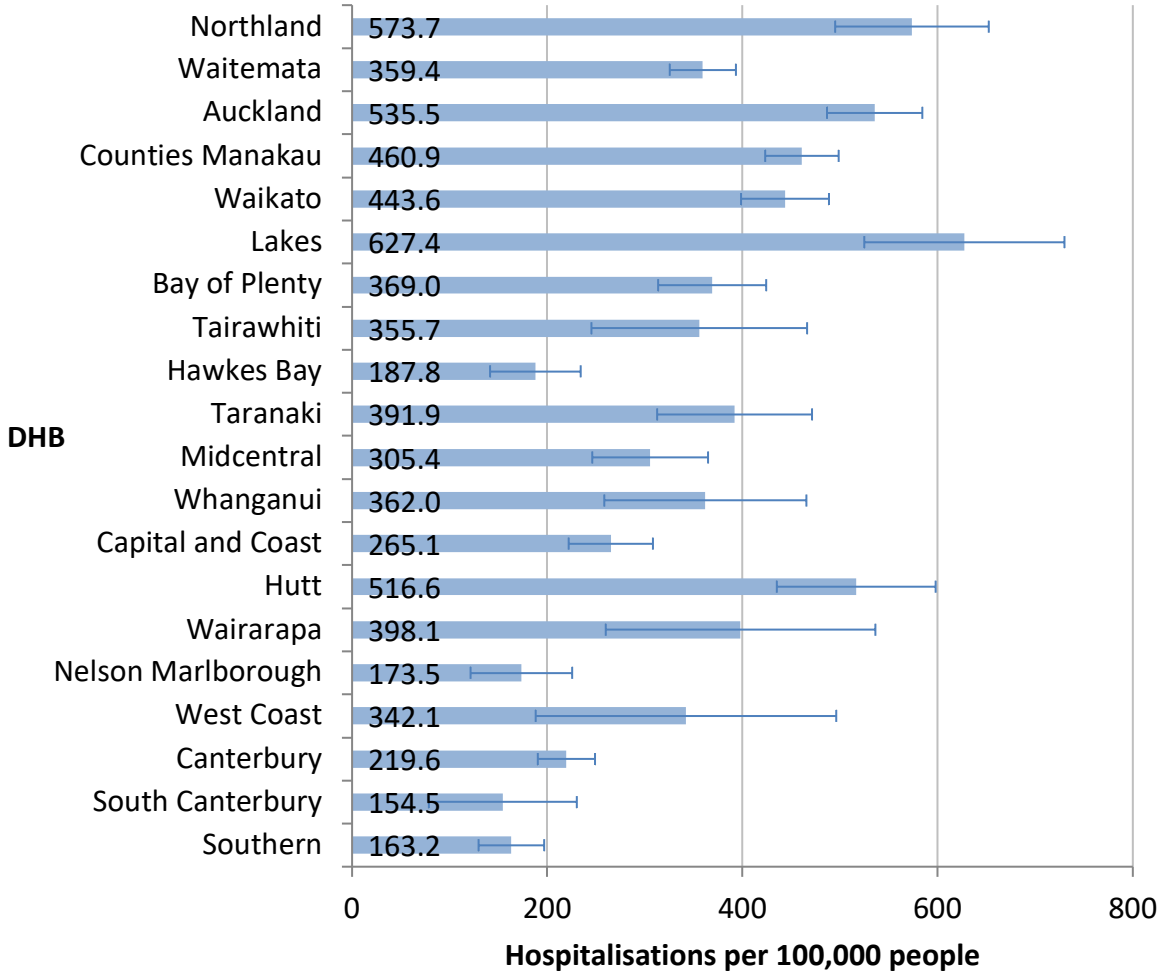
See Table A 70 and Table A 71 for data.

Figure 56. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and NZDep2013, 2017, age-adjusted.



(See Table A 72 for data)

Figure 57. Childhood pneumonia hospitalisations per 100,000 people by DHB, 2017.



(see Table A 73 for data)

6.5.2. CHILDHOOD PNEUMONIA MORTALITY

Trends over time 2000 - 2015

Mortality from childhood pneumonia showed no significant trend over the study period (Figure 58).

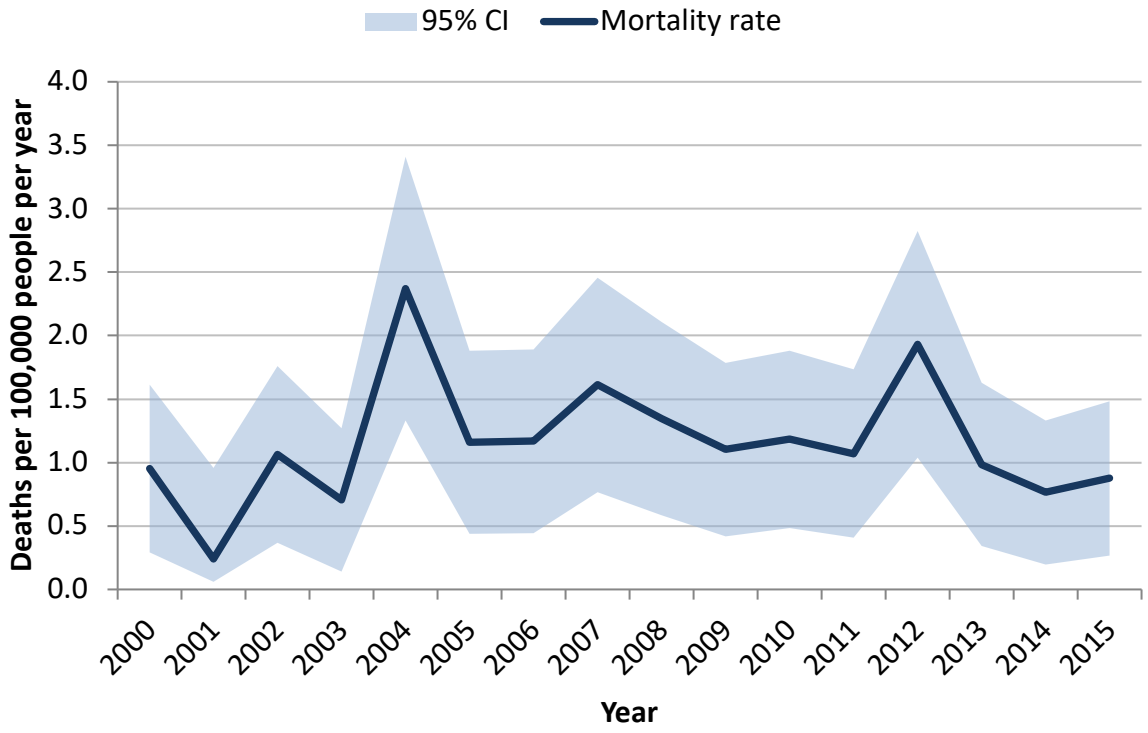
Risks and determinants 2006 - 2015

Pneumonia mortality rates for children aged under did not differ significantly by sex in either the under 5 years or the 5 to 14 years age group (Figure 59).

There was high inequality in the distribution of childhood pneumonia mortality by ethnicity. Rates for non-MPA and Asian peoples were 0.5 deaths per 100,000 children per year. Rates for Māori and Pacific peoples were 2.2 and 3.0 deaths respectively per 100,000 people per year, making rates 4.1 times higher for Māori and 5.6 times higher for Pacific peoples

(Figure 60). In absolute numbers, this meant that across the 122 deaths between 2006 and 2015, 53 deaths were Māori, 38 Pacific, 5 Asian, and 26 non-MPA.

Figure 58. Childhood pneumonia mortality rates 2000-2015, age-adjusted.

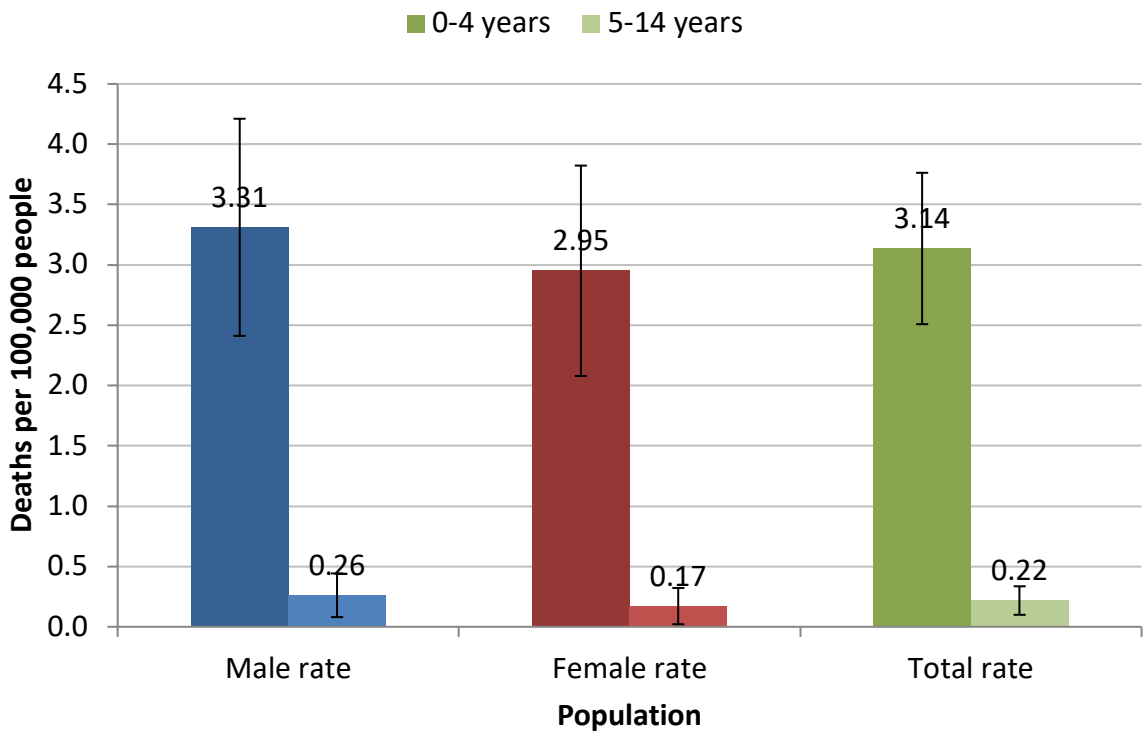


(See Table A 74 for data)
N.B. Confidence intervals are wide. The peak and trough in 2004 and 2001 respectively are significantly different from each other, but not from other years.

Socio-economic inequalities were even more marked. In the previous 2004-2013 study period, there was a clear trend of higher mortality with increasing deprivation. For this study 2006 -2015 study period, differences over the first four NZDep2013 quintiles have reduced, but rates in the most deprived quintile have remained markedly higher than other quintiles. Over half of all deaths were in the most deprived quintile (Figure 61), for whom the mortality rate was 8.06 times higher than in the least deprived quintile. This difference is an improvement on the previous report, when the ratio was 17.9, and also on the 11.9 ratio for the 2002 – 2011 study period before that.

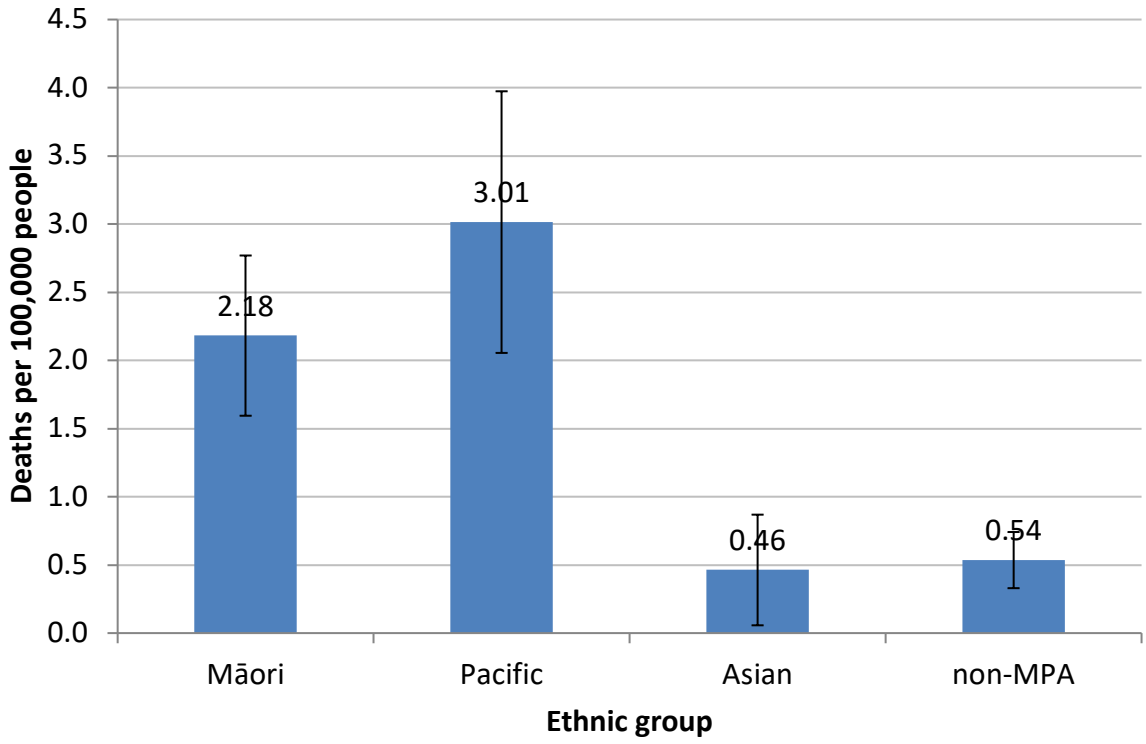
Childhood pneumonia mortality rates were highest, and significantly higher than the national average, in Bay of Plenty, Counties Manukau, Taranaki, Northland and Waikato DHBs. There were five DHBs with no childhood pneumonia deaths, and four other DHBs where rates were significantly below the national average (Figure 62).

Figure 59. Childhood pneumonia deaths per 100,000 people by age group and sex, 2006-2015.



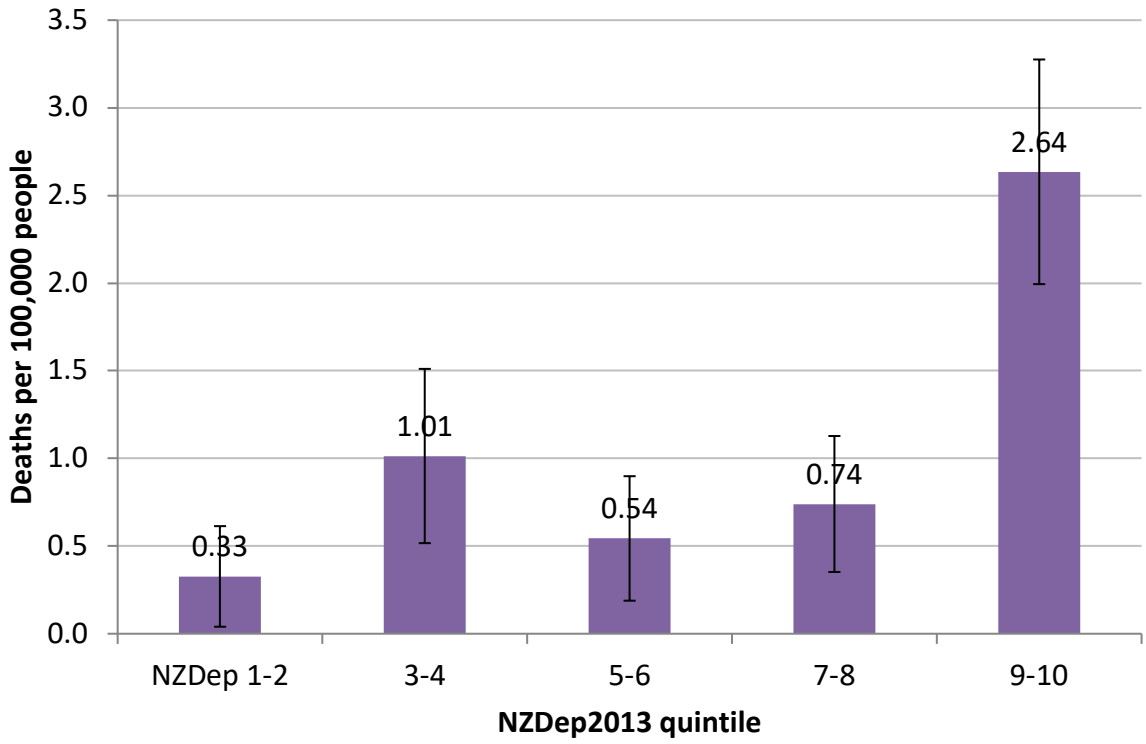
(See Table A 75 and Table A 76 for data)

Figure 60. Childhood pneumonia mortality per 100,000 people per year by ethnic group, 2006-2015.



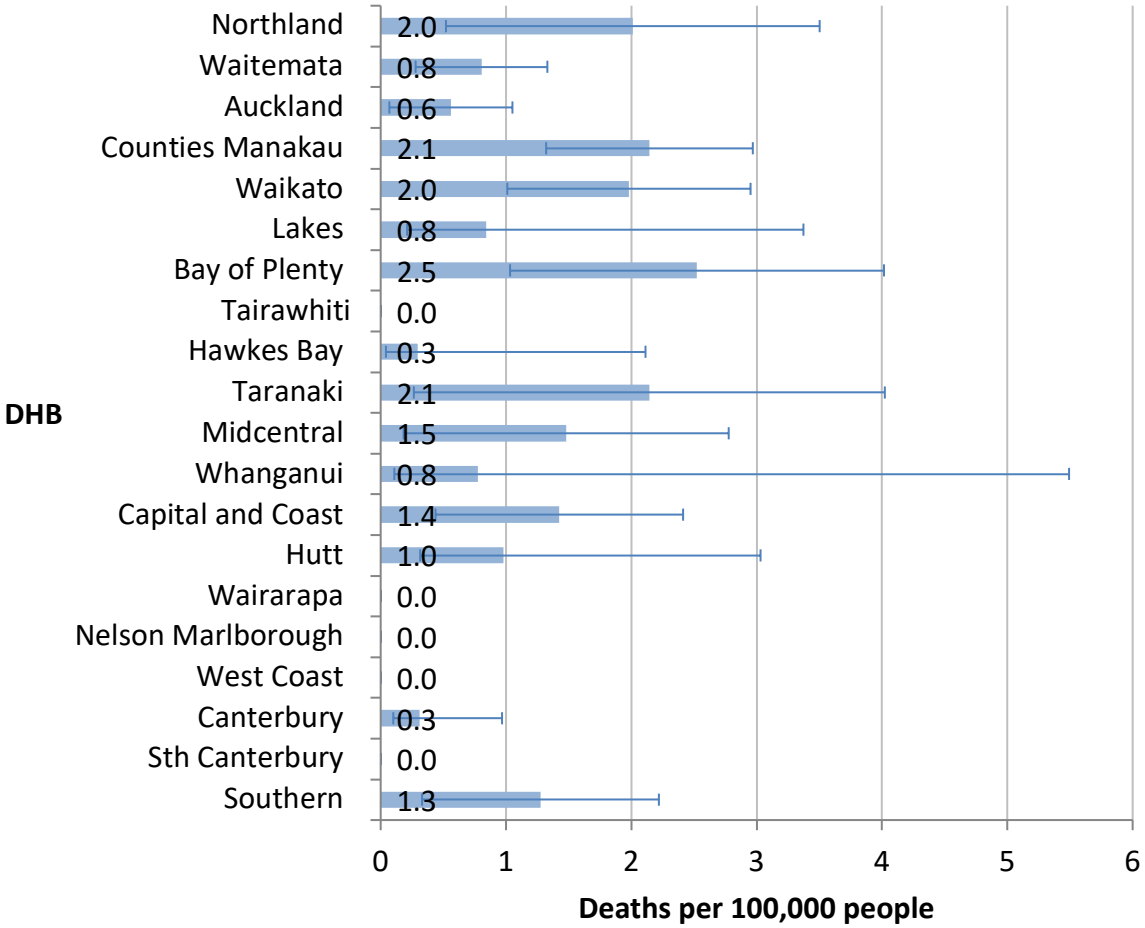
(See Table A 77 for data)

Figure 61. Childhood pneumonia deaths per 100,000 people by NZDep2013 quintile, 2006-2015, age-adjusted.



(See Table A 78 for data)

Figure 62. Childhood pneumonia deaths per 100,000 people per year, by DHB, 2006-2015, age-adjusted



(see Table A 79 for data)

6.6. COPD IN OLDER ADULTS (45+ YEARS)

6.6.1. ADULT 45+ YEARS COPD PREVALENCE

Research summary

The 2003/4 prevalence of COPD in adults aged 40 and over was estimated to be 14.2%[25 26]. 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] Milne et al reported 2012/13 total population hospital admission rates for COPD at 2.82 per 100,000 people.[27]

There were no new studies of the incidence or prevalence of adult COPD since the previous report.

We estimated the 1 July 2017 prevalence of severe COPD by identifying people who had been hospitalised with COPD as a primary or secondary diagnosis between 1988 and 2017, and excluding those deceased before 1 July 2017. This method identified 44,002 New Zealanders living with COPD on 1 July 2017, giving a total population prevalence of 0.95%. Age-standardised population prevalence was highest for Māori, at 2.44%, followed by Pacific, at 2.19%, and trailed by non-MPA and Asian peoples at 0.77% and 0.34% respectively. Age-standardised prevalence was 7.6% higher for men (0.98%) than women (0.88%). 96% of cases people with COPD in 2017 were over the age of 45, making the population prevalence of ever-hospitalised COPD 2.2% in people aged 45 and over.

The average age of Māori with COPD was 63.9, compared with 67.1 for Pacific peoples, 70.2 for Asian peoples, and 73.7 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 an ongoing reference, bearing in mind that the 1.9% prevalence in adults aged 40 and over represented 13.4% of the 2003/4 GOLD-defined prevalence, though the 2.2% prevalence in adults aged 45 and over was 77% of the prevalence found in the 2014 primary care cohort.

6.6.2. ADULT 45+ YEARS COPD INCIDENCE

We estimated the 2017 incidence of severe COPD by identifying COPD hospital admissions in 2017 where the patient had not previously been hospitalised with COPD (since 1988, the start of data availability). There were 5,579 new cases of COPD in 2017, a total incidence rate of 116.4 per 100,000 people. Rates were highest for Māori, at 295.4 per 100,000, followed by Pacific at 165.5, and lower for non-MPA, at 100.8, and Asian peoples, at 36.0. Average age of onset was 69.9 years, and was earliest for Māori and Pacific, at 62.5 and 63.2 years respectively, followed by Asian, at 68.8 years, and latest for non-MPA, at 72.4 years.

6.6.3. ADULT 45+ YEARS COPD HOSPITALISATIONS

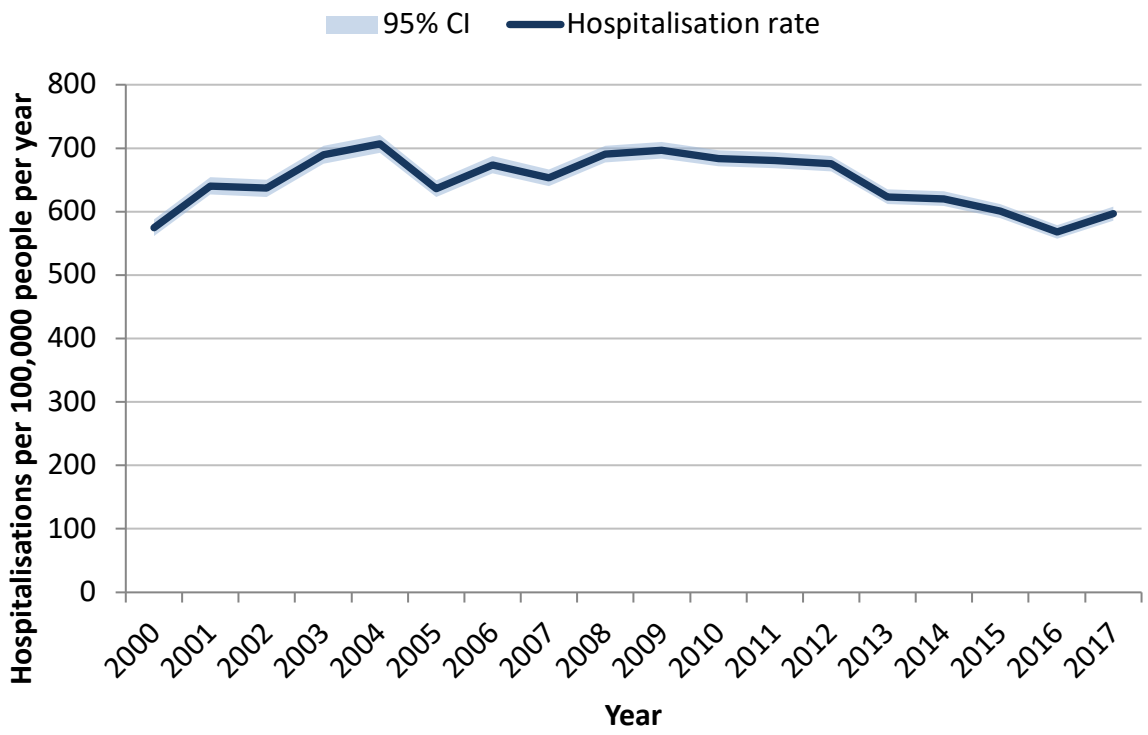
It should be noted that COPD hospitalisations may include cases of misdiagnosed bronchiectasis, and vice versa. Bronchiectasis hospitalisations are less common than COPD: if all bronchiectasis hospitalisations in adults aged 45 years and over were in fact misdiagnosed COPD, it would increase COPD rates by about 31 hospitalisations per 100,000 people per year (2017), about 4.9% of the total COPD burden. However, although the actual proportion of misdiagnoses is unknown, it is unlikely to be so large.

Trends over time 2000 - 2017

2016 COPD hospitalisation rates dipped below the 2000 rate for the first time in the study period (Figure 63). While 2017 rates were a little higher again, all rates over the last five years were lower than rates in the period 2001 to 2012. Ethnic and socio-economic

disparities in COPD hospitalisation rates widened between 2000 and 2017 (Figure 66 and Figure 69).

Figure 63. COPD hospitalisations in adults aged 45+, per 100,000 people per year, 2000-2017, age-adjusted.



(See Table A 80 for data)

Risks and determinants 2017

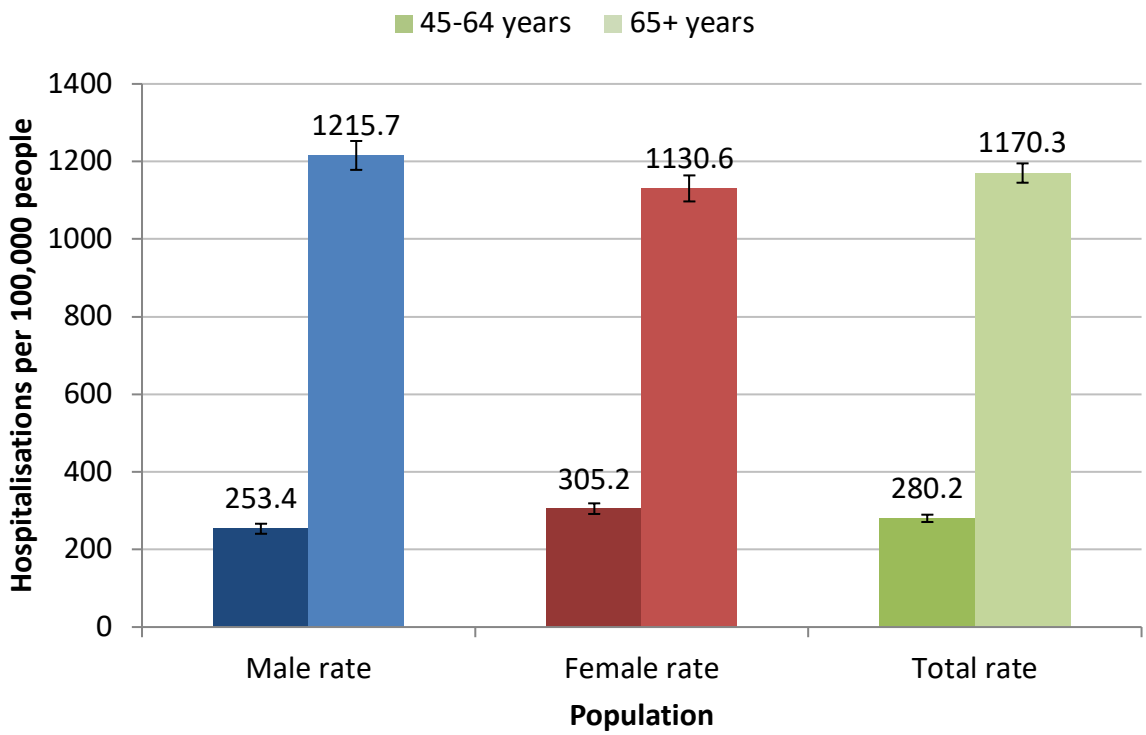
COPD hospitalisation rates were higher for women than men in the 45 to 64 year age group (rate ratio 1.20), but lower in the 65+ age group (rate ratio 0.93) (Figure 64).

COPD rates were highest for Māori, at 3.54 times the non-MPA rate, and Pacific peoples (rate ratio 2.70), and lowest for Asian peoples (rate ratio 0.34) (Figure 65).

There was a strong deprivation gradient, with COPD rates 5.11 times higher in the most deprived NZDep quintile than in the least deprived (Figure 68). The gradient was present across all ethnic groups (Figure 70).

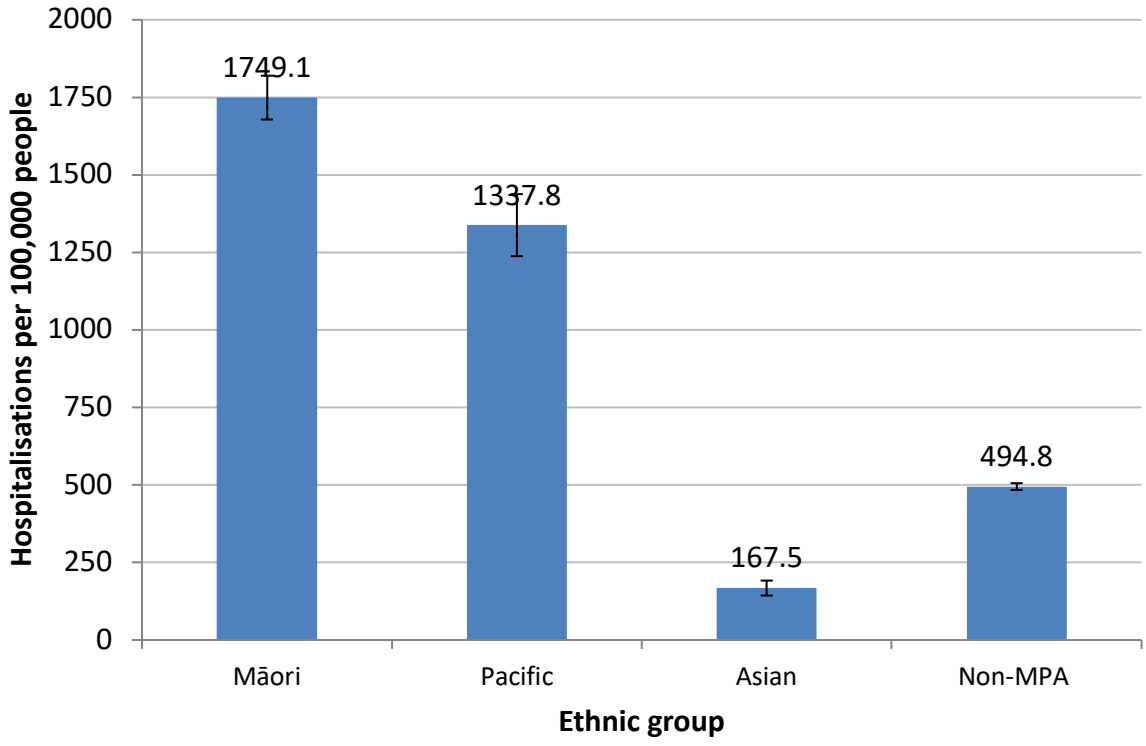
COPD hospitalisation rates were highest in West Coast and Whanganui, and lowest in Nelson Marlborough (Figure 71).

Figure 64. COPD hospitalisations in adults aged 45+, per 100,000 people, by age group and sex, 2017.



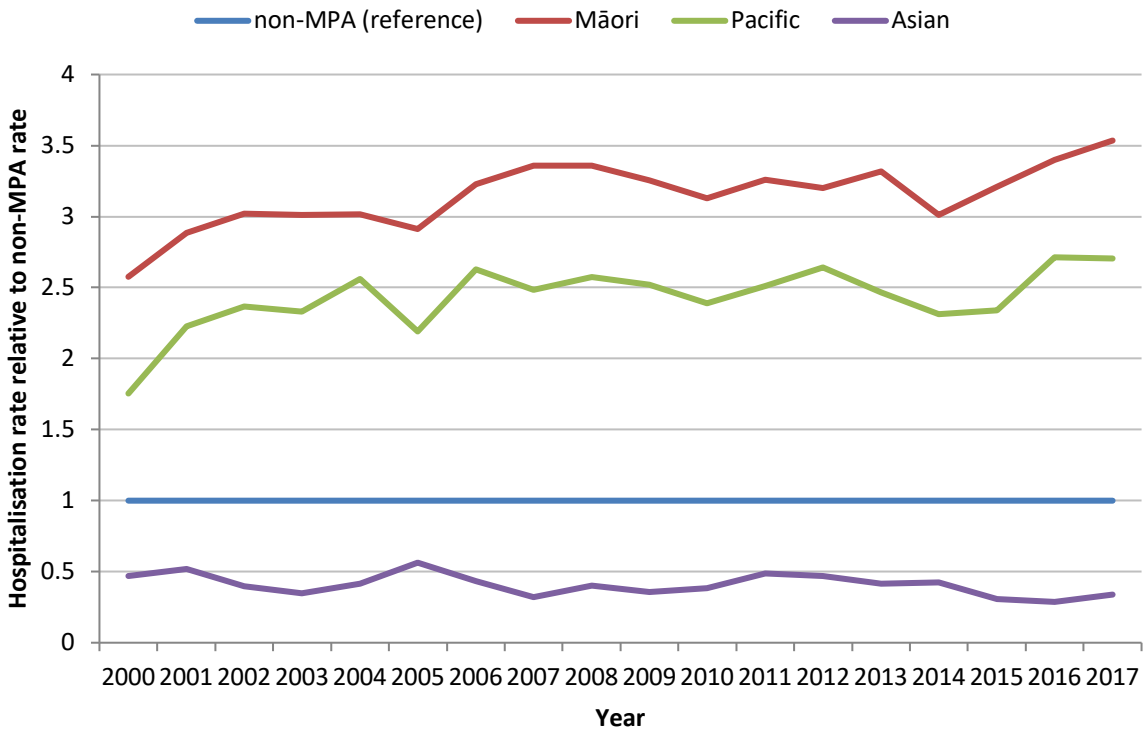
(See Table A 81 and Table A 82 for data)

Figure 65. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group, 2017, age-adjusted.



