Asthma + Respiratory FOUNDATION NZ

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

The impact of respiratory disease in New Zealand: 2020 update

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Overview

Chronic and serious respiratory illnesses continue to make a substantial contribution to New Zealand's health burden. Respiratory diagnoses accounted for 1 in 10 of all 2019 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 2000-2019.

Across the 2000 to 2019 study period, hospitalisation rates have increased for bronchiectasis, childhood bronchiolitis and total respiratory disease, remained static for childhood pneumonia, and declined for asthma and COPD. Mortality rates between 2000 and 2017 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 asthma and 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 2.0 for childhood pneumonia, to 3.1 for childhood bronchiolitis and 4.9 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 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 adult rates were higher in women than in men.

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

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

Total respiratory disease

The 2019 rate of respiratory hospitalisations was 1779.9 per 100,000 people. Total respiratory hospitalisations have been increasing at a rate of 17.2 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, respiratory mortality rates did not change meaningfully between 2000 and 2017, with an age-adjusted rate of 66.5 per 100,000 people per year in 2000, and 68.0 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 2.6 times higher than for non-MPA. Māori rates were also significantly higher (rate ratio 2.2), while rates for Asian peoples were significantly lower (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 1.9 times higher. The deprivation gradient was present for hospitalisations in all ethnic groups, and for mortality in all ethnic groups except Asian peoples.

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 continued to increase since their low in 2010, reaching a new peak of at 2.5 deaths per 100,000 in 2017.

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, asthma prevalence and hospitalisation were higher for boys, whereas for deaths, and for adult prevalence and hospitalisations, asthma rates were higher in females.

Socio-economic differences in asthma hospitalisation saw rates 2.9 times higher in the most deprived NZDep2018 quintile 9-10, and 2.1 times higher in NZDep2018 quintile 7-8, compared to the wealthiest NZDep2018 quintile. These differences were similar to mortality

differences. Asthma prevalence showed a deprivation gradient for both males and females, children and adults.

2019 asthma hospitalisation rates were lower than the national average in Nelson Marlborough, Canterbury and Southern DHBs, highest in Whanganui, and higher than the national average in six North Island DHBs; 2017 mortality rates were highest in MidCentral DHB, and lowest in West Coast (where there were no asthma deaths in 2017).

Bronchiectasis

Bronchiectasis hospitalisation rates increased significantly over the study period, from 21.1 per 100,000 in 2000, to 29.5 in 2019. Mortality rates more than doubled, from 1.3 per 100,000 to 3.2.

Being of Māori, Pacific, or Asian ethnicity was a significant risk factor for bronchiectasis hospitalisation and death – all rates were higher than for non-MPA. The greatest disparity in hospitalisations by age and ethnicity was for Pacific peoples aged over 65 years, whose bronchiectasis hospitalisation rates of 424.0 per 100,000 were 4.7 times higher than for non-MPA. Overall, Pacific peoples were 5.4 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 significantly lower (0.8). Mortality differences were similar to hospitalisation differences for Māori and Pacific, but were 1.3 times higher than the non-MPA rate for Asian peoples.

Bronchiectasis also showed strong socio-economic disparity, with hospitalisation rates 2.8 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 Pacific peoples.

Childhood bronchiolitis

Childhood bronchiolitis hospitalisation rates increased by nearly a half from 2000 to 2019. Pacific rates were 3.9 times higher than non-MPA, and Māori rates 2.9 times higher. The rate for the most deprived quintile was 3.1 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 nearly five times as likely to be hospitalised as non-MPA children in the wealthiest quintile.

There were few deaths from childhood bronchiolitis, but 8 of the 9 deaths between 2006 and 2017 were in NZDep deciles 7-10; and 8 of the 9 deaths were Māori and/or Pacific children.

Childhood pneumonia

Overall, the outstanding differences in childhood pneumonia hospitalisation rates were for Pacific peoples, and for those in more deprived quintiles. Pacific children's pneumonia rates were 3.1 times higher than the non-MPA rate for hospitalisation, and 4.8 times higher for mortality; Māori children's rates were 1.7 and 3.3 times higher respectively. Hospitalisation rates for Asian children were 1.4 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 2.0 times higher in the most deprived NZDep quintile than in the least deprived. Nearly half of deaths were in the most deprived quintile, making the NZDep9-10 mortality rate 9.2 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. In the 65+ years age group, hospitalisation rates for men and women were not significantly different, but deaths were higher for men than for women, but not significantly different between men and women in the 65+ age group. COPD rates were highest for Māori, at 3.7 times the non-MPA rate for hospitalisation and 2.3 times the rate for mortality. Pacific peoples' hospitalisation rates were 2.6 times higher, and mortality 1.5 times higher than non-MPA. Both measures were lowest for Asian peoples, at roughly a quarter of the non-MPA rate.

There was a strong deprivation gradient, with COPD hospitalisation rates 4.9 times higher in the most deprived NZDep quintile than in the least deprived, and mortality rates 2.6 times higher. The gradient was apparent for all ethnic groups.

As in the previous report, Whanganui had the highest hospitalisation rates by DHB, followed by West Coast, while the highest DHB mortality rates were in Taranaki, Whanganui and Lakes DHBs.

Costs

We estimated the minimum cost burden of respiratory disease to New Zealand to be $6.68b in 2017. Of this, $6.08b were indirect costs from mortality and disability affected life years, and the remaining $590.5m were direct costs from hospitalisations, prescriptions and doctors' visits. We have costed asthma separately, at $1.182b, with $269.7m in direct costs, and $912.0m in indirect costs from work days lost, disability affected life years, and mortality.

While total costs have reduced since the last report, the reduction comes from fewer life years lost and a reduction in the value of a life year. There was a large increase in the estimated cost of doctors' visits, due to a change in the calculation method.

1. INTRODUCTION

1.1. BACKGROUND

This report was commissioned by the Asthma and Respiratory Foundation NZ (ARFNZ). ARFNZ 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].

ARFNZ has previously published six 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 (2015) and 2016 (2016) updates[5 6] (2016).
- The Impact of Respiratory Disease in New Zealand: 2018 update (2018) which this report updates, and refers to as "the previous report".

1.2. AIMS

This report updates analysis from earlier reports in 2002, 2003, 2006, 2014, 2016, and 2018; 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 ARFNZ in best use of resources in the future.

ARFNZ identified six conditions to include in Impact Report updates. 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 earlier 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 2020 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. Previous reports have noted studies reporting OSA prevalence among New Zealanders aged 30 – 59 years of 12.5% for males and 3.4% for females[7]; 8 – 38% of trained team sport athletes[8]; and 20% of a small sample of pre-surgery duodenal switch patients.[9] No new studies of OSA prevalence were found since the previous report. We continue to recommend further research on the New Zealand prevalence of OSA.

It should be noted that although 2020 hospitalisation data were available, and are included in time series charts in this report, indicator results are reported for 2019, as COVID-19 pandemic management measures had a marked impact on overall respiratory infection, making 2020 figures not representative of usual trends. Multiple research projects are underway nationwide examining these impacts, and their lessons for infectious disease management, including respiratory disease.

2. INDICATOR SELECTION AND METHODS

2.1. CONDITIONS

All respiratory conditions for monitoring were nominated by ARFNZ. The conditions selected had been previously identified as making the largest contribution to New Zealand's respiratory burden[10]. 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.

2.2. 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 2019-2020.

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	

2.3. 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 2018 (and for 2000 – 2020 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.

2.3.1. 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.

2.3.2. 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, 2016/17, and 2019/20. 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 2000. Previous reports estimated cumulative counts since 1988, making this report's estimate a greater underestimate compared to previous reports.

2.3.3. COSTS

We report costs for 2017, as this is the most recent year for which mortality data were available.

The cost of asthma to the New Zealand economy was estimated at $349m in 2000,[11] at $800m in the 2014 report, at $858m in the 2016 report, and at $1.018b in the 2018 report. In general we have repeated methods used in the 2018 report, but with a change to the calculation of GP visit costs.

Previously, GP visit costs were estimated by estimating numbers of GP visits from pharmaceutical prescriptions, then calculating public and private costs per visit separately, and aggregating these figures. For the current report, we again estimate the number of GP visits from pharmaceutical scripts, but use a single total cost per GP visit of $80 (excluding GST), the average cost estimated by Pharmac for 2018, including "both patient co-payment and government contribution".[12] Using this cost per visit results in a substantially higher figure for doctors' visits than in previous report estimates.

Health system 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[13]. Mortality costs are estimated from years of life lost based on average life expectancy at age of death[14], multiplied by a value per life year of $170,805. The life year value is estimated from the 2017 NZTA value of a statistical life ($4.21m) and a 3% discount rate[15] [16].

Hospitalisation costs are summed from all 2017 publicly-funded hospitalisation discharges, using the appropriate 2016/17 or 2017/18 Ministry of Health cost weight multiplier.

The method for calculating the total cost of pharmaceuticals is described in Telfar Barnard et al 2011[15]. The total pharmaceutical cost is the sum across all included prescriptions of:

Dispensing fee + retail subsidy - estimated 2017 Pharmac rebate

The estimated Pharmac rebate for 2017[17] was $445.60m total rebates/$1321.10m gross expenditure = 33.73%.

Estimating adult and child prescription and GP 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[11], giving a ratio of 1.19.

The 2017/18 ratio of child to adult asthma prevalence was 14.9/12.0=1.24.

Adjusting to include prescriptions with no age data, children aged under 15 years were issued with 331,337 initial (rather than follow-on/repeat) respiratory prescriptions in 2017, giving a rate of 35.4 prescriptions per 100 people, barely changed since the 2015 report. Applying this rate, reduced by the ratio of child to adult asthma prevalence, gives a figure of 1,104,310 first prescriptions for adults, or 62.1% 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.[18]

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 48.1% 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 [19] to the 2017/18 level of 12.0%, so potentially provides a better estimate than the 50.2% used in 2011 or the 60.2% found for 2015.

We assume a doctor's visit for each initial prescription date, and multiply this estimated number of visits by the $80 estimated consult fee to estimate the cost of GP visits for respiratory disease. We assume 44.1% of these costs are for asthma.

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[20]. 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.[21]

We have costed each day off school conservatively, as 8 hours at half the 2017 adult minimum wage of $15.75/hr.

Cost of days off school=[2017/18 Asthma prevalence in under 15 year olds] * [Statistics NZ estimated 2017 population under 15 years] * [additional days off school] *[0.5*adult minimum wage]*8 hours

=0.149 * 936,800 * 4.4 * 0.5 * $15.75 * 8
= $38,692,463

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.[11] As the prevalence of adult asthma has decreased from the 15.2% used in that calculation, to 12.0% in the 2017 adult population, we updated the figures by the increase in the average weekly wage to $1,286[*], and the increase in the 15 – 44 years working age population to 1,940,790 people, 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 2012 cost of an ED or OP visit was estimated at $254.85 in 2014, as the average of costs for ED03001 and ED04001 for 2011/12 (both $260.41) and 2012/13 (both 249.26). While the annual values are no longer the same for the two codes, we have continued to work with the average, which for 2016/17 and 2017/18 comes to $325.98. Working from Statistics New Zealand's 2017 resident population estimate of 4,813,600, 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

[*] "Earnings from wage and salary jobs by sex, age groups, region, and full-time and part-time status" tables at nzdotstat.stats.govt.nz

= 4.8% * 4,813,600 * 2.17 * $325.98

= $163,441,344

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. In 2013, the Ministry of Health estimated YLDs from asthma in 2006 to be 13,362.[22] Newer estimates are not available, but as asthma prevalence has changed little since then, 2006 represents a better estimate than the 2001 figure. Increasing the 13,362 by the 19.5% increase in the population from 4,027,927 in the 2006 census to the 2017 resident population estimate of 4,813,600, takes the 2017 estimate of YLDs to 15,968. With the 2017 value of a life year at $170,805 and applying the same arbitrary 20% value as Holt and Beasley, the cost of YLDs is estimated at $545,494,593.

The estimate of YLDs from total respiratory disease in 2006 was 34,581. Allowing for the population increase to 2017 would take this estimate to 41,326. Respiratory hospitalisation rates increased between 2006 and 2017, so this should be a conservative estimate. At 20% of $170,805 per YLD, the YLD cost of total respiratory disease is estimated at $1,411,745,886.

3. NEW ZEALAND'S RESPIRATORY DISEASE BURDEN

3.1. 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, published after 1 January 2018 to exclude papers included in the 2018 report, and before 15 July 2021.

We searched Pubmed 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) NOT (COVID-19 OR SARS-CoV-2)"; with each search limited to publications from 2018 onwards, and limited to humans. There was no need to limit the search by language as all results were published in English. For the final search (respiratory AND etc), we excluded COVID-19 and SARS-COV-2 as outside the scope of this report.

The search turned up eight new relevant publications: four on asthma, two on bronchiectasis, one on adult COPD, and one on total respiratory disease. These publications are discussed in the relevant sections.

However, in carrying out our literature search, we observed note the compelling evidence, over a range of studies, for the role of cold housing in asthma and respiratory disease. We have therefore included a summary of this research, as it is relevant to recommendations for reducing respiratory disease risk.

3.2. ASTHMA

3.2.1. ASTHMA PREVALENCE

New research

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 4-2. Since the previous report, there were three new studies reporting New Zealand asthma prevalence. A 2019 study reported 13.2% (self-reported) doctor-diagnosed asthma prevalence among participants, aged 50 to 84 years old, in a 2011 – 2012 Auckland community Vitamin D

supplementation trial.[23] A 2018 study reported asthma prevalence at 11 years old among children with a family history of eczema or allergic disease to be 29.0% among participants treated with placebo, and 17.0 – 18.4% among treated participants. Wheeze prevalences were 33.0% (placebo) and 25.4 – 25.9%.[24] Another 2018, study of Māori and Pacific patients aged 35 years or older, enrolled with a Dunedin general practice, found asthma prevalence was 16.7% for Māori and 18.6% for Pacific patients.

Asthma prevalence 2019/20

Prevalence for medicated asthma was sourced from the most recently published New Zealand Health Survey data. For current asthma prevalence, data covers the 2019-20 period. The International Study of Asthma and Allergies in Children (ISAAC) last measured New Zealand child asthma rates in 2001-03.[25] 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], could not be directly compared with New Zealand Health Survey prevalence figures, even if they were not now at least 17 years old. The Global Asthma Network has completed Phase I surveillance, including Auckland and global measures of asthma prevalence, and we look forward to results becoming available in time for the next report .[26] [27]

It should be noted that diagnostic practice for childhood asthma changed over the study period. Guidelines released in 2012 mean that children aged under 5 who present with wheeze are now less likely to be diagnosed with asthma than previously[28], and in particular wheeze in children aged under 3 is now seldom described as asthma.

NZ Health Survey measures of asthma prevalence, over time, by age group and sex, and by ethnicity, NZDep2018 quintile, for children and adults, are shown in Figures 1 to 5.

Trends over time 2006/7 – 2019/20

Medicated asthma prevalence showed no significant change over the study period, in children or in adults, for males or females (Figure 1, Table 2 and Table 3).

Figure 1. Age-standardised medicated asthma prevalence rates, 2006/7 – 2019/20.

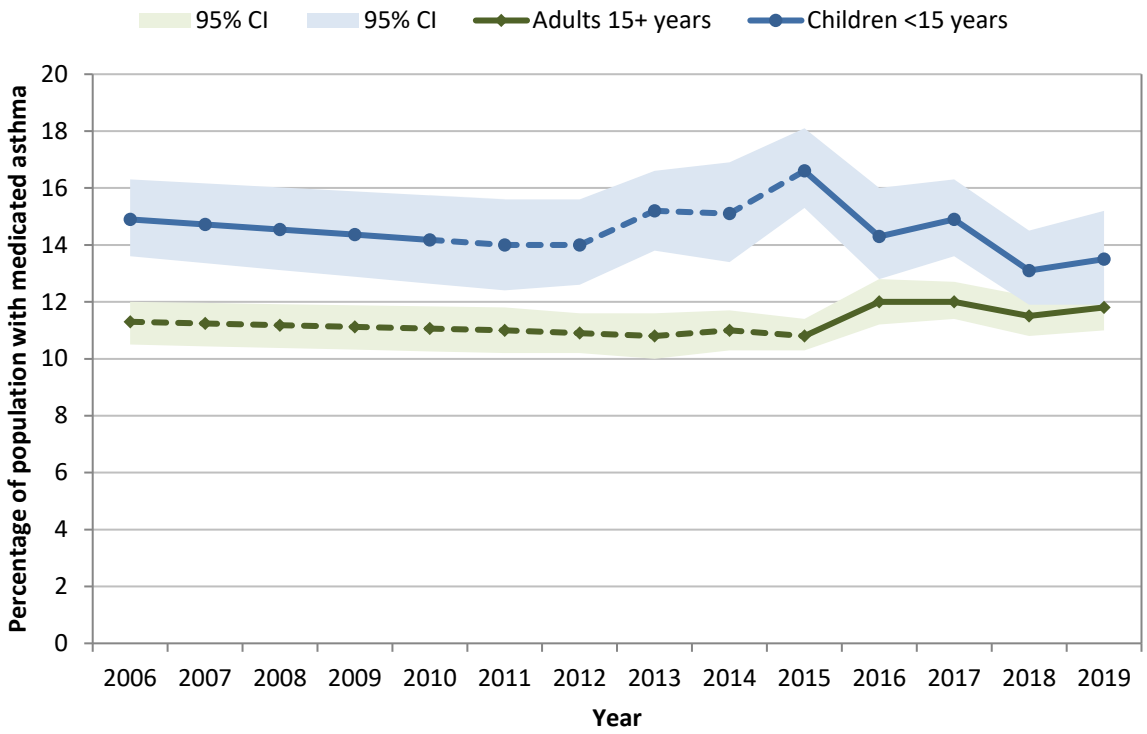


Table 2. Total child medicated asthma prevalence 2006 – 2019, age-standardised

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)
2017/18	14.9	(13.6 – 16.3)	17.3	(15.3 – 19.4)	12.3	(10.5 – 14.5)
2018/19	13.1	(11.9 – 14.5)	15.4	(13.4 – 17.7)	10.8	(9.1 – 12.7)
2019/20	13.5	(11.9 - 15.2)	14.6	(12.3 - 17.3)	12.2	(10.4 - 14.4)

Table 3. Total adult medicated asthma prevalence 2006 – 2019, 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)
2017/18	12.0	(11.4 – 12.7)	10.4	(9.5 – 11.4)	13.6	(12.7 – 14.5)
2018/19	11.5	(10.8 – 12.2)	9.2	(8.3 – 10.2)	13.7	(12.8 – 14.6)
2019/20	11.8	(11.0 - 12.7)	10.2	(9.1 - 11.4)	13.4	(12.3 - 14.6)

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

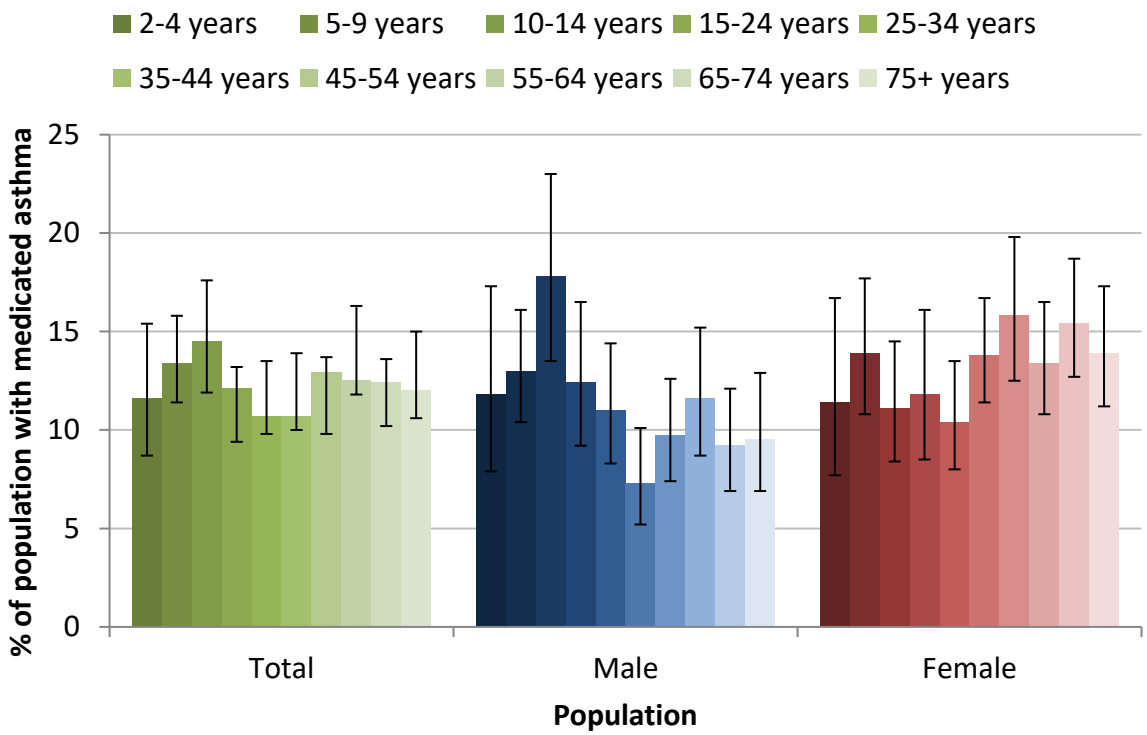
Risks and determinants 2019/20

Boys had higher medicated asthma prevalence than girls (rate ratio 1.19); but the difference was not significant, and men had significantly lower prevalence than women (rate ratio 0.76).

Medicated asthma prevalence was significantly higher for Māori than for the rest of the population in both children (rate ratio 2.14) and adults (rate ratio 1.48). Prevalence for the most deprived NZDep2013 quintile was higher than for the least deprived for children (rate ratio 1.15), and for adults (rate ratio 1.40) but the difference was only significantly different for adults; however we observe that that the gradient of increasing asthma prevalence with increasing deprivation among girls aged under 15 years appears to be less steep in 2019/20 than in data for the previous report (2016/17)

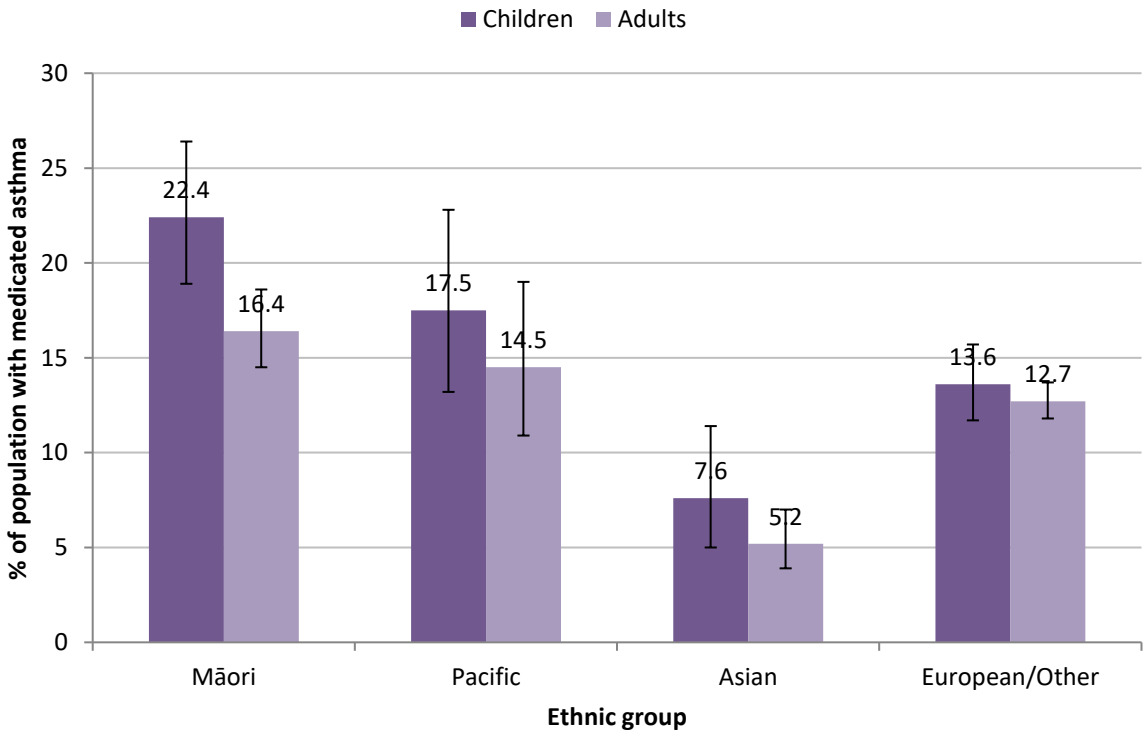
Updated asthma prevalence by DHB was not available for the 2020 report.

Figure 2. Age-standardised medicated asthma rates by age group and sex, 2019/20.



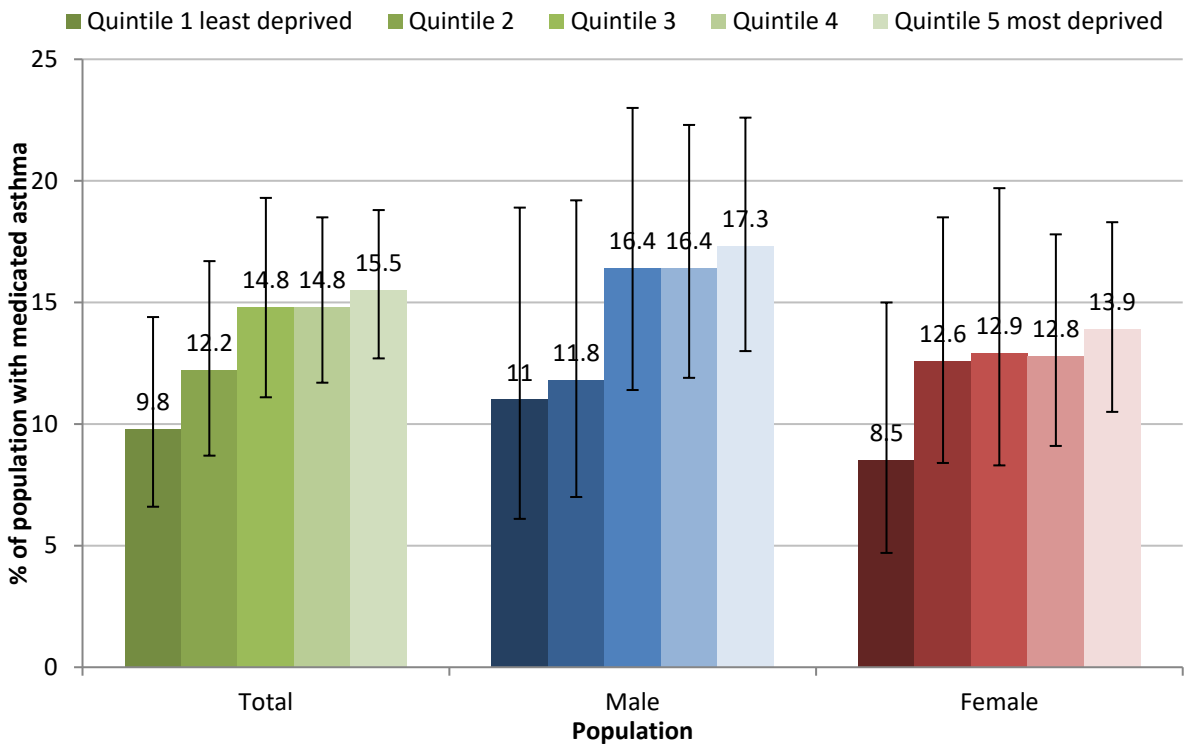
(See Table A 1-1 for data)

Figure 3. Medicated asthma prevalence by ethnic group 2019/20, children and adults



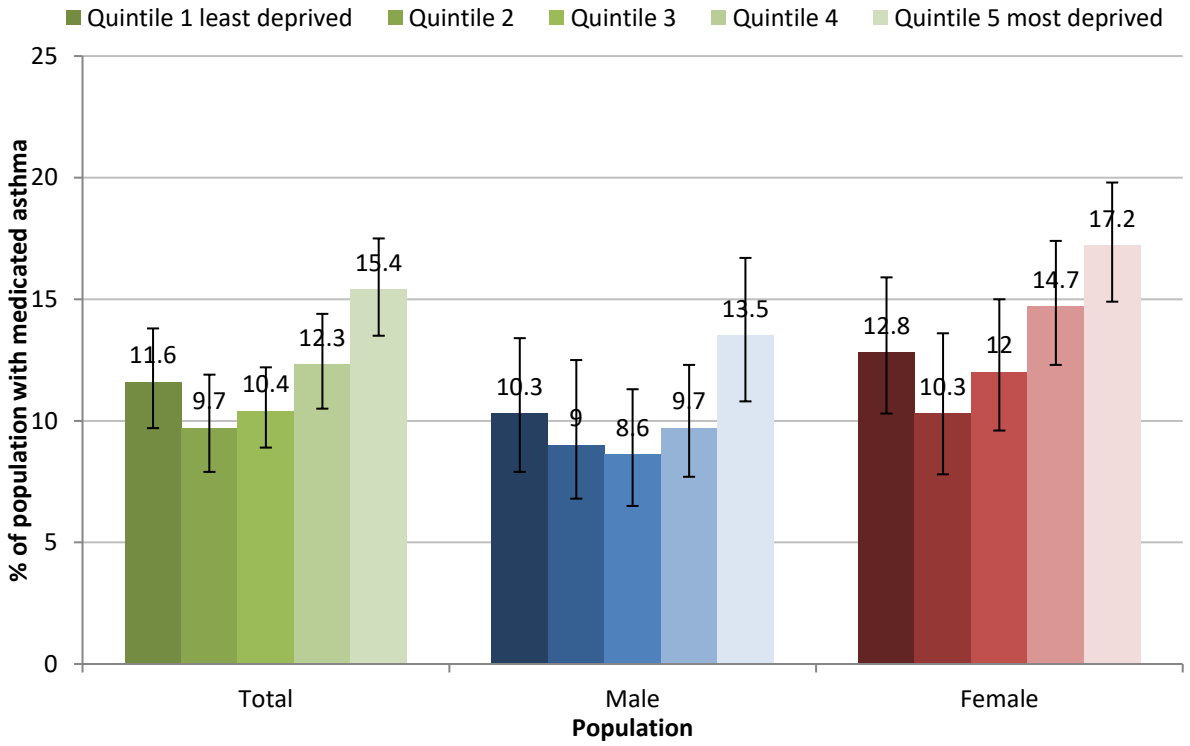
(See Table A 1-2 for data)

Figure 4. Child medicated asthma prevalence 2019/20 by NZDep2018, unadjusted



(See Table A 1-3 for data)

Figure 5. Adult medicated asthma prevalence 2019/20 by NZDep2018, unadjusted



(See Table A 1-4 for data)

3.2.2. ASTHMA HOSPITALISATIONS

New research

In 2021 Schlichting et al[29] analysed socioeconomic inequities in pharmaceutical prescriptions and hospital admissions data for asthma in children, finding that while both outcomes had declined, clear inequities remained in health outcomes for New Zealand children with asthma, and cocluding that "many New Zealand children, particularly Māori children and those living in areas of high deprivation, are not receiving levels of primary care for asthma that are consistent with prevention." The research disaggregates asthma hospitalisations in children under 15 years over time by 5-year age group and NZDep quintile.

In 2019, Abdelkarim et al[30] reported that asthma admissions contributed 0.73% of all Intensive Care Unit admissions in Australia and New Zealand, however the data were not disaggregated by country.

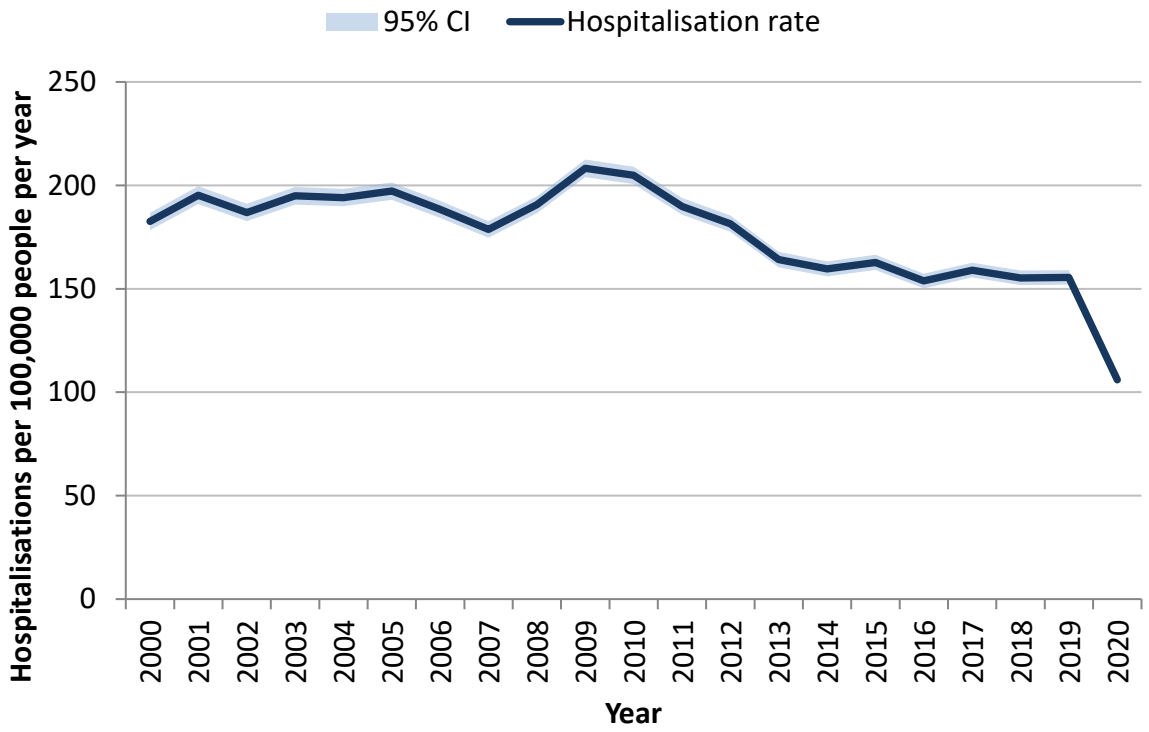
Trends over time 2000 - 2019

Asthma hospitalisation rates show a small but statistically significant decline over the eighteen years 2000-2019. For the seven years from 2013 to 2019, rates continued below 170 hospitalisations per 100,000 people per year, reaching their lowest point of 154 in 2016, and averaging 159. The average from 2000 to 2012 was 192, and never dipped below 180 (Figure 6).

Inequalities (Figure 9) 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 from 2014 onwards.

Socio-economic inequalities in asthma hospitalisation peaked in 2014 and 2015, but subsequently returned to levels consistent with the 2002 to 2013 period. (Figure 12).

Figure 6. Asthma hospitalisations per 100,000 people per year, 2000-2020.



(See Table A 1-5 for data)

Risks and determinants 2019

Most risks and determinants in prevalence were magnified in hospitalisation. Asthma hospitalisation rates in children under 15 years were nearly 5 times the rates for adults aged 30-64 (rate ratio 4.8). This difference increased substantially from the 2.7 in the previous report. Girls had substantially lower rates than boys (rate ratio 0.72), but women's asthma hospitalisation rates were nearly twice or more those of men (Figure 7, Table A 1-6).

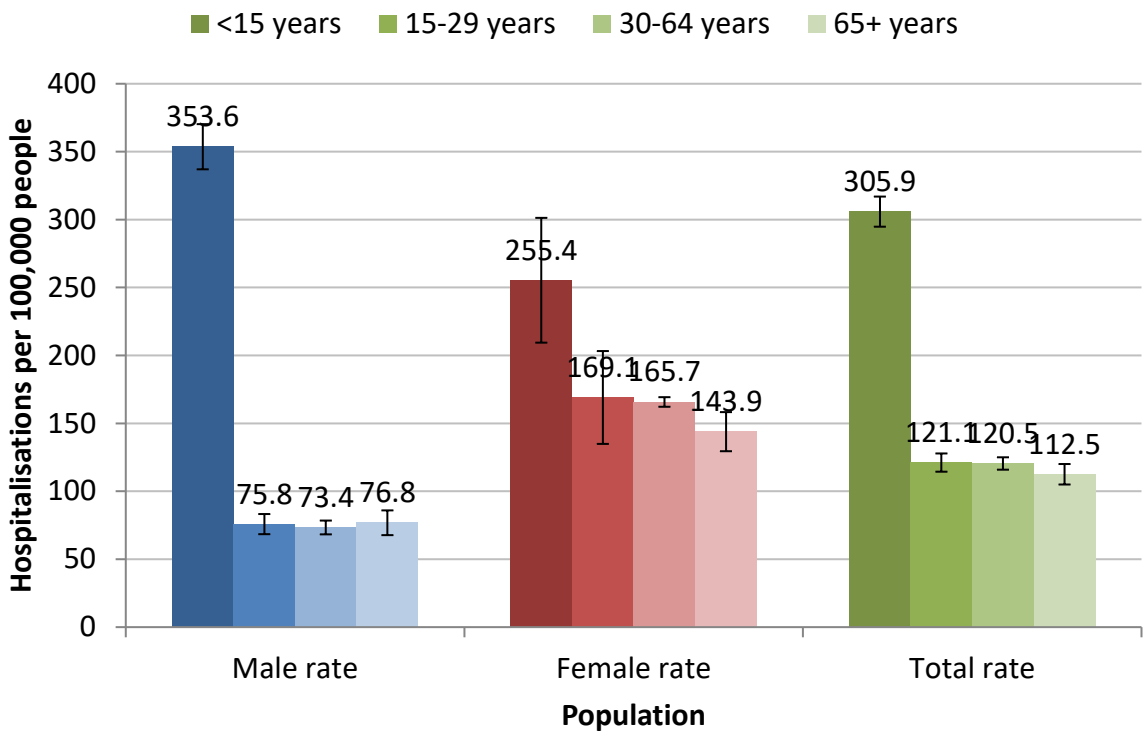
Differences in asthma hospitalisation rates by ethnic group lay in the same direction as prevalence. Māori rates were more than 3 times higher than non-MPA (rate ratio 3.24), Pacific rates were similar (rate ratio 3.22), and Asian rates were lower than non-MPA (rate ratio 0.85)(Figure 8). These rates are similar to the 2018 report except that rate ratio for Māori has increased considerably, from 2.84.

There was a clear socio-economic gradient in asthma hospitalisation (Figure 11), with the most socioeconomically deprived areas having a hospitalisation rate nearly 3 times that of the wealthiest areas (rate ratio 2.89). Socioeconomic inequalities increased a little from the previous report (rate ratio 2.70). This reduction is partly because asthma hospitalisation rates in NZDep 9-10 have decreased, but also because rates in NZDep 1-2 have increased,

Across DHBs, 2019 asthma hospitalisation rates were lowest in South Canterbury, and also significantly lower than the national average in Waitemata, Capital and Coast, Nelson

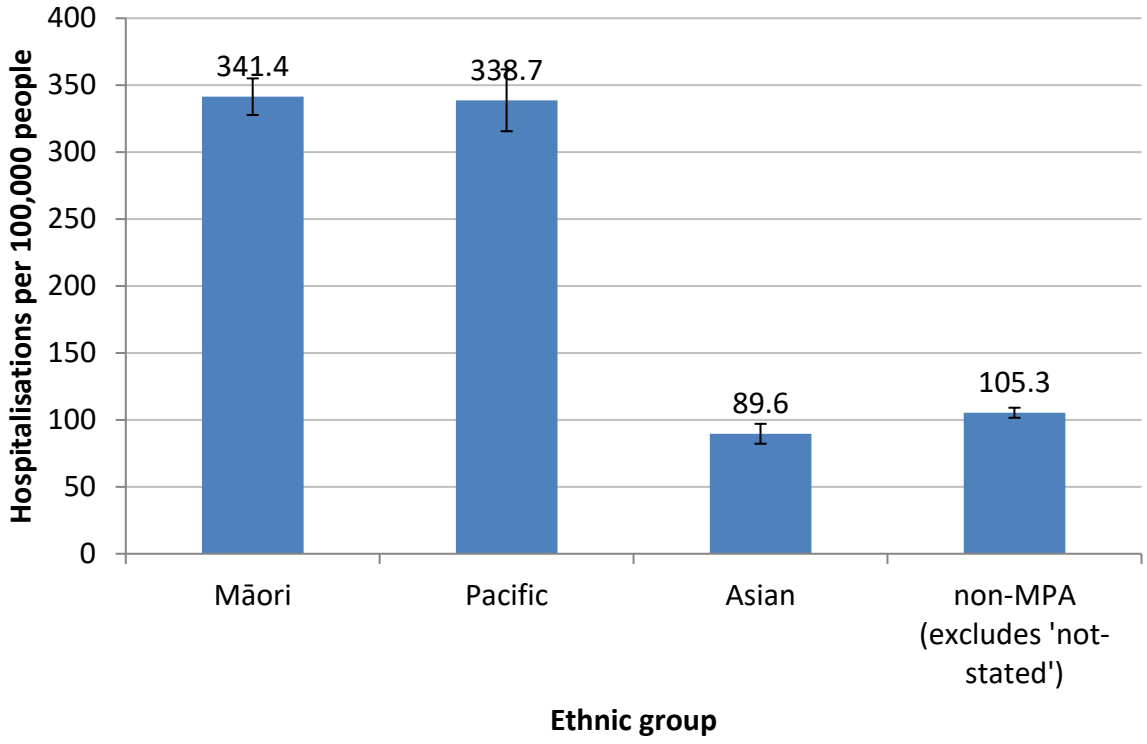
Marlborough, Canterbury and Southern DHBs. Rates were highest in Whanganui, and also significantly higher than the national average in Northland, Waikato, Lakes, Taranaki, and Hutt DHBs (Table A 1-16).

Figure 7. Asthma hospitalisations per 100,000 people by age group and sex, 2019.



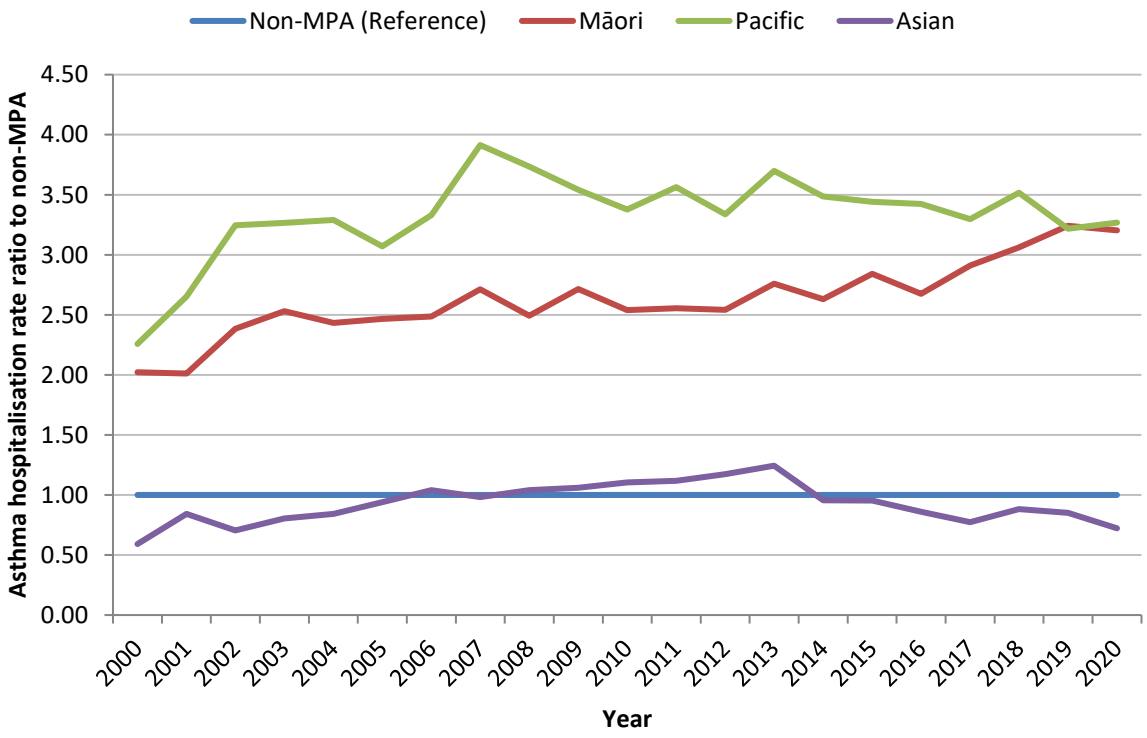
(See Table A 1-6 and Table A 1-7 for data)

Figure 8. Asthma hospitalisations per 100,000 people by ethnic group, 2019, age-adjusted.



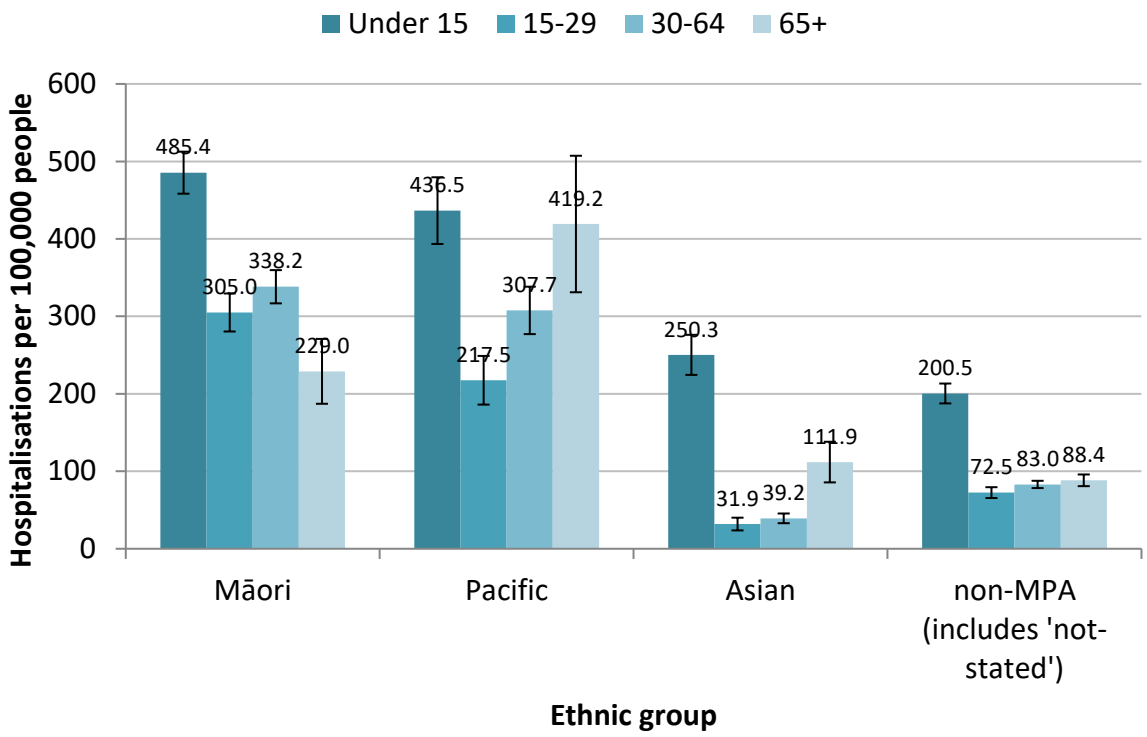
(See Table A 1-8 for data)

Figure 9. Asthma hospitalisations rates relative to non-MPA by ethnic group, 2000 – 2020, age-adjusted.



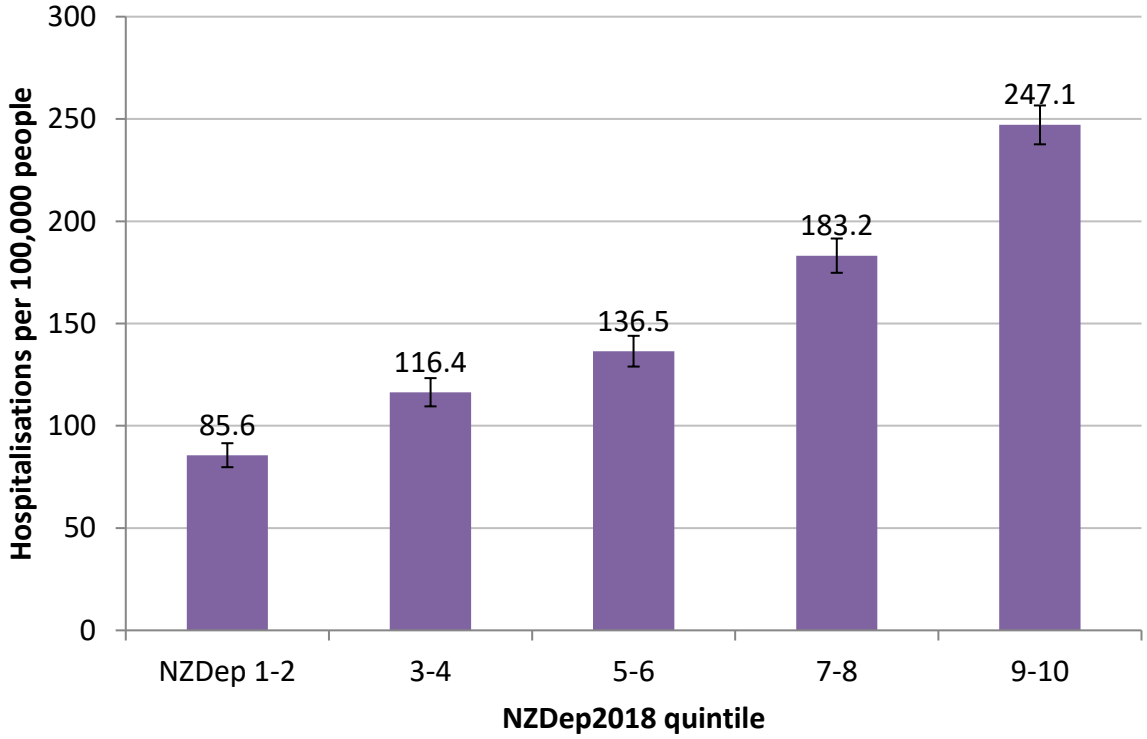
(See Table A 1-9 and Table A 1-10 for data)

Figure 10. Asthma hospitalisations per 100,000 people by ethnic group and age group, 2019.



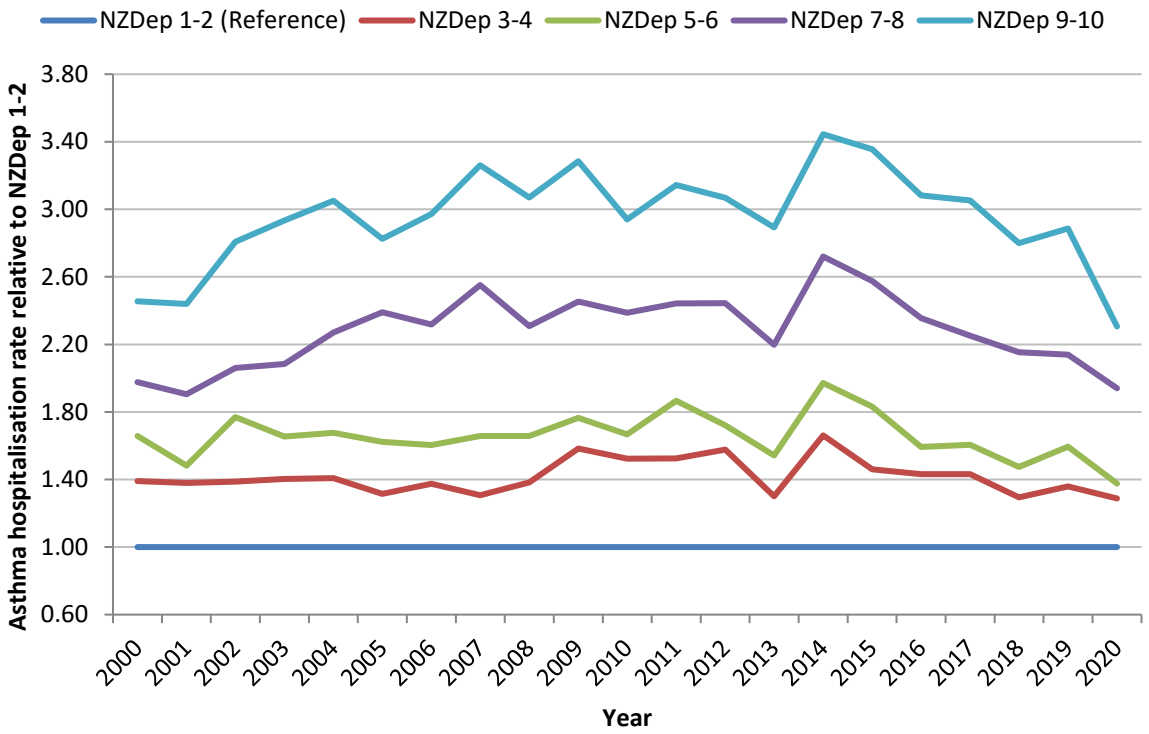
(See Table A 1-11 for data)

Figure 11. Asthma hospitalisations per 100,000 people by NZDep2018 quintile, 2019, age-adjusted.



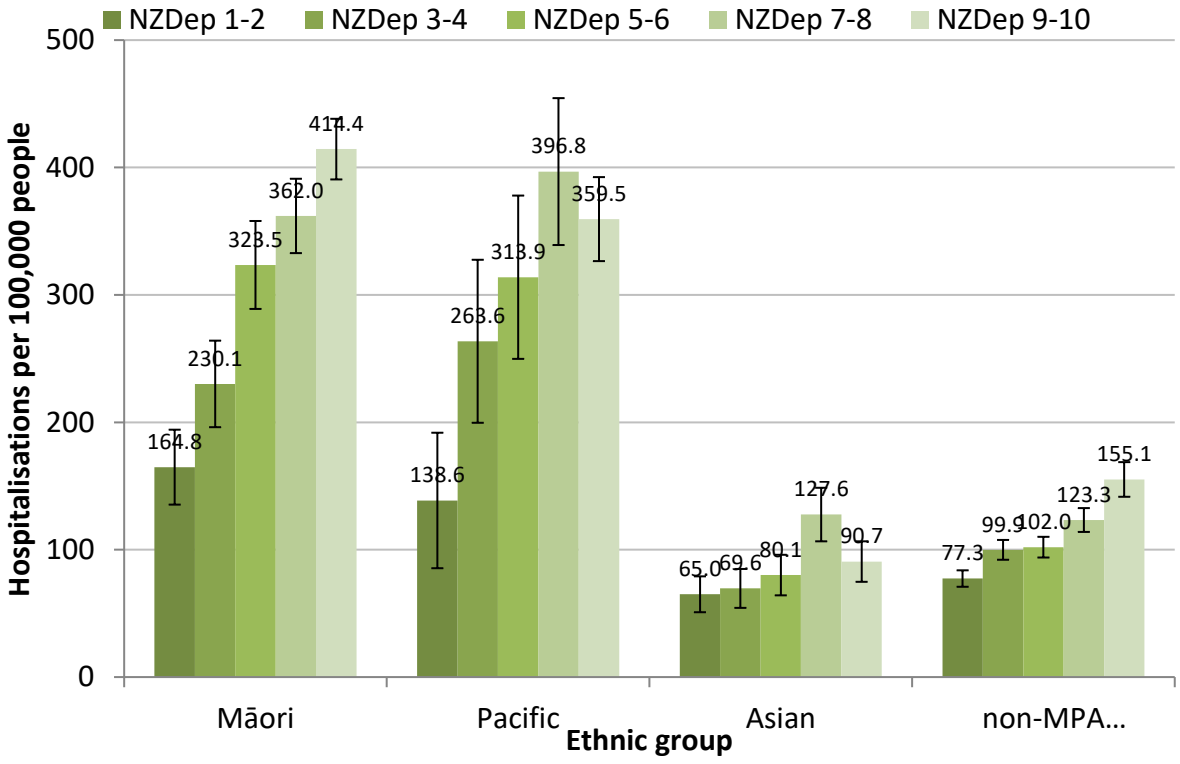
(See Table A 1-12 for data)

Figure 12. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile, 2000 - 2020, age-adjusted.