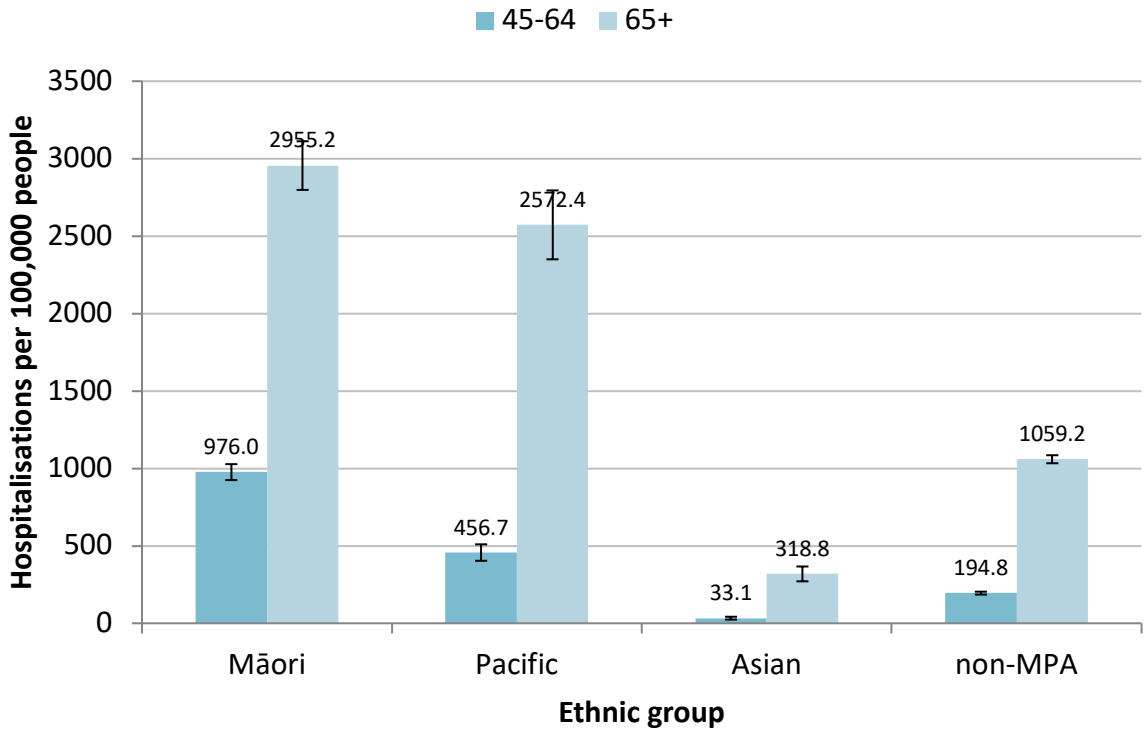
(See Table A 83 for data)

Figure 66. COPD hospitalisation rate in adults aged 45, by ethnic group, relative to non-MPA reference rate, 2000 - 2017, age-adjusted.



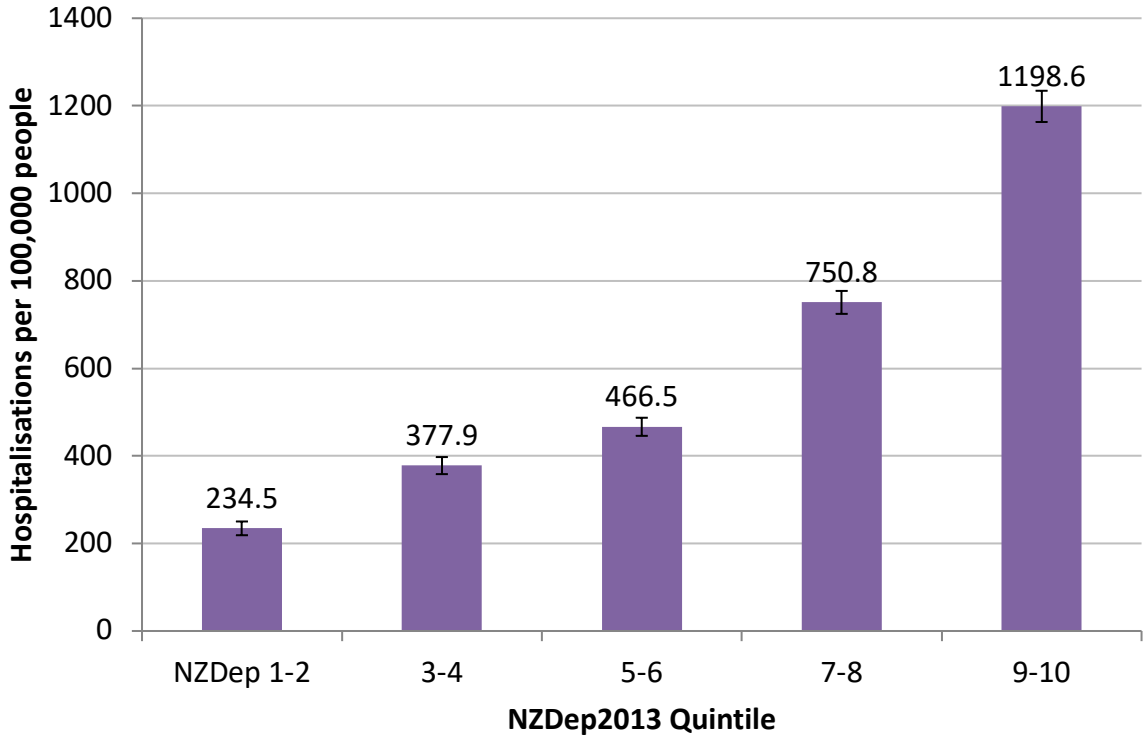
See Table A 84 and Table A 85 for data.

Figure 67. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and age group, 2017.



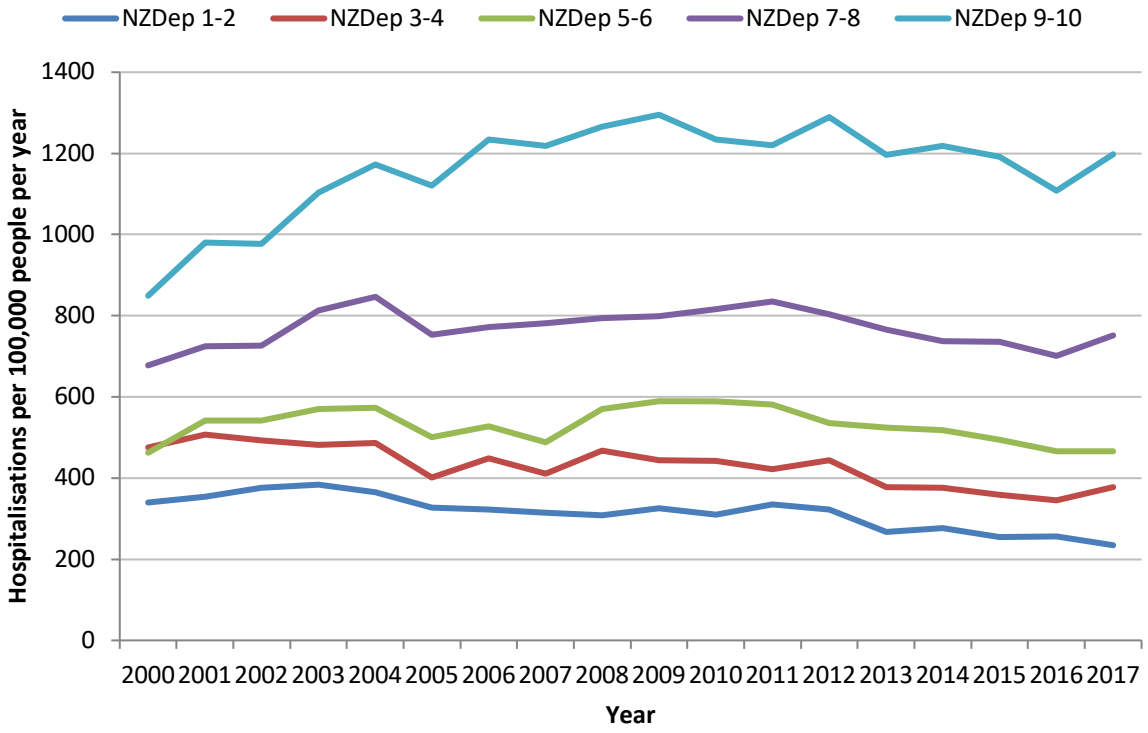
(See Table A 86 for data)

Figure 68. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2013 quintile, 2017, age-adjusted.



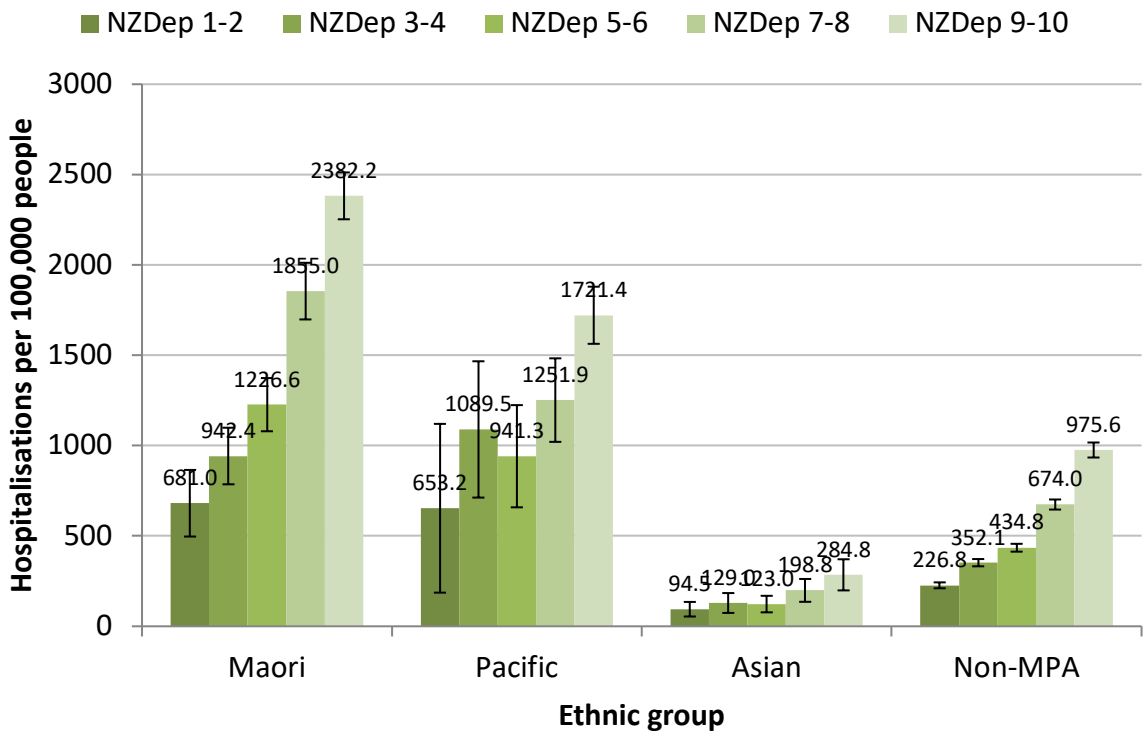
(See Table A 87 for data)

Figure 69. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2013 quintile, 2000 - 2017, age-adjusted.



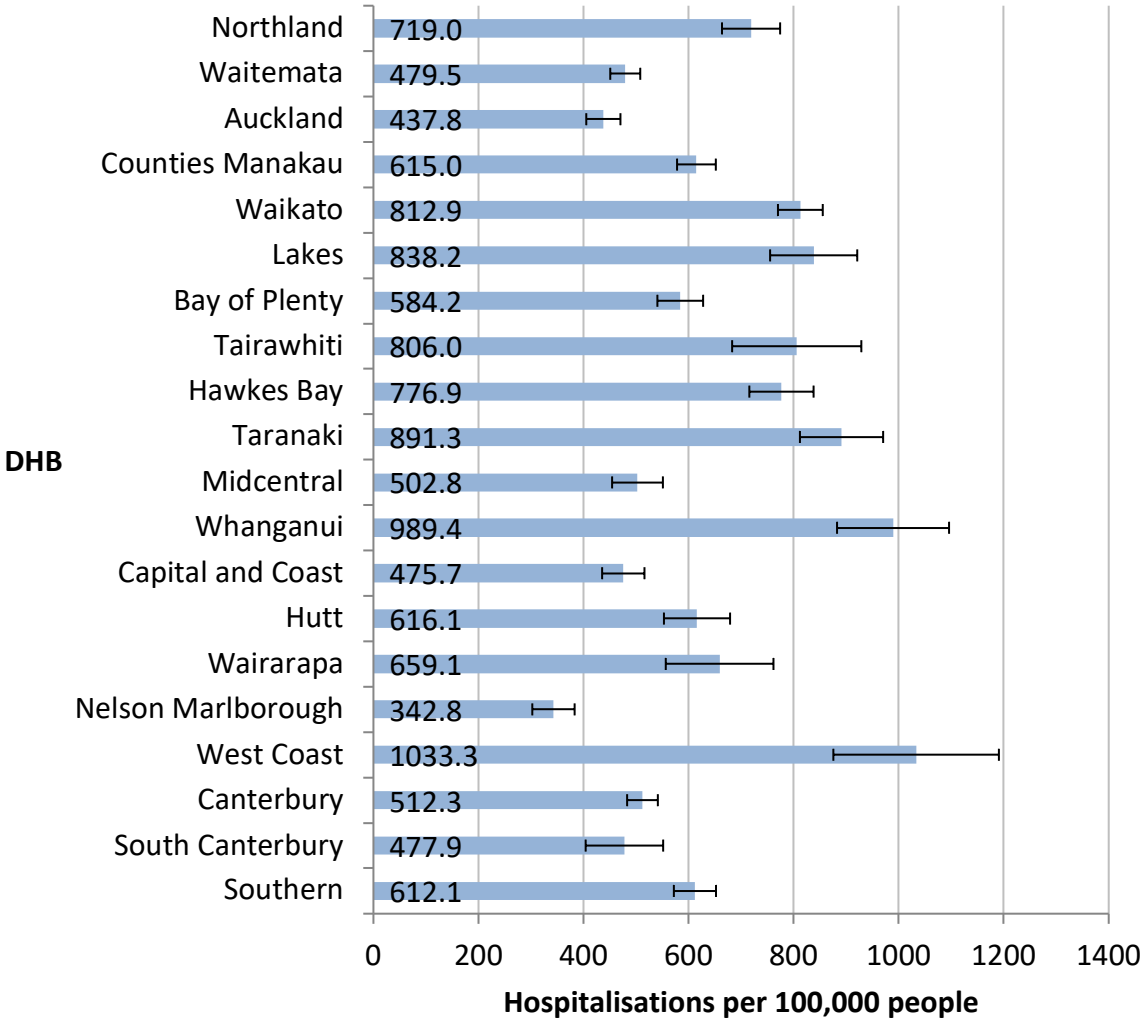
(See Table A 88 and Table A 89 for data)

Figure 70. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and NZDep2013, 2017, age-adjusted.



(See Table A 90 for data)

Figure 71. COPD hospitalisations in adults aged 45+, per 100,000 people, by DHB, 2017.



(see Table A 91 for data)

6.6.4. ADULT 45+ YEARS COPD MORTALITY

Trends over time 2000 - 2015

Mortality due to COPD declined over the study period, from an age-adjusted 111.9 deaths per 100,000 in 2000, to 85.0 deaths per 100,000 in 2015. This represented a decline of 2.81 deaths per 100,000 people per year. If this trend were to continue, we would see COPD eliminated as a cause of death by 2045.

Risks and determinants 2015

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 73).

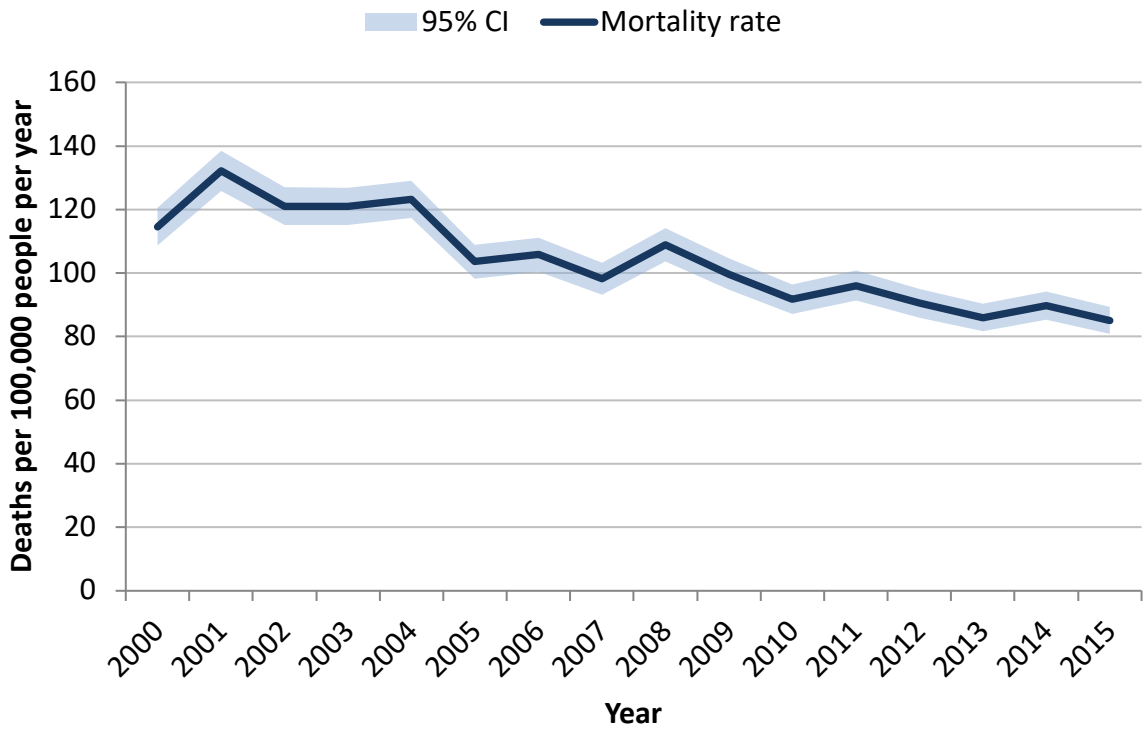
COPD mortality rates were highest in Māori, whose rate of 183.4 deaths per 100,000 people per year was 2.24 (95% CI 2.07-2.42) times higher than 81.9 rate for non-MPA. Pacific rates

were 1.08 times higher than non-MPA. However, the COPD mortality rate for Asian peoples was well under half that of non-MPA (Figure 74). These patterns were exaggerated in the younger 45-64 year age group (Figure 75).

COPD mortality rates also increased with increasing socio-economic deprivation, with deaths in NZDep2013 quintile 9-10 occurring at 2.26 times the rate in quintile 1-2 (Figure 76). Increasing COPD mortality with increasing deprivation was significant for Māori and non-MPA, but not significant for Pacific or Asian peoples (Figure 77).

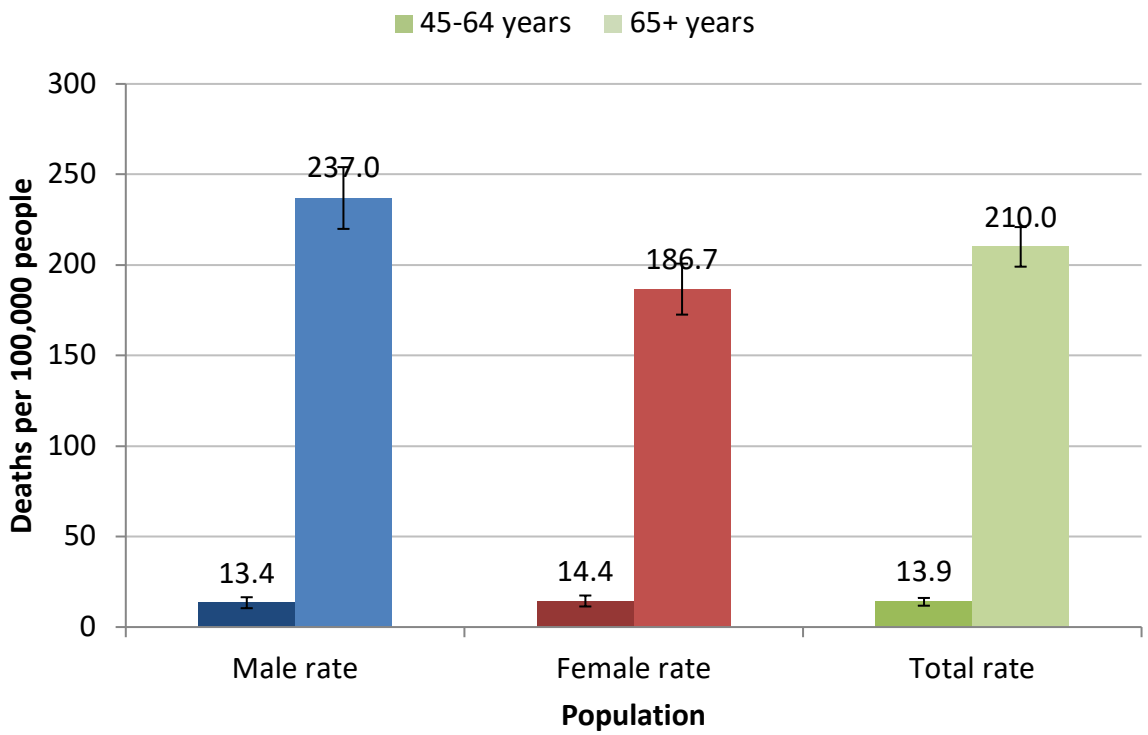
Adult COPD mortality rates for 2015 were highest in Lakes, West Coast, and Whanganui DHBs; and lowest in Capital and Coast, and Waitemata.

Figure 72. Adult COPD mortality rates 2000-2015, age-adjusted.



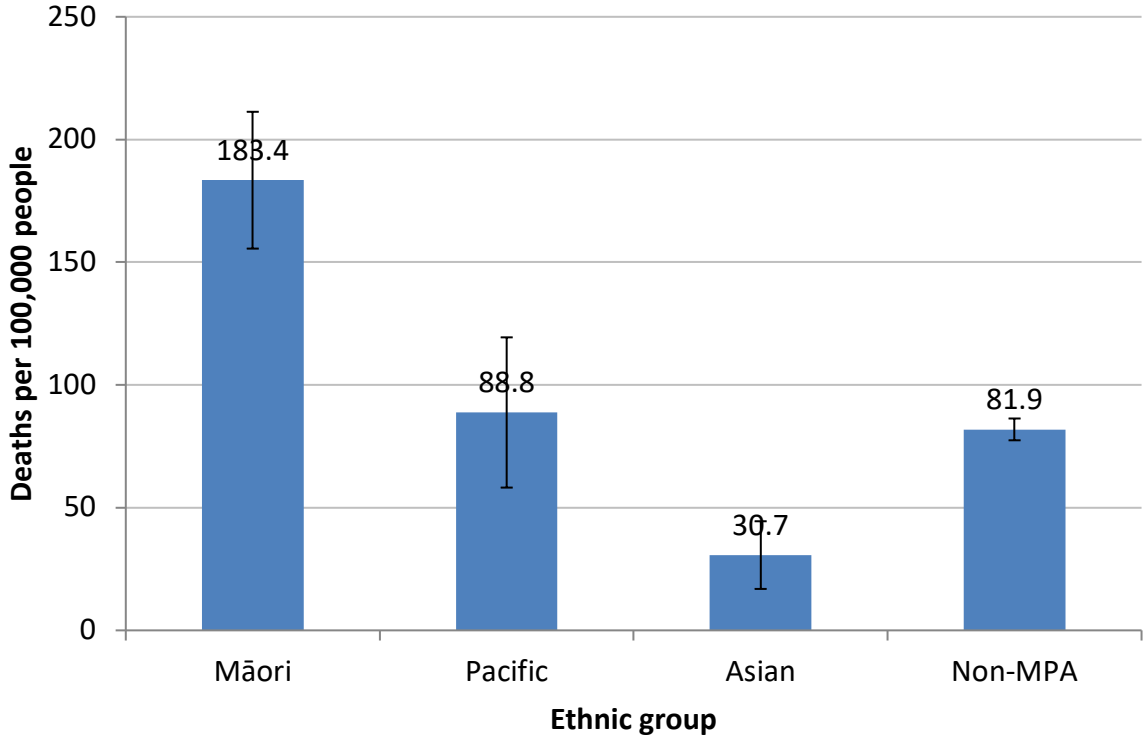
(See Table A 92 for data)

Figure 73. Adult COPD deaths per 100,000 people by age group and sex, 2015.



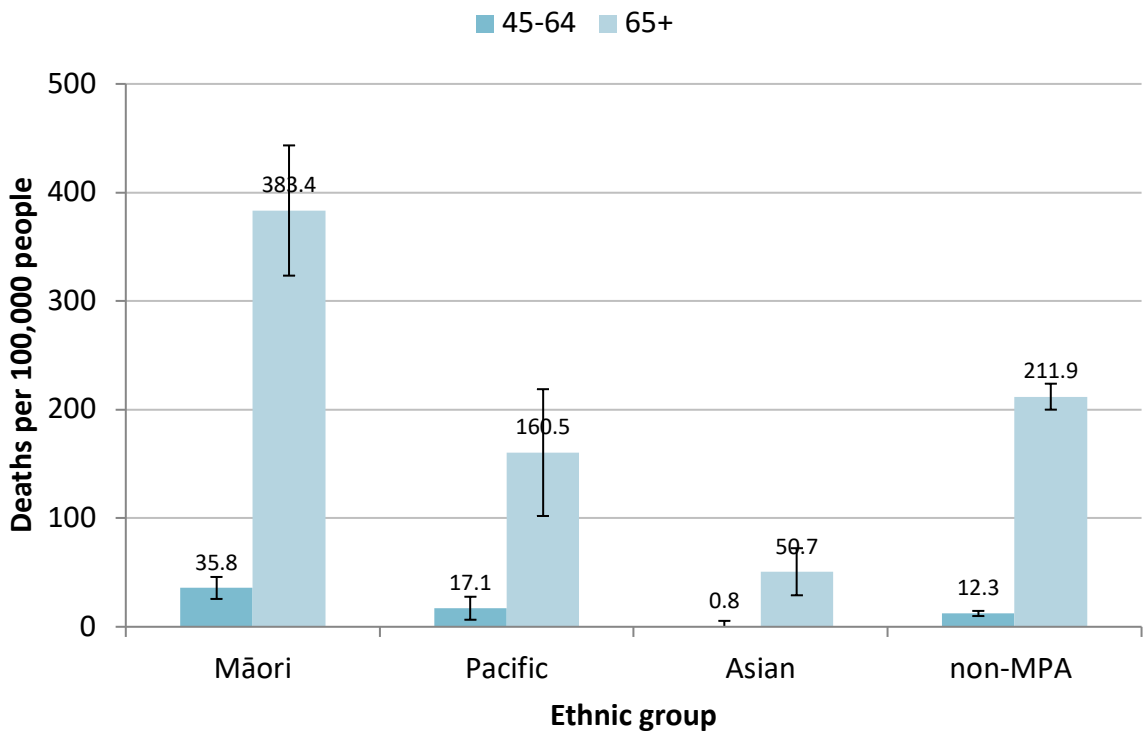
(See Table A 93 and Table A 94 for data)

Figure 74. Adult COPD mortality per 100,000 people per year by ethnic group, 2015.



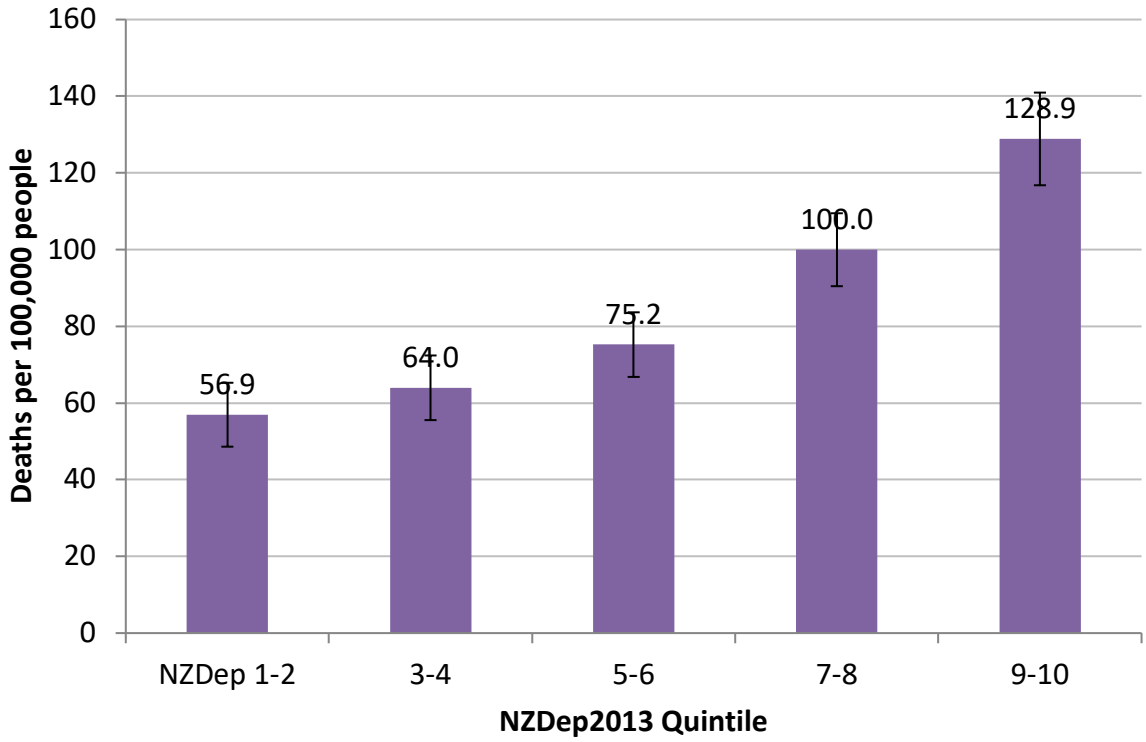
(See Table A 95 for data)

Figure 75. Adult COPD deaths per 100,000 people per year, by ethnic group and age group, 2015.



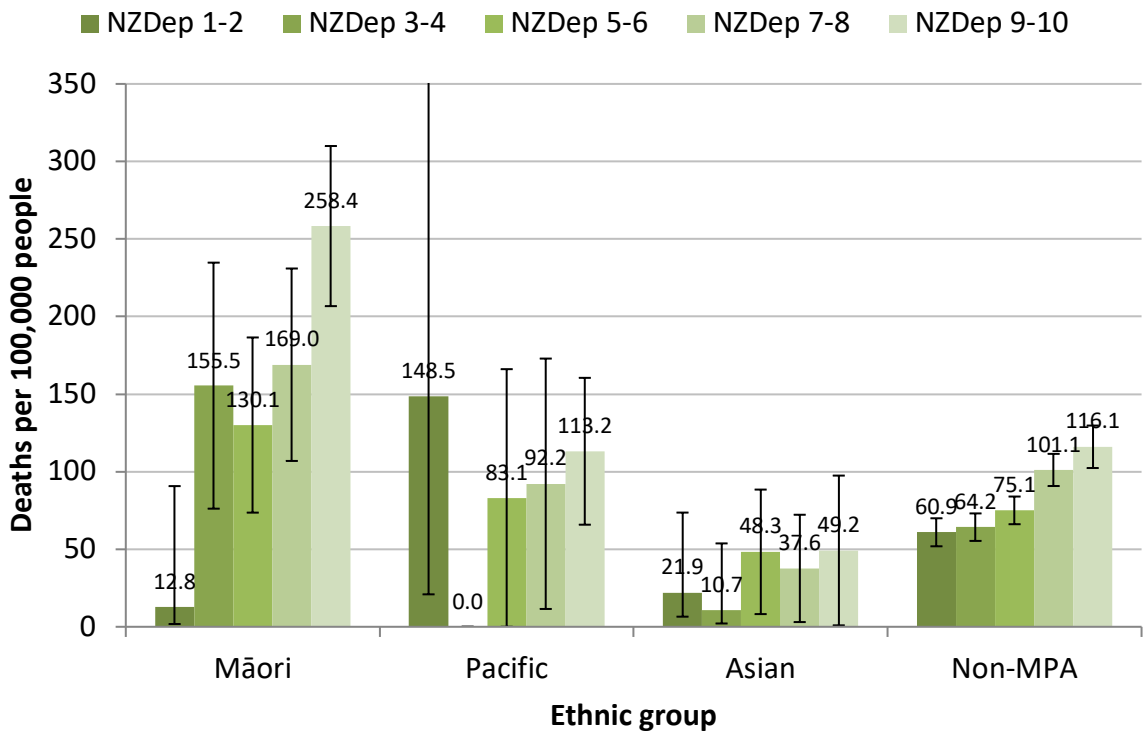
(See Table A 96 for data).

Figure 76. Adult COPD deaths per 100,000 people by NZDep2013 quintile, 2015, age-adjusted.



(See Table A 97 for data)

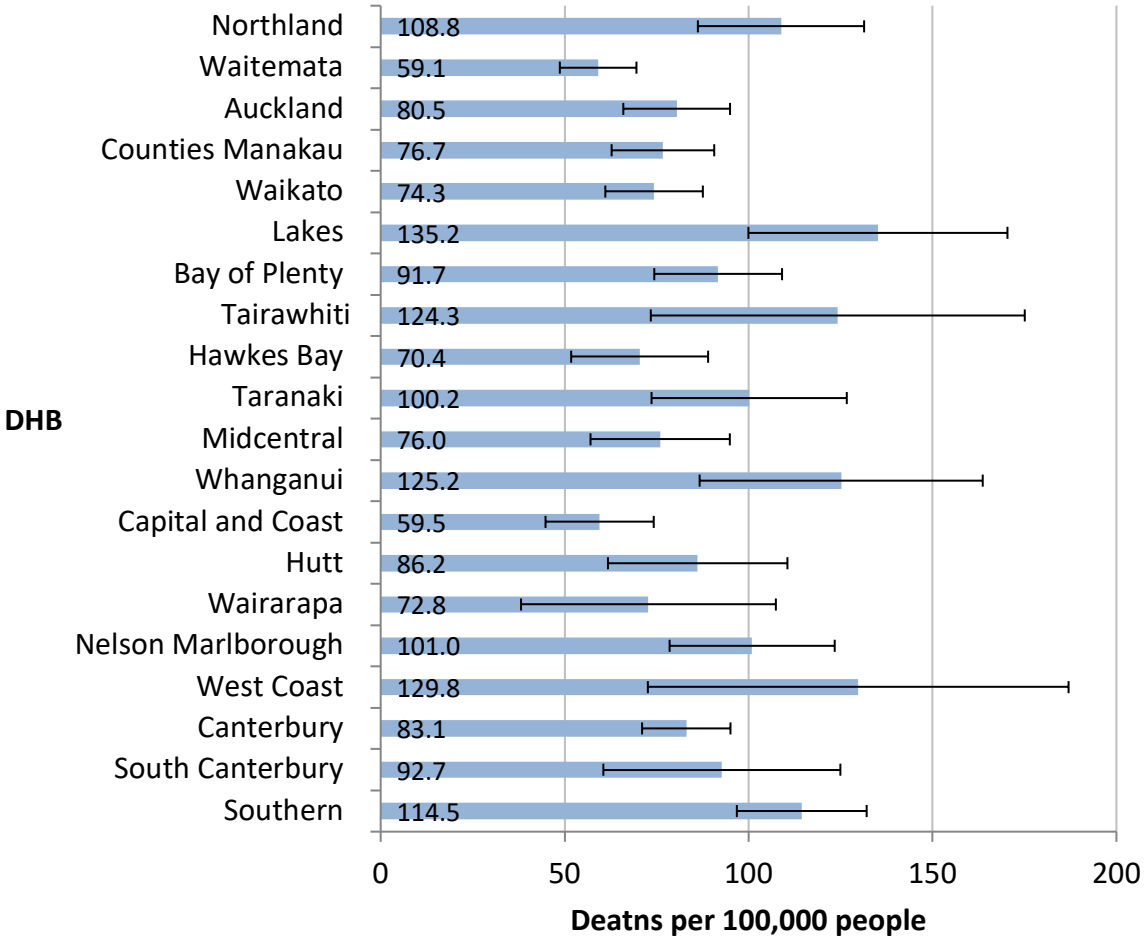
Figure 77. Adult COPD deaths per 100,000 people by ethnic group and NZDep2013, 2015, age-adjusted.



(See Table A 98 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 or Asian peoples.

Figure 78. Adult COPD deaths per 100,000 people per year, by DHB, 2015, age-adjusted



(see Table A 99 for data)

6.7. TOTAL SERIOUS RESPIRATORY DISEASE

New research on respiratory disease incidence in children

Dowell et al analysed general practitioner (GP) consultations across 36 New Zealand primary care practices for children under 18 years of age, between 2008 and 2013 inclusive.[28] Their study found rates of 1101 respiratory consultations per 1000 person-years, with 509 for upper respiratory tract infections, 107 for lower respiratory tract infections, 235 for wheeze, 180 for throat infections, 296 for otitis media and 36 for other infections. Seventy percent of children visited their GP for a respiratory condition in their first year of life. Respiratory conditions made up 45.4% of all consultations.