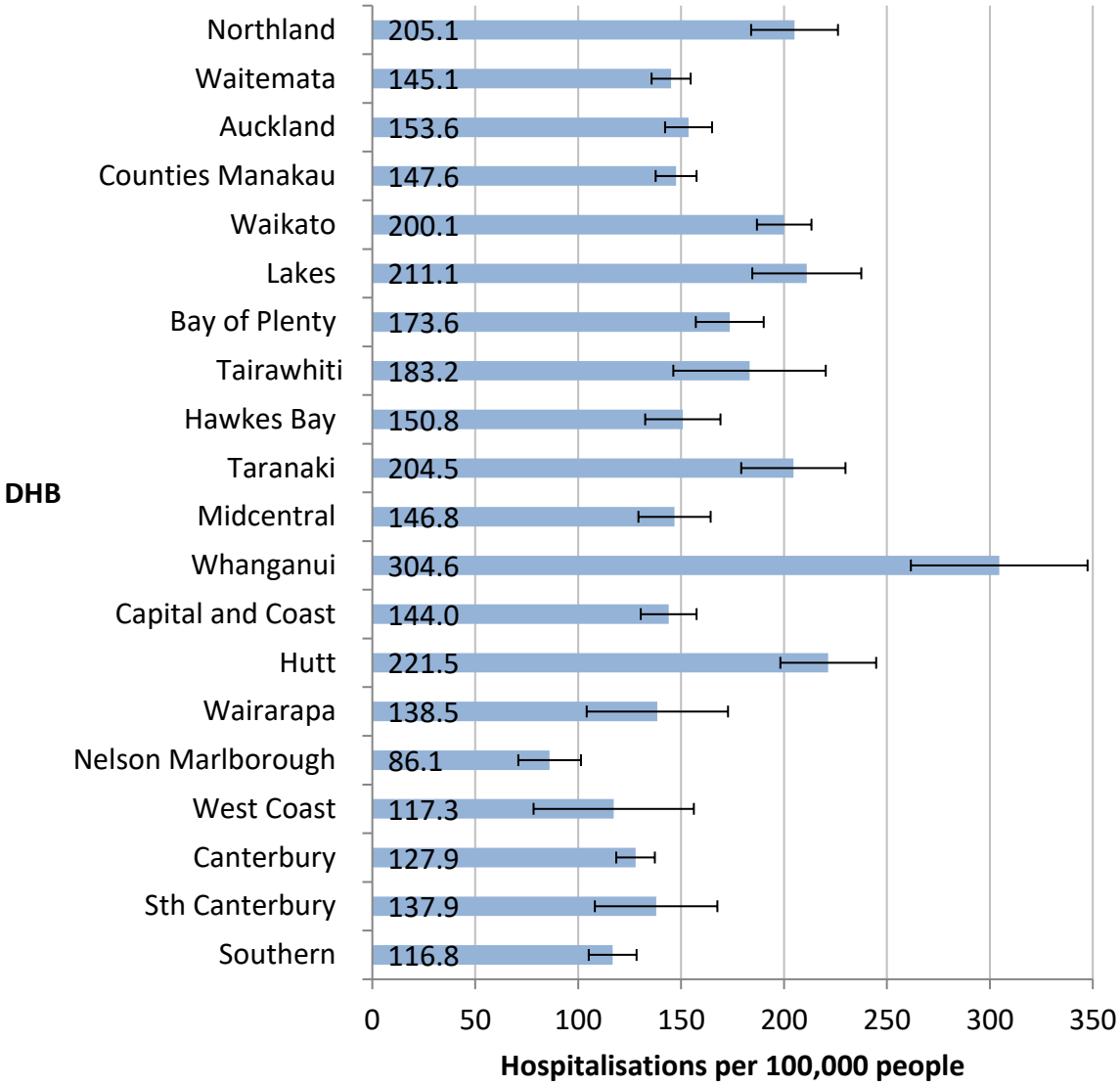
(See Table A 1-13 and Table A 1-14 for data)

Figure 13. Asthma hospitalisations per 100,000 people by ethnic group and NZDep2018, 2019, age-adjusted.



(See Table A 1-15 for data)

Figure 14. Asthma hospitalisations per 100,000 people by DHB, 2019.



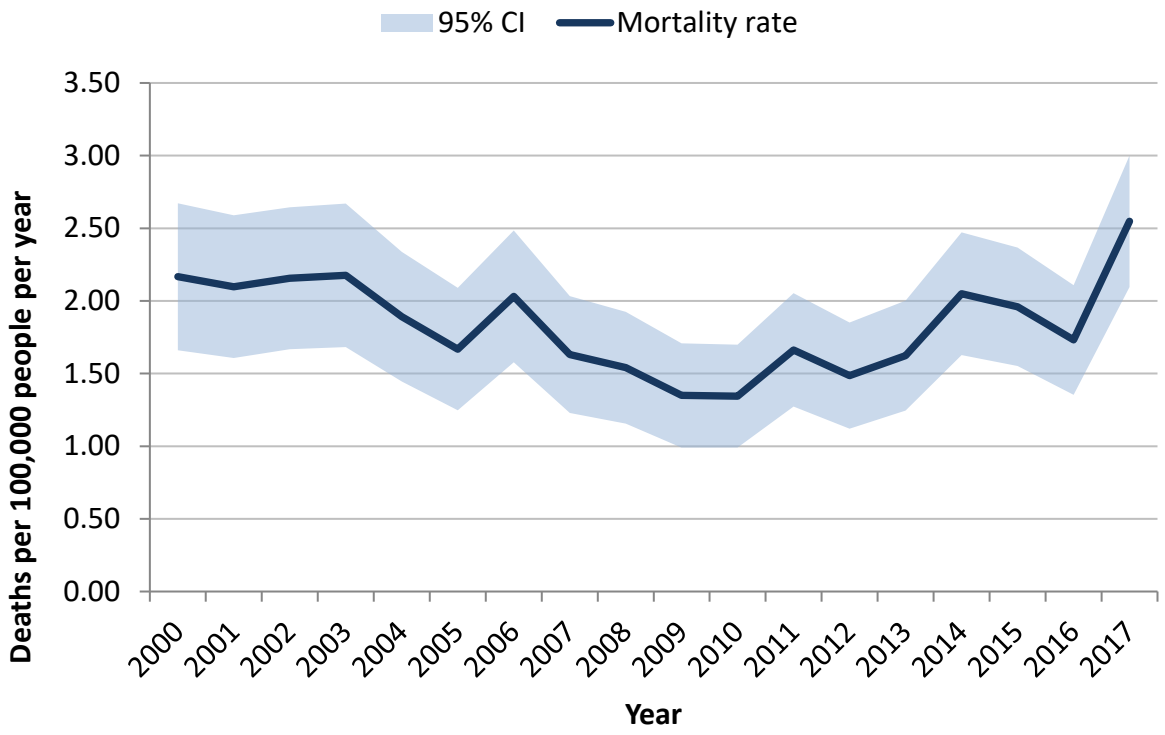
(see Table A 1-16 for data)

3.2.3. ASTHMA MORTALITY

Trends over time 2000 - 2017

There were 122 deaths from asthma in 2017, a significant increase from the lows of 2009 and 2010 (55 and 56 deaths respectively), and the highest rate (2.55 per 100,000 people per year, age-adjusted) since the start of the study period in 2000.

Figure 15. Asthma mortality rates 2000-2017, age-adjusted.



(See Table A 1-17 for data)

Risks and determinants 2012 - 2017

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 16).

Asthma mortality rates were highest for Māori and Pacific peoples, with rates 3.36 and 2.76 times higher than rates for non-MPA (Figure 17 and Figure 18). Since the previous report, Māori rates have dropped by 0.23 deaths per 100,000 people per year, and Pacific rates by 0.16, whereas Asian rates have risen 0.13 and non-MPA rates by 0.26.

There were socio-economic differences in asthma mortality, with rates 2.27 times higher in the most deprived NZDep2018 quintile 9-10, and 2.06 times higher in NZDep2083 quintile 7-8, compared to the least deprived NZDep2018 quintile 1-2 (Figure 19). This inequity has

increased since the previous report. There was insufficient data to measure socioeconomic gradients across ethnic groups (Figure 20).

Ethnic inequalities are lower in this report than in previous reports, but socioeconomic inequalities are lower than in early reports, but not significantly different from the most recent report (Table 4).

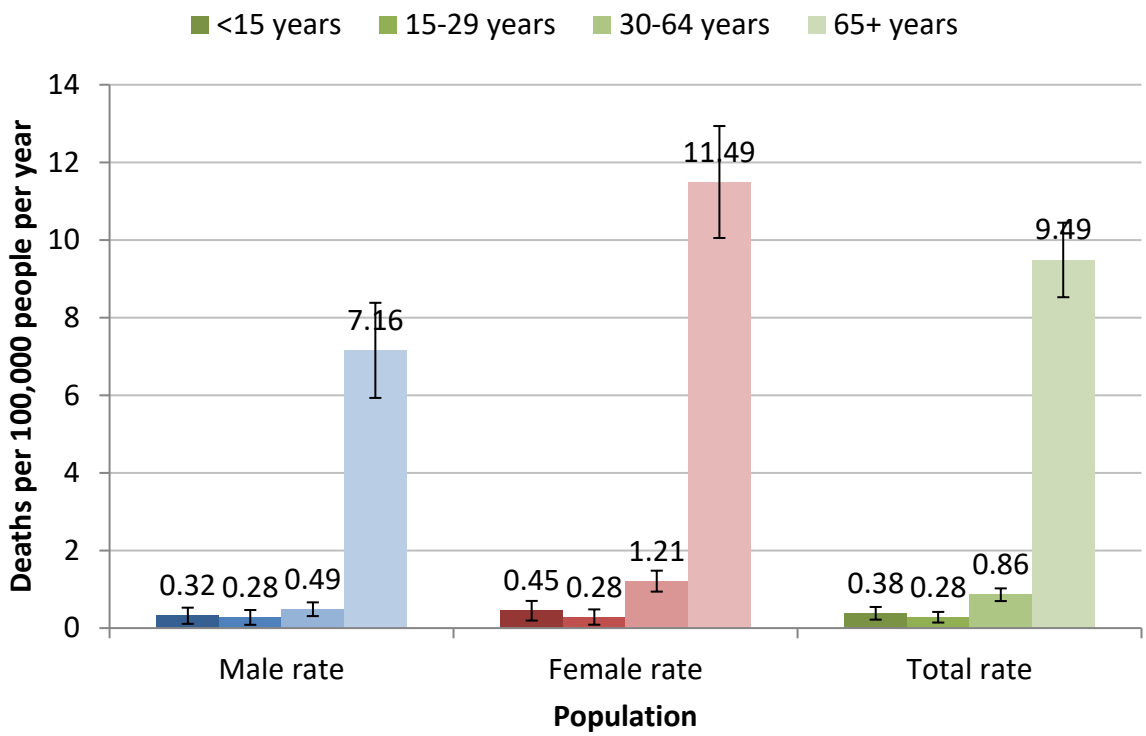
Asthma mortality rates were again highest in the MidCentral DHB (Figure 21), followed by Hutt and Northland, and lowest in West Coast (where no asthma deaths were recorded between 2012 and 2017) and Tairawhiti DHBs.

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)
2020	2012-2017	3.36 (3.00-3.78)	*2.76 (2.28-3.35)	2.27 (1.95-2.65)

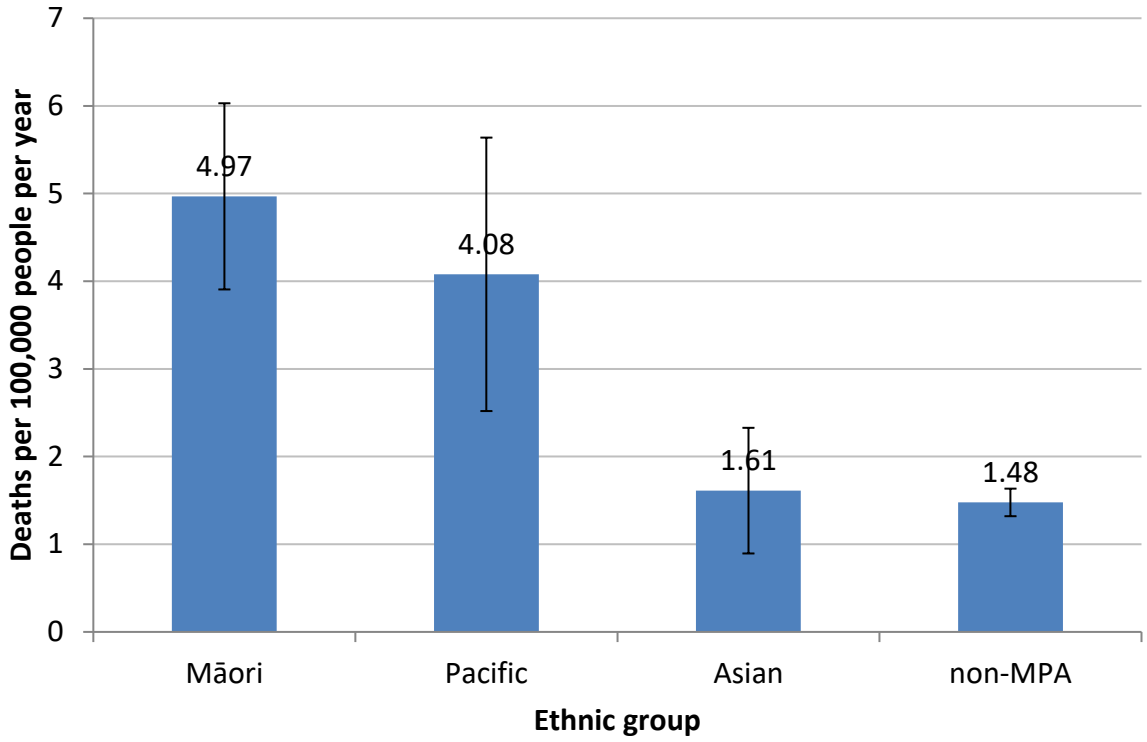
*Ethnicity data is prioritised rather than total ethnicity in the 2020 data

Figure 16. Asthma deaths per 100,000 people by age group and sex, 2012-2017.



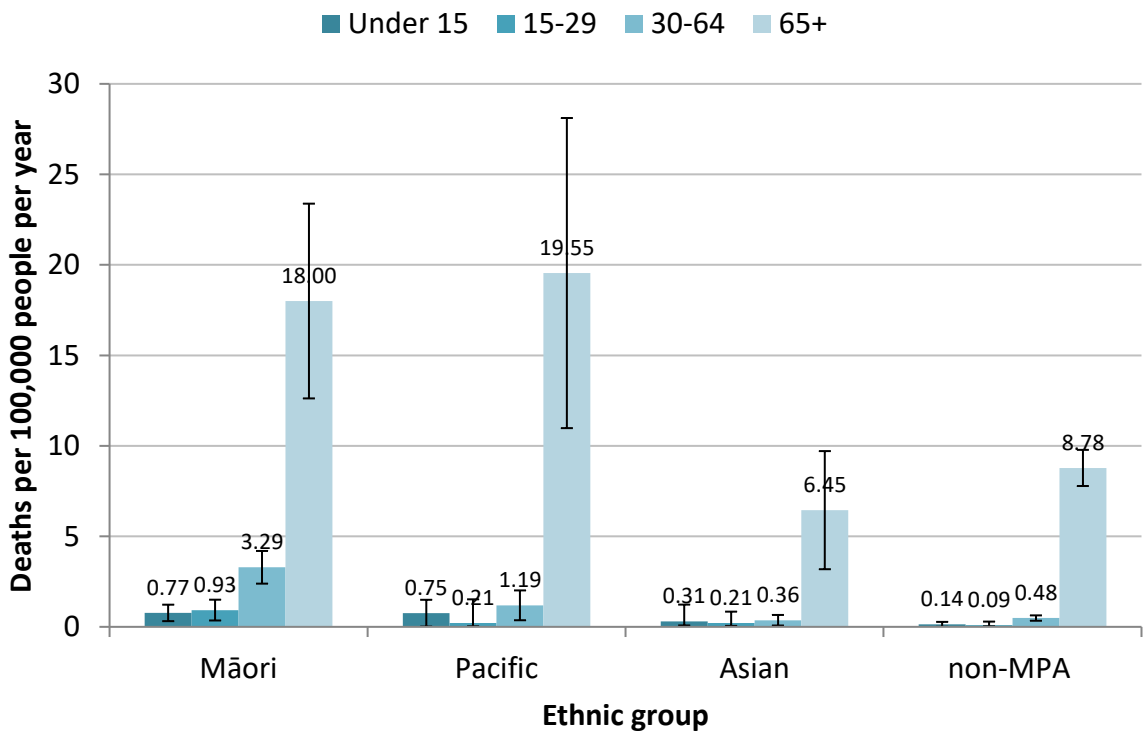
(See Table A 1-18 and Table A 1-19 for data)

Figure 17. Asthma mortality per 100,000 people per year by ethnic group, 2012-2017.



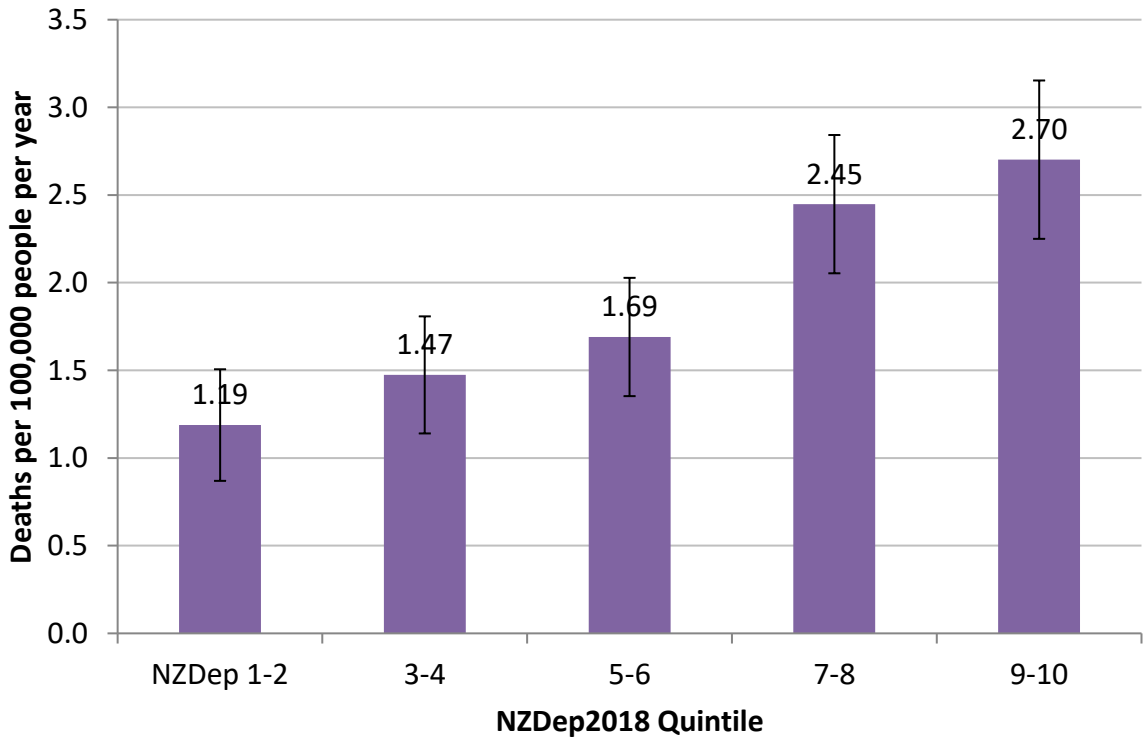
(See Table A 1-20 for data)

Figure 18. Asthma deaths per 100,000 people per year, by ethnic group and age group, 2012-2017.



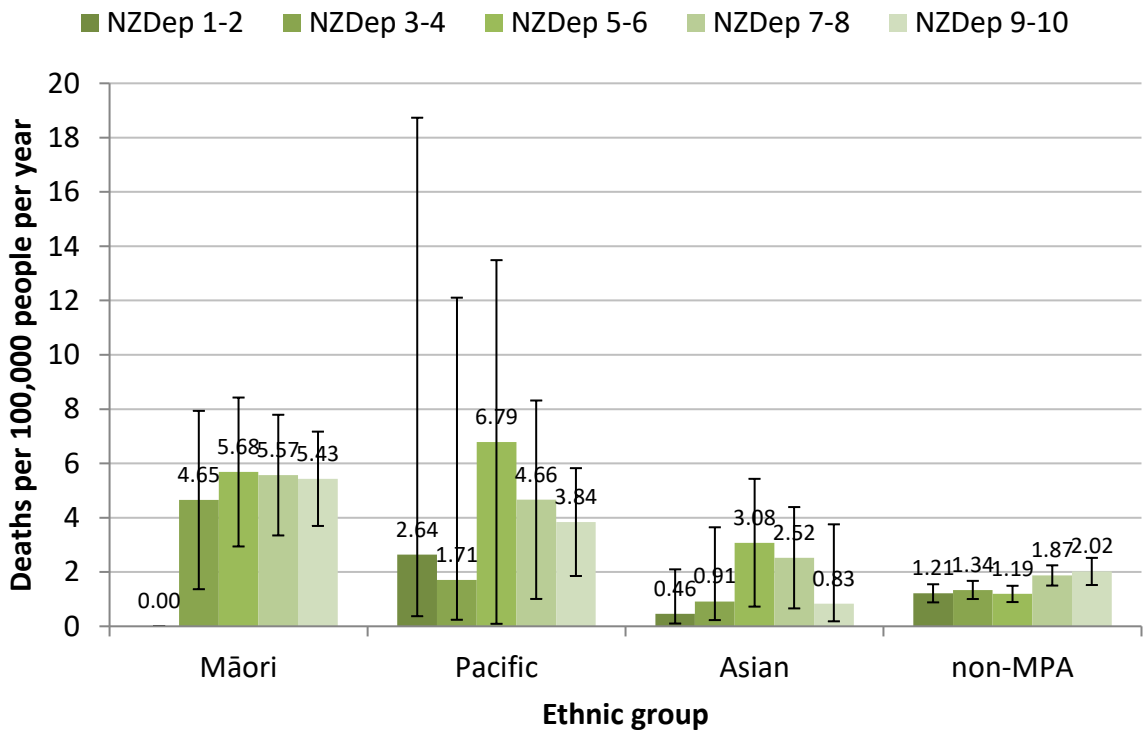
(See Table A 1-21 for data)

Figure 19. Asthma deaths per 100,000 people by NZDep2018 quintile, 2012-2017, age-adjusted.



(See Table A 1-22 for data)

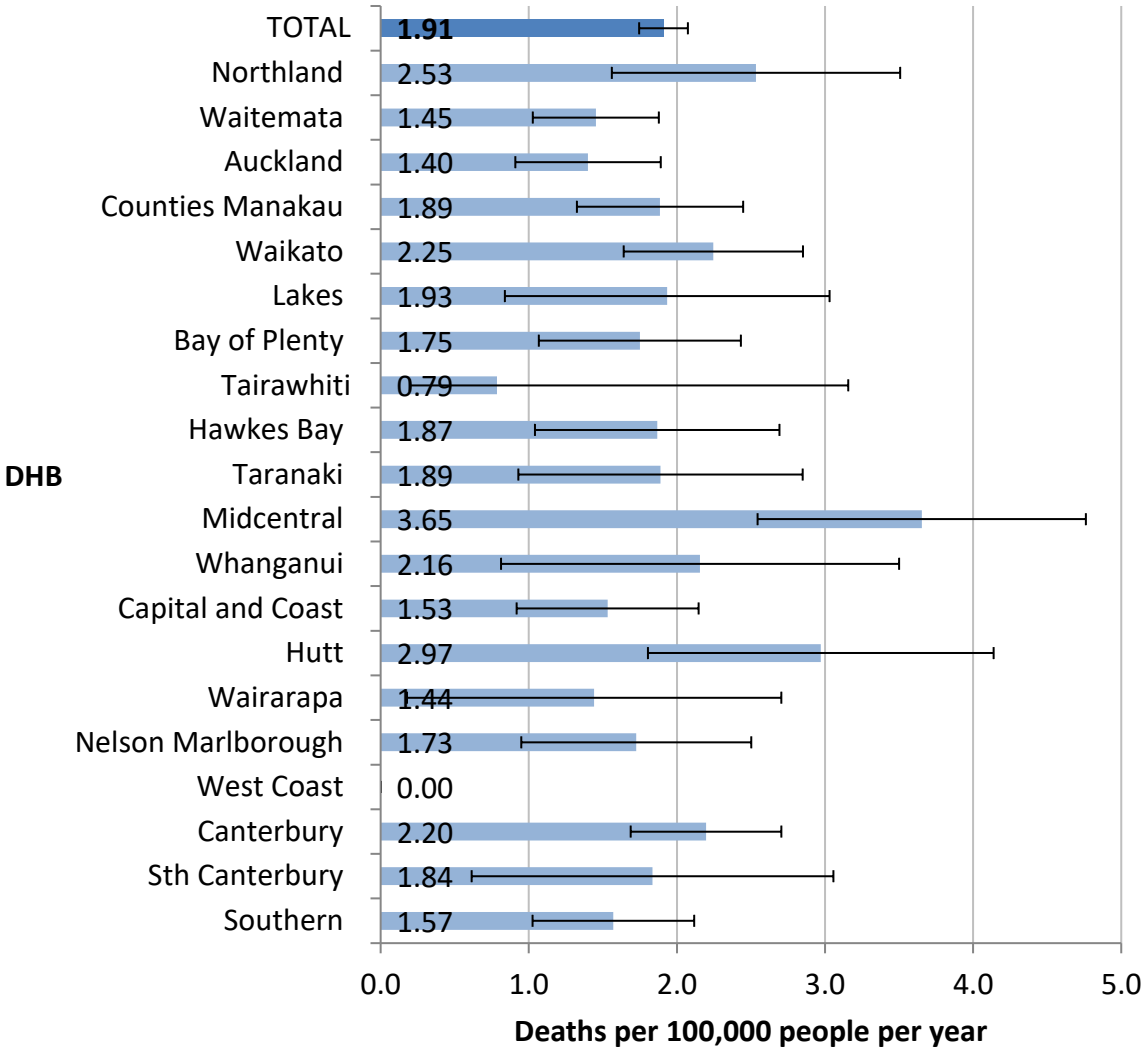
Figure 20. Asthma deaths per 100,000 people by ethnic group and NZDep2018, 2012-2017, age-adjusted.



(See Table A 1-23 for data)

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

Figure 21. Asthma deaths per 100,000 people per year, by DHB, 2012-2017, age-adjusted

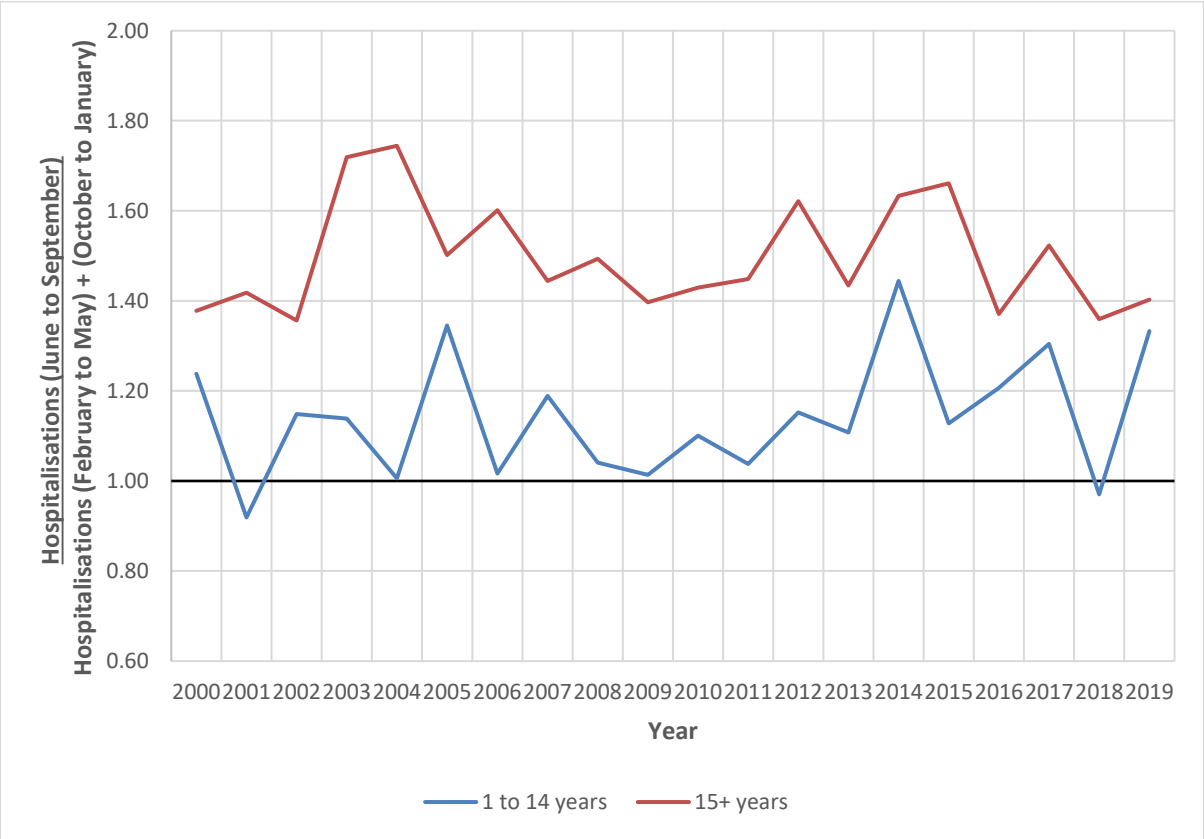


(see Table A 1-24 for data)

3.2.4. ASTHMA SEASONALITY

Asthma in adults aged over 15 years showed a strong winter excess for hospitalisations and deaths, with the winter: non-winter ratio averaging 1.32 between 2000 and 2019, and no significant increase or decrease over that period (Figure 22).

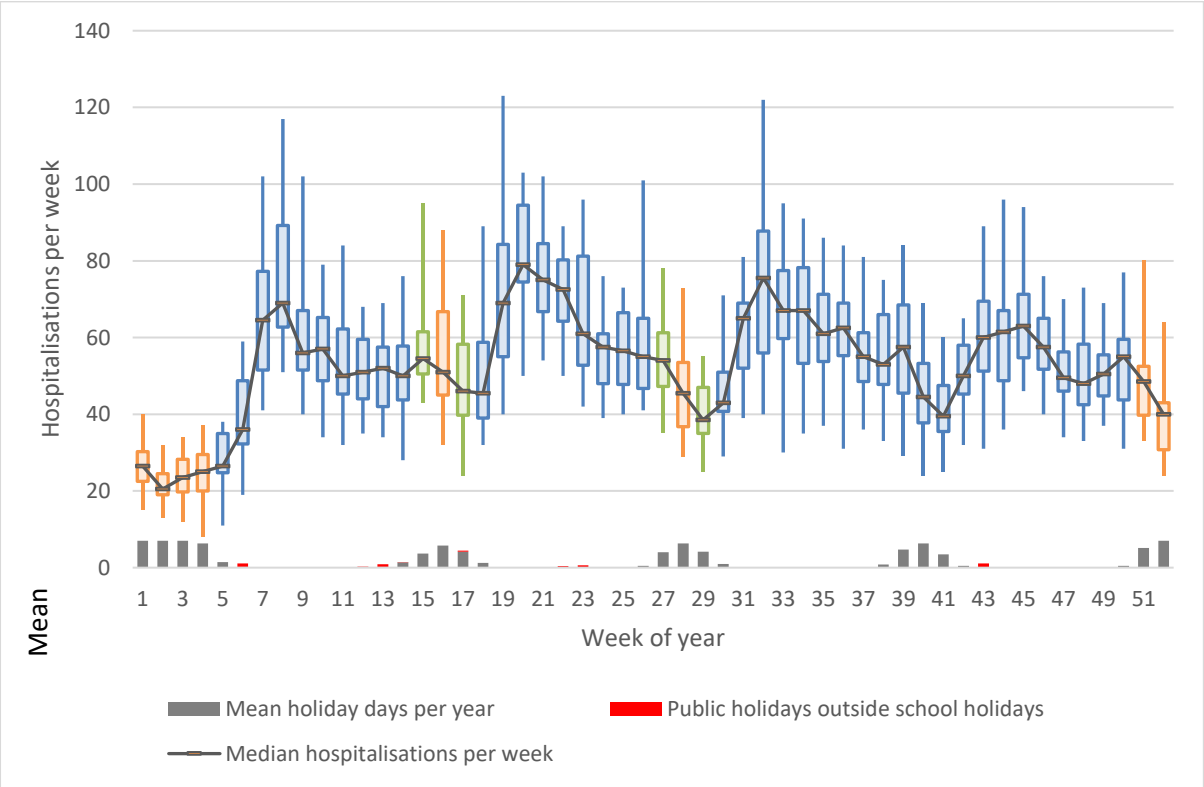
Figure 22. Asthma winter: non-winter hospitalisation rate ratio, 2000 – 2019.



(See Table A 30 for data)

However, for children aged 14 years and younger, for whom the winter: non-winter ratio ranged from 0.92 (a summer excess) to 1.44, the effect of winter was less dramatic than the effect of return to school following school holidays. The effect is demonstrated for children aged 3 to 14 in Figure 23. Peak asthma hospitalisation risk day for each term, and hospitalisation risk ratio to the first day of term, are shown in [Table 5]

Figure 23. **Mean asthma hospitalisations per week of year in children aged 3 to 14 years, 2000 – 2019.**



Note: School holiday weeks are shown in orange (school holidays 75 – 100% of days in study period) and green (50 – 74% of days in study period), while school term weeks are shown in blue.

Table 5. **Peak asthma hospitalisation risk day and rate ratios Day 1 to peak, children aged 3 to 14 years, 2000 - 2019.**

	Peak day	**Rate ratio to day 1**	**95%CI**
Period			
Term 1	23	2.79	(2.57 – 3.03)
Term 2	20	1.84	(1.72 – 1.97)
Term 3	18	1.92	(1.78 – 2.06)
Term 4	17	1.66	(1.54 – 1.78)

The greatest effect of return to school fell in Term 1, with risk of hospitalisation nearly three times higher on the peak day in the third week of term, than on the first day of term (and in previous days). Risk of hospitalisation was also significantly elevated within a similar timeframe in Terms 2 to 4. As hospitalisations represent only a small proportion of asthma exacerbations, it is likely that general asthma symptoms are also increased in the first few weeks following school holidays.

These findings closely resemble results for a similar analysis of asthma hospitalisations in Sydney between 1994 and 2000, except that New Zealand's Term 3 rates effect was stronger than in Sydney.[31]

These results have important implications for asthma management in school children. We recommend ARFNZ investigate what interventions or communication strategies may help children and their families reduce return to school exacerbation risks.

3.3. BRONCHIECTASIS

3.3.1. BRONCHIECTASIS PREVALENCE

We estimated the prevalence of severe bronchiectasis in 2019 by identifying living individuals hospitalised with bronchiectasis, as either primary or secondary diagnosis[†], since 2000. While the method is the same as in previous reports, the data starting point has changed (previous reports started in 1988), meaning that the estimate likely underestimates bronchiectasis prevalence more than in previous reports.

On 1 December 2019 there were 8,053 people previously hospitalised with bronchiectasis, giving a population prevalence of 162 per 100,000 people. Prevalence was 22% higher in women than in men, with an age-standardised rate of 177.1 per 100,000 for women compared to 144.3 for men. Rates were highest in adults aged 65+. Among ethnic groups, Pacific peoples' prevalence rates were highest, with an age-standardised population rate of 670.7 per 100,000 (rate ratio 5.55 compared to non-MPA), followed by Māori, with 355.7 (rate ratio 3.55 compared to non-MPA). Asian peoples rates of 112.5 per 100,000 were significantly lower than the 118.5 rate for non-MPA (Table A 1-28), with a rate ratio of 0.81.

There was also a strong socio-economic gradient, with people in the most deprived NZDep quintile having 2.95 times higher bronchiectasis prevalence than people in the least deprived NZDep quintile (Table A 1-29).

After standardising by age, severe bronchiectasis prevalence was highest in Counties Manukau DHB, where prevalence was 301.0 cases per 100,000 people; and lowest in South Canterbury, with 68.5 cases per 100,000 people (Table A 1-30). These differences were partly due to demography: after adding adjustment for ethnic and socio-economic distribution as well as age, Auckland DHB rates were equivalent to Counties Manukau.

New research

A 2018 study found Māori and Pacific peoples were over-represented among Auckland bronchiectasis outpatients over the period 2007 to 2010.[32] A 2021 study found 46.7% of patients with common variable immunodeficiency disorders had radiologically proven bronchiectasis, however these data were not representative of the general population.[33]

[†] 2013 report included only primary diagnoses.

3.3.2. 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[34]. "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 the incidence of bronchiectasis in New Zealand adults or children since the previous report.

We measured the 2019 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 2005. This measure found 113 new cases of bronchiectasis in 2019, compared to 86 in 2018 and 125 in 2017. The 2019 incidence rate was 11.8 per 100,000. Incidence was highest in Pacific children at 21.7 compared with 19.2 in Māori, 3.6 in Asian children, and 7.9 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 3.5 times higher than in NZDep 1-2. This ratio was a large increase on the 2017 figure of 2.4.

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.[35]

3.3.3. BRONCHIECTASIS HOSPITALISATIONS

Trends over time 2000 - 2019

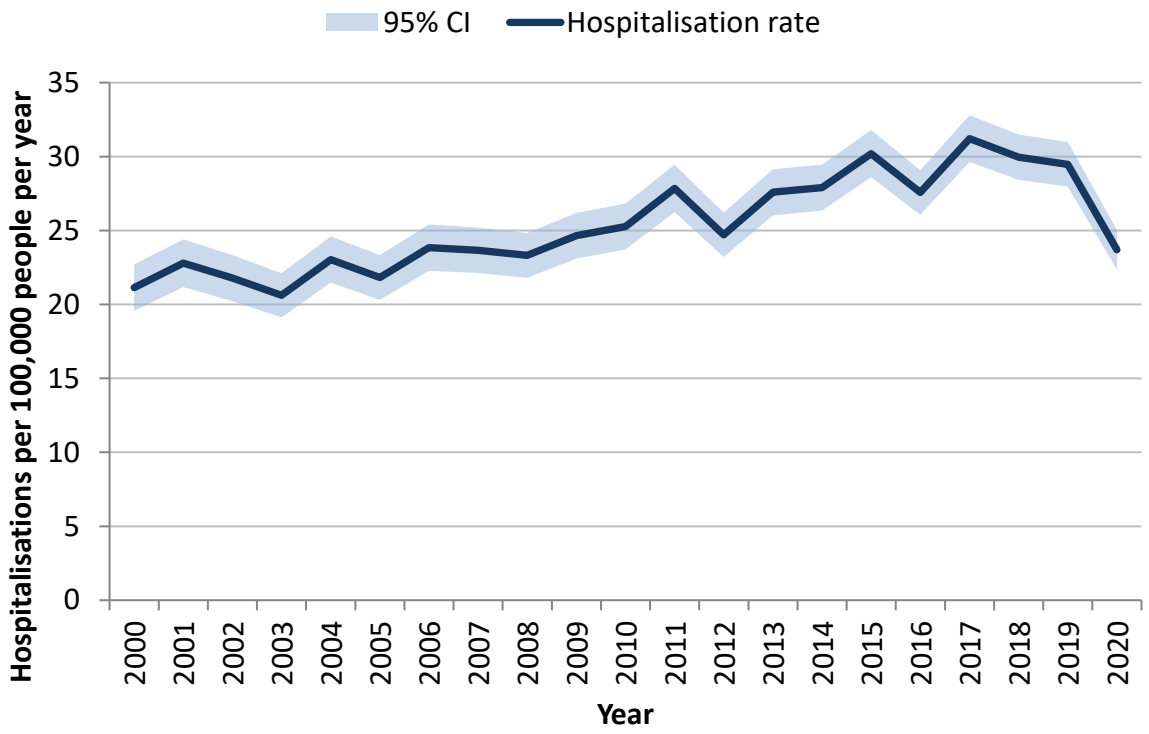
After adjusting for age, the bronchiectasis hospitalisation rate increased significantly over the period 2000 to 2019 (see Figure 24), though did not increase significantly since the 2017 report – it remains to be seen whether 2020's return to ~2006 levels will be sustained in the absence of Covid-19 pandemic effects. The 2019 age-adjusted rate of 29.5 hospitalisations per 100,000 people represented an increase of 39% over the 2000 rate of 21.1 per 100,000. The increase has been highest in children aged under 15 years, and adults aged 65 years and over. As noted in the previous report, personal communication with respiratory specialists suggested that some of the increase for children aged under 15 years may have be the result of diagnosing bronchiectasis at increasing earlier ages; this assessment is supported by changes in the age distribution of incidence. Children's hospitalisations peaked in 2017, and no longer appears to be increasing.

Although ethnic inequalities continue, and bronchiectasis rates continue to rise for all ethnic groups (Table A 1-36), the 2000 – 2019 study period has seen an overall reduction in ethnic

inequalities in bronchiectasis hospitalisation (Figure 28. 2017 was the first year in the study period to see Asian bronchiectasis rates dip below those of non-MPA, where they appear likely to remain.

Socio-economic disparities show no clear pattern over the study period, but at least do not appear to be getting worse (Figure 31).

Figure 24. Bronchiectasis hospitalisations per 100,000 people per year, 2000-2020.



(See Table A 1-31 for data)

Risks and determinants 2019

Bronchiectasis hospitalisation rates were highest in the elderly, with 76.2 hospitalisations per 100,000 people aged 65+. Female rates were significantly higher than males in age groups over 15 years. Male rates were higher in children aged under 15 years, but the difference was not statistically significant (Figure 26).

Bronchiectasis hospitalisation rates also varied by ethnicity (Figure 27). Pacific peoples were 6.93 times more likely to be hospitalised, and Māori 3.81 times more likely to be hospitalised, than non-MPA. Asian peoples' hospitalisation rates were significantly lower than 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 peoples aged 65 years and over,

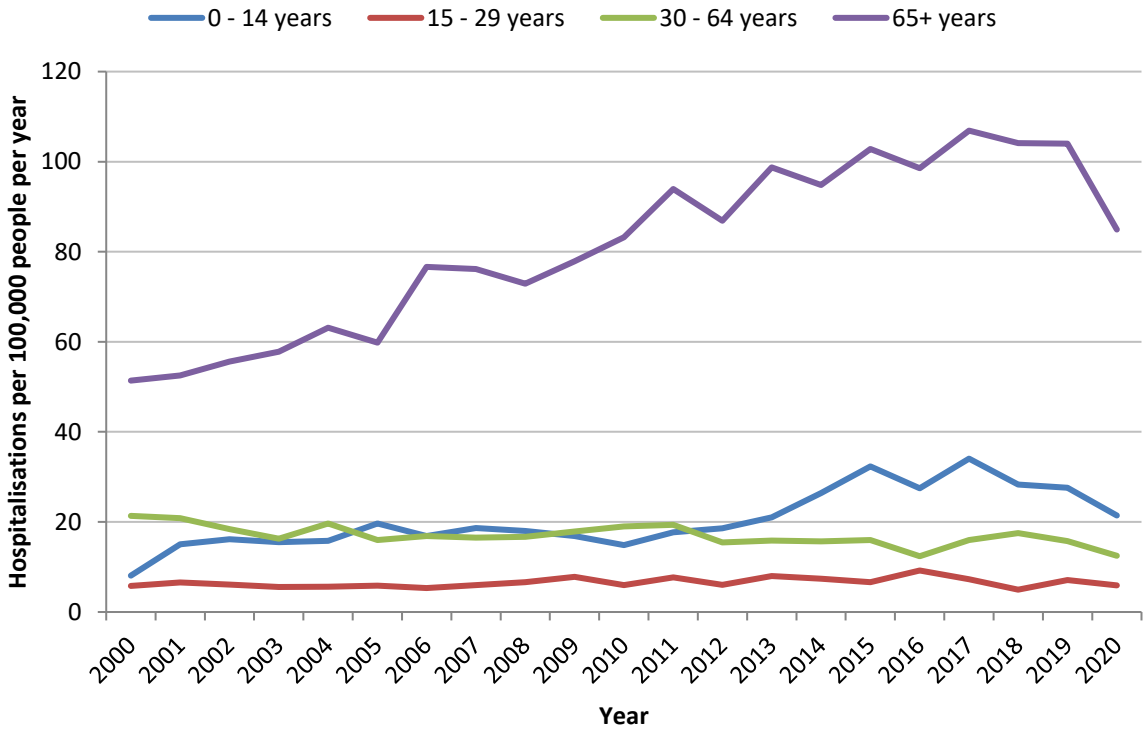
whose bronchiectasis hospitalisation rates of 490.5 per 100,000 were 5.94 times higher than the rate of 82.5 per 100,000 for non-MPA (Figure 29).

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 2.8 times higher than for NZDep 1-2, it was also much higher than the next most deprived NZDep 7-8 neighbourhoods (Figure 30). Bronchiectasis hospitalisation rates rose across all NZDep quintiles between 2000 and 2017, and remained flat or declined slightly from 2017 to 2019 (Figure 31), and there has been no clear trend in socio-economic inequalities across the study period (Table A 1-41).

There was a mild socioeconomic trend in 2019 hospitalisation rates for Pacific Peoples and non-MPA, but no significant trend for Māori or Asian Peoples (Figure 32).

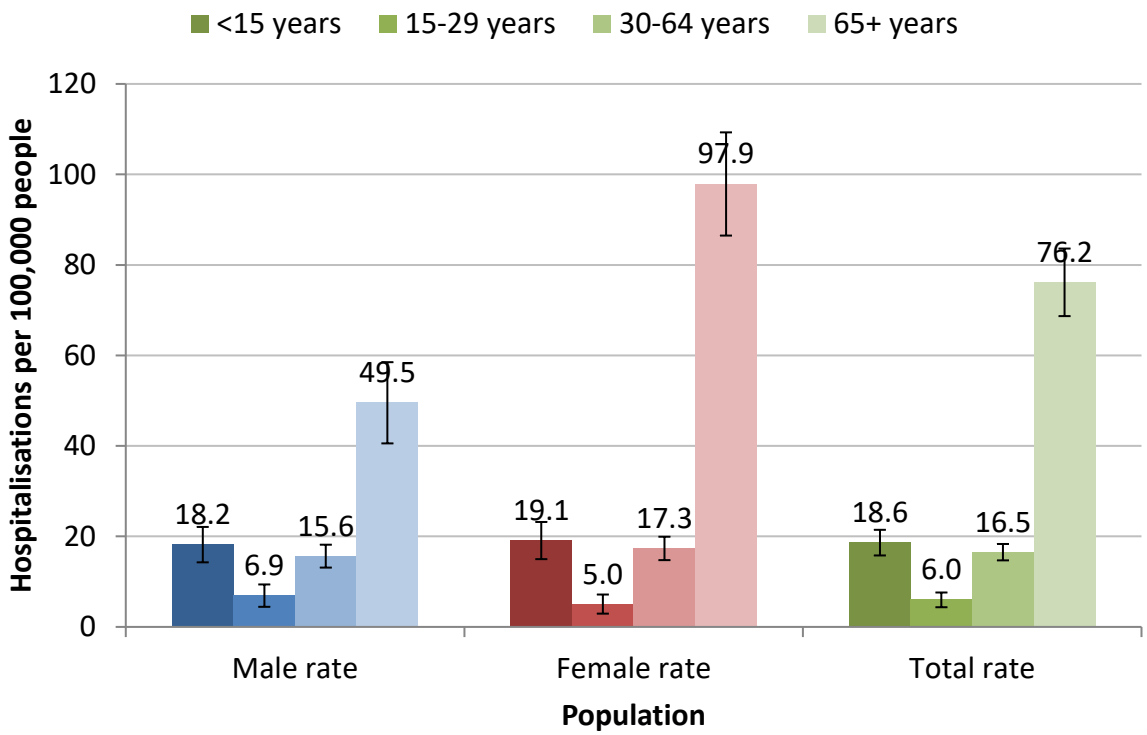
As with other respiratory illnesses, there was a rough north to south gradient in bronchiectasis hospitalisations. The highest rates were in Tairawhiti (51.4 per 100,000 people), Lakes, (45.6), Counties Manukau (43.4), Waikato (42.6) and Bay of Plenty (42.1), compared to the national rate of 23.7 (Figure 33).

Figure 25. Bronchiectasis hospitalisations per 100,000 people per year by age group, 2000-2020.



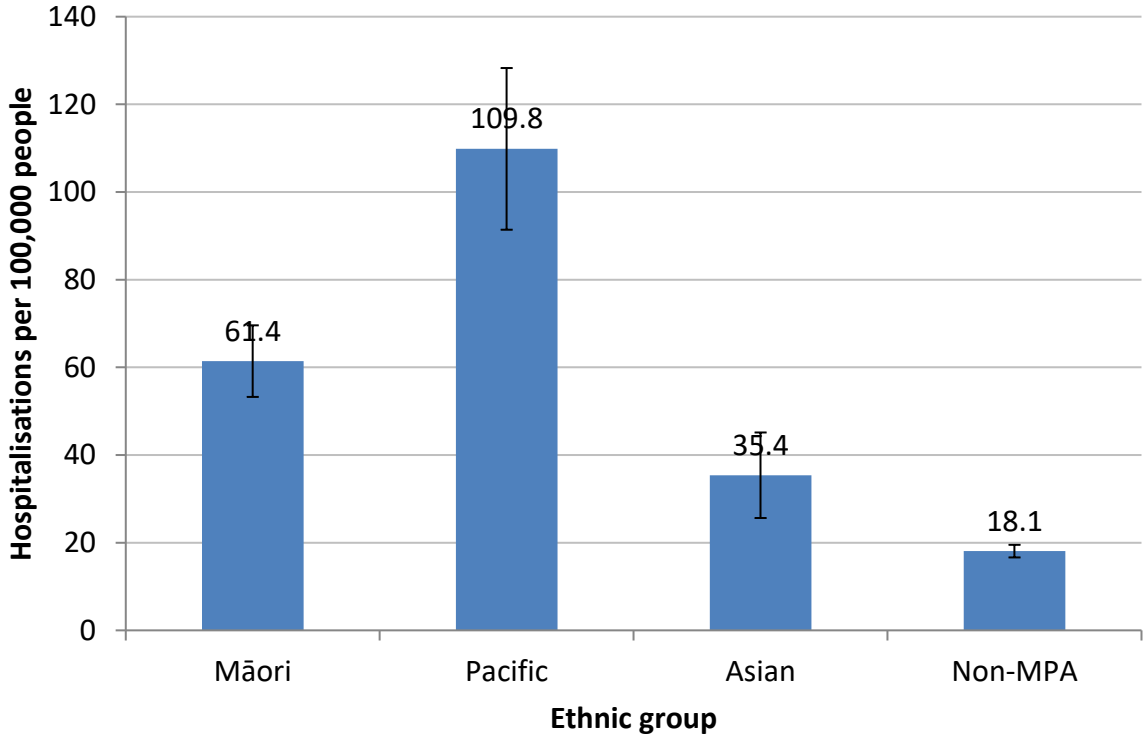
See Table A 1-32 for data.

Figure 26. Bronchiectasis hospitalisations per 100,000 people by age group and sex, 2019.



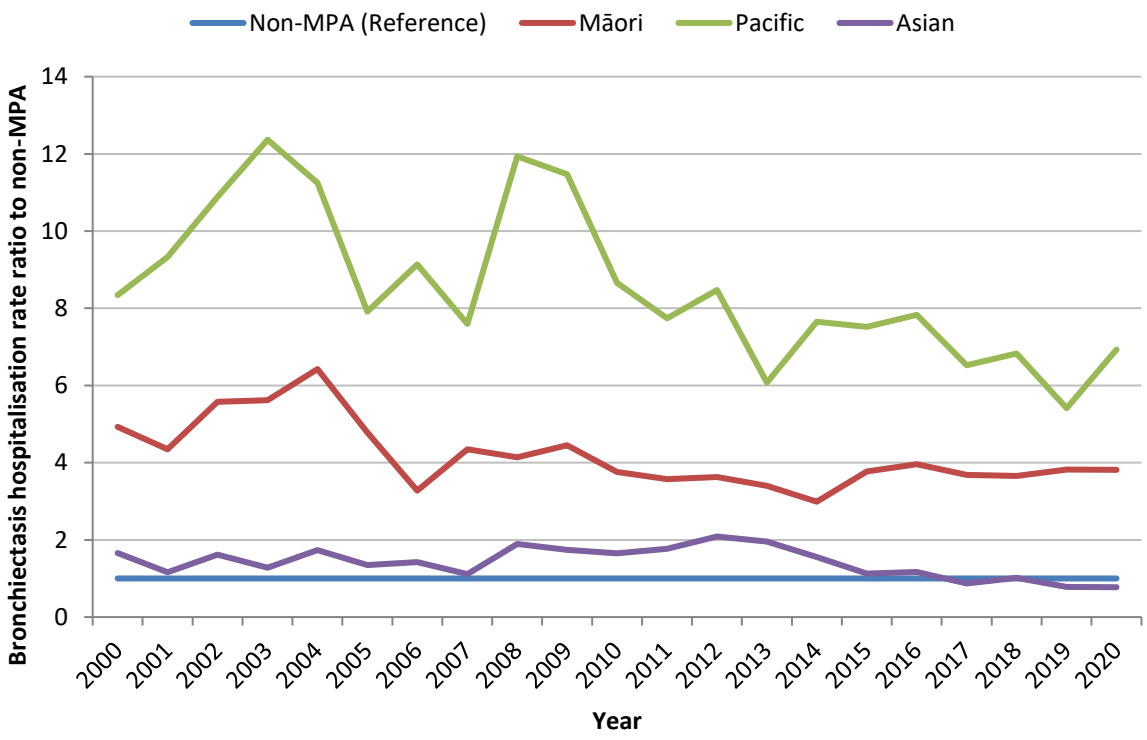
(See Table A 1-33 and Table A 1-34 for data)

Figure 27. Bronchiectasis hospitalisations per 100,000 people by prioritised ethnic group, 2019.



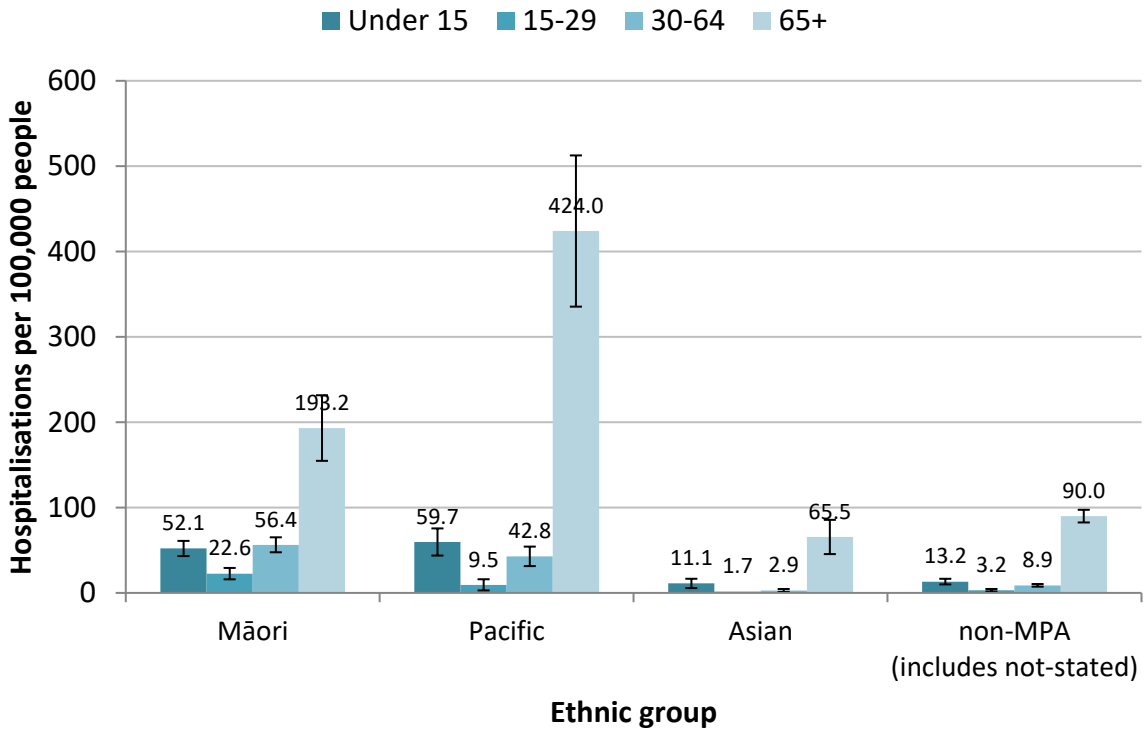
(See Table A 1-35 for data)

Figure 28. Bronchiectasis hospitalisation rate ratios to non-MPA by ethnic group, 2000 – 2020, age-adjusted.



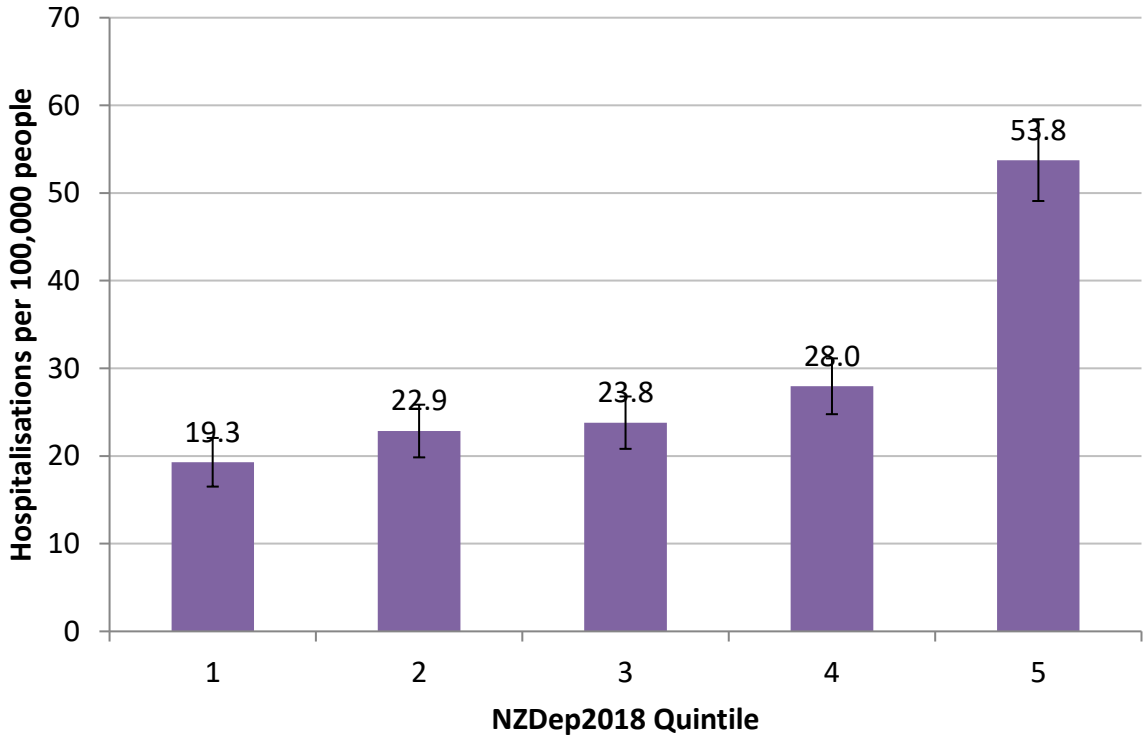
(See Table A 1-36 and Table A 1-37 for data)

Figure 29. Bronchiectasis hospitalisations per 100,000 people by ethnic group and age group, 2020.



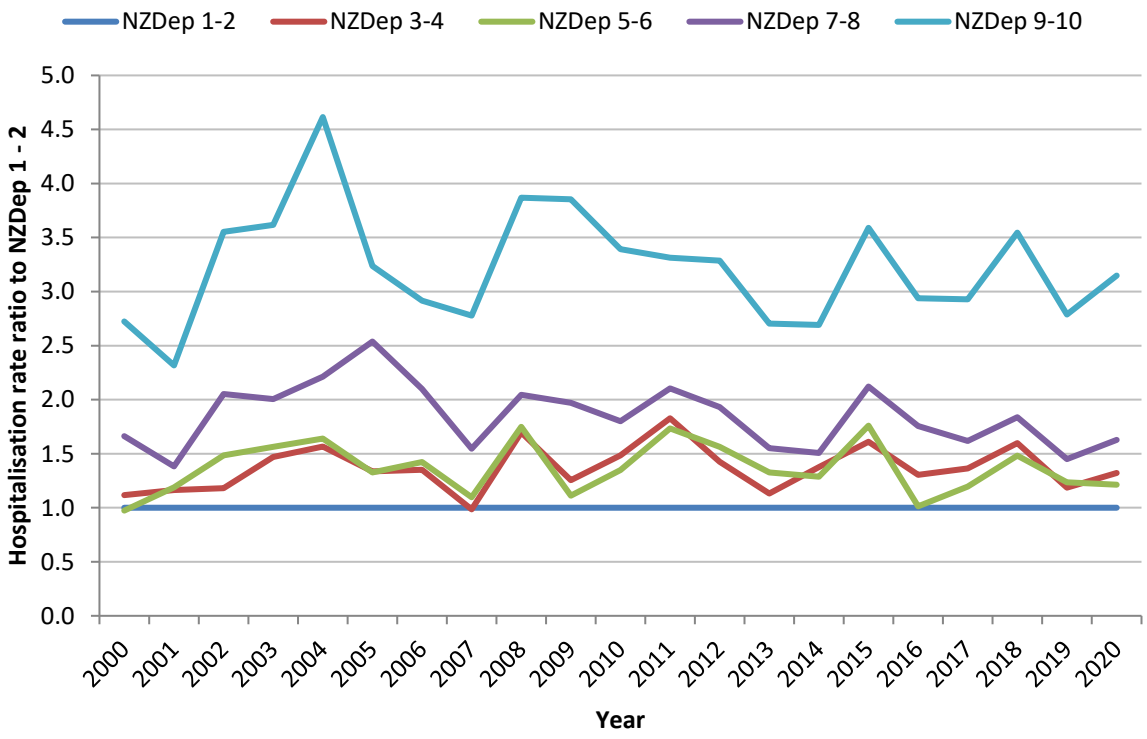
(See Table A 1-38 for data)

Figure 30. Bronchiectasis hospitalisations per 100,000 people by NZDep2018 quintile, 2019, age-adjusted.



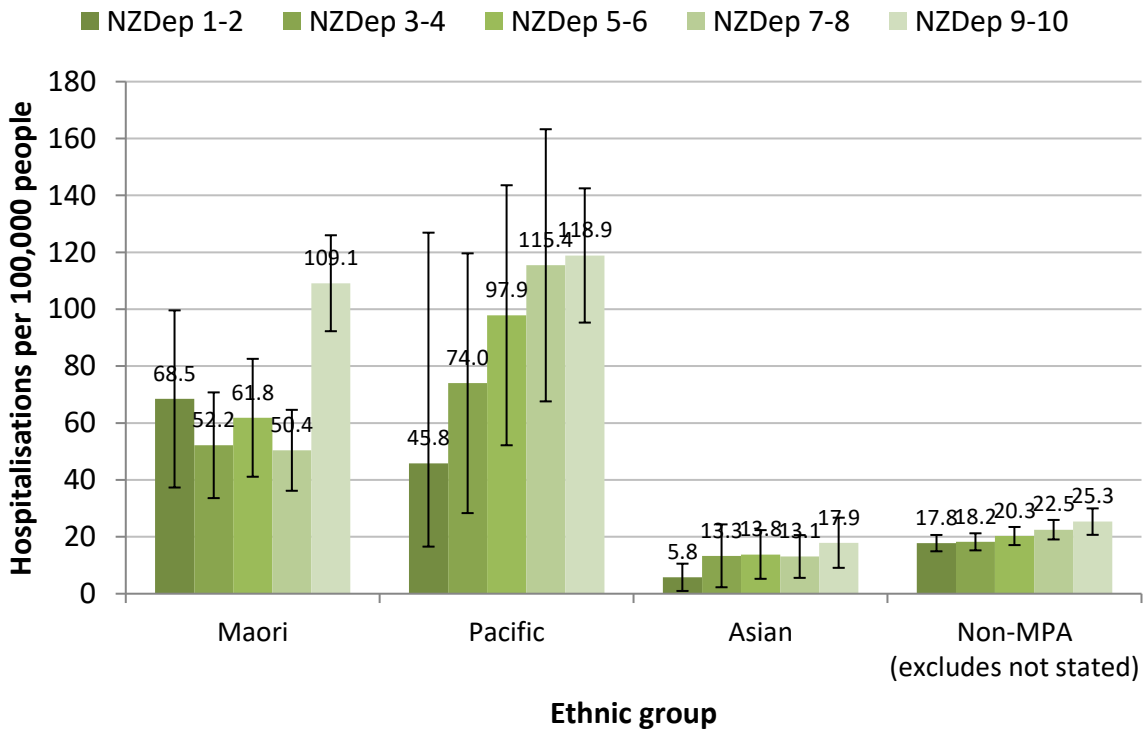
(See Table A 1-39 for data)

Figure 31. Bronchiectasis hospitalisations rate ratios to NZDep 1 - 2e by NZDep2018 quintile, 2000 - 2020, age-adjusted.



See Table A 1-41 for data.

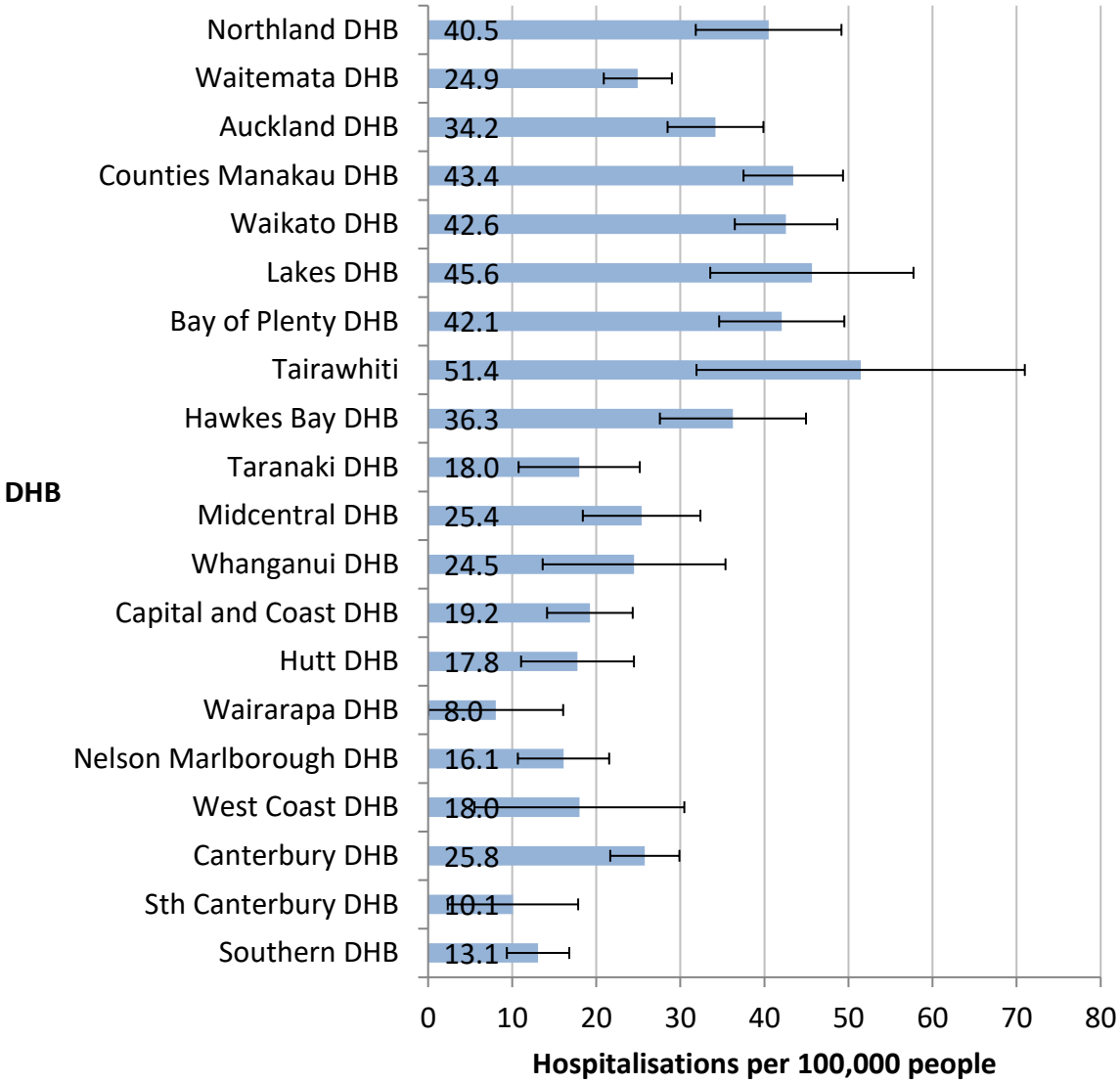
Figure 32. Bronchiectasis hospitalisations per 100,000 people by prioritised ethnic group and NZDep2018 quintile, 2019, age-adjusted.



(See Table A 1-42 for data)

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

Figure 33. Bronchiectasis hospitalisations per 100,000 people by DHB, 2019.



(see Table A 1-43 for data)

3.3.4. BRONCHIECTASIS MORTALITY

Trends over time 2000 - 2017

Bronchiectasis mortality increased significantly over the study period, from 42 deaths per year in 2000-2001, to 154 deaths in 2017. This represented an age-adjusted increase of 0.08 deaths per 100,000 people per year. The trend was unchanged from the previous report.

Risks and determinants 2012 - 2017

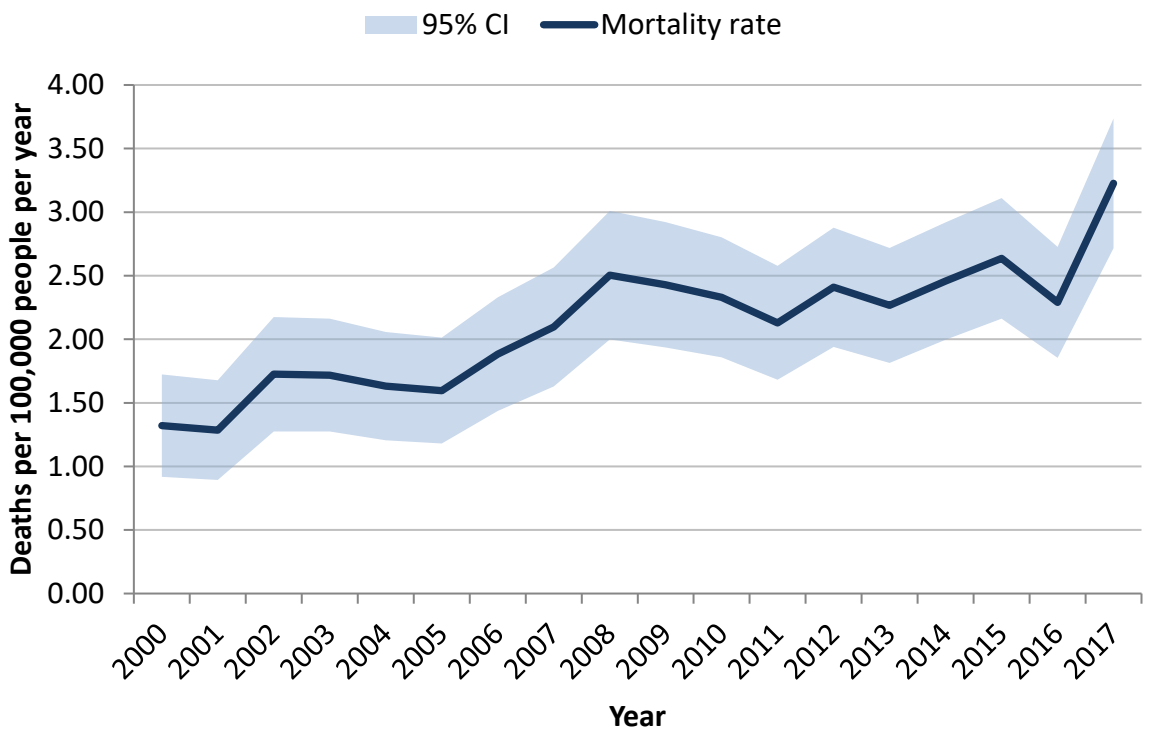
Bronchiectasis mortality rates were highest in people aged 65+, and were significantly higher in women than in men for people aged 30 and over (Figure 35).

Bronchiectasis mortality was highest for Pacific peoples, with rates 5.81 times higher than for non-MPA. Rates were also significantly higher for Māori, (rate ratio 3.65) and Asian peoples (rate ratio 1.30) (Figure 36). Most of the difference was due to in differences in rates in the two older age groups (Figure 37).

There were socio-economic differences in bronchiectasis mortality, with mortality rates increasing with increasing NZDep2018 quintile. People in NZDep 9-10 were nearly twice as likely to die of bronchiectasis as those in NZDep 1-2 (RR 1.8). (Figure 38). 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 Peoples 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 39).

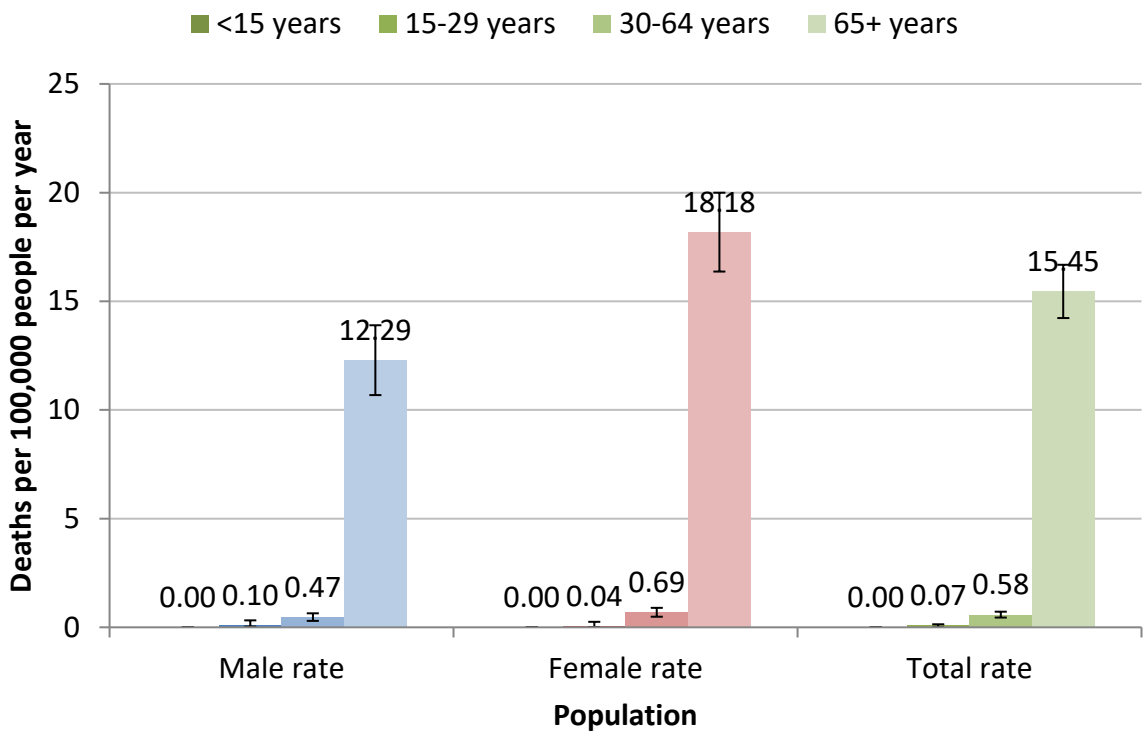
Bronchiectasis mortality rates were highest, and significantly higher than the national rate, in Counties Manukau, Tairawhiti, Auckland and Hutt Valley DHBs, and lowest in Whanganui, South Canterbury and Wairarapa (Figure 40). Rates were also significantly below the national average in six other DHBs.

Figure 34. Bronchiectasis mortality rates 2000-2017, age-adjusted.



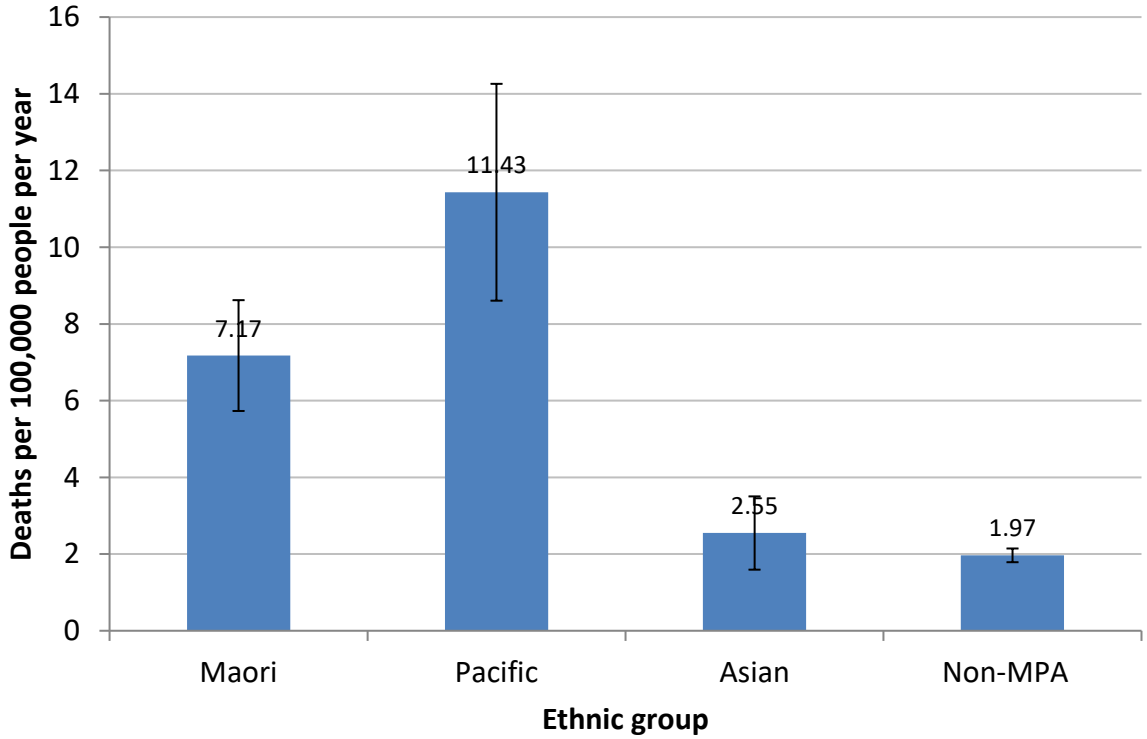
(See Table A 1-44 for data)

Figure 35. Bronchiectasis deaths per 100,000 people by age group and sex, 2012-2017.



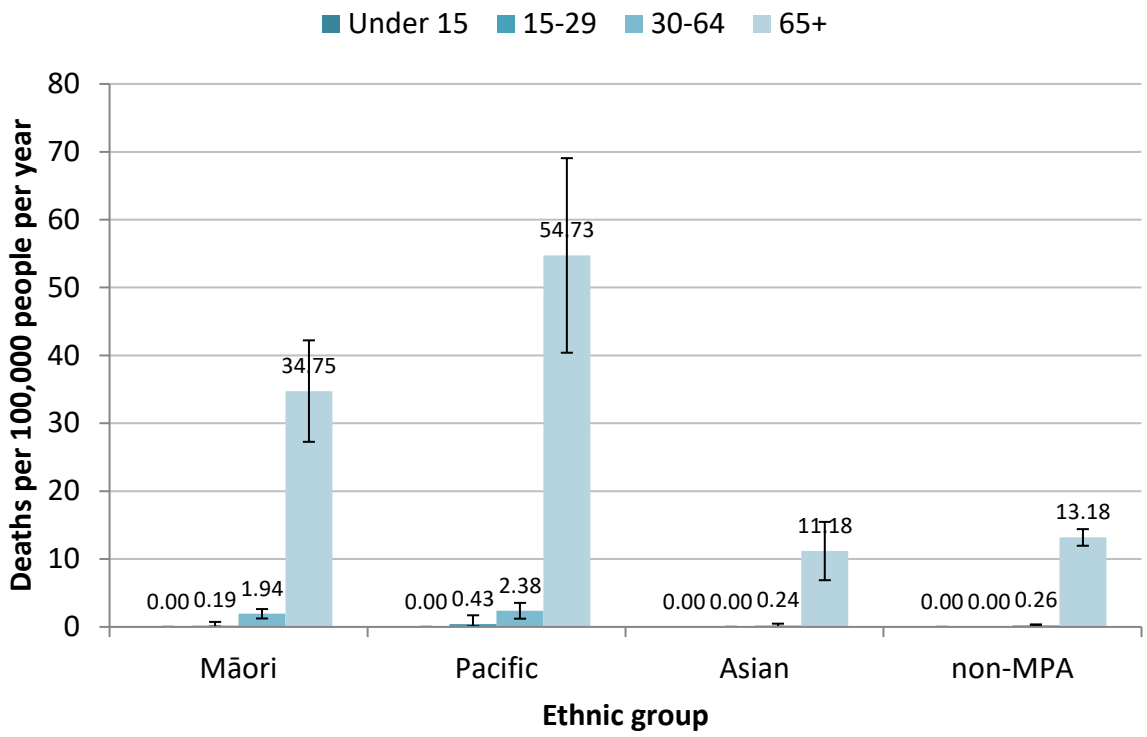
(See Table A 1-45 and Table A 1-46 for data)

Figure 36. Bronchiectasis mortality per 100,000 people per year by ethnic group, 2012-2017.



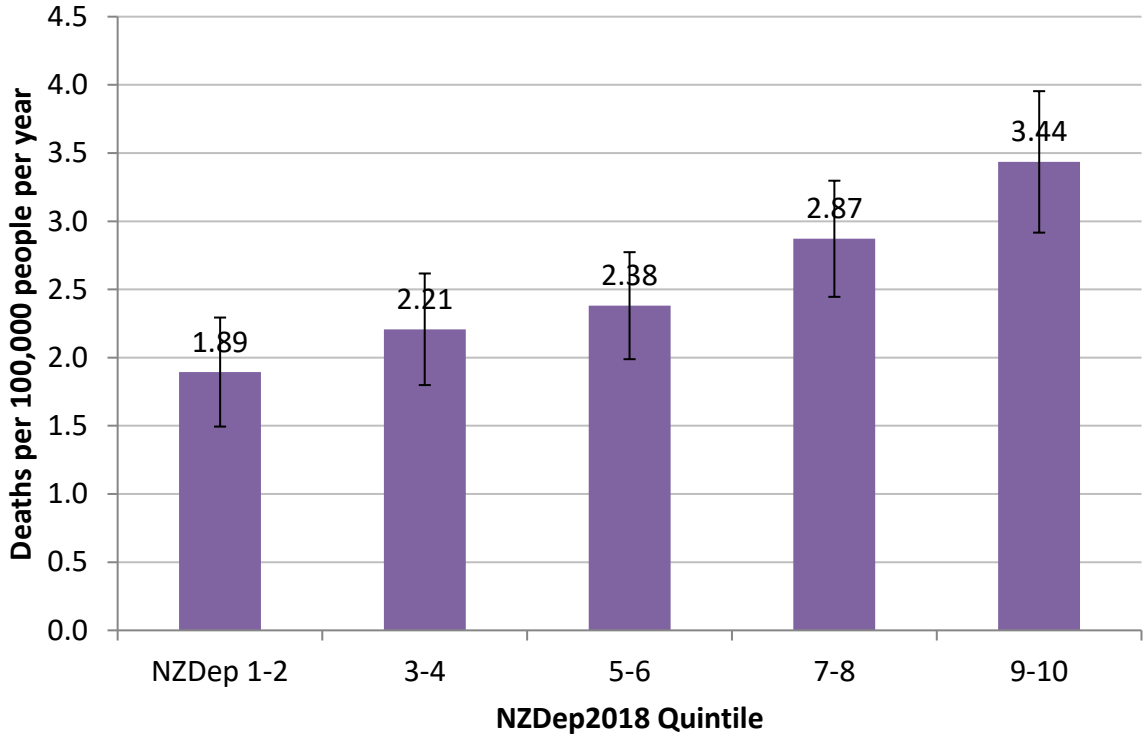
(See Table A 1-47 for data)

Figure 37. Bronchiectasis deaths per 100,000 people per year, by ethnic group and age group, 2012-2017.



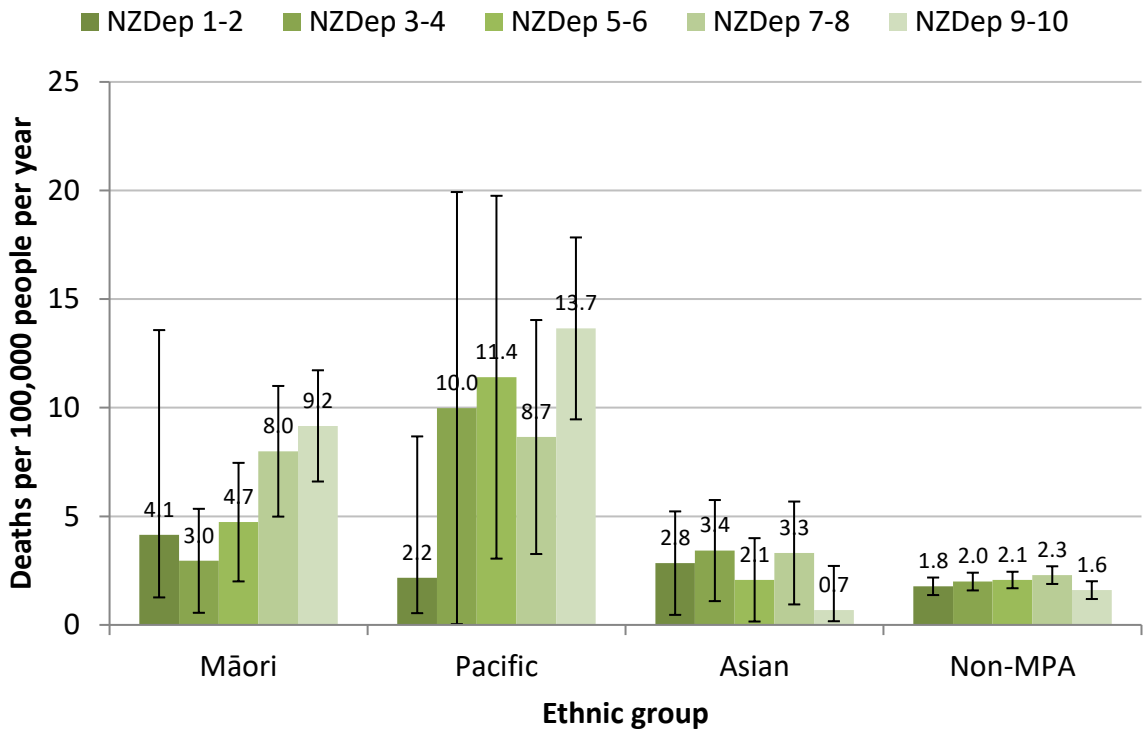
(See Table A 1-48 for data)

Figure 38. Bronchiectasis deaths per 100,000 people by NZDep2018 quintile, 2012-2017, age-adjusted.



(See Table A 1-49 for data)

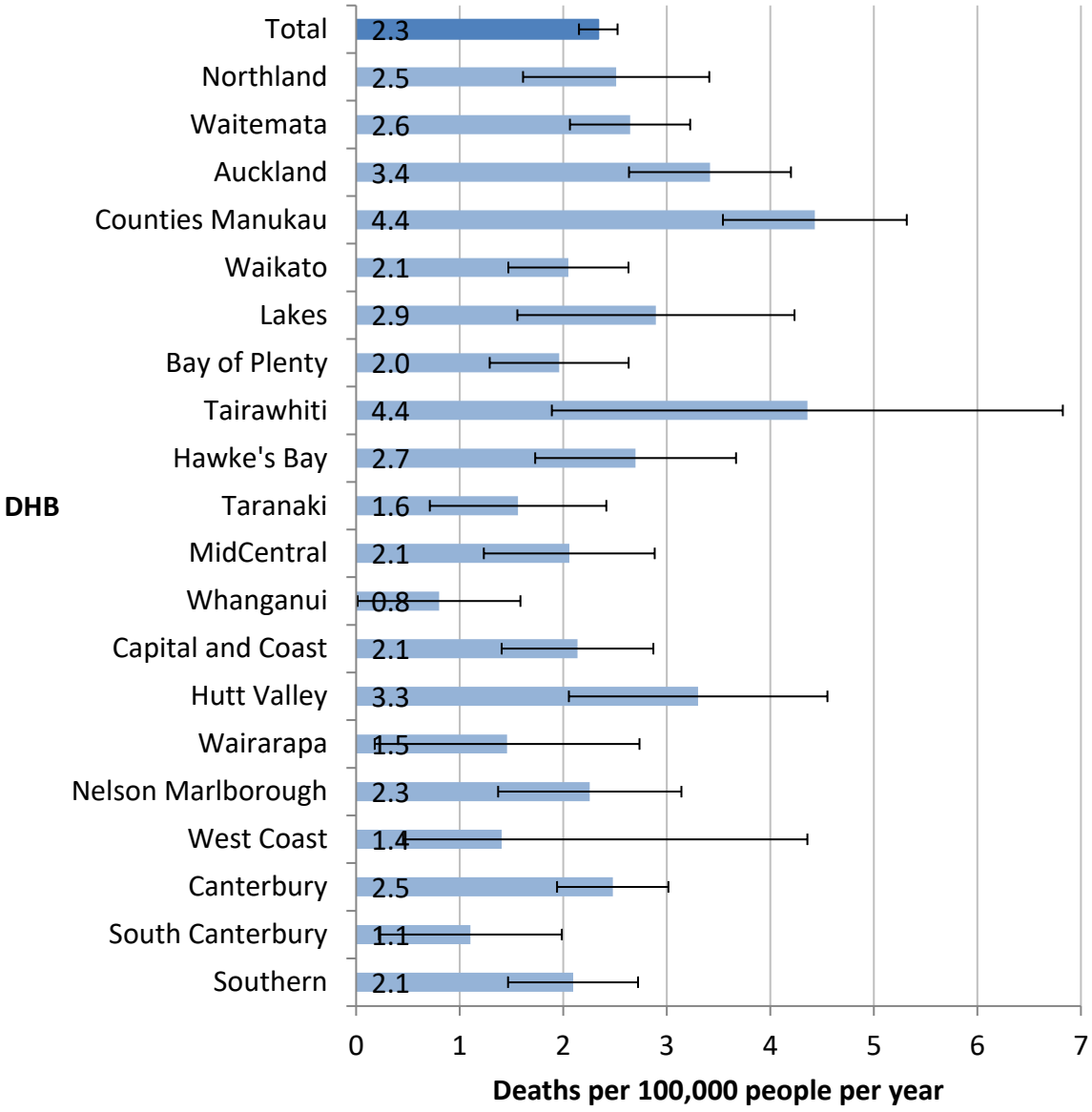
Figure 39. Bronchiectasis deaths per 100,000 people by ethnic group and NZDep2018, 2012-2017, age-adjusted.



(See Table A 1-50 for data)

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

Figure 40. Bronchiectasis deaths per 100,000 people per year, by DHB, 2012-2017, age-adjusted



(see Table A 1-51 for data)

3.4. CHILDHOOD BRONCHIOLITIS

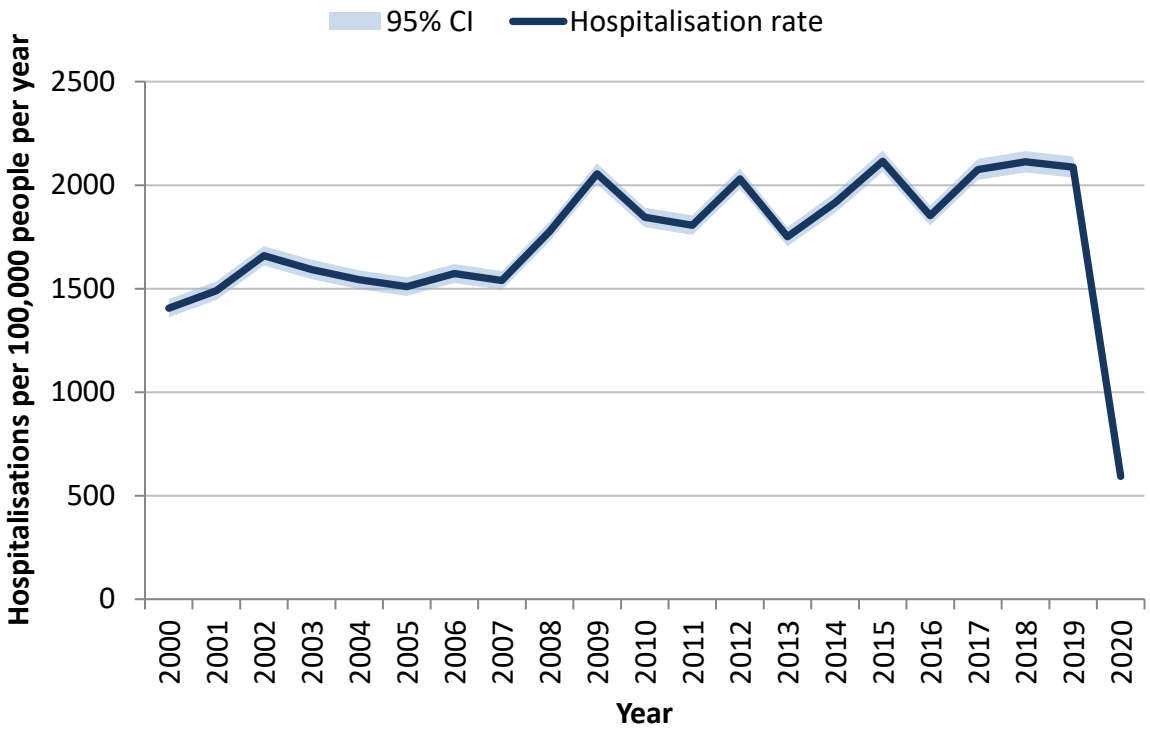
3.4.1. CHILDHOOD BRONCHIOLITIS HOSPITALISATIONS

Trends over time 2000 - 2019

Childhood bronchiolitis hospitalisation rates increased significantly over the period 2000 - 2019 (see Figure 41), by an estimated 35.1 hospitalisations per year. The overall hospitalisation rate has increased almost a half over the period, though increased little from the last report (and was dramatically lower in 2020).

Ethnic disparities reduced slightly from 2009 to 2019, however the reduction was primarily due to the continued increase in rates for non-MPA rather than a meaningful decrease in rates for Māori or Pacific peoples (Figure 44). Socio-economic inequalities increased between 2000 and 2003, and have reduced since then – in 2019 they returned to or improved on their 2000 levels - but they remain high overall (Figure 46).

Figure 41. Childhood bronchiolitis hospitalisations per 100,000 people per year, 2000-2020.



(See Table A 1-52 for data)

Risks and determinants 2019

As with other childhood respiratory illness, bronchiolitis hospitalisation rates were higher for boys than for girls (rate ratio 0.63) (Figure 42).

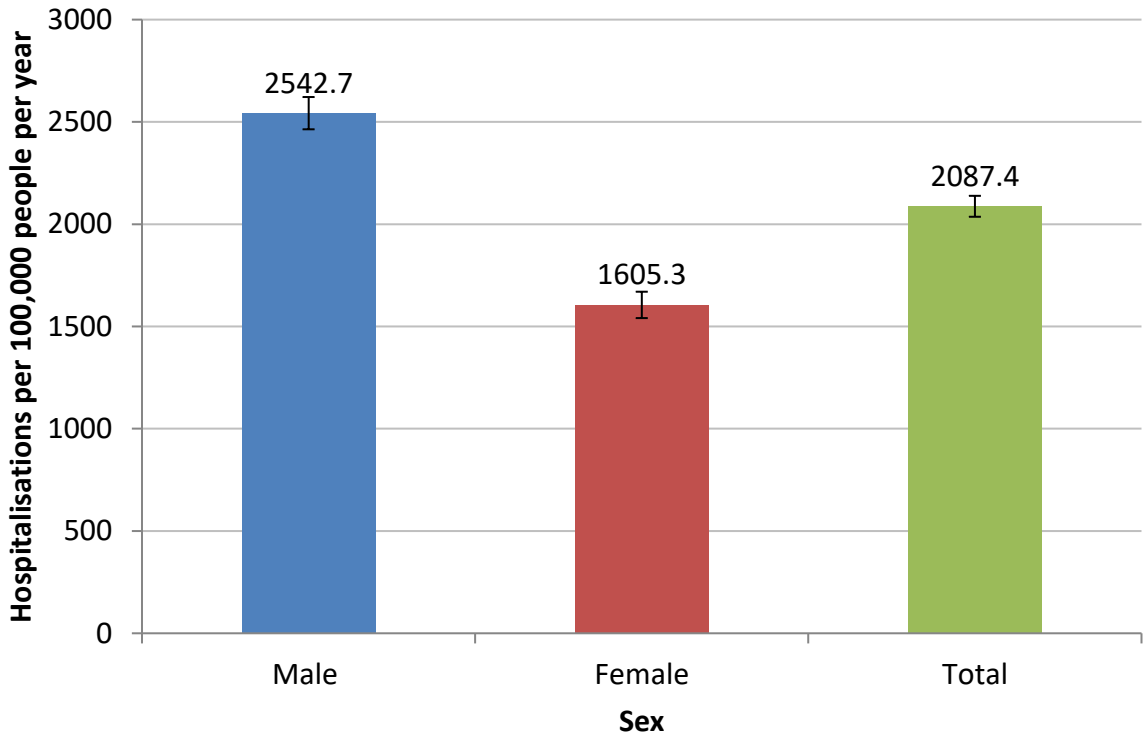
While we report rates for the 0 to 4 years age group, it should be noted that the vast majority of bronchiolitis hospitalisations – 84% in 2019 - occur in children aged under 1 year of age. A further 15% of all hospitalisations were in children aged 12 – 23 months, and only 0.8% in children aged 2 to 4.

Rates were lowest for non-MPA children, at 1214.2 per 100,000, highest for Pacific children, at 4709.9 per 100,000, and also high for Māori, at 3510.1, while Asian rates were lower, at 709.0 per 100,000 children (Figure 43). These differences were significant: Pacific rates were 3.9 times higher than non-MPA, Māori rates 2.9 times higher, and Asian rates 0.6 times lower than non-MPA rates.

The deprivation gradient for childhood bronchiolitis was more exponential than linear. There were 2692 bronchiolitis hospitalisations for children in the most deprived neighbourhoods, making their rates 3.1 times the 564 hospitalisations in the least deprived neighbourhoods (Figure 45). 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 almost five times as likely to be hospitalised as NZ non-MPA children in the wealthiest quintile (Figure 47).

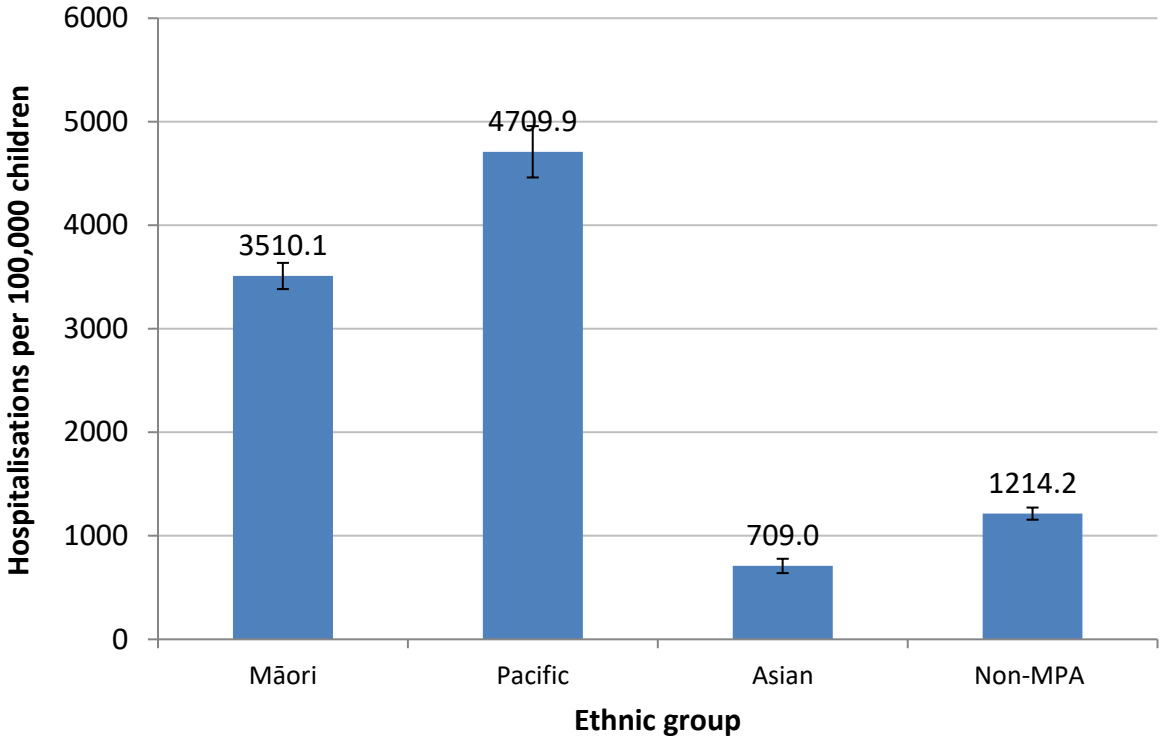
Across DHBs, childhood bronchiolitis rates were highest in Tairawhiti, Lakes, Hawkes Bay and Northland, and lowest in South Canterbury, Nelson Marlborough, and West Coast (Figure 48).

Figure 42. Childhood bronchiolitis hospitalisations per 100,000 people by sex, 2019.



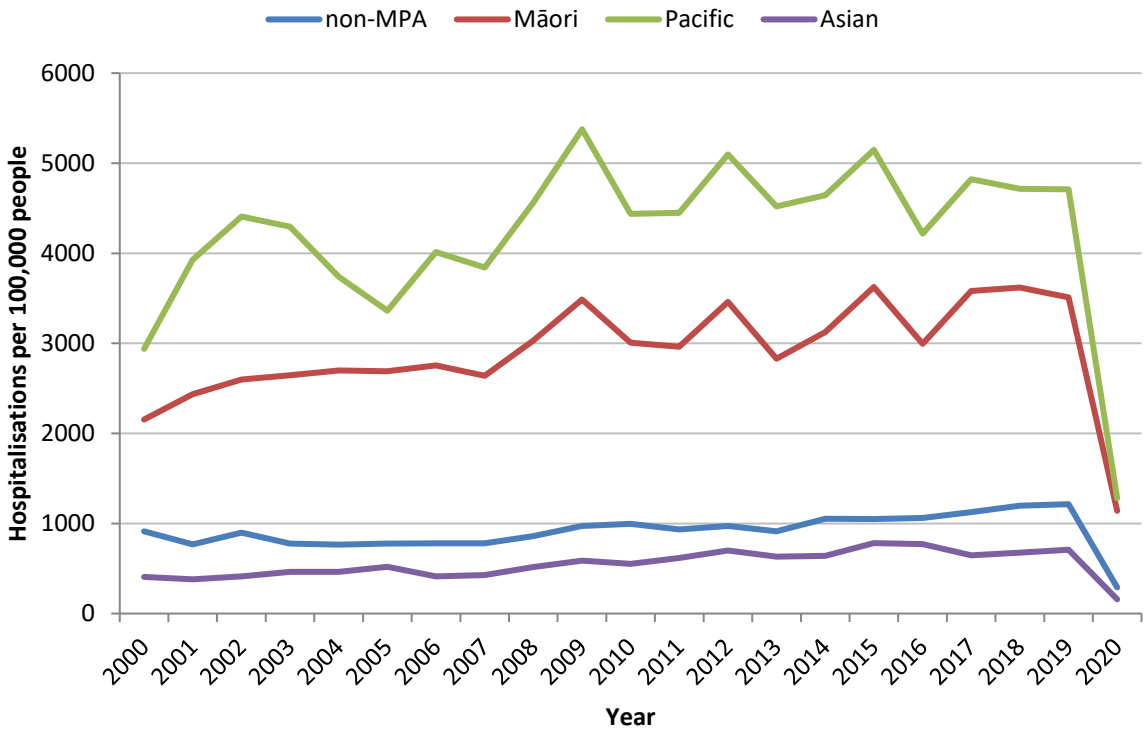
See Table A 1-53 for data

Figure 43. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2019.



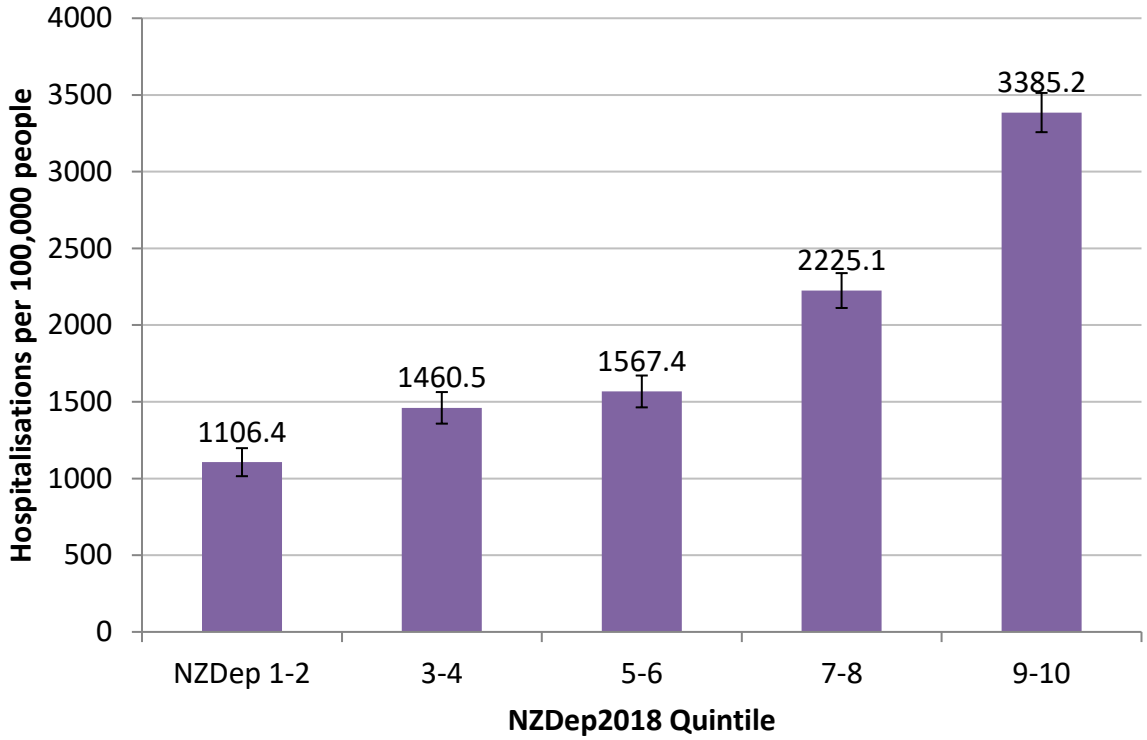
(See Table A 1-54 for data)

Figure 44. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2000 - 2020.



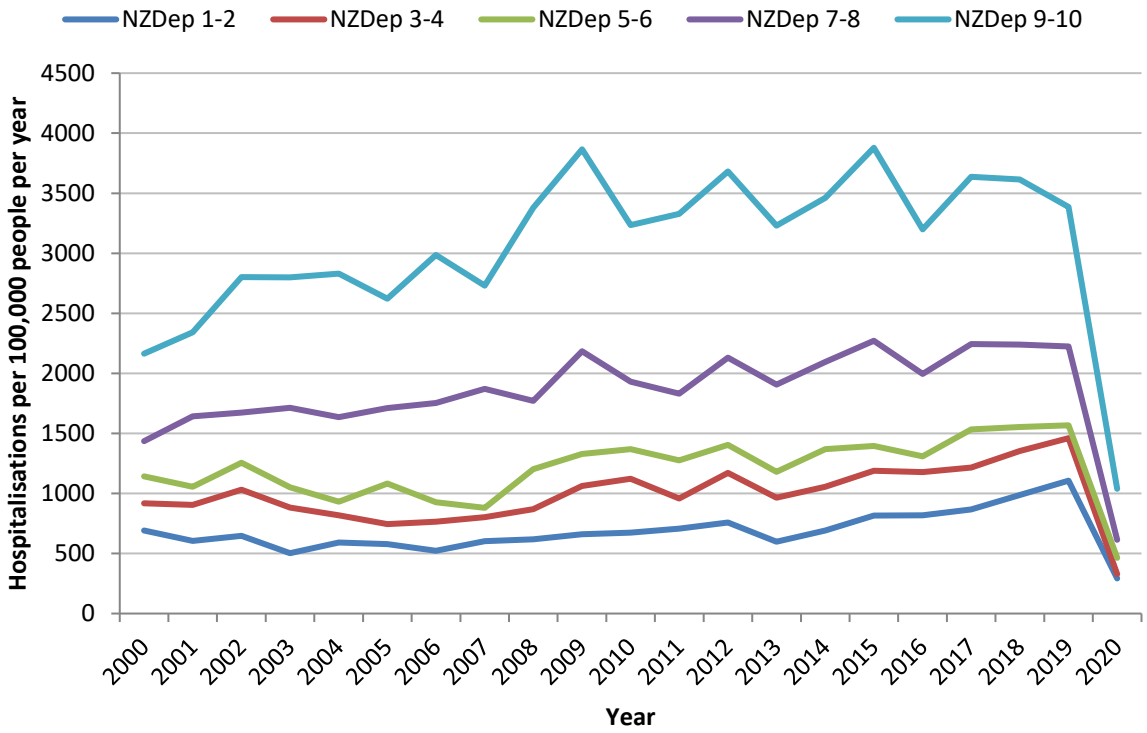
See Table A 1-55 and Table A 1-56 for data.

Figure 45. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2018 quintile, 2019.



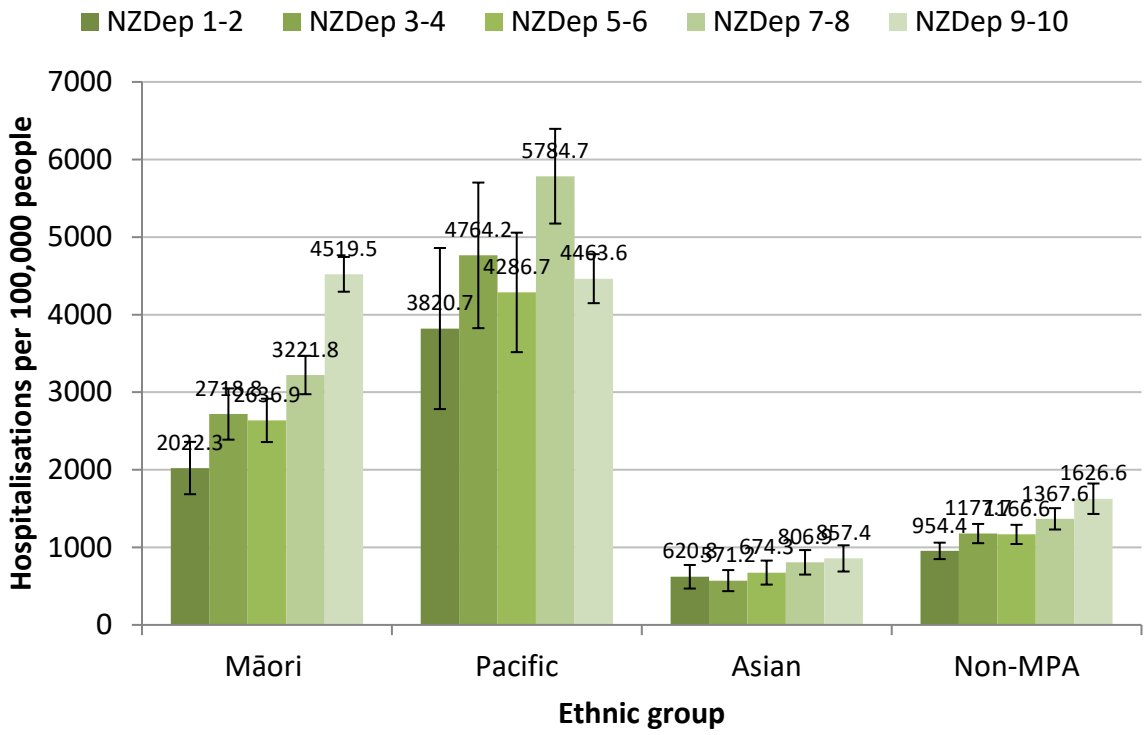
(See Table A 1-57 for data)

Figure 46. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2018 quintile, 2000 - 2020.



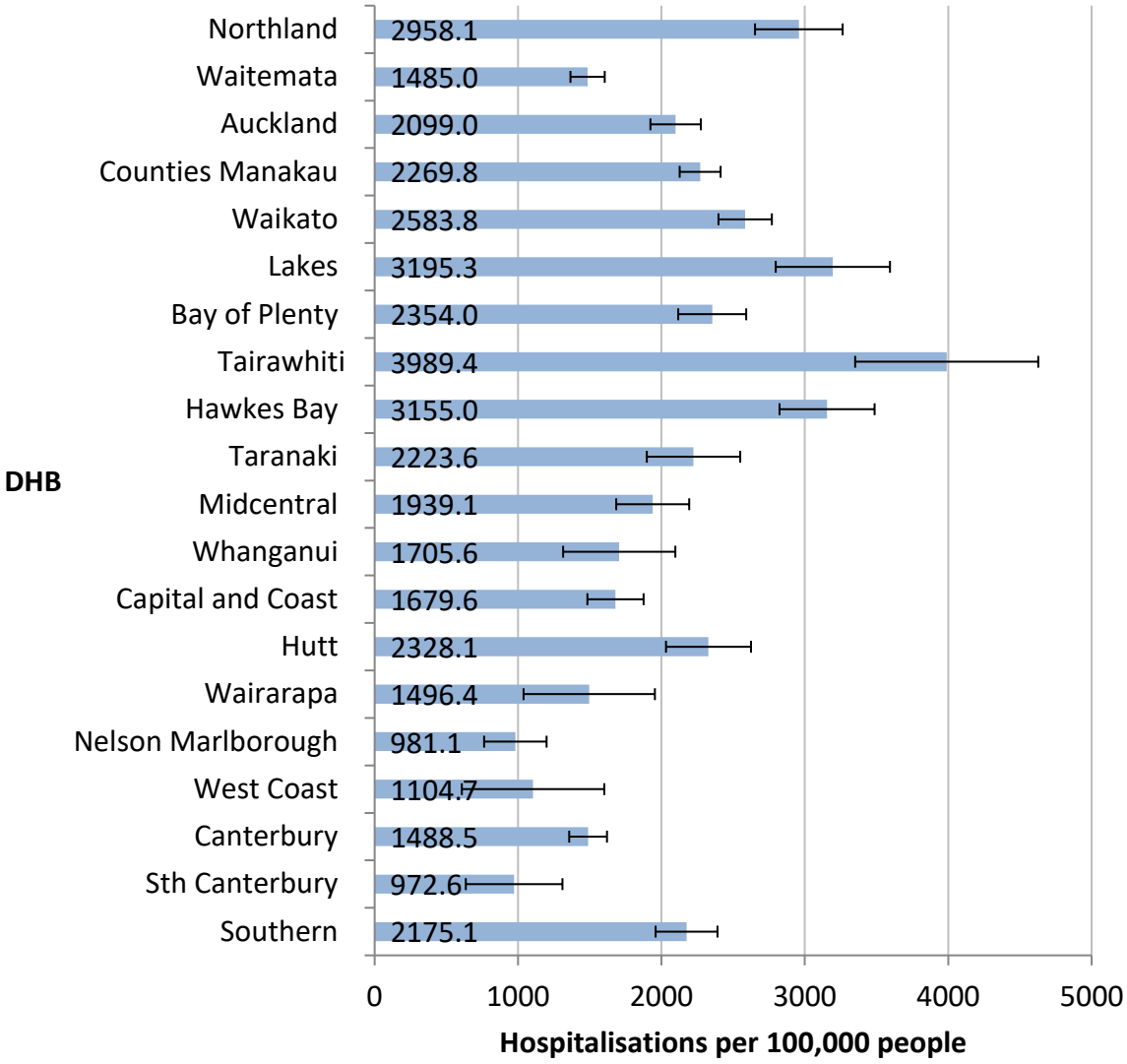
See Table A 1-58 and Table A 1-59 for data.