Priest et al found primary school children aged 5 to 11 years had 0.80 absences for respiratory illness per 100 child days. Provision of hand sanitiser in school did not reduce absences.[29]

6.7.1. TOTAL RESPIRATORY HOSPITALISATIONS

New research

Lawton et al reported that 6.4% percent of infants born 1995 to 2009 inclusive were admitted to hospital for respiratory illness at least once in their first year of life.[30] Infants of Māori and Pacific mothers had higher admission rates (rate ratios 2.42 and 3.79 respectively), particularly if the mothers were young; as did infants of mothers who lived in NZDep 9-10 areas (rate ratio 1.33 compared to NZDep 1-2), who smoked (rate ratio 1.3), or who had three or more previous births (rate ratio 2.77 compared to no previous births). Hospitalisation rates were also higher for pre-term births (rate ratio 3.14). Breastfeeding was not protective against respiratory hospitalisation.

Trends over time 2000 - 2017

The 2017 rate of respiratory hospitalisations was 1812.0 per 100,000 people. Total respiratory hospitalisations have been increasing at a rate of 17.4 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 between 2007 and 2009, hen crept up slowly between 2009 and 2017. 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 79).

This increase has occurred despite a drop in tobacco smoking prevalence over a similar period (2000 – 2016/17) from 25% to 15.7%.[31]

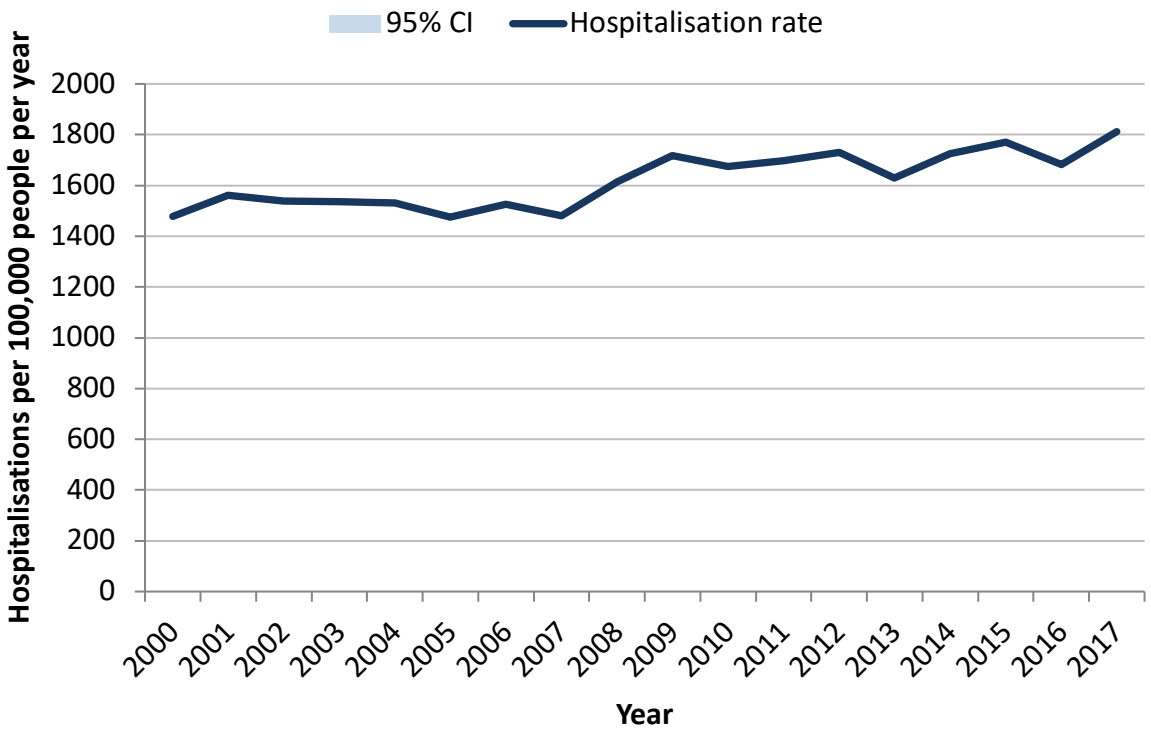
While ethnic disparities in hospitalisation rates rose over the first half of the study period, reaching their peak in the late 2000s, since 2010 they have stabilised at a level slightly below that peak (Figure 83). Socio-economic disparities show a similar pattern (Figure 86).

Risks and determinants 2017

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 81).

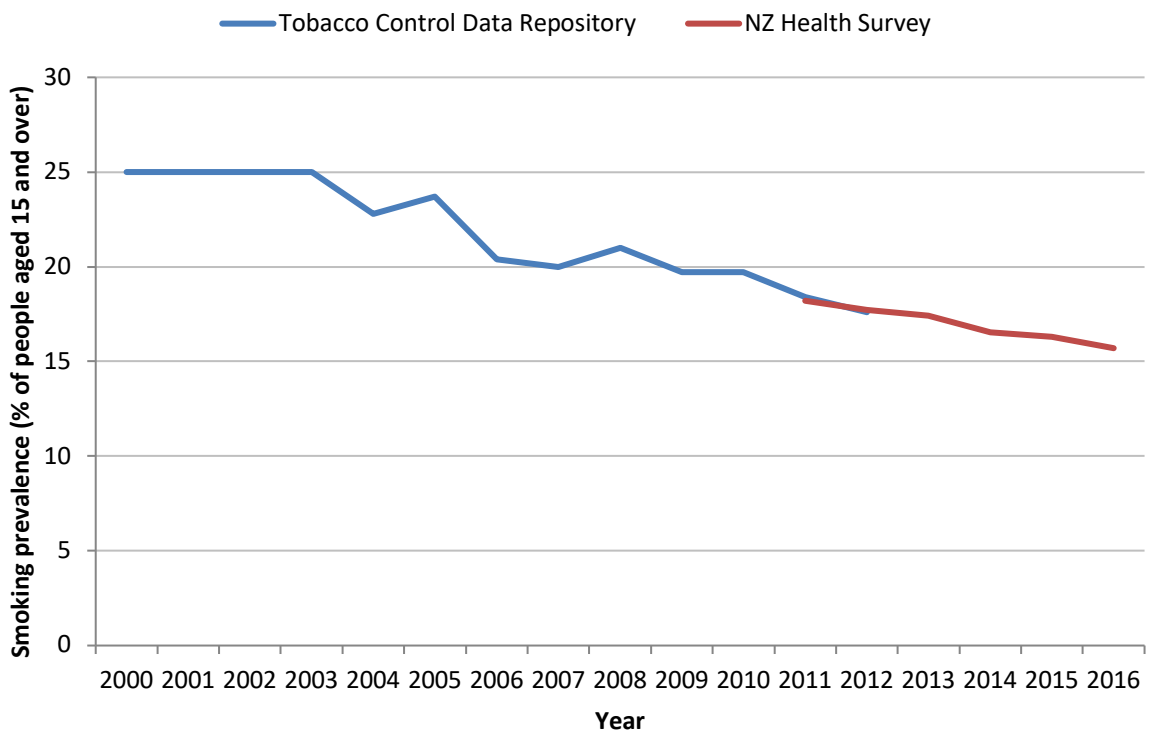
Respiratory hospitalisation rates were highest for Pacific peoples, with rates 2.51 times higher (95%CI 2.6-2.7) than for non-MPA. Māori rates were also significantly higher (rate ratio 2.03), and lower (rate ratio 0.71) for Asian peoples. These trends were repeated across all age groups (Figure 84).

Figure 79. Total respiratory hospitalisations per 100,000 people per year, 2000-2017, age-adjusted.



(See Table A 100 for data)

Figure 80. New Zealand smoking prevalence 2000-2016/17.



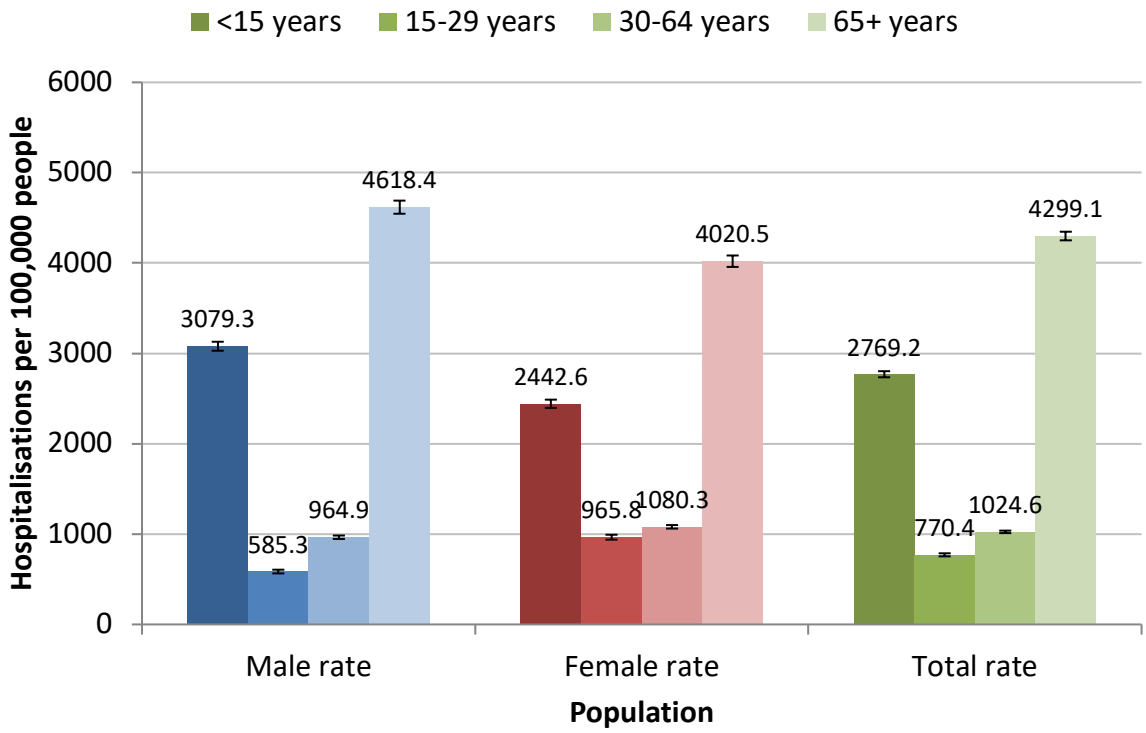
Data sourced from Tobacco Control Data Repository, http://www.tcdata.org.nz/TobaccoSectorOverview.aspx, accessed 11 August 2016, and New Zealand Health Survey data for 2011/12 - 2016/7.

There was a significant deprivation gradient in total respiratory hospitalisations, with rates in the most deprived NZDep quintile 2.32 times higher than rates in the least deprived quintile (Figure 85).

The deprivation gradient was present for all ethnic groups. However, the lowest Pacific rate, in the wealthiest quintile, was significantly higher than rates for non-MPA in the most deprived quintile: respiratory outcomes for Pacific peoples in even the wealthiest areas are worse than for non-MPA people in even the most deprived areas (Figure 87).

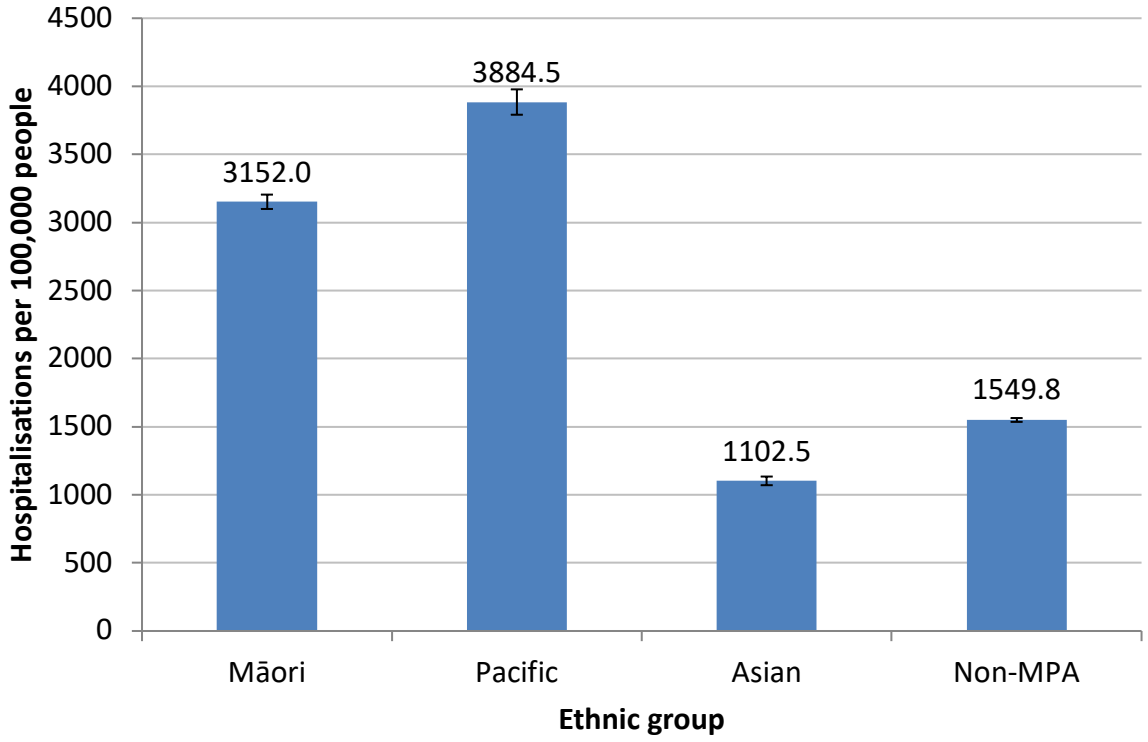
Total respiratory hospitalisation rates were highest in Lakes, Whanganui and Waikato DHBs, and lowest in Nelson Marlborough (Figure 88).

Figure 81. Total respiratory hospitalisations per 100,000 people by age group and sex, 2017.



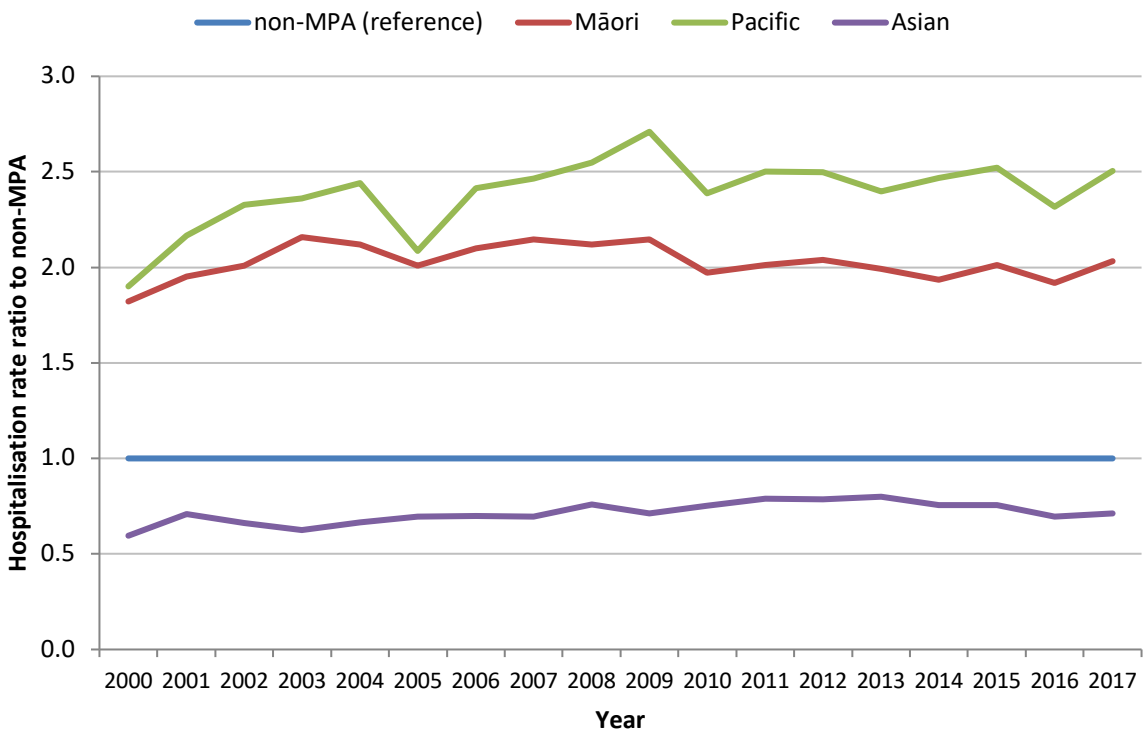
(See Table A 101 and Table A 102 for data)

Figure 82. Total respiratory hospitalisations per 100,000 people by ethnic group, 2017, age-adjusted.



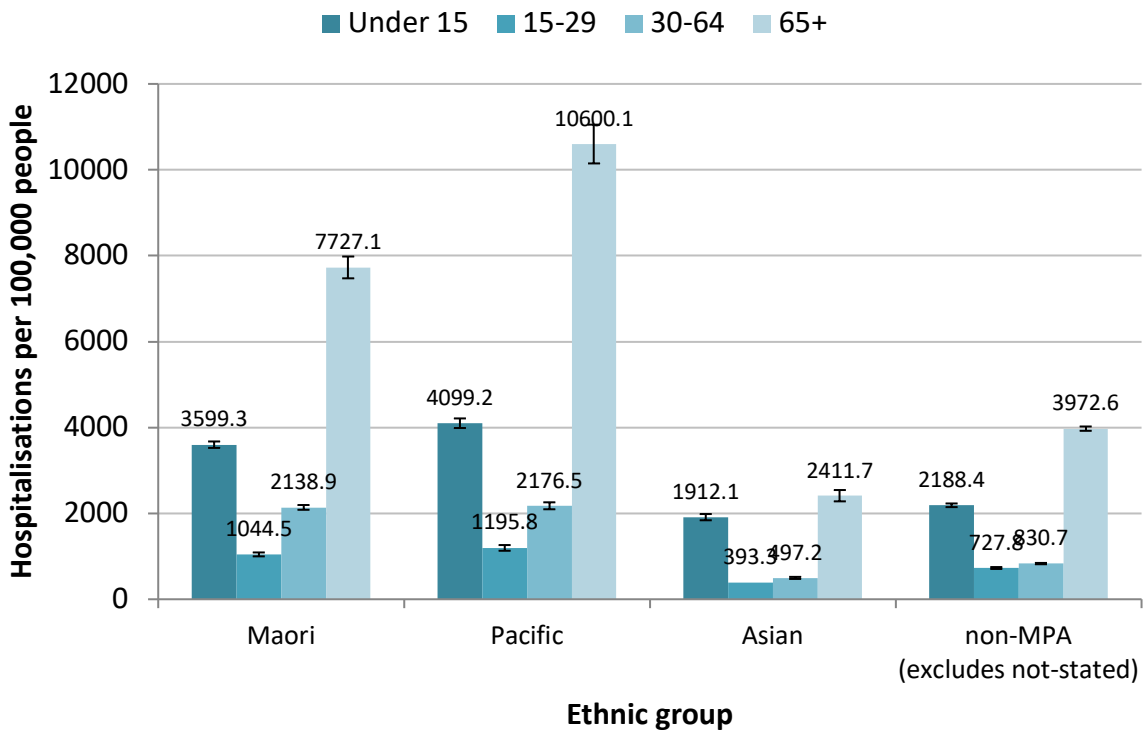
(See Table A 103 for data)

Figure 83. Respiratory hospitalisation rate ratio to non-MPA by ethnic group, 2000 – 2017, age-adjusted.



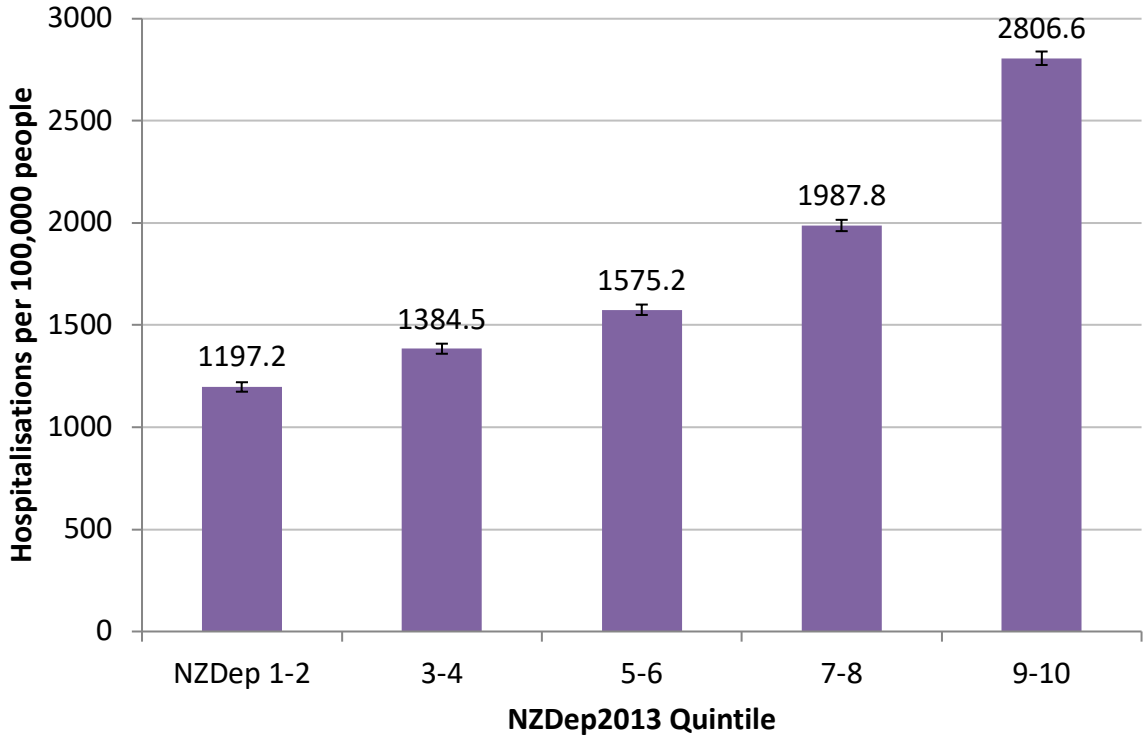
See Table A 104and Table A 105 for data.

Figure 84. Total respiratory hospitalisations per 100,000 people by ethnic group and age group, 2017.



(See Table A 106 for data)

Figure 85. Total respiratory hospitalisations per 100,000 people by NZDep2013 quintile, 2017, age-adjusted.



(See Table A 107 for data)

Figure 86. Total respiratory hospitalisation rate ratio to NZDep 1-2 by NZDep2013 quintile, 2000-2017, age-adjusted.

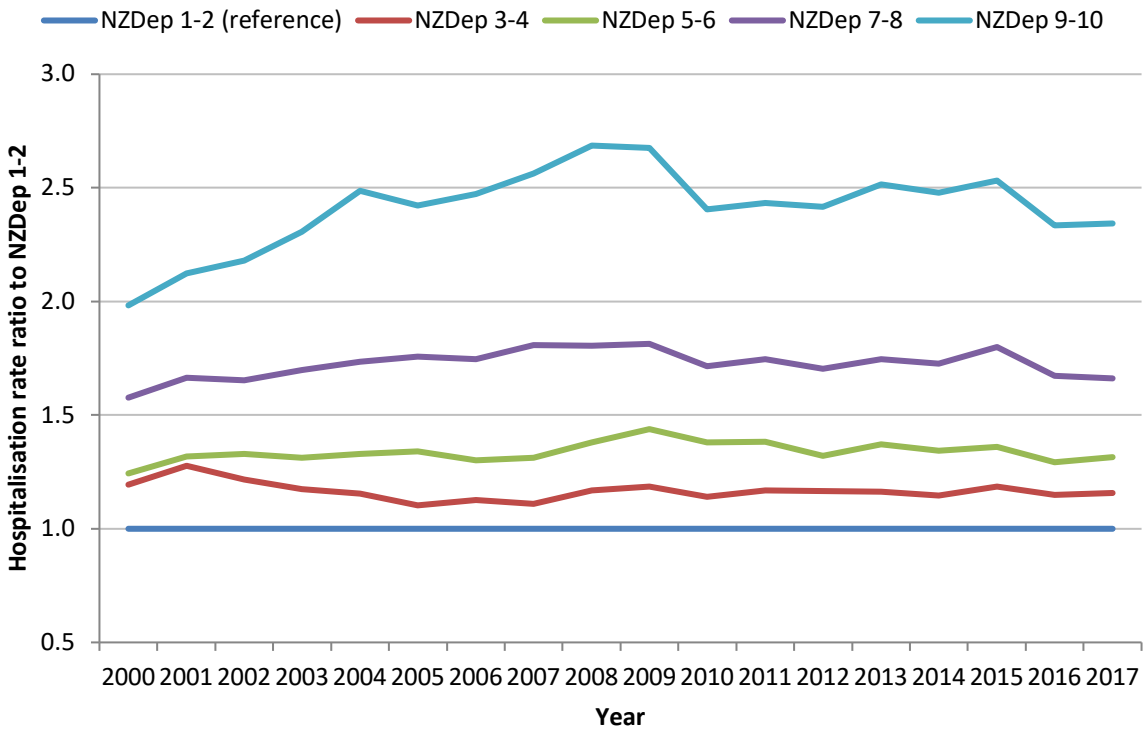
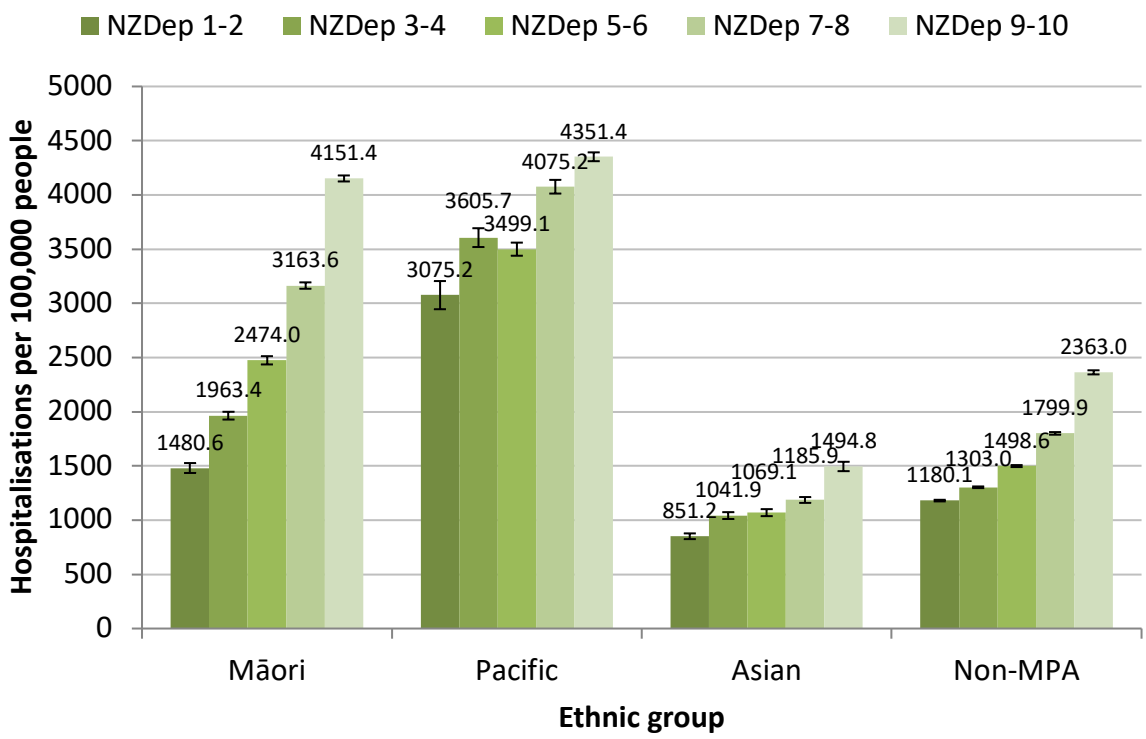
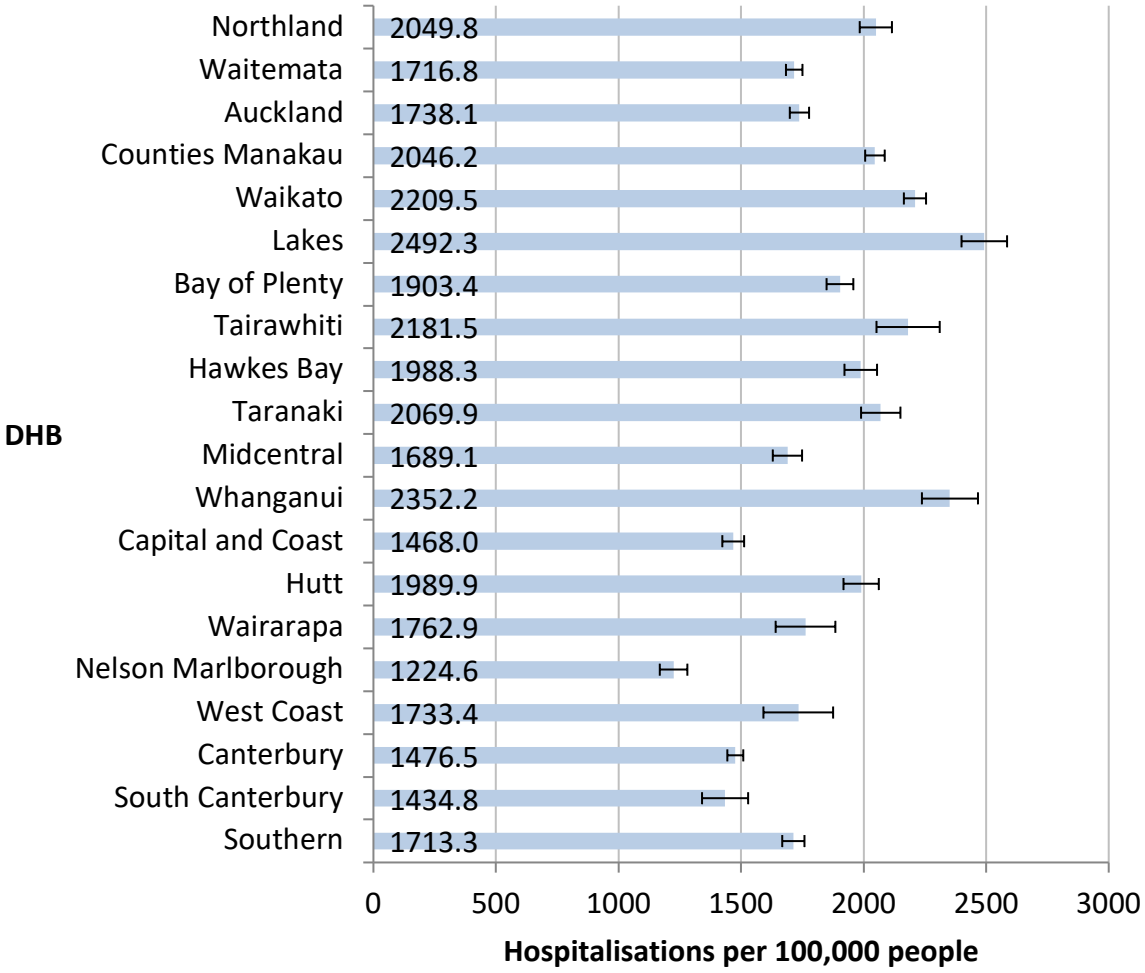


Figure 87. Total respiratory hospitalisations per 100,000 people by ethnic group and NZDep2013, 2017, age-adjusted.



(See Table A 110 for data)

Figure 88. Total respiratory hospitalisations per 100,000 people by DHB, 2017.



(see Table A 111 for data)

6.7.2. TOTAL RESPIRATORY MORTALITY

New research

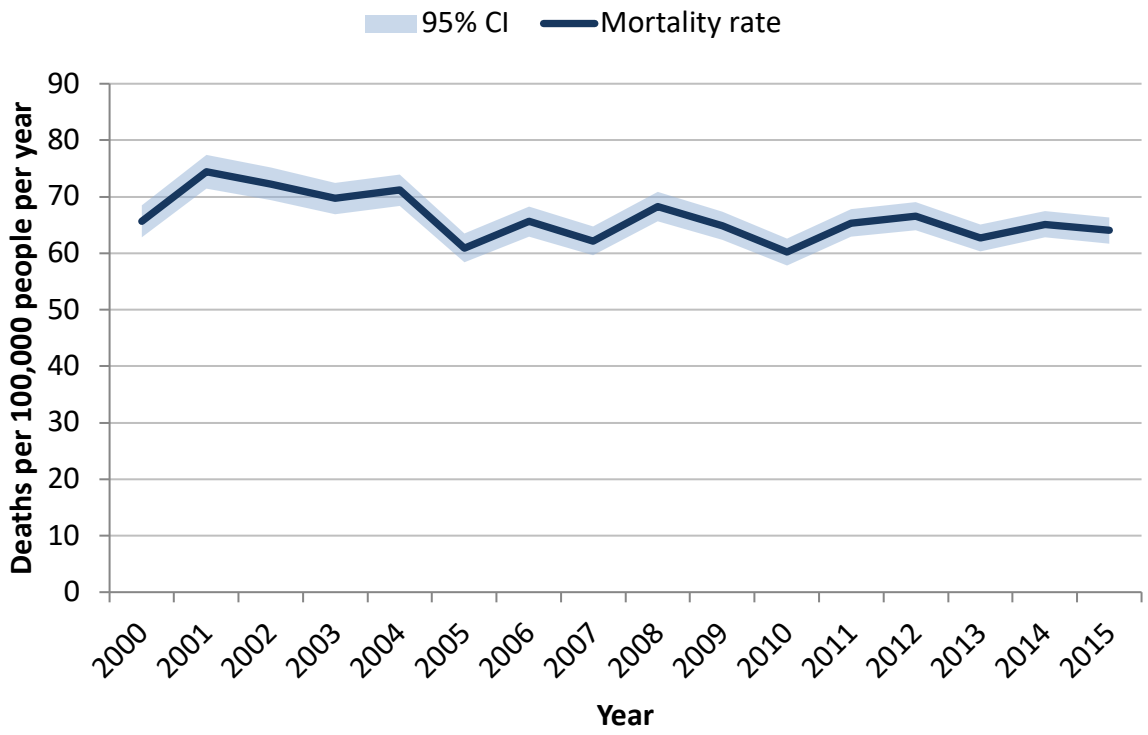
In 2014 Kessaram et al had estimated seasonal influenza to account for 10.6 deaths per 100,000 people over the period 1990 to 2008.[32] Further modelling by Khieu et al increased that estimate to 13.5 per 100,000 over the period 1994 to 2008, with 1.8% of all New Zealand deaths attributable to seasonal influenza. Males were at greater risk than females (rate ratio 1.9); Māori and Pacific peoples had higher rates than non-MPA (rate ratios 3.6 and 2.4 respectively); and those in the most socioeconomically deprived areas (NZDep 9-10) had higher rates than those in the least deprived areas (NZDep 1-2) (rate ratio 1.8).[33]

Trends 2000 - 2015

Respiratory disease was the cause of 2922 deaths in 2015. There were 64.0 deaths per 100,000 people, which was not significantly different from the 65.6 deaths in 2000. Earlier

reports detected a trend of declining respiratory mortality rates, but the longer study period shows that while respiratory mortality rates were higher than average between 2001 and 2004, and there is a linear trend, there is no sign of further decline after 2004.

Figure 89. Total respiratory mortality rates 2000-2015, age-adjusted.