Figure 47. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group and NZDep2018, 2019.



(See Table A 1-60 for data)

Figure 48. Childhood bronchiolitis hospitalisations per 100,000 people by DHB, 2019.



(see Table A 1-61 for data)

3.4.2. CHILDHOOD BRONCHIOLITIS MORTALITY

Trends over time 2000 - 2017

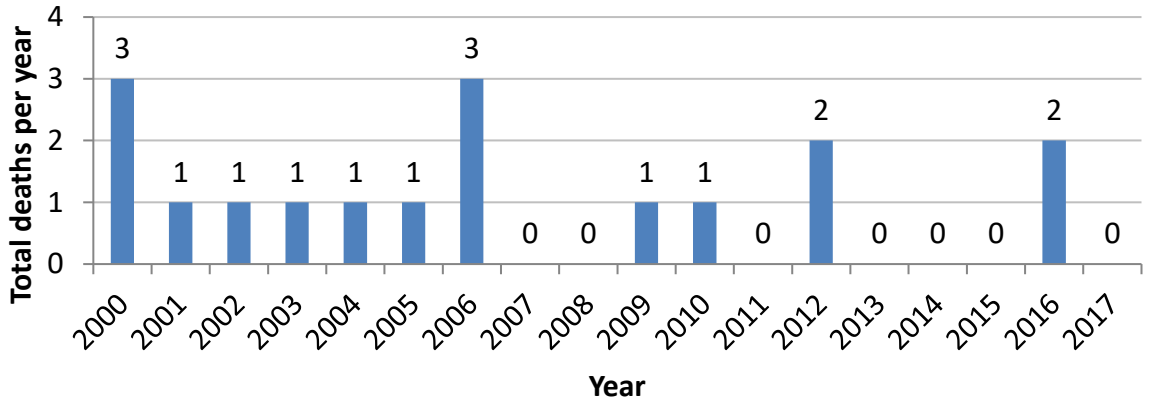
Deaths from childhood bronchiolitis were rare, totalling 17 over the period 2000-2017. There were two new child deaths from bronchiolitis since the previous report.

Risks and determinants 2008 - 2017

There was no significant trend in bronchiolitis deaths over time. For the 6 deaths over the ten years 2008 to 2017, there was no significant difference between male and female mortality rates. All deaths were under two years of age, and four were younger than one year of age. Among the 6 deaths, by total ethnicity, there were two Māori children, three

Pacific children, and one Asian child. No non-MPA children died. One child died in NZDep3-4; the other 5 deaths were all in 8 to 10.

Figure 49. Childhood bronchiolitis mortality numbers 2000-2017.



3.5. CHILDHOOD PNEUMONIA

3.5.1. CHILDHOOD PNEUMONIA HOSPITALISATIONS

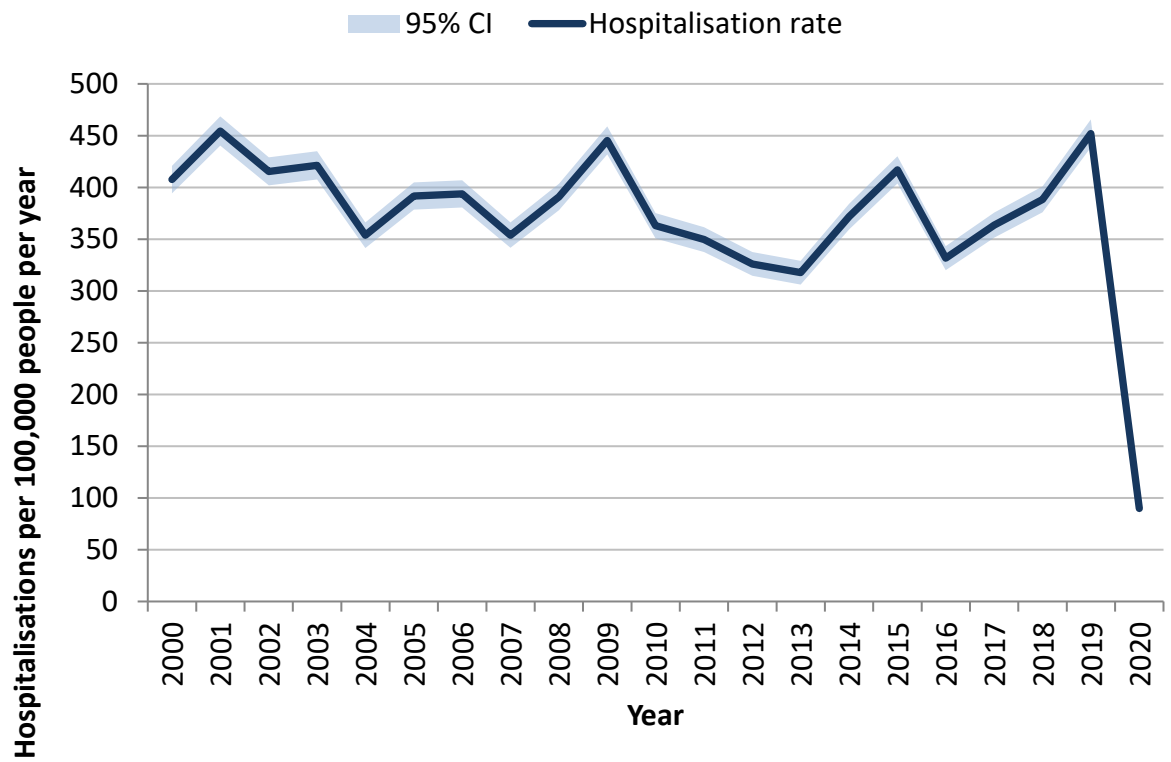
Trends over time 2000 - 2019

While childhood pneumonia hospitalisations declined between 2000 and 2019, by 1.9 hospitalisations per 100,000 children per year, that decline occurred over the period 2000 – 2016, and since then rates have increased: the 2019 rate of 452.1 hospitalisations per 100,000 children per year is now higher than the study period average of 385.4 (Figure 50).

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 53). Of concern, however, is the increase between 2000 and 2019 in childhood pneumonia rates among Asian children. Asian children's childhood pneumonia rates have increased by 58% over the study period, from an average of 217 hospitalisations per 100,000 children per year in 2000 – 2004, to 342 in 2015 – 2019. 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 -2019.

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 56).

Figure 50. Childhood pneumonia hospitalisations per 100,000 people per year, 2000-2020.



(See Table A 1-62 for data)

Risks and determinants 2019

Childhood pneumonia rates were significantly lower in males than females in both age sub-groups (Figure 51).

Pacific children had the highest childhood pneumonia rates, at 960.2 hospitalisations per 100,000 children. This rate was 3.7 times higher than the non-MPA rate of308.4 hospitalisations per 100,000. Rates for Māori children were 1.6 times higher, while rates for Asian children were 1.2 times higher (Figure 52).

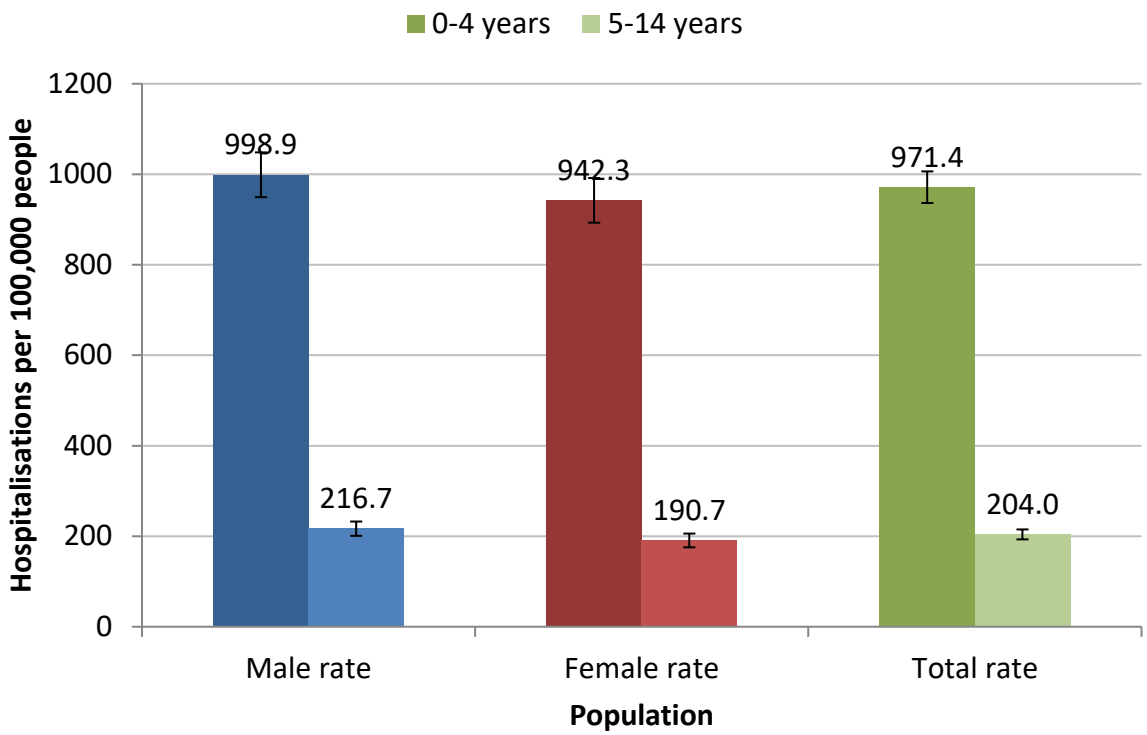
For Māori and Pacific children, these differences were more pronounced for children aged under 5 years (Figure 54).

Childhood pneumonia rates were highest in the most deprived areas, with rates 2.0 times higher in the most deprived NZDep quintile than in the least deprived (Figure 55).

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 NZDep quintile 7-8. There was no socioeconomic gradient for Asian children. There was also a strong socioeconomic gradient in childhood pneumonia for non-MPA (Figure 57).

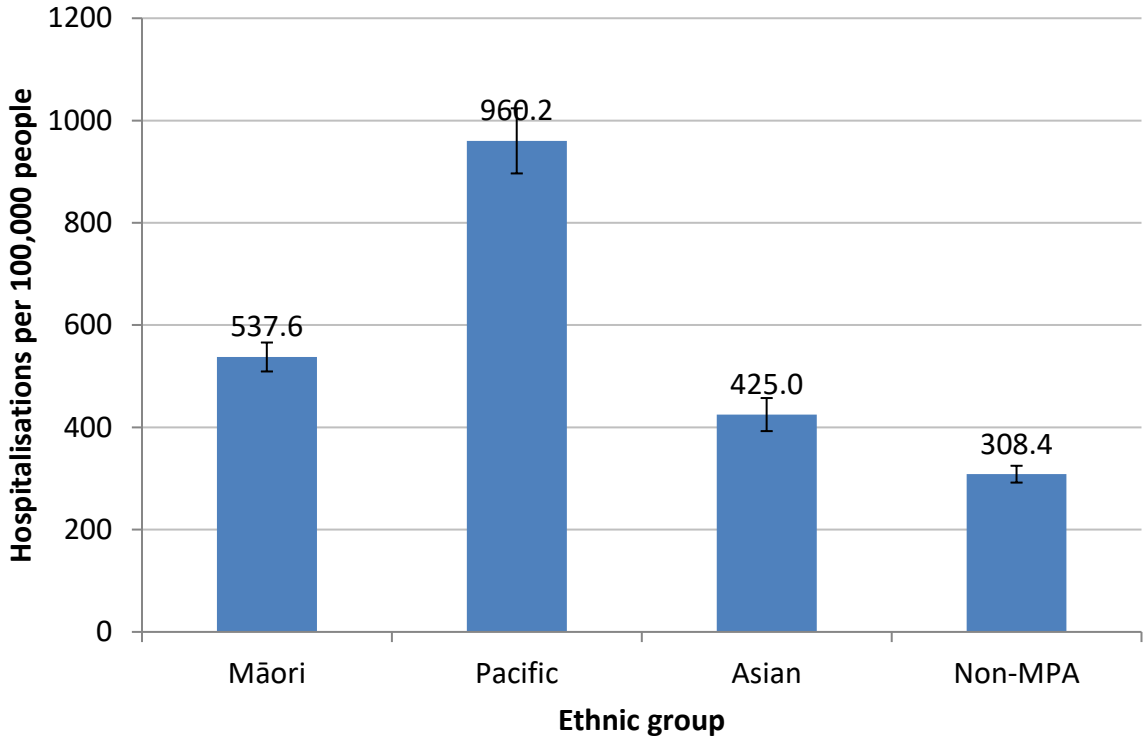
Across DHBs, the highest childhood pneumonia rates were in Northland, Hutt, and Auckland. Rates were lowest in South Canterbury, MidCentral, and Nelson Marlborough, (Figure 58).

Figure 51. Childhood pneumonia hospitalisations per 100,000 people by age group and sex, 2019.



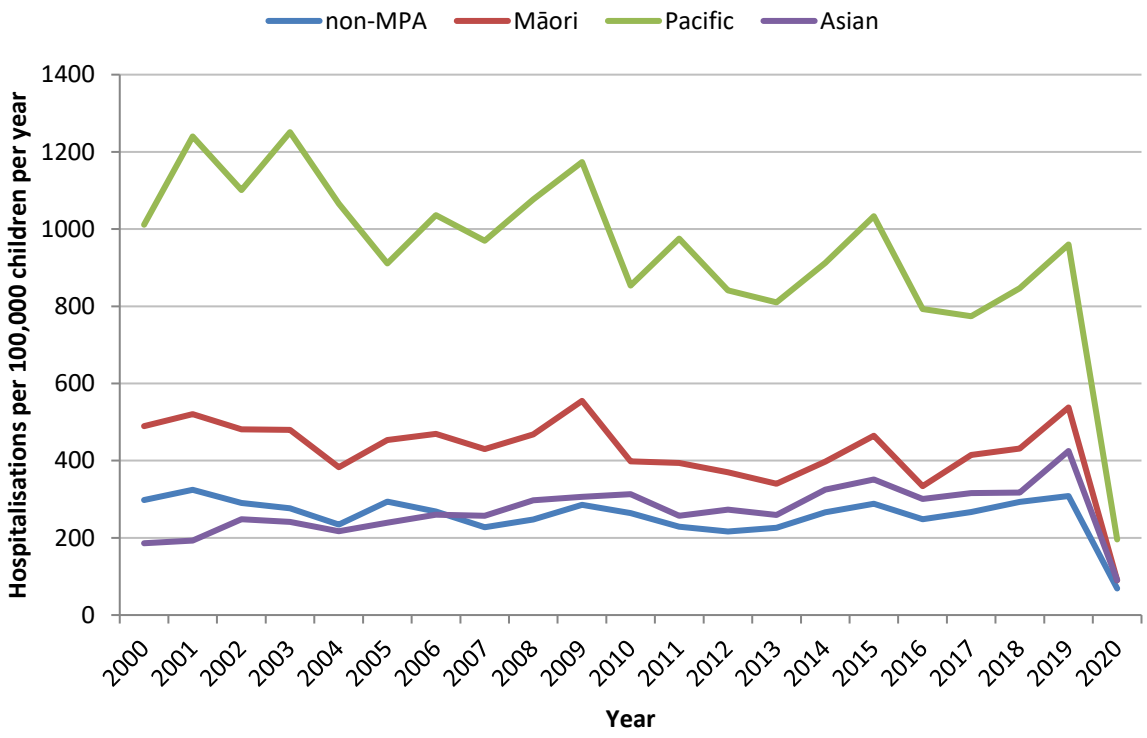
(See Table A 1-63 and Table A 1-64 for data)

Figure 52. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2019, age-adjusted.



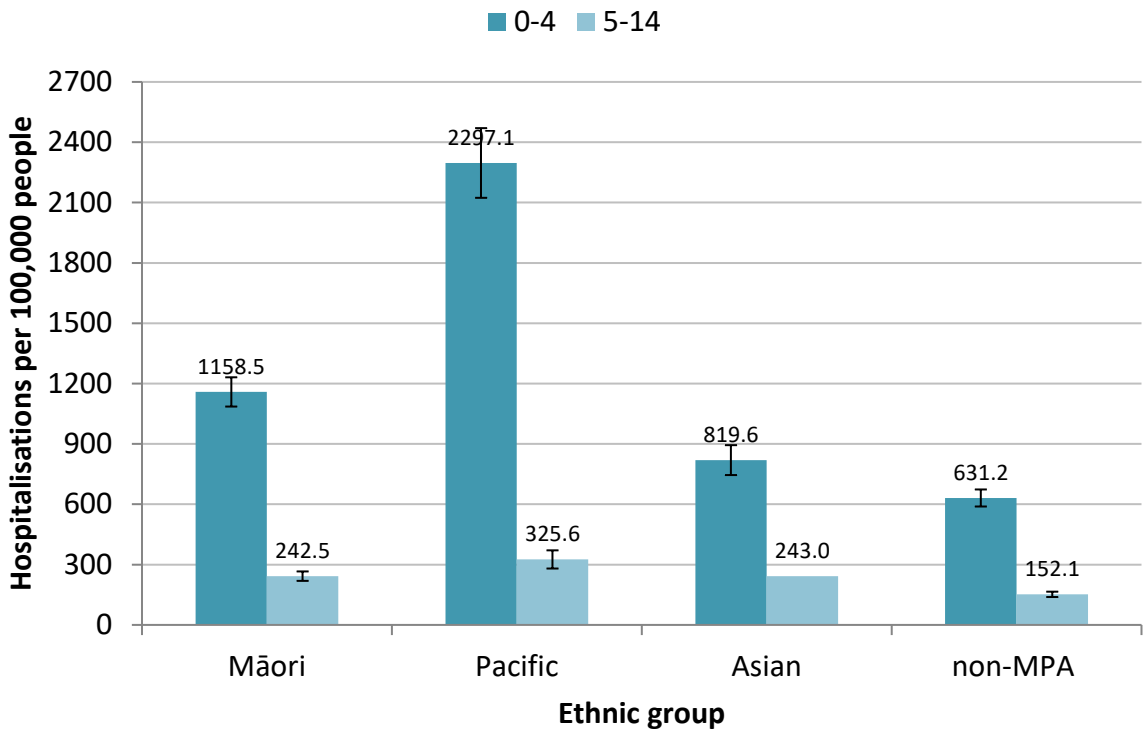
(See Table A 1-65 for data)

Figure 53. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2000 – 2020, age-adjusted.



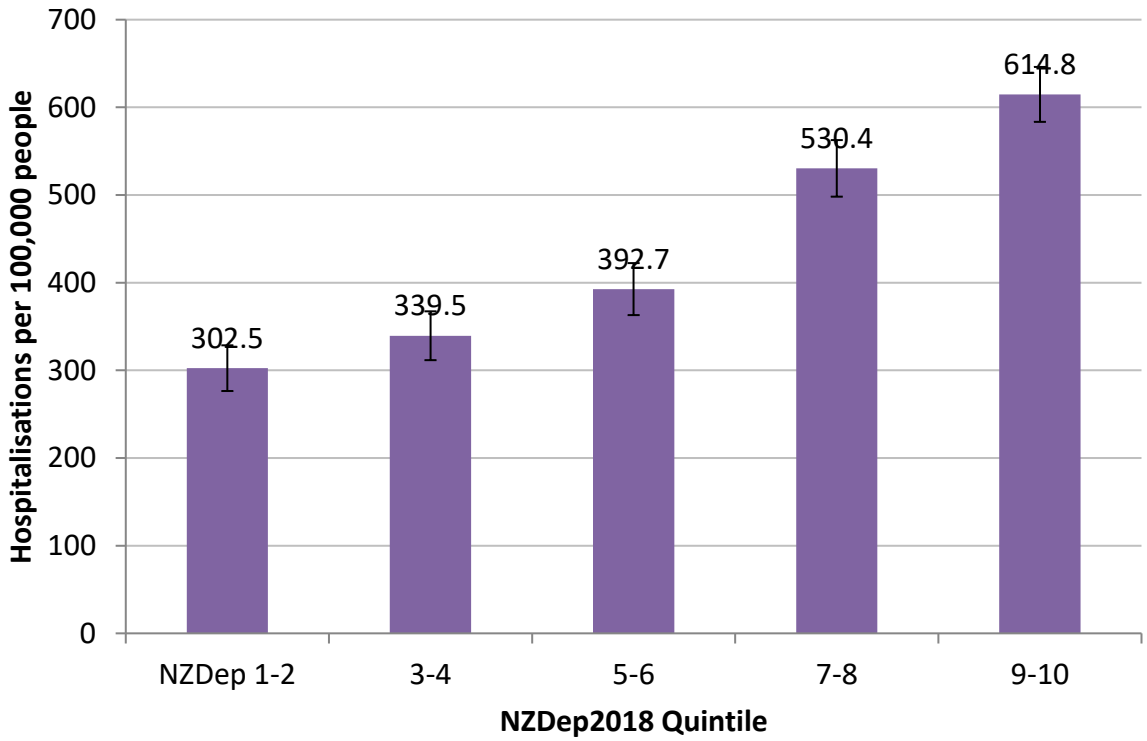
See Table A 1-66 and Table A 1-67 for data.

Figure 54. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and age group, 2019.



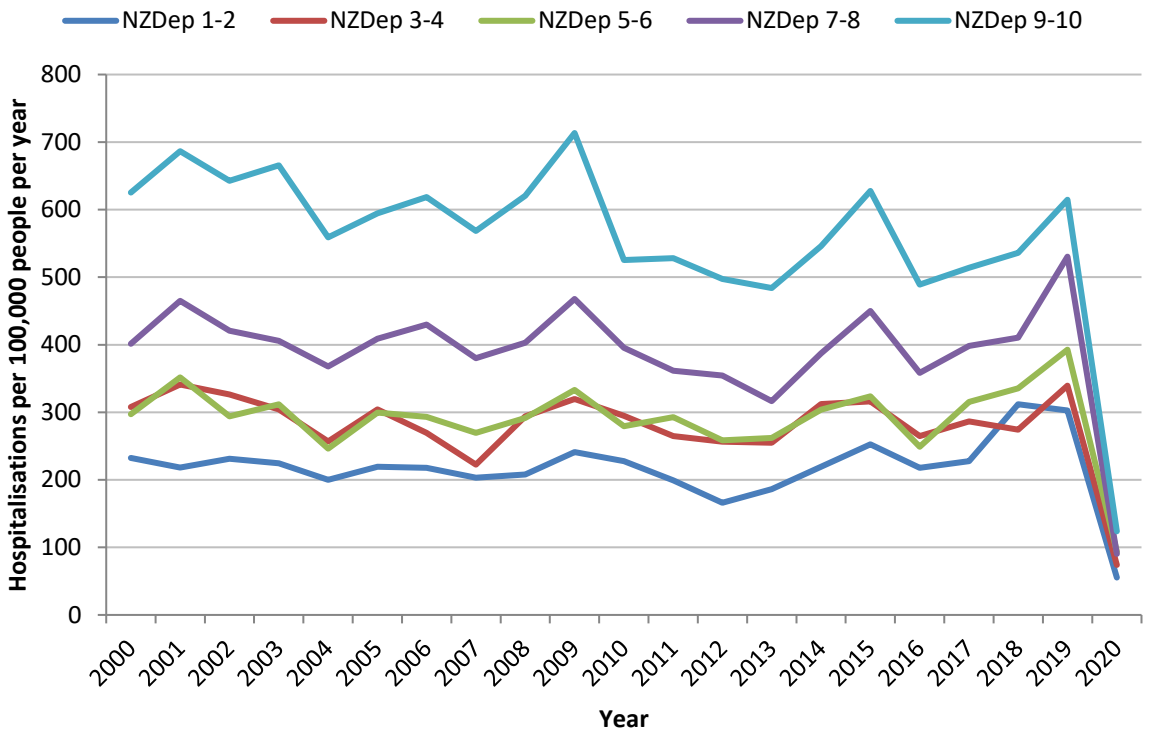
(See Table A 1-68 for data)

Figure 55. Childhood pneumonia hospitalisations per 100,000 people by NZDep2018 quintile, 2019, age-adjusted.



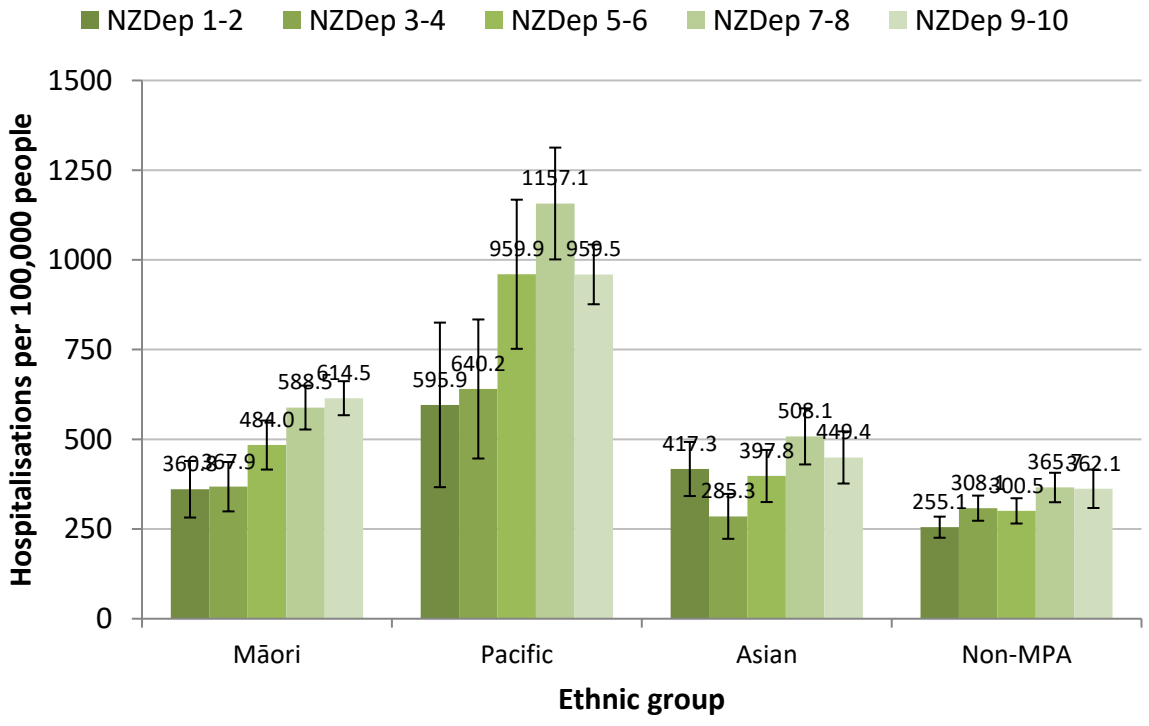
(See Table A 1-69 for data)

Figure 56. Childhood pneumonia hospitalisations per 100,000 people by NZDep2018 quintile, 2000 - 2020, age-adjusted.



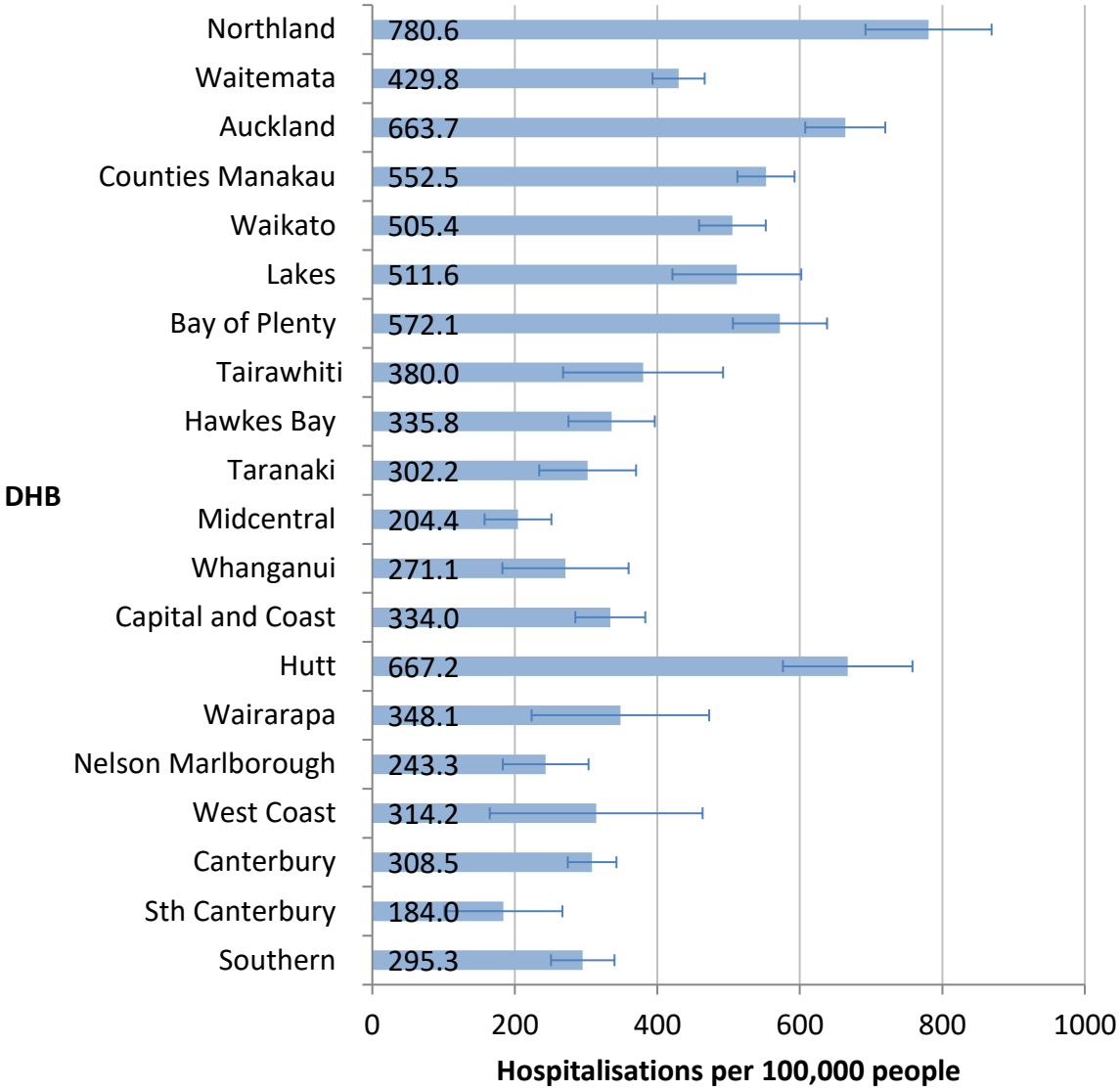
See Table A 1-70 and Table A 1-71 for data.

Figure 57. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and NZDep2018, 2019, age-adjusted.



(See Table A 1-72 for data)

Figure 58. Childhood pneumonia hospitalisations per 100,000 people by DHB, 2019.



(see Table A 1-73 for data)

3.5.2. CHILDHOOD PNEUMONIA MORTALITY

Trends over time 2000 - 2017

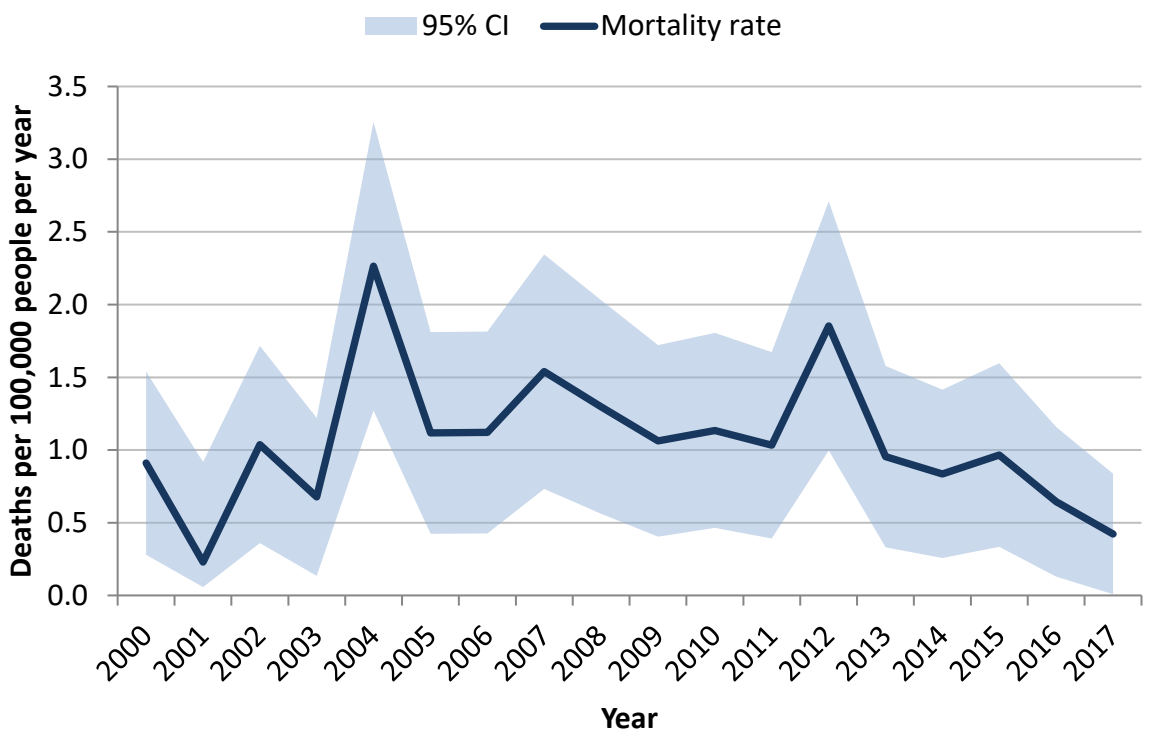
Mortality from childhood pneumonia showed no significant trend over the study period (Figure 59).

Risks and determinants 2008 - 2017

Pneumonia mortality rates were higher in boys than girls for children aged under 5 years, but did not differ significantly by sex in the 5 to 14 years age group (Figure 60).

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 1.7 and 2.5 deaths respectively per 100,000 people per year, making rates 3.3 times higher for Māori and 4.8 times higher for Pacific peoples (Figure 61). In absolute numbers, this meant that across the 122 deaths between 2008 and 2017, 44 deaths were Māori, 23 Pacific, 5 Asian, and 25 non-MPA. These differences improved for Māori and Pacific children from the previous report.

Figure 59. Childhood pneumonia mortality rates 2000-2017, age-adjusted.



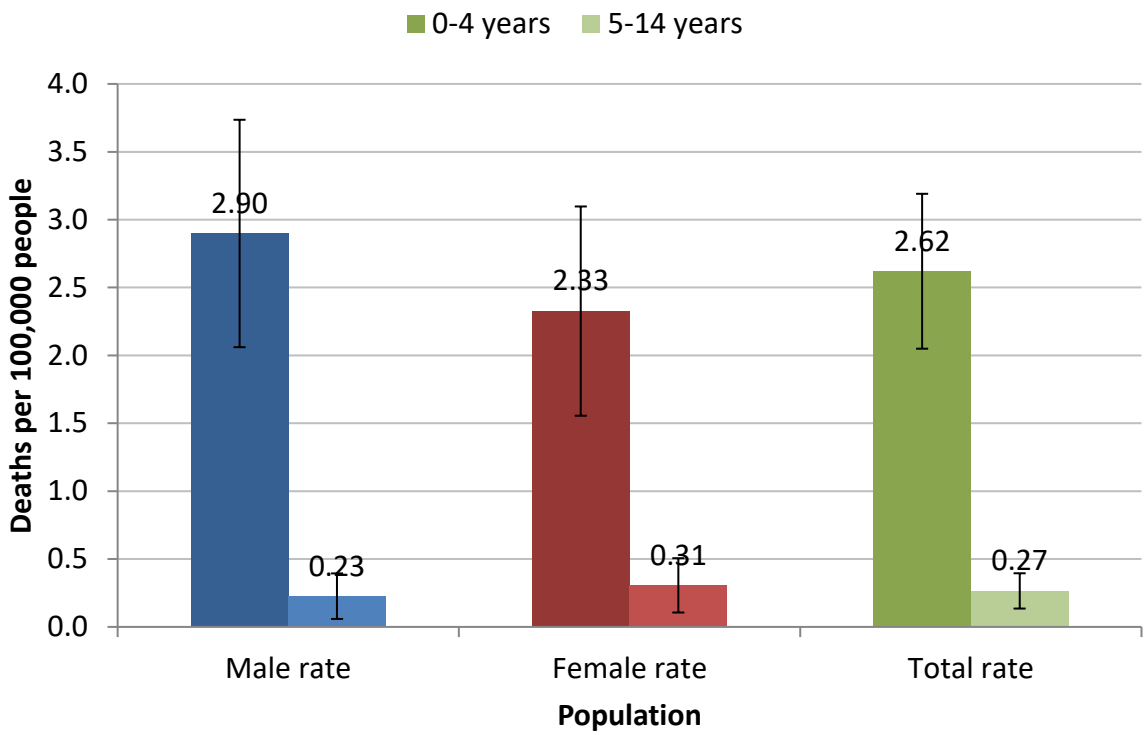
(See Table A 1-74 for data)

N.B. Confidence intervals are wide. The lows in 2001 and 2017 are significantly different from the peaks in 2004 and 2012, but other years are not significantly different from each other

Socio-economic inequalities were even more marked. In the previous 2006-2015 study period, there was a clear trend of higher mortality with increasing deprivation. Well over half (56) of all 97 deaths were in the most deprived quintile (Figure 62), for whom the mortality rate was 9.2 times higher than in the least deprived quintile. This difference has not improved since the last report.

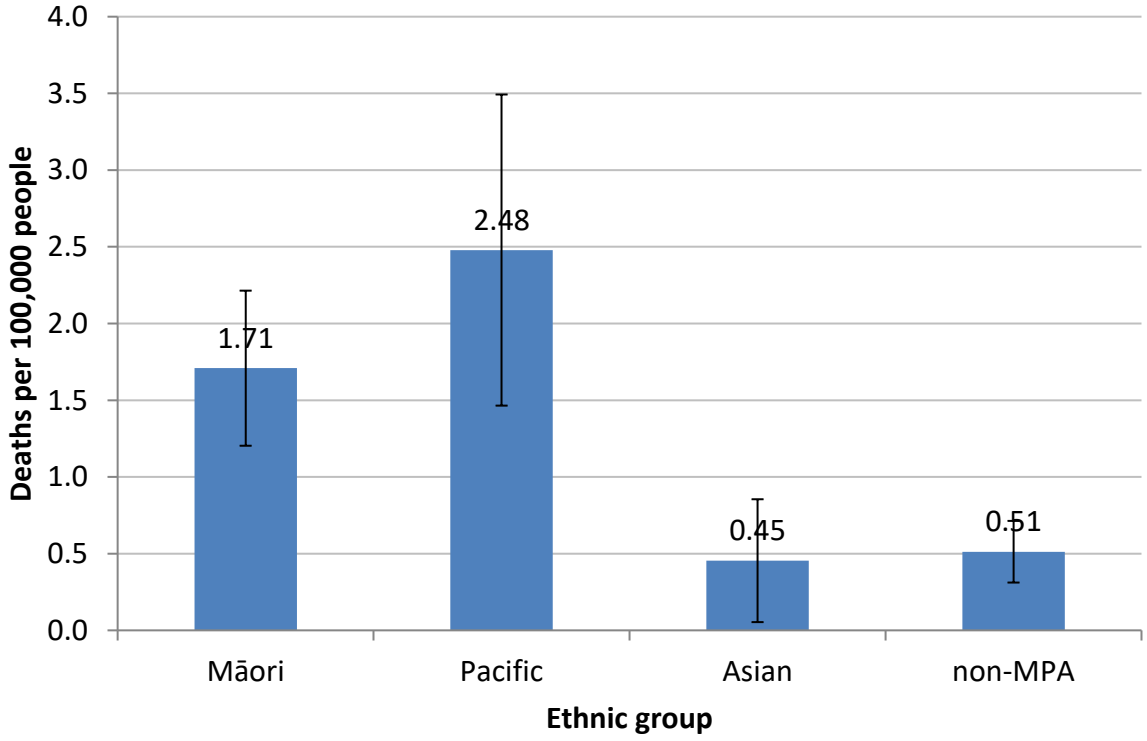
Childhood pneumonia mortality rates were highest, and significantly higher than the national average, in Northland, Waikato, Counties Manukau, and Bay of Plenty DHBs. There were four DHBs (Tairawhiti, Wairarapa, Nelson Marlborough and South Canterbury) with no childhood pneumonia deaths, and two other DHBs (Canterbury, Waitemata) where rates were significantly below the national average (Figure 63).

Figure 60. Childhood pneumonia deaths per 100,000 people by age group and sex, 2008-2017.



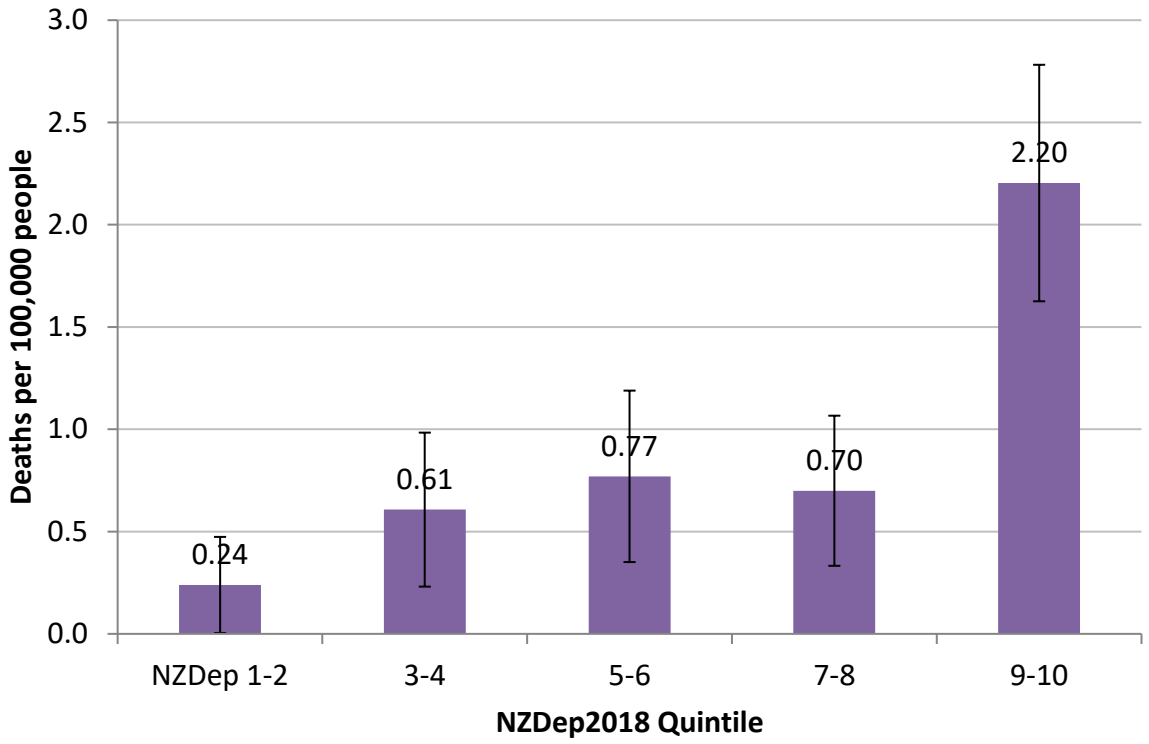
(See Table A 1-75 and Table A 1-76 for data)

Figure 61. Childhood pneumonia mortality per 100,000 people per year by ethnic group, 2008-2017.



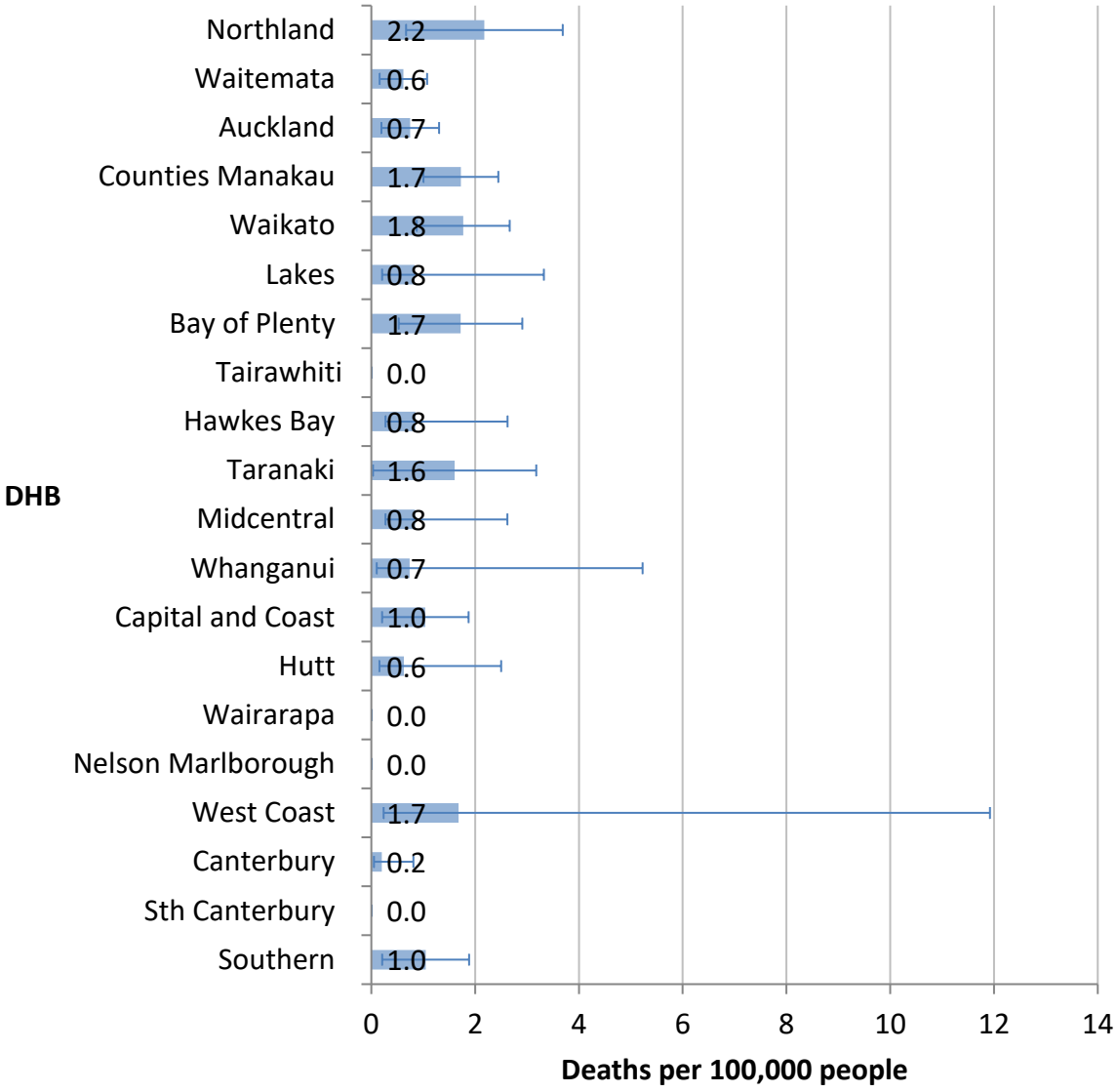
(See Table A 1-77 for data)

Figure 62. Childhood pneumonia deaths per 100,000 people by NZDep2018 quintile, 2008-2017, age-adjusted.



(See Table A 1-78 for data)

Figure 63. Childhood pneumonia deaths per 100,000 people per year, by DHB, 2008-2017, age-adjusted



(see Table A 1-79 for data)

3.6. COPD IN OLDER ADULTS (45+ YEARS)

3.6.1. 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%[36 37]. 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.[38]

Stokes et al found 2016 prevalence of COPD among Dunedin enrolled patients aged 35 years and older to be 3.7% for Māori and 4.3% for Pacific patients.[39]

A 2019 study of Australian and New Zealand COPD exacerbations found an acute exacerbated COPD ICU admission rate of 100 – 150 per million people per year, but the data were not disaggregated by country.[40]

We estimated the 31 December 2019 prevalence of severe COPD by identifying people who had been hospitalised with COPD as a primary or secondary diagnosis between 2000 and 2019 inclusive, and excluding those deceased before 31 December 2019. This method identified 48,459 New Zealanders living with COPD on 31 December 2019, giving a total population prevalence of 0.97%. Age-standardised population prevalence was highest for Māori, at 2.50%, followed by Pacific peoples, at 2.44%, and trailed by non-MPA and Asian peoples at 0.83% and 0.35% respectively. Age-standardised prevalence was 5.8% higher for women (1.00% prevalence) than men (0.95% prevalence). 91% of people with COPD in 2019 were aged 45 and over, making the population prevalence of post-2000 hospitalised COPD 2.2% in people aged 45 and over.

The average age of Māori with COPD was 61.3 years, compared with 62.6 for Pacific peoples, 65.7 for Asian peoples, and 70.7 for non-MPA.

It is important to note that this measure includes only those hospitalised for COPD since 2000, and could not include those who have been able to effectively manage their COPD in the community and primary care. Note also that figures are not comparable with the previous report, which was able to include diagnoses since 1988 rather than 2000. However, it is included here to provide an ongoing reference, bearing in mind that the 2.0% prevalence in adults aged 40 and over represented 13.7% of the 2003/4 GOLD-defined prevalence, though the 2.2% prevalence in adults aged 45 and over reported here was close to the 2.3% found in the 2014 primary care cohort. However, the hospitalised COPD prevalences of 2.50% and 2.44% for Māori and Pacific peoples were substantially less than the Dunedin primary care prevalences of 3.7% and 4.3% found by Stokes et al.[39]

3.6.2. ADULT 45+ YEARS COPD INCIDENCE

We estimated the 2019 incidence of severe COPD by identifying COPD hospital admissions in 2019 where the patient had not previously been hospitalised with COPD (since 2000, the start of data availability). There were 6,644 new cases of COPD in 2019, a total incidence rate of 133.4 per 100,000 people. Rates were highest for Māori, at 356.6 per 100,000, followed by Pacific at 225.3, and lower for non-MPA, at 114.8, and Asian peoples, at 39.6. There was also a strong socioeconomic gradient, with 3.5 times higher incidence in NZDep 9-10 than in NZDep 1-2. Average age of onset was 69.3 years, and was earliest for Pacific

peoples and Māori, at 61.2 and 61.8 years respectively, followed by Asian, at 65.4 years, and latest for non-MPA, at 72.6 years.

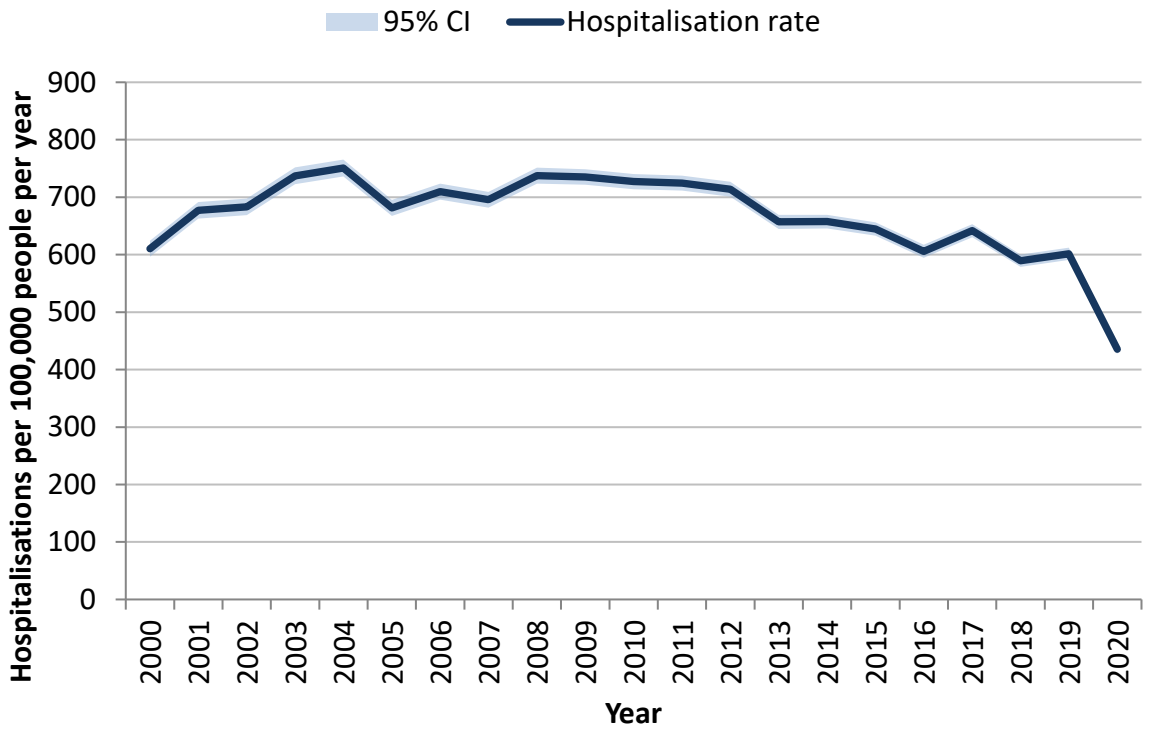
3.6.3. ADULT 45+ YEARS COPD HOSPITALISATIONS

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 2019 bronchiectasis hospitalisations in adults aged 45 years and over were in fact misdiagnosed COPD, it would increase COPD rates by about 54 hospitalisations per 100,000 people per year, about 9.0% 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 - 2020

2016 COPD hospitalisation rates dipped below the 2000 rate for the first time in the study period (Figure 64). While 2017 rates were a little higher 2018 and 2019 were again below 2000, suggesting ongoing declines since a higher rates period between 2001 to 2012. Ethnic and socio-economic disparities in COPD hospitalisation rates widened between 2000 and 2019 (Figure 67 and Figure 70).

Figure 64. COPD hospitalisations in adults aged 45+, per 100,000 people per year, 2000-2020, age-adjusted.



(See Table A 1-80 for data)

Risks and determinants 2019

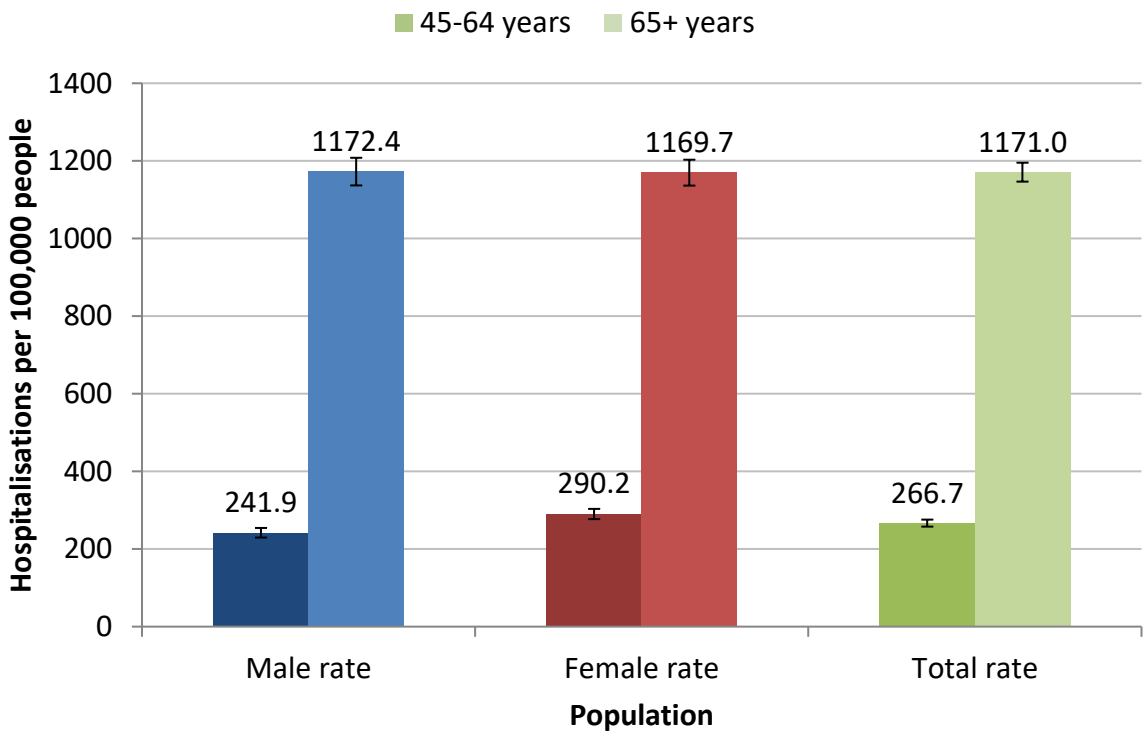
COPD hospitalisation rates were higher for women than men in the 45 to 64 year age group (rate ratio 1.20), but there was no difference in the 65+ age group (rate ratio 1.00) (Figure 65).