(See Table A 112 for data)

Risks and determinants 2010 - 2015

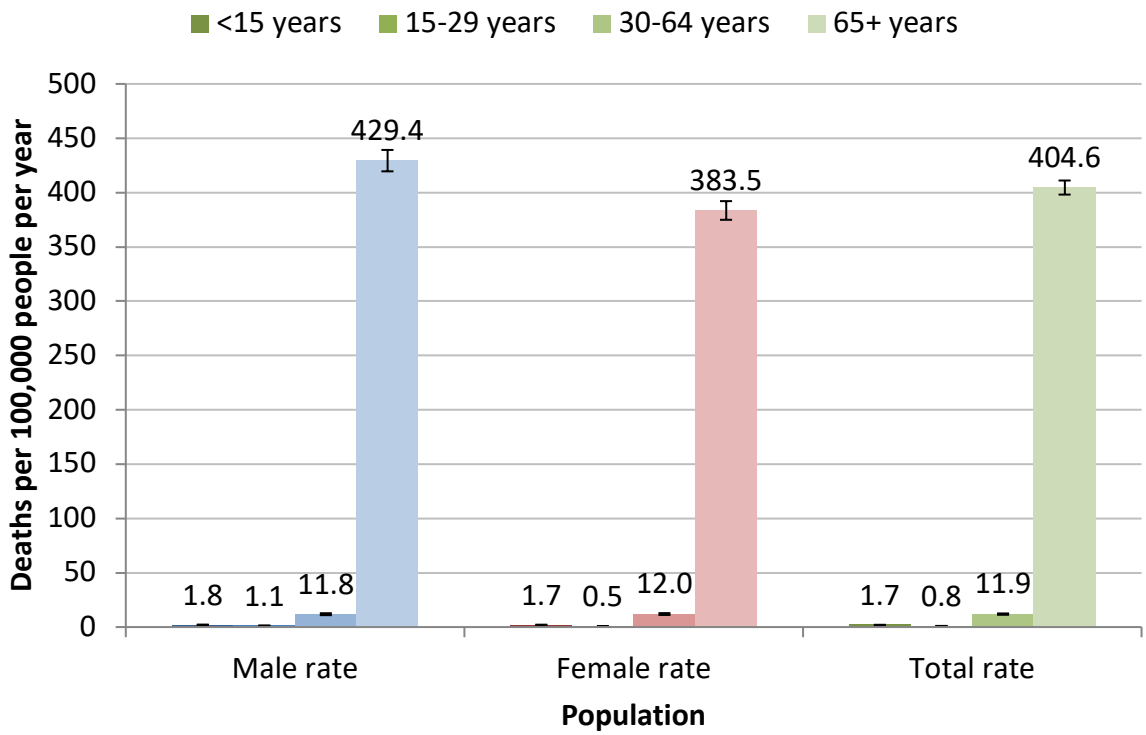
Over the period 2010 – 2015, mortality rates due to any respiratory disease were 36.2 times higher in people aged 65+ than in adults aged 30-64. Mortality rates were higher in males than females in people aged 15 to 29 years and over 65 years, but not significantly different in adults aged 30-64 and children younger than 15 years (Figure 90).

Respiratory mortality rates were highest in Māori, with a rate ratio to non-MPA of 1.73; and also higher for Pacific peoples (rate ratio 1.27). However, the rate for Asian peoples was nearly half that of non-MPA (rate ratio 0.52) (Figure 91).

Respiratory mortality rates also increased with increasing socio-economic deprivation. Rates for the most deprived quintile were had a rate ratio of 1.80 to rates for the least deprived quintile (Figure 93). The deprivation gradient was present for all ethnic groups, though less linear for Pacific peoples (Figure 94).

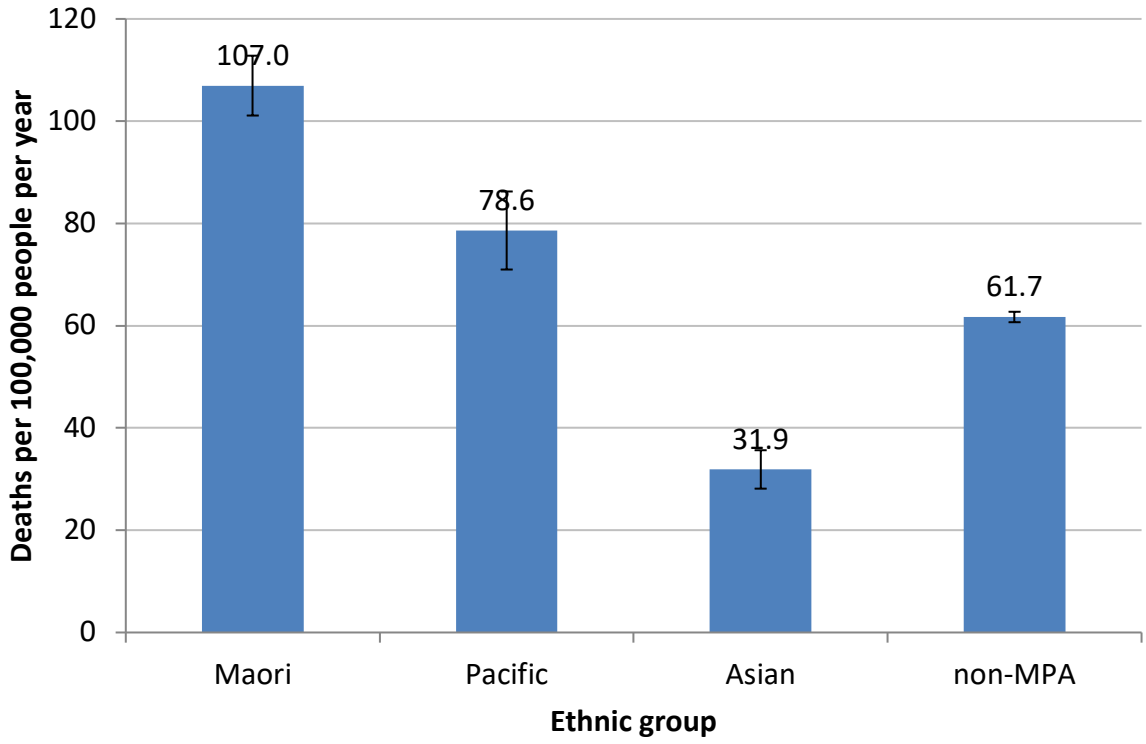
Total respiratory mortality rates were highest in the Tairawhiti and Lakes DHBs, and also significantly higher than the national average in seven other DHBs. Rates were lowest in Waitemata, Capital and Coast, and Auckland DHBs (Figure 95).

Figure 90. Total respiratory deaths per 100,000 people by age group and sex, 2010-2015.



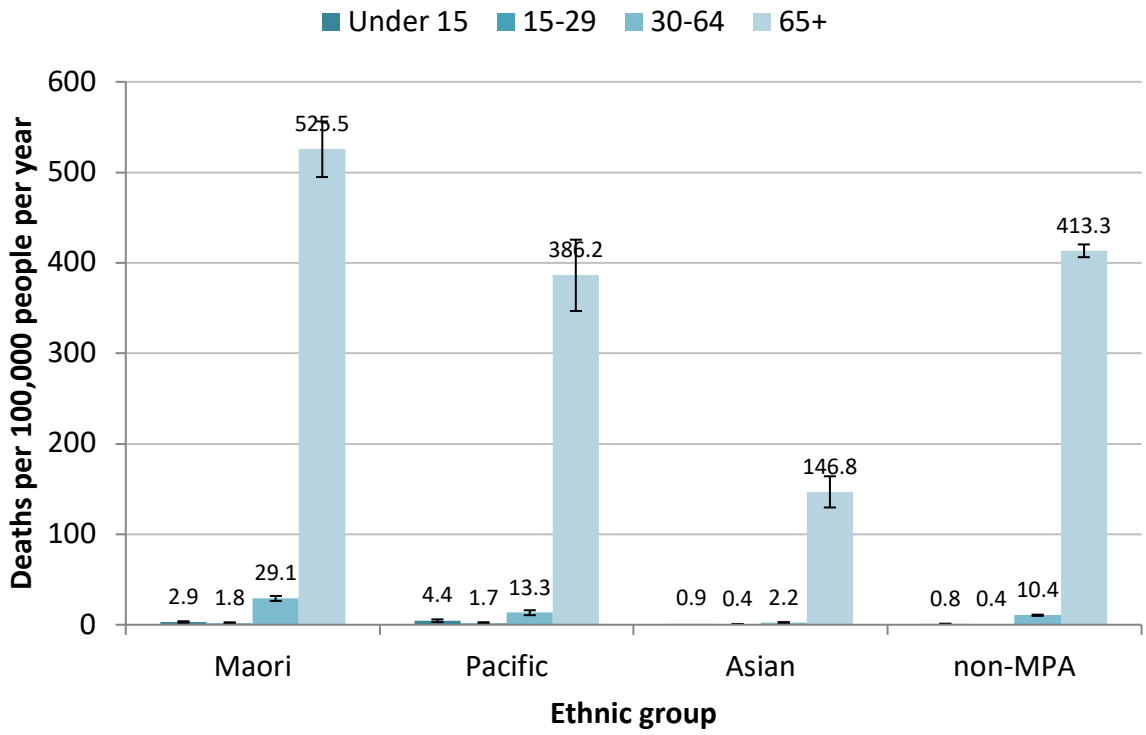
(See Table A 113 and Table A 114 for data)

Figure 91. Total respiratory mortality per 100,000 people per year by ethnic group, 2010-2015.



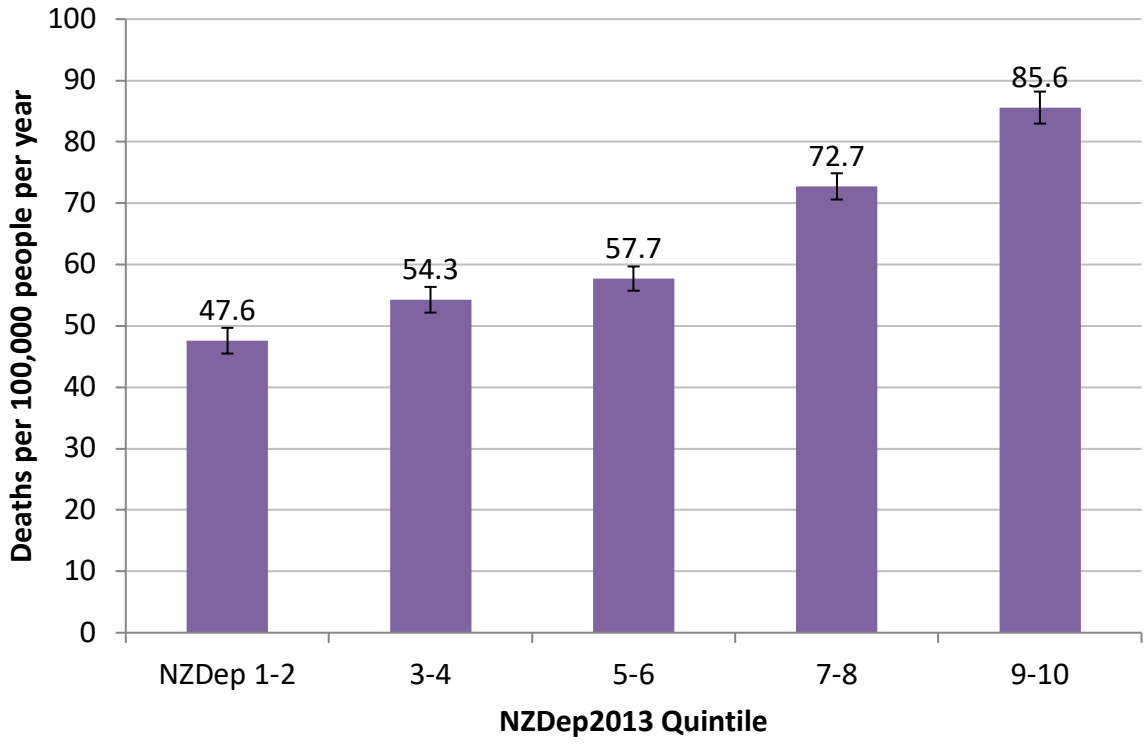
(See Table A 115 for data)

Figure 92. Total respiratory deaths per 100,000 people per year, by ethnic group and age group, 2010-2015.



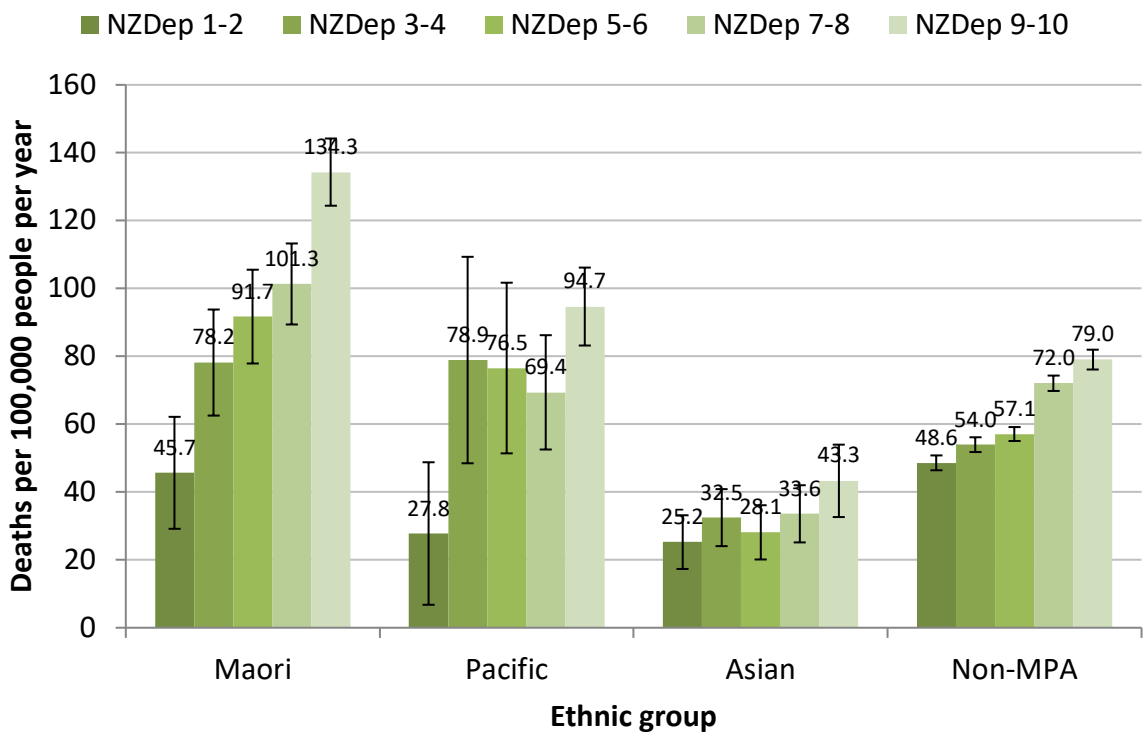
(See Table A 116 for data)

Figure 93. Total respiratory deaths per 100,000 people by NZDep2013 quintile, 2010-2015, age-adjusted.



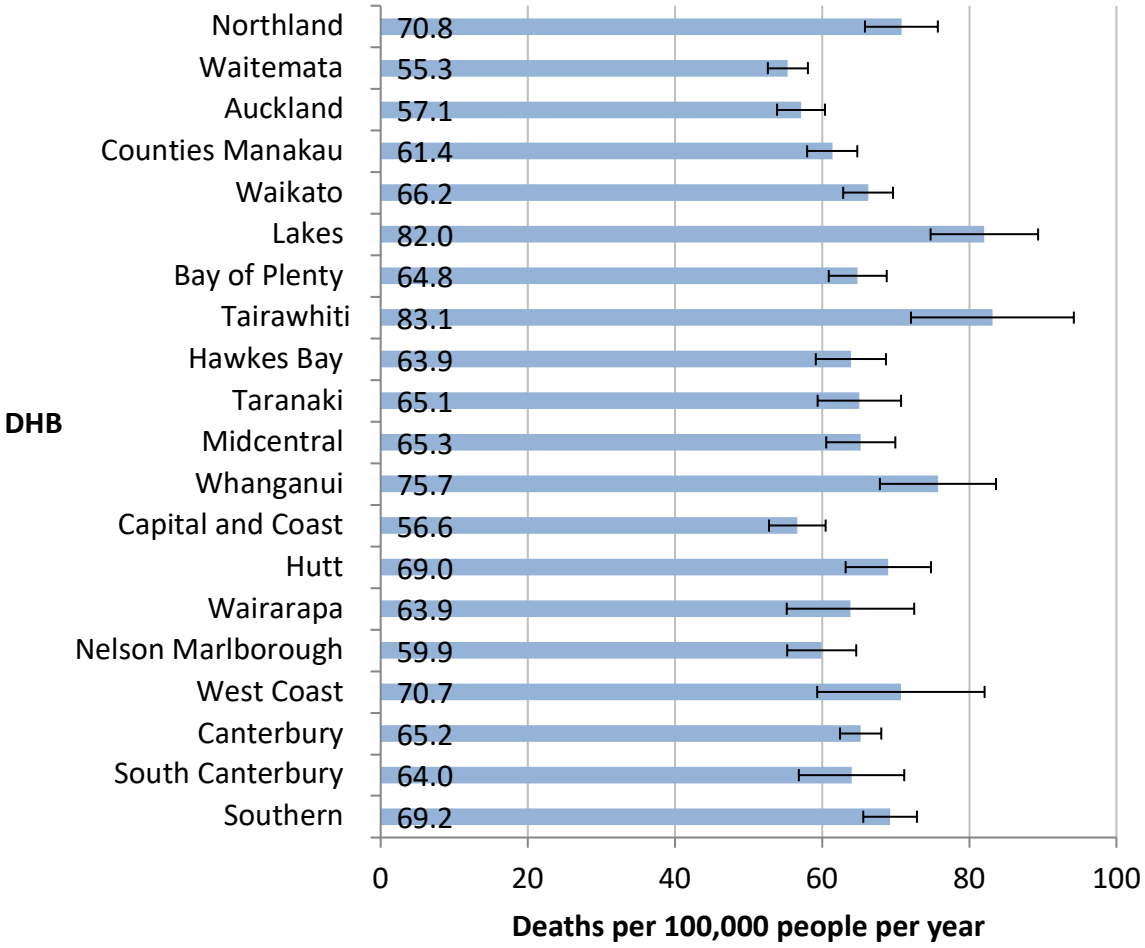
(See Table A 117 for data)

Figure 94. Total respiratory deaths per 100,000 people by ethnic group and NZDep2013, 2010-2015, age-adjusted.



(See Table A 118 for data)

Figure 95. Total respiratory deaths per 100,000 people per year, by DHB, 2010-2015, age-adjusted



(see Table A 119 for data)

6.8. COST SUMMARY

The total cost of respiratory (ICD-10 Chapter 10) deaths in 2015 was $5,200,546,556, from 29,549 life years lost.

The total cost of asthma (J45 and J46) deaths in 2015 was $247,982,240, from 1409 life years lost

The total cost of respiratory (ICD-10 Chapter 10) hospitalisations in 2015 was $333,505,940.

The total cost of asthma (J45 and J46) hospitalisations in 2015 was $17,077,337.

The total cost to New Zealand (whether paid by patients or the State) of respiratory prescriptions in 2015 was $82,474,632.

Combining public and private costs of doctors' visits for any respiratory condition, we estimate a minimum total cost of $49,004,860.

The cost of doctors' visits for asthma, for adults aged 15+ was estimated at $18,856,970, and the cost of prescriptions was estimated at $35,557,064. For children these estimates were $2,754,175 and $2,102,368 respectively.

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	$39,347,086	$4,232,557	$43,579,643
Doctors' visits:	$2,754,175	$18,856,970	$21,611,144
Prescriptions:	$2,102,368	$35,557,064	$37,659,432
ED and OP visits:			$121,993,745
Hospitalisations:	$7,360,497	$9,716,840	$17,077,337
YLDs			$536,641,796
Mortality:	$27,665,440	$220,316,800	$247,982,240
TOTAL:	$78,297,057	$280,992,007	$1,017,924,605

	All respiratory
Doctors' visits:	$49,004,860
Prescriptions:	$82,474,632
Hospitalisations:	$333,505,940
YLDs:	$1,388,834,751
Mortality:	$5,200,546,556
TOTAL:	$7,054,366,739

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

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 refinement in the method. The cost of work days lost due to children's asthma has increased substantially due to a calculation correction.

The cost of doctors' visits attributed to asthma has decreased for children due to an overall reduction in prescription costs, a reduction is private doctors' visits costs not yet adjusted

for in public costs in the method, and also a marked reduction in the proportion of prescriptions issued to children.

The cost of ED and OP visits has also increased due to a calculation correction.

The cost of asthma hospitalisations reduced because asthma hospitalisation numbers dropped between 2013 and 2015. The cost of child asthma mortality has decreased because two children died of asthma in 2015, compared to three children in 2013.

7. RECOMMENDATIONS

Recommendations have changed little since the previous report, though we note Counties Manukau no longer has the country's highest rates for respiratory disease hospitalisation.

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 Lakes DHB; 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 again 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. ASTHMA PREVALENCE

Table A 1. Age-standardised medicated asthma rates by age-group and sex, 2016/17

Population group	Total %	Total 95% CI	Male %	Male 95% CI	Female %	Female 95% CI	M vs F RR	M vs F 95% CI
Total children <15 years	14.9	(13.6 - 16.3)	15.5	(13.6 - 17.7)	14.2	(12.5 - 16.1)	1.53	(1.27–1.86)
2–4 years	12.4	(10.2 - 15.1)	15.4	(12.2 - 19.3)	9.0	(6.4 - 12.7)		
5–9 years	16.3	(13.7 - 19.2)	19.9	(16.3 - 24.1)	12.4	(9.5 - 16.1)		
10–14 years	13.3	(11.1 - 15.8)	15.4	(12.3 – 19.0)	11.2	(8.5 - 14.6)		
Total adults	12.0	(11.2 - 12.8)	9.9	(8.8 - 11.1)	14.0	(13.0 – 15.0)	0.71	(0.62–0.81)
15–24 years	11.2	(9.4 - 13.2)	9.4	(7.0 - 12.4)	13.1	(10.4 - 16.3)		
25–34 years	11.5	(9.8 - 13.5)	10.3	(7.9 - 13.4)	12.7	(10.5 - 15.3)		
35–44 years	11.8	(10.0 - 13.9)	8.9	(6.7 - 11.7)	14.5	(12.0 - 17.4)		
45–54 years	11.6	(9.8 - 13.7)	9.2	(6.7 - 12.4)	13.8	(11.5 - 16.5)		
55–64 years	13.9	(11.8 - 16.3)	12.8	(10.0 - 16.2)	14.9	(12.3 – 18.0)		
65–74 years	11.8	(10.2 - 13.6)	8.9	(6.8 - 11.6)	14.5	(12.4 - 16.9)		
75+ years	12.6	(10.6 – 15.0)	9.4	(6.8 - 12.7)	15.2	(12.4 - 18.6)		

Table A 2. Medicated asthma prevalence by ethnic group 2016/17, children and adults

Population group	Children %	Children 95% CI	Children RR* to rest of population	Adults %	Adults 95% CI	Adults RR* to rest of population
Total	14.9	(13.6 - 16.3)		12.0	(11.2 - 12.8)	
Māori	17.8	(15.1 - 20.8)	**1.36 (1.11–1.66)**	16.4	(14.4 - 18.8)	**1.48 (1.24–1.75)**
Pacific	15.6	(12.6 - 19.3)	1.10 (0.86–1.41)	11.4	(9 - 14.4)	0.96 (0.75–1.23)
Asian	9.8	(7.3 - 13.2)	**0.66 (0.48–0.91)**	6.5	(4.9 - 8.7)	**0.52 (0.39–0.69)**
European/Other	14.8	(12.8 - 17)	Not given	12.7	(11.8 - 13.7)	Not given

*Rate ratios are age and sex adjusted.

Rate ratios in bold are statistically significant (p<0.05)

Table A 3. Child medicated asthma prevalence 2016/17 by NZDep2013, unadjusted

NZDep quintile	Total %	Total 95% CI	Boys %	Boys 95% CI	Girls %	Girls 95% CI
1-2	11.7	(8.4 - 16)	17.8	(13.2 - 23.7)	5.4	(2.8 - 10.3)
3-4	13.2	(9.5 - 18.1)	16.3	(11.4 - 22.9)	9.4	(5.8 - 14.9)
5-6	13.7	(10.9 - 17.1)	16.4	(12.6 - 21.1)	10.9	(6.7 - 17)
7-8	15.4	(12.3 - 19.2)	17.8	(13.5 - 23.3)	13.2	(9.3 - 18.4)
9-10	17	(14.7 - 19.6)	17.6	(14.5 - 21.2)	16.4	(12.9 - 20.6)
Age-adjusted rate ratio 9-10 vs 1-2	**1.56**	**(1.03–2.35)**	0.94	(0.59–1.51)	**3.55**	**(1.86–6.81)**

Table A 4. Adult medicated asthma prevalence 2016/17 by NZDep2013, unadjusted

NZDep quintile	Total		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
1-2	11.7	(9.7 - 14)	9.8	(7.1 - 13.4)	13.5	(11.2 - 16)
3-4	10.9	(9.5 - 12.6)	8.6	(6.5 - 11.3)	13.3	(11.1 - 15.7)
5-6	12.2	(10.8 - 13.8)	10.6	(8.7 - 12.9)	13.7	(11.8 - 15.8)
7-8	12.1	(10.4 - 14.1)	9.3	(7.2 - 11.8)	14.9	(12.5 - 17.5)
9-10	13.1	(11.5 - 14.8)	11.3	(9 - 14.1)	14.6	(12.7 - 16.6)
Age and ethnicity adjusted rate ratio 9-10 vs 1-2	1.11	(0.85–1.45)	1.18	(0.75–1.85)	1.06	(0.80–1.41)

Table A 5. Children (aged 2-14) and adult (aged 15+) medicated asthma prevalence by DHB 2016/17

District Health Boards (DHB)	Unadjusted prevalence (2016/17)			
	Children		Adults	
	%	(95% CI)	%	(95% CI)
New Zealand	14.3	(12.8-16.0)	12.0	(11.2-12.8)
Northland	9.1	(5.3-15.4)	9.5	(7.0-12.8)
Waitemata	11.6	(7.4-17.8)	**8.8**	**(7.0-11.1)**
Auckland	**10.4**	**(7.5-14.2)**	11.1	(9.1-13.6)
Counties-Manukau	14.7	(10.6-20.0)	**9.6**	**(7.6-12.1)**
Waikato	13.9	(9.9-19.3)	12.8	(10.3-15.8)
Bay of Plenty	15.7	(10.2-23.5)	9.2	(6.7-12.6)
Tairawhiti	14.9	(8.5-24.8)	9.3	(5.8-14.6)
Lakes	15.2	(7.5-28.4)	13.7	(9.6-19.2)
Taranaki	21.5	(14.3-31.0)	10.4	(7.9-13.6)
Hawkes Bay	14.3	(9.2-21.6)	11	(9.1-13.3)
Whanganui	20.1	(11.6-32.5)	**16.3**	**(13.4-19.8)**
MidCentral	20.2	(14.1-28.1)	18.7	(14.3-24.0)
Capital and Coast	14	(8.4-22.5)	12.7	(9.9-16.2)
Hutt Valley	20.2	(13.8-28.5)	**18.4**	**(15.1-22.2)**
Wairarapa	15	(5.5-34.9)	14.2	(10.3-19.1)
Nelson-Marlborough	13.9	(8.7-21.4)	11.2	(9.4-13.4)
West Coast	21.2	(12.4-33.9)	14.8	(8.1-25.5)
Canterbury	12.9	(8.8-18.5)	13.1	(10.3-16.6)
South Canterbury	9.1	(3.5-21.8)	**17.3**	**(12.9-22.7)**
Southern	17.1	(11.3-25.1)	13.6	(10.9-17.0)
Bold values were statistically significantly different from the NZ rate				

Data source: Ministry of Health New Zealand Health Survey 2016/17 data tables.

9.1.2. ASTHMA HOSPITALISATIONS

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

Table A 6. Asthma hospitalisations, rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		raw	age adj'd	95% CI
2000	7519	194.9	187.5	(183.2-191.7)
2001	8088	208.4	200.8	(196.4-205.3)
2002	7755	196.4	192.0	(187.7-196.3)
2003	8232	204.4	200.6	(196.2-204.9)
2004	8356	204.4	201.3	(197-205.7)
2005	8536	206.5	204.6	(200.3-209)
2006	8214	196.3	195.0	(190.8-199.2)
2007	7874	186.4	184.8	(180.7-188.9)
2008	8471	198.9	196.5	(192.3-200.7)
2009	9381	218.0	214.6	(210.2-218.9)
2010	9346	214.8	211.3	(207-215.6)
2011	8650	197.3	194.7	(190.6-198.8)
2012	8289	188.0	186.2	(182.2-190.2)
2013	7501	168.9	168.1	(164.3-171.9)
2014	7353	163.0	163.2	(159.4-166.9)
2015	7599	165.3	166.4	(162.7-170.2)
2016	7278	155.1	156.7	(153.1-160.3)
2017	7685	160.3	162.1	(158.4-165.7)
Trend 2000 -2017			-2.24	(-3.54 - -0.94), p=0.002

Table A 7. 2017 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	3050	326.6	(315.1-338.2)	1750	365.3	(348.2-382.5)	1300	285.9	(270.3-301.4)	0.78	(0.76-0.81)	
15-29	1326	128.2	(121.3-135.1)	368	69.3	(62.2-76.4)	958	190.4	(178.4-202.5)	2.75	(2.59-2.91)	
30-64	2528	120.2	(115.5-124.9)	813	80.2	(74.7-85.7)	1715	157.5	(150-165)	1.96	(1.89-2.05)	
65+	781	108.0	(100.4-115.6)	229	68.0	(59.2-76.8)	552	142.9	(131-154.9)	2.10	(1.95-2.27)	

Table A 8. 2017 asthma hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	2.72	(2.65-2.79)	4.56	(4.38-4.74)	1.82	(1.75-1.88)
15-29	1.07	(1.03-1.1)	0.86	(0.81-0.92)	1.21	(1.16-1.26)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	0.90	(0.86-0.93)	0.85	(0.79-0.91)	0.91	(0.87-0.95)

Table A 9. 2017 asthma hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	2666	354.9	329.0	(315.1-342.9)	2.84	(2.76-2.91)
Pacific	1365	361.6	373.0	(349.2-396.9)	3.21	(3.1-3.33)
Asian	658	93.2	99.9	(91.7-108)	0.86	(0.82-0.9)
Non-MPA	3292	107.9	116.0	(112-120.1)	1.00	Baseline

Table A 10. Asthma hospitalisation rates and rate ratios by ethnic group 2000 - 2017.

Year	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
2000	2180	320.7	(303.4-338.1)	984	332.1	(304.7-359.5)	252	100.8	(84.7-116.8)	4128	155.3	(150.5-160.0)
2001	2328	325.1	(308.7-341.5)	1248	392.2	(363.3-421.1)	356	141.7	(123.4-160.0)	4182	158.0	(153.2-162.8)
2002	2431	348.4	(331.2-365.6)	1246	434.5	(402.3-466.7)	336	111.9	(97.9-125.8)	3809	143.0	(138.5-147.6)
2003	2554	376.1	(357.2-395.1)	1474	449.2	(419.5-478.8)	407	129.1	(113.0-145.3)	3917	147.4	(142.8-152.1)
2004	2605	359.0	(342.2-375.8)	1535	443.6	(414.8-472.4)	459	134.6	(120.0-149.3)	3894	147.0	(142.4-151.7)
2005	2731	371.3	(353.8-388.7)	1527	422.2	(394.8-449.5)	529	150.8	(136.1-165.6)	3924	148.9	(144.2-153.6)
2006	2644	348.0	(332.2-363.9)	1516	438.0	(408.2-467.8)	555	151.5	(137.2-165.9)	3700	137.9	(133.4-142.4)
2007	2611	342.1	(326.6-357.7)	1615	459.8	(430.6-488.9)	527	132.8	(120.4-145.2)	3357	125.1	(120.9-129.4)
2008	2677	343.6	(328.0-359.1)	1732	470.4	(442.4-498.4)	632	157.6	(143.5-171.6)	3664	136.3	(131.8-140.7)
2009	3188	396.7	(381.0-412.3)	1863	484.9	(457.7-512.1)	707	167.0	(153.3-180.8)	3945	145.8	(141.2-150.4)
2010	3125	376.9	(361.4-392.4)	1777	467.9	(440.5-495.2)	757	174.7	(160.3-189.2)	4017	148.6	(144.0-153.3)
2011	2856	349.2	(333.9-364.5)	1720	463.1	(435.4-490.8)	761	170.8	(156.2-185.3)	3704	136.1	(131.6-140.5)
2012	2713	333.1	(318.8-347.5)	1627	411.5	(386.7-436.4)	725	159.9	(146.0-173.7)	3537	130.9	(126.6-135.3)
2013	2515	311.2	(297.4-324.9)	1494	385.4	(361.1-409.7)	729	150.8	(138.3-163.3)	3036	112.4	(108.3-116.4)
2014	2455	300.5	(287.0-314.0)	1392	369.7	(346.2-393.3)	630	119.4	(109.0-129.8)	3134	114.5	(110.4-118.5)
2015	2681	323.5	(309.8-337.3)	1380	365.8	(342.0-389.5)	659	119.2	(109.2-129.2)	3143	114.6	(110.5-118.7)
2016	2475	297.1	(284.1-310.1)	1364	355.3	(332.6-378.0)	658	106.3	(97.6-115.0)	3058	111.5	(107.5-115.5)
2017	2666	329.0	(315.1-342.9)	1365	373.0	(349.2-396.9)	658	99.9	(91.7-108.0)	3292	116.0	(112.0-120.1)

Table A 11. Asthma hospitalisation ethnic group rate ratios to non-MPA, 2000 – 2017.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.07	(2.00 - 2.13)	2.14	(2.05 - 2.23)	0.65	(0.60 - 0.70)
2001	2.06	(2.00 - 2.12)	2.48	(2.39 - 2.58)	0.90	(0.84 - 0.96)
2002	2.44	(2.37 - 2.51)	3.04	(2.92 - 3.16)	0.78	(0.73 - 0.83)
2003	2.55	(2.48 - 2.63)	3.05	(2.94 - 3.16)	0.88	(0.82 - 0.93)
2004	2.44	(2.38 - 2.51)	3.02	(2.91 - 3.13)	0.92	(0.87 - 0.97)
2005	2.49	(2.43 - 2.56)	2.83	(2.74 - 2.94)	1.01	(0.96 - 1.06)
2006	2.52	(2.46 - 2.59)	3.18	(3.06 - 3.29)	1.10	(1.05 - 1.15)
2007	2.73	(2.66 - 2.81)	3.67	(3.55 - 3.8)	1.06	(1.01 - 1.11)
2008	2.52	(2.45 - 2.59)	3.45	(3.34 - 3.57)	1.16	(1.10 - 1.21)
2009	2.72	(2.66 - 2.79)	3.33	(3.22 - 3.43)	1.15	(1.10 - 1.20)
2010	2.54	(2.47 - 2.6)	3.15	(3.05 - 3.25)	1.18	(1.13 - 1.23)
2011	2.57	(2.50 - 2.64)	3.40	(3.29 - 3.52)	1.26	(1.20 - 1.31)
2012	2.54	(2.48 - 2.61)	3.14	(3.04 - 3.25)	1.22	(1.17 - 1.28)
2013	2.77	(2.69 - 2.85)	3.43	(3.31 - 3.55)	1.34	(1.28 - 1.40)
2014	2.63	(2.55 - 2.70)	3.23	(3.12 - 3.35)	1.04	(1.00 - 1.09)
2015	2.82	(2.75 - 2.90)	3.19	(3.08 - 3.31)	1.04	(1.00 - 1.09)
2016	2.66	(2.59 - 2.74)	3.19	(3.08 - 3.30)	0.95	(0.91 - 1.00)
2017	2.84	(2.76 - 2.91)	3.21	(3.10 - 3.33)	0.86	(0.82 - 0.90)

Table A 12. 2017 asthma hospitalisation rates by ethnic group and age.

Age	Māori			Pacific			Asian			non-MPA		
(years)	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	1196	487.6	(459.9-515.2)	607	481.4	(443.1-519.7)	318	229.1	(203.9-254.3)	1118	236.7	(222.8-250.5)
15-29	537	275.8	(252.4-299.1)	241	232.0	(202.7-261.3)	88	47.7	(37.8-57.7)	531	91.7	(83.9-99.5)
30-64	823	310.3	(289.1-331.5)	407	319.2	(288.2-350.2)	182	55.2	(47.2-63.2)	1150	82.4	(77.6-87.1)
65+	110	239.0	(194.4-283.7)	110	550.5	(447.6-653.4)	70	131.3	(100.5-162)	493	81.5	(74.3-88.7)

Table A 13. 2017 asthma hospitalisation rates by NZDep2013 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	867	93.5	97.6	(91.1-104.2)	1.00	Baseline
3-4	969	108.0	111.0	(104.0-118.1)	1.14	(1.09-1.19)
5-6	1200	129.7	133.5	(125.9-141.1)	1.37	(1.31-1.43)
7-8	1818	183.9	186.8	(178.2-195.5)	1.91	(1.84-1.99)
9-10	2825	267.8	263.6	(253.8-273.5)	2.70	(2.60-2.80)

Table A 14. Asthma hospitalisation rates by NZDep2013 quintile 2000 - 2017.

	NZDep 1-2		NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI
2000	752	116.4 (107.9-124.8)	1032	150.4 (141.1-159.6)	1212	155.9 (147.0-164.7)	1837	212.9 (203.1-222.8)	2665	265.0 (254.6-275.5)
2001	842	130.6 (121.6-139.5)	1105	159.8 (150.3-169.3)	1250	159.8 (150.9-168.7)	1897	218.9 (208.9-228.8)	2912	290.6 (279.8-301.5)
2002	746	112.5 (104.4-120.7)	968	138.0 (129.3-146.8)	1336	169.6 (160.5-178.8)	1760	205.5 (195.8-215.1)	2935	295.0 (284.0-306.0)
2003	805	119.1 (110.8-127.5)	988	138.5 (129.8-147.2)	1341	168.8 (159.7-177.9)	1889	217.0 (207.1-226.8)	3172	314.3 (303.1-325.5)
2004	773	111.2 (103.3-119.2)	961	133.0 (124.5-141.5)	1373	173.2 (164.0-182.4)	1882	214.9 (205.1-224.6)	3360	328.2 (316.9-339.6)
2005	827	117.3 (109.2-125.3)	972	131.6 (123.3-139.9)	1385	175.6 (166.3-184.9)	2031	231.5 (221.4-241.6)	3305	320.6 (309.5-331.8)
2006	797	110.2 (102.5-117.9)	964	128.8 (120.6-136.9)	1233	153.4 (144.8-162.0)	1930	220.1 (210.3-230.0)	3283	319.2 (308.1-330.3)
2007	733	99.5 (92.2-106.7)	832	110.0 (102.5-117.5)	1143	141.2 (133.0-149.4)	1918	215.9 (206.2-225.6)	3241	315.6 (304.5-326.6)
2008	820	109.5 (101.9-117.0)	982	127.6 (119.6-135.7)	1324	162.0 (153.2-170.7)	1935	215.3 (205.6-224.9)	3386	327.8 (316.6-339.0)
2009	876	114.4 (106.8-122.0)	1098	140.0 (131.7-148.4)	1545	186.7 (177.3-196.0)	2138	235.0 (225.0-245.0)	3718	355.0 (343.4-366.6)
2010	940	120.3 (112.5-128.0)	1129	142.6 (134.2-150.9)	1543	184.3 (175.1-193.5)	2226	242.5 (232.4-252.6)	3504	333.0 (321.8-344.2)
2011	859	108.6 (101.3-115.9)	1058	131.8 (123.8-139.7)	1425	169.7 (160.9-178.5)	2019	219.5 (209.9-229.1)	3282	315.6 (304.7-326.6)
2012	835	103.1 (96.1-110.2)	1051	130.6 (122.7-138.5)	1310	155.9 (147.5-164.4)	1959	212.5 (203.1-222.0)	3133	302.2 (291.4-312.9)
2013	780	95.9 (89.1-102.6)	904	111.3 (104.0-118.6)	1181	140.1 (132.1-148.1)	1728	188.6 (179.7-197.5)	2900	281.2 (270.8-291.5)
2014	703	84.5 (78.2-90.8)	895	109.2 (102.0-116.3)	1171	137.2 (129.4-145.1)	1774	192.7 (183.7-201.7)	2805	268.9 (258.8-278.9)
2015	750	88.0 (81.6-94.3)	883	106.1 (99.1-113.1)	1144	132.9 (125.2-140.6)	1892	202.3 (193.1-211.5)	2911	276.4 (266.2-286.6)
2016	780	89.8 (83.5-96.2)	862	102.8 (95.9-109.7)	1046	119.5 (112.2-126.7)	1815	189.9 (181.1-198.7)	2774	259.4 (249.6-269.2)
2017	867	97.6 (91.1-104.2)	969	111.0 (104.0-118.1)	1200	133.5 (125.9-141.1)	1818	186.8 (178.2-195.5)	2825	263.6 (253.8-273.5)

Table A 15. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 - 2017.

	NZDep 3-4	NZDep 5-6	NZDep 7-8	NZDep 9-10
Year	RR 95% CI	RR 95% CI	RR 95% CI	RR 95% CI
2000	1.29 (1.23 - 1.35)	1.34 (1.28 - 1.40)	1.83 (1.76 - 1.91)	2.28 (2.19 - 2.37)
2001	1.22 (1.17 - 1.28)	1.22 (1.17 - 1.28)	1.68 (1.61 - 1.74)	2.23 (2.14 - 2.31)
2002	1.23 (1.17 - 1.29)	1.51 (1.44 - 1.58)	1.83 (1.75 - 1.90)	2.62 (2.52 - 2.73)
2003	1.16 (1.11 - 1.22)	1.42 (1.36 - 1.48)	1.82 (1.75 - 1.90)	2.64 (2.54 - 2.74)
2004	1.20 (1.14 - 1.25)	1.56 (1.49 - 1.63)	1.93 (1.85 - 2.01)	2.95 (2.84 - 3.07)
2005	1.12 (1.07 - 1.17)	1.50 (1.44 - 1.56)	1.97 (1.90 - 2.05)	2.73 (2.63 - 2.84)
2006	1.17 (1.12 - 1.22)	1.39 (1.33 - 1.45)	2.00 (1.92 - 2.08)	2.90 (2.79 - 3.01)
2007	1.11 (1.05 - 1.16)	1.42 (1.36 - 1.48)	2.17 (2.08 - 2.26)	3.17 (3.05 - 3.30)
2008	1.17 (1.11 - 1.22)	1.48 (1.42 - 1.54)	1.97 (1.89 - 2.05)	2.99 (2.89 - 3.11)
2009	1.22 (1.17 - 1.28)	1.63 (1.57 - 1.70)	2.05 (1.98 - 2.13)	3.10 (2.99 - 3.22)
2010	1.19 (1.14 - 1.24)	1.53 (1.47 - 1.59)	2.02 (1.94 - 2.09)	2.77 (2.67 - 2.87)
2011	1.21 (1.16 - 1.27)	1.56 (1.50 - 1.63)	2.02 (1.94 - 2.10)	2.91 (2.80 - 3.02)
2012	1.27 (1.21 - 1.32)	1.51 (1.45 - 1.58)	2.06 (1.98 - 2.14)	2.93 (2.82 - 3.04)
2013	1.16 (1.11 - 1.22)	1.46 (1.40 - 1.53)	1.97 (1.89 - 2.05)	2.93 (2.82 - 3.05)
2014	1.29 (1.23 - 1.36)	1.62 (1.55 - 1.70)	2.28 (2.19 - 2.38)	3.18 (3.06 - 3.31)
2015	1.21 (1.15 - 1.26)	1.51 (1.44 - 1.58)	2.30 (2.21 - 2.40)	3.14 (3.02 - 3.27)
2016	1.14 (1.09 - 1.20)	1.33 (1.27 - 1.39)	2.11 (2.03 - 2.20)	2.89 (2.78 – 3.00)
2017	1.14 (1.09 - 1.19)	1.37 (1.31 - 1.43)	1.91 (1.84 - 1.99)	2.70 (2.60 - 2.80)

Table A 16. 2017 asthma hospitalisation rates by ethnic group and NZDep2013 quintile.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	121	226	342	692	1282
	Rate (raw)	179.0	258.8	291.1	393.3	423.5
	Rate (age adj'd)	154.0	228.0	276.0	366.1	397.4
	95%CI	(125.0-183.0)	(196.2-259.9)	(244.2-307.8)	(335.1-397.1)	(372.8-422.1)
Pacific	Hosp_Num	54	85	152	322	749
	Rate (raw)	278.4	281.3	378.7	425.1	357.4
	Rate (age adj'd)	274.4	262.6	382.2	444.1	382.3
	95%CI	(193.2-355.6)	(189.8-335.5)	(314.4-450.1)	(382.1-506.2)	(348.3-416.3)
Asian	Hosp_Num	77	121	111	147	202
	Rate (raw)	63.5	82.6	83.5	103.5	125.1
	Rate (age adj'd)	61.2	92.9	91.2	114.2	140.6
	95%CI	(47.4-75.1)	(74.8-111.0)	(73.1-109.2)	(94.3-134.1)	(119.7-161.6)
NZ European/ Other	Hosp_Num	632	556	628	750	726
	Rate (raw)	85.4	84.3	97.4	122.0	185.4
	Rate (age adj'd)	89.6	89.2	105.8	135.3	208.4
	95%CI	(82.5-96.7)	(81.6-96.7)	(97.3-114.3)	(125.2-145.3)	(192.5-224.2)

Table A 17. 2017 asthma hospitalisation rates by DHB.

DHB	n	Rate		
		raw)	age adj'd	95%CI
Northland	276	157.4	161.4	(142.1-180.8)
Waitemata	887	146.4	145.3	(135.7-154.9)
Auckland	802	153.2	169.3	(157.3-181.3)
Counties Manukau	927	169.6	168.1	(157.1-179.0)
Waikato	892	218.2	216.4	(202.1-230.6)
Lakes	275	253.4	251.5	(221.6-281.3)
Bay of Plenty	432	186.2	189.2	(171.1-207.2)
Tairawhiti	122	251.5	235.4	(193.2-277.6)
Hawkes Bay	312	190.3	190.6	(169.3-211.9)
Taranaki	250	211.6	213.2	(186.6-239.8)
MidCentral	253	143.3	143.6	(125.8-161.5)
Whanganui	161	251.3	251.3	(212.0-290.6)
Capital and Coast	420	134.3	138.9	(125.5-152.4)
Hutt	340	229.8	229.9	(205.4-254.4)
Wairarapa	78	175.2	186.7	(144.4-228.9)
Nelson Marlborough	129	86.7	91.5	(75.4-107.6)
West Coast	45	138.6	145.9	(102.4-189.3)
Canterbury	638	115.7	120.3	(110.9-129.7)
South Canterbury	42	70.6	72.1	(49.8-94.3)
Southern	404	124.6	130.6	(117.7-143.4)

9.1.3. ASTHMA MORTALITY

Table A 18. 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 - 1.70)
2011	70	1.60	1.65	(1.27 - 2.04)
2012	64	1.45	1.49	(1.13 - 1.86)
2013	71	1.60	1.63	(1.25 - 2.00)
2014	91	2.02	2.04	(1.62 - 2.46)
2015	87	1.89	1.90	(1.50 - 2.30)
Trend 2000 -2015			-0.03	(-0.06 - -0.02), p=0.037

Table A 19. Asthma mortality rates and rate ratios by age group and sex, 2010-2015.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	15	0.3	(0.1-0.4)	6	0.2	(0.0-0.4)	9	0.3	(0.1-0.6)	1.58	(0.96-2.60)
15-29	20	0.4	(0.2-0.5)	11	0.4	(0.2-0.6)	9	0.3	(0.1-0.5)	0.83	(0.54-1.27)
30-64	102	0.8	(0.7-1.0)	29	0.5	(0.3-0.7)	73	1.2	(0.9-1.4)	2.34	(1.90-2.88)
65+	302	8.2	(7.2-9.1)	99	5.8	(4.7-7.0)	203	10.2	(8.8-11.6)	1.75	(1.55-1.96)

Table A 20. Asthma mortality rate ratios by age group and sex, 2010-2015.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.32	(0.25-0.42)	0.43	(0.28-0.66)	0.29	(0.21-0.4)
15-29	0.43	(0.34-0.54)	0.80	(0.57-1.11)	0.28	(0.2-0.4)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	9.64	(8.65-10.75)	11.64	(9.52-14.23)	8.69	(7.64-9.9)

Table A 21. Asthma mortality rates and rate ratios by ethnic group, 2010-2015.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	111	2.7	5.2	(4.1-6.4)	4.26	(3.77-4.82)
Pacific	35	1.7	3.9	(2.4-5.4)	3.20	(2.63-3.89)
Asian	21	0.7	1.5	(0.7-2.2)	1.21	(0.94-1.55)
Non-MPA	274	1.5	1.2	(1.1-1.4)	1.00	Baseline

Table A 22. Asthma mortality rates by ethnic group and age, 2010-2015

Age (years)	Māori		Pacific		Asian		non-MPA	
	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI
<15	8	0.6 (0.2-1)	4	0.5 (0-1.1)	1	0.2 (0-1.1)	2	0.1 (0-0.3)
15-29	11	1.1 (0.4-1.7)	4	0.7 (0-1.5)	2	0.2 (0.1-0.9)	4	0.1 (0-0.3)
30-64	49	3.3 (2.4-4.2)	9	1.3 (0.5-2.1)	7	0.5 (0.1-0.8)	39	0.5 (0.3-0.6)
65+	43	20.1 (14.1-26.2)	18	18.8 (10.1-27.5)	11	5.8 (2.4-9.2)	229	7.2 (6.2-8.1)

Table A 23. Asthma mortality rates NZDep2006 quintile, 2010-2015.

NZDep quintile	n	Rate		RR 95% CI
		Rate (raw)	Rate (age adj'd) 95% CI	
1-2	50	1.0	1.2 (0.8-1.5)	1.00 Baseline
3-4	74	1.5	1.5 (1.2-1.9)	1.33 (1.12-1.59)
5-6	63	1.2	1.1 (0.9-1.4)	0.98 (0.82-1.17)
7-8	122	2.2	2.1 (1.7-2.4)	1.78 (1.51-2.09)
9-10	126	2.1	2.5 (2.1-2.9)	2.16 (1.84-2.53)

Table A 24. Asthma mortality rates by ethnic group and NZDep quintile, 2010-2015.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	1	12	17	31	50
	Rate (raw)	0.3	2.6	2.7	3.2	2.9
	Rate (age adj'd)	0.6	6.0	4.9	5.0	6.2
	95%CI	(0.1-4.3)	(1.7-10.3)	(2.2-7.6)	(3.0-7.1)	(4.1-8.2)
Pacific	Hosp_Num	0	2	1	10	21
	Rate (raw)	0	1.3	0.5	2.4	1.8
	Rate (age adj'd)	0	0.8	0.3	5.7	4.8
	95%CI	-	(0.2-3.4)	(0.0-2.0)	(1.5-9.8)	(2.5-7.2)
Asian	Hosp_Num	3	4	3	4	5
	Rate (raw)	0.5	0.6	0.5	0.6	0.7
	Rate (age adj'd)	0.7	1.5	1.2	1.9	1.7
	95%CI	(0.2-2.5)	(0.5-4.9)	(0.4-4.3)	(0.7-5.4)	(0.5-5.1)
NZ European/ Other	Hosp_Num	46	57	42	78	50
	Rate (raw)	1.1	1.5	1.1	2.1	2.1
	Rate (age adj'd)	1.2	1.3	0.8	1.4	1.5
	95%CI	(0.8-1.5)	(1-1.6)	(0.6-1.1)	(1.1-1.8)	(1.1-1.9)

Table A 25. Asthma mortality rates by DHB, 2010-2015.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	25	2.54	2.38	(1.43-3.32)
Waitemata	48	1.45	1.62	(1.16-2.08)
Auckland	31	1.12	1.41	(0.91-1.91)
Counties Manukau	47	1.58	2.00	(1.42-2.59)
Waikato	34	1.50	1.51	(1.00-2.02)
Lakes	13	2.10	2.20	(1.00-3.39)
Bay of Plenty	20	1.55	1.36	(0.76-1.96)
Tairawhiti	5	1.77	1.91	(0.24-3.59)
Hawkes Bay	14	1.48	1.32	(0.63-2.02)
Taranaki	11	1.62	1.47	(0.60-2.35)
MidCentral	32	3.16	2.89	(1.89-3.89)
Whanganui	6	1.60	1.34	(0.27-2.41)
Capital and Coast	19	1.08	1.26	(0.69-1.83)
Hutt	19	2.21	2.37	(1.3-3.44)
Wairarapa	3	1.18	0.96	(0.31-2.97)
Nelson Marlborough	16	1.88	1.58	(0.80-2.37)
West Coast	1	0.51	0.42	(0.06-2.97)
Canterbury	59	1.93	1.84	(1.37-2.31)
South Canterbury	3	0.87	0.59	(0.19-1.82)
Southern	27	1.47	1.38	(0.86-1.90)

9.2. BRONCHIECTASIS

9.2.1. SEVERE BRONCHIECTASIS PREVALENCE

Table A 26. 2017 severe bronchiectasis prevalence numbers, rates and rate ratios by age group and sex

Age (years)	Total		Male		Female		M v F	
	n	Rate	n	Rate	n	Rate	RR	95% CI
<15	712	76.3	403	84.2	309	68.0	0.81	(0.70-0.94)
15-29	749	72.2	372	69.5	377	75.2	1.08	(0.94-1.25)
30-64	2447	116.4	1072	105.7	1375	126.4	1.20	(1.10-1.30)
65+	4458	617.1	1669	515.8	2789	705.9	1.37	(1.29-1.46)
Total	8366	174.5	3718	635.4	5088	477.8	1.23	(1.18-1.29)

Table A 27. 2017 severe bronchiectasis prevalence age group rate ratios total and by sex.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.66	(0.60-0.71)	0.80	(0.71-0.89)	0.54	(0.48-0.61)
15-29	0.62	(0.57-0.67)	0.66	(0.58-0.74)	0.59	(0.53-0.67)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	5.30	(5.04-5.57)	4.69	(4.35-5.07)	5.71	(5.36-6.10)

Table A 28. 2017 severe bronchiectasis prevalence rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	1987	264.5	420.1	(398.9-441.4)	**3.75**	(3.55-3.96))
Pacific	1561	413.6	789.5	(742.2-836.7)	**6.30**	(5.93-6.70)
Asian	529	74.9	135.3	(122.4-148.3)	0.97	(0.88-1.06)
Non-MPA	4444	145.6	119.3	(114.7-122.8)	1.00	Baseline

Table A 29. 2017 severe bronchiectasis prevalence rates by NZDep2013 quintile.

NZDep quintile	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	977	103.8	108.2	(101.4-115.1)	1.00	Baseline
3-4	988	108.0	106.4	(99.8-113.1)	1.01	(0.93-1.11)
5-6	1,313	142.1	132.8	(125.6-140.0)	1.28	(1.17-1.39)
7-8	1,672	168.7	163.6	(155.8-171.5)	1.55	(1.43-1.68)
9-10	2,973	291.1	321.2	(309.6-332.8)	3.09	(2.87-3.32)

Table A 30. 2017 severe bronchiectasis prevalence rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	337	192.1	172.2	(153.5-190.8)
Waitemata	872	143.9	152.2	(142.1-162.3)
Auckland	1,036	197.9	242.6	(227.7-257.5)
Counties Manukau	1,508	275.9	324.1	(307.5-340.7)
Waikato	739	180.8	178.9	(166.0-191.8)
Lakes	182	167.7	166.9	(142.6-191.2)
Bay of Plenty	546	235.4	202.2	(185.1-219.4)
Tairawhiti	94	193.7	195.7	(155.8-235.5)
Hawkes Bay	249	151.9	142.5	(124.5-160.5)
Taranaki	130	110.1	104.5	(86.3-122.6)
MidCentral	167	94.6	87.3	(74.0-100.5)
Whanganui	84	131.2	110.2	(86.4-134.0)
Capital and Coast	307	98.2	106.0	(94.1-117.9)
Hutt	234	158.2	161.6	(140.9-182.2)
Wairarapa	56	125.8	107.8	(78.7-136.9)
Nelson Marlborough	144	96.8	81.0	(67.4-94.7)
West Coast	42	129.5	115.7	(80.1-151.2)
Canterbury	735	133.3	129.8	(120.4-139.2)
South Canterbury	48	80.7	65.2	(46.1-84.3)
Southern	413	127.4	119.1	(107.6-130.6)

9.2.2. BRONCHIECTASIS HOSPITALISATIONS

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

Table A 31. Bronchiectasis hospitalisations, rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	719	18.6	20.9	(19.3 - 22.4)
2001	791	20.4	22.5	(20.9 - 24.1)
2002	782	19.8	21.6	(20.1 - 23.2)
2003	758	18.8	20.5	(19.0 - 21.9)
2004	862	21.1	22.9	(21.3 - 24.4)
2005	825	20.0	21.6	(20.1 - 23.1)
2006	912	21.8	23.4	(21.9 - 24.9)
2007	938	22.2	23.6	(22.0 - 25.1)
2008	935	21.9	23.2	(21.7 - 24.6)
2009	1001	23.3	24.5	(22.9 – 26.0)
2010	1035	23.8	24.9	(23.4 - 26.4)
2011	1161	26.5	27.4	(25.9 – 29.0)
2012	1055	23.9	24.4	(22.9 - 25.9)
2013	1197	26.9	27.2	(25.7 - 28.8)
2014	1243	27.6	27.7	(26.1 - 29.2)
2015	1372	29.9	29.9	(28.3 - 31.5)
2016	1288	27.4	27.2	(25.7 - 28.7)
2017	1493	31.1	31.0	(29.4 - 32.6)
Trend 2000 -2017			0.53	(0.41 - 0.65), p<0.001

Table A 32. Bronchiectasis hospitalisation rates and rate ratios by age group, 2000 - 2017

Year	<15 years			15-29 years			30 – 64 years			65+ years		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	71	8.1	(6.2 – 10.0)	46	5.8	(4.1 - 7.4)	369	21.3	(19.2 - 23.5)	233	51.4	(44.8 – 58.0)
2001	132	15.0	(12.5 - 17.6)	52	6.6	(4.8 - 8.4)	365	20.8	(18.7 – 23.0)	242	52.5	(45.9 - 59.2)
2002	143	16.2	(13.5 - 18.8)	49	6.1	(4.4 - 7.8)	330	18.4	(16.4 - 20.4)	260	55.6	(48.9 - 62.4)
2003	138	15.5	(12.9 - 18.1)	46	5.6	(4.0 - 7.2)	299	16.3	(14.4 - 18.1)	275	57.8	(51.0 - 64.7)
2004	141	15.8	(13.2 - 18.4)	47	5.6	(4.0 - 7.2)	368	19.7	(17.7 - 21.7)	306	63.1	(56.1 - 70.2)
2005	175	19.7	(16.7 - 22.6)	50	5.9	(4.3 - 7.5)	303	16.0	(14.2 - 17.8)	297	59.8	(53.0 - 66.6)
2006	150	16.9	(14.2 - 19.6)	46	5.3	(3.8 - 6.9)	324	16.9	(15.0 - 18.7)	392	76.6	(69.0 - 84.2)
2007	166	18.6	(15.8 - 21.5)	52	6.0	(4.4 - 7.6)	320	16.5	(14.7 - 18.3)	400	76.1	(68.7 - 83.6)
2008	161	18.0	(15.2 - 20.8)	58	6.6	(4.9 - 8.3)	326	16.7	(14.9 - 18.5)	390	72.9	(65.7 - 80.1)
2009	152	16.9	(14.2 - 19.5)	69	7.8	(6.0 - 9.7)	353	17.9	(16.0 - 19.8)	427	77.9	(70.5 - 85.3)
2010	135	14.9	(12.4 - 17.4)	53	5.9	(4.3 - 7.5)	378	19.0	(17.1 - 20.9)	469	83.2	(75.7 - 90.8)
2011	161	17.7	(14.9 - 20.4)	69	7.7	(5.9 - 9.5)	386	19.3	(17.4 - 21.3)	545	94.0	(86.1 - 101.8)
2012	169	18.6	(15.8 - 21.4)	54	6.0	(4.4 - 7.6)	308	15.4	(13.7 - 17.1)	524	86.9	(79.5 - 94.3)
2013	191	21.0	(18.0 – 24.0)	72	8.0	(6.1 - 9.8)	318	15.9	(14.1 - 17.6)	616	98.4	(90.6 - 106.2)
2014	241	26.5	(23.1 - 29.8)	69	7.4	(5.7 - 9.2)	318	15.8	(14.0 - 17.5)	615	94.6	(87.1 – 102.0)
2015	296	32.4	(28.7 - 36.1)	64	6.6	(5.0 - 8.2)	329	16.1	(14.4 - 17.9)	683	101.3	(93.7 - 108.9)
2016	254	27.6	(24.2 - 30.9)	92	9.2	(7.3 - 11)	260	12.6	(11.0 - 14.1)	682	97.7	(90.3 - 105)
2017	319	34.2	(30.4 - 37.9)	76	7.3	(5.7 – 9.0)	341	16.2	(14.5 - 17.9)	757	104.7	(97.2 - 112.1)

Table A 33. 2017 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	319	34.2	(30.4-37.9)	178	37.2	(31.7-42.6)	141	31.0	(25.9-36.1)	0.83	(0.75-0.93)
15-29	76	7.3	(5.7-9.0)	31	5.8	(3.8-7.9)	45	8.9	(6.3-11.6)	1.53	(1.23-1.91)
30-64	341	16.2	(14.5-17.9)	159	15.7	(13.2-18.1)	182	16.7	(14.3-19.1)	1.07	(0.96-1.18)
65+	757	104.7	(97.2-112.1)	223	66.2	(57.5-74.9)	534	138.3	(126.6-150.0)	2.09	(1.94-2.25)

Table A 34. 2017 bronchiectasis hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	2.11	(1.96-2.27)	2.37	(2.14-2.63)	1.86	(1.67-2.06)
15-29	0.45	(0.40-0.51)	0.37	(0.31-0.45)	0.54	(0.46-0.63)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	6.46	(6.07-6.87)	4.22	(3.82-4.66)	8.27	(7.63-8.98)

Table A 35. 2017 bronchiectasis hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	413	55.0	76.3	(67.4-85.2)	**3.75**	(3.51-4.01)
Pacific	275	72.9	126.6	(108.1-145.1)	**6.23**	(5.75-6.74)
Asian	74	10.5	18.7	(14.0-23.5)	0.92	(0.81-1.05)
Non-MPA	747	24.5	20.3	(18.8-21.8)	1.00	Baseline

Table A 36. Bronchiectasis hospitalisation rates by ethnic group 2000 - 2017.

Year	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	198	65.5	(53.8-77.2)	135	105.0	(82.9-127.1)	18	20.5	(8.7-32.4)	369	13.2	(11.9-14.6)
2001	212	62.2	(51.0-73.5)	175	126.2	(102.3-150.0)	23	17.1	(9.4-24.7)	391	14.1	(12.7-15.5)
2002	236	67.3	(56.6-77.9)	184	123.0	(100.2-145.9)	26	19.3	(9.7-28.9)	333	11.8	(10.5-13.0)
2003	231	63.8	(52.8-74.9)	183	129.6	(104.1-155.1)	22	14.1	(6.6-21.6)	325	11.1	(9.9-12.3)
2004	268	79.8	(66.7-92.8)	197	133.4	(108.1-158.6)	34	20.4	(12.4-28.4)	366	12.3	(11.0-13.6)
2005	243	61.3	(50.7-71.8)	182	93.8	(75.5-112.0)	27	17.0	(8.9-25.1)	376	12.5	(11.2-13.8)
2006	211	48.7	(40.7-56.8)	207	127.3	(104.2-150.4)	37	21.9	(12.6-31.3)	448	14.3	(13.0-15.6)
2007	268	63.4	(53.7-73.1)	192	103.5	(84.5-122.5)	35	15.8	(10.0-21.5)	447	14.1	(12.8-15.4)
2008	261	53.5	(45.3-61.7)	249	146.4	(122.1-170.7)	51	24.5	(16.2-32.9)	399	12.5	(11.2-13.7)
2009	288	60.5	(52.2-68.8)	244	145.8	(122.9-168.8)	51	23.0	(15.4-30.7)	431	13.1	(11.8-14.3)
2010	255	58.1	(49.3-67.0)	223	124.6	(104.6-144.5)	55	24.3	(16.9-31.7)	502	14.9	(13.6-16.2)
2011	290	63.1	(54.4-71.7)	251	129.8	(109.7-149.9)	64	31.2	(22.2-40.3)	583	17.3	(15.9-18.7)
2012	269	55.3	(47.1-63.5)	215	123.8	(103.0-144.5)	70	31.1	(22.3-39.8)	522	15.1	(13.8-16.4)
2013	309	60.5	(52.5-68.4)	214	103.2	(85.9-120.5)	75	35.5	(26.0-44.9)	610	17.3	(15.9-18.7)
2014	299	52.4	(45.2-59.7)	291	128.3	(110.5-146.1)	72	30.0	(21.7-38.3)	618	17.2	(15.9-18.6)
2015	387	71.1	(62.5-79.8)	268	132.5	(113.3-151.8)	81	23.6	(17.8-29.4)	663	18.5	(17.1-20.0)
2016	370	66.4	(58.3-74.5)	249	125.4	(105.7-145.0)	82	20.9	(15.8-26.0)	608	16.5	(15.2-17.8)
2017	413	76.3	(67.4-85.2)	275	126.6	(108.1-145.1)	74	18.7	(14.0-23.5)	747	20.3	(18.8-21.8)

Table A 37. Bronchiectasis hospitalisation rate ratios to non-MPA by ethnic group 2000 - 2017.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	4.95	(4.48-5.47)	7.94	(7.09-8.90)	1.55	(1.17-2.06)
2001	4.40	(3.98-4.86)	8.93	(8.05-9.90)	1.21	(0.96-1.51)
2002	5.72	(5.22-6.28)	10.47	(9.43-11.62)	1.64	(1.28-2.10)
2003	5.74	(5.20-6.34)	11.66	(10.45-13.01)	1.27	(0.98-1.65)
2004	6.50	(5.91-7.13)	10.86	(9.78-12.06)	1.66	(1.36-2.02)
2005	4.90	(4.45-5.40)	7.50	(6.74-8.34)	1.36	(1.07-1.72)
2006	3.41	(3.11-3.74)	8.90	(8.06-9.83)	1.53	(1.24-1.89)
2007	4.50	(4.12-4.91)	7.34	(6.64-8.11)	1.12	(0.93-1.34)
2008	4.30	(3.93-4.7)	11.76	(10.71-12.91)	1.97	(1.66-2.34)
2009	4.63	(4.27-5.02)	11.16	(10.20-12.2)	1.76	(1.49-2.09)
2010	3.91	(3.59-4.26)	8.38	(7.67-9.16)	1.64	(1.40-1.91)
2011	3.64	(3.37-3.94)	7.50	(6.89-8.16)	1.80	(1.56-2.09)
2012	3.67	(3.38-3.99)	8.21	(7.49-8.99)	2.06	(1.79-2.38)
2013	3.49	(3.24-3.76)	5.95	(5.44-6.51)	2.04	(1.79-2.34)
2014	3.04	(2.81-3.29)	7.44	(6.89-8.04)	1.74	(1.51-2.00)
2015	3.84	(3.58-4.12)	7.15	(6.60-7.75)	1.27	(1.12-1.44)
2016	4.03	(3.75-4.32)	7.60	(6.98-8.28)	1.27	(1.12-1.43)
2017	3.75	(3.51-4.01)	6.23	(5.75-6.74)	0.92	(0.81-1.05)

Table A 38. 2017 bronchiectasis hospitalisation rates by ethnic group and age.

Age	Māori			Pacific			Asian			non-MPA		
(years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	161	65.6	(55.5-75.8)	88	69.8	(55.2-84.4)	10	7.2	(2.7-11.7)	66	16.1	(12.5-19.7)
15-29	29	14.9	(9.5-20.3)	22	21.2	(12.3-30)	2	1.1	(0.3-4.3)	9	4.1	(2.5-5.8)
30-64	106	40.0	(32.4-47.6)	67	52.5	(40.0-65.1)	22	6.7	(3.9-9.5)	122	10.6	(8.9-12.3)
65+	117	254.2	(208.2-300.3)	98	490.5	(393.4-587.6)	40	75.0	(51.8-98.3)	444	82.5	(75.3-89.8)

Table A 39. 2017 bronchiectasis hospitalisation rates by NZDep2013 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	206	22.2	22.6	(19.5-25.7)	1.00	Baseline
3-4	179	20.0	19.8	(16.8-22.7)	0.87	(0.79-0.96)
5-6	249	26.9	24.8	(21.7-27.9)	1.10	(1.00-1.20)
7-8	293	29.6	28.6	(25.3-31.9)	1.27	(1.16-1.38)
9-10	566	53.7	57.2	(52.4-62.0)	2.53	(2.34-2.74)

Table A 40. Bronchiectasis hospitalisation rates by NZDep2013 quintile 2000 - 2017.

	NZDep 1-2			NZDep 3-4			NZDep 5-6			NZDep 7-8			NZDep 9-10		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	87	15.4	(12.0-18.7)	74	11.9	(9.1-14.7)	103	14.3	(11.5-17.1)	176	23.2	(19.7-26.7)	279	36.9	(32.5-41.4)
2001	100	18.0	(14.4-21.6)	99	16.5	(13.2-19.8)	122	16.5	(13.5-19.4)	169	22.1	(18.7-25.5)	292	36.3	(32.0-40.6)
2002	76	13.4	(10.3-16.5)	85	13.4	(10.5-16.2)	115	15.6	(12.7-18.4)	179	22.8	(19.4-26.2)	327	39.5	(35.0-43.9)
2003	63	11.5	(8.6-14.3)	96	13.9	(11.1-16.7)	118	15.3	(12.5-18.0)	166	20.5	(17.3-23.6)	312	38.0	(33.7-42.3)
2004	66	11.0	(8.3-13.7)	105	15.3	(12.3-18.2)	113	14.8	(12.1-17.6)	181	21.9	(18.7-25.2)	395	48.0	(43.1-52.9)
2005	80	13.2	(10.3-16.1)	67	9.7	(7.4-12.1)	112	14.3	(11.6-16.9)	226	27.1	(23.5-30.6)	339	39.4	(35.1-43.7)
2006	90	14.1	(11.1-17.0)	103	14.7	(11.8-17.5)	140	17.4	(14.5-20.3)	232	26.8	(23.3-30.3)	347	40.8	(36.4-45.1)
2007	103	15.5	(12.5-18.6)	96	13.2	(10.5-15.8)	141	17.2	(14.3-20.0)	192	22.6	(19.4-25.8)	406	46.8	(42.2-51.5)
2008	74	11.0	(8.4-13.5)	126	16.9	(13.9-19.8)	148	17.9	(15.0-20.8)	188	21.7	(18.6-24.8)	399	45.5	(41.0-50.1)
2009	86	12.0	(9.4-14.6)	108	14.5	(11.7-17.2)	129	15.3	(12.7-17.9)	213	24.1	(20.8-27.3)	462	53.0	(48.1-57.9)
2010	106	14.4	(11.6-17.1)	135	17.2	(14.3-20.1)	168	19.5	(16.6-22.5)	201	22.3	(19.2-25.4)	425	49.4	(44.7-54.2)
2011	115	15.5	(12.7-18.4)	159	20.2	(17.0-23.3)	203	23.3	(20.1-26.5)	253	27.8	(24.4-31.2)	431	48.6	(44.0-53.3)
2012	111	14.4	(11.7-17.1)	121	14.9	(12.3-17.6)	197	22.1	(19.0-25.2)	216	23.4	(20.3-26.5)	410	45.6	(41.1-50.1)
2013	148	18.0	(15.1-20.9)	152	18.4	(15.5-21.3)	219	23.9	(20.7-27.1)	236	25.2	(21.9-28.4)	442	48.2	(43.7-52.8)
2014	171	20.7	(17.6-23.9)	167	19.7	(16.7-22.7)	200	21.6	(18.6-24.7)	241	25.3	(22.1-28.5)	463	49.6	(45.1-54.2)
2015	160	18.5	(15.6-21.4)	177	20.4	(17.4-23.4)	213	22.2	(19.2-25.2)	306	31.4	(27.9-35.0)	515	54.4	(49.6-59.1)
2016	169	19.1	(16.2-22.0)	149	16.7	(14.0-19.4)	180	18.5	(15.8-21.3)	276	27.2	(24-30.4)	512	52.5	(47.9-57.2)
2017	206	22.6	(19.5-25.7)	179	19.8	(16.8-22.7)	249	24.8	(21.7-27.9)	293	28.6	(25.3-31.9)	566	57.2	(52.4-62.0)

Table A 41. Bronchiectasis hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 - 2017.

	NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
2000	0.77	(0.66 - 0.90)	0.93	(0.81 - 1.07)	1.51	(1.33 - 1.72)	2.41	(2.13 - 2.71)
2001	0.92	(0.80 - 1.05)	0.92	(0.81 - 1.04)	1.23	(1.09 - 1.39)	2.02	(1.80 - 2.26)
2002	1.00	(0.86 - 1.16)	1.16	(1.01 - 1.34)	1.70	(1.49 - 1.95)	2.95	(2.60 - 3.34)
2003	1.21	(1.04 - 1.42)	1.33	(1.15 - 1.55)	1.78	(1.55 - 2.06)	3.32	(2.90 - 3.79)
2004	1.39	(1.19 - 1.62)	1.35	(1.16 - 1.57)	1.99	(1.74 - 2.29)	4.36	(3.84 - 4.96)
2005	0.74	(0.63 - 0.86)	1.08	(0.94 - 1.25)	2.05	(1.81 - 2.33)	2.99	(2.65 - 3.37)
2006	1.04	(0.91 - 1.19)	1.23	(1.08 - 1.40)	1.90	(1.69 - 2.14)	2.89	(2.58 - 3.24)
2007	0.85	(0.74 - 0.97)	1.11	(0.98 - 1.25)	1.45	(1.29 - 1.64)	3.02	(2.71 - 3.36)
2008	1.54	(1.33 - 1.77)	1.63	(1.42 - 1.87)	1.97	(1.73 - 2.25)	4.15	(3.67 - 4.69)
2009	1.21	(1.05 - 1.39)	1.28	(1.12 - 1.46)	2.01	(1.78 - 2.27)	4.42	(3.95 - 4.95)
2010	1.20	(1.06 - 1.35)	1.36	(1.21 - 1.53)	1.55	(1.38 - 1.74)	3.44	(3.10 - 3.82)
2011	1.30	(1.15 - 1.46)	1.50	(1.34 - 1.67)	1.79	(1.61 - 1.99)	3.13	(2.83 - 3.46)
2012	1.04	(0.92 - 1.18)	1.54	(1.37 - 1.72)	1.63	(1.46 - 1.82)	3.18	(2.87 - 3.52)
2013	1.02	(0.91 - 1.14)	1.33	(1.20 - 1.47)	1.40	(1.26 - 1.54)	2.68	(2.44 - 2.93)
2014	0.95	(0.86 - 1.05)	1.04	(0.95 - 1.15)	1.22	(1.11 - 1.34)	2.39	(2.20 - 2.61)
2015	1.10	(0.99 - 1.22)	1.20	(1.08 - 1.32)	1.69	(1.54 - 1.86)	2.93	(2.69 - 3.20)
2016	0.88	(0.79 - 0.98)	0.97	(0.88 - 1.08)	1.43	(1.30 - 1.57)	2.75	(2.53 – 3.00)
2017	0.87	(0.79 - 0.96)	1.10	(1.00 - 1.20)	1.27	(1.16 - 1.38)	2.53	(2.34 - 2.74)

Table A 42. 2017 bronchiectasis hospitalisation rates by ethnic group and NZDep2013 quintile.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	8	32	47	74	252
	Rate (raw)	11.8	36.6	40.0	42.1	83.2
	Rate (age adj'd)	18.9	56.5	62.6	61.6	109.3
	95%CI	(3.8-34.0)	(33.5-79.6)	(42.7-82.6)	(42.5-80.7)	(92.9-125.8)
Pacific	Hosp_Num	10	18	32	40	175
	Rate (raw)	51.6	59.6	79.7	52.8	83.5
	Rate (age adj'd)	79.4	183.8	131.3	79.3	155.3
	95%CI	(27.0-131.7)	(75.5-292.2)	(75.9-186.7)	(49.4-109.2)	(126.0-184.7)
Asian	Hosp_Num	19	12	7	18	18
	Rate (raw)	15.7	8.2	5.3	12.7	11.2
	Rate (age adj'd)	23.1	15.0	9.7	20.2	31.3
	95%CI	(12.0-34.2)	(5.3-24.6)	(2.1-17.3)	(9.5-30.8)	(12.9-49.7)
NZ European/ Other	Hosp_Num	171	116	165	165	130
	Rate (raw)	23.1	17.6	25.6	26.8	33.2
	Rate (age adj'd)	21.8	15.4	20.2	20.8	26.8
	95%CI	(18.5-25.1)	(12.6-18.3)	(17.0-23.4)	(17.4-24.1)	(21.9-31.7)

Table A 43. 2017 bronchiectasis hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	79	45.0	40.6	(31.5-49.7)
Waitemata	170	28.1	30.1	(25.6-34.7)
Auckland	173	33.0	41.6	(35.3-47.8)
Counties Manukau	253	46.3	53.5	(46.8-60.2)
Waikato	127	31.1	30.2	(25.0-35.5)
Lakes	51	47.0	46.0	(33.3-58.7)
Bay of Plenty	91	39.2	33.8	(26.7-40.8)
Tairawhiti	14	28.9	28.6	(13.5-43.6)
Hawkes Bay	61	37.2	32.5	(24.3-40.7)
Taranaki	35	29.6	27.9	(18.6-37.2)
MidCentral	41	23.2	21.8	(15.1-28.5)
Whanganui	18	28.1	21.6	(11.6-31.7)
Capital and Coast	53	16.9	18.3	(13.3-23.2)
Hutt	37	25.0	25.2	(17.1-33.3)
Wairarapa	9	20.2	15.6	(5.2-26.0)
Nelson Marlborough	24	16.1	11.9	(7.1-16.6)
West Coast	7	21.6	17.5	(4.3-30.7)
Canterbury	172	31.2	30.3	(25.7-34.8)
South Canterbury	5	8.4	5.3	(0.6-10.0)
Southern	73	22.5	20.9	(16.0-25.7)

9.2.1. BRONCHIECTASIS MORTALITY

Table A 44. Bronchiectasis mortality rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	42	1.09	1.30	(0.90-1.70)
2001	42	1.08	1.26	(0.88-1.65)
2002	57	1.44	1.69	(1.25-2.13)
2003	58	1.44	1.69	(1.25-2.13)
2004	57	1.39	1.62	(1.19-2.04)
2005	57	1.38	1.58	(1.17-1.99)
2006	69	1.65	1.87	(1.42-2.31)
2007	78	1.85	2.07	(1.61-2.53)
2008	95	2.23	2.46	(1.97-2.96)
2009	94	2.18	2.38	(1.90-2.86)
2010	94	2.16	2.31	(1.84-2.78)
2011	87	1.98	2.09	(1.65-2.53)
2012	102	2.31	2.39	(1.93-2.86)
2013	97	2.18	2.23	(1.79-2.68)
2014	109	2.42	2.45	(1.99-2.91)
2015	116	2.52	2.54	(2.08-3.00)
Trend 2000 -2015			0.08	(0.06 – 0.10), p<0.001

Table A 45. Bronchiectasis mortality rates and rate ratios by age group and sex, 2010-2015.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	1	0.0	(0.0-0.1)	1	0.0	(0.0-0.3)	0	0		0	
15-29	5	0.1	(0.0-0.2)	3	0.1	(0.0-0.3)	2	0.1	(0.0-0.3)	0.68	(0.28-1.61)
30-64	81	0.7	(0.5-0.8)	32	0.6	(0.4-0.7)	49	0.8	(0.6-1.0)	1.42	(1.15-1.77)
65+	518	14.0	(12.8-15.2)	190	11.2	(9.6-12.8)	328	16.4	(14.7-18.2)	1.47	(1.35-1.60)

Table A 46. Bronchiectasis mortality rate ratios by age group and sex, 2010-2015.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.03	(0.01-0.07)	0.06	(0.02-0.17)	-	
15-29	0.14	(0.09-0.21)	0.20	(0.11-0.35)	0.09	(0.05-0.19)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	20.83	(18.59-23.33)	20.25	(16.88-24.28)	20.93	(18.09-24.2)

Table A 47. Bronchiectasis mortality rates and rate ratios by ethnic group, 2010-2015.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	107	2.6	6.8	(5.3-8.2)	3.91	(3.49-4.39)
Pacific	74	3.6	11.0	(8.2-13.8)	6.34	(5.56-7.22)
Asian	28	0.9	3.0	(1.8-4.2)	1.72	(1.41-2.09)
Non-MPA	398	2.2	1.7	(1.6-1.9)	1.00	Baseline

Table A 48. Bronchiectasis mortality rates by ethnic group and age, 2010-2015

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	0	0.0		1	0.1	(0.0-1.0)	0	0.0	n/a	0	0.0	n/a
15-29	2	0.2	(0.0-0.8)	2	0.4	(0.1-1.5)	1	0.1	(0.0-0.8)	0	0.0	n/a
30-64	37	2.5	(1.7-3.3)	17	2.5	(1.3-3.6)	2	0.1	(0.0-0.5)	25	0.3	(0.2-0.4)
65+	68	31.9	(24.3-39.4)	54	56.5	(41.4-71.6)	25	13.2	(8.0-18.3)	373	11.7	(10.5-12.9)

Table A 49. Bronchiectasis mortality rates NZDep2006 quintile, 2010-2015.

NZDep quintile	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	89	1.8	2.1	(1.6-2.5)	1.00	Baseline
3-4	88	1.8	1.8	(1.5-2.2)	0.89	(0.77-1.02)
5-6	115	2.2	2.0	(1.7-2.4)	0.97	(0.85-1.12)
7-8	127	2.3	2.1	(1.7-2.5)	1.00	(0.88-1.15)
9-10	185	3.2	3.8	(3.2-4.3)	1.82	(1.61-2.06)

Table A 50. Bronchiectasis mortality rates by ethnic group and NZDep2013 quintile, 2010-2015.

Ethnic group		NZDep2013 quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	**Deaths**	6	8	16	16	61
	Rate (raw)	1.8	1.8	2.5	1.6	3.5
	Rate (age adj'd)	4.7	4.4	6.4	4.2	9.3
	95%CI	(1.5-14.6)	(0.9-7.9)	(2.8-10)	(1.8-6.6)	(6.7-12)
Pacific	**Deaths**	2	4	9	5	53
	Rate (raw)	2.0	2.5	4.2	1.2	4.5
	Rate (age adj'd)	3.2	13.1	14.6	4.6	14.0
	95%CI	(0.8-13.8)	(4.8-36.2)	(3.7-25.4)	(0.2-9)	(9.8-18.2)
Asian	**Deaths**	9	10	2	4	3
	Rate (raw)	1.6	1.5	0.3	0.6	0.4
	Rate (age adj'd)	4.9	5.5	1.0	2.6	0.8
	95%CI	(1.4-8.3)	(2.0-9.1)	(0.2-4.5)	(0.1-5.1)	(0.2-2.8)
NZ European/ Other	**Deaths**	72	67	88	102	69
	Rate (raw)	1.7	1.8	2.3	2.8	2.9
	Rate (age adj'd)	1.8	1.5	1.7	1.9	1.9
	95%CI	(1.4-2.3)	(1.2-1.9)	(1.3-2)	(1.5-2.2)	(1.4-2.3)

Table A 51. Bronchiectasis mortality rates by DHB, 2010-2015.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	25	2.5	2.2	(1.4-3.1)
Waitemata	74	2.2	2.6	(2.0-3.1)
Auckland	74	2.7	3.5	(2.7-4.3)
Counties Manukau	81	2.7	3.7	(2.9-4.5)
Waikato	45	2.0	2.0	(1.4-2.6)
Lakes	18	2.9	3.0	(1.6-4.4)
Bay of Plenty	32	2.5	2.0	(1.3-2.7)
Tairawhiti	11	3.9	4.2	(1.7-6.7)
Hawkes Bay	26	2.7	2.4	(1.5-3.3)
Taranaki	9	1.3	1.1	(0.4-1.9)
MidCentral	22	2.2	1.9	(1.1-2.7)
Whanganui	4	1.1	0.8	(0.0-1.6)
Capital and Coast	27	1.5	1.8	(1.1-2.5)
Hutt	17	2.0	2.2	(1.1-3.2)
Wairarapa	2	0.8	0.6	(0.2-2.4)
Nelson Marlborough	19	2.2	1.8	(1.0-2.6)
West Coast	3	1.5	1.4	(0.5-4.4)
Canterbury	67	2.2	2.1	(1.6-2.6)
South Canterbury	7	2.0	1.4	(0.4-2.4)
Southern	41	2.2	2.1	(1.4-2.7)

9.3. CHILDHOOD BRONCHIOLITIS

9.3.1. CHILDHOOD BRONCHIOLITIS HOSPITALISATIONS

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

Table A 52. Childhood bronchiolitis hospitalisations, rates and age-adjusted rates 2000-2017.

Year	n	Rate	95% CI
2000	3984	1405.7	(1362.0 - 1449.3)
2001	4187	1490.0	(1444.9 - 1535.1)
2002	4663	1658.6	(1611.0 - 1706.2)
2003	4489	1592.7	(1546.1 - 1639.3)
2004	4393	1543.2	(1497.6 - 1588.9)
2005	4292	1509.6	(1464.5 - 1554.8)
2006	4502	1574.0	(1528.1 – 1620.0)
2007	4511	1539.1	(1494.2 – 1584.0)
2008	5349	1776.8	(1729.2 - 1824.5)
2009	6312	2054.8	(2004.1 - 2105.5)
2010	5798	1844.4	(1796.9 - 1891.9)
2011	5735	1806.5	(1759.7 - 1853.3)
2012	6411	2030.6	(1980.9 - 2080.3)
2013	5461	1750.8	(1704.3 - 1797.2)
2014	5909	1913.6	(1864.8 - 1962.4)
2015	6452	2110.2	(2058.7 - 2161.6)
2016	5645	1850.7	(1802.4 – 1899.0)
2017	6320	2065.4	(2014.4 - 2116.3)
Trend 2000 - 2017		34.7	(22.7-46.6), p<0.000

Table A 53. 2017 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
6320	2065.4	(2014.4-2116.3)	3930	2502	(2423.5-2579.9)	2390	1605.1	(1540.7-1669.4)	0.64	(0.63-0.66)

Table A 54. 2017 childhood bronchiolitis hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			
		Raw	95% CI	RR	95%CI
Māori	2972	3561.4	(3433.4-3689.5)	3.16	(4.18-4.44)
Pacific	1746	3967.6	(3781.4-4153.7)	3.52	(4.87-5.20)
Asian	373	677.0	(608.3-745.7)	0.60	(1.02-1.13)
Non-MPA	1602	1127.1	(1071.9-1182.2)	1.00	Baseline

Table A 55. Childhood bronchiolitis hospitalisation rates by ethnic group 2000 - 2017.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	1631	2154.3	(2049.7-2258.8)	875	2417.9	(2257.7-2578.1)	86	428.0	(337.6-518.5)	1453	890.7	(844.9-936.5)
2001	1816	2434.3	(2322.4-2546.3)	1154	3151.3	(2969.5-3333.1)	80	392.3	(306.4-478.3)	1218	754.9	(712.5-797.3)
2002	1934	2598.1	(2482.3-2713.9)	1318	3524.7	(3334.4-3715.0)	96	431.0	(344.8-517.3)	1403	879.7	(833.7-925.8)
2003	1956	2646.5	(2529.2-2763.7)	1308	3429.0	(3243.2-3614.9)	117	475.9	(389.7-562.1)	1209	764.2	(721.1-807.3)
2004	1996	2700.6	(2582.1-2819.1)	1177	2992.9	(2821.9-3163.9)	128	495.2	(409.4-581.0)	1203	756.1	(713.4-798.8)
2005	1967	2687.9	(2569.1-2806.7)	1143	2889.6	(2722.1-3057.2)	137	521.7	(434.3-609.1)	1229	772.8	(729.6-816.0)
2006	2014	2757.4	(2637.0-2877.8)	1287	3289.9	(3110.1-3469.6)	122	454.0	(373.5-534.6)	1236	769.1	(726.3-812.0)
2007	2032	2636.2	(2521.6-2750.8)	1275	3185.9	(3011.0-3360.8)	131	452.3	(374.8-529.7)	1253	776.4	(733.4-819.4)
2008	2457	3030.0	(2910.2-3149.8)	1597	3837.5	(3649.3-4025.7)	194	620.0	(532.8-707.3)	1387	854.9	(809.9-899.9)
2009	2919	3486.2	(3359.7-3612.7)	1905	4450.2	(4250.4-4650.0)	214	642.0	(556.0-728.0)	1581	968.6	(920.8-1016.3)
2010	2587	3007.1	(2891.2-3123.0)	1693	3808.8	(3627.3-3990.2)	217	611.0	(529.7-692.3)	1647	997.6	(949.4-1045.8)
2011	2568	2961.9	(2847.4-3076.5)	1719	3783.1	(3604.3-3961.9)	240	636.7	(556.1-717.2)	1535	930.1	(883.5-976.6)
2012	2956	3454.9	(3330.3-3579.4)	1955	4278.9	(4089.3-4468.6)	303	769.8	(683.1-856.5)	1580	969.8	(922.0-1017.6)
2013	2375	2826.0	(2712.4-2939.7)	1629	3655.7	(3478.2-3833.3)	269	654.0	(575.9-732.2)	1455	909.7	(862.9-956.4)
2014	2610	3124.6	(3004.7-3244.5)	1691	3820.8	(3638.7-4002.9)	301	694.1	(615.7-772.5)	1636	1055.7	(1004.5-1106.8)
2015	2994	3611.6	(3482.2-3740.9)	1866	4237.2	(4045.0-4429.5)	377	804.4	(723.2-885.5)	1577	1054.0	(1002.0-1106.0)
2016	2484	2992.4	(2874.7-3110.1)	1490	3393.0	(3220.7-3565.3)	401	788.4	(711.2-865.5)	1546	1061.8	(1008.9-1114.7)
2017	2972	3561.4	(3433.4-3689.5)	1746	3967.6	(3781.4-4153.7)	373	677.0	(608.3-745.7)	1602	1127.1	(1071.9-1182.2)

Table A 56. Childhood bronchiolitis hospitalisation rate ratios to non-MPA by ethnic group 2000 - 2017.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.42	(2.34 - 2.50)	2.71	(2.61 - 2.83)	0.48	(0.43 - 0.53)
2001	3.22	(3.11 - 3.34)	4.17	(4.01 - 4.34)	0.52	(0.47 - 0.58)
2002	2.95	(2.86 - 3.05)	4.01	(3.86 - 4.16)	0.49	(0.44 - 0.54)
2003	3.46	(3.34 - 3.59)	4.49	(4.32 - 4.66)	0.62	(0.57 - 0.68)
2004	3.57	(3.45 - 3.70)	3.96	(3.81 - 4.12)	0.65	(0.60 - 0.72)
2005	3.48	(3.36 - 3.60)	3.74	(3.60 - 3.89)	0.68	(0.62 - 0.74)
2006	3.59	(3.46 - 3.71)	4.28	(4.12 - 4.44)	0.59	(0.54 - 0.65)
2007	3.40	(3.28 - 3.51)	4.10	(3.95 - 4.26)	0.58	(0.53 - 0.64)
2008	3.54	(3.43 - 3.66)	4.49	(4.33 - 4.65)	0.73	(0.67 - 0.78)
2009	3.60	(3.49 - 3.71)	4.59	(4.45 - 4.75)	0.66	(0.62 - 0.71)
2010	3.01	(2.93 - 3.11)	3.82	(3.69 - 3.95)	0.61	(0.57 - 0.66)
2011	3.18	(3.09 - 3.28)	4.07	(3.93 - 4.21)	0.68	(0.64 - 0.73)
2012	3.56	(3.46 - 3.67)	4.41	(4.27 - 4.56)	0.79	(0.75 - 0.84)
2013	3.11	(3.01 - 3.21)	4.02	(3.88 - 4.16)	0.72	(0.68 - 0.77)
2014	2.96	(2.87 - 3.05)	3.62	(3.50 - 3.74)	0.66	(0.62 - 0.70)
2015	3.43	(3.33 - 3.53)	4.02	(3.89 - 4.15)	0.76	(0.72 - 0.81)
2016	2.82	(2.73 - 2.91)	3.20	(3.09 - 3.31)	0.74	(0.70 - 0.78)
2017	3.16	(3.07 - 3.25)	3.52	(3.41 - 3.64)	0.60	(0.57 - 0.63)

Table A 57. 2017 childhood bronchiolitis hospitalisation rates by NZDep2013 quintile.

NZDep quintile	n	Rate	95% CI	RR	95% CI
1-2	454	918.3	(833.8-1002.8)	1.00	Baseline
3-4	604	1154.2	(1062.2-1246.3)	1.26	(1.18-1.33)
5-6	824	1477.2	(1376.4-1578.1)	1.61	(1.52-1.7)
7-8	1434	2186.3	(2073.1-2299.5)	2.38	(2.26-2.51)
9-10	2994	3613.8	(3484.3-3743.2)	3.94	(3.75-4.13)

Table A 58. Childhood bronchiolitis hospitalisation rates by NZDep2013 quintile 2000 - 2017.

	NZDep 1-2			NZDep 3-4			NZDep 5-6			NZDep 7-8			NZDep 9-10		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	299	713.1	(632.3-793.9)	415	916.3	(828.2-1004.5)	562	1084.1	(994.5-1173.7)	855	1401.0	(1307-1494.9)	1837	2205.8	(2104.9-2306.7)
2001	291	683.9	(605.3-762.5)	403	886.7	(800.1-973.3)	531	1025.7	(938.4-1112.9)	936	1552.8	(1453.3-1652.2)	1939	2396.2	(2289.5-2502.9)
2002	308	710.0	(630.7-789.3)	482	1048.1	(954.5-1141.6)	602	1167.1	(1073.9-1260.4)	971	1626.2	(1523.9-1728.5)	2297	2855.5	(2738.8-2972.3)
2003	240	541.5	(473.0-610.0)	402	859.9	(775.8-944.0)	538	1048.7	(960.1-1137.4)	954	1608.8	(1506.7-1710.9)	2304	2874.6	(2757.2-2992.0)
2004	283	621.2	(548.8-693.5)	351	737.9	(660.7-815.1)	508	982.6	(897.1-1068.0)	901	1519.4	(1420.2-1618.6)	2349	2918.0	(2800.0-3036.0)
2005	276	599.6	(528.9-670.3)	342	713.8	(638.2-789.5)	544	1058.8	(969.8-1147.8)	952	1615.2	(1512.6-1717.8)	2168	2709.7	(2595.6-2823.7)
2006	253	536.1	(470.1-602.2)	352	723.7	(648.1-799.3)	496	952.0	(868.2-1035.8)	944	1595.4	(1493.6-1697.2)	2454	3110.7	(2987.6-3233.7)
2007	309	636.2	(565.3-707.1)	366	730.8	(656.0-805.7)	464	872.7	(793.3-952.1)	1034	1695.9	(1592.5-1799.3)	2336	2909.5	(2791.5-3027.4)
2008	327	658.7	(587.3-730.1)	409	794.8	(717.8-871.8)	614	1123.3	(1034.5-1212.2)	1074	1715.1	(1612.5-1817.7)	2906	3516.5	(3388.6-3644.3)
2009	348	693.2	(620.4-766.1)	508	970.8	(886.3-1055.2)	721	1294.9	(1200.4-1389.4)	1340	2085.0	(1973.3-2196.6)	3389	4001.7	(3866.9-4136.4)
2010	385	753.1	(677.9-828.4)	517	971.8	(888.0-1055.6)	753	1317.6	(1223.5-1411.7)	1248	1886.9	(1782.2-1991.6)	2893	3335.6	(3214.1-3457.2)
2011	394	761.6	(686.4-836.9)	498	926.9	(845.5-1008.3)	647	1118.2	(1032.1-1204.4)	1198	1793.4	(1691.9-1895.0)	2998	3433.0	(3310.1-3555.8)
2012	430	830.4	(751.9-908.9)	582	1090.5	(1001.9-1179.1)	781	1357.8	(1262.6-1453.0)	1379	2068.4	(1959.2-2177.6)	3236	3747.1	(3618.0-3876.2)
2013	328	633.7	(565.1-702.3)	476	891.7	(811.6-971.8)	672	1177.3	(1088.3-1266.3)	1167	1766.8	(1665.5-1868.2)	2815	3366.4	(3242.1-3490.8)
2014	388	760.2	(684.5-835.8)	518	985.2	(900.3-1070.0)	768	1362.4	(1266.1-1458.8)	1297	1988.0	(1879.8-2096.2)	2937	3515.7	(3388.5-3642.8)
2015	444	878.0	(796.3-959.7)	544	1043.1	(955.5-1130.8)	795	1435.5	(1335.7-1535.3)	1428	2203.7	(2089.4-2318.0)	3228	3896.7	(3762.2-4031.1)
2016	422	852.0	(770.7-933.3)	577	1109.2	(1018.7-1199.7)	709	1280.0	(1185.8-1374.2)	1247	1909.6	(1803.7-2015.6)	2684	3243.1	(3120.4-3365.8)
2017	454	918.3	(833.8-1002.8)	604	1154.2	(1062.2-1246.3)	824	1477.2	(1376.4-1578.1)	1434	2186.3	(2073.1-2299.5)	2994	3613.8	(3484.3-3743.2)

Table A 59. Childhood bronchiolitis hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 - 2017.

	NZDep 3-4	NZDep 5-6	NZDep 7-8	NZDep 9-10
Year	RR 95% CI	RR 95% CI	RR 95% CI	RR 95% CI
2000	1.28 (1.20 - 1.38)	1.52 (1.42 - 1.63)	1.96 (1.84 - 2.09)	3.09 (2.92 - 3.28)
2001	1.30 (1.21 - 1.39)	1.50 (1.40 - 1.61)	2.27 (2.13 - 2.42)	3.50 (3.30 - 3.72)
2002	1.48 (1.38 - 1.58)	1.64 (1.54 - 1.76)	2.29 (2.15 - 2.44)	4.02 (3.80 - 4.26)
2003	1.59 (1.47 - 1.72)	1.94 (1.80 - 2.08)	2.97 (2.77 - 3.18)	5.31 (4.98 - 5.66)
2004	1.19 (1.10 - 1.28)	1.58 (1.47 - 1.70)	2.45 (2.29 - 2.61)	4.70 (4.43 - 4.99)
2005	1.19 (1.10 - 1.29)	1.77 (1.65 - 1.89)	2.69 (2.52 - 2.87)	4.52 (4.25 - 4.80)
2006	1.35 (1.25 - 1.46)	1.78 (1.65 - 1.91)	2.98 (2.78 - 3.18)	5.80 (5.45 - 6.18)
2007	1.15 (1.07 - 1.24)	1.37 (1.28 - 1.47)	2.67 (2.51 - 2.84)	4.57 (4.32 - 4.84)
2008	1.21 (1.12 - 1.29)	1.71 (1.60 - 1.82)	2.60 (2.45 - 2.76)	5.34 (5.05 - 5.64)
2009	1.40 (1.31 - 1.50)	1.87 (1.76 - 1.99)	3.01 (2.84 - 3.18)	5.77 (5.47 - 6.09)
2010	1.29 (1.21 - 1.38)	1.75 (1.65 - 1.86)	2.51 (2.37 - 2.65)	4.43 (4.21 - 4.66)
2011	1.22 (1.14 - 1.30)	1.47 (1.38 - 1.56)	2.35 (2.23 - 2.49)	4.51 (4.28 - 4.74)
2012	1.31 (1.24 - 1.39)	1.64 (1.54 - 1.73)	2.49 (2.36 - 2.62)	4.51 (4.30 - 4.74)
2013	1.41 (1.31 - 1.51)	1.86 (1.74 - 1.98)	2.79 (2.63 - 2.96)	5.31 (5.03 - 5.62)
2014	1.30 (1.22 - 1.38)	1.79 (1.69 - 1.90)	2.62 (2.48 - 2.76)	4.62 (4.39 - 4.87)
2015	1.19 (1.12 - 1.26)	1.64 (1.55 - 1.73)	2.51 (2.38 - 2.64)	4.44 (4.23 - 4.66)
2016	1.30 (1.22 - 1.38)	1.50 (1.42 - 1.59)	2.24 (2.12 - 2.36)	3.81 (3.62 – 4.00)
2017	1.26 (1.18 - 1.33)	1.61 (1.52 - 1.70)	2.38 (2.26 - 2.51)	3.94 (3.75 - 4.13)

Table A 60. 2017 childhood bronchiolitis hospitalisation rates by ethnic group and NZDep quintile.

NZDep quintile	Māori		Pacific		Asian		non-MPA	
	n	Rate 95%CI	n	Rate 95%CI	n	Rate 95%CI	n	Rate 95%CI
1-2	80	1217.7 (950.8-1484.5)	45	2229 (1577.6-2880.0)	50	529 (382.1-675.2)	291	856 (757.8-954.6)
3-4	181	1959.5 (1674.0-2245.0)	106	3301 (2672.7-3929.6)	71	640 (491.3-789.2)	275	889 (784.0-994.2)
5-6	323	2539.3 (2262.4-2816.2)	153	3468 (2918.3-4017.3)	57	562 (416.0-707.8)	331	1077 (961.2-1193.3)
7-8	713	3581.8 (3318.9-3844.8)	314	3373 (3000.3-3746.6)	85	688 (541.5-833.9)	394	1360 (1225.5-1494.0)
9-10	1671	4772.4 (4543.6-5001.2)	1126	4506 (4243.0-4769.4)	110	929 (755.6-1103.0)	307	1758 (1561.7-1955.1)

Table A 61. 2017 childhood bronchiolitis hospitalisation rates by DHB.

DHB	n	Rate	95%CI
Northland	302	2619.3	(2323.8-2914.7)
Waitemata	541	1332.2	(1219.9-1444.4)
Auckland	464	1585.0	(1440.8-1729.2)
Counties Manukau	1050	2487.6	(2337.1-2638.0)
Waikato	921	3295.2	(3082.4-3508.0)
Lakes	282	3720.3	(3286.1-4154.5)
Bay of Plenty	426	2810.0	(2543.2-3076.9)
Tairawhiti	169	4694.4	(3986.7-5402.2)
Hawkes Bay	257	2334.2	(2048.9-2619.6)
Taranaki	165	2101.9	(1781.2-2422.6)
MidCentral	221	2005.4	(1741.0-2269.9)
Whanganui	106	2462.3	(1993.5-2931.0)
Capital and Coast	329	1829.8	(1632.1-2027.5)
Hutt	232	2324.6	(2025.5-2623.8)
Wairarapa	49	1870.2	(1346.6-2393.9)
Nelson Marlborough	98	1240.5	(994.9-1486.1)
West Coast	17	934.1	(490.0-1378.1)
Canterbury	362	1119.7	(1004.4-1235.0)
South Canterbury	30	898.2	(576.8-1219.6)
Southern	299	1668.5	(1479.4-1857.7)

9.4. CHILDHOOD PNEUMONIA

9.4.1. CHILDHOOD PNEUMONIA HOSPITALISATIONS

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

Table A 62. Childhood pneumonia hospitalisations, rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	3580	407.4	418.7	(405.0 - 432.4)
2001	3961	451.5	466.8	(452.2 - 481.3)
2002	3626	410.4	427.5	(413.6 - 441.4)
2003	3693	414.9	435.3	(421.3 - 449.4)
2004	3122	349.6	365.1	(352.3 - 377.9)
2005	3448	387.3	401.1	(387.7 - 414.5)
2006	3480	391.8	405.5	(392.0 – 419.0)
2007	3187	357.6	364.4	(351.7 – 377.0)
2008	3583	400.1	401.7	(388.5 - 414.8)
2009	4131	458.4	456.2	(442.3 - 470.2)
2010	3414	375.9	371.3	(358.9 - 383.8)
2011	3324	365.0	358.6	(346.4 - 370.8)
2012	3096	340.3	334.7	(322.9 - 346.4)
2013	2994	329.5	325.9	(314.3 - 337.6)
2014	3484	382.4	380.7	(368.0 - 393.3)
2015	3900	426.5	427.6	(414.1 – 441.0)
2016	3113	337.8	340.3	(328.4 - 352.3)
2017	3426	366.9	371.8	(359.3 - 384.3)
Trend 2000 -2017			-4.41	(-7.78- 1.03), p=0.014

Table A 63. 2017 childhood pneumonia 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
<5	2476	809.2	(777.3-841.0)	1303	829.4	(784.4-874.5)	1173	787.8	(742.7-832.8)	0.95	(0.91-0.99)
5-14	950	151.3	(141.7-161.0)	477	148.2	(134.9-161.5)	473	154.7	(140.7-168.6)	1.04	(0.98-1.11)

Table A 64. 2017 childhood pneumonia hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	5.35	(5.16-5.54)	5.60	(5.32-5.89)	5.09	(4.84-5.36)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 65. 2017 childhood pneumonia hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	1053	429.3	425.2	(399.5-450.9)	1.56	(1.5-1.63)
Pacific	840	666.1	649.3	(605.3-693.2)	2.39	(2.29-2.49)
Asian	472	340.1	308.1	(280.1-336)	1.13	(1.08-1.19)
Non-MPA	1215	257.2	271.8	(256.5-287.2)	1.00	Baseline

Table A 66. Childhood pneumonia hospitalisation rates by ethnic group 2000 – 2017, age-adjusted.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	1121	504.2	(474.7-533.7)	869	829.6	(774.3-884.8)	110	184.0	(149.6-218.4)	1494	296.5	(281.4-311.5)
2001	1177	535.8	(505.2-566.5)	1097	1029.2	(968.2-1090.1)	131	216.1	(179.1-253.1)	1617	323.6	(307.8-339.4)
2002	1092	496.6	(467.1-526.1)	979	900.0	(843.6-956.5)	168	250.8	(212.9-288.7)	1433	291.8	(276.6-306.9)
2003	1085	496.0	(466.5-525.6)	1137	1021.4	(962-1080.8)	176	238.8	(203.5-274.1)	1347	279.0	(264-293.9.0)
2004	865	395.6	(369.2-421.9)	992	864.4	(810.6-918.3)	163	210.6	(178.3-242.9)	1154	237.7	(223.9-251.4)
2005	1010	466.1	(437.3-494.8)	874	759.8	(709.4-810.2)	189	237.6	(203.7-271.5)	1447	294.7	(279.5-309.9)
2006	1045	483.4	(454.1-512.7)	989	861.4	(807.7-915.1)	216	268.7	(232.8-304.5)	1317	269.8	(255.2-284.4)
2007	996	442.6	(415.1-470.1)	937	802.0	(750.7-853.4)	229	268.4	(233.6-303.1)	1133	232.1	(218.6-245.6)
2008	1122	481.1	(452.9-509.3)	1118	924.6	(870.3-978.8)	282	310.8	(274.5-347.1)	1231	251.6	(237.6-265.7)
2009	1350	567.7	(537.3-598.0)	1220	987.1	(931.7-1042.6)	310	322.3	(286.4-358.2)	1424	289.2	(274.1-304.2)
2010	995	408.0	(382.6-433.4)	912	717.7	(671.0-764.3)	322	319.9	(284.9-355.0)	1324	267.7	(253.3-282.1)
2011	997	404.5	(379.3-429.6)	1048	806.2	(757.2-855.1)	288	271.0	(239.6-302.5)	1143	232.2	(218.8-245.7)
2012	937	380.1	(355.7-404.5)	943	716.7	(670.9-762.6)	304	274.1	(243.2-305.1)	1076	220.8	(207.6-234.0)
2013	851	350.2	(326.6-373.7)	856	662.7	(618.2-707.1)	301	260.2	(230.7-289.7)	1108	230.1	(216.6-243.7)
2014	997	408.4	(383.1-433.8)	962	748.2	(700.9-795.6)	397	326.9	(294.6-359.1)	1280	271.7	(256.8-286.5)
2015	1165	477.3	(449.9-504.8)	1109	861.1	(810.4-911.8)	467	356.9	(324.3-389.4)	1357	295.1	(279.4-310.9)
2016	841	342.2	(319.1-365.4)	827	642.3	(598.5-686.1)	431	301.8	(273.1-330.5)	1148	254.3	(239.6-269.1)
2017	1053	425.2	(399.5-450.9)	840	649.3	(605.3-693.2)	472	308.1	(280.1-336.0)	1215	271.8	(256.5-287.2)