COPD rates were highest for Māori, at 3.71 times the non-MPA rate, and Pacific peoples (rate ratio 2.62), and lowest for Asian peoples (rate ratio 0.27) (Figure 66).

There was a strong deprivation gradient, with COPD rates 4.89 times higher in the most deprived NZDep quintile than in the least deprived (Figure 69). The gradient was present across all ethnic groups (Figure 71).

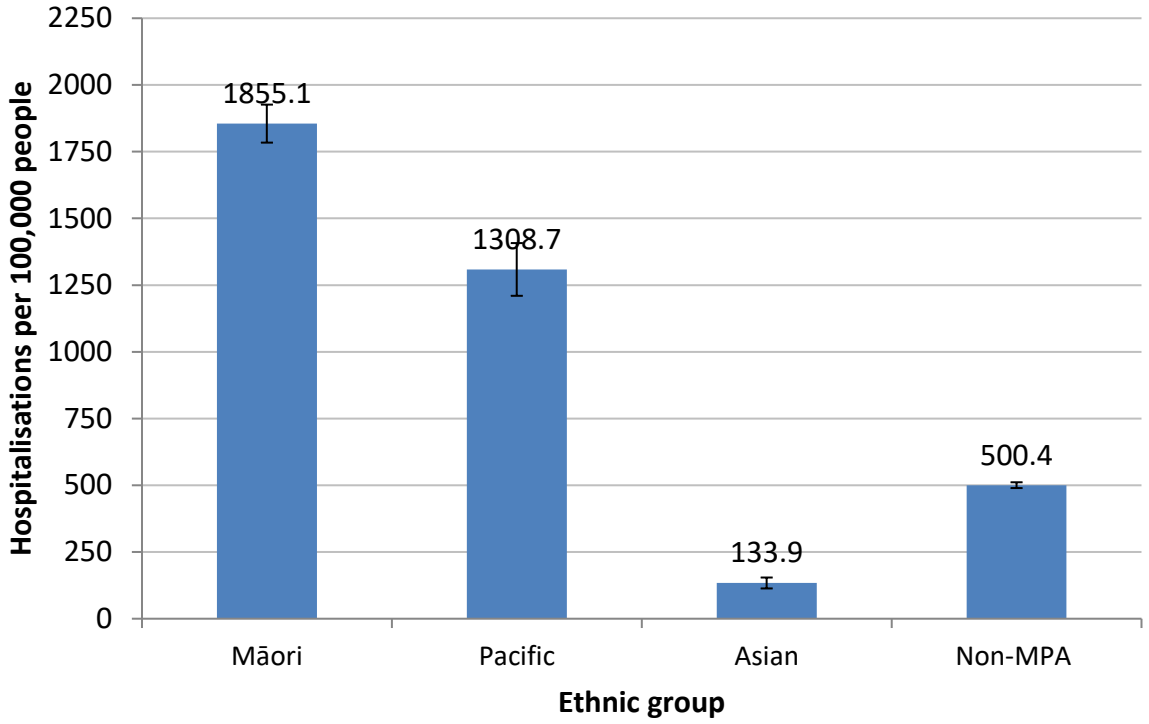
COPD hospitalisation rates were highest in West Coast and Whanganui, and lowest in Nelson Marlborough (Figure 72).

Figure 65. COPD hospitalisations in adults aged 45+, per 100,000 people, by age group and sex, 2019.



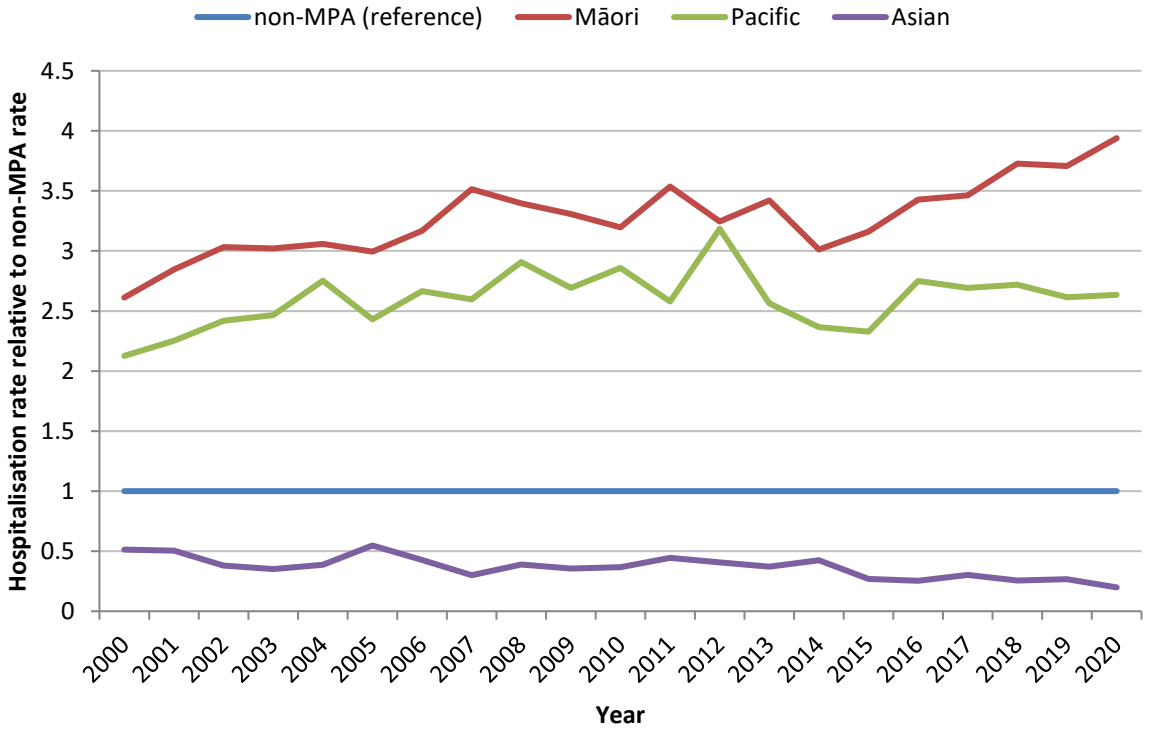
(See Table A 1-81 and Table A 1-82 for data)

Figure 66. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group, 2019, age-adjusted.



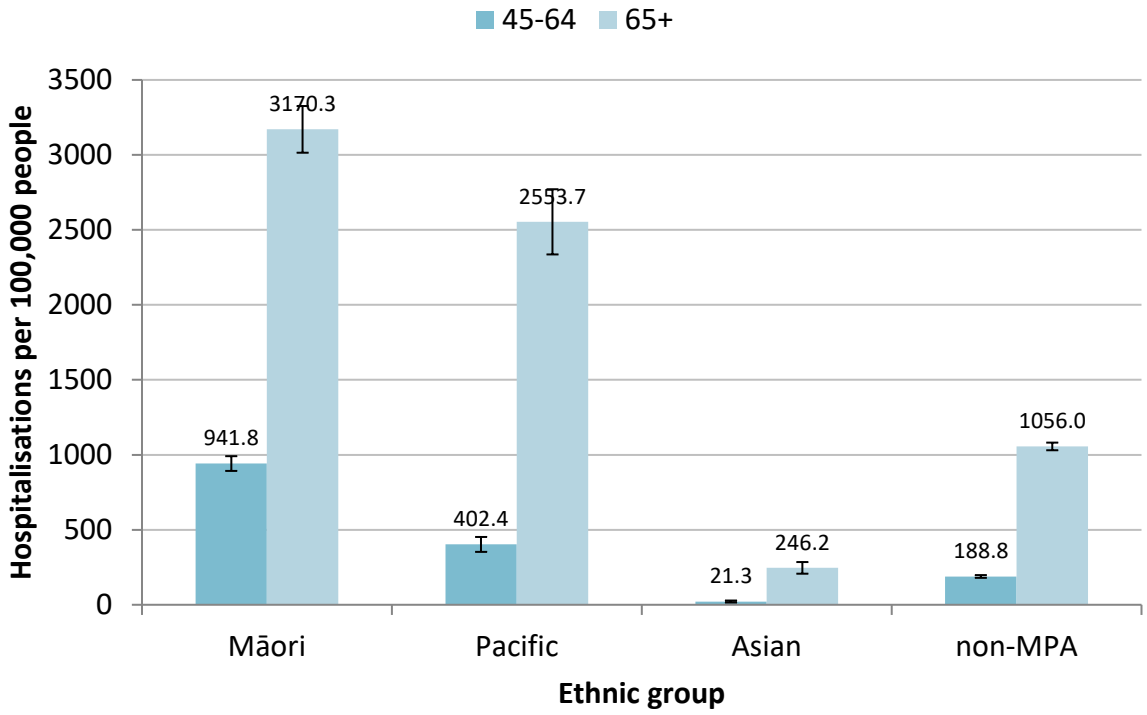
(See Table A 1-83 for data)

Figure 67. COPD hospitalisation rate in adults aged 45, by ethnic group, relative to non-MPA reference rate, 2000 - 2020, age-adjusted.



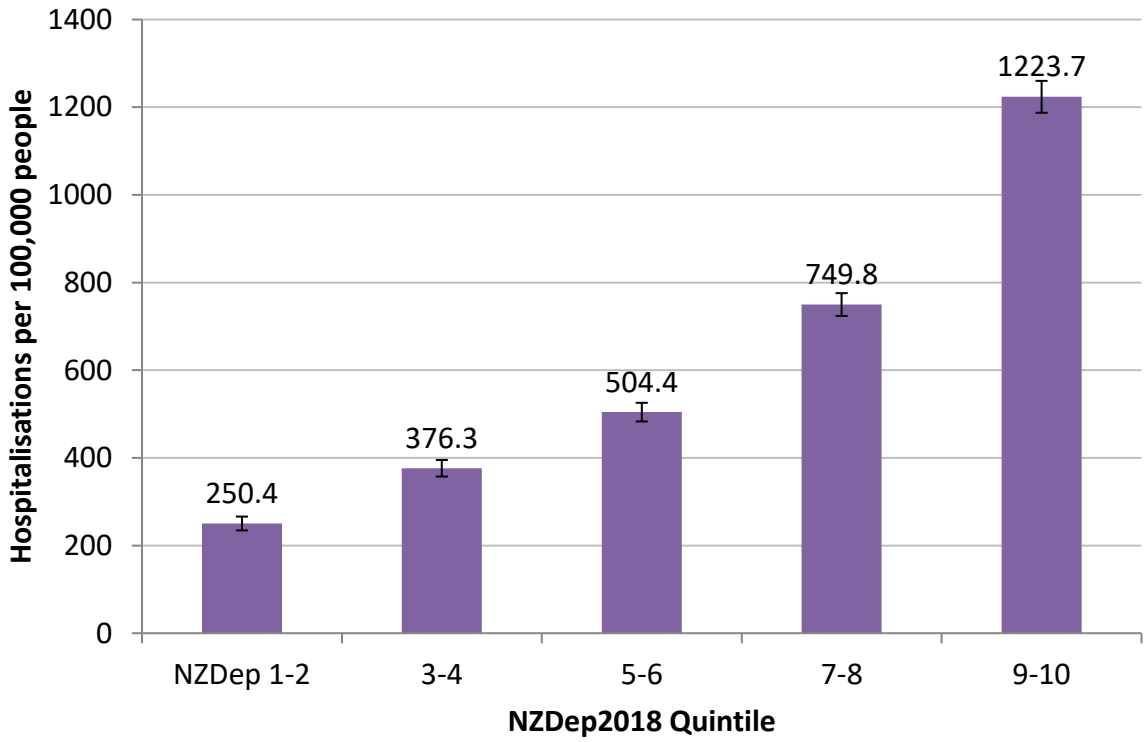
See Table A 1-84 and Table A 1-85 for data.

Figure 68. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and age group, 2019.



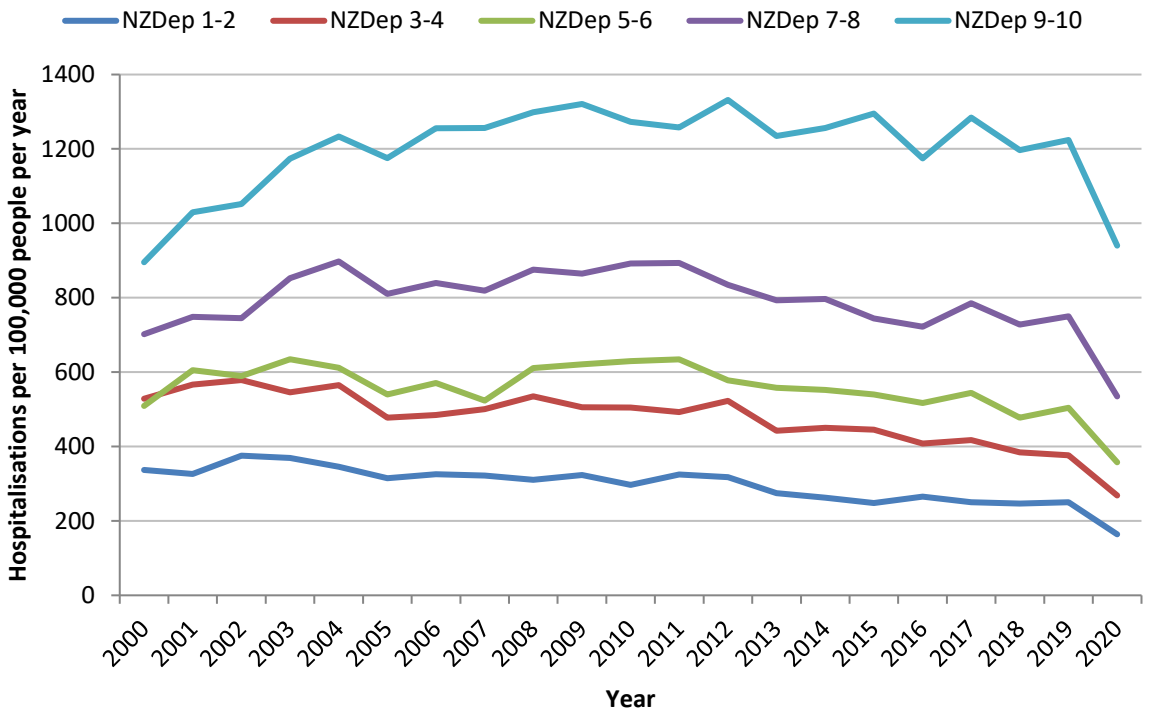
(See Table A 1-86 for data)

Figure 69. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2018 quintile, 2019, age-adjusted.



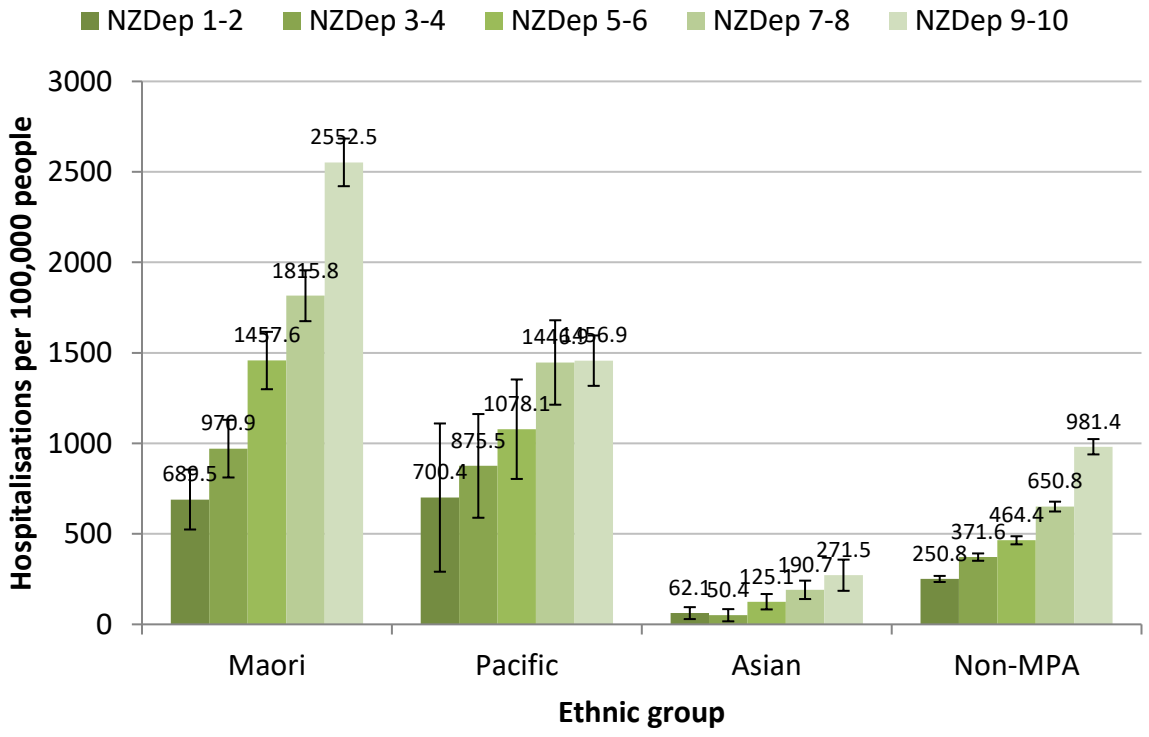
(See Table A 1-87 for data)

Figure 70. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2018 quintile, 2000 - 2020, age-adjusted.



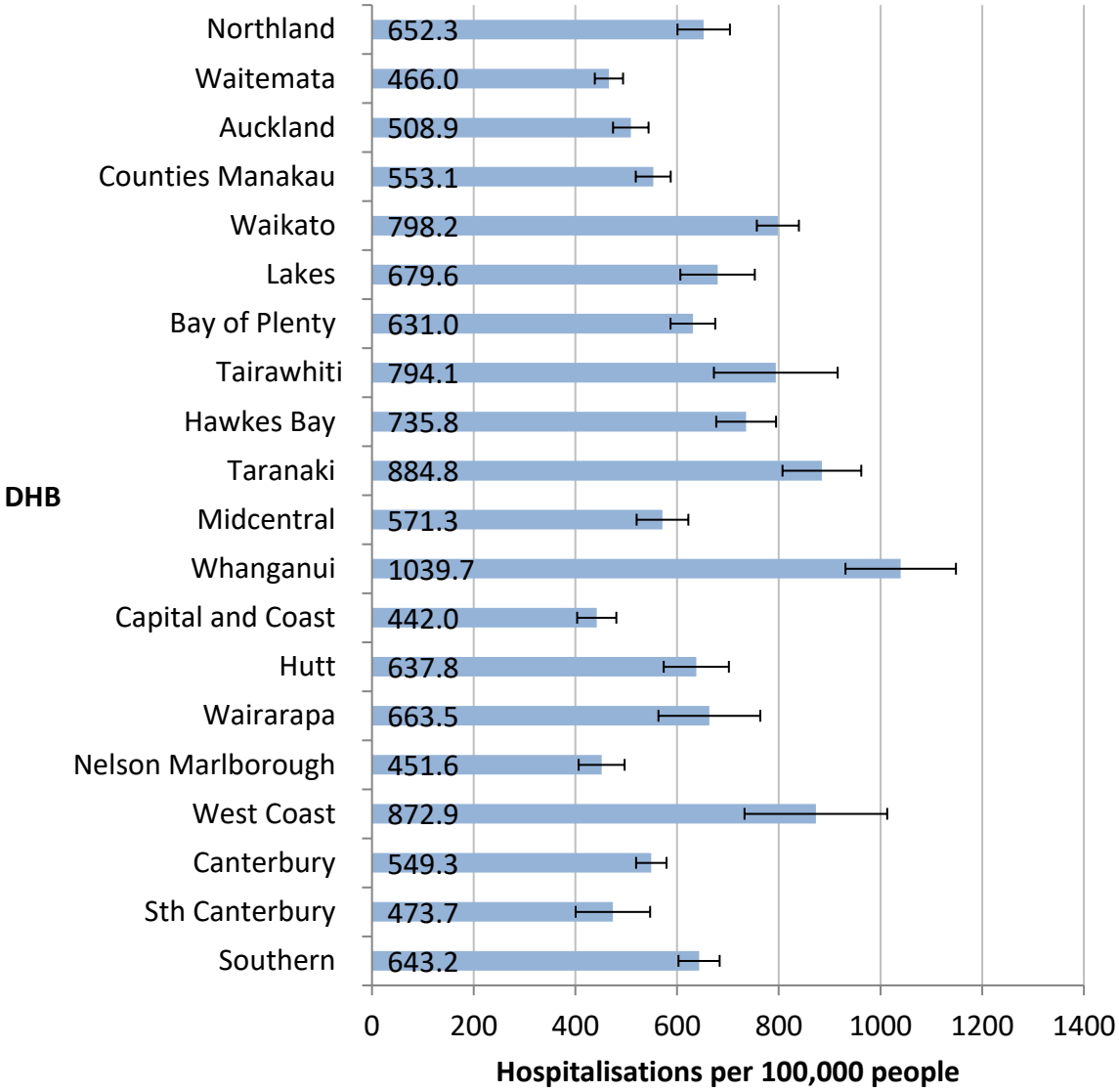
(See Table A 1-88 and Table A 1-89 for data)

Figure 71. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and NZDep2018, 2019, age-adjusted.



(See Table A 1-90 for data)

Figure 72. COPD hospitalisations in adults aged 45+, per 100,000 people, by DHB, 2019.



(see Table A 1-91 for data)

3.6.4. ADULT 45+ YEARS COPD MORTALITY

Trends over time 2000 - 2017

Mortality due to COPD declined over the study period, from an age-adjusted 116.4 deaths per 100,000 in 2000, to 84.7 deaths per 100,000 in 2017. This represented a decline of 2.70 deaths per 100,000 people per year.

Risks and determinants 2017

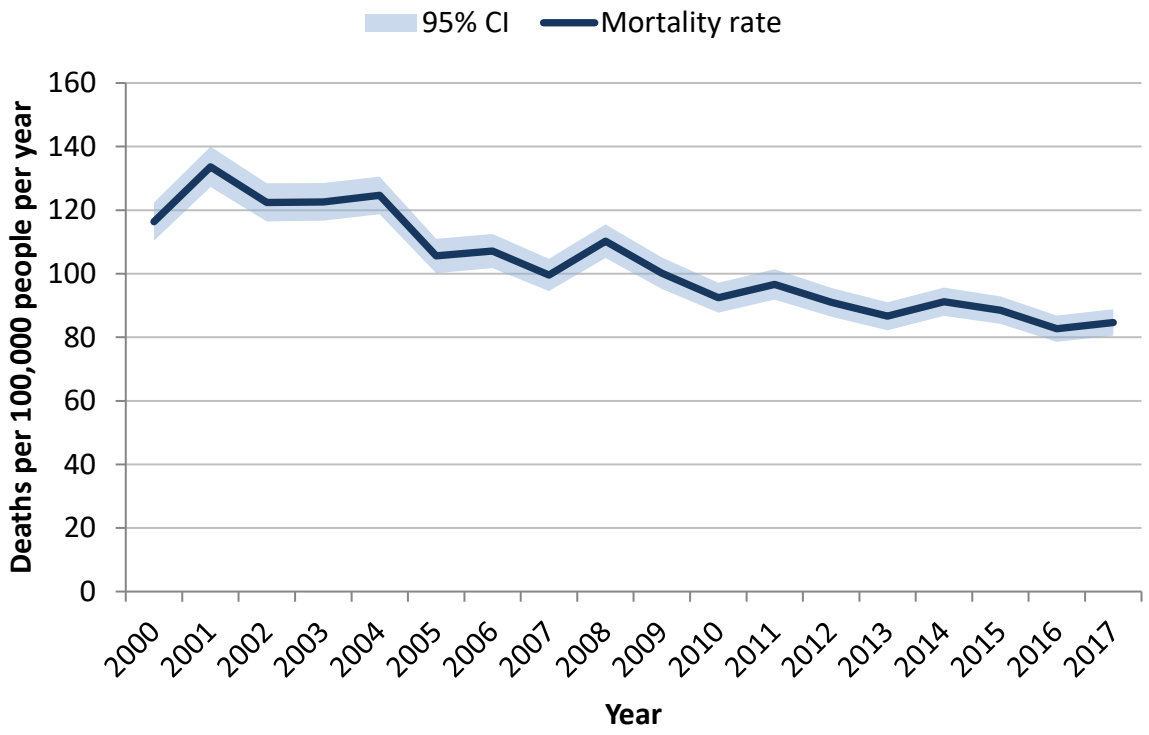
COPD mortality rates were similar for higher for men than for women in the 45-64 years age group (rate ratio 1.30), but higher in women than in men in the 65+ years age group (rate ratio 0.86) (Figure 74).

COPD mortality rates were highest in Māori, whose rate of 186.4 deaths per 100,000 people per year was 2.32 (95% CI 2.07-2.42) times higher than the 80.3 rate for non-MPA. Pacific rates were 1.47 times higher than non-MPA. However, the COPD mortality rate for Asian peoples was just under a quarter of that of non-MPA (Figure 75). These patterns were exaggerated in the younger 45-64 year age group (Figure 76).

COPD mortality rates also increased with increasing socio-economic deprivation, with deaths in NZDep2018 quintile 9-10 occurring at 2.61 times the rate in quintile 1-2 (Figure 77). Increasing COPD mortality with increasing deprivation was significant for Māori and non-MPA, but not significant for Pacific or Asian peoples (Figure 78).

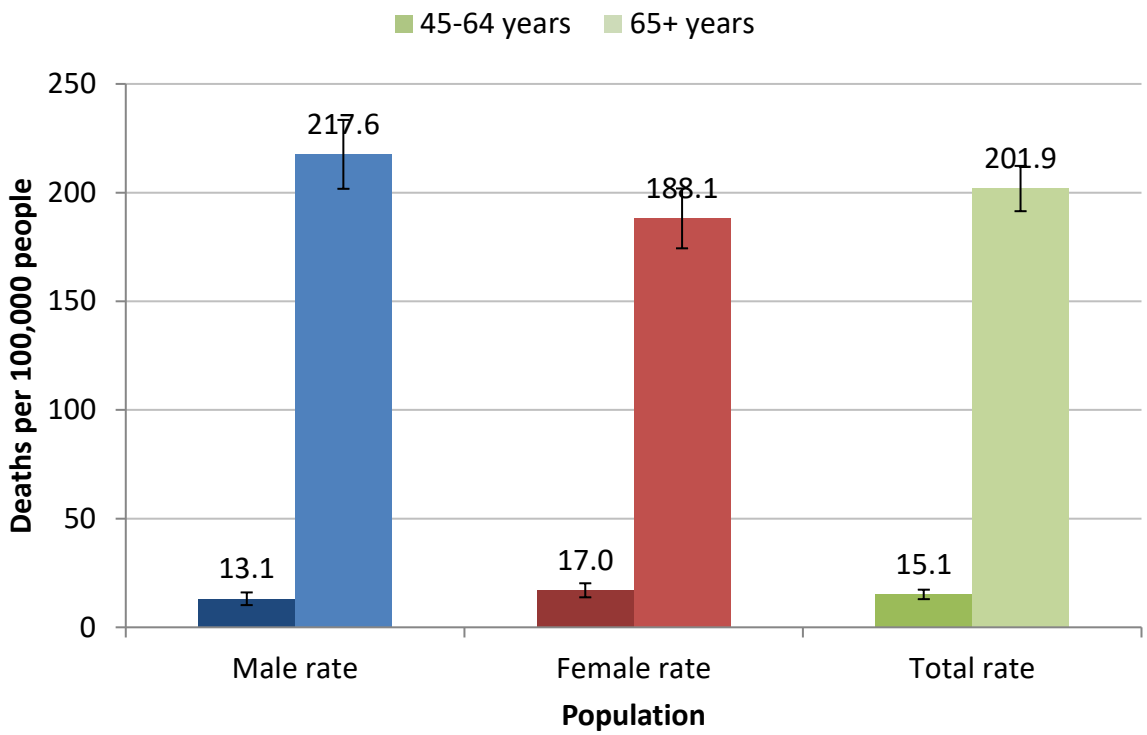
Adult COPD mortality rates for 2017 were highest in Taranaki, Whanganui, and Lakes DHBs; and lowest in Capital and Coast, and Auckland.

Figure 73. Adult COPD mortality rates 2000-2017, age-adjusted.



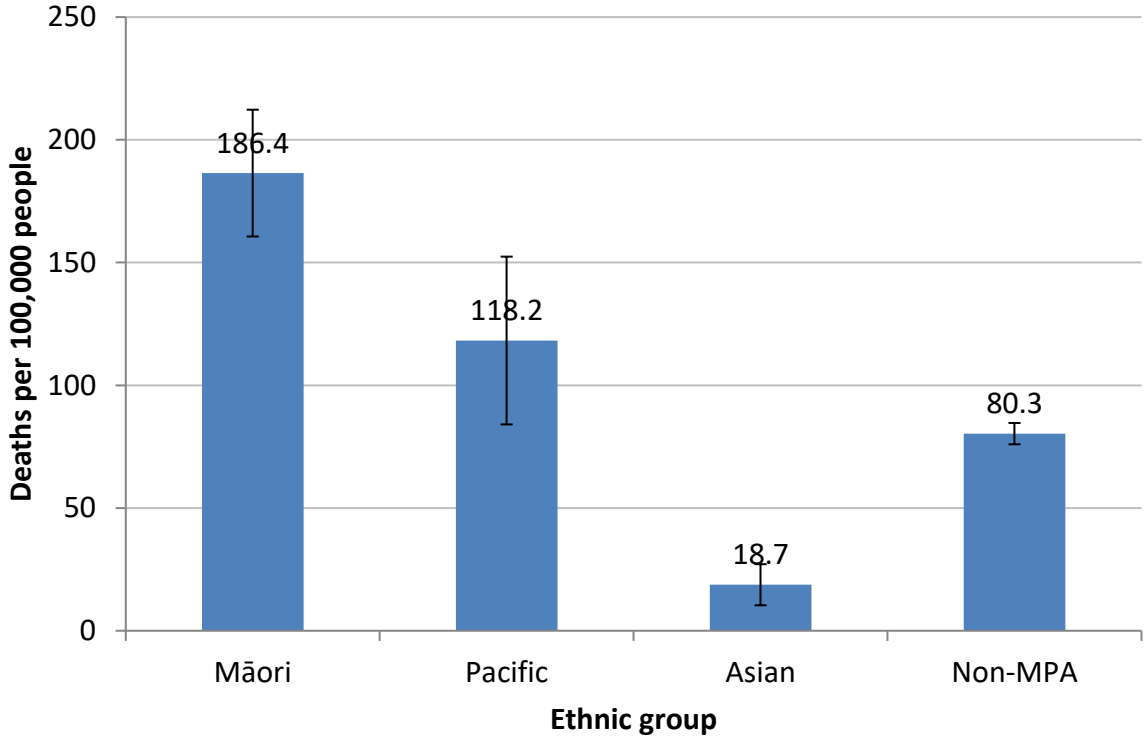
(See Table A 1-92 for data)

Figure 74. Adult COPD deaths per 100,000 people by age group and sex, 2017.



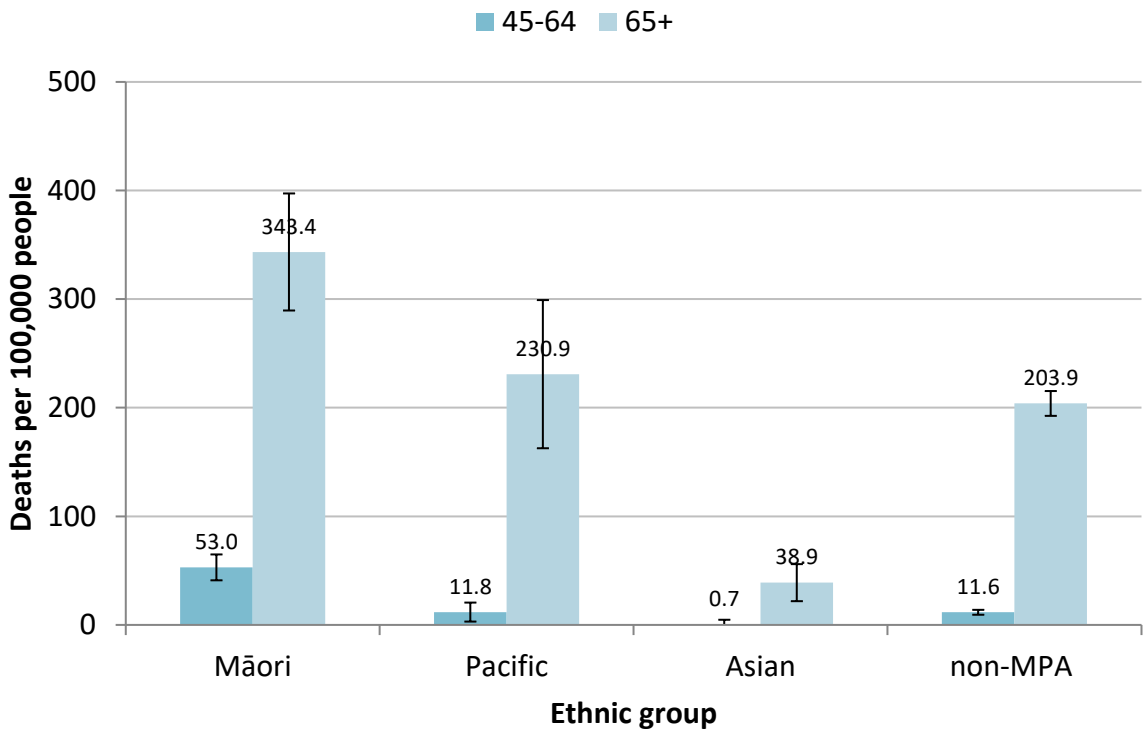
(See Table A 1-93 and Table A 1-94 for data)

Figure 75. Adult COPD mortality per 100,000 people per year by ethnic group, 2017.



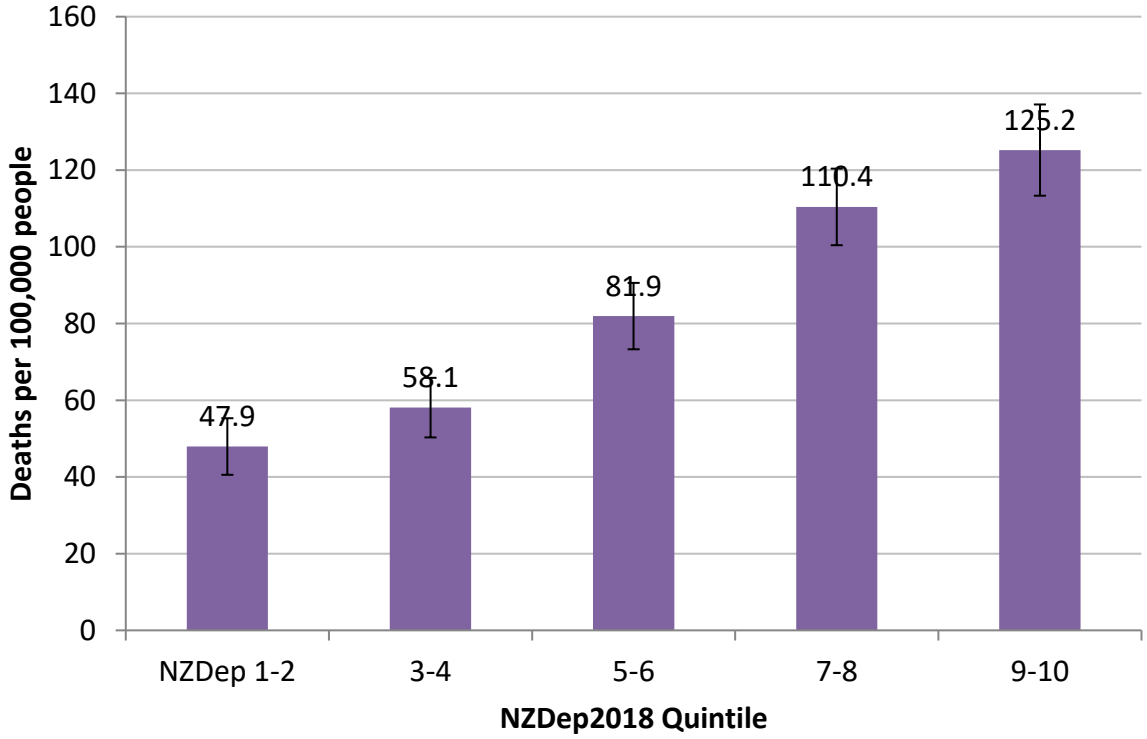
(See Table A 1-95 for data)

Figure 76. Adult COPD deaths per 100,000 people per year, by ethnic group and age group, 2017.



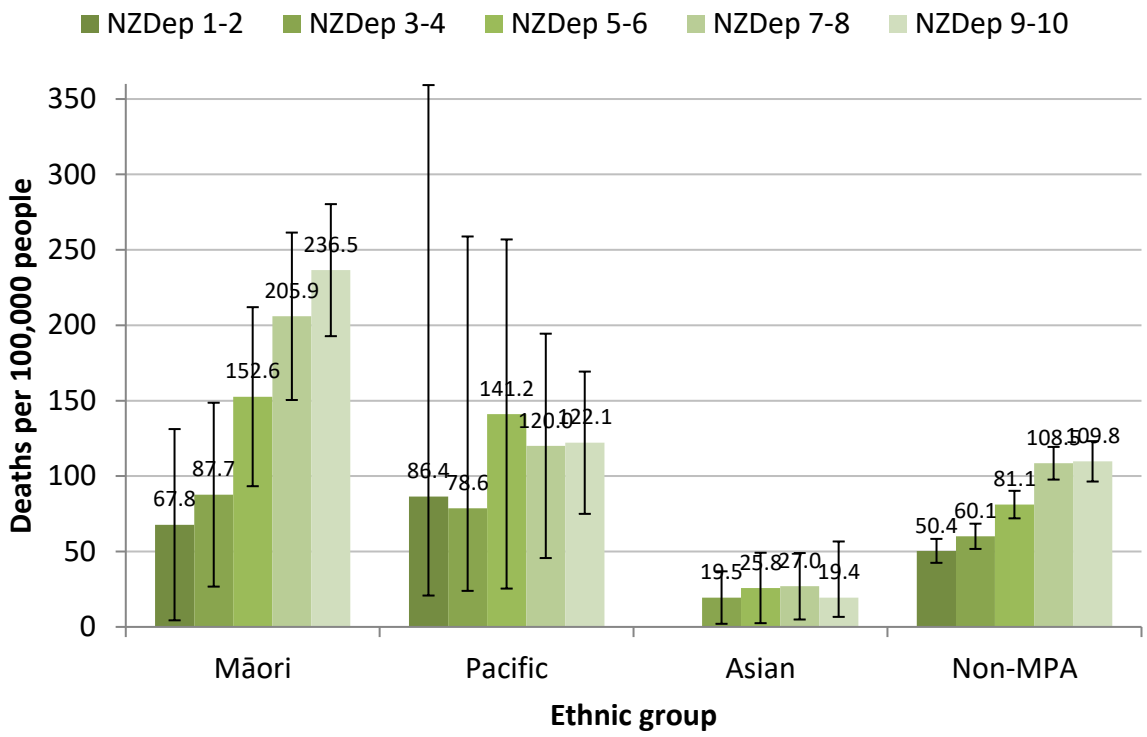
(See Table A 1-96 for data).

Figure 77. Adult COPD deaths per 100,000 people by NZDep2018 quintile, 2017, age-adjusted.



(See Table A 1-97 for data)

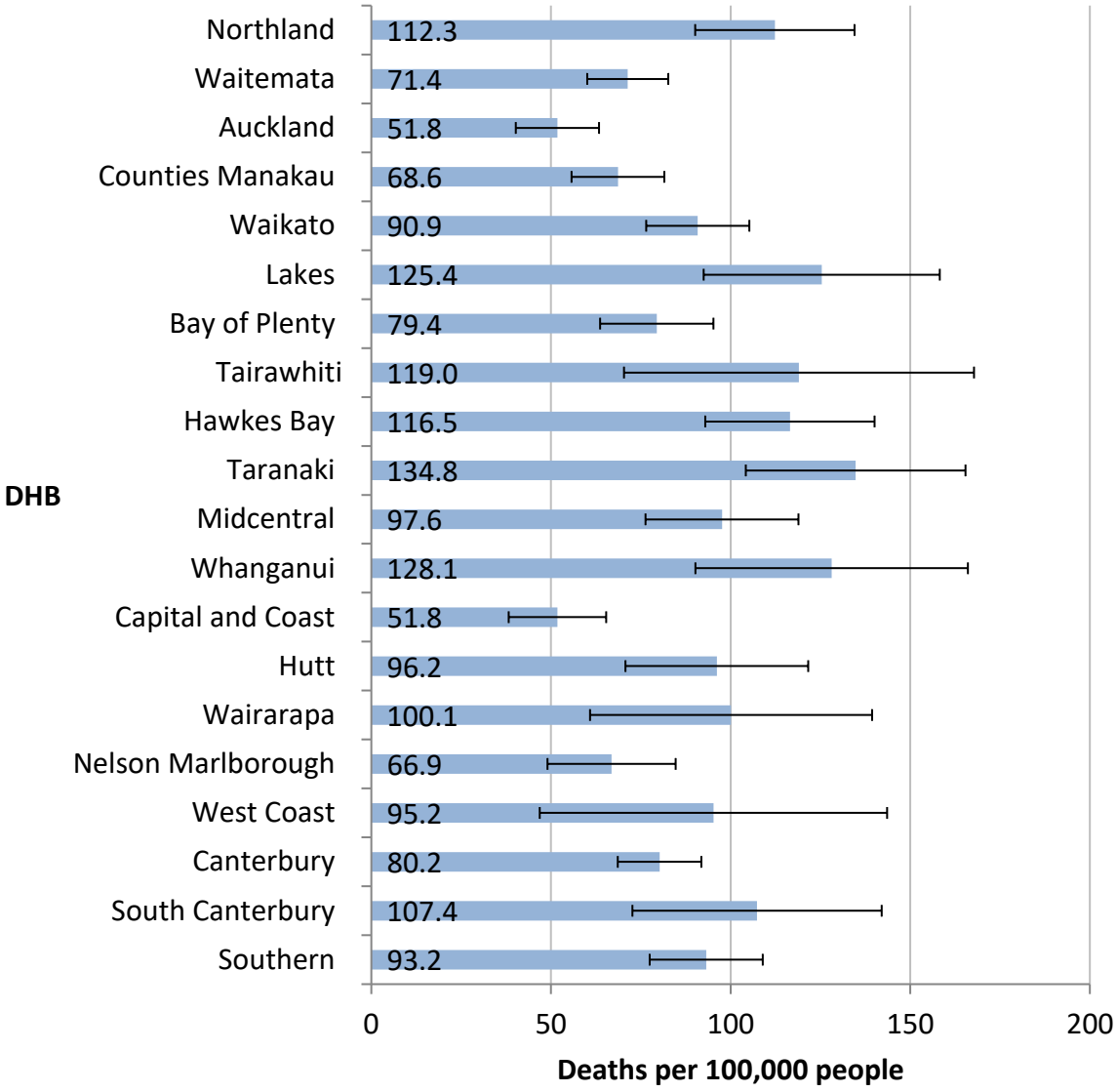
Figure 78. Adult COPD deaths per 100,000 people by ethnic group and NZDep2018, 2017, age-adjusted.



(See Table A 1-98 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 79. Adult COPD deaths per 100,000 people per year, by DHB, 2017, age-adjusted



(see Table A 1-99 for data)

3.7. TOTAL SERIOUS RESPIRATORY DISEASE

3.7.1. TOTAL RESPIRATORY HOSPITALISATIONS

New research

Ingham et al reported 12,701 acute respiratory infection (ARI) hospital admissions among 9003 children aged younger than two years old, from a total population of 118,580. These figures produce a hospitalisation rate of 10,711 hospitalisations per 100,000 children (less than 2 years) per year.[41]

Trends over time 2000 - 2020

The 2019 rate of respiratory hospitalisations was 1105.9 per 100,000 people. Total respiratory hospitalisations increased at a rate of 17.2 hospitalisations per year over the period 2000 to 2019. However, this increase appeared 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 2019. 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 80).

This increase has occurred despite a drop in tobacco smoking prevalence over a similar period (2000 – 2019/20) from 25% to 13.4%.[42]

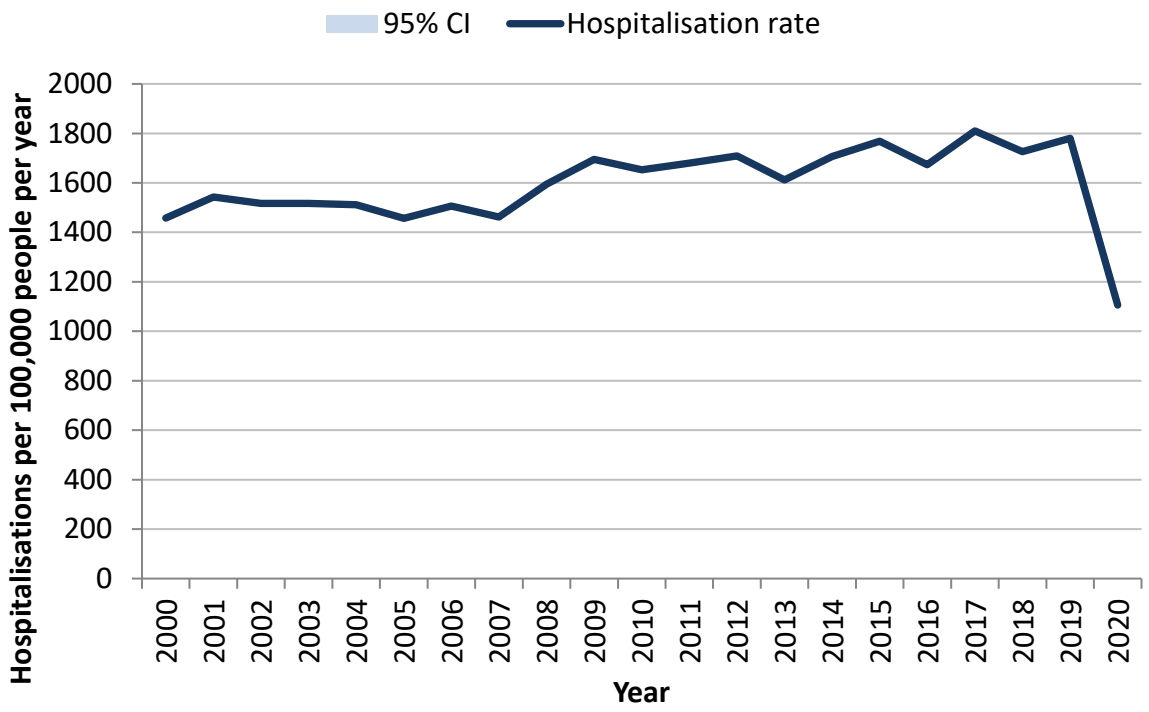
While ethnic disparities in hospitalisation rates rose over the first half of the study period, reaching their peak in the late 2000s, since 2010 they have stabilised at a level slightly below that peak (Figure 84). Socio-economic disparities show a similar pattern, and may even be declining slightly (Figure 87).

Risks and determinants 2019

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 82).

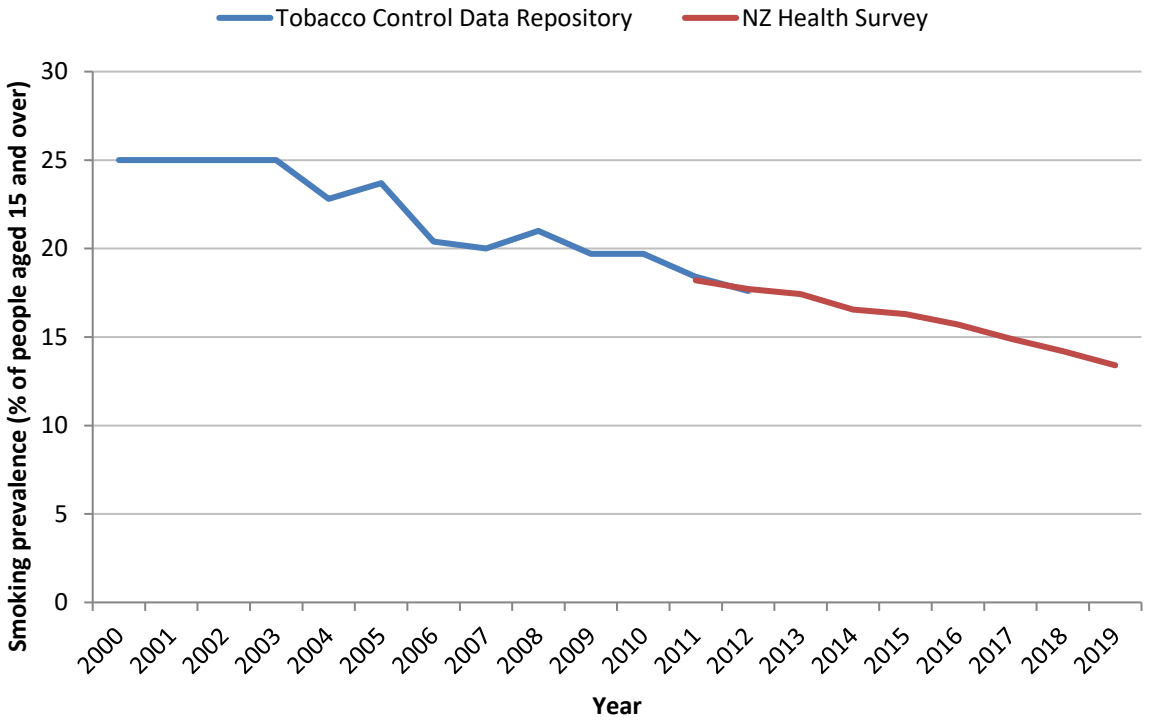
Respiratory hospitalisation rates were highest for Pacific peoples, with rates 2.59 times higher (95%CI 2.6-2.7) than for non-MPA. Māori rates were also significantly higher (rate ratio 2.19), and lower (rate ratio 0.69) for Asian peoples. These trends were repeated across all age groups (Figure 85), and were not meaningfully changed from the previous report.

Figure 80. Total respiratory hospitalisations per 100,000 people per year, 2000-2020, age-adjusted.



(See Table A 1-100 for data)

Figure 81. New Zealand smoking prevalence 2000-2019/20.



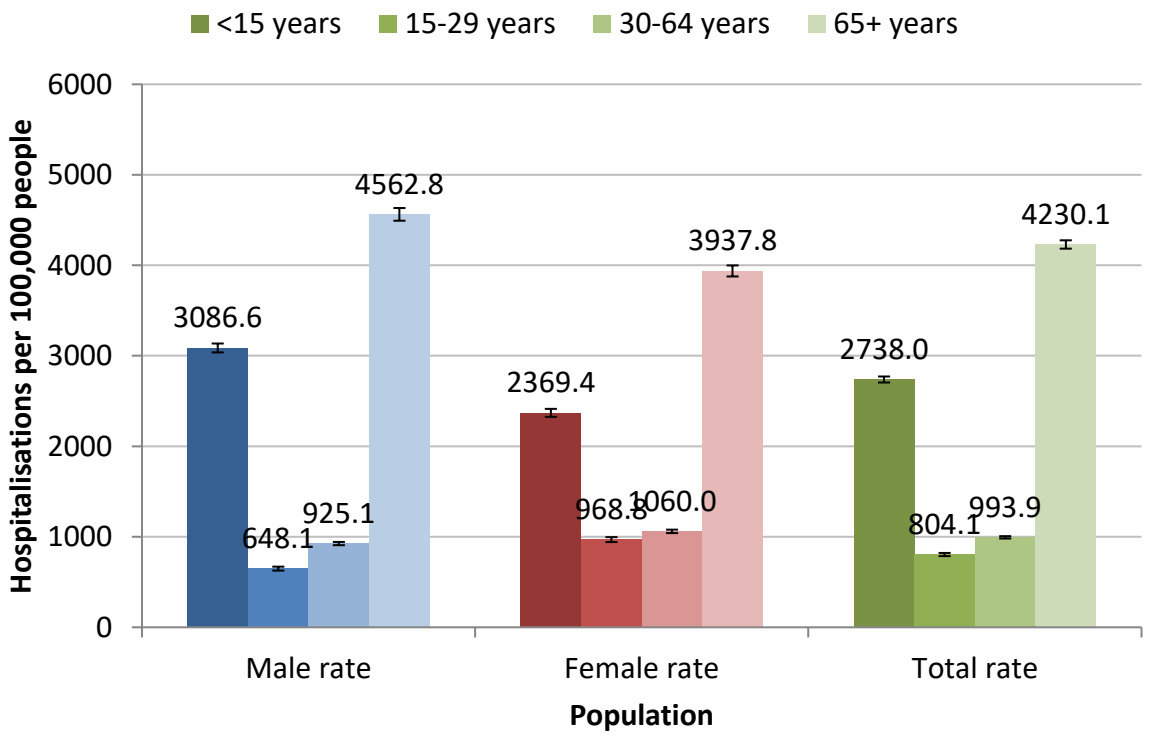
Data sourced from Tobacco Control Data Repository, http://www.tcdata.org.nz/TobaccoSectorOverview.aspx, accessed 11 August 2016, and New Zealand Health Survey data for 2011/12 – 2019/20.

There was a significant deprivation gradient in total respiratory hospitalisations, with rates in the most deprived NZDep quintile 2.37 times higher than rates in the least deprived quintile (Figure 86).

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: in other words, respiratory outcomes for Pacific peoples in even the wealthiest areas are worse than for non-MPA people in even the most deprived areas (Figure 88).

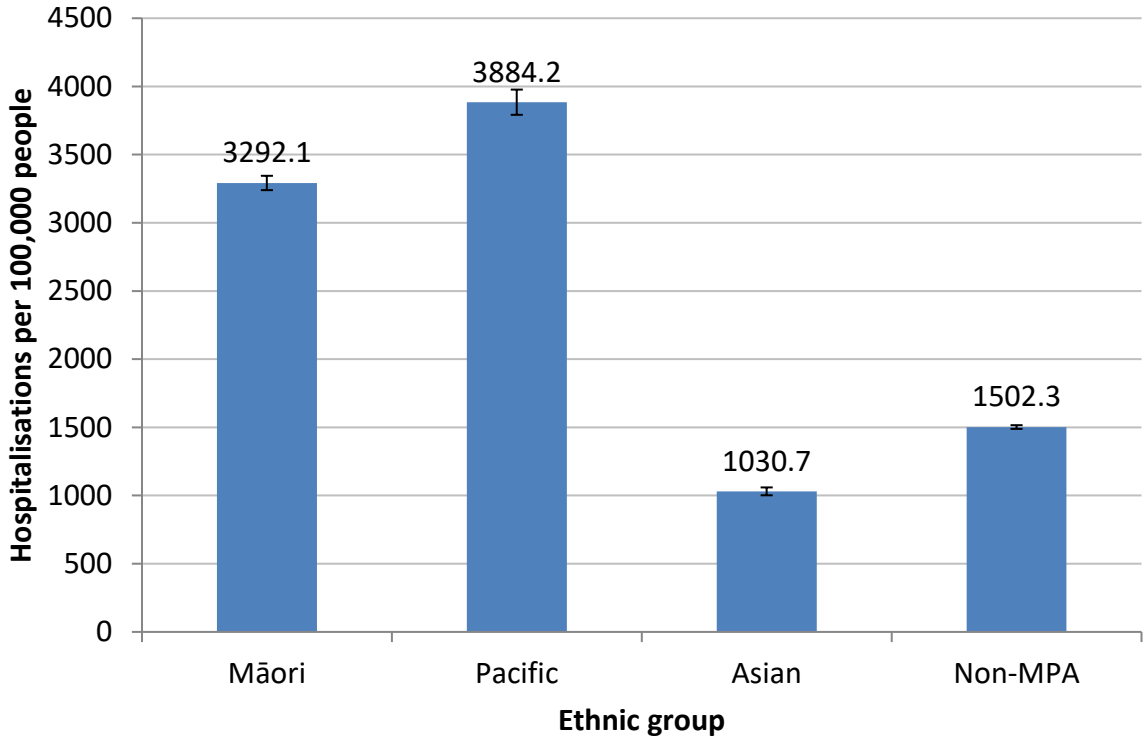
Total respiratory hospitalisation rates were highest in Whanganui, Tairawhiti and Taranaki DHBs, and lowest in Nelson Marlborough (Figure 89).

Figure 82. Total respiratory hospitalisations per 100,000 people by age group and sex, 2019.



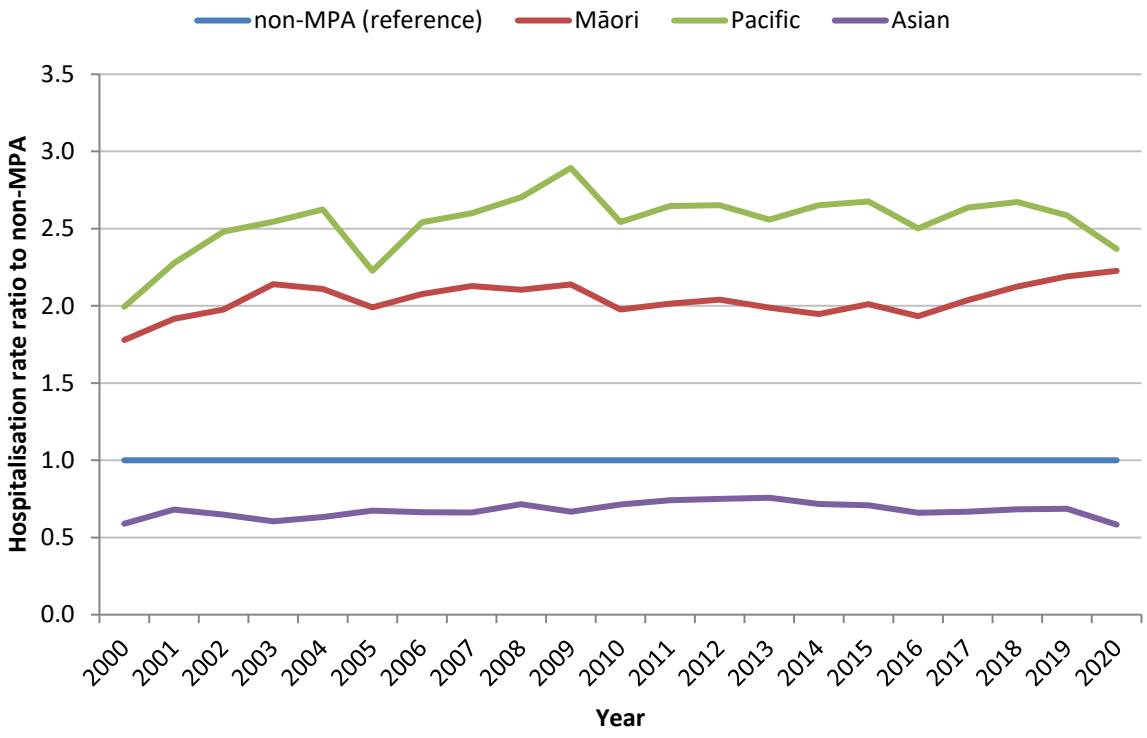
(See Table A 1-101 and Table A 1-102 for data)

Figure 83. Total respiratory hospitalisations per 100,000 people by ethnic group, 2019 age-adjusted.



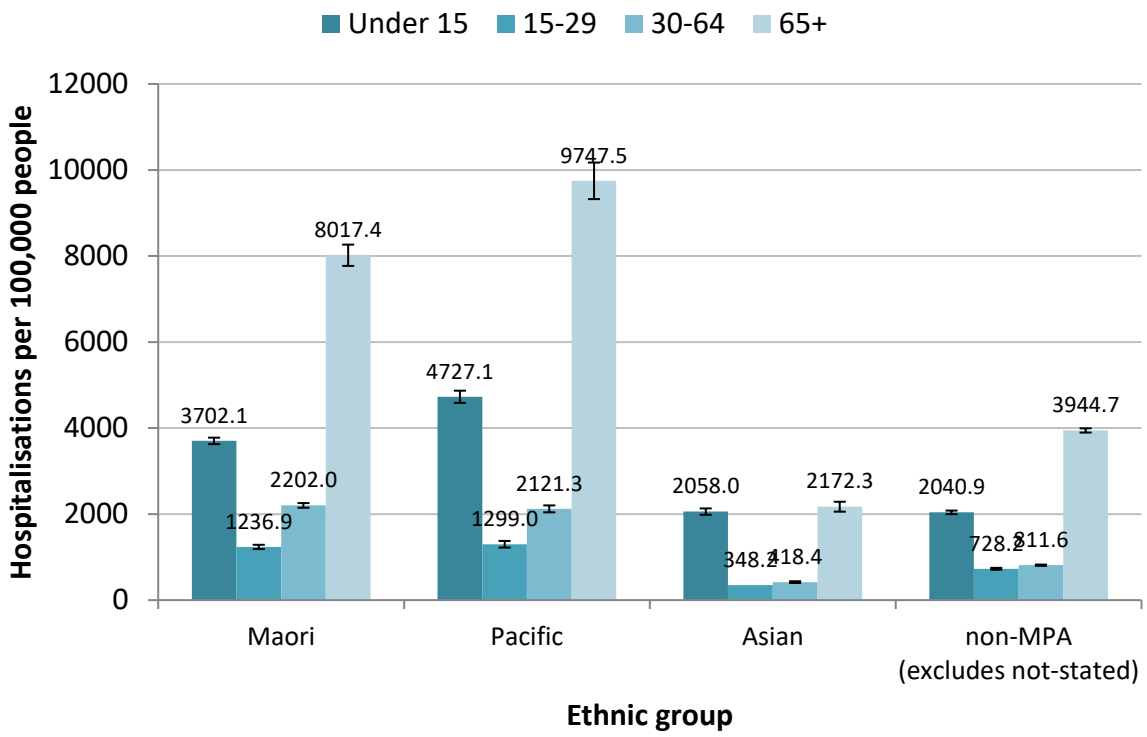
(See Table A 1-103 for data)

Figure 84. Respiratory hospitalisation rate ratio to non-MPA by ethnic group, 2000 – 2020, age-adjusted.



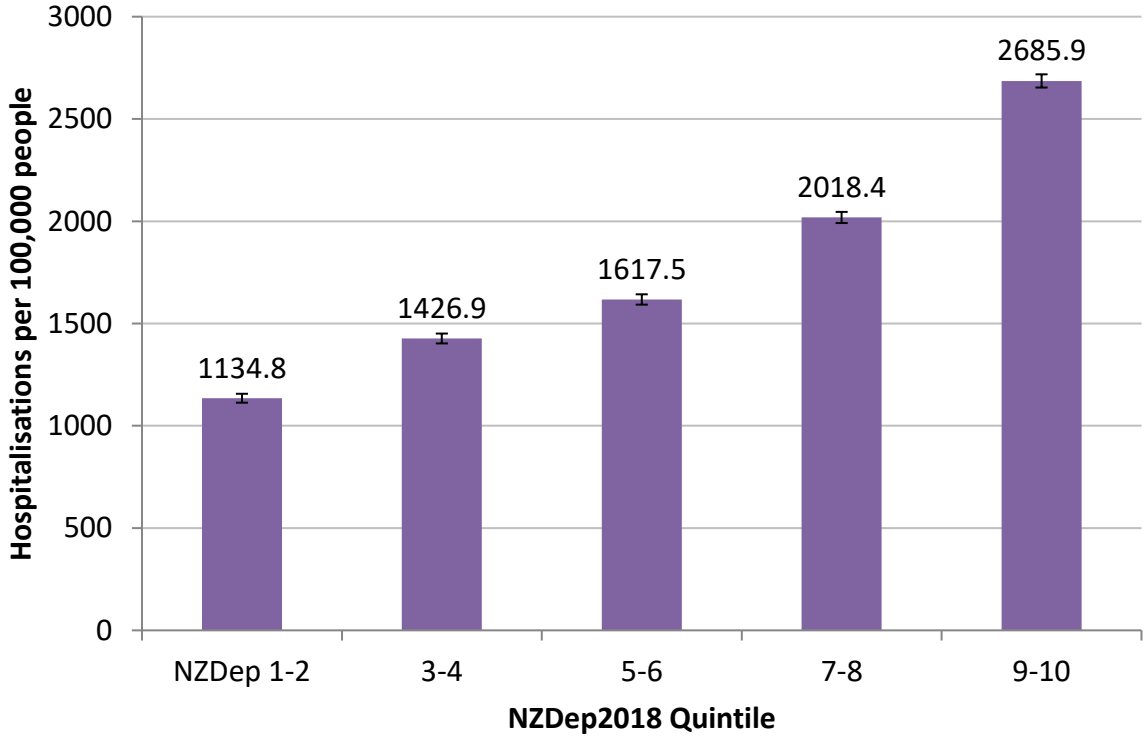
See Table A 1-104 and Table A 1-105 for data.

Figure 85. Total respiratory hospitalisations per 100,000 people by ethnic group and age group, 2019.



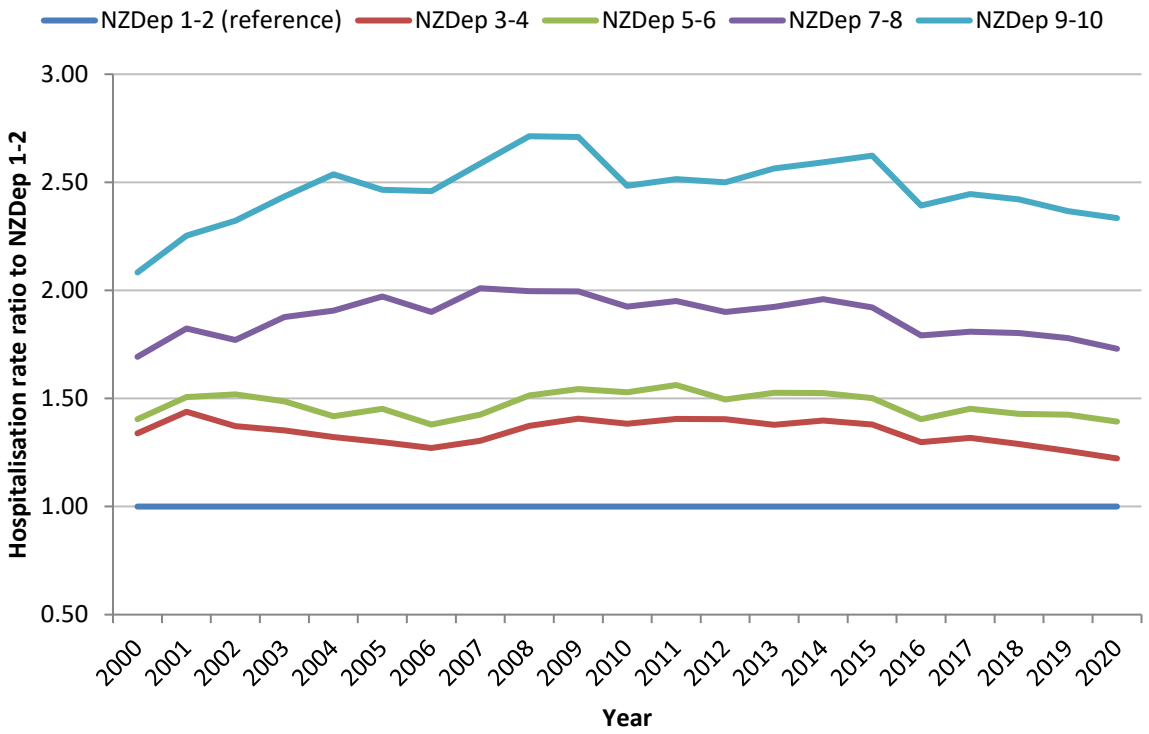
(See Table A 1-106 for data)

Figure 86. Total respiratory hospitalisations per 100,000 people by NZDep2018 quintile, 2019, age-adjusted.



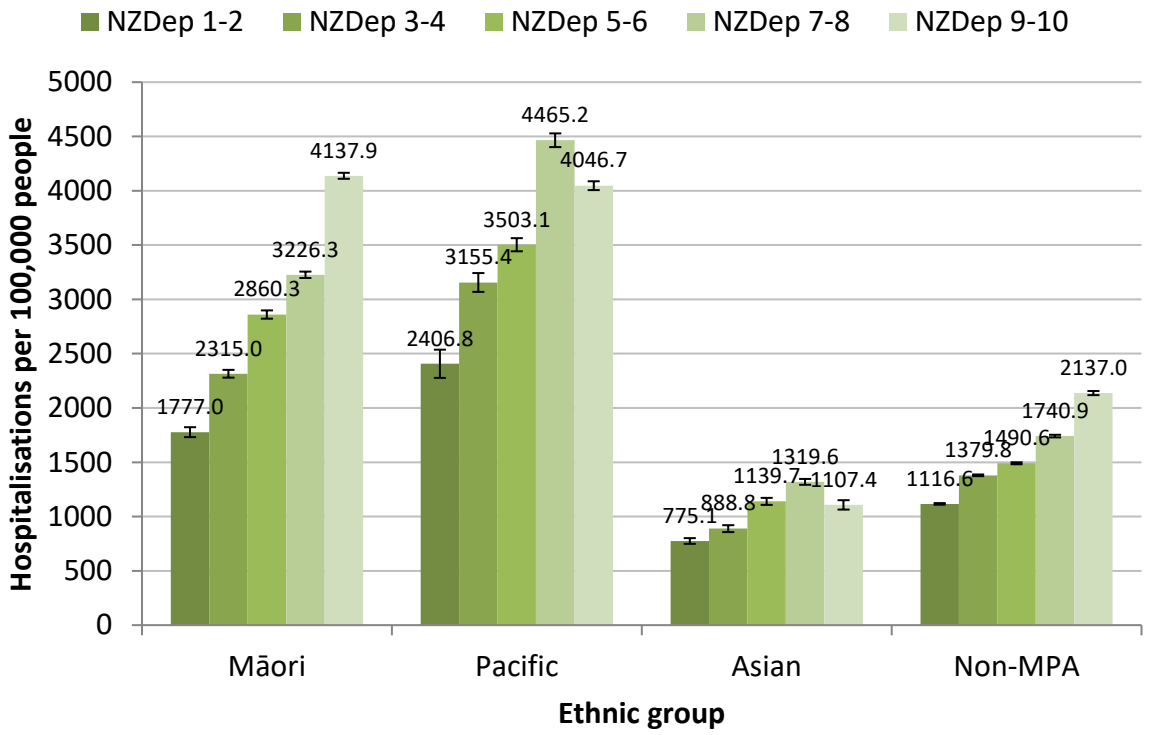
(See Table A 1-107 for data)

Figure 87. Total respiratory hospitalisation rate ratio to NZDep 1-2 by NZDep2018 quintile, 2000-2020, age-adjusted.



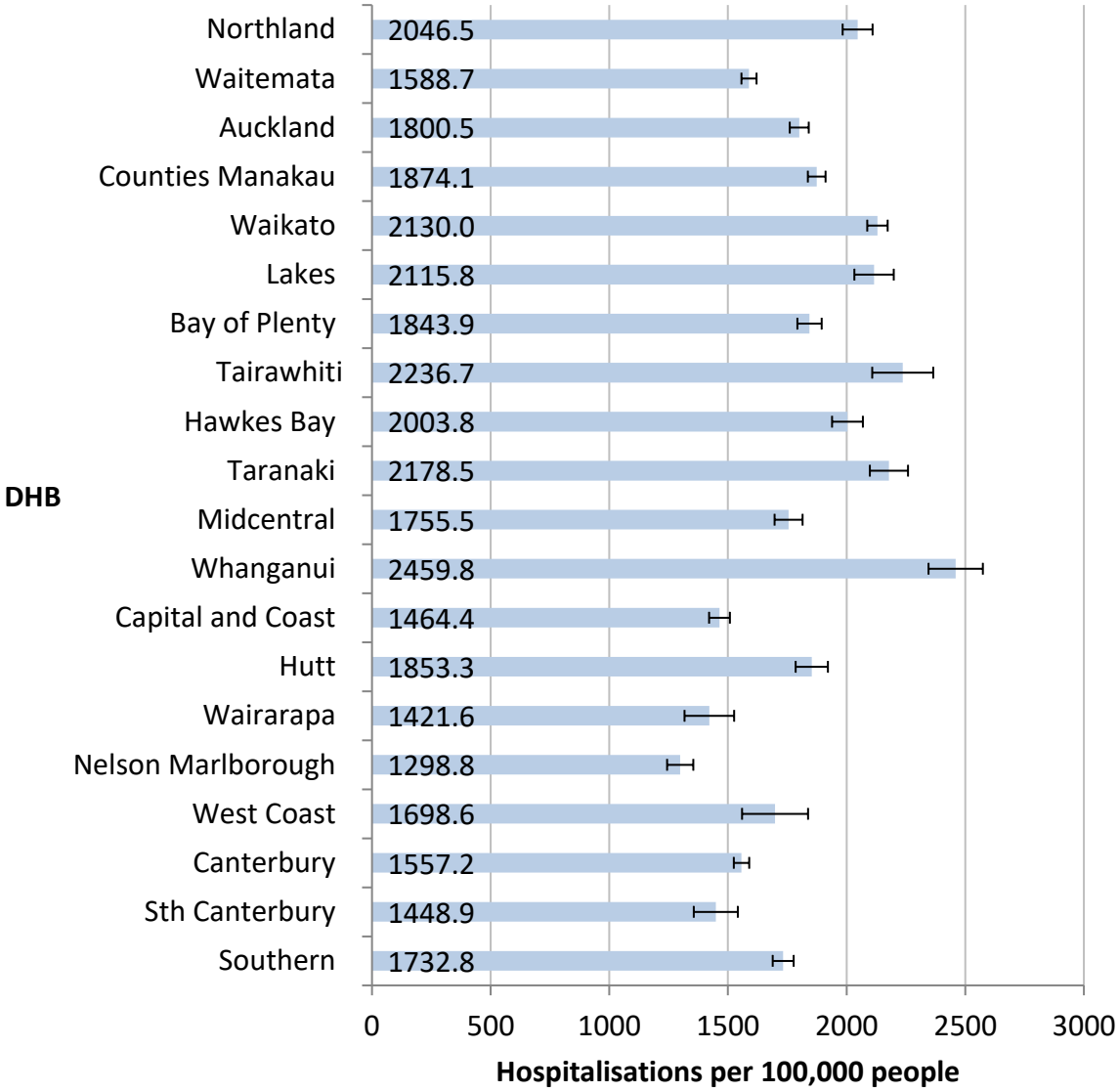
(See Table A 108 for data)

Figure 88. Total respiratory hospitalisations per 100,000 people by ethnic group and NZDep2018, 2019, age-adjusted.



(See Table A 1-110 for data)

Figure 89. Total respiratory hospitalisations per 100,000 people by DHB, 2019.



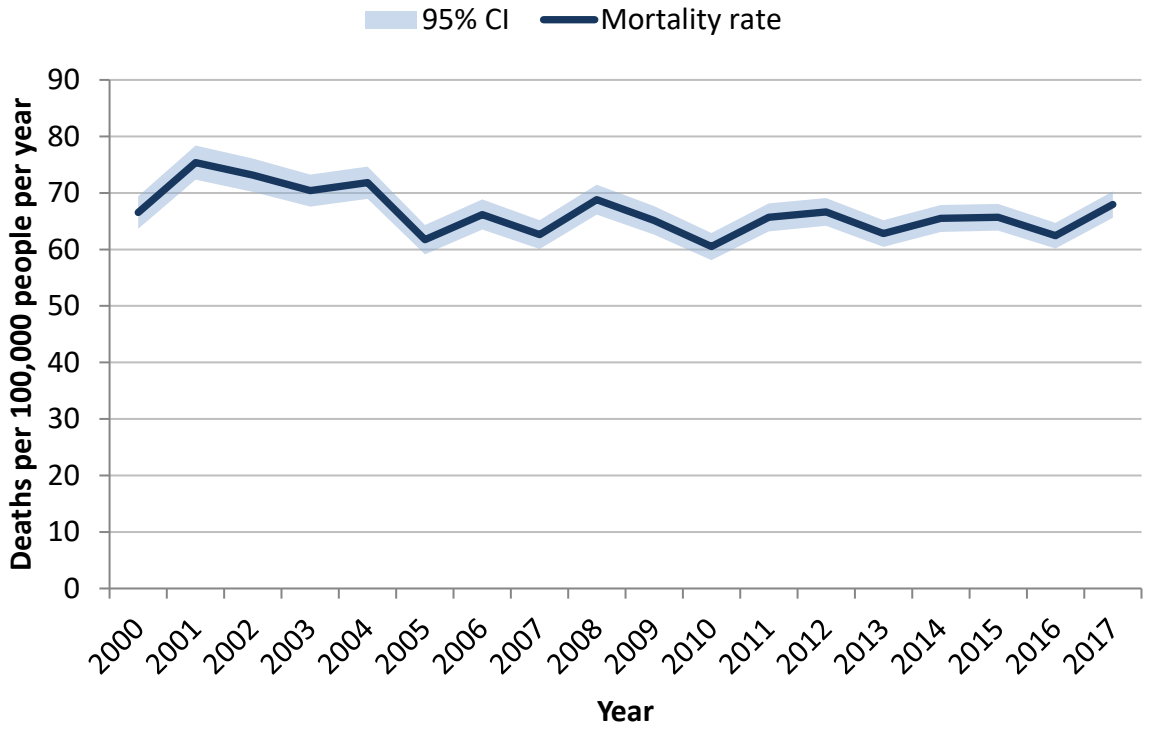
(see Table A 1-111 for data)

3.7.2. TOTAL RESPIRATORY MORTALITY

Trends 2000 - 2017

Respiratory disease was the cause of 3243 deaths in 2017. There were 67.4 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 ongoing decline after 2004.

Figure 90. Total respiratory mortality rates 2000-2017, age-adjusted.



(See Table A 1-112 for data)

Risks and determinants 2017

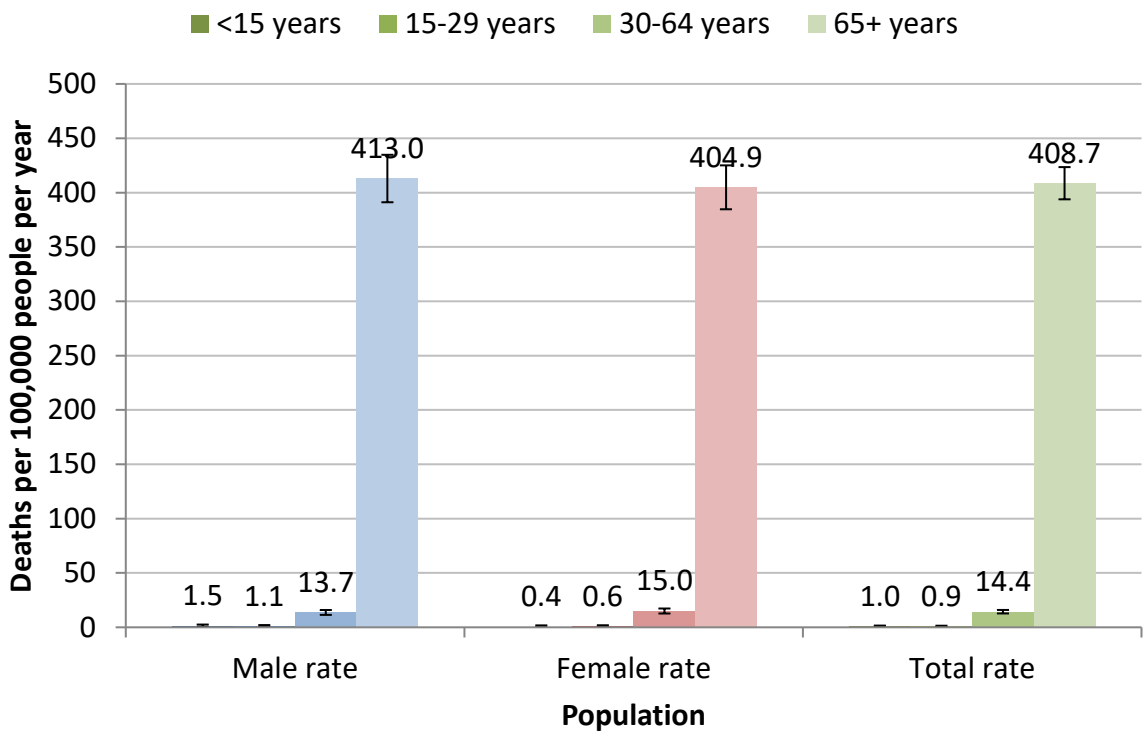
For the year 2017, mortality rates due to any respiratory disease were 28.4 times higher in people aged 65+ than in adults aged 30-64. Male mortality rates were significantly higher than females' in all ages except 30-64 years (Figure 91).

Respiratory mortality rates were highest in Māori, with a rate ratio to non-MPA of 1.74; and also higher for Pacific peoples (rate ratio 1.50). However, the rate for Asian peoples was less than half that of non-MPA (rate ratio 0.44) (Figure 92).

Respiratory mortality rates also increased with increasing socio-economic deprivation. Rates for the most deprived quintile were had a rate ratio of 1.90 to rates for the least deprived quintile (Figure 94). The deprivation gradient was present for all ethnic groups except Asian Peoples, though less linear for Pacific peoples (Figure 95).

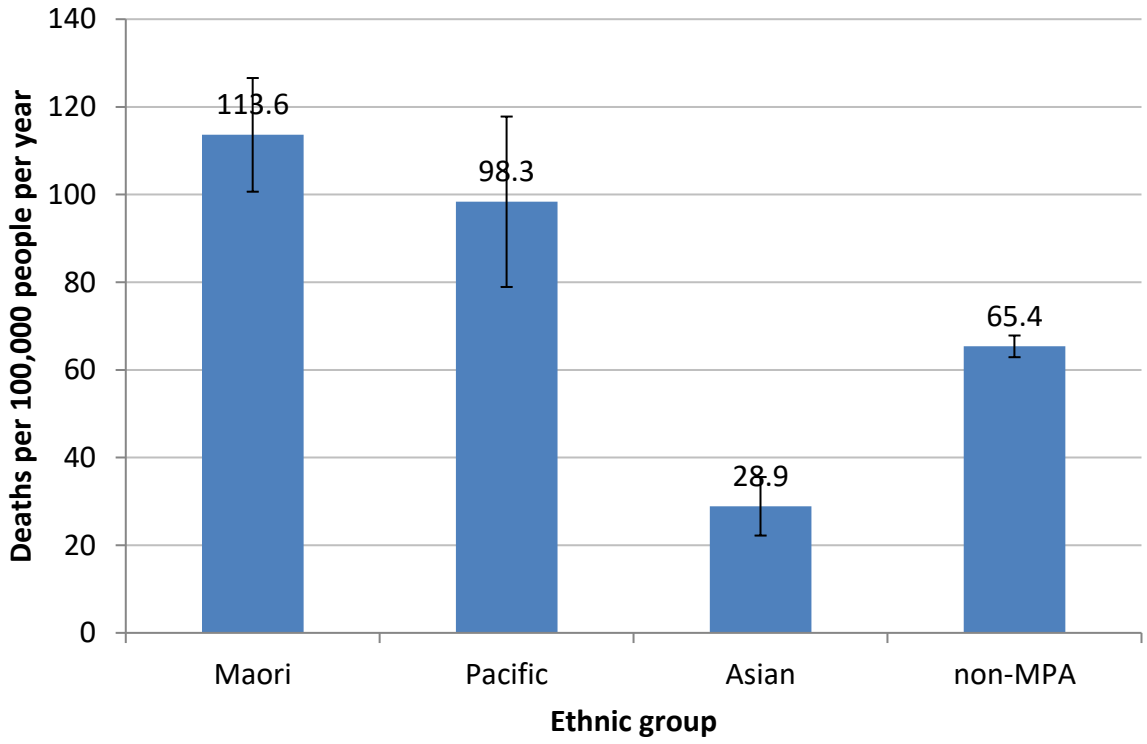
Total respiratory mortality rates were highest in the Tairawhiti and Taranaki DHBs, and also significantly higher than the national average in five other DHBs. Rates were lowest in Auckland, Capital and Coast, and West Coast DHBs, and also significantly lower than the national average in Waitemata and Canterbury DHBs (Figure 96).

Figure 91. Total respiratory deaths per 100,000 people by age group and sex, 2017.



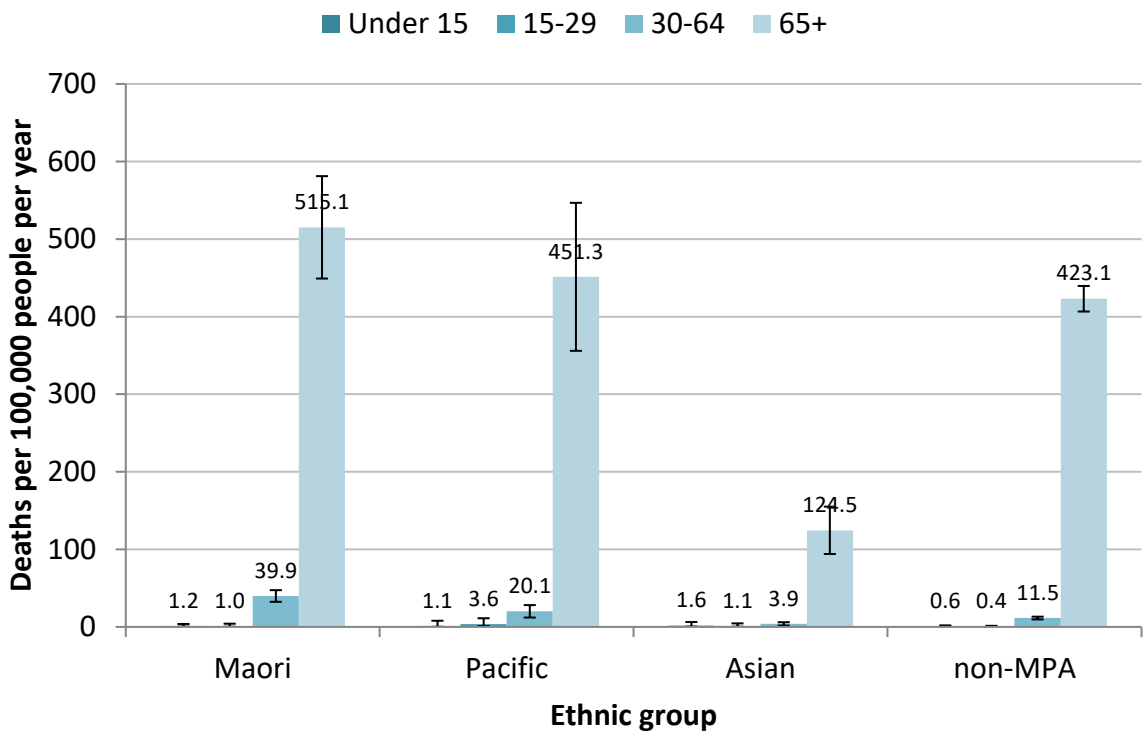
(See Table A 1-113 and Table A 1-114 for data)

Figure 92. Total respiratory mortality per 100,000 people per year by ethnic group, 2017.



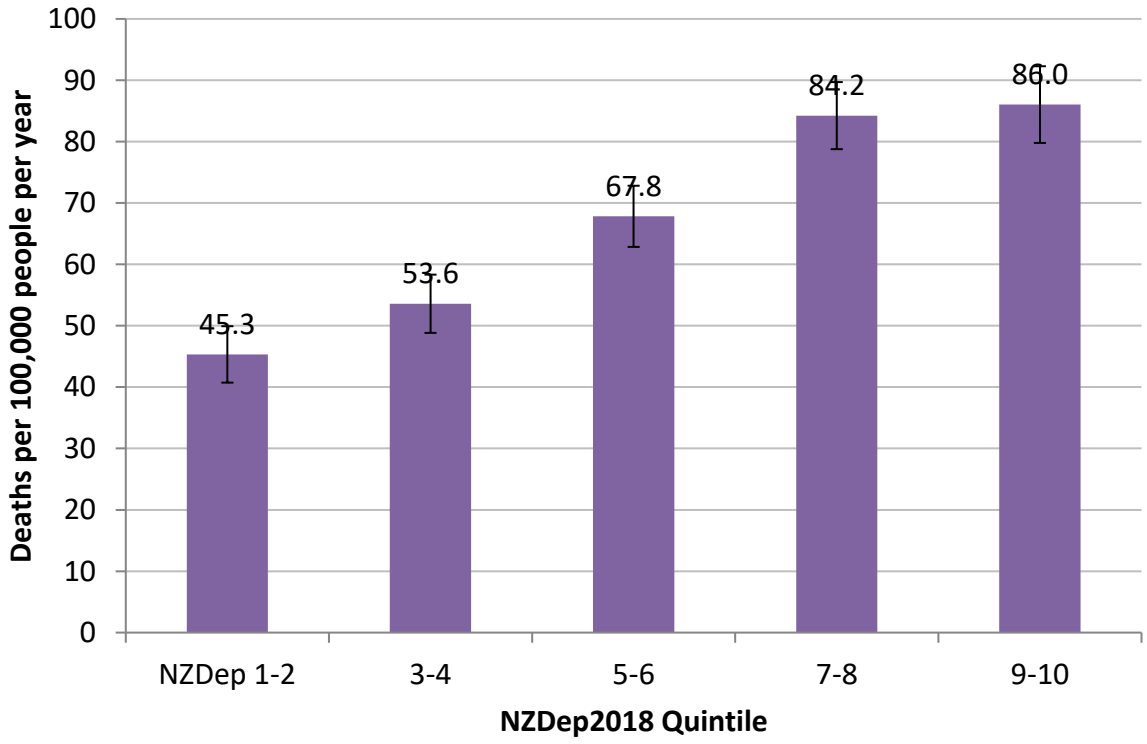
(See Table A 1-115 for data)

Figure 93. Total respiratory deaths per 100,000 people per year, by ethnic group and age group, 2017.



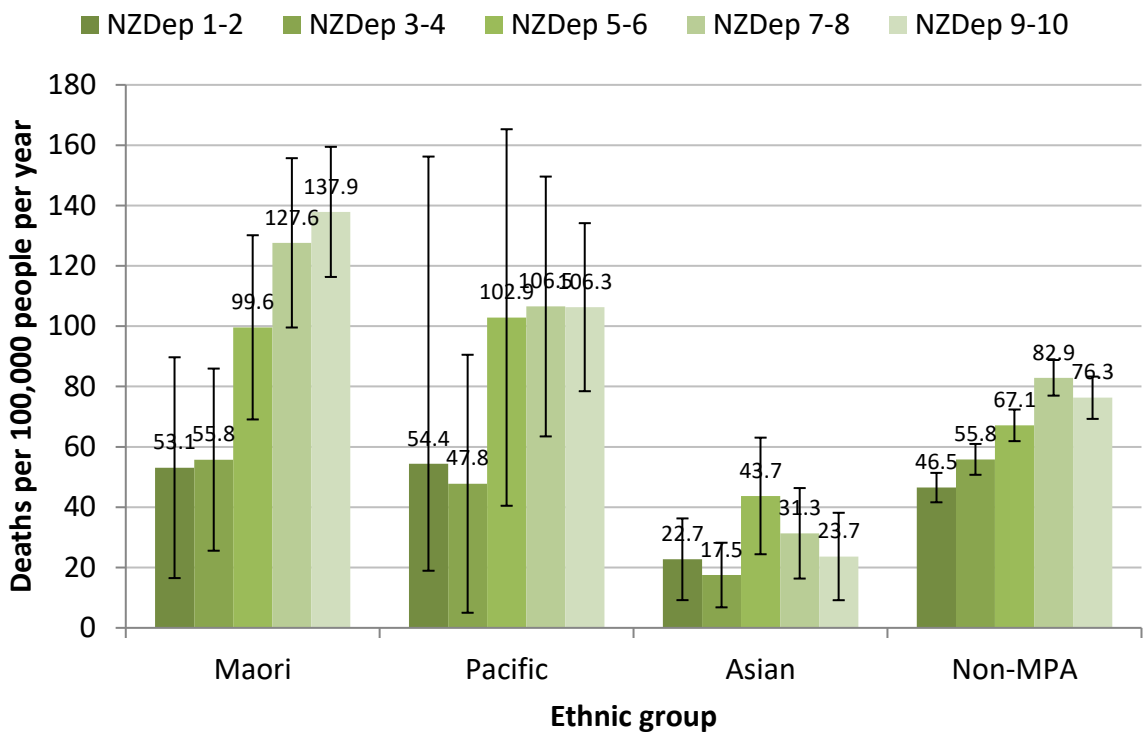
(See Table A 1-116 for data)

Figure 94. Total respiratory deaths per 100,000 people by NZDep2018 quintile, 2017, age-adjusted.



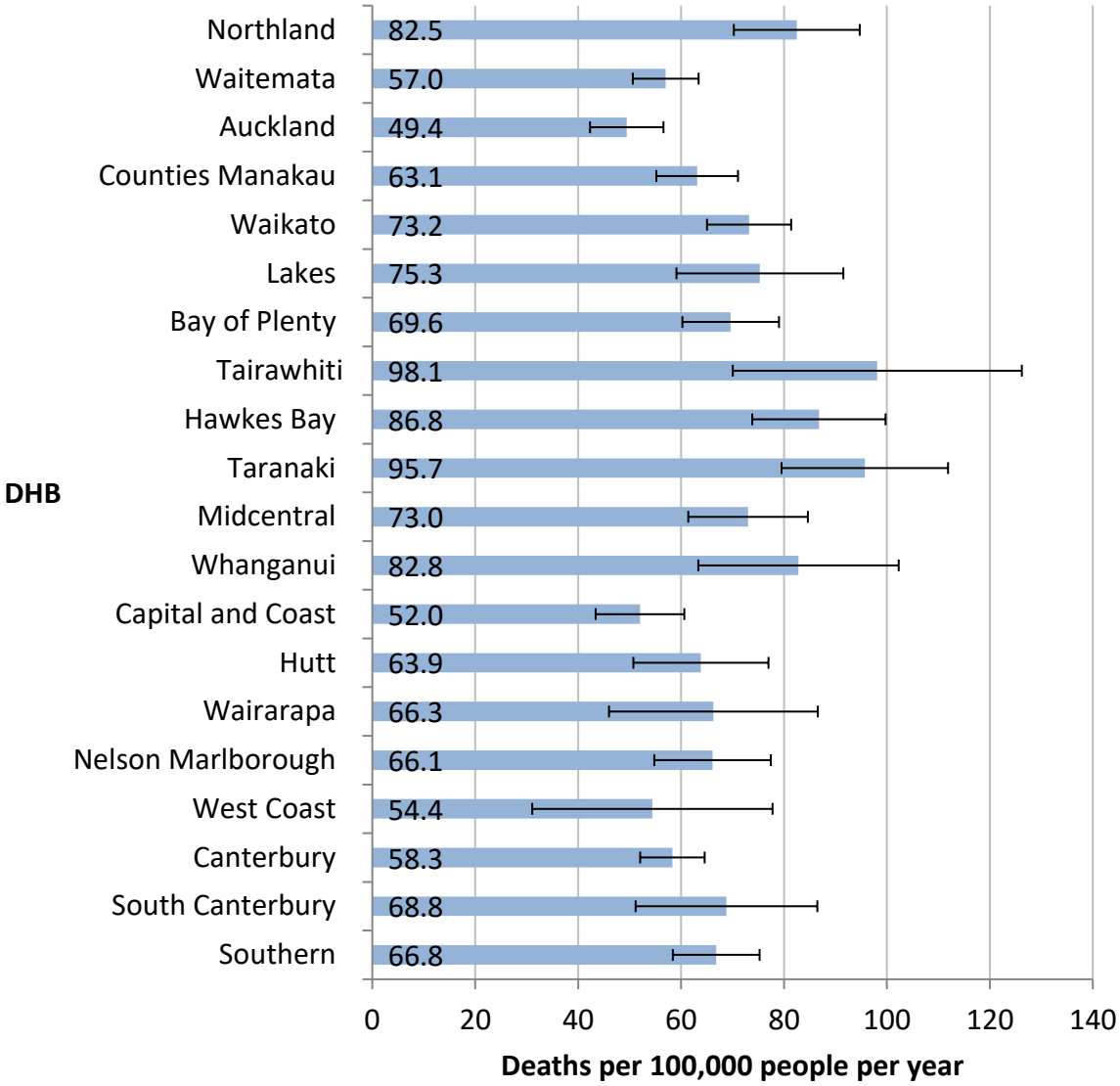
(See Table A 1-117 for data)

Figure 95. Total respiratory deaths per 100,000 people by ethnic group and NZDep2018, 2017, age-adjusted.



(See Table A 1-118 for data)

Figure 96. Total respiratory deaths per 100,000 people per year, by DHB, 2017, age-adjusted



(see Table A 1-119 for data)

3.8. COST SUMMARY

The total cost of respiratory (ICD-10 Chapter 10) deaths in 2017 was $4,677,119,154, from 27,383 life years lost.

The total cost of asthma (J45 and J46) deaths in 2017 was $366,479,208, from 2,146 life years lost

The total cost of respiratory (ICD-10 Chapter 10) hospitalisations in 2017 was $404,872,489.

The total cost of asthma (J45 and J46) hospitalisations in 2017 was $18,275,475.

The total cost to New Zealand (whether paid by patients or the State) of respiratory prescriptions in 2017 was $69,835,288.

Combining public and private costs of doctors' visits for any respiratory condition, we estimate a minimum total cost of $115,802,720

The cost of doctors' visits for asthma, for adults aged 15+ was estimated at $42,451,471and the cost of prescriptions was estimated at $29,198,218. For children these estimates were $8,617,528 and $1,599,146 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	$38,692,463	$6,856,977	$45,549,440
Doctors' visits:	$8,617,528	$42,451,471	$51,069,000
Prescriptions:	$1,599,146	$29,198,218	$30,797,364
ED and OP visits:			$163,441,344
Hospitalisations:	$6,497,138	$11,778,337	$18,275,475
YLDs			$545,494,593
Mortality:	$49,738,416	$316,740,792	$366,479,208
TOTAL:	$105,144,691	$407,025,795	$1,181,707,531

	All respiratory
Doctors' visits:	$115,802,720
Prescriptions:	$69,835,288
Hospitalisations:	$404,872,489
YLDs:	$1,411,745,886
Mortality:	$4,677,119,154
TOTAL:	$6,679,375,537

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 doctors' visits attributed to asthma has more than doubled, due to a change in the method of calculating costs, following a change in government funding mechanisms.

The cost of ED and OP visits has increased due in particular to increased costs per visit.

3.9. SEASONAL RISKS

Respiratory disease hospitalisations and deaths show a strong seasonal effect, with much higher rates in winter than in non-winter months.

Seasonality is commonly simply measured by the ratio of four winter months (June to September in New Zealand) to prior and subsequent non-winter months (February to May, and October to January) event rates.

Using this measure, the winter excess for respiratory hospitalisations in adults aged over 15 years ranged from a low of 25% in 2000, to a high of 64% in 2003, with an average of 47%.

For children aged 14 years and younger, winter excesses were higher, ranging from 74% to 105%, and averaging 89%.

4. RECOMMENDATIONS

Our first three recommendations have changed little from the previous report:

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 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.

In 2021, we add three further recommendations:

4. Based on compelling evidence (see Housing and respiratory illness), we recommend initiatives to improve housing quality and warmth, and reduce dampness, in order to reduce respiratory illness.
5. We recommend investigation of what measures might reduce the impact of return to school on children's asthma exacerbations.
6. Given the sharp drop in respiratory hospitalisations and deaths in 2020, we recommend further research to identify elements of COVID-19 pandemic control measure which could have the potential to reduce respiratory illness on an ongoing basis.

5. REFERENCES

1. Ministry of Health. Health loss in New Zealand: A report from the New Zealand burden of diseases, injuries and risk factors study, 2006-2016. Wellington: Ministry of Health, 2013.

2. Trying to Catch Our Breath – The Burden of Preventable Breathing Diseases in Children and Young People. In: Asher I, Byrnes C, eds. Wellington: The Asthma and Respiratory Foundation of New Zealand, 2006.

3. Holt S, Beasley R. The burden of asthma in New Zealand. Wellington: The Asthma and Respiratory Foundation of New Zealand, 2002.

4. Broad J, Jackson R. Chronic Obstructive Pulmonary Disease and Lung Cancer in New Zealand Wellington: The Asthma and Respiratory Foundation of New Zealand, 2003.

5. Telfar Barnard L, Baker M, Pierse N, et al. The impact of respiratory disease in New Zealand: 2014 update. Wellington: The Asthma Foundation, 2015.

6. Telfar Barnard L, Zhang J. The impact of respiratory disease in New Zealand: 2016 update. https://www.asthmafoundation.org.nz/research/the-impact-of-respiratory-disease-in-new-zealand-2016-update: Asthma and Respiratory Foundation NZ, 2016.

7. Mihaere KM, Harris R, Gander PH, et al. Obstructive sleep apnea in New Zealand adults: prevalence and risk factors among Māori and non-Māori. *Sleep* 2009;32(7):949-56. doi: 10.1093/sleep/32.7.949 [published Online First: 2009/07/31]

8. Swinbourne R, Gill N, Vaile J, et al. Prevalence of poor sleep quality, sleepiness and obstructive sleep apnoea risk factors in athletes. *European journal of sport science* 2016;16(7):850-8. doi: 10.1080/17461391.2015.1120781 [published Online First: 2015/12/25]

9. Humphreys ML, Robinson SJ, McKeand C, et al. Duodenal switch--the initial experience in New Zealand. *The New Zealand medical journal* 2014;127(1392):38-47. [published Online First: 2014/05/09]

10. Ministry of Health. Health of older people in New Zealand: a statistical reference. Wellington: Ministry of Health, 2002:116.

11. Wilson N. The Cost Burden of Asthma in New Zealand: Asthma and Respiratory Foundation of New Zealand, 2000.

12. Cost Resource Manual Version 3: Pharmac, 2018.

13. Asthma and COPD in New Zealand. The experience of a large primary care cohort prevalence, pharmaceutical management and health services utilisation. Draft report. New Zealand: CBG Health Research Limited, 2014.

14. National and subnational period life tables: 2017-2019: Statistics New Zealand, 2021.

15. Telfar Barnard L, Preval N, Howden-Chapman P, et al. The impact of retrofitted insulation and new heaters on health services utilisation and costs, pharmaceutical costs and mortality. Wellington: Ministry of Economic Development, MED, 2011.

16. Surgical mesh registry: cost benefit analysis. Ministry of Health: Deloitte Access Economics, 2018.

17. Annual report of Pharmaceutical Management Agency (Pharmac) for the year ended 30 June 2017. New Zealand: Pharmaceutical Management Agency (Pharmac), 2017.

18. McAvoy B, Davis P, Raymont A, et al. The Waikato Medical Care (WaiMedCa) Survey 1991-1992. *New Zealand medical journal* 1994(107 (pt 2)):399-433.

19. Taking the pulse: The 1996/97 New Zealand Health Survey. Wellington, New Zealand: Ministry of Health, 1999.

20. Free S, Howden-Chapman P, Pierse N, et al. More effective home heating reduces school absences for children with asthma. *J Epidemiol Community Health* 2010;64:379-86.

21. A picture of health. Wellington, NZ: Statistics New Zealand and Ministry of Health, 1993.

22. Health Mo. Health Loss in New Zealand: A report from the New Zealand Burden of Diseases, Injuries and Risk Factors Study, 2006-2016. Wellington: Ministry of Health, 2013.

23. Win SS, Camargo CA, Jr., Khaw KT, et al. Cross-sectional associations of vitamin D status with asthma prevalence, exacerbations, and control in New Zealand adults. *The Journal of steroid biochemistry and molecular biology* 2019;188:1-7. doi: 10.1016/j.jsbmb.2018.11.016 [published Online First: 2018/12/07]

24. Wickens K, Barthow C, Mitchell EA, et al. Effects of Lactobacillus rhamnosus HN001 in early life on the cumulative prevalence of allergic disease to 11 years. *Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology* 2018;29(8):808-14. doi: 10.1111/pai.12982 [published Online First: 2018/11/16]

25. Ellison-Loschmann L, Pattemore PK, Asher MI, et al. Ethnic differences in time trends in asthma prevalence in New Zealand: ISAAC Phases I and III. *International journal of tuberculosis and lung disease* 2009;13(6):775-82.

26. Ellwood P, Asher MI, Billo NE, et al. The Global Asthma Network rationale and methods for Phase I global surveillance: prevalence, severity, management and risk factors. *Eur Respir J* 2017;49(1) doi: 10.1183/13993003.01605-2016 [published Online First: 2017/01/13]

27. Ellwood P, Ellwood E, Rutter C, et al. Global Asthma Network Phase I Surveillance: Geographical Coverage and Response Rates. *J Clin Med* 2020;9(11):3688. doi: 10.3390/jcm9113688

28. Diagnosing and managing asthma in children. *Best Practice Journal* 2012;42

29. Schlichting D, Fadason T, Grant CC, et al. Childhood asthma in New Zealand: the impact of on-going socioeconomic disadvantage (2010-2019). *The New Zealand medical journal* 2021;134(1533):80-95. [published Online First: 2021/05/01]

30. Abdelkarim H, Durie M, Bellomo R, et al. A comparison of characteristics and outcomes of patients admitted to the ICU with asthma in Australia and New Zealand and United states. *The Journal of asthma : official journal of the Association for the Care of*

Asthma 2020;57(4):398-404. doi: 10.1080/02770903.2019.1571082 [published Online First: 2019/02/01]

31. Lincoln D, Morgan G, Sheppeard V, et al. Childhood asthma and return to school in Sydney, Australia. *Public Health* 2006;120(9):854-62. doi: 10.1016/j.puhe.2006.05.015 [published Online First: 2006/08/15]

32. de Boer S, Lewis CA, Fergusson W, et al. Ethnicity, socioeconomic status and the severity and course of non-cystic fibrosis bronchiectasis. *Intern Med J* 2018;48(7):845-50. doi: https://doi.org/10.1111/imj.13739

33. Ameratunga R, Jordan A, Cavadino A, et al. Bronchiectasis is associated with delayed diagnosis and adverse outcomes in the New Zealand Common Variable Immunodeficiency Disorders cohort study. *Clin Exp Immunol* 2021;204(3):352-60. doi: 10.1111/cei.13595 [published Online First: 2021/03/24]

34. Twiss J, Metcalfe R, Edwards E, et al. New Zealand national incidence of bronchiectasis "too high" for a developed country. *Archives of Disease in Childhood* 2005;90(7):737-40.

35. Bibby S, Milne R, Beasley R. Hospital admissions for non-cystic fibrosis bronchiectasis in New Zealand. *New Zealand medical journal* 2015(Sep 4):30-38,5.

36. Shirtcliffe P, Weatherall M, Beasley R. From the authors. *European Respiratory Journal* 2008;31(1):218-19.

37. Shirtcliffe P, Weatherall M, Marsh S, et al. COPD prevalence in a random population survey: a matter of definition. *The European respiratory journal* 2007;30(2):232-39.

38. Milne RJ, Beasley R. Hospital admissions for chronic obstructive pulmonary disease in New Zealand. *New Zealand medical journal* 2015(Jan 30):23-35.

39. Stokes T, Azam M, Noble FD. Multimorbidity in Māori and Pacific patients: cross-sectional study in a Dunedin general practice. *Journal of primary health care* 2018;10(1):39-43. doi: 10.1071/hc17046 [published Online First: 2018/08/03]

40. Berenyi F, Steinfort DP, Abdelhamid YA, et al. Characteristics and Outcomes of Critically Ill Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease in Australia and New Zealand. *Annals of the American Thoracic Society* 2020;17(6):736-45. doi: 10.1513/AnnalsATS.201911-821OC

41. Ingham T, Keall M, Jones B, et al. Damp mouldy housing and early childhood hospital admissions for acute respiratory infection: a case control study. *Thorax* 2019;74(9):849-57. doi: 10.1136/thoraxjnl-2018-212979 [published Online First: 2019/08/16]

42. Tobacco Use 2012/13. New Zealand Health Survey. http://www.health.govt.nz/publication/tobacco-use-2012-13-new-zealand-health-survey: Ministry of Health, 2014.

43. Cohet C, Cheng S, MacDonald C, et al. Infections, medication use, and the prevalence of symptoms of asthma, rhinitis, and eczema in childhood. *J Epidemiol Community Health* 2004;58(10):852-57.

44. Bates MN, Garrett N, Crane J, et al. Associations of ambient hydrogen sulfide exposure with self-reported asthma and asthma symptoms. *Environmental research* 2013;122:81-87.

45. Crampton P, Davis P, Lay-Yee R, et al. Comparison of private for-profit with private community-governed not-for-profit primary care services in New Zealand. *Journal of health services and research policy* 2004;9 supp 2:17-22.

46. Douwes J, Travier N, Huang K, et al. Lifelong farm exposure may strongly reduce the risk of asthma in adults. *Allergy* 2007;62(10):1158-65.

47. Hansell A, Ghosh RE, Poole S, et al. Occupational risk factors for chronic respiratory disease in a New Zealand population using lifetime occupational history. *Journal of Occupational and Environmental Medicine* 2014;56(3)

48. Eng A, Mannetje AT, Douwes J, et al. The New Zealand workforce survey II: occupational risk factors for asthma. *Annals of occupational hygiene* 2010;54(2):154-64.

49. Eng A, Mannetje A, Pearce N, et al. Work-related stress and asthma: results from a workforce survey in New Zealand. *Journal of asthma* 2011;48(8):783-89.

50. Watson P, McDonald B. Subcutaneous body fat in pregnant New Zealand women: association with wheeze in their infants at 18 months. *Maternal & child health journal* 2013;17(5):959-67.

51. Howden-Chapman P, Matheson A, Crane J, et al. Effect of insulating existing houses on health inequality: cluster randomised study in the community. *British Medical Journal* 2007;334:460.

52. Fyfe C, Telfar L, Barnard, et al. Association between home insulation and hospital admission rates: retrospective cohort study using linked data from a national intervention programme. *BMJ* 2020;371:m4571. doi: 10.1136/bmj.m4571 [published Online First: 2020/12/31]

53. Preval N, Keall M, Telfar-Barnard L, et al. Impact of improved insulation and heating on mortality risk of older cohort members with prior cardiovascular or respiratory hospitalisations. *BMJ open* 2017;7(11):e018079. doi: 10.1136/bmjopen-2017-018079 [published Online First: 2017/11/16]

54. Howden-Chapman P, Pierse N, Nicholls S, et al. Effects of improved home heating on asthma in community dwelling children: randomised controlled trial. *BMJ* 2008;337:a1411.

55. Pierse N, Arnold R, Keall M, et al. Modelling the effects of low indoor temperatures on the lung function of children with asthma. *J Epidemiol Community Health* 2013;67(11):918-25. doi: 10.1136/jech-2013-202632 [published Online First: 2013/08/14]

56. Kelly A, Denning-Kemp G, Geiringer K, et al. Exposure to harmful housing conditions is common in children admitted to Wellington Hospital. *The New Zealand medical journal* 2013;126(1387):108-26. [published Online First: 2013/12/24]

57. Su B, Wu L. Occupants' Health and Their Living Conditions of Remote Indigenous Communities in New Zealand. *International journal of environmental research and*

public health 2020;17(22) doi: 10.3390/ijerph17228340 [published Online First: 2020/11/15]

58. Morton S, Lai H, Walker C, et al. Keeping our children warm and dry: Evidence from *Growing Up In New Zealand*. External Research Report New Zealand: BRANZ, 2020.

APPENDIX 1. DATA TABLES

A 1.1. ASTHMA

A 1.1.1 ASTHMA PREVALENCE

Table A 1-1. Age-standardised medicated asthma rates by age-group and sex, 2019/20

Population group	Total		Male		Female		M vs F	
	%	95% CI	%	95% CI	%	95% CI	RR	95% CI
Total children <15 years	13.5	(11.9 - 15.2)	14.6	(12.3 - 17.3)	12.2	(10.4 - 14.4)	1.19	(0.95–1.50)
2–4 years	11.6	(8.7 - 15.4)	11.8	(7.9 - 17.3)	11.4	(7.7 - 16.7)		
5–9 years	13.4	(11.4 - 15.8)	13.0	(10.4 - 16.1)	13.9	(10.8 - 17.7)		
10–14 years	14.5	(11.9 - 17.6)	17.8	(13.5 - 23)	11.1	(8.4 - 14.5)		
Total adults	11.8	(11.0 - 12.7)	10.2	(9.1 - 11.4)	13.4	(12.3 - 14.6)	0.76	(0.67–0.88)
15–24 years	12.1	(9.8 - 14.9)	12.4	(9.2 - 16.5)	11.8	(8.5 - 16.1)		
25–34 years	10.7	(9.0 - 12.7)	11.0	(8.3 - 14.4)	10.4	(8.0 - 13.5)		
35–44 years	10.7	(8.9 - 12.7)	7.3	(5.2 - 10.1)	13.8	(11.4 - 16.7)		
45–54 years	12.9	(10.7 - 15.4)	9.7	(7.4 - 12.6)	15.8	(12.5 - 19.8)		
55–64 years	12.5	(10.6 - 14.7)	11.6	(8.7 - 15.2)	13.4	(10.8 - 16.5)		
65–74 years	12.4	(10.6 - 14.5)	9.2	(6.9 - 12.1)	15.4	(12.7 - 18.7)		
75+ years	12.0	(10.1 - 14.1)	9.5	(6.9 - 12.9)	13.9	(11.2 - 17.3)		

Table A 1-2. Medicated asthma prevalence by ethnic group 2019/20, children and adults

Population group	Children			Adults		
	%	95% CI	RR* to rest of population	%	95% CI	RR* to rest of population
Total	13.5	(11.9 - 15.2)		11.8	(11 - 12.7)	
Māori	22.4	(3.5 – 4.0)	**2.14 (1.69–2.71)**	16.4	(1.9 - 2.2)	**1.48 (1.29–1.70)**
Pacific	17.5	(4.3 - 5.3)	1.35 (0.98–1.85)	14.5	(3.6 - 4.5)	1.24 (0.94–1.64)
Asian	7.6	(2.6 - 3.8)	**0.53 (0.34–0.83)**	5.2	(1.3 - 1.8)	**0.41 (0.30–0.56)**
European/Other	13.6	(1.9 - 2.1)	Not provided	12.7	(0.9 – 1.0)	Not provided

*Rate ratios are age and sex adjusted.