Table A 67. Childhood pneumonia hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2017, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.70	(1.64 - 1.77)	2.80	(2.69 - 2.91)	0.62	(0.57 - 0.68)
2001	1.66	(1.6 - 1.72)	3.18	(3.06 - 3.3)	0.67	(0.61 - 0.73)
2002	1.70	(1.64 - 1.77)	3.08	(2.97 - 3.21)	0.86	(0.8 - 0.93)
2003	1.78	(1.71 - 1.85)	3.66	(3.52 - 3.8)	0.86	(0.79 - 0.92)
2004	1.66	(1.59 - 1.74)	3.64	(3.49 - 3.79)	0.89	(0.82 - 0.96)
2005	1.58	(1.52 - 1.64)	2.58	(2.47 - 2.69)	0.81	(0.75 - 0.87)
2006	1.79	(1.72 - 1.86)	3.19	(3.07 - 3.32)	1.00	(0.93 - 1.07)
2007	1.91	(1.83 - 1.99)	3.46	(3.31 - 3.6)	1.16	(1.08 - 1.24)
2008	1.91	(1.84 - 1.99)	3.67	(3.53 - 3.82)	1.24	(1.16 - 1.32)
2009	1.96	(1.89 - 2.04)	3.41	(3.29 - 3.54)	1.11	(1.05 - 1.18)
2010	1.52	(1.46 - 1.59)	2.68	(2.57 - 2.79)	1.20	(1.13 - 1.27)
2011	1.74	(1.67 - 1.81)	3.47	(3.33 - 3.62)	1.17	(1.1 - 1.24)
2012	1.72	(1.65 - 1.8)	3.25	(3.11 - 3.39)	1.24	(1.17 - 1.32)
2013	1.52	(1.46 - 1.59)	2.88	(2.76 - 3.01)	1.13	(1.06 - 1.2)
2014	1.50	(1.44 - 1.57)	2.75	(2.64 - 2.87)	1.20	(1.14 - 1.27)
2015	1.62	(1.56 - 1.68)	2.92	(2.81 - 3.03)	1.21	(1.15 - 1.27)
2016	1.35	(1.29 - 1.41)	2.53	(2.42 - 2.64)	1.19	(1.12 - 1.25)
2017	1.56	(1.5 - 1.63)	2.39	(2.29 - 2.49)	1.13	(1.08 - 1.19)

Table A 68. 2017 childhood pneumonia 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
<5	813	974.2 (907.3-1041.2)	657	1492.9 (1378.8-1607.1)	335	608.0 (542.9-673.1)	781	549.5 (510.9-588)
5-14	240	148.3 (129.5-167)	183	222.9 (190.6-255.2)	137	163.7 (136.3-191.1)	434	131.4 (119-143.8)

Table A 69. 2017 childhood pneumonia hospitalisation rates by NZDep2013 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	408	234.8	255.4	(230.4-280.3)	1.00	Baseline
3-4	431	260.9	269.4	(243.9-294.8)	1.05	(0.99-1.13)
5-6	545	322.4	325.3	(298.0-352.6)	1.27	(1.20-1.36)
7-8	757	405.9	393.8	(365.7-421.9)	1.54	(1.45-1.64)
9-10	1284	536.9	525.4	(496.6-554.1)	2.06	(1.95-2.17)

Table A 70. Childhood pneumonia hospitalisation rates by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 1-2		NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI
2000	350	268.3 (240.1-296.5)	407	291.8 (263.4-320.2)	451	284.1 (257.9-310.4)	749	411.2 (381.8-440.7)	1603	652.1 (620.1-684.0)
2001	337	253.3 (226.2-280.4)	462	329.0 (299.0-359.1)	570	361.7 (332.0-391.4)	809	449.9 (418.9-480.9)	1731	721.6 (687.6-755.6)
2002	340	252.9 (226.0-279.9)	455	323.3 (293.5-353.1)	462	292.9 (266.1-319.6)	753	422.1 (391.9-452.2)	1613	675.3 (642.4-708.3)
2003	353	260.2 (233.0-287.5)	423	298.0 (269.5-326.4)	480	307.8 (280.3-335.4)	704	397.8 (368.4-427.2)	1682	706.2 (672.4-739.9)
2004	321	228.6 (203.5-253.7)	328	227.0 (202.4-251.6)	406	259.0 (233.8-284.3)	634	358.6 (330.7-386.6)	1430	599.1 (568.0-630.1)
2005	344	238.5 (213.2-263.7)	421	284.7 (257.4-311.9)	481	305.6 (278.3-333.0)	688	391.3 (362.1-420.6)	1508	636.1 (604.0-668.2)
2006	351	242.3 (216.9-267.7)	394	266.6 (240.2-292.9)	455	290.0 (263.3-316.6)	716	408.3 (378.4-438.2)	1560	666.5 (633.4-699.5)
2007	329	222.7 (198.6-246.8)	324	214.8 (191.4-238.2)	405	254.8 (230.0-279.6)	653	364.9 (336.9-392.9)	1475	622.8 (591.0-654.5)
2008	368	242.6 (217.8-267.4)	415	269.2 (243.3-295.1)	472	290.7 (264.5-317.0)	689	376.8 (348.7-405.0)	1632	676.1 (643.3-708.9)
2009	412	266.9 (241.1-292.7)	450	286.6 (260.2-313.1)	573	348.3 (319.8-376.9)	850	458.0 (427.2-488.8)	1844	754.5 (720.1-789.0)
2010	426	272.1 (246.3-298.0)	404	254.4 (229.6-279.2)	462	276.2 (251.0-301.4)	740	392.3 (364.0-420.6)	1382	557.2 (527.8-586.6)
2011	356	224.5 (201.1-247.8)	413	258.1 (233.2-282.9)	491	292.5 (266.6-318.3)	691	360.6 (333.7-387.6)	1372	548.3 (519.2-577.4)
2012	325	203.0 (180.9-225.1)	363	227.2 (203.8-250.6)	415	247.6 (223.8-271.5)	672	352.9 (326.2-379.7)	1320	531.5 (502.7-560.2)
2013	352	217.8 (194.9-240.6)	373	232.7 (209.1-256.3)	441	264.1 (239.4-288.7)	573	302.8 (277.9-327.6)	1255	518.8 (490.1-547.6)
2014	401	249.7 (225.2-274.3)	453	284.4 (258.2-310.5)	502	302.1 (275.7-328.6)	705	374.9 (347.2-402.6)	1423	585.0 (554.6-615.4)
2015	441	274.3 (248.6-300.1)	478	301.7 (274.6-328.7)	557	337.7 (309.6-365.7)	818	434.0 (404.2-463.8)	1598	659.7 (627.3-692.1)
2016	406	258.6 (233.4-283.9)	380	238.7 (214.6-262.7)	445	268.1 (243.2-293.0)	604	317.9 (292.5-343.2)	1275	524.2 (495.4-553.0)
2017	408	255.4 (230.4-280.3)	431	269.4 (243.9-294.8)	545	325.3 (298.0-352.6)	757	393.8 (365.7-421.9)	1284	525.4 (496.6-554.1)

Table A 71. Childhood pneumonia hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 3-4	NZDep 5-6	NZDep 7-8	NZDep 9-10
Year	RR 95% CI	RR 95% CI	RR 95% CI	RR 95% CI
2000	1.09 (1.01 - 1.17)	1.06 (0.99 - 1.13)	1.53 (1.44 - 1.63)	2.43 (2.30 - 2.57)
2001	1.30 (1.21 - 1.39)	1.43 (1.34 - 1.52)	1.78 (1.67 - 1.89)	2.85 (2.69 - 3.02)
2002	1.28 (1.19 - 1.37)	1.16 (1.08 - 1.24)	1.67 (1.57 - 1.78)	2.67 (2.52 - 2.83)
2003	1.14 (1.07 - 1.23)	1.18 (1.11 - 1.26)	1.53 (1.44 - 1.63)	2.71 (2.57 - 2.87)
2004	0.99 (0.92 - 1.07)	1.13 (1.06 - 1.22)	1.57 (1.47 - 1.67)	2.62 (2.47 - 2.78)
2005	1.19 (1.11 - 1.28)	1.28 (1.20 - 1.37)	1.64 (1.54 - 1.75)	2.67 (2.52 - 2.82)
2006	1.10 (1.03 - 1.18)	1.20 (1.12 - 1.28)	1.69 (1.58 - 1.79)	2.75 (2.60 - 2.91)
2007	0.96 (0.90 - 1.04)	1.14 (1.07 - 1.23)	1.64 (1.54 - 1.75)	2.80 (2.64 - 2.96)
2008	1.11 (1.04 - 1.19)	1.20 (1.12 - 1.28)	1.55 (1.46 - 1.65)	2.79 (2.64 - 2.94)
2009	1.07 (1.01 - 1.15)	1.31 (1.23 - 1.39)	1.72 (1.62 - 1.82)	2.83 (2.68 - 2.98)
2010	0.93 (0.88 - 1.00)	1.01 (0.95 - 1.08)	1.44 (1.36 - 1.53)	2.05 (1.94 - 2.16)
2011	1.15 (1.07 - 1.23)	1.30 (1.22 - 1.39)	1.61 (1.51 - 1.71)	2.44 (2.31 - 2.58)
2012	1.12 (1.04 - 1.20)	1.22 (1.14 - 1.31)	1.74 (1.63 - 1.85)	2.62 (2.47 - 2.78)
2013	1.07 (1.00 - 1.15)	1.21 (1.13 - 1.30)	1.39 (1.30 - 1.48)	2.38 (2.25 - 2.52)
2014	1.14 (1.07 - 1.22)	1.21 (1.14 - 1.29)	1.50 (1.41 - 1.59)	2.34 (2.22 - 2.47)
2015	1.10 (1.03 - 1.17)	1.23 (1.16 - 1.31)	1.58 (1.50 - 1.67)	2.40 (2.28 - 2.53)
2016	0.92 (0.86 - 0.99)	1.04 (0.97 - 1.11)	1.23 (1.16 - 1.31)	2.03 (1.92 - 2.14)
2017	1.05 (0.99 - 1.13)	1.27 (1.20 - 1.36)	1.54 (1.45 - 1.64)	2.06 (1.95 - 2.17)

Table A 72. 2017 childhood pneumonia hospitalisation rates by ethnic group and NZDep2013 quintile.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	42	78	143	250	540
	Rate (raw)	191.0	275.2	379.5	443.3	535.4
	Rate (age adj'd)	197.9	280.2	379.2	429.9	522.6
	95%CI	(137.7-258.1)	(218.0-342.5)	(317.0-441.3)	(376.6-483.3)	(478.5-566.7)
Pacific	Hosp_Num	22	63	72	161	521
	Rate (raw)	361.1	649.0	577.5	617.4	724.2
	Rate (age adj'd)	359.1	655.6	561.8	591.9	708.2
	95%CI	(208.9-509.2)	(493.6-817.5)	(431.9-691.8)	(500.3-683.5)	(647.4-769.1)
Asian	Hosp_Num	84	99	97	90	102
	Rate (raw)	342.4	335.6	389.1	312.2	336.5
	Rate (age adj'd)	316.8	314.4	350.6	272.9	304.1
	95%CI	(248.8-384.7)	(252.3-376.5)	(280.3-420.9)	(215.8-329.9)	(244.8-363.5)
NZ European/ Other	Hosp_Num	264	208	248	296	199
	Rate (raw)	198.7	193.7	253.8	353.1	393.4
	Rate (age adj'd)	226.7	208.5	263.0	347.5	387.5
	95%CI	(198.9-254.5)	(180.0-237.0)	(230.2-295.8)	(307.9-387.1)	(333.7-441.4)

Table A 73. 2017 childhood pneumonia hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	205	550.5	573.7	(495.0-652.4)
Waitemata	432	364.6	359.4	(325.5-393.3)
Auckland	462	546.8	535.5	(486.6-584.3)
Counties Manukau	576	465.1	460.9	(423.3-498.6)
Waikato	373	433.9	443.6	(398.6-488.7)
Lakes	144	607.3	627.4	(524.8-730.0)
Bay of Plenty	171	359.2	369.0	(313.6-424.3)
Tairawhiti	40	343.6	355.7	(245.2-466.2)
Hawkes Bay	63	179.8	187.8	(141.4-234.2)
Taranaki	94	381.6	391.9	(312.6-471.3)
MidCentral	102	294.2	305.4	(246.1-364.7)
Whanganui	47	356.6	362.0	(258.4-465.5)
Capital and Coast	145	263.1	265.1	(221.9-308.3)
Hutt	155	516.7	516.6	(435.2-597.9)
Wairarapa	32	378.7	398.1	(259.9-536.2)
Nelson Marlborough	43	160.3	173.5	(121.4-225.5)
West Coast	19	328.7	342.1	(188.1-496.1)
Canterbury	216	217.3	219.6	(190.3-248.9)
South Canterbury	16	150.1	154.5	(78.7-230.3)
Southern	91	159.6	163.2	(129.6-196.8)

9.4.1. CHILDHOOD PNEUMONIA MORTALITY

Table A 74. Childhood pneumonia mortality rates and age-adjusted rates 2000-2015.

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	20	2.24	2.37	(1.33-3.41)
2005	10	1.12	1.16	(0.44-1.88)
2006	10	1.13	1.17	(0.44-1.89)
2007	14	1.57	1.61	(0.77-2.46)
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	1.98	1.93	(1.04-2.82)
2013	9	0.99	0.98	(0.34-1.63)
2014	7	0.77	0.76	(0.2-1.33)
2015	8	0.87	0.87	(0.27-1.48)
Trend 2000 -2015			0.04	(-0.03 - 0.11), p=0.289

Table A 75. Childhood pneumonia mortality rates and rate ratios by age group and sex, 2006-2015.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	96	3.1	(2.5-3.8)	52	3.3	(2.4-4.2)	44	3.0	(2.1-3.8)	0.89	(0.73-1.08)
5-14	13	0.2	(0.1-0.3)	8	0.3	(0.1-0.4)	5	0.2	(0-0.3)	0.66	(0.38-1.13)

Table A 76. Childhood pneumonia hospitalisation age group rate ratios by sex, 2006-2015.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	14.42	(10.89-19.09)	12.68	(8.84-18.18)	17.21	(10.99-26.94)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 77. Childhood pneumonia mortality rates and rate ratios by ethnic group, 2006-2015.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	53	2.3	2.2	(1.6-2.8)	4.07	(3.25-5.12)
Pacific	38	3.2	3.0	(2.1-4)	5.63	(4.42-7.17)
Asian	5	0.5	0.5	(0.1-0.9)	0.86	(0.54-1.37)
Non-MPA	26	0.5	0.5	(0.3-0.7)	1.00	Baseline

Table A 78. Childhood pneumonia mortality rates NZDep2006 quintile, 2006-2015.

NZDep	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	5	0.3	0.3	(0-0.6)	1.00	Baseline
3-4	16	1.0	1.0	(0.5-1.5)	3.10	(1.91-5.05)
5-6	9	0.5	0.5	(0.2-0.9)	1.66	(0.98-2.83)
7-8	14	0.8	0.7	(0.4-1.1)	2.26	(1.38-3.72)
9-10	65	2.8	2.6	(2-3.3)	8.06	(5.18-12.53)

Table A 79. Childhood pneumonia mortality rates by DHB, 2006-2015.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	7	1.96	2.01	(0.5-3.5)
Waitemata	9	0.81	0.80	(0.3-1.3)
Auckland	5	0.61	0.56	(0.1-1.1)
Counties Manukau	26	2.19	2.14	(1.3-3.0)
Waikato	16	1.98	1.98	(1.0-3.0)
Lakes	2	0.84	0.84	(0.2-3.4)
Bay of Plenty	11	2.43	2.52	(1.0-4.0)
Tairawhiti	0			
Hawkes Bay	1	0.29	0.30	(0.0-2.1)
Taranaki	5	2.12	2.14	(0.3-4.0)
MidCentral	5	1.45	1.48	(0.2-2.8)
Whanganui	1	0.75	0.77	(0.1-5.5)
Capital and Coast	8	1.47	1.43	(0.4-2.4)
Hutt	3	0.98	0.98	(0.3-3.0)
Wairarapa	0			
Nelson Marlborough	0			
West Coast	0			
Canterbury	3	0.31	0.31	(0.1-1.0)
South Canterbury	0			
Southern	7	1.26	1.28	(0.3-2.2)

9.1. COPD IN ADULTS AGED 45+ YEARS

9.1.1. ADULT 45+ YEARS COPD HOSPITALISATIONS

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

Table A 80. COPD hospitalisations in adults aged 45+, rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	7327	569.0	574.6	(561.4 - 587.8)
2001	8367	635.0	640.4	(626.6 - 654.2)
2002	8513	629.5	637.1	(623.5 - 650.7)
2003	9384	675.4	689.3	(675.3 - 703.3)
2004	9868	690.8	706.8	(692.8 - 720.8)
2005	9086	619.1	636.3	(623.1 - 649.4)
2006	9856	652.6	673.8	(660.5 - 687.2)
2007	9816	633.3	653.4	(640.5 - 666.4)
2008	10618	668.3	690.5	(677.4 - 703.7)
2009	10970	674.4	696.7	(683.7 - 709.8)
2010	11056	664.6	683.9	(671.2 - 696.7)
2011	11304	665.9	681.0	(668.4 - 693.5)
2012	11539	667.0	675.7	(663.4 - 688)
2013	10931	619.5	623.3	(611.6 - 635)
2014	11214	621.7	620.2	(608.7 - 631.6)
2015	11178	606.3	600.4	(589.3 - 611.6)
2016	10917	578.6	568.0	(557.3 - 578.7)
2017	11842	613.7	596.6	(585.9 - 607.4)
Trend 2000 -2017			-2.36	(-6.45 – 1.73), p=0.238

Table A 81. 2017 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	3381	280.2	(270.8-289.7)	1473	253.4	(240.5-266.3)	1908	305.2	(291.5-318.9)	1.20	(1.17-1.24)	
65+	8461	1170.3	(1145.3-1195.2)	4095	1215.7	(1178.4-1252.9)	4366	1130.6	(1097.1-1164.2)	0.93	(0.91-0.95)	

Table A 82. 2017 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+	4.18	(4.1-4.26)	4.80	(4.66-4.94)	3.70	(3.61-3.8)

Table A 83. 2017 COPD in adults aged 45+ hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	2743	1461.2	1749.1	(1678.5-1819.8)	3.54	(3.46-3.61)
Pacific	798	971.1	1337.8	(1237.8-1437.7)	2.70	(2.60-2.81)
Asian	220	107.6	167.5	(143.3-191.7)	0.34	(0.32-0.36)
Non-MPA	8079	551.7	494.8	(483.9-505.6)	1.00	Baseline

Table A 84. COPD in adults aged 45+ hospitalisation rates by ethnic group 2000 – 2017, age-adjusted.

	Māori		Pacific		Asian		non-MPA	
Year	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI
2000	921	1340.7 (1243.7-1437.6)	232	913.1 (787.0-1039.1)	63	243.9 (175.9-311.9)	6003	520.5 (507.2-533.7)
2001	1177	1618.4 (1515.8-1721.0)	343	1249.5 (1106.0-1392.9)	86	290.8 (222.6-358.9)	6624	561.1 (547.5-574.8)
2002	1280	1671.5 (1568.8-1774.2)	380	1310.9 (1167.0-1454.7)	77	218.7 (164.9-272.5)	6656	553.3 (539.9-566.7)
2003	1431	1810.3 (1705.1-1915.6)	423	1401.4 (1257.1-1545.7)	88	209.9 (160.2-259.6)	7326	601.2 (587.3-615.1)
2004	1459	1866.6 (1757.3-1975.8)	508	1585.2 (1435.9-1734.5)	110	257.9 (204.9-310.9)	7717	619.0 (605.1-632.9)
2005	1391	1624.7 (1528.9-1720.4)	397	1220.8 (1090.0-1351.7)	121	314.3 (251.7-377.0)	7089	557.7 (544.6-570.8)
2006	1640	1871.1 (1769.0-1973.3)	512	1523.3 (1377.9-1668.7)	115	250.2 (199.5-300.8)	7518	579.3 (566.2-592.5)
2007	1725	1878.3 (1778.5-1978.0)	530	1388.5 (1261.7-1515.4)	94	178.2 (137.3-219.1)	7401	559.0 (546.2-571.8)
2008	1868	1992.8 (1892.0-2093.6)	560	1527.4 (1391.1-1663.7)	125	238.2 (191.3-285.0)	7997	593.5 (580.4-606.5)
2009	1997	1938.6 (1844.5-2032.7)	627	1501.8 (1375.8-1627.8)	126	213.4 (171.8-255.1)	8169	595.9 (582.9-608.8)
2010	2014	1843.4 (1754.8-1931.9)	610	1407.4 (1287.3-1527.5)	159	225.7 (187.2-264.1)	8258	589.5 (576.8-602.3)
2011	2163	1885.2 (1797.7-1972.6)	626	1453.7 (1329.8-1577.7)	198	282.1 (238.0-326.3)	8289	578.4 (566.0-590.9)
2012	2191	1839.9 (1754.1-1925.8)	690	1518.2 (1395.6-1640.7)	210	269.1 (228.8-309.4)	8431	574.9 (562.6-587.2)
2013	2207	1752.7 (1672.1-1833.2)	622	1302.1 (1190.7-1413.6)	183	220.0 (184.7-255.3)	7894	528.0 (516.3-539.7)
2014	2201	1627.1 (1552.4-1701.8)	626	1250.2 (1143.0-1357.3)	202	230.4 (194.7-266.1)	8172	540.5 (528.8-552.3)
2015	2372	1650.3 (1577.9-1722.7)	663	1203.7 (1103.9-1303.6)	167	157.0 (130.9-183.1)	7952	514.5 (503.1-525.8)
2016	2422	1622.2 (1552.4-1692.1)	732	1294.3 (1193.2-1395.4)	177	137.1 (115.2-159.0)	7565	477.0 (466.2-487.8)
2017	2743	1749.1 (1678.5-1819.8)	798	1337.8 (1237.8-1437.7)	220	167.5 (143.3-191.7)	8079	494.8 (483.9-505.6)

Table A 85. COPD in adults aged 45+ hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2017, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.58	(2.48 - 2.67)	1.75	(1.64 - 1.88)	0.47	(0.41 - 0.54)
2001	2.88	(2.79 - 2.98)	2.23	(2.10 - 2.36)	0.52	(0.46 - 0.58)
2002	3.02	(2.93 - 3.12)	2.37	(2.24 - 2.50)	0.40	(0.35 - 0.45)
2003	3.01	(2.92 - 3.10)	2.33	(2.21 - 2.45)	0.35	(0.31 - 0.39)
2004	3.02	(2.93 - 3.11)	2.56	(2.44 - 2.68)	0.42	(0.38 - 0.46)
2005	2.91	(2.83 - 3.00)	2.19	(2.08 - 2.31)	0.56	(0.51 - 0.62)
2006	3.23	(3.14 - 3.32)	2.63	(2.51 - 2.76)	0.43	(0.39 - 0.48)
2007	3.36	(3.27 - 3.46)	2.48	(2.37 - 2.60)	0.32	(0.29 - 0.36)
2008	3.36	(3.27 - 3.45)	2.57	(2.46 - 2.69)	0.40	(0.36 - 0.44)
2009	3.25	(3.17 - 3.34)	2.52	(2.42 - 2.63)	0.36	(0.33 - 0.39)
2010	3.13	(3.05 - 3.21)	2.39	(2.29 - 2.49)	0.38	(0.35 - 0.42)
2011	3.26	(3.18 - 3.34)	2.51	(2.41 - 2.62)	0.49	(0.45 - 0.53)
2012	3.20	(3.12 - 3.28)	2.64	(2.54 - 2.75)	0.47	(0.44 - 0.50)
2013	3.32	(3.24 - 3.40)	2.47	(2.36 - 2.57)	0.42	(0.39 - 0.45)
2014	3.01	(2.94 - 3.09)	2.31	(2.22 - 2.41)	0.43	(0.40 - 0.46)
2015	3.21	(3.13 - 3.28)	2.34	(2.24 - 2.44)	0.31	(0.28 - 0.33)
2016	3.40	(3.32 - 3.48)	2.71	(2.61 - 2.82)	0.29	(0.27 - 0.31)
2017	3.54	(3.46 - 3.61)	2.70	(2.60 - 2.81)	0.34	(0.32 - 0.36)

Table A 86. 2017 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	1383	976.0	(924.6-1027.4)	284	456.7	(403.5-509.8)	50	33.1	(23.9-42.3)	1675	194.8	(185.5-204.1)
65+	1360	2955.2	(2798.2-3112.3)	514	2572.4	(2350.1-2794.8)	170	318.8	(270.9-366.7)	6404	1059.2	(1033.3-1085.1)

Table A 87. 2017 COPD in adults aged 45+ hospitalisation rates by NZDep2013 quintile.

		Rate				
NZDep	n	raw	age adj'd	95% CI	RR	95% CI
1-2	875	215.3	234.5	(218.8-250.2)	1.00	Baseline
3-4	1451	379.1	377.9	(358.4-397.4)	1.61	(1.55-1.68)
5-6	1968	502.6	466.5	(445.9-487.2)	1.99	(1.91-2.07)
7-8	3189	812.9	750.8	(724.5-777)	3.20	(3.09-3.32)
9-10	4350	1222.4	1198.6	(1162.9-1234.3)	5.11	(4.93-5.3)

Table A 88. COPD in adults 45+ hospitalisation rates by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 1-2			NZDep 3-4			NZDep 5-6			NZDep 7-8			NZDep 9-10		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	660	339.4	(313.3-365.5)	1059	475.3	(446.5-504.1)	1307	462.4	(437.1-487.6)	2042	677.6	(647.9-707.4)	2241	849.2	(813.8-884.6)
2001	715	354.2	(328.0-380.4)	1159	507.1	(477.8-536.4)	1568	542.2	(515.2-569.2)	2234	724.1	(693.7-754.5)	2629	980.3	(942.6-1018.0)
2002	782	376.6	(350.0-403.2)	1159	493.3	(464.8-521.8)	1600	541.9	(515.2-568.6)	2297	726.4	(696.3-756.4)	2663	977.7	(940.4-1015.1)
2003	826	383.8	(357.4-410.2)	1169	482.0	(454.2-509.7)	1701	569.9	(542.7-597.2)	2614	812.7	(781.2-844.2)	3037	1103.0	(1063.6-1142.4)
2004	801	364.7	(339.2-390.2)	1219	487.1	(459.6-514.5)	1764	573.7	(546.8-600.6)	2790	846.6	(814.8-878.4)	3287	1173.2	(1132.8-1213.5)
2005	742	327.4	(303.6-351.1)	1034	402.1	(377.5-426.7)	1569	500.8	(475.9-525.7)	2537	753.5	(723.9-783.1)	3197	1121.2	(1082.1-1160.2)
2006	752	321.9	(298.7-345.1)	1188	449.3	(423.7-475.0)	1675	527.6	(502.3-553)	2656	771.4	(741.7-801.0)	3582	1233.5	(1192.9-1274.0)
2007	766	314.3	(291.9-336.8)	1123	411.0	(386.9-435.1)	1600	487.9	(463.9-511.9)	2719	780.7	(751.1-810.3)	3601	1218.7	(1178.7-1258.6)
2008	779	307.8	(286.0-329.6)	1308	466.8	(441.4-492.1)	1913	570.6	(545-596.3)	2806	793.6	(764.0-823.2)	3796	1265.5	(1225.1-1305.8)
2009	859	325.3	(303.3-347.2)	1288	443.7	(419.5-468.0)	2014	589.3	(563.5-615.1)	2866	798.8	(769.4-828.3)	3938	1295.2	(1254.7-1335.7)
2010	851	309.1	(288.1-330.0)	1326	442.7	(418.9-466.6)	2067	589.3	(563.8-614.7)	2985	816.2	(786.8-845.7)	3818	1234.5	(1195.3-1273.7)
2011	956	335.8	(314.3-357.2)	1308	421.4	(398.6-444.3)	2079	580.4	(555.4-605.4)	3120	835.8	(806.3-865.3)	3836	1220.0	(1181.4-1258.6)
2012	955	322.3	(301.7-343.0)	1426	443.7	(420.7-466.8)	1963	535.7	(511.9-559.4)	3056	802.9	(774.3-831.5)	4136	1290.1	(1250.8-1329.4)
2013	827	267.8	(249.4-286.2)	1251	376.9	(356.0-397.8)	1971	524.8	(501.6-548.0)	2971	765.4	(737.8-793.1)	3902	1196.1	(1158.6-1233.6)
2014	904	277.0	(258.7-295.2)	1291	376.2	(355.6-396.7)	1999	517.4	(494.7-540.1)	2918	737.8	(710.9-764.7)	4092	1218.8	(1181.5-1256.2)
2015	865	253.9	(236.8-271.0)	1273	359.0	(339.3-378.8)	1964	494.9	(472.9-516.8)	2971	735.5	(708.9-762.0)	4084	1190.8	(1154.3-1227.4)
2016	922	256.7	(240.0-273.4)	1272	345.1	(326.1-364.1)	1912	466.7	(445.8-487.7)	2897	700.7	(675.0-726.3)	3912	1108.3	(1073.5-1143.0)
2017	875	234.5	(218.8-250.2)	1451	377.9	(358.4-397.4)	1968	466.5	(445.9-487.2)	3189	750.8	(724.5-777.0)	4350	1198.6	(1162.9-1234.3)

Table A 89. COPD in adults 45+ hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 3-4	NZDep 5-6	NZDep 7-8	NZDep 9-10
Year	RR 95% CI	RR 95% CI	RR 95% CI	RR 95% CI
2000	1.40 (1.34 - 1.47)	1.36 (1.30 - 1.43)	2.00 (1.91 - 2.08)	2.50 (2.40 - 2.61)
2001	1.43 (1.37 - 1.50)	1.53 (1.47 - 1.60)	2.04 (1.96 - 2.13)	2.77 (2.66 - 2.88)
2002	1.31 (1.25 - 1.37)	1.44 (1.38 - 1.50)	1.93 (1.85 - 2.01)	2.60 (2.50 - 2.70)
2003	1.26 (1.20 - 1.31)	1.49 (1.43 - 1.55)	2.12 (2.04 - 2.20)	2.87 (2.77 - 2.98)
2004	1.34 (1.28 - 1.39)	1.57 (1.51 - 1.64)	2.32 (2.23 - 2.41)	3.22 (3.10 - 3.34)
2005	1.23 (1.17 - 1.29)	1.53 (1.47 - 1.60)	2.30 (2.21 - 2.4)	3.42 (3.29 - 3.56)
2006	1.40 (1.33 - 1.46)	1.64 (1.57 - 1.71)	2.40 (2.30 - 2.49)	3.83 (3.69 - 3.98)
2007	1.31 (1.25 - 1.37)	1.55 (1.49 - 1.62)	2.48 (2.39 - 2.58)	3.88 (3.73 - 4.03)
2008	1.52 (1.45 - 1.58)	1.85 (1.78 - 1.93)	2.58 (2.48 - 2.68)	4.11 (3.96 - 4.27)
2009	1.36 (1.31 - 1.42)	1.81 (1.74 - 1.88)	2.46 (2.37 - 2.55)	3.98 (3.84 - 4.13)
2010	1.43 (1.37 - 1.49)	1.91 (1.83 - 1.98)	2.64 (2.54 - 2.74)	3.99 (3.85 - 4.14)
2011	1.26 (1.21 - 1.31)	1.73 (1.67 - 1.79)	2.49 (2.40 - 2.58)	3.63 (3.51 - 3.76)
2012	1.38 (1.32 - 1.43)	1.66 (1.60 - 1.73)	2.49 (2.40 - 2.58)	4.00 (3.87 - 4.14)
2013	1.41 (1.35 - 1.47)	1.96 (1.88 - 2.04)	2.86 (2.75 - 2.97)	4.47 (4.31 - 4.63)
2014	1.36 (1.30 - 1.42)	1.87 (1.80 - 1.94)	2.66 (2.57 - 2.76)	4.40 (4.25 - 4.56)
2015	1.41 (1.36 - 1.47)	1.95 (1.87 - 2.03)	2.90 (2.79 - 3.01)	4.69 (4.53 - 4.86)
2016	1.34 (1.29 - 1.40)	1.82 (1.75 - 1.89)	2.73 (2.63 - 2.83)	4.32 (4.17 - 4.47)
2017	1.61 (1.55 - 1.68)	1.99 (1.91 - 2.07)	3.20 (3.09 - 3.32)	5.11 (4.93 - 5.30)

Table A 90. 2017 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	75	165	298	664	1537
	Rate (raw)	428.5	734.2	1011.6	1539.1	2051.7
	Rate (age adj'd)	681.0	942.4	1226.6	1855.0	2382.2
	95%CI	(496.7-865.3)	(785.8-1099.0)	(1079.4-1373.8)	(1698.2-2011.7)	(2252.6-2511.8)
Pacific	Hosp_Num	15	44	56	140	542
	Rate (raw)	307.8	642.8	617.6	876.5	1223.9
	Rate (age adj'd)	653.2	1089.5	941.3	1251.9	1721.4
	95%CI	(186.2-1120.2)	(712.4-1466.7)	(658.5-1224.1)	(1020.8-1483.0)	(1563.3-1879.6)
Asian	Hosp_Num	25	48	33	47	67
	Rate (raw)	60.3	103.5	83.9	124.3	173.5
	Rate (age adj'd)	94.5	183.9	123.0	198.8	284.8
	95%CI	(54.2-134.9)	(129.0-238.9)	(77.3-168.7)	(135.6-262)	(198.7-371)
NZ European/ Other	Hosp_Num	756	1184	1581	2343	2210
	Rate (raw)	214.5	375.8	505.7	798.2	1162.6
	Rate (age adj'd)	226.8	352.1	434.8	674.0	975.6
	95%CI	(210.5-243.1)	(332.0-372.2)	(413.2-456.5)	(646.1-701.9)	(934.1-1017.2)

Table A 91. 2017 COPD in adults aged 45+ hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	660	790.5	719.0	(663.7-774.4)
Waitemata	1087	466.8	479.5	(450.9-508.0)
Auckland	702	409.5	437.8	(405.3-470.3)
Counties Manukau	1083	573.3	615.0	(578.1-651.9)
Waikato	1405	849.3	812.9	(770.2-855.5)
Lakes	396	872.1	838.2	(755.3-921.2)
Bay of Plenty	708	657.7	584.2	(540.7-627.7)
Tairawhiti	166	847.8	806.0	(683.0-929.0)
Hawkes Bay	627	846.4	776.9	(715.7-838.1)
Taranaki	490	948.7	891.3	(812.1-970.5)
MidCentral	420	554.6	502.8	(454.4-551.2)
Whanganui	335	1111.5	989.4	(882.7-1096)
Capital and Coast	537	460.5	475.7	(435.4-516.1)
Hutt	369	613.4	616.1	(553.1-679.1)
Wairarapa	162	733.4	659.1	(556.6-761.7)
Nelson Marlborough	282	377.8	342.8	(302.5-383.1)
West Coast	168	1044.8	1033.3	(875.7-1190.9)
Canterbury	1181	523.0	512.3	(483.0-541.5)
South Canterbury	164	555.2	477.9	(404.1-551.6)
Southern	900	651.9	612.1	(572.0-652.3)

9.1.1. ADULT 45+ YEARS COPD MORTALITY

Table A 92. COPD in adults 45+ mortality rates and age-adjusted rates 2000-2015.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	1441	111.91	114.56	(108.60-120.52)
2001	1709	129.71	132.17	(125.86-138.47)
2002	1598	118.17	121.04	(115.07-127.00)
2003	1641	118.10	120.93	(115.04-126.81)
2004	1704	119.28	123.22	(117.34-129.10)
2005	1473	100.36	103.55	(98.24-108.86)
2006	1541	102.04	105.77	(100.47-111.07)
2007	1471	94.91	98.20	(93.16-103.23)
2008	1671	105.18	108.97	(103.74-114.21)
2009	1563	96.08	99.71	(94.76-104.66)
2010	1482	89.08	91.74	(87.07-96.41)
2011	1591	93.73	96.03	(91.31-100.75)
2012	1540	89.01	90.47	(85.95-94.99)
2013	1499	84.96	85.98	(81.63-90.33)
2014	1616	89.59	89.73	(85.35-94.11)
2015	1579	85.65	85.04	(80.84-89.24)
Trend 2000 -2015			-2.81	(-3.53 - -2.09), p<0.001

Table A 93. COPD in adults aged 45+ mortality rates and rate ratios by age group and sex, 2015.

	Total			Male			Female			M v F	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
45-64	163	13.9	(11.8-16.1)	76	13.4	(10.4-16.5)	87	14.4	(11.4-17.4)	1.07	(0.92-1.24)
65+	1416	210.0	(199.1-220.9)	741	237.0	(219.9-254.1)	675	186.7	(172.6-200.7)	0.79	(0.75-0.83)

Table A 94. COPD in adults aged 45+ age group mortality rate ratios by sex, 2015.

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+	15.06	(13.93-16.3)	17.62	(15.72-19.76)	12.96	(11.63-14.44)

Table A 95. COPD in adults aged 45+ mortality rates and rate ratios by ethnic group, 2015.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	205	117.1	183.4	(155.6-211.3)	2.24	(2.07-2.42)
Pacific	39	50.9	88.8	(58.2-119.4)	1.08	(0.92-1.28)
Asian	22	12.8	30.7	(16.9-44.5)	0.37	(0.3-0.47)
Non-MPA	1312	92.6	81.9	(77.4-86.3)	1.00	Baseline

Table A 96. COPD in adults aged 45+ mortality rates by ethnic group and age, 2015.

	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	48	35.8	(25.7-45.9)	10	17.1	(6.5-27.7)	1	0.8	(0.1-5.5)	104	12.3	(9.9-14.6)
65+	157	383.4	(323.4-443.4)	29	160.5	(102.1-218.8)	21	50.7	(29-72.4)	1208	211.9	(200-223.9)

Table A 97. COPD in adults aged 45+ mortality rates by NZDep2006 quintile, 2015.

NZDep	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	182	47.2	56.9	(48.6-65.3)	1.00	Baseline
3-4	222	60.8	64.0	(55.5-72.4)	1.12	(1.02-1.24)
5-6	307	81.9	75.2	(66.8-83.7)	1.32	(1.21-1.44)
7-8	428	113.8	100.0	(90.5-109.5)	1.76	(1.61-1.91)
9-10	438	128.4	128.9	(116.8-140.9)	2.26	(2.08-2.46)

Table A 98. COPD in adults aged 45+ mortality rates by ethnic group and NZDep2013 quintile, 2015.

		NZDep2013 quintile				
Ethnic group		**1-2**	**3-4**	**5-6**	**7-8**	**9-10**
Māori	**Hosp_Num**	1	18	23	40	122
	Rate (raw)	6.4	88.4	84.3	99.3	170.6
	Rate (age adj'd)	12.8	155.5	130.1	169.0	258.4
	95%CI	(1.8-90.7)	(76.2-234.8)	(73.6-186.5)	(106.9-231)	(206.7-310)
Pacific	**Hosp_Num**	1	0	4	7	27
	Rate (raw)	22.8	0.0	48.4	46.8	64.5
	Rate (age adj'd)	148.5	0.0	83.1	92.2	113.2
	95%CI	(20.9-1054.5)	(0-0)	(0-166.1)	(11.5-172.9)	(65.8-160.5)
Asian	**Hosp_Num**	3	2	6	5	6
	Rate (raw)	8.7	5.2	18.0	15.7	18.2
	Rate (age adj'd)	21.9	10.7	48.3	37.6	49.2
	95%CI	(6.5-73.6)	(2.1-53.8)	(8.2-88.5)	(3.1-72.2)	(0.9-97.5)
NZ European/ Other	**Hosp_Num**	177	202	274	376	282
	Rate (raw)	53.1	66.8	90.2	130.8	148.1
	Rate (age adj'd)	60.9	64.2	75.1	101.1	116.1
	95%CI	(51.9-70)	(55.4-73.1)	(66.1-84)	(90.8-111.5)	(102.4-129.7)

Table A 99. COPD in adults aged 45+ mortality rates by DHB, 2015.

DHB	**n**	**Rate (raw)**	**Rate (age adj'd)**	**95%CI**
Northland	90	114.5	108.8	(86.2-131.4)
Waitemata	124	55.7	59.1	(48.7-69.5)
Auckland	119	72.3	80.5	(66-95)
Counties Manukau	118	65.5	76.7	(62.8-90.7)
Waikato	121	77.2	74.3	(61.1-87.6)
Lakes	57	132.4	135.2	(100-170.4)
Bay of Plenty	108	106.6	91.7	(74.4-109.1)
Tairawhiti	23	122.7	124.3	(73.4-175.1)
Hawkes Bay	55	77.6	70.4	(51.8-89)
Taranaki	55	110.2	100.2	(73.6-126.7)
MidCentral	62	85.3	76.0	(57-94.9)
Whanganui	41	141.7	125.2	(86.7-163.7)
Capital and Coast	63	56.5	59.5	(44.8-74.2)
Hutt	48	82.7	86.2	(61.8-110.6)
Wairarapa	17	80.7	72.8	(38.2-107.4)
Nelson Marlborough	78	109.4	101.0	(78.5-123.4)
West Coast	20	128.0	129.8	(72.6-187)
Canterbury	184	85.2	83.1	(71.1-95.1)
South Canterbury	32	111.3	92.7	(60.5-125)
Southern	162	122.1	114.5	(96.8-132.1)

9.2. TOTAL SERIOUS RESPIRATORY DISEASE

9.2.1. TOTAL RESPIRATORY HOSPITALISATIONS

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

Table A 100. Total respiratory hospitalisations, rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	54886	1422.7	1476.8	(1464.2 - 1489.3)
2001	58336	1503.3	1560.8	(1548.0 - 1573.6)
2002	58214	1474.4	1538.3	(1525.7 – 1551.0)
2003	58738	1458.5	1535.9	(1523.4 - 1548.5)
2004	59328	1451.4	1530.6	(1518.2 - 1543.1)
2005	58216	1408.3	1475.2	(1463.1 - 1487.3)
2006	60900	1455.3	1526.5	(1514.3 - 1538.6)
2007	60203	1425.3	1480.1	(1468.3 – 1492.0)
2008	66703	1565.9	1613.8	(1601.5 - 1626.1)
2009	72427	1683.4	1717.1	(1704.6 - 1729.7)
2010	71805	1650.4	1673.5	(1661.3 - 1685.8)
2011	73787	1683.1	1698.5	(1686.3 - 1710.8)
2012	75944	1722.8	1729.7	(1717.4 – 1742.0)
2013	72210	1625.6	1629.1	(1617.2 – 1641.0)
2014	77650	1721.8	1725.0	(1712.9 - 1737.2)
2015	81001	1762.5	1770.2	(1758.0 - 1782.4)
2016	78595	1674.6	1682.9	(1671.1 - 1694.6)
2017	86457	1803.5	1812.0	(1799.8 - 1824.1)
Trend 2000 -2015			17.37	(11.79-22.96), p<0.001

Table A 101. 2017 total respiratory 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	25857	2769.21594	(2735.5-2803)	14750	3079.3	(3029.6-3129)	11107	2442.6	(2397.2-2488)	0.79	(0.78-0.8)
15-29	7967	770.3576211	(753.4-787.3)	3109	585.3	(564.7-605.9)	4858	965.8	(938.6-992.9)	1.65	(1.61-1.69)
30-64	21547	1024.635086	(1011-1038.3)	9784	964.9	(945.7-984)	11763	1080.3	(1060.8-1099.8)	1.12	(1.11-1.13)
65+	31086	4299.079638	(4251.3-4346.9)	15561	4618.4	(4545.8-4691)	15525	4020.5	(3957.2-4083.7)	0.87	(0.86-0.88)

Table A 102. 2017 total respiratory hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	2.70	(2.68-2.73)	3.19	(3.15-3.23)	2.26	(2.23-2.29)
15-29	0.75	(0.74-0.76)	0.61	(0.59-0.62)	0.89	(0.88-0.91)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	4.20	(4.16-4.23)	4.79	(4.73-4.85)	3.72	(3.68-3.77)

Table A 103. 2017 total respiratory hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	20092	2674.3	3152.0	(3099.3-3204.7)	2.03	(2.02-2.05)
Pacific	11304	2994.9	3884.5	(3791.4-3977.7)	2.51	(2.48-2.54)
Asian	6305	892.7	1102.5	(1070.8-1134.1)	0.71	(0.70-0.72)
Non-MPA	50168	1643.7	1549.8	(1535.6-1563.9)	1.00	Baseline

Table A 104. Total respiratory hospitalisation rates and rate ratios by ethnic group, 2000 – 2017, age-adjusted.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	11285	2411.0	(2343.1-2478.9)	5380	2515.6	(2411.8-2619.3)	1458	788.1	(730.0-846.2)	35960	1323.7	(1309.9-1337.5)
2001	12239	2638.0	(2567.3-2708.6)	6614	2925.8	(2816.6-3035.0)	1829	955.5	(896.2-1014.9)	37074	1351.1	(1337.3-1365.0)
2002	12638	2641.8	(2573.2-2710.4)	6916	3060.0	(2947.9-3172.1)	1906	871.7	(818.5-924.9)	36270	1315.6	(1301.9-1329.3)
2003	13037	2804.8	(2733.4-2876.1)	7246	3067.0	(2958.9-3175.1)	2082	813.4	(765.9-861.0)	36260	1299.5	(1285.9-1313.0)
2004	12926	2757.1	(2687.0-2827.2)	7365	3177.7	(3068.4-3286.9)	2226	865.8	(817.2-914.4)	36824	1301.4	(1288.0-1314.9)
2005	12880	2558.8	(2495.5-2622.2)	6707	2657.7	(2562.2-2753.3)	2382	884.2	(835.6-932.8)	36335	1274.1	(1260.9-1287.4)
2006	13399	2718.3	(2652.8-2783.8)	7582	3125.8	(3020.0-3231.6)	2521	904.9	(858.4-951.5)	37542	1295.1	(1281.8-1308.3)
2007	13598	2673.4	(2609.8-2737.1)	7727	3073.9	(2973.6-3174.1)	2665	868.4	(825.7-911.0)	36543	1246.3	(1233.4-1259.3)
2008	15070	2863.3	(2799.3-2927.2)	8932	3445.9	(3341.8-3549.9)	3195	1026.0	(979.6-1072.3)	40084	1351.5	(1338.1-1364.9)
2009	17245	3034.7	(2972.8-3096.5)	10346	3830.7	(3725.5-3935.9)	3554	1004.8	(963.0-1046.6)	42141	1413.7	(1400.0-1427.4)
2010	16316	2828.5	(2769.6-2887.4)	9366	3425.0	(3327.5-3522.5)	3928	1079.9	(1037.7-1122.1)	43168	1434.1	(1420.4-1447.8)
2011	16633	2899.2	(2840.4-2958.0)	10019	3605.1	(3505.6-3704.5)	4166	1136.0	(1092.1-1179.9)	44140	1441.2	(1427.5-1454.9)
2012	17240	2984.9	(2925.4-3044.4)	10295	3659.2	(3560.5-3758.0)	4500	1153.6	(1111.5-1195.8)	45066	1464.9	(1451.1-1478.7)
2013	16094	2777.6	(2722.1-2833.0)	9401	3338.9	(3246.0-3431.8)	4582	1114.2	(1074.2-1154.2)	43099	1393.5	(1380.1-1407.0)
2014	17207	2880.5	(2825.4-2935.6)	10398	3670.1	(3575.2-3765.0)	5046	1126.1	(1087.9-1164.3)	46229	1488.0	(1474.0-1501.9)
2015	18735	3015.6	(2961.0-3070.1)	11101	3774.9	(3681.2-3868.7)	5577	1132.8	(1097.2-1168.4)	46869	1497.6	(1483.6-1511.5)
2016	17686	2823.0	(2771.8-2874.2)	10030	3410.3	(3322.6-3497.9)	5611	1025.3	(993.9-1056.8)	46421	1471.0	(1457.2-1484.9)
2017	20092	3152.0	(3099.3-3204.7)	11304	3884.5	(3791.4-3977.7)	6305	1102.5	(1070.8-1134.1)	50168	1549.8	(1535.6-1563.9)

Table A 105. Total respiratory hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2017, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.82	(1.8 - 1.85)	1.90	(1.86 - 1.94)	0.60	(0.57 - 0.62)
2001	1.95	(1.93 - 1.98)	2.17	(2.13 - 2.21)	0.71	(0.69 - 0.73)
2002	2.01	(1.98 - 2.04)	2.33	(2.28 - 2.37)	0.66	(0.64 - 0.68)
2003	2.16	(2.13 - 2.19)	2.36	(2.32 - 2.4)	0.63	(0.61 - 0.64)
2004	2.12	(2.09 - 2.15)	2.44	(2.4 - 2.48)	0.67	(0.65 - 0.68)
2005	2.01	(1.98 - 2.03)	2.09	(2.05 - 2.12)	0.69	(0.68 - 0.71)
2006	2.10	(2.07 - 2.13)	2.41	(2.37 - 2.46)	0.70	(0.68 - 0.72)
2007	2.15	(2.12 - 2.17)	2.47	(2.43 - 2.51)	0.70	(0.68 - 0.71)
2008	2.12	(2.09 - 2.14)	2.55	(2.51 - 2.59)	0.76	(0.74 - 0.78)
2009	2.15	(2.12 - 2.17)	2.71	(2.67 - 2.75)	0.71	(0.7 - 0.73)
2010	1.97	(1.95 - 1.99)	2.39	(2.35 - 2.42)	0.75	(0.74 - 0.77)
2011	2.01	(1.99 - 2.03)	2.50	(2.47 - 2.54)	0.79	(0.77 - 0.8)
2012	2.04	(2.02 - 2.06)	2.50	(2.46 - 2.53)	0.79	(0.77 - 0.8)
2013	1.99	(1.97 - 2.01)	2.40	(2.36 - 2.43)	0.80	(0.79 - 0.81)
2014	1.94	(1.92 - 1.96)	2.47	(2.43 - 2.5)	0.76	(0.74 - 0.77)
2015	2.01	(1.99 - 2.03)	2.52	(2.49 - 2.55)	0.76	(0.74 - 0.77)
2016	1.92	(1.9 - 1.94)	2.32	(2.29 - 2.35)	0.70	(0.69 - 0.71)
2017	2.03	(2.02 - 2.05)	2.51	(2.48 - 2.54)	0.71	(0.7 - 0.72)

Table A 106. 2017 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	8829	3599.3	(3524.2-3674.3)	5169	4099.2	(3987.4-4210.9)	2654	1912.1	(1839.4-1984.9)	10338	2188.4	(2146.2-2230.6)
15-29	2034	1044.5	(999.1-1089.9)	1242	1195.8	(1129.3-1262.3)	725	393.3	(364.7-422.0)	4215	727.8	(705.8-749.8)
30-64	5673	2138.9	(2083.2-2194.6)	2775	2176.5	(2095.5-2257.5)	1640	497.2	(473.2-521.3)	11596	830.7	(815.6-845.8)
65+	3556	7727.1	(7473.1-7981.0)	2118	10600.1	(10148.6-11051.5)	1286	2411.7	(2279.9-2543.5)	24019	3972.6	(3922.4-4022.9)

Table A 107. 2017 total respiratory hospitalisation rates by NZDep2013 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	10460	1128.3	1197.2	(1174-1220.4)	1.00	Baseline
3-4	12256	1366.4	1384.5	(1359.8-1409.1)	1.16	(1.14-1.17)
5-6	14932	1613.7	1575.2	(1549.7-1600.7)	1.32	(1.3-1.33)
7-8	20183	2041.4	1987.8	(1960.1-2015.4)	1.66	(1.64-1.68)
9-10	28556	2707.0	2806.6	(2773.6-2839.6)	2.34	(2.32-2.37)

Table A 108. Total respiratory hospitalisation rates by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 1-2			NZDep 3-4			NZDep 5-6			NZDep 7-8			NZDep 9-10		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	5928	1021.3	(994.7-1047.8)	7757	1219.1	(1191.7-1246.6)	9496	1269.9	(1244.1-1295.6)	13352	1610.4	(1582.8-1638.1)	18155	2025.0	(1994.2-2055.8)
2001	6008	1015.6	(989.4-1041.8)	8366	1297.0	(1268.9-1325.1)	10125	1339.4	(1313.1-1365.7)	14073	1690.6	(1662.4-1718.8)	19224	2157.6	(2125.8-2189.3)
2002	6087	1007.8	(982-1033.6)	8081	1227.2	(1200.2-1254.2)	10213	1338.9	(1312.8-1365.0)	13939	1666.8	(1638.9-1694.7)	19821	2196.0	(2164.3-2227.8)
2003	6066	985.0	(959.7-1010.2)	7749	1156.1	(1130.1-1182.1)	9963	1293.5	(1267.9-1319.0)	14137	1674.1	(1646.3-1701.9)	20485	2271.9	(2239.7-2304.1)
2004	6064	958.2	(933.7-982.8)	7552	1107.2	(1082.1-1132.4)	9932	1273.9	(1248.8-1299.1)	14204	1663.2	(1635.6-1690.8)	21516	2381.8	(2348.9-2414.7)
2005	6125	935.0	(911.2-958.8)	7253	1031.3	(1007.4-1055.2)	9890	1253.5	(1228.7-1278.3)	14203	1643.0	(1615.8-1670.2)	20668	2264.4	(2232.6-2296.2)
2006	6450	966.2	(942.3-990.2)	7755	1089.2	(1064.8-1113.6)	10034	1256.0	(1231.4-1280.7)	14731	1687.5	(1660.1-1715.0)	21866	2389.2	(2356.7-2421.7)
2007	6330	921.4	(898.4-944.4)	7468	1023.6	(1000.3-1047.0)	9851	1208.1	(1184.2-1232.0)	14725	1664.8	(1637.7-1691.8)	21774	2361.5	(2329.3-2393.7)
2008	6846	972.7	(949.4-996.1)	8460	1137.2	(1112.8-1161.5)	11101	1342.0	(1317.0-1367.1)	15772	1756.8	(1729.3-1784.4)	24372	2612.8	(2579.1-2646.4)
2009	7444	1028.0	(1004.4-1051.7)	9284	1219.0	(1194.1-1243.9)	12404	1478.8	(1452.7-1504.9)	17005	1864.5	(1836.4-1892.7)	26235	2749.6	(2715.5-2783.7)
2010	7953	1070.7	(1046.9-1094.5)	9480	1220.7	(1196.1-1245.4)	12634	1478.4	(1452.5-1504.2)	17020	1835.0	(1807.3-1862.7)	24683	2576.1	(2543.2-2609.0)
2011	8138	1075.1	(1051.5-1098.7)	9955	1257.7	(1232.9-1282.4)	12866	1485.9	(1460.1-1511.6)	17630	1878.8	(1851.0-1906.7)	25162	2615.4	(2582.4-2648.4)
2012	8646	1115.9	(1092.1-1139.6)	10437	1300.1	(1275.2-1325.1)	12853	1473.4	(1447.9-1498.9)	18007	1902.7	(1874.8-1930.6)	25969	2696.4	(2663.0-2729.9)
2013	8140	1027.5	(1005.0-1050.0)	9755	1195.8	(1172.0-1219.5)	12422	1408.8	(1383.9-1433.6)	17070	1794.4	(1767.4-1821.4)	24767	2584.5	(2551.7-2617.2)
2014	8945	1103.4	(1080.4-1126.5)	10460	1264.1	(1239.9-1288.4)	13256	1481.5	(1456.2-1506.8)	18295	1903.9	(1876.2-1931.7)	26651	2735.4	(2702.1-2768.8)
2015	9173	1102.8	(1080.0-1125.5)	11000	1307.6	(1283.1-1332.1)	13620	1501.5	(1476.1-1526.8)	19343	1984.6	(1956.5-2012.7)	27666	2792.9	(2759.5-2826.3)
2016	9463	1114.2	(1091.6-1136.9)	11008	1280.2	(1256.2-1304.2)	13379	1441.9	(1417.3-1466.5)	18546	1863.5	(1836.5-1890.4)	26168	2600.9	(2569-2632.9)
2017	10460	1197.2	(1174.0-1220.4)	12256	1384.5	(1359.8-1409.1)	14932	1575.2	(1549.7-1600.7)	20183	1987.8	(1960.1-2015.4)	28556	2806.6	(2773.6-2839.6)

Table A 109. Total respiratory hospitalisation rates relative to NZDep 1-2 by NZDep2013 quintile 2000 – 2017, age-adjusted.

	NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.19	(1.17 - 1.21)	1.24	(1.22 - 1.26)	1.58	(1.55 - 1.60)	1.98	(1.95 - 2.01)
2001	1.28	(1.26 - 1.30)	1.32	(1.30 - 1.34)	1.66	(1.64 - 1.69)	2.12	(2.09 - 2.16)
2002	1.22	(1.20 - 1.24)	1.33	(1.31 - 1.35)	1.65	(1.63 - 1.68)	2.18	(2.15 - 2.21)
2003	1.17	(1.15 - 1.19)	1.31	(1.29 - 1.33)	1.70	(1.67 - 1.72)	2.31	(2.27 - 2.34)
2004	1.16	(1.14 - 1.17)	1.33	(1.31 - 1.35)	1.74	(1.71 - 1.76)	2.49	(2.45 - 2.52)
2005	1.10	(1.08 - 1.12)	1.34	(1.32 - 1.36)	1.76	(1.73 - 1.78)	2.42	(2.39 - 2.46)
2006	1.13	(1.11 - 1.15)	1.30	(1.28 - 1.32)	1.75	(1.72 - 1.77)	2.47	(2.44 - 2.51)
2007	1.11	(1.09 - 1.13)	1.31	(1.29 - 1.33)	1.81	(1.78 - 1.83)	2.56	(2.53 - 2.60)
2008	1.17	(1.15 - 1.19)	1.38	(1.36 - 1.40)	1.81	(1.78 - 1.83)	2.69	(2.65 - 2.72)
2009	1.19	(1.17 - 1.20)	1.44	(1.42 - 1.46)	1.81	(1.79 - 1.84)	2.67	(2.64 - 2.71)
2010	1.14	(1.12 - 1.16)	1.38	(1.36 - 1.40)	1.71	(1.69 - 1.74)	2.41	(2.38 - 2.44)
2011	1.17	(1.15 - 1.19)	1.38	(1.36 - 1.40)	1.75	(1.73 - 1.77)	2.43	(2.40 - 2.46)
2012	1.17	(1.15 - 1.18)	1.32	(1.30 - 1.34)	1.71	(1.68 - 1.73)	2.42	(2.39 - 2.45)
2013	1.16	(1.15 - 1.18)	1.37	(1.35 - 1.39)	1.75	(1.72 - 1.77)	2.52	(2.48 - 2.55)
2014	1.15	(1.13 - 1.16)	1.34	(1.33 - 1.36)	1.73	(1.70 - 1.75)	2.48	(2.45 - 2.51)
2015	1.19	(1.17 - 1.20)	1.36	(1.34 - 1.38)	1.80	(1.78 - 1.82)	2.53	(2.50 - 2.56)
2016	1.15	(1.13 - 1.16)	1.29	(1.28 - 1.31)	1.67	(1.65 - 1.69)	2.33	(2.31 - 2.36)
2017	1.16	(1.14 - 1.17)	1.32	(1.30 - 1.33)	1.66	(1.64 - 1.68)	2.34	(2.32 - 2.37)

Table A 110. 2017 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	805	1467	2462	4712	10627
	Rate (raw)	1191.1	1680.2	2095.7	2678.0	3510.4
	Rate (age adj'd)	1480.6	1963.4	2474.0	3163.6	4151.4
	95%CI	(1343.4-1617.8)	(1838.8-2088)	(2358.3-2589.8)	(3051.4-3275.7)	(4054.5-4248.4)
Pacific	Hosp_Num	363	803	1085	2273	6771
	Rate (raw)	1871.5	2657.4	2703.0	3001.1	3231.3
	Rate (age adj'd)	3075.2	3605.7	3499.1	4075.2	4351.4
	95%CI	(2510.2-3640.2)	(3245.1-3966.3)	(3214-3784.3)	(3845.5-4305)	(4212.8-4490)
Asian	Hosp_Num	913	1205	1117	1337	1732
	Rate (raw)	752.9	822.8	840.4	941.1	1073.0
	Rate (age adj'd)	851.2	1041.9	1069.1	1185.9	1494.8
	95%CI	(789.5-913)	(975-1108.9)	(996.2-1141.9)	(1109.5-1262.3)	(1395.7-1594)
NZ European/ Other	Hosp_Num	8380	8879	10421	12200	10246
	Rate (raw)	1132.2	1345.5	1615.7	1984.8	2617.1
	Rate (age adj'd)	1180.1	1303.0	1498.6	1799.9	2363.0
	95%CI	(1154.1-1206)	(1275-1331)	(1468.3-1528.8)	(1765.8-1834.1)	(2313.8-2412.3)

Table A 111. 2017 total respiratory hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	3908	2228.0	2049.8	(1984.1-2115.6)
Waitemata	10062	1660.5	1716.8	(1683.2-1750.5)
Auckland	7840	1497.7	1738.1	(1698.8-1777.4)
Counties Manukau	10490	1919.2	2046.2	(2006.3-2086.1)
Waikato	9232	2258.4	2209.5	(2164.2-2254.7)
Lakes	2787	2568.0	2492.3	(2399.4-2585.3)
Bay of Plenty	4863	2096.2	1903.4	(1848.8-1958)
Tairawhiti	1111	2290.2	2181.5	(2052.5-2310.5)
Hawkes Bay	3530	2153.6	1988.3	(1921.9-2054.7)
Taranaki	2598	2199.3	2069.9	(1989.6-2150.2)
MidCentral	3144	1780.2	1689.1	(1629.4-1748.8)
Whanganui	1695	2646.2	2352.2	(2237.9-2466.6)
Capital and Coast	4246	1357.8	1468.0	(1423.5-1512.5)
Hutt	2938	1985.7	1989.9	(1917.9-2062)
Wairarapa	859	1929.9	1762.9	(1641.1-1884.7)
Nelson Marlborough	1961	1318.0	1224.6	(1168.4-1280.8)
West Coast	600	1847.9	1733.4	(1591.2-1875.5)
Canterbury	8005	1452.0	1476.5	(1443.9-1509)
South Canterbury	966	1623.0	1434.8	(1340.7-1528.8)
Southern	5618	1732.1	1713.3	(1668-1758.6)

9.2.1. TOTAL RESPIRATORY MORTALITY

Table A 112. Total respiratory mortality rates and age-adjusted rates 2000-2015.

		Rate		
Year	n	Raw	(age adj'd)	95% CI
2000	2060	53.40	65.61	(62.77-68.46)
2001	2407	62.03	74.42	(71.44-77.40)
2002	2392	60.58	72.24	(69.34-75.15)
2003	2357	58.53	69.68	(66.86-72.50)
2004	2467	60.35	71.16	(68.35-73.97)
2005	2164	52.35	60.91	(58.34-63.48)
2006	2396	57.26	65.61	(62.98-68.24)
2007	2329	55.14	62.16	(59.64-64.69)
2008	2623	61.58	68.24	(65.63-70.85)
2009	2558	59.45	64.84	(62.32-67.35)
2010	2439	56.06	60.21	(57.82-62.60)
2011	2718	62.00	65.33	(62.87-67.79)
2012	2833	64.27	66.56	(64.10-69.01)
2013	2719	61.21	62.70	(60.35-65.06)
2014	2902	64.35	65.14	(62.77-67.51)
2015	2922	63.60	64.03	(61.70-66.35)
Trend 2000 -2015			-0.47	(-0.88 - -0.06), p=0.027

Table A 113. Total respiratory mortality rates and rate ratios by age group and sex, 2010-2015.

	Total			Male			Female			M v F	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	95	1.7	(1.4-2.1)	50	1.8	(1.3-2.3)	45	1.7	(1.2-2.2)	0.95	(0.78-1.15)
15-29	45	0.8	(0.6-1.1)	31	1.1	(0.7-1.5)	14	0.5	(0.2-0.8)	0.46	(0.34-0.62)
30-64	1435	11.9	(11.3-12.5)	687	11.8	(11.0-12.7)	748	12.0	(11.1-12.8)	1.01	(0.96-1.06)
65+	14959	404.6	(398.1-411.1)	7302	429.4	(419.5-439.2)	7657	383.5	(374.9-392.1)	0.89	(0.88-0.91)

Table A 114. Total respiratory mortality rate ratios by age group and sex, 2010-2015.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.15	(0.13-0.16)	0.15	(0.13-0.17)	0.15	(0.13-0.17)
15-29	0.07	(0.06-0.08)	0.09	(0.08-0.11)	0.06	(0.04-0.07)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	33.95	(33.07-34.85)	36.24	(34.89-37.64)	30.99	(29.89-32.13)

Table A 115. Total respiratory mortality rates and rate ratios by ethnic group, 2010-2015.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	1616	39.0	107.0	(101.1-112.8)	1.73	(1.69-1.78)
Pacific	502	24.4	78.6	(71.0-86.3)	1.27	(1.21-1.34)
Asian	321	10.0	31.9	(28.1-35.6)	0.52	(0.49-0.55)
Non-MPA	14122	79.6	61.7	(60.7-62.7)	1.00	Baseline

Table A 116. Total respiratory mortality rates by ethnic group and age, 2010-2015

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	41	2.9	(2.0-3.8)	32	4.4	(2.9-5.9)	6	0.9	(0.2-1.7)	25	0.8	(0.5-1.2)
15-29	19	1.8	(1.0-2.7)	9	1.7	(0.6-2.8)	4	0.4	(0.0-0.9)	14	0.4	(0.2-0.7)
30-64	434	29.1	(26.3-31.8)	92	13.3	(10.6-16)	32	2.2	(1.4-3.0)	883	10.4	(9.7-11.1)
65+	1122	525.5	(494.8-556.3)	369	386.2	(346.8-425.6)	279	146.8	(129.6-164.1)	13200	413.3	(406.2-420.3)

Table A 117. Total respiratory mortality rates NZDep2013 quintile, 2010-2015.

NZDep quintile	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	2002	39.6	47.6	(45.5-49.7)	1.00	Baseline
3-4	2582	51.6	54.3	(52.2-56.4)	1.14	(1.11-1.17)
5-6	3285	63.2	57.7	(55.7-59.7)	1.21	(1.18-1.25)
7-8	4480	80.6	72.7	(70.6-74.9)	1.53	(1.49-1.57)
9-10	4145	70.6	85.6	(83.0-88.2)	1.80	(1.75-1.85)

Table A 118. Total respiratory mortality rates by ethnic group and NZDep2013 quintile, 2010-2015.

		NZDep2013 quintile				
Ethnic group		**1-2**	**3-4**	**5-6**	**7-8**	**9-10**
Māori	**Hosp_Num**	44	123	210	353	885
	Rate (raw)	13.1	27.0	33.0	36.4	50.7
	Rate (age adj'd)	45.7	78.2	91.7	101.3	134.3
	95%CI	(29.2-62.2)	(62.5-93.8)	(77.9-105.5)	(89.4-113.3)	(124.4-144.2)
Pacific	**Hosp_Num**	9	34	48	82	325
	Rate (raw)	9.2	21.5	22.6	19.8	27.8
	Rate (age adj'd)	27.8	78.9	76.5	69.4	94.7
	95%CI	(6.8-48.8)	(48.5-109.3)	(51.4-101.7)	(52.5-86.2)	(83.2-106.1)
Asian	**Hosp_Num**	45	66	54	68	81
	Rate (raw)	8.2	10.0	8.7	10.4	11.0
	Rate (age adj'd)	25.2	32.5	28.1	33.6	43.3
	95%CI	(17.3-33.1)	(24-40.9)	(20.1-36.1)	(25.1-42)	(32.6-54)
NZ European/ Other	**Hosp_Num**	1904	2364	2977	3980	2869
	Rate (raw)	46.3	62.4	78.7	109.6	118.7
	Rate (age adj'd)	48.6	54.0	57.1	72.0	79.0
	95%CI	(46.4-50.8)	(51.8-56.1)	(55-59.1)	(69.8-74.3)	(76.1-81.9)

Table A 119. Total respiratory mortality rates by DHB, 2010-2015.

DHB	**n**	**Rate (raw)**	**Rate (age adj'd)**	**95%CI**
Northland	789	80.1	70.8	(65.8-75.7)
Waitemata	1589	48.1	55.3	(52.6-58.1)
Auckland	1188	42.8	57.1	(53.9-60.4)
Counties Manukau	1268	42.5	61.4	(58.0-64.8)
Waikato	1472	65.0	66.2	(62.9-69.6)
Lakes	486	78.3	82.0	(74.7-89.4)
Bay of Plenty	1046	81.0	64.8	(60.9-68.8)
Tairawhiti	217	77.0	83.1	(72.1-94.2)
Hawkes Bay	691	72.9	63.9	(59.1-68.7)
Taranaki	508	74.7	65.1	(59.4-70.7)
MidCentral	744	73.4	65.3	(60.6-69.9)
Whanganui	356	94.8	75.7	(67.8-83.6)
Capital and Coast	833	47.3	56.6	(52.8-60.5)
Hutt	544	63.4	69.0	(63.2-74.8)
Wairarapa	209	82.5	63.9	(55.2-72.5)
Nelson Marlborough	628	73.9	59.9	(55.3-64.6)
West Coast	149	75.5	70.7	(59.3-82.1)
Canterbury	2082	68.1	65.2	(62.4-68.0)
South Canterbury	311	90.3	64.0	(56.8-71.2)
Southern	1385	75.3	69.2	(65.6-72.9)

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 (children under 15 years)
  - 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 PHARMACEUTICAL INCLUSIONS

Pharmaceutical products included in the cost calculations were those pharmaceuticals classified as (Level 2 classification):

- Beta-Adrenoceptor Agonists;
- Corticosteroids and Related Agents for Systemic Use;
- Inhaled Anticholinergic agents;
- Inhaled Corticosteroids;
- Inhaled Long-acting Beta-adrenoceptor Agonists;
- Methylxanthines;

And also spacer devices and masks.

In 2017, these had the following chemical_ids:

1056	1829	3967
1065	1832	4042
1066	2096	4043
1083	2374	4056
1108	2375	4057
1168	2404	4058
1492	3710	4059
1580	3758	4060
1598	3805	4079
1826	3858	6311

12. APPENDIX 4 LITERATURE SEARCH RESULTS

Table A 120. Literature search publication numbers and filtering

(Publications since previous report only)

Condition	Medline publications returned	Remaining after abstract screening	Remaining after full text screening
Asthma	11	1	0
Bronchiectasis	6	0	0
Childhood bronchiolitis	11	2	1
Childhood pneumonia	34	1	0
COPD in adults	35	2	0
OSA	8	2	2
Total respiratory	164	13	5

Table A 121. Asthma prevalence in published studies

(None new since previous report)

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
Cohet et al 2004[34]	2002	Greater Wellington	2539 controls	6-7 years; all	Wheezing ever	44.5%
					Wheezing last 12 months	24.3%
					More than one wheezing attach 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[35]	2008-2010	Rotorua	1637	18-65 years; all	current asthma, defined as: *"ever been diagnosed by a doctor as having asthma",*	16.7%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
					plus either wheeze in the last 12 months or current use of asthma medication.	
					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[36]	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%
Douwes et al 2007[37] 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[38]	2003-2004	Greater Wellington	1017	24-74 years; all;	Asthma ever diagnosed	23.9%
Ellison-Loschmann et al 2009[19] 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%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
					Night waking from wheeze	11.2%
					Speech-limiting wheeze	6.2%
					Asthma ever	33.4%
					Exercise wheeze	38.3%
					Night cough	28.8%
Eng et al 2010[39], Eng et al 2011[40]	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[41]		Northern New Zealand	369	18 months; European & Polynesian (not disaggregated)	Wheeze in the last 12 months	118/369= 32.0%

In memory of Dr W Brent Wilson;
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NEW ZEALAND

The impact of respiratory disease in New Zealand: 2018 update