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

Table A 1-3. Child medicated asthma prevalence 2019/20 by NZDep2018, unadjusted

NZDep quintile	Total		Boys		Girls	
	%	95% CI	%	95% CI	%	95% CI
1-2	11.6	(9.7 - 13.8)	10.3	(7.9 - 13.4)	12.8	(10.3 - 15.9)
3-4	9.7	(7.9 - 11.9)	9.0	(6.8 - 11.9)	10.3	(7.8 - 13.6)
5-6	10.4	(8.9 - 12.2)	8.6	(6.5 - 11.3)	12.0	(9.6 – 15.0)
7-8	12.3	(10.5 - 14.4)	9.7	(7.7 - 12.3)	14.7	(12.3 - 17.4)
9-10	15.4	(13.5 - 17.5)	13.5	(10.8 - 16.7)	17.2	(14.9 - 19.8)
Age-adjusted rate ratio 9-10 vs 1-2	1.15	(0.74–1.80)	1.50	(0.80–2.82)	0.79	(0.41–1.53)

*Rate ratios are adjusted by age, sex, and ethnic group.

Table A 1-4. Adult medicated asthma prevalence 2019/20 by NZDep2018, unadjusted

NZDep quintile	Total		Men		Women	
	%	95% CI	%	95% CI	%	95% CI
1-2	9.8	(6.6 - 14.4)	11.0	(6.1 - 18.9)	8.5	(4.7 – 15.0)
3-4	12.2	(8.7 - 16.7)	11.8	(7.0 - 19.2)	12.6	(8.4 - 18.5)
5-6	14.8	(11.1 - 19.3)	16.4	(11.4 – 23.0)	12.9	(8.3 - 19.7)
7-8	14.8	(11.7 - 18.5)	16.4	(11.9 - 22.3)	12.8	(9.1 - 17.8)
9-10	15.5	(12.7 - 18.8)	17.3	(13.0 - 22.6)	13.9	(10.5 - 18.3)
Age and ethnicity adjusted rate ratio 9-10 vs 1-2	**1.40**	**(1.06–1.85)**	1.22	(0.80–1.87)	**1.56**	**(1.11–2.19)**

*Rate ratios are adjusted by age, sex, and ethnic group.

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

A 1.1.2 ASTHMA HOSPITALISATIONS

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

Table A 1-5. Asthma hospitalisations, rates and age-adjusted rates 2000-20120

Year	n	Rate		
		raw	age adj'd	95% CI
2000	7519	194.9	182.6	(178.4-186.7)
2001	8087	208.4	195.2	(190.9-199.6)
2002	7755	196.4	186.9	(182.7-191.1)
2003	8232	204.4	194.9	(190.7-199.2)
2004	8356	204.4	194.1	(189.9-198.3)
2005	8535	206.5	197.2	(193.0-201.4)
2006	8214	196.3	188.4	(184.3-192.5)
2007	7874	186.4	178.7	(174.7-182.7)
2008	8472	198.9	190.7	(186.6-194.8)
2009	9380	218.0	208.3	(204.0-212.5)
2010	9346	214.8	204.9	(200.7-209.0)
2011	8651	197.3	189.9	(185.8-193.9)
2012	8289	188.0	181.4	(177.5-185.4)
2013	7504	168.9	164.1	(160.4-167.8)
2014	7358	162.9	159.6	(156.0-163.3)
2015	7618	165.3	162.8	(159.1-166.4)
2016	7313	155.1	153.8	(150.2-157.3)
2017	7686	159.7	159.0	(155.5-162.6)
2018	7611	155.3	155.3	(151.8-158.8)
2019	7717	155.0	155.5	(152.0-159.0)
2020	5357	105.4	106.0	(103.2-108.9)
Trend 2000 -2019			-2.25	(-3.24 - -1.26), p<0.001

Table A 1-6. 2019 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	2924	305.9	(294.8-316.9)	1737	353.6	(337.0-370.3)	1187	255.4	(270.2-301.3)	0.72	(0.70-0.75)
15-29	1249	121.1	(114.4-127.8)	402	75.8	(68.4-83.2)	847	169.1	(178.9-203.2)	2.23	(2.10-2.36)
30-64	2689	120.5	(115.9-125.0)	803	73.4	(68.3-78.4)	1886	165.7	(147.5-162.2)	2.26	(2.17-2.35)
65+	855	112.5	(105.0-120.1)	273	76.8	(67.7-85.9)	582	143.9	(134.0-158.3)	1.87	(1.75-2.01)

Table A 1-7. 2019 asthma hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	2.54	(2.48-2.60)	4.82	(4.63-5.02)	1.54	(1.49-1.60)
15-29	1.01	(0.97-1.04)	1.03	(0.98-1.10)	1.02	(0.98-1.06)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	0.93	(0.9-0.97)	1.05	(0.98-1.12)	0.87	(0.83-0.91)

Table A 1-8. 2019 asthma hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	2894	370.7	341.4	(327.7-355.1)	3.24	(3.16-3.33)
Pacific	1054	327.4	338.7	(315.6-361.8)	3.22	(3.10-3.34)
Asian	638	82.8	89.6	(82.2-97.1)	0.85	(0.81-0.89)
Non-MPA	3131	100.8	105.3	(101.6-109.1)	1.00	Baseline

Table A 1-9. Asthma hospitalisation rates and rate ratios by ethnic group 2000 - 2020.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
2000	2180	313.8	(296.5-331.1)	901	350.5	(321.4-379.7)	212	91.8	(75.3-108.4)	4226	155.3	(150.6-160.0)
2001	2328	318.4	(301.9-334.9)	1157	419.9	(389.3-450.5)	307	133.3	(114.5-152.1)	4295	158.3	(153.5-163.1)
2002	2431	340.5	(323.3-357.8)	1158	463.8	(429.4-498.2)	282	100.7	(86.7-114.7)	3884	142.9	(138.4-147.4)
2003	2554	370.4	(351.2-389.5)	1348	478.0	(446.4-509.5)	343	117.7	(101.3-134.2)	3987	146.3	(141.8-150.9)
2004	2605	350.3	(333.4-367.2)	1401	474.1	(443.1-505.1)	398	121.2	(107.1-135.4)	3952	144.0	(139.5-148.6)
2005	2733	360.7	(343.3-378.1)	1365	449.1	(419.5-478.7)	454	137.5	(122.6-152.4)	3983	146.3	(141.7-150.8)
2006	2645	338.0	(322.2-353.8)	1317	453.0	(421.6-484.3)	495	141.5	(127.1-155.8)	3757	136.0	(131.6-140.4)
2007	2611	333.5	(318.0-348.9)	1412	480.9	(449.5-512.3)	453	120.6	(108.3-132.9)	3398	122.9	(118.7-127.1)
2008	2680	335.5	(320.0-351.0)	1538	502.5	(472.1-532.8)	543	139.9	(126.3-153.5)	3711	134.6	(130.2-139.0)
2009	3191	388.4	(372.7-404.0)	1593	506.4	(477.0-535.8)	613	151.5	(138.0-165.0)	3983	143.0	(138.5-147.5)
2010	3126	368.4	(352.9-384.0)	1521	490.1	(460.5-519.7)	662	160.3	(146.0-174.5)	4038	145.1	(140.6-149.6)
2011	2855	342.3	(326.9-357.7)	1430	477.6	(447.8-507.5)	636	149.8	(135.6-163.9)	3730	134.0	(129.7-138.4)
2012	2714	327.1	(312.7-341.6)	1368	429.5	(402.4-456.5)	645	150.9	(136.9-164.9)	3562	128.7	(124.4-133.0)
2013	2517	306.2	(292.4-320.0)	1292	410.4	(383.8-437.0)	633	138.0	(125.5-150.6)	3062	111.0	(107.0-115.0)
2014	2458	296.1	(282.5-309.6)	1192	392.4	(366.7-418.1)	554	107.6	(97.8-117.4)	3154	112.6	(108.6-116.6)
2015	2687	319.8	(306.0-333.7)	1188	387.3	(361.5-413.1)	570	107.4	(97.7-117.2)	3173	112.6	(108.6-116.5)
2016	2478	293.5	(280.5-306.5)	1172	375.7	(350.9-400.6)	559	94.3	(85.9-102.8)	3104	109.7	(105.8-113.6)
2017	2680	333.7	(318.9-348.5)	1126	378.0	(352.4-403.5)	557	88.7	(80.8-96.7)	3323	114.6	(110.7-118.6)
2018	2771	320.0	(306.6-333.4)	1168	367.8	(344.1-391.5)	629	92.3	(84.6-100.0)	3043	104.6	(100.8-108.3)
2019	2894	341.4	(327.7-355.1)	1054	338.7	(315.6-361.8)	638	89.6	(82.2-97.1)	3131	105.3	(101.6-109.1)
2020	1946	235.3	(224-246.6)	746	240.1	(220.9-259.4)	400	53.1	(47.7-58.6)	2265	73.5	(70.4-76.5)

Table A 1-10. Asthma hospitalisation ethnic group rate ratios to non-MPA, 2000 – 2020.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.02	(1.96 - 2.08)	2.26	(2.16 - 2.36)	0.59	(0.54 - 0.65)
2001	2.01	(1.95 - 2.07)	2.65	(2.55 - 2.76)	0.84	(0.79 - 0.90)
2002	2.38	(2.31 - 2.45)	3.25	(3.12 - 3.37)	0.70	(0.66 - 0.76)
2003	2.53	(2.46 - 2.61)	3.27	(3.15 - 3.38)	0.80	(0.75 - 0.86)
2004	2.43	(2.37 - 2.50)	3.29	(3.18 - 3.41)	0.84	(0.79 - 0.89)
2005	2.47	(2.40 - 2.54)	3.07	(2.96 - 3.18)	0.94	(0.89 - 0.99)
2006	2.49	(2.42 - 2.55)	3.33	(3.21 - 3.46)	1.04	(0.99 - 1.10)
2007	2.71	(2.64 - 2.79)	3.91	(3.78 - 4.06)	0.98	(0.93 - 1.03)
2008	2.49	(2.43 - 2.56)	3.73	(3.61 - 3.86)	1.04	(0.99 - 1.09)
2009	2.72	(2.65 - 2.78)	3.54	(3.43 - 3.66)	1.06	(1.01 - 1.11)
2010	2.54	(2.48 - 2.60)	3.38	(3.27 - 3.49)	1.10	(1.05 - 1.16)
2011	2.55	(2.49 - 2.62)	3.56	(3.44 - 3.69)	1.12	(1.06 - 1.17)
2012	2.54	(2.48 - 2.61)	3.34	(3.22 - 3.45)	1.17	(1.12 - 1.23)
2013	2.76	(2.68 - 2.84)	3.70	(3.57 - 3.83)	1.24	(1.19 - 1.30)
2014	2.63	(2.56 - 2.70)	3.49	(3.36 - 3.61)	0.96	(0.91 – 1.00)
2015	2.84	(2.77 - 2.92)	3.44	(3.32 - 3.57)	0.95	(0.91 – 1.00)
2016	2.67	(2.60 - 2.75)	3.42	(3.30 - 3.55)	0.86	(0.82 - 0.90)
2017	2.91	(2.83 - 2.99)	3.30	(3.18 - 3.42)	0.77	(0.74 - 0.81)
2018	3.06	(2.98 - 3.14)	3.52	(3.39 - 3.65)	0.88	(0.84 - 0.92)
2019	3.24	(3.16 - 3.33)	3.22	(3.10 - 3.34)	0.85	(0.81 - 0.89)
2020	3.20	(3.11 - 3.30)	3.27	(3.13 - 3.42)	0.72	(0.69 - 0.76)

Table A 1-11. 2019 asthma hospitalisation rates by ethnic group and age.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	1231	485.4	(458.3-512.6)	395	436.5	(393.4-479.5)	360	250.3	(224.4-276.2)	938	200.5	(187.6-213.3)
15-29	594	305.0	(280.5-329.5)	184	217.5	(186.1-248.9)	58	31.9	(23.7-40.1)	413	72.5	(65.5-79.5)
30-64	954	338.2	(316.8-359.7)	388	307.7	(277.1-338.3)	150	39.2	(33.0-45.5)	1197	83.0	(78.3-87.7)
65+	115	229.0	(187.2-270.9)	87	419.2	(331.1-507.3)	70	111.9	(85.7-138.1)	529	88.4	(80.8-95.9)

Table A 1-12. 2019 asthma hospitalisation rates by NZDep2018 quintile.

NZDep quintile	n	Rate				
		raw	age adj'd	95% CI	RR	95% CI
1-2	839	84.4	85.6	(79.8-91.5)	1.00	Baseline
3-4	1098	114.6	116.4	(109.5-123.3)	1.36	(1.30-1.42)
5-6	1274	133.3	136.5	(129.0-144.0)	1.59	(1.53-1.66)
7-8	1846	180.5	183.2	(174.8-191.6)	2.14	(2.06-2.23)
9-10	2659	253.8	247.1	(237.6-256.6)	2.89	(2.78-3.00)

Table A 1-13. Asthma hospitalisation rates by NZDep2018 quintile 2000 - 2020.

	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	682	103.3	(95.4-111.2)	1011	143.7	(134.8-152.7)	1357	171.2	(162.0-180.4)	1827	204.2	(194.7-213.6)	2621	253.6	(243.5-263.7)
2001	752	113.4	(105.2-121.7)	1119	156.4	(147.2-165.7)	1341	168.1	(159.0-177.2)	1934	216.0	(206.3-225.8)	2859	276.7	(266.2-287.3)
2002	669	99.3	(91.7-107.0)	987	137.9	(129.2-146.6)	1412	175.8	(166.6-185.1)	1819	204.8	(195.3-214.3)	2858	278.9	(268.3-289.5)
2003	705	102.5	(94.8-110.2)	1054	143.9	(135.1-152.7)	1388	169.6	(160.6-178.6)	1930	213.6	(204.0-223.2)	3118	300.8	(289.9-311.7)
2004	699	98.6	(91.2-106.1)	1053	138.9	(130.4-147.4)	1353	165.3	(156.4-174.2)	2052	224.0	(214.2-233.7)	3193	300.8	(290.1-311.6)
2005	753	103.1	(95.6-110.6)	1029	135.5	(127.2-143.9)	1377	167.3	(158.4-176.2)	2250	246.5	(236.3-256.7)	3110	291.2	(280.7-301.7)
2006	723	97.5	(90.2-104.7)	1034	134.0	(125.7-142.2)	1296	156.3	(147.7-164.8)	2066	225.9	(216.1-235.6)	3088	289.7	(279.2-300.2)
2007	663	87.4	(80.6-94.2)	892	114.3	(106.7-121.8)	1215	144.9	(136.7-153.1)	2054	223.0	(213.3-232.7)	3043	285.0	(274.6-295.4)
2008	752	97.3	(90.3-104.4)	1062	134.7	(126.5-142.8)	1367	161.4	(152.8-170.0)	2082	224.7	(215.0-234.4)	3185	298.8	(288.2-309.5)
2009	796	99.5	(92.5-106.6)	1272	157.7	(148.9-166.4)	1499	175.6	(166.7-184.6)	2287	244.3	(234.2-254.3)	3520	327.0	(315.9-338.0)
2010	846	104.5	(97.4-111.7)	1312	159.2	(150.6-167.9)	1508	174.3	(165.5-183.1)	2357	249.5	(239.4-259.7)	3321	307.4	(296.7-318.1)
2011	760	92.6	(85.9-99.3)	1168	141.2	(133.1-149.4)	1487	172.7	(163.9-181.5)	2133	226.2	(216.5-235.8)	3096	291.1	(280.6-301.6)
2012	750	90.1	(83.6-96.6)	1172	142.1	(133.9-150.2)	1341	155.1	(146.8-163.4)	2082	220.3	(210.8-229.8)	2943	276.6	(266.3-286.8)
2013	740	89.6	(83.0-96.2)	969	116.5	(109.1-123.9)	1196	138.3	(130.4-146.1)	1855	197.0	(188.0-206.0)	2736	259.2	(249.3-269.1)
2014	618	72.1	(66.4-77.9)	1013	119.8	(112.4-127.2)	1241	142.2	(134.2-150.1)	1853	196.1	(187.2-205.1)	2628	248.4	(238.7-258.0)
2015	683	77.5	(71.6-83.3)	980	113.1	(106.0-120.2)	1253	141.9	(134.0-149.7)	1918	199.4	(190.5-208.4)	2765	259.9	(250.0-269.7)
2016	726	79.7	(73.8-85.5)	1004	114.0	(106.9-121.1)	1141	126.9	(119.6-134.3)	1830	187.6	(179.0-196.2)	2611	245.5	(236.0-255.1)
2017	784	84.0	(78.0-89.9)	1085	120.3	(113.1-127.5)	1234	134.8	(127.2-142.3)	1861	189.0	(180.4-197.7)	2719	256.3	(246.5-266.1)
2018	837	87.6	(81.6-93.6)	1045	113.4	(106.5-120.3)	1188	129.2	(121.8-136.5)	1885	188.6	(180.0-197.1)	2655	245.2	(235.8-254.7)
2019	839	85.6	(79.8-91.5)	1098	116.4	(109.5-123.3)	1274	136.5	(129.0-144.0)	1846	183.2	(174.8-191.6)	2659	247.1	(237.6-256.6)
2020	672	66.6	(61.5-71.7)	840	85.8	(79.9-91.6)	878	91.6	(85.6-97.7)	1311	129.2	(122.2-136.2)	1654	153.6	(146.1-161.0)

Table A 1-14. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2020.

	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	1.39	(1.33 - 1.46)	1.66	(1.58 - 1.73)	1.98	(1.89 - 2.06)	2.45	(2.35 - 2.56)
2001	1.38	(1.32 - 1.44)	1.48	(1.42 - 1.55)	1.90	(1.83 - 1.99)	2.44	(2.34 - 2.54)
2002	1.39	(1.32 - 1.46)	1.77	(1.69 - 1.85)	2.06	(1.97 - 2.15)	2.81	(2.69 - 2.93)
2003	1.40	(1.34 - 1.47)	1.65	(1.58 - 1.73)	2.08	(2.00 - 2.17)	2.93	(2.82 - 3.06)
2004	1.41	(1.34 - 1.48)	1.68	(1.60 - 1.75)	2.27	(2.18 - 2.37)	3.05	(2.93 - 3.18)
2005	1.31	(1.26 - 1.38)	1.62	(1.55 - 1.70)	2.39	(2.30 - 2.49)	2.82	(2.72 - 2.94)
2006	1.37	(1.31 - 1.44)	1.60	(1.53 - 1.68)	2.32	(2.22 - 2.42)	2.97	(2.86 - 3.09)
2007	1.31	(1.24 - 1.37)	1.66	(1.58 - 1.74)	2.55	(2.44 - 2.66)	3.26	(3.13 - 3.40)
2008	1.38	(1.32 - 1.45)	1.66	(1.59 - 1.73)	2.31	(2.22 - 2.40)	3.07	(2.95 - 3.19)
2009	1.58	(1.52 - 1.65)	1.76	(1.69 - 1.84)	2.45	(2.36 - 2.55)	3.28	(3.16 - 3.41)
2010	1.52	(1.46 - 1.59)	1.67	(1.60 - 1.74)	2.39	(2.30 - 2.48)	2.94	(2.83 - 3.05)
2011	1.53	(1.46 - 1.60)	1.87	(1.79 - 1.95)	2.44	(2.35 - 2.54)	3.14	(3.02 - 3.27)
2012	1.58	(1.51 - 1.65)	1.72	(1.65 - 1.80)	2.44	(2.35 - 2.55)	3.07	(2.95 - 3.19)
2013	1.30	(1.24 - 1.36)	1.54	(1.48 - 1.61)	2.20	(2.11 - 2.29)	2.89	(2.78 - 3.01)
2014	1.66	(1.58 - 1.74)	1.97	(1.88 - 2.07)	2.72	(2.60 - 2.84)	3.44	(3.30 - 3.60)
2015	1.46	(1.39 - 1.53)	1.83	(1.75 - 1.92)	2.57	(2.47 - 2.69)	3.36	(3.22 - 3.50)
2016	1.43	(1.37 - 1.50)	1.59	(1.52 - 1.67)	2.36	(2.26 - 2.46)	3.08	(2.96 - 3.21)
2017	1.43	(1.37 - 1.50)	1.60	(1.54 - 1.68)	2.25	(2.16 - 2.34)	3.05	(2.94 - 3.17)
2018	1.29	(1.24 - 1.35)	1.47	(1.41 - 1.54)	2.15	(2.07 - 2.24)	2.80	(2.70 - 2.91)
2019	1.36	(1.30 - 1.42)	1.59	(1.53 - 1.66)	2.14	(2.06 - 2.23)	2.89	(2.78 – 3.00)
2020	1.29	(1.23 - 1.35)	1.38	(1.31 - 1.45)	1.94	(1.85 - 2.03)	2.31	(2.21 - 2.41)

Table A 1-15. 2019 asthma hospitalisation rates by ethnic group and NZDep2018 quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	144	228	429	710	1383
	Rate (raw)	197.0	245.3	347.9	387.9	448.8
	Rate (age adj'd)	164.8	230.1	323.5	362.0	414.4
	95%CI	(135.4-194.2)	(196.2-264.1)	(289.0-358.0)	(332.8-391.1)	(390.6-438.2)
Pacific	Hosp_Num	27	77	104	248	598
	Rate (raw)	158.9	291.7	309.7	389.6	329.8
	Rate (age adj'd)	138.6	263.6	313.9	396.8	359.5
	95%CI	(85.5-191.8)	(199.6-327.6)	(249.8-378.0)	(339.2-454.4)	(326.5-392.5)
Asian	Hosp_Num	88	130	105	178	136
	Rate (raw)	64.8	79.7	72.8	114.8	79.0
	Rate (age adj'd)	65.0	84.9	80.1	127.6	90.7
	95%CI	(50.9-79.1)	(69.6-100.1)	(64.2-96.0)	(106.6-148.6)	(74.8-106.6)
NZ European/ Other	Hosp_Num	580	663	636	710	542
	Rate (raw)	75.5	98.1	97.1	114.3	140.4
	Rate (age adj'd)	77.3	99.9	102.0	123.3	155.1
	95%CI	(70.9-83.8)	(92.1-107.6)	(93.9-110.1)	(113.9-132.7)	(141.5-168.7)

Table A 1-16. 2019 asthma hospitalisation rates by DHB.

DHB	n	Rate		
		raw)	age adj'd	95%CI
Northland	375	197.8	205.1	(184.0-226.2)
Waitemata	900	144.1	145.1	(135.6-154.7)
Auckland	716	143.7	153.6	(142.2-165.0)
Counties Manakau	871	150.4	147.6	(137.6-157.5)
Waikato	879	204.9	200.1	(186.8-213.3)
Lakes	246	213.7	211.1	(184.6-237.5)
Bay of Plenty	433	169.1	173.6	(157.1-190.1)
Tairawhiti	96	191.5	183.2	(146.2-220.3)
Hawkes Bay	265	151.4	150.8	(132.6-169.1)
Taranaki	254	206.6	204.5	(179.2-229.9)
Midcentral	271	147.1	146.8	(129.3-164.4)
Whanganui	198	293.7	304.6	(261.6-347.5)
Capital and Coast	439	137.5	144.0	(130.4-157.5)
Hutt	349	223.8	221.5	(198.2-244.8)
Wairarapa	66	138.3	138.5	(104.1-172.8)
Nelson Marlborough	129	81.6	86.1	(70.9-101.4)
West Coast	36	111.5	117.3	(78.3-156.2)
Canterbury	716	125.7	127.9	(118.5-137.2)
Sth Canterbury	86	140.1	137.9	(108.1-167.6)
Southern	392	114.3	116.8	(105.1-128.4)

A 1.1.3 ASTHMA MORTALITY

Table A 1-17. Asthma mortality rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		raw	age adj'd	95% CI
2000	72	1.87	2.17	(1.66 - 2.67)
2001	71	1.83	2.10	(1.61 - 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	1.89	(1.45 - 2.34)
2005	61	1.48	1.67	(1.25 - 2.09)
2006	78	1.86	2.03	(1.58 - 2.49)
2007	64	1.52	1.63	(1.23 - 2.03)
2008	62	1.46	1.54	(1.16 - 1.93)
2009	55	1.28	1.35	(0.99 - 1.71)
2010	56	1.29	1.34	(0.99 - 1.70)
2011	70	1.60	1.66	(1.27 - 2.05)
2012	64	1.45	1.49	(1.12 - 1.85)
2013	71	1.60	1.62	(1.25 - 2.00)
2014	91	2.01	2.05	(1.63 - 2.47)
2015	89	1.93	1.96	(1.55 - 2.37)
2016	81	1.72	1.73	(1.35 - 2.11)
2017	122	2.53	2.55	(2.10 - 3.00)
Trend 2000 -2017			-0.01	(-0.04 - 0.02), p=0.521

Table A 1-18. Asthma mortality rates and rate ratios by age group and sex, 2010-2017.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	21	0.4	(0.2-0.5)	9	0.3	(0.1-0.5)	12	0.4	(0.2-0.7)	1.40	(0.92-2.14)
15-29	16	0.3	(0.1-0.4)	8	0.3	(0.1-0.5)	8	0.3	(0.1-0.5)	1.04	(0.64-1.66)
30-64	106	0.9	(0.7-1.0)	29	0.5	(0.3-0.7)	77	1.2	(0.9-1.5)	2.49	(2.02-3.06)
65+	375	9.5	(8.5-10.4)	131	7.2	(5.9-8.4)	244	11.5	(10.1-12.9)	1.61	(1.45-1.78)

Table A 1-19. Asthma mortality rate ratios by age group and sex, 2010-2017.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.44	(0.35-0.56)	0.65	(0.46-0.94)	0.37	(0.28-0.50)
15-29	0.33	(0.25-0.42)	0.57	(0.39-0.83)	0.24	(0.17-0.34)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	11.03	(9.94-12.25)	14.71	(12.1-17.88)	9.50	(8.39-10.76)

Table A 1-20. Asthma mortality rates and rate ratios by ethnic group, 2010-2017.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	115	2.7	5.0	(3.9-6.0)	3.36	(3.00-3.78)
Pacific	33	1.9	4.1	(2.5-5.6)	2.76	(2.28-3.35)
Asian	25	0.7	1.6	(0.9-2.3)	1.09	(0.87-1.36)
Non-MPA	345	1.9	1.5	(1.3-1.6)	1.00	Baseline

Table A 1-21. Asthma mortality rates by ethnic group and age, 2010-2017

Age (years)	Māori		Pacific		Asian		non-MPA	
	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI	n	Rate 95% CI
<15	11	0.8 (0.3-1.2)	4	0.8 (0.0-1.5)	2	0.3 (0.1-1.2)	4	0.1 (0.0-0.3)
15-29	10	0.9 (0.4-1.5)	1	0.2 (0.0-1.5)	2	0.2 (0.1-0.8)	3	0.1 (0.0-0.3)
30-64	51	3.3 (2.4-4.2)	8	1.2 (0.4-2.0)	6	0.4 (0.1-0.7)	41	0.5 (0.3-0.6)
65+	43	18.0 (12.6-23.4)	20	19.5 (11-28.1)	15	6.4 (3.2-9.7)	297	8.8 (7.8-9.8)

Table A 1-22. Asthma mortality rates NZDep2018 quintile, 2010-2017.

NZDep quintile	n	Rate		RR 95% CI
		Rate (raw)	Rate (age adj'd) 95% CI	
1-2	54	1.0	1.2 (0.9-1.5)	1.00 Baseline
3-4	75	1.4	1.5 (1.1-1.8)	1.24 (1.05-1.47)
5-6	97	1.8	1.7 (1.4-2.0)	1.42 (1.21-1.67)
7-8	150	2.6	2.4 (2.1-2.8)	2.06 (1.77-2.40)
9-10	139	2.3	2.7 (2.3-3.2)	2.27 (1.95-2.65)

Table A 1-23. Asthma mortality rates by ethnic group and NZDep quintile, 2012-2017.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	0	10	22	32	51
	Rate (raw)	0	2.1	3.3	3.2	2.9
	Rate (age adj'd)	0	4.7	5.7	5.6	5.4
	95%CI	-	(1.4-7.9)	(2.9-8.4)	(3.3-7.8)	(3.7-7.2)
Pacific	Hosp_Num	1	1	5	8	18
	Rate (raw)	1.2	0.7	2.8	2.3	1.8
	Rate (age adj'd)	2.6	1.7	6.8	4.7	3.8
	95%CI	(0.4-18.7)	(0.2-12.1)	(0.1-13.5)	(1.0-8.3)	(1.9-5.8)
Asian	Hosp_Num	2	2	8	8	3
	Rate (raw)	0.3	0.3	1.2	1.1	0.4
	Rate (age adj'd)	0.5	0.9	3.1	2.5	0.8
	95%CI	(0.1-2.1)	(0.2-3.6)	(0.7-5.4)	(0.7-4.4)	(0.2-3.8)
NZ European/ Other	Hosp_Num	51	62	62	102	67
	Rate (raw)	1.2	1.6	1.6	2.8	2.8
	Rate (age adj'd)	1.2	1.3	1.2	1.9	2.0
	95%CI	(0.9-1.5)	(1.0-1.7)	(0.9-1.5)	(1.5-2.2)	(1.5-2.5)

Table A 1-24. Asthma mortality rates by DHB, 2012-2017.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	27	2.63	2.53	(1.56-3.51)
Waitemata	45	1.31	1.45	(1.03-1.88)
Auckland	32	1.13	1.40	(0.91-1.89)
Counties Manukau	45	1.45	1.89	(1.33-2.45)
Waikato	53	2.26	2.25	(1.64-2.85)
Lakes	12	1.88	1.93	(0.84-3.03)
Bay of Plenty	26	1.93	1.75	(1.07-2.43)
Tairawhiti	2	0.70	0.79	(0.20-3.16)
Hawkes Bay	20	2.05	1.87	(1.04-2.69)
Taranaki	15	2.15	1.89	(0.93-2.85)
MidCentral	42	4.05	3.65	(2.54-4.76)
Whanganui	10	2.61	2.16	(0.81-3.50)
Capital and Coast	24	1.33	1.53	(0.92-2.15)
Hutt	25	2.85	2.97	(1.80-4.14)
Wairarapa	5	1.91	1.44	(0.18-2.71)
Nelson Marlborough	19	2.16	1.73	(0.95-2.50)
West Coast	0	0	0	-
Canterbury	72	2.30	2.20	(1.69-2.71)
South Canterbury	9	2.56	1.84	(0.61-3.06)
Southern	32	1.69	1.57	(1.03-2.12)

A 1.1.4 ASTHMA HOSPITALISATION SEASONALITY

Table A 1-25. Ratio of asthma hospitalisations June to September, to hospitalisations February to May and October to January combined.

	Age group	
Year	1 - 14 years	15+ years
2000	1.24	1.38
2001	0.92	1.42
2002	1.15	1.36
2003	1.14	1.72
2004	1.01	1.74
2005	1.35	1.50
2006	1.02	1.60
2007	1.19	1.44
2008	1.04	1.49
2009	1.01	1.40
2010	1.10	1.43
2011	1.04	1.45
2012	1.15	1.62
2013	1.11	1.43
2014	1.44	1.63
2015	1.13	1.66
2016	1.21	1.37
2017	1.30	1.52
2018	0.97	1.36
2019	1.33	1.40

A 1.2. BRONCHIECTASIS

A 1.2.1 SEVERE BRONCHIECTASIS PREVALENCE

Table A 1-26. 2019 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	816	92.2	473	96.3	343	73.8	0.77	(0.67-0.88)
15-29	792	83.8	402	75.8	390	77.9	1.03	(0.89-1.18)
30-64	2166	103.1	926	84.6	1240	109.0	1.28	(1.17-1.39)
65+	4279	562.9	1628	457.0	2651	654.7	1.37	(1.28-1.45)
Total	8053	161.7	3429	144.3	4624	177.1	1.22	(1.17-1.28)

Table A 1-27. 2019 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	0.88	(0.81-0.95)	1.14	(1.02-1.27)	0.68	(0.60-0.76)
15-29	0.79	(0.73-0.86)	0.90	(0.80-1.01)	0.71	(0.64-0.80)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	5.79	(5.50-6.10)	5.40	(4.98-5.85)	6.01	(5.61-6.43)

Table A 1-28. 2019 severe bronchiectasis prevalence rates and rate ratios by ethnic group, age-standardised

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	1819	233.0	355.7	(337.1-374.4)	3.55	(2.98-3.34)
Pacific	1316	408.7	670.7	(628.4-712.9)	5.55	(5.21-5.92)
Asian	495	64.2	112.5	(101.6-123.4)	0.81	(0.74-0.89)
Non-MPA	4423	142.4	118.5	(114.9-122.0)	1.00	Baseline

Table A 1-29. 2019 severe bronchiectasis prevalence rates by NZDep2018 quintile, age-standardised

NZDep quintile	n	Rate				
		raw	age adj'd	95% CI	RR	95% CI
1-2	914	92.1	95.2	(89.0-101.4)	1.00	Baseline
3-4	1196	124.8	123.0	(116.0-130.0)	1.33	(1.22-1.45)
5-6	1353	141.5	132.4	(125.3-139.5)	1.44	(1.33-1.57)
7-8	1763	172.0	168.6	(160.7-176.5)	1.80	(1.66-1.95)
9-10	2583	246.8	270.4	(259.9-280.9)	2.95	(2.73-3.18)

Table A 1-30. 2019 severe bronchiectasis prevalence rates by DHB, age-standardised.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	352	193.8	173.4	(154.9-191.8)
Waitemata	966	151.6	160.7	(150.6-170.9)
Auckland	990	178.3	221.6	(207.6-235.6)
Counties Manukau	1,474	258.3	301.0	(285.5-316.6)
Waikato	758	178.2	175.6	(163.1-188.1)
Lakes	177	158.1	155.7	(132.7-178.7)
Bay of Plenty	576	238.2	206.1	(189.1-223.1)
Tairawhiti	93	187.3	188.9	(150.2-227.5)
Hawkes Bay	263	157.2	143.0	(125.4-160.5)
Taranaki	139	115.1	108.4	(90.3-126.6)
MidCentral	185	102.7	93.7	(80.2-107.3)
Whanganui	73	112.0	97.2	(74.5-119.8)
Capital and Coast	333	103.4	111.3	(99.3-123.3)
Hutt	218	144.1	145.1	(125.9-164.4)
Wairarapa	50	110.0	93.3	(66.6-120.0)
Nelson Marlborough	156	102.4	86.7	(72.6-100.9)
West Coast	46	143.0	124.8	(88.0-161.6)
Canterbury	754	131.0	128.3	(119.1-137.4)
South Canterbury	52	86.1	68.5	(49.2-87.8)
Southern	396	119.0	111.3	(100.4-122.3)

A 1.2.2 BRONCHIECTASIS HOSPITALISATIONS

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

Table A 1-31. Bronchiectasis hospitalisations, rates and age-adjusted rates 2000-2020.

		Rate		
Year	**n**	**Raw**	**(age adj'd)**	**95% CI**
2000	719	18.6	21.1	(19.6 - 22.7)
2001	791	20.4	22.8	(21.2 - 24.4)
2002	782	19.8	21.8	(20.2 - 23.3)
2003	758	18.8	20.6	(19.1 - 22.1)
2004	862	21.1	23.0	(21.5 - 24.6)
2005	825	20.0	21.8	(20.3 - 23.3)
2006	912	21.8	23.8	(22.3 - 25.4)
2007	938	22.2	23.7	(22.1 - 25.2)
2008	935	21.9	23.3	(21.8 - 24.8)
2009	1001	23.3	24.6	(23.1 - 26.2)
2010	1035	23.8	25.3	(23.7 - 26.8)
2011	1161	26.5	27.8	(26.2 - 29.5)
2012	1055	23.9	24.7	(23.2 - 26.2)
2013	1199	27.0	27.6	(26.0 - 29.2)
2014	1243	27.5	27.9	(26.3 - 29.5)
2015	1378	29.9	30.2	(28.6 - 31.8)
2016	1288	27.3	27.6	(26.1 - 29.1)
2017	1498	31.1	31.2	(29.6 - 32.8)
2018	1468	30.0	30.0	(28.4 - 31.5)
2019	1479	29.7	29.5	(28.0 – 31.0)
2020	1226	25.0	23.7	(22.4 – 25.0)
Trend 2000 -2019			0.52	(0.42 - 0.62), p<0.001

Table A 1-32. Bronchiectasis hospitalisation rates and rate ratios by age group, 2000 - 2020

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 - 64.6)
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	76.2	(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)	618	98.7	(90.9 - 106.5)
2014	241	26.4	(23.1 - 29.8)	69	7.4	(5.7 - 9.2)	318	15.7	(14.0 - 17.4)	615	94.8	(87.3 - 102.3)
2015	296	32.3	(28.6 – 36.0)	64	6.6	(5.0 - 8.3)	329	16.0	(14.3 - 17.7)	689	102.8	(95.1 - 110.5)
2016	254	27.5	(24.1 - 30.8)	92	9.2	(7.3 - 11.1)	260	12.4	(10.9 - 13.9)	682	98.6	(91.2 – 106.0)
2017	319	34.1	(30.3 - 37.8)	74	7.3	(5.6 - 8.9)	342	16.0	(14.3 - 17.6)	763	106.9	(99.3 - 114.5)
2018	268	28.3	(24.9 - 31.7)	51	5.0	(3.6 - 6.3)	384	17.5	(15.8 - 19.3)	765	104.1	(96.7 - 111.5)
2019	264	27.6	(24.3 - 30.9)	73	7.1	(5.5 - 8.7)	352	15.8	(14.1 - 17.4)	790	104.0	(96.7 - 111.2)
2020	207	21.4	(18.5 - 24.3)	61	5.9	(4.4 - 7.4)	286	12.5	(11.0 - 13.9)	672	85.0	(78.5 - 91.4)

Table A 1-33. 2019 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	166	18.6	(15.8-21.5)	83	18.2	(14.3-22.1)	83	19.1	(15.0-23.2)	0.94	(0.81-1.09)
15-29	52	6.0	(4.4-7.6)	30	6.9	(4.4-9.4)	22	5.0	(2.9-7.2)	1.41	(1.09-1.82)
30-64	320	16.5	(14.7-18.3)	147	15.6	(13.1-18.2)	173	17.3	(14.8-19.9)	1.68	(1.50-1.87)
65+	400	76.2	(68.7-83.6)	117	49.5	(40.6-58.5)	283	97.9	(86.5-109.3)	1.87	(1.69-2.08)

Table A 1-34. 2019 bronchiectasis hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	1.13	(1.03-1.23)	1.16	(1.02-1.32)	1.10	(0.97-1.25)
15-29	0.36	(0.31-0.42)	0.44	(0.37-0.53)	0.29	(0.23-0.36)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	4.61	(4.29-4.95)	3.17	(2.82-3.56)	5.64	(5.15-6.19)

Table A 1-35. 2019 bronchiectasis hospitalisation rates and rate ratios by prioritised ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	310	44.8	61.4	(53.3-69.6)	3.81	(3.55-4.10)
Pacific	196	68.6	109.8	(91.4-128.3)	6.93	(6.36-7.56)
Asian	70	13.4	35.4	(25.6-45.1)	0.77	(0.67-0.89)
Non-MPA	623	21.2	18.1	(16.6-19.5)	1.00	Baseline

Table A 1-36. Bronchiectasis hospitalisation rates by prioritised ethnic group 2000 - 2020.

Year	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	198	66.4	(54.5-78.3)	133	112.5	(88.6-136.3)	17	22.3	(9.2-35.5)	371	13.5	(12.1-14.9)
2001	212	62.7	(51.2-74.1)	166	134.4	(108.7-160.2)	20	16.7	(8.5-24.9)	393	14.4	(13.0-15.8)
2002	236	68.4	(57.2-79.5)	180	133.5	(108.7-158.3)	24	19.8	(9.6-30.1)	342	12.3	(11.0-13.6)
2003	231	64.2	(52.8-75.5)	178	141.1	(113.2-169.1)	21	14.6	(6.7-22.5)	328	11.4	(10.2-12.7)
2004	268	81.1	(67.5-94.6)	190	141.9	(115.0-168.8)	34	21.8	(13.1-30.6)	370	12.6	(11.3-13.9)
2005	243	61.8	(50.8-72.7)	175	102.3	(82.6-122.0)	26	17.4	(8.8-26.0)	381	12.9	(11.6-14.2)
2006	211	49.7	(41.3-58.1)	204	138.7	(113.6-163.8)	35	21.6	(12.1-31.2)	462	15.2	(13.8-16.6)
2007	268	63.2	(53.3-73.0)	183	110.4	(90.1-130.8)	34	16.2	(10.2-22.1)	453	14.5	(13.2-15.9)
2008	261	53.3	(45.0-61.7)	222	153.7	(127.6-179.7)	48	24.4	(15.7-33.0)	404	12.9	(11.6-14.1)
2009	288	60.3	(51.9-68.8)	226	155.5	(130.7-180.3)	49	23.6	(15.6-31.6)	438	13.6	(12.3-14.8)
2010	255	58.5	(49.5-67.6)	213	134.8	(113.1-156.6)	54	25.7	(17.9-33.5)	513	15.6	(14.2-16.9)
2011	290	63.7	(54.8-72.6)	227	138.1	(116.3-159.9)	59	31.6	(22.2-41.0)	585	17.8	(16.4-19.3)
2012	269	56.0	(47.6-64.4)	193	130.7	(108.5-152.9)	70	32.2	(23.1-41.3)	523	15.4	(14.1-16.8)
2013	310	61.4	(53.3-69.6)	196	109.8	(91.4-128.3)	70	35.4	(25.6-45.1)	623	18.1	(16.6-19.5)
2014	299	52.6	(45.2-59.9)	263	134.6	(115.5-153.6)	61	27.3	(19.1-35.6)	620	17.6	(16.2-19.0)
2015	388	71.3	(62.6-80.0)	252	142.0	(121.3-162.7)	69	21.2	(15.6-26.9)	669	18.9	(17.4-20.3)
2016	370	67.7	(59.3-76.1)	226	133.7	(112.4-155.1)	75	19.9	(14.8-25.0)	617	17.1	(15.7-18.5)
2017	413	77.1	(67.9-86.2)	259	136.5	(116.6-156.4)	67	18.2	(13.3-23.1)	759	20.9	(19.4-22.5)
2018	394	71.7	(63.1-80.3)	262	133.9	(114.9-152.9)	77	20.0	(15.0-25.0)	735	19.6	(18.2-21.1)
2019	432	77.1	(68.1-86.0)	204	109.2	(91.4-126.9)	71	15.7	(11.7-19.7)	772	20.2	(18.7-21.6)
2020	341	60.6	(53.1-68.2)	206	110.2	(92.7-127.8)	60	12.3	(8.9-15.7)	619	15.9	(14.6-17.2)

Table A 1-37. Bronchiectasis hospitalisation rate ratios to non-MPA by prioritised ethnic group 2000 - 2020.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	4.92	(4.45-5.44)	8.34	(7.44-9.35)	1.66	(1.24-2.21)
2001	4.35	(3.93-4.81)	9.33	(8.40-10.36)	1.16	(0.91-1.48)
2002	5.57	(5.07-6.13)	10.88	(9.81-12.08)	1.62	(1.25-2.09)
2003	5.62	(5.08-6.22)	12.37	(11.08-13.8)	1.28	(0.98-1.67)
2004	6.42	(5.84-7.07)	11.25	(10.13-12.49)	1.73	(1.42-2.11)
2005	4.78	(4.33-5.28)	7.91	(7.12-8.79)	1.35	(1.05-1.72)
2006	3.27	(2.98-3.59)	9.14	(8.28-10.08)	1.43	(1.14-1.77)
2007	4.35	(3.98-4.75)	7.60	(6.87-8.40)	1.11	(0.93-1.34)
2008	4.14	(3.79-4.53)	11.93	(10.85-13.12)	1.89	(1.58-2.26)
2009	4.45	(4.10-4.83)	11.47	(10.48-12.55)	1.74	(1.47-2.06)
2010	3.76	(3.45-4.10)	8.66	(7.92-9.46)	1.65	(1.42-1.92)
2011	3.57	(3.30-3.86)	7.74	(7.10-8.44)	1.77	(1.52-2.06)
2012	3.63	(3.34-3.95)	8.47	(7.72-9.29)	2.09	(1.81-2.41)
2013	3.40	(3.15-3.66)	6.08	(5.55-6.65)	1.96	(1.70-2.25)
2014	2.99	(2.76-3.23)	7.65	(7.07-8.28)	1.55	(1.34-1.81)
2015	3.77	(3.52-4.05)	7.52	(6.94-8.14)	1.12	(0.98-1.29)
2016	3.96	(3.69-4.26)	7.83	(7.18-8.54)	1.16	(1.02-1.33)
2017	3.68	(3.44-3.94)	6.52	(6.03-7.06)	0.87	(0.76-0.99)
2018	3.66	(3.42-3.92)	6.83	(6.32-7.38)	1.02	(0.90-1.16)
2019	3.82	(3.58-4.08)	5.41	(4.96-5.90)	0.78	(0.68-0.89)
2020	3.81	(3.55-4.10)	6.93	(6.36-7.56)	0.77	(0.67-0.89)

Table A 1-38. 2019 bronchiectasis hospitalisation rates by prioritised ethnic group and age.

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	132	52.1	(43.2-60.9)	54	59.7	(43.8-75.6)	16	11.1	(5.7-16.6)	62	13.2	(10.0-16.5)
15-29	44	22.6	(15.9-29.3)	8	9.5	(2.9-16.0)	3	1.7	(0.5-5.1)	18	3.2	(1.7-4.6)
30-64	159	56.4	(47.6-65.1)	54	42.8	(31.4-54.2)	11	2.9	(1.2-4.6)	128	8.9	(7.3-10.4)
65+	97	193.2	(154.7-231.6)	88	424.0	(335.4-512.6)	41	65.5	(45.5-85.6)	564	90.0	(82.5-97.4)

Table A 1-39. 2019 bronchiectasis hospitalisation rates by NZDep2018 quintile.

NZDep quintile	n	Rate				
		raw	age adj'd	95% CI	RR	95% CI
1-2	189	19.0	19.3	(16.5-22.1)	1.00	Baseline
3-4	223	23.3	22.9	(19.8-25.9)	1.18	(1.08-1.3)
5-6	246	25.7	23.8	(20.8-26.8)	1.23	(1.13-1.35)
7-8	300	29.3	28.0	(24.8-31.1)	1.45	(1.33-1.58)
9-10	521	49.7	53.8	(49.1-58.4)	2.79	(2.57-3.02)

Table A 1-40. Bronchiectasis hospitalisation rates by NZDep2018 quintile 2000 - 2020.

	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	78	13.8	(10.6-17.0)	95	15.4	(12.2-18.5)	92	13.4	(10.6-16.2)	171	22.9	(19.4-26.4)	283	37.5	(33.0-42.0)
2001	85	15.6	(12.2-19.0)	109	18.2	(14.7-21.6)	133	18.5	(15.4-21.7)	165	21.6	(18.2-24.9)	290	36.2	(31.8-40.5)
2002	62	11.3	(8.4-14.2)	85	13.4	(10.5-16.2)	123	16.8	(13.8-19.8)	182	23.2	(19.8-26.6)	330	40.2	(35.7-44.7)
2003	57	10.3	(7.6-13.0)	104	15.1	(12.2-18.1)	123	16.1	(13.2-19.0)	166	20.7	(17.5-23.8)	305	37.3	(32.9-41.6)
2004	60	10.1	(7.5-12.7)	107	15.8	(12.8-18.9)	127	16.6	(13.7-19.5)	181	22.4	(19.1-25.7)	385	46.7	(41.9-51.5)
2005	66	11.1	(8.4-13.9)	99	14.9	(11.9-17.9)	115	14.8	(12.1-17.5)	235	28.3	(24.6-31.9)	309	36.1	(31.9-40.2)
2006	82	13.2	(10.3-16.1)	119	17.8	(14.6-21.0)	150	18.8	(15.7-21.8)	233	27.7	(24.1-31.3)	328	38.4	(34.2-42.7)
2007	102	15.7	(12.6-18.8)	108	15.5	(12.5-18.4)	143	17.2	(14.4-20.1)	206	24.3	(20.9-27.6)	379	43.6	(39.1-48.1)
2008	72	11.0	(8.4-13.6)	136	18.7	(15.5-21.8)	157	19.2	(16.2-22.3)	196	22.5	(19.3-25.7)	374	42.5	(38.1-47.0)
2009	90	13.0	(10.3-15.8)	122	16.4	(13.4-19.3)	121	14.5	(11.9-17.1)	224	25.7	(22.3-29.1)	441	50.2	(45.4-55.0)
2010	103	13.8	(11.1-16.5)	158	20.5	(17.3-23.7)	157	18.6	(15.7-21.5)	217	24.8	(21.5-28.2)	400	46.8	(42.1-51.5)
2011	101	13.8	(11.0-16.5)	192	25.2	(21.6-28.7)	204	23.9	(20.6-27.2)	259	29.0	(25.4-32.5)	405	45.6	(41.1-50.2)
2012	100	13.3	(10.6-15.9)	151	18.9	(15.9-21.9)	182	20.7	(17.7-23.8)	235	25.6	(22.3-28.9)	387	43.6	(39.2-48.1)
2013	142	17.6	(14.7-20.5)	162	19.9	(16.8-23.0)	209	23.3	(20.2-26.5)	254	27.3	(23.9-30.7)	432	47.6	(43.0-52.1)
2014	143	17.6	(14.7-20.5)	204	24.3	(20.9-27.6)	207	22.7	(19.6-25.8)	252	26.6	(23.3-29.9)	436	47.4	(42.9-52.0)
2015	125	14.7	(12.1-17.4)	206	23.8	(20.5-27.0)	243	25.9	(22.7-29.2)	305	31.3	(27.8-34.8)	498	52.9	(48.2-57.7)
2016	146	17.0	(14.2-19.8)	198	22.2	(19.1-25.2)	165	17.2	(14.6-19.8)	300	29.9	(26.5-33.3)	477	49.9	(45.4-54.5)
2017	171	19.2	(16.3-22.1)	242	26.1	(22.8-29.4)	227	22.9	(19.9-25.9)	316	31.0	(27.6-34.4)	542	56.1	(51.3-60.9)
2018	154	15.7	(13.2-18.2)	240	25.1	(21.9-28.3)	236	23.3	(20.3-26.3)	302	28.9	(25.6-32.2)	536	55.8	(51.0-60.5)
2019	189	19.3	(16.5-22.1)	223	22.9	(19.8-25.9)	246	23.8	(20.8-26.8)	300	28.0	(24.8-31.1)	521	53.8	(49.1-58.4)
2020	148	14.3	(12.0-16.7)	191	18.9	(16.2-21.6)	185	17.4	(14.9-19.9)	255	23.3	(20.4-26.2)	446	45.1	(40.9-49.3)

Table A 1-41. Bronchiectasis hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2020.

	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	1.12	(0.96 - 1.30)	0.97	(0.84 - 1.13)	1.66	(1.45 - 1.90)	2.72	(2.40 - 3.09)
2001	1.16	(1.01 - 1.34)	1.19	(1.04 - 1.36)	1.38	(1.21 - 1.57)	2.32	(2.05 - 2.61)
2002	1.18	(1.00 - 1.39)	1.48	(1.28 - 1.73)	2.05	(1.78 - 2.37)	3.55	(3.10 - 4.07)
2003	1.47	(1.25 - 1.72)	1.56	(1.34 - 1.83)	2.01	(1.73 - 2.33)	3.62	(3.14 - 4.16)
2004	1.57	(1.34 - 1.83)	1.64	(1.41 - 1.91)	2.21	(1.91 - 2.56)	4.61	(4.03 - 5.28)
2005	1.34	(1.15 - 1.56)	1.33	(1.14 - 1.54)	2.54	(2.22 - 2.90)	3.24	(2.84 - 3.69)
2006	1.35	(1.18 - 1.55)	1.42	(1.25 - 1.62)	2.10	(1.85 - 2.38)	2.92	(2.59 - 3.29)
2007	0.99	(0.86 - 1.13)	1.10	(0.97 - 1.24)	1.55	(1.37 - 1.74)	2.78	(2.49 - 3.09)
2008	1.70	(1.47 - 1.95)	1.75	(1.52 – 2.00)	2.04	(1.79 - 2.33)	3.87	(3.41 - 4.38)
2009	1.26	(1.10 - 1.44)	1.11	(0.97 - 1.27)	1.97	(1.75 - 2.22)	3.85	(3.44 - 4.31)
2010	1.48	(1.31 - 1.68)	1.35	(1.19 - 1.52)	1.80	(1.60 - 2.02)	3.39	(3.05 - 3.77)
2011	1.83	(1.62 - 2.06)	1.73	(1.54 - 1.95)	2.10	(1.88 - 2.36)	3.31	(2.98 - 3.69)
2012	1.42	(1.26 - 1.61)	1.56	(1.39 - 1.76)	1.93	(1.72 - 2.16)	3.29	(2.95 - 3.66)
2013	1.13	(1.01 - 1.26)	1.33	(1.19 - 1.47)	1.55	(1.40 - 1.71)	2.70	(2.46 - 2.97)
2014	1.38	(1.24 - 1.53)	1.29	(1.16 - 1.43)	1.51	(1.36 - 1.67)	2.69	(2.45 - 2.95)
2015	1.61	(1.45 - 1.80)	1.76	(1.58 - 1.95)	2.12	(1.92 - 2.35)	3.59	(3.26 - 3.95)
2016	1.30	(1.17 - 1.45)	1.01	(0.91 - 1.13)	1.76	(1.60 - 1.94)	2.94	(2.68 - 3.22)
2017	1.36	(1.24 - 1.50)	1.20	(1.09 - 1.32)	1.62	(1.48 - 1.77)	2.93	(2.69 - 3.19)
2018	1.60	(1.45 - 1.76)	1.48	(1.34 - 1.64)	1.84	(1.67 - 2.02)	3.54	(3.25 - 3.87)
2019	1.18	(1.08 - 1.30)	1.23	(1.13 - 1.35)	1.45	(1.33 - 1.58)	2.79	(2.57 - 3.02)
2020	1.32	(1.19 - 1.47)	1.21	(1.09 - 1.35)	1.63	(1.47 - 1.80)	3.15	(2.88 - 3.45)

Table A 1-42. 2019 bronchiectasis hospitalisation rates by ethnic group and NZDep2018 quintile.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	29	41	45	71	246
	Rate (raw)	39.7	44.1	36.5	38.8	79.8
	Rate (age adj'd)	68.5	52.2	61.8	50.4	109.1
	95%CI	(37.3-99.6)	(33.6-70.8)	(41.1-82.6)	(36.2-64.6)	(92.3-126.0)
Pacific	Hosp_Num	4	14	21	33	132
	Rate (raw)	23.5	53.0	62.5	51.8	72.8
	Rate (age adj'd)	45.8	74.0	97.9	115.4	118.9
	95%CI	(16.6-126.9)	(28.3-119.6)	(52.2-143.6)	(67.6-163.3)	(95.3-142.5)
Asian	Hosp_Num	6	22	12	13	18
	Rate (raw)	4.4	13.5	8.3	8.4	10.5
	Rate (age adj'd)	5.8	24.4	13.8	13.1	17.9
	95%CI	(1.0-10.6)	(13.3-35.4)	(5.2-22.4)	(5.6-20.6)	(9.1-26.7)
NZ European/ Other	Hosp_Num	150	146	168	183	125
	Rate (raw)	19.5	21.6	25.7	29.5	32.4
	Rate (age adj'd)	17.8	18.2	20.3	22.5	25.3
	95%CI	(14.9-20.6)	(15.2-21.2)	(17.1-23.5)	(19.1-25.9)	(20.7-30.0)

Table A 1-43. 2019 bronchiectasis hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	86	45.4	40.5	(31.8-49.2)
Waitemata	146	23.4	24.9	(20.9-29.0)
Auckland	140	28.1	34.2	(28.5-39.9)
Counties Manukau	215	37.1	43.4	(37.5-49.3)
Waikato	188	43.8	42.6	(36.5-48.7)
Lakes	55	47.8	45.6	(33.6-57.7)
Bay of Plenty	125	48.8	42.1	(34.6-49.5)
Tairawhiti	27	53.9	51.4	(31.9-71.0)
Hawkes Bay	68	38.9	36.3	(27.6-44.9)
Taranaki	24	19.5	18.0	(10.8-25.2)
MidCentral	51	27.7	25.4	(18.4-32.4)
Whanganui	20	29.7	24.5	(13.6-35.4)
Capital and Coast	55	17.2	19.2	(14.1-24.3)
Hutt	27	17.3	17.8	(11.1-24.5)
Wairarapa	4	8.4	8.0	(0.0-16.1)
Nelson Marlborough	34	21.5	16.1	(10.7-21.5)
West Coast	8	24.8	18.0	(5.5-30.5)
Canterbury	151	26.5	25.8	(21.7-29.9)
South Canterbury	7	11.4	10.1	(2.3-17.8)
Southern	48	14.0	13.1	(9.4-16.8)

A 1.2.3 BRONCHIECTASIS MORTALITY

Table A 1-44. Bronchiectasis mortality rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	42	1.09	1.32	(0.92-1.72)
2001	42	1.08	1.28	(0.89-1.68)
2002	57	1.44	1.73	(1.28-2.18)
2003	58	1.44	1.72	(1.27-2.16)
2004	57	1.39	1.63	(1.21-2.06)
2005	57	1.38	1.60	(1.18-2.01)
2006	69	1.65	1.88	(1.44-2.33)
2007	78	1.85	2.10	(1.63-2.56)
2008	95	2.23	2.50	(2.00-3.01)
2009	94	2.18	2.43	(1.94-2.92)
2010	94	2.16	2.33	(1.86-2.80)
2011	87	1.98	2.13	(1.68-2.58)
2012	102	2.31	2.41	(1.94-2.88)
2013	97	2.18	2.27	(1.81-2.72)
2014	109	2.41	2.46	(2.00-2.92)
2015	119	2.58	2.64	(2.16-3.11)
2016	106	2.25	2.29	(1.85-2.73)
2017	154	3.20	3.23	(2.72-3.74)
Trend 2000 -2017			0.08	(0.06 – 0.10), p<0.001

Table A 1-45. Bronchiectasis mortality rates and rate ratios by age group and sex, 2012-2017.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	0	0	-	0	0	-	0	0	-	-	-
15-29	4	0.1	(0.0-0.1)	3	0.1	(0.0-0.3)	1	0.0	(0.0-0.3)	0.35	(0.12-1.03)
30-64	72	0.6	(0.4-0.7)	28	0.5	(0.3-0.6)	44	0.7	(0.5-0.9)	1.47	(1.17-1.85)
65+	611	15.5	(14.2-16.7)	225	12.3	(10.7-13.9)	386	18.2	(16.4-20)	1.48	(1.37-1.60)

Table A 1-46. Bronchiectasis mortality rate ratios by age group and sex, 2012-2017.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	-		-		-	
15-29	0.12	(0.07-0.20)	0.22	(0.12-0.39)	0.05	(0.02-0.13)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	26.46	(23.51-29.78)	26.17	(21.63-31.65)	26.31	(22.62-30.60)

Table A 1-47. Bronchiectasis mortality rates and rate ratios by ethnic group, 2012-2017.

Prioritised Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	115	2.7	7.2	(5.7-8.6)	3.65	(3.28-4.06)
Pacific	74	4.2	11.4	(8.6-14.3)	5.81	(5.12-6.61)
Asian	30	0.9	2.5	(1.6-3.5)	1.30	(1.07-1.56)
Non-MPA	468	2.6	2.0	(1.8-2.1)	1.00	Baseline

Table A 1-48. Bronchiectasis mortality rates by prioritised ethnic group and age, 2012-2017

	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	0	-	0	0	-	0	0	-
15-29	2	0.2	(0.0-0.7)	2	0.4	(0.1-1.7)	0	0	-	0	0	-
30-64	30	1.9	(1.2-2.6)	16	2.4	(1.2-3.5)	4	0.2	(0.0-0.5)	22	0.3	(0.2-0.4)
65+	83	34.7	(27.3-42.2)	56	54.7	(40.4-69.1)	26	11.2	(6.9-15.5)	446	13.2	(12.0-14.4)

Table A 1-49. Bronchiectasis mortality rates NZDep2018 quintile, 2012-2017.

NZDep quintile	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	87	1.6	1.9	(1.5-2.3)	1.00	Baseline
3-4	112	2.2	2.2	(1.8-2.6)	1.17	(1.02-1.34)
5-6	142	2.7	2.4	(2.0-2.8)	1.26	(1.10-1.43)
7-8	177	3.1	2.9	(2.4-3.3)	1.52	(1.34-1.72)
9-10	169	2.8	3.4	(2.9-4.0)	1.81	(1.60-2.06)

Table A 1-50. Bronchiectasis mortality rates by ethnic group and NZDep2018 quintile, 2012-2017.

Ethnic group		NZDep2018 quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Deaths	4	7	14	32	58
	Rate (raw)	1.1	1.4	2.1	3.2	3.3
	Rate (age adj'd)	4.1	3.0	4.7	8.0	9.2
	95%CI	(1.3-13.6)	(0.6-5.3)	(2-7.5)	(5.0-11.0)	(6.6-11.7)
Pacific	Deaths	2	4	8	11	49
	Rate (raw)	2.3	2.9	4.5	3.1	4.8
	Rate (age adj'd)	2.2	10.0	11.4	8.7	13.7
	95%CI	(0.5-8.7)	(0.0-19.9)	(3.1-19.8)	(3.3-14.0)	(9.5-17.8)
Asian	Deaths	6	9	5	8	2
	Rate (raw)	1.0	1.2	0.7	1.1	0.3
	Rate (age adj'd)	2.8	3.4	2.1	3.3	0.7
	95%CI	(0.5-5.2)	(1.1-5.7)	(0.2-4.0)	(0.9-5.7)	(0.2-2.7)
NZ European/ Other	Deaths	75	92	115	126	60
	Rate (raw)	1.8	2.4	3.0	3.5	2.5
	Rate (age adj'd)	1.8	2.0	2.1	2.3	1.6
	95%CI	(1.4-2.2)	(1.6-2.4)	(1.7-2.4)	(1.9-2.7)	(1.2-2.0)

Table A 1-51. Bronchiectasis mortality rates by DHB, 2012-2017.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	30	2.9	2.5	(1.6-3.4)
Waitemata	80	2.3	2.6	(2.1-3.2)
Auckland	74	2.6	3.4	(2.6-4.2)
Counties Manukau	97	3.1	4.4	(3.5-5.3)
Waikato	48	2.0	2.1	(1.5-2.6)
Bay of Plenty	18	2.8	2.9	(1.6-4.2)
Taranaki	33	2.4	2.0	(1.3-2.6)
Lakes	12	4.2	4.4	(1.9-6.8)
Tairawhiti	30	3.1	2.7	(1.7-3.7)
Whanganui	13	1.9	1.6	(0.7-2.4)
MidCentral	24	2.3	2.1	(1.2-2.9)
Hawke's Bay	4	1.0	0.8	(0.0-1.6)
Capital and Coast	33	1.8	2.1	(1.4-2.9)
Hutt Valley	27	3.1	3.3	(2.1-4.6)
Wairarapa	5	1.9	1.5	(0.2-2.7)
Nelson Marlborough	25	2.8	2.3	(1.4-3.1)
West Coast	3	1.5	1.4	(0.5-4.4)
Canterbury	82	2.6	2.5	(1.9-3.0)
South Canterbury	6	1.7	1.1	(0.2-2.0)
Southern	43	2.3	2.1	(1.5-2.7)

A 1.3. CHILDHOOD BRONCHIOLITIS

A 1.3.1 CHILDHOOD BRONCHIOLITIS HOSPITALISATIONS

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

Table A 1-52. Childhood bronchiolitis hospitalisations, rates and age-adjusted rates 2000-2020.

Year	n	Rate	95% CI
2000	3984	1405.7	(1362.0 - 1449.3)
2001	4187	1490.0	(1444.9 - 1535.2)
2002	4663	1658.6	(1611.0 - 1706.2)
2003	4489	1592.7	(1546.1 - 1639.3)
2004	4392	1542.9	(1497.3 - 1588.5)
2005	4292	1509.6	(1464.4 - 1554.7)
2006	4500	1573.4	(1527.5 - 1619.4)
2007	4511	1539.1	(1494.2 – 1584.0)
2008	5349	1776.9	(1729.3 - 1824.5)
2009	6312	2054.7	(2004.0 - 2105.4)
2010	5797	1844.1	(1796.7 - 1891.6)
2011	5735	1806.5	(1759.8 - 1853.3)
2012	6411	2030.5	(1980.8 - 2080.2)
2013	5461	1750.7	(1704.3 - 1797.1)
2014	5909	1916.1	(1867.3 – 1965.0)
2015	6456	2115.3	(2063.7 - 2166.9)
2016	5645	1852.6	(1804.3 – 1901.0)
2017	6342	2075.8	(2024.7 - 2126.9)
2018	6443	2112.3	(2060.7 - 2163.8)
2019	6380	2087.4	(2036.1 - 2138.6)
2020	1812	593.4	(566.1 - 620.7)
Trend 2000 - 2019		35.1	(25.4-44.8), p<0.000

Table A 1-53. 2019 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
6380	2087.4	(2036.1-2138.6)	3994	2543	(2463.8-2621.5)	2385	1605.3	(1540.9-1669.7)	0.63	(0.62-0.65)

Table A 1-54. 2019 childhood bronchiolitis hospitalisation rates and rate ratios by ethnic group.

Prioritised Ethnicity	n	Rate			
		Raw	95% CI	RR	95%CI
Māori	2951	3510.1	(3383.5-3636.8)	2.89	(2.81-2.98)
Pacific	1384	4709.9	(4461.7-4958)	3.88	(3.75-4.02)
Asian	404	709.0	(639.9-778.1)	0.58	(0.55-0.62)
Non-MPA	1641	1214.2	(1155.5-1273)	1.00	Baseline

Table A 1-55. Childhood bronchiolitis hospitalisation rates by ethnic group 2000 - 2020.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	1631	2153.9	(2049.3-2258.4)	792	2939.5	(2734.8-3144.3)	72	408.1	(313.9-502.4)	1489	912.9	(866.6-959.3)
2001	1816	2434.0	(2322.0-2545.9)	1066	3929.1	(3693.2-4165.0)	68	379.1	(289.0-469.3)	1237	766.6	(723.9-809.4)
2002	1934	2597.5	(2481.8-2713.3)	1215	4408.6	(4160.7-4656.5)	81	412.1	(322.3-501.8)	1433	898.6	(852.1-945.1)
2003	1956	2646.5	(2529.2-2763.8)	1202	4295.3	(4052.5-4538.1)	101	464.3	(373.8-554.9)	1230	777.4	(734.0-820.9)
2004	1995	2699.6	(2581.1-2818.0)	1074	3739.3	(3515.7-3962.9)	106	462.1	(374.1-550.1)	1217	764.9	(721.9-807.9)
2005	1968	2689.6	(2570.8-2808.5)	967	3363.1	(3151.2-3575.1)	121	518.0	(425.7-610.3)	1236	777.1	(733.7-820.4)
2006	2013	2756.1	(2635.7-2876.5)	1136	4013.3	(3779.9-4246.7)	99	412.9	(331.6-494.2)	1252	779.1	(736.0-822.3)
2007	2034	2638.9	(2524.2-2753.6)	1105	3842.8	(3616.2-4069.4)	111	428.8	(349.1-508.6)	1261	781.3	(738.2-824.4)
2008	2457	3029.4	(2909.6-3149.2)	1354	4561.8	(4318.9-4804.8)	145	517.5	(433.2-601.7)	1393	858.6	(813.5-903.7)
2009	2920	3486.9	(3360.4-3613.3)	1630	5376.5	(5115.5-5637.5)	176	588.4	(501.5-675.3)	1586	971.6	(923.8-1019.4)
2010	2587	3006.5	(2890.6-3122.4)	1387	4436.0	(4202.5-4669.4)	176	551.2	(469.8-632.7)	1647	997.5	(949.3-1045.6)
2011	2569	2963.1	(2848.5-3077.7)	1414	4450.7	(4218.8-4682.7)	210	618.3	(534.7-702.0)	1542	934.3	(887.7-981.0)
2012	2961	3460.4	(3335.8-3585.1)	1617	5097.4	(4849.0-5345.9)	249	700.5	(613.5-787.5)	1584	972.3	(924.5-1020.2)
2013	2378	2829.3	(2715.6-2943.0)	1389	4519.6	(4281.9-4757.3)	235	631.7	(550.9-712.5)	1459	912.2	(865.4-959.0)
2014	2613	3125.4	(3005.6-3245.3)	1410	4646.0	(4403.4-4888.5)	252	640.7	(561.6-719.8)	1634	1053.5	(1002.5-1104.6)
2015	3007	3625.6	(3496.0-3755.2)	1544	5148.4	(4891.6-5405.2)	333	782.2	(698.2-866.3)	1572	1050.2	(998.3-1102.1)
2016	2488	2996.2	(2878.4-3113.9)	1254	4219.5	(3986.0-4453.1)	357	771.2	(691.2-851.2)	1546	1061.5	(1008.6-1114.4)
2017	2989	3580.3	(3452.0-3708.7)	1427	4822.1	(4571.9-5072.3)	325	646.6	(576.3-716.9)	1601	1126.1	(1070.9-1181.2)
2018	3030	3619.7	(3490.8-3748.6)	1392	4715.8	(4468.0-4963.5)	358	677.6	(607.4-747.8)	1663	1197.0	(1139.5-1254.6)
2019	2951	3510.1	(3383.5-3636.8)	1384	4709.9	(4461.7-4958.0)	404	709.0	(639.9-778.1)	1641	1214.2	(1155.5-1273.0)
2020	961	1140.7	(1068.5-1212.8)	374	1280.1	(1150.4-1409.9)	96	158.6	(126.9-190.3)	381	290.2	(261.0-319.3)

Table A 1-56. Childhood bronchiolitis hospitalisation rate ratios to non-MPA by ethnic group 2000 - 2020.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.36	(2.28 - 2.44)	3.22	(3.09 - 3.36)	0.45	(0.40 - 0.50)
2001	3.17	(3.07 - 3.29)	5.13	(4.93 - 5.33)	0.49	(0.44 - 0.56)
2002	2.89	(2.80 - 2.99)	4.91	(4.73 - 5.09)	0.46	(0.41 - 0.51)
2003	3.40	(3.29 - 3.52)	5.53	(5.32 - 5.74)	0.60	(0.54 - 0.66)
2004	3.53	(3.41 - 3.65)	4.89	(4.70 - 5.09)	0.60	(0.55 - 0.67)
2005	3.46	(3.34 - 3.58)	4.33	(4.16 - 4.51)	0.67	(0.61 - 0.73)
2006	3.54	(3.42 - 3.66)	5.15	(4.95 - 5.36)	0.53	(0.48 - 0.59)
2007	3.38	(3.26 - 3.49)	4.92	(4.73 - 5.11)	0.55	(0.50 - 0.60)
2008	3.53	(3.42 - 3.64)	5.31	(5.12 - 5.51)	0.60	(0.55 - 0.65)
2009	3.59	(3.48 - 3.70)	5.53	(5.35 - 5.72)	0.61	(0.56 - 0.65)
2010	3.01	(2.93 - 3.11)	4.45	(4.30 - 4.60)	0.55	(0.51 - 0.60)
2011	3.17	(3.08 - 3.27)	4.76	(4.60 - 4.93)	0.66	(0.62 - 0.71)
2012	3.56	(3.46 - 3.67)	5.24	(5.07 - 5.42)	0.72	(0.68 - 0.77)
2013	3.10	(3.01 - 3.20)	4.95	(4.78 - 5.13)	0.69	(0.65 - 0.74)
2014	2.97	(2.88 - 3.06)	4.41	(4.26 - 4.56)	0.61	(0.57 - 0.65)
2015	3.45	(3.35 - 3.56)	4.90	(4.74 - 5.07)	0.74	(0.70 - 0.79)
2016	2.82	(2.74 - 2.91)	3.98	(3.83 - 4.12)	0.73	(0.69 - 0.77)
2017	3.18	(3.09 - 3.27)	4.28	(4.14 - 4.43)	0.57	(0.54 - 0.61)
2018	3.02	(2.94 - 3.11)	3.94	(3.81 - 4.08)	0.57	(0.54 - 0.60)
2019	2.89	(2.81 - 2.98)	3.88	(3.75 - 4.02)	0.58	(0.55 - 0.62)
2020	3.93	(3.71 - 4.16)	4.41	(4.12 - 4.73)	0.55	(0.49 - 0.61)

Table A 1-57. 2019 childhood bronchiolitis hospitalisation rates by NZDep2018 quintile.

NZDep quintile	n	Rate	95% CI	RR	95% CI
1-2	564	1106.4	(1015.1-1197.7)	1.00	Baseline
3-4	773	1460.5	(1357.6-1563.5)	1.32	(1.25-1.39)
5-6	876	1567.4	(1463.6-1671.2)	1.42	(1.35-1.49)
7-8	1474	2225.1	(2111.5-2338.7)	2.01	(1.92-2.11)
9-10	2692	3385.2	(3257.3-3513.1)	3.06	(2.93-3.20)

Table A 1-58. Childhood bronchiolitis hospitalisation rates by NZDep2018 quintile 2000 - 2020.

	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	291	691.9	(612.4-771.3)	417	918.8	(830.6-1007.0)	598	1142.7	(1051.1-1234.3)	880	1435.7	(1340.8-1530.5)	1782	2164.9	(2064.4-2265.4)
2001	257	603.9	(530.1-677.8)	411	904.5	(817.1-992.0)	546	1055.0	(966.5-1143.5)	990	1641.5	(1539.2-1743.7)	1896	2342.2	(2236.8-2447.6)
2002	280	647.7	(571.8-723.5)	473	1032.1	(939.1-1125.1)	648	1255.7	(1159.0-1352.4)	1002	1673.1	(1569.5-1776.7)	2257	2801.4	(2685.8-2916.9)
2003	222	503.6	(437.3-569.8)	409	881.5	(796.1-967.0)	542	1050.3	(961.9-1138.7)	1020	1712.5	(1607.4-1817.6)	2245	2799.5	(2683.7-2915.3)
2004	268	592.4	(521.5-663.3)	387	817.9	(736.4-899.3)	484	931.3	(848.4-1014.3)	977	1635.5	(1533.0-1738.1)	2275	2829.9	(2713.6-2946.2)
2005	266	578.6	(509.0-648.1)	356	745.6	(668.1-823.0)	561	1082.7	(993.1-1172.3)	1014	1711.6	(1606.3-1817.0)	2085	2621.1	(2508.6-2733.6)
2006	247	523.5	(458.2-588.8)	372	765.1	(687.4-842.9)	483	927.2	(844.5-1009.9)	1038	1753.5	(1646.8-1860.2)	2357	2987.0	(2866.4-3107.6)
2007	291	603.1	(533.8-672.4)	399	801.9	(723.2-880.6)	470	881.2	(801.5-960.9)	1139	1871.8	(1763.1-1980.5)	2210	2731.7	(2617.8-2845.6)
2008	305	618.1	(548.7-687.5)	443	869.0	(788.0-949.9)	658	1202.7	(1110.8-1294.6)	1112	1771.3	(1667.2-1875.4)	2812	3379.4	(3254.5-3504.3)
2009	333	661.5	(590.4-732.5)	552	1061.4	(972.9-1150.0)	743	1330.0	(1234.4-1425.6)	1404	2183.3	(2069.1-2297.5)	3274	3866.5	(3734.1-3998.9)
2010	347	673.1	(602.3-744.0)	598	1122.7	(1032.7-1212.7)	783	1369.3	(1273.4-1465.2)	1275	1930.6	(1824.6-2036.5)	2792	3235.3	(3115.3-3355.3)
2011	369	707.9	(635.7-780.1)	516	957.7	(875.0-1040.3)	738	1276.0	(1183.9-1368.0)	1225	1831.7	(1729.1-1934.3)	2887	3329.0	(3207.6-3450.4)
2012	395	759.0	(684.2-833.9)	629	1170.3	(1078.9-1261.8)	810	1405.2	(1308.4-1502.0)	1421	2131.8	(2021.0-2242.7)	3153	3681.9	(3553.4-3810.4)
2013	309	597.2	(530.6-663.7)	515	964.9	(881.6-1048.2)	674	1180.5	(1091.4-1269.6)	1259	1906.1	(1800.8-2011.4)	2701	3229.5	(3107.7-3351.3)
2014	354	691.4	(619.3-763.4)	558	1056.3	(968.6-1143.9)	772	1368.6	(1272.0-1465.1)	1374	2095.2	(1984.5-2206.0)	2850	3461.3	(3334.2-3588.3)
2015	414	816.7	(738.1-895.4)	623	1189.5	(1096.1-1282.9)	779	1396.1	(1298.1-1494.1)	1480	2271.5	(2155.8-2387.2)	3147	3878.7	(3743.2-4014.2)
2016	415	819.0	(740.2-897.8)	618	1178.8	(1085.9-1271.8)	729	1308.1	(1213.1-1403.0)	1303	1994.8	(1886.5-2103.1)	2576	3198.8	(3075.2-3322.3)
2017	441	867.2	(786.3-948.1)	641	1216.5	(1122.3-1310.7)	857	1533.7	(1431.0-1636.4)	1475	2243.6	(2129.1-2358.1)	2922	3637.7	(3505.8-3769.6)
2018	502	987.3	(901.0-1073.7)	713	1353.0	(1253.7-1452.3)	867	1554.3	(1450.8-1657.7)	1475	2240.7	(2126.4-2355.1)	2884	3613.8	(3481.9-3745.7)
2019	564	1106.4	(1015.1-1197.7)	773	1460.5	(1357.6-1563.5)	876	1567.4	(1463.6-1671.2)	1474	2225.1	(2111.5-2338.7)	2692	3385.2	(3257.3-3513.1)
2020	149	292.3	(245.4-339.2)	174	328.4	(279.6-377.1)	259	463.8	(407.3-520.3)	408	614.1	(554.5-673.7)	821	1038.8	(967.7-1109.8)

Table A 1-59. Childhood bronchiolitis hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2020.

	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	1.33 (1.24 - 1.43)	1.65 (1.54 - 1.77)	2.08 (1.95 - 2.21)	3.13 (2.95 - 3.32)
2001	1.50 (1.39 - 1.62)	1.75 (1.63 - 1.88)	2.72 (2.54 - 2.90)	3.88 (3.64 - 4.13)
2002	1.59 (1.48 - 1.71)	1.94 (1.81 - 2.08)	2.58 (2.42 - 2.75)	4.33 (4.07 - 4.59)
2003	1.75 (1.62 - 1.89)	2.09 (1.93 - 2.25)	3.40 (3.17 - 3.65)	5.56 (5.20 - 5.94)
2004	1.38 (1.28 - 1.49)	1.57 (1.46 - 1.69)	2.76 (2.59 - 2.95)	4.78 (4.49 - 5.08)
2005	1.29 (1.19 - 1.39)	1.87 (1.74 - 2.01)	2.96 (2.77 - 3.16)	4.53 (4.26 - 4.82)
2006	1.46 (1.35 - 1.58)	1.77 (1.64 - 1.91)	3.35 (3.13 - 3.58)	5.71 (5.35 - 6.08)
2007	1.33 (1.24 - 1.43)	1.46 (1.36 - 1.57)	3.10 (2.92 - 3.30)	4.53 (4.27 - 4.81)
2008	1.41 (1.31 - 1.51)	1.95 (1.82 - 2.08)	2.87 (2.70 - 3.05)	5.47 (5.16 - 5.79)
2009	1.60 (1.50 - 1.71)	2.01 (1.89 - 2.14)	3.30 (3.11 - 3.50)	5.85 (5.53 - 6.17)
2010	1.67 (1.56 - 1.78)	2.03 (1.91 - 2.16)	2.87 (2.71 - 3.04)	4.81 (4.55 - 5.07)
2011	1.35 (1.27 - 1.44)	1.80 (1.70 - 1.92)	2.59 (2.45 - 2.74)	4.70 (4.46 - 4.96)
2012	1.54 (1.45 - 1.64)	1.85 (1.75 - 1.96)	2.81 (2.66 - 2.96)	4.85 (4.61 - 5.10)
2013	1.62 (1.51 - 1.73)	1.98 (1.85 - 2.11)	3.19 (3.01 - 3.39)	5.41 (5.11 - 5.73)
2014	1.53 (1.43 - 1.63)	1.98 (1.86 - 2.10)	3.03 (2.86 - 3.21)	5.01 (4.75 - 5.28)
2015	1.46 (1.37 - 1.55)	1.71 (1.61 - 1.81)	2.78 (2.64 - 2.93)	4.75 (4.52 - 4.99)
2016	1.44 (1.36 - 1.53)	1.60 (1.51 - 1.69)	2.44 (2.31 - 2.57)	3.91 (3.71 - 4.11)
2017	1.40 (1.32 - 1.49)	1.77 (1.67 - 1.87)	2.59 (2.46 - 2.72)	4.19 (4.00 - 4.40)
2018	1.37 (1.30 - 1.45)	1.57 (1.49 - 1.66)	2.27 (2.16 - 2.38)	3.66 (3.50 - 3.83)
2019	1.32 (1.25 - 1.39)	1.42 (1.35 - 1.49)	2.01 (1.92 - 2.11)	3.06 (2.93 - 3.20)
2020	1.12 (1.01 - 1.25)	1.59 (1.44 - 1.75)	2.10 (1.92 - 2.30)	3.55 (3.27 - 3.87)

Table A 1-60. 2019 childhood bronchiolitis hospitalisation rates by ethnic group and NZDep2018 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	138	2022.3 (1684.9-2359.7)	52	3821 (2782.2-4859.2)	64	621 (468.7-772.8)	310	954 (848.2-1060.7)
3-4	260	2718.8 (2388.3-3049.3)	99	4764 (3825.7-5702.7)	68	571 (435.4-707.0)	346	1178 (1053.6-1301.8)
5-6	342	2636.9 (2357.4-2916.3)	119	4287 (3516.5-5057.0)	73	674 (519.6-829.0)	342	1167 (1043.0-1290.2)
7-8	650	3221.8 (2974.1-3469.5)	345	5785 (5174.3-6395.1)	100	807 (648.8-965.1)	379	1368 (1229.9-1505.3)
9-10	1561	4519.5 (4295.3-4743.7)	768	4464 (4147.9-4779.2)	99	857 (688.5-1026.3)	264	1627 (1430.4-1822.8)

Table A 1-61. 2019 childhood bronchiolitis hospitalisation rates by DHB.

DHB	n	Rate	95%CI
Northland	360	2958.1	(2652.5-3263.7)
Waitemata	594	1485.0	(1365.6-1604.4)
Auckland	547	2099.0	(1923.1-2274.9)
Counties Manakau	971	2269.8	(2127.0-2412.5)
Waikato	740	2583.8	(2397.6-2770.0)
Lakes	247	3195.3	(2796.8-3593.8)
Bay of Plenty	379	2354.0	(2117.0-2591.0)
Tairawhiti	150	3989.4	(3350.9-4627.8)
Hawkes Bay	348	3155.0	(2823.5-3486.5)
Taranaki	179	2223.6	(1897.9-2549.4)
Midcentral	223	1939.1	(1684.6-2193.6)
Whanganui	73	1705.6	(1314.3-2096.9)
Capital and Coast	282	1679.6	(1483.5-1875.6)
Hutt	237	2328.1	(2031.7-2624.5)
Wairarapa	41	1496.4	(1038.3-1954.4)
Nelson Marlborough	78	981.1	(763.4-1198.9)
West Coast	19	1104.7	(607.9-1601.4)
Canterbury	490	1488.5	(1356.7-1620.3)
Sth Canterbury	32	972.6	(635.6-1309.6)
Southern	390	2175.1	(1959.2-2391.0)

A 1.4. CHILDHOOD PNEUMONIA

A 1.4.1 CHILDHOOD PNEUMONIA HOSPITALISATIONS

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

Table A 1-62. Childhood pneumonia hospitalisations, rates and age-adjusted rates 2000-2020.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	3580	407.4	407.5	(394.2 - 420.9)
2001	3961	451.5	454.4	(440.3 - 468.6)
2002	3626	410.4	415.4	(401.9 - 428.9)
2003	3693	414.9	421.3	(407.7 - 434.9)
2004	3122	349.6	353.8	(341.4 - 366.2)
2005	3448	387.3	391.7	(378.7 - 404.8)
2006	3480	391.8	393.8	(380.7 - 406.9)
2007	3186	357.5	353.9	(341.6 - 366.2)
2008	3582	400.0	390.8	(378.0 - 403.6)
2009	4131	458.4	445.3	(431.7 - 458.9)
2010	3414	375.9	363.0	(350.8 - 375.1)
2011	3322	364.8	349.6	(337.7 - 361.5)
2012	3096	340.3	326.0	(314.5 - 337.5)
2013	2991	329.1	317.6	(306.2 – 329.0)
2014	3484	382.1	371.7	(359.4 - 384.1)
2015	3900	425.7	416.9	(403.8 – 430.0)
2016	3113	336.7	331.6	(319.9 - 343.2)
2017	3434	366.6	363.6	(351.4 - 375.7)
2018	3676	388.4	388.4	(375.8 – 401.0)
2019	4296	449.4	452.1	(438.6 - 465.6)
2020	857	88.7	89.9	(83.9 - 95.9)
Trend 2000 -2019			-1.94	(-5.24- 1.36), p=0.233

Table A 1-63. 2019 childhood pneumonia hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	2969	971.4	(936.4-1006.3)	1569	998.9	(949.4-1048.3)	1400	942.3	(893.0-991.7)	0.94	(0.91-0.98)
5-14	1327	204.0	(193.1-215.0)	724	216.7	(200.9-232.5)	603	190.7	(175.4-205.9)	0.88	(0.83-0.93)

Table A 1-64. 2019 childhood pneumonia hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	4.76	(4.61-4.91)	4.61	(4.42-4.81)	4.94	(4.72-5.18)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 1-65. 2019 childhood pneumonia hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	1385	546.2	537.6	(509.3-565.9)	1.65	(1.80-3.25)
Pacific	874	965.8	960.2	(896.5-1023.9)	3.11	(3.39-1.24)
Asian	678	471.4	425.0	(392.7-457.3)	1.17	(1.32-1.44)
Non-MPA	1359	290.4	308.4	(292.0-324.8)	1.00	Baseline

Table A 1-66. Childhood pneumonia hospitalisation rates by ethnic group 2000 – 2020, 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	1536	297.7	(282.8-312.6)	1121	489.6	(460.9-518.2)	822	1011.0	(941.8-1080.3)	101	186.2	(149.9-222.5)
2001	1658	324.5	(308.8-340.1)	1177	520.5	(490.7-550.3)	1020	1239.8	(1163.7-1316.0)	106	192.6	(155.9-229.3)
2002	1461	290.2	(275.3-305.1)	1092	481.3	(452.7-509.9)	921	1101.0	(1029.8-1172.2)	152	248.4	(208.9-287.9)
2003	1377	276.5	(261.9-291.1)	1085	479.9	(451.3-508.4)	1068	1251.0	(1175.9-1326.1)	163	241.1	(204.1-278.1)
2004	1170	234.3	(220.9-247.8)	865	382.8	(357.3-408.4)	933	1066.1	(997.6-1134.6)	154	217.3	(182.9-251.6)
2005	1470	293.6	(278.6-308.6)	1010	453.8	(425.8-481.8)	794	911.0	(847.6-974.4)	174	239.5	(203.9-275.1)
2006	1342	268.3	(253.9-282.7)	1046	469.5	(441.0-497.9)	899	1035.7	(968.0-1103.5)	193	259.9	(223.2-296.6)
2007	1138	227.2	(214.0-240.4)	995	429.8	(403.0-456.6)	850	969.5	(904.3-1034.7)	203	257.1	(221.7-292.5)
2008	1243	247.9	(234.1-261.6)	1121	468.1	(440.6-495.6)	969	1076.5	(1008.6-1144.3)	249	297.6	(260.5-334.7)
2009	1436	285.8	(271.0-300.5)	1351	554.9	(525.2-584.7)	1072	1173.6	(1103.2-1244.0)	272	306.3	(269.8-342.8)
2010	1331	264.1	(249.9-278.3)	995	398.2	(373.3-423.1)	796	853.8	(794.3-913.2)	292	313.1	(277.0-349.2)
2011	1149	228.6	(215.4-241.8)	996	394.1	(369.5-418.7)	925	975.1	(912.1-1038.1)	252	257.2	(225.2-289.2)
2012	1077	216.4	(203.5-229.4)	938	369.8	(346.0-393.6)	801	841.4	(782.9-899.8)	280	273.1	(240.9-305.3)
2013	1109	226.2	(212.9-239.5)	849	340.0	(317.1-362.9)	755	810.0	(752.2-867.9)	278	259.2	(228.5-289.8)
2014	1281	266.2	(251.6-280.7)	997	397.3	(372.6-422.0)	841	912.2	(850.5-973.9)	365	324.7	(291.2-358.3)
2015	1359	288.6	(273.3-304.0)	1168	464.8	(438.1-491.5)	946	1033.2	(967.4-1099.1)	427	351.2	(317.6-384.8)
2016	1146	247.9	(233.6-262.3)	843	333.7	(311.2-356.3)	723	793.0	(735.2-850.9)	401	301.0	(271.2-330.7)
2017	1220	267.0	(252.0-282.0)	1059	415.1	(390.1-440.1)	705	774.1	(717.0-831.3)	450	315.6	(286.2-345.1)
2018	1316	293.1	(277.3-309.0)	1108	431.2	(405.8-456.6)	773	846.9	(787.2-906.6)	479	317.4	(288.7-346.0)
2019	1359	308.4	(292.0-324.8)	1385	537.6	(509.3-565.9)	874	960.2	(896.5-1023.9)	678	425.0	(392.7-457.3)
2020	297	68.8	(61.0-76.7)	233	90.0	(78.4-101.5)	178	195.9	(167.1-224.7)	149	90.4	(75.7-105.1)

Table A 1-67. Childhood pneumonia hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2020, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.64	(1.58 - 1.71)	3.40	(3.26 - 3.54)	0.63	(0.57 - 0.69)
2001	1.60	(1.55 - 1.66)	3.82	(3.68 - 3.97)	0.59	(0.54 - 0.65)
2002	1.66	(1.60 - 1.72)	3.79	(3.65 - 3.95)	0.86	(0.79 - 0.93)
2003	1.74	(1.67 - 1.80)	4.52	(4.35 - 4.70)	0.87	(0.81 - 0.94)
2004	1.63	(1.57 - 1.70)	4.55	(4.36 - 4.74)	0.93	(0.85 - 1.01)
2005	1.55	(1.49 - 1.61)	3.10	(2.98 - 3.24)	0.82	(0.76 - 0.88)
2006	1.75	(1.68 - 1.82)	3.86	(3.71 - 4.02)	0.97	(0.90 - 1.04)
2007	1.89	(1.82 - 1.97)	4.27	(4.09 - 4.46)	1.13	(1.05 - 1.22)
2008	1.89	(1.82 - 1.96)	4.34	(4.17 - 4.52)	1.20	(1.12 - 1.28)
2009	1.94	(1.87 - 2.01)	4.11	(3.95 - 4.27)	1.07	(1.01 - 1.14)
2010	1.51	(1.45 - 1.57)	3.23	(3.10 - 3.37)	1.19	(1.11 - 1.26)
2011	1.72	(1.65 - 1.80)	4.27	(4.09 - 4.45)	1.13	(1.05 - 1.20)
2012	1.71	(1.64 - 1.78)	3.89	(3.72 - 4.06)	1.26	(1.18 - 1.35)
2013	1.50	(1.44 - 1.57)	3.58	(3.42 - 3.74)	1.15	(1.07 - 1.22)
2014	1.49	(1.43 - 1.55)	3.43	(3.29 - 3.57)	1.22	(1.15 - 1.29)
2015	1.61	(1.55 - 1.67)	3.58	(3.44 - 3.73)	1.22	(1.15 - 1.28)
2016	1.35	(1.29 - 1.41)	3.20	(3.06 - 3.35)	1.21	(1.15 - 1.28)
2017	1.55	(1.49 - 1.62)	2.90	(2.77 - 3.03)	1.18	(1.12 - 1.25)
2018	1.47	(1.41 - 1.53)	2.89	(2.77 - 3.02)	1.08	(1.03 - 1.14)
2019	1.74	(1.68 - 1.81)	3.11	(2.99 - 3.24)	1.38	(1.32 - 1.44)
2020	1.31	(1.20 - 1.42)	2.85	(2.60 - 3.11)	1.31	(1.19 - 1.45)

Table A 1-68. 2019 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	974	1158.5 (1085.8-1231.3)	675	2297.1 (2123.8-2470.4)	467	819.6 (745.2-893.9)	853	631.2 (588.8-673.5)
5-14	411	242.5 (219.0-265.9)	199	325.6 (280.4-370.9)	211	243.0 (210.2-275.7)	506	152.1 (138.8-165.3)

Table A 1-69. 2019 childhood pneumonia hospitalisation rates by NZDep2018 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	525	276.3	302.5	(276.4-328.6)	1.00	Baseline
3-4	572	325.5	339.5	(311.6-367.3)	1.12	(1.06-1.19)
5-6	674	395.5	392.7	(363.0-422.3)	1.30	(1.23-1.37)
7-8	1042	556.3	530.4	(498.1-562.6)	1.75	(1.67-1.85)
9-10	1481	637.4	614.8	(583.4-646.1)	2.03	(1.94-2.13)

Table A 1-70. Childhood pneumonia hospitalisation rates by NZDep2018 quintile 2000 – 2020, 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	311	232.5 (206.6-258.3)	442	307.8 (279.1-336.5)	486	297.2 (270.7-323.6)	753	401.3 (372.7-430.0)	1568	625.2 (594.2-656.2)
2001	297	218.2 (193.3-243.0)	489	341.1 (310.8-371.3)	569	351.6 (322.7-380.5)	858	464.9 (433.8-496.0)	1696	686.5 (653.8-719.2)
2002	319	231.3 (205.9-256.7)	471	326.6 (297.1-356.1)	474	294.0 (267.5-320.5)	773	420.9 (391.2-450.6)	1586	642.6 (611.0-674.2)
2003	314	224.6 (199.8-249.5)	444	304.1 (275.8-332.4)	503	311.8 (284.6-339.1)	743	405.8 (376.6-434.9)	1640	665.6 (633.4-697.8)
2004	288	200.1 (177.0-223.3)	381	256.8 (231.0-282.7)	398	246.2 (222.0-270.4)	673	368.0 (340.1-395.8)	1379	559.0 (529.5-588.5)
2005	323	219.5 (195.5-243.4)	458	304.1 (276.2-331.9)	483	299.4 (272.7-326.1)	736	408.8 (379.3-438.4)	1442	594.5 (563.8-625.2)
2006	324	217.7 (194.0-241.5)	409	269.6 (243.5-295.7)	472	293.1 (266.6-319.6)	776	429.9 (399.6-460.2)	1495	618.4 (587.0-649.7)
2007	308	203.3 (180.6-226.0)	343	222.6 (199.1-246.2)	442	269.6 (244.5-294.8)	698	380.2 (352.0-408.5)	1394	568.3 (538.5-598.2)
2008	323	208.0 (185.3-230.7)	463	294.0 (267.2-320.8)	484	291.8 (265.8-317.8)	759	403.0 (374.3-431.8)	1546	620.4 (589.4-651.4)
2009	383	241.2 (217.0-265.4)	510	319.7 (291.9-347.4)	562	333.0 (305.4-360.6)	891	467.9 (437.1-498.7)	1783	713.4 (680.2-746.6)
2010	368	227.8 (204.5-251.0)	477	294.6 (268.1-321.0)	477	279.5 (254.3-304.6)	763	395.4 (367.2-423.6)	1329	525.5 (497.1-553.9)
2011	325	199.1 (177.4-220.7)	432	264.8 (239.8-289.8)	500	292.7 (267.0-318.4)	710	361.6 (334.8-388.3)	1354	528.0 (499.8-556.3)
2012	273	166.0 (146.3-185.7)	420	256.3 (231.8-280.9)	444	258.5 (234.4-282.6)	694	354.4 (327.9-380.9)	1264	497.5 (470.0-525.1)
2013	308	186.2 (165.4-207.0)	417	254.8 (230.4-279.3)	446	261.8 (237.5-286.2)	616	316.5 (291.4-341.6)	1204	484.0 (456.6-511.5)
2014	363	219.5 (196.9-242.1)	511	312.2 (285.2-339.3)	515	304.0 (277.7-330.2)	749	387.2 (359.3-415.0)	1346	545.9 (516.6-575.1)
2015	420	252.4 (228.2-276.6)	518	316.3 (289.1-343.5)	549	323.6 (296.5-350.6)	872	450.1 (420.2-480.1)	1533	627.8 (596.4-659.3)
2016	363	217.9 (195.4-240.4)	437	264.8 (239.9-289.6)	423	248.8 (225.1-272.6)	698	358.2 (331.5-384.8)	1190	489.0 (461.2-516.8)
2017	389	227.6 (204.8-250.3)	477	286.3 (260.6-312.0)	539	315.2 (288.5-341.8)	778	398.4 (370.3-426.4)	1251	513.9 (485.4-542.4)
2018	529	311.9 (285.2-338.6)	461	274.1 (249.1-299.2)	574	335.4 (308.0-362.8)	812	410.4 (382.1-438.7)	1300	535.9 (506.8-565.1)
2019	525	302.5 (276.4-328.6)	572	339.5 (311.6-367.3)	674	392.7 (363.0-422.3)	1042	530.4 (498.1-562.6)	1481	614.8 (583.4-646.1)
2020	96	55.4 (44.2-66.5)	126	74.0 (61.1-86.9)	161	93.7 (79.2-108.1)	178	90.4 (77.1-103.7)	296	123.8 (109.7-137.9)

Table A 1-71. Childhood pneumonia hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2020, 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	1.32 (1.23 - 1.42)	1.28 (1.19 - 1.37)	1.73 (1.62 - 1.84)	2.69 (2.54 - 2.85)
2001	1.56 (1.46 - 1.68)	1.61 (1.51 - 1.73)	2.13 (2.00 - 2.27)	3.15 (2.96 - 3.34)
2002	1.41 (1.32 - 1.51)	1.27 (1.19 - 1.36)	1.82 (1.71 - 1.94)	2.78 (2.62 - 2.95)
2003	1.35 (1.26 - 1.45)	1.39 (1.30 - 1.49)	1.81 (1.69 - 1.93)	2.96 (2.79 - 3.14)
2004	1.28 (1.19 - 1.38)	1.23 (1.14 - 1.32)	1.84 (1.72 - 1.97)	2.79 (2.63 - 2.97)
2005	1.39 (1.29 - 1.48)	1.36 (1.27 - 1.46)	1.86 (1.75 - 1.98)	2.71 (2.55 - 2.87)
2006	1.24 (1.15 - 1.33)	1.35 (1.26 - 1.44)	1.97 (1.85 - 2.10)	2.84 (2.68 - 3.01)
2007	1.10 (1.02 - 1.18)	1.33 (1.24 - 1.42)	1.87 (1.75 – 2.00)	2.80 (2.63 - 2.97)
2008	1.41 (1.32 - 1.51)	1.40 (1.31 - 1.50)	1.94 (1.82 - 2.06)	2.98 (2.81 - 3.16)
2009	1.33 (1.24 - 1.41)	1.38 (1.30 - 1.47)	1.94 (1.83 - 2.06)	2.96 (2.80 - 3.12)
2010	1.29 (1.21 - 1.38)	1.23 (1.15 - 1.31)	1.74 (1.63 - 1.84)	2.31 (2.18 - 2.44)
2011	1.33 (1.24 - 1.43)	1.47 (1.37 - 1.57)	1.82 (1.70 - 1.94)	2.65 (2.50 - 2.81)
2012	1.54 (1.43 - 1.66)	1.56 (1.45 - 1.68)	2.13 (1.99 - 2.28)	3.00 (2.81 - 3.19)
2013	1.37 (1.27 - 1.47)	1.41 (1.31 - 1.51)	1.70 (1.59 - 1.82)	2.60 (2.45 - 2.76)
2014	1.42 (1.33 - 1.52)	1.38 (1.30 - 1.48)	1.76 (1.66 - 1.87)	2.49 (2.35 - 2.63)
2015	1.25 (1.18 - 1.33)	1.28 (1.21 - 1.36)	1.78 (1.69 - 1.89)	2.49 (2.36 - 2.62)
2016	1.21 (1.14 - 1.30)	1.14 (1.07 - 1.22)	1.64 (1.55 - 1.75)	2.24 (2.12 - 2.38)
2017	1.26 (1.18 - 1.34)	1.38 (1.30 - 1.48)	1.75 (1.65 - 1.86)	2.26 (2.14 - 2.39)
2018	0.88 (0.83 - 0.93)	1.08 (1.02 - 1.14)	1.32 (1.25 - 1.39)	1.72 (1.64 - 1.80)
2019	1.12 (1.06 - 1.19)	1.30 (1.23 - 1.37)	1.75 (1.67 - 1.85)	2.03 (1.94 - 2.13)
2020	1.34 (1.17 - 1.52)	1.69 (1.50 - 1.91)	1.63 (1.45 - 1.84)	2.24 (2.00 - 2.50)

Table A 1-72. 2019 childhood pneumonia hospitalisation rates by ethnic group and NZDep2018 quintile.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	81	110	193	356	645
	Rate (raw)	340.5	363.9	488.8	610.2	634.0
	Rate (age adj'd)	360.8	367.9	484.0	588.5	614.5
	95%CI	(282.0-439.6)	(299.1-436.7)	(415.7-552.2)	(527.3-649.6)	(567.1-662)
Pacific	Hosp_Num	26	42	82	212	511
	Rate (raw)	587.2	606.5	983.7	1185.8	965.4
	Rate (age adj'd)	595.9	640.2	959.9	1157.1	959.5
	95%CI	(366.6-825.2)	(446.4-834.0)	(752.1-1167.7)	(1001.3-1312.9)	(876.3-1042.7)
Asian	Hosp_Num	120	120	119	169	149
	Rate (raw)	450.9	379.8	451.0	576.7	497.8
	Rate (age adj'd)	417.3	347.9	397.8	508.1	449.4
	95%CI	(342.0-492.7)	(285.3-410.5)	(325.2-470.4)	(430.0-586.2)	(376.8-522.1)
NZ European/ Other	Hosp_Num	298	300	280	305	176
	Rate (raw)	220.4	280.5	291.1	373.0	368.5
	Rate (age adj'd)	255.1	308.1	300.5	365.7	362.1
	95%CI	(225.6-284.5)	(273.1-343.1)	(265.3-335.8)	(324.6-406.8)	(308.6-415.7)

Table A 1-73. 2019 childhood pneumonia hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	299	767.3	780.6	(692.1-869.1)
Waitemata	530	435.7	429.8	(393.2-466.4)
Auckland	536	663.1	663.7	(607.5-719.9)
Counties Manakau	729	558.8	552.5	(512.4-592.6)
Waikato	448	505.6	505.4	(458.6-552.2)
Lakes	123	504.3	511.6	(421.2-602.0)
Bay of Plenty	288	564.2	572.1	(506.0-638.2)
Tairawhiti	44	376.1	380.0	(267.7-492.2)
Hawkes Bay	118	327.8	335.8	(275.2-396.4)
Taranaki	76	297.1	302.2	(234.2-370.1)
Midcentral	73	203.2	204.4	(157.5-251.3)
Whanganui	36	268.9	271.1	(182.6-359.7)
Capital and Coast	178	327.3	334.0	(284.9-383.1)
Hutt	207	677.8	667.2	(576.3-758.1)
Wairarapa	30	340.1	348.1	(223.5-472.8)
Nelson Marlborough	63	231.1	243.3	(183.1-303.5)
West Coast	17	306.9	314.2	(164.8-463.5)
Canterbury	313	307.5	308.5	(274.3-342.6)
Sth Canterbury	19	177.7	184.0	(101.2-266.7)
Southern	169	289.2	295.3	(250.8-339.9)

A 1.4.2 CHILDHOOD PNEUMONIA MORTALITY

Table A 1-74. Childhood pneumonia mortality rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	8	0.91	0.91	(0.28-1.54)
2001	2	0.23	0.23	(0.06-0.92)
2002	9	1.02	1.04	(0.36-1.72)
2003	6	0.67	0.68	(0.14-1.22)
2004	20	2.24	2.26	(1.27-3.26)
2005	10	1.12	1.12	(0.42-1.81)
2006	10	1.13	1.12	(0.43-1.82)
2007	14	1.57	1.54	(0.73-2.35)
2008	12	1.34	1.30	(0.56-2.03)
2009	10	1.11	1.06	(0.40-1.72)
2010	11	1.21	1.13	(0.46-1.81)
2011	10	1.10	1.03	(0.39-1.67)
2012	18	1.98	1.85	(1.00-2.71)
2013	9	0.99	0.95	(0.33-1.58)
2014	8	0.88	0.84	(0.26-1.42)
2015	9	0.98	0.97	(0.33-1.60)
2016	6	0.65	0.64	(0.13-1.16)
2017	4	0.43	0.42	(0.01-0.84)
Trend 2000 -2017			0.01	(-0.04 - 0.07), p=0.600

Table A 1-75. Childhood pneumonia mortality rates and rate ratios by age group and sex, 2008-2017.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	81	2.6	(2.0-3.2)	46	2.9	(2.1-3.7)	35	2.3	(1.6-7.6)	0.80	(0.65-0.99)
5-14	16	0.3	(0.1-0.4)	7	0.2	(0.1-0.4)	9	0.3	(0.1-0.5)	1.35	(0.84-2.18)

Table A 1-76. Childhood pneumonia hospitalisation age group rate ratios by sex, 2008-2017.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	9.88	(7.62-12.81)	12.80	(8.71-18.82)	5.33	(10.84-26.94)
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 1-77. Childhood pneumonia mortality rates and rate ratios by ethnic group, 2008-2017.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	44	1.9	1.7	(1.2-2.2)	3.33	(2.63-4.23)
Pacific	23	2.6	2.5	(1.5-3.5)	4.84	(3.68-6.37)
Asian	5	0.5	0.5	(0.1-0.9)	0.89	(0.56-1.41)
Non-MPA	25	0.5	0.5	(0.3-0.7)	1.00	Baseline

Table A 1-78. Childhood pneumonia mortality rates NZDep2018 quintile, 2008-2017.

NZDep	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	4	0.2	0.2	(0.0-0.5)	1.00	Baseline
3-4	10	0.6	0.6	(0.2-1.0)	2.54	(1.45-4.46)
5-6	13	0.8	0.8	(0.4-1.2)	3.22	(1.87-5.55)
7-8	14	0.8	0.7	(0.3-1.1)	2.93	(1.71-5.02)
9-10	56	2.4	2.2	(1.6-2.8)	9.22	(5.63-15.08)

Table A 1-79. Childhood pneumonia mortality rates by DHB, 2008 - 2017.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	8	2.21	2.18	(0.7-3.7)
Waitemata	7	0.62	0.62	(0.2-1.1)
Auckland	7	0.84	0.75	(0.2-1.3)
Counties Manakau	22	1.82	1.73	(1.0-2.4)
Waikato	15	1.83	1.77	(0.9-2.7)
Lakes	2	0.85	0.83	(0.2-3.3)
Bay of Plenty	8	1.74	1.72	(0.5-2.9)
Tairawhiti	0	0	0	-
Hawkes Bay	3	0.86	0.85	(0.3-2.6)
Taranaki	4	1.67	1.61	(0.0-3.2)
Midcentral	3	0.87	0.85	(0.3-2.6)
Whanganui	1	0.76	0.74	(0.1-5.2)
Capital and Coast	6	1.09	1.04	(0.2-1.9)
Hutt	2	0.66	0.63	(0.2-2.5)
Wairarapa	0	0	0	-
Nelson Marlborough	0	0	0	-
West Coast	1	1.62	1.68	(0.2-11.9)
Canterbury	2	0.21	0.20	(0.1-0.8)
Sth Canterbury	0	0	0	-
Southern	6	1.07	1.05	(0.2-1.9)

A 1.5. COPD IN ADULTS AGED 45+ YEARS

A 1.5.1 ADULT 45+ YEARS COPD HOSPITALISATIONS

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

Table A 1-80. COPD hospitalisations in adults aged 45+, rates and age-adjusted rates 2000-2020.

		Rate		
Year	n	Raw	(age adj'd)	95% CI
2000	7539	585.5	610.3	(596.5-624.1)
2001	8584	651.5	677.2	(662.8-691.6)
2002	8862	655.3	683.2	(668.9-697.5)
2003	9741	701.0	737.2	(722.4-751.9)
2004	10185	713.0	750.8	(736.1-765.5)
2005	9433	642.7	681.3	(667.5-695.1)
2006	10088	668.0	709.8	(695.8-723.7)
2007	10146	654.7	695.5	(681.9-709.1)
2008	11015	693.3	737.5	(723.6-751.3)
2009	11273	693.0	735.2	(721.6-748.8)
2010	11456	688.6	727.2	(713.8-740.5)
2011	11713	690.0	724.6	(711.4-737.7)
2012	11874	686.3	713.8	(700.9-726.6)
2013	11243	637.2	657.0	(644.8-669.2)
2014	11580	641.7	657.4	(645.5-669.4)
2015	11676	632.5	644.6	(632.9-656.3)
2016	11290	596.9	605.9	(594.7-617.1)
2017	12343	637.6	641.8	(630.5-653.1)
2018	11649	589.5	589.5	(578.8-600.2)
2019	12245	607.7	601.3	(590.7-612.0)
2020	9182	444.7	435.4	(426.5-444.3)
Trend 2000 -2019			-0.06	(-0.11 - -0.01), p=0.026

Table A 1-81. 2019 COPD in adults aged 45+ 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	
45-64	3348	266.7	(257.7-275.7)	1479	241.9	(229.6-254.2)	1869	290.2	(277.1-303.4)	1.20	(1.16-1.24)	
65+	8897	1171.0	(1146.6-1195.3)	4166	1172.4	(1136.8-1208)	4731	1169.7	(1136.4-1203)	1.00	(0.98-1.02)	

Table A 1-82. 2019 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+	4.39	(4.31-4.48)	4.85	(4.71-4.99)	4.03	(3.93-4.14)

Table A 1-83. 2019 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	3003	1501.3	1855.1	(1783.9-1926.3)	3.71	(3.63-3.79)
Pacific	781	939.6	1308.7	(1209.9-1407.5)	2.62	(2.52-2.72)
Asian	190	82.0	133.9	(113.5-154.3)	0.27	(0.25-0.29)
Non-MPA	8271	551.1	500.4	(489.6-511.2)	1.00	Baseline

Table A 1-84. COPD in adults aged 45+ hospitalisation rates by ethnic group 2000 – 2020, 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	6239	558.7	(544.7-572.7)	981	1459.2	(1357.4-1560.9)	252	1188.0	(1023.7-1352.3)	67	286.5	(209.3-363.6)
2001	6940	605.9	(591.5-620.3)	1208	1724.5	(1616.6-1832.4)	352	1365.1	(1210.0-1520.3)	84	306.0	(234.0-378.0)
2002	7029	602.3	(588.1-616.5)	1359	1826.5	(1717.5-1935.5)	398	1457.1	(1299.2-1615.1)	76	229.4	(172.6-286.2)
2003	7682	649.8	(635.1-664.4)	1517	1962.7	(1851.9-2073.5)	449	1602.4	(1442.1-1762.8)	93	228.0	(176.1-280.0)
2004	8003	659.9	(645.3-674.5)	1537	2018.7	(1904.0-2133.3)	544	1815.5	(1649.8-1981.3)	101	255.0	(200.8-309.2)
2005	7376	598.7	(584.9-612.5)	1500	1793.2	(1691.7-1894.7)	436	1454.5	(1306.1-1602.8)	121	327.8	(262.3-393.3)
2006	7771	616.6	(602.7-630.4)	1678	1952.5	(1847.2-2057.7)	524	1643.5	(1488.6-1798.4)	115	263.1	(210.5-315.7)
2007	7637	593.4	(580.0-606.8)	1870	2086.0	(1980.5-2191.6)	554	1541.5	(1404.1-1679.0)	85	178.1	(136.4-219.8)
2008	8302	633.6	(619.9-647.3)	1966	2151.9	(2046.4-2257.3)	623	1841.8	(1687.0-1996.5)	124	247.0	(198.8-295.3)
2009	8411	630.0	(616.5-643.6)	2085	2084.6	(1985.1-2184.0)	660	1696.2	(1557.5-1834.9)	117	224.4	(180.0-268.8)
2010	8481	621.3	(608.0-634.6)	2136	1986.0	(1893.2-2078.9)	692	1776.8	(1635.4-1918.2)	147	227.8	(188.2-267.4)
2011	8528	610.7	(597.6-623.7)	2379	2159.5	(2063.9-2255.1)	631	1574.6	(1441.0-1708.2)	175	271.8	(226.9-316.7)
2012	8645	604.7	(591.9-617.5)	2276	1962.8	(1872.9-2052.7)	779	1925.3	(1778.1-2072.5)	174	245.6	(205.5-285.8)
2013	8105	555.9	(543.7-568.0)	2325	1901.5	(1816.8-1986.1)	654	1424.7	(1305.9-1543.5)	159	206.1	(170.9-241.3)
2014	8481	571.6	(559.4-583.8)	2278	1721.5	(1643.7-1799.3)	634	1351.8	(1236.7-1466.9)	187	242.4	(203.9-280.9)
2015	8393	554.0	(542.1-565.9)	2471	1750.8	(1675.2-1826.3)	665	1289.1	(1182.4-1395.8)	147	148.5	(122.5-174.6)
2016	7884	510.0	(498.7-521.3)	2520	1747.4	(1673.3-1821.5)	732	1402.0	(1292.6-1511.4)	154	129.0	(106.9-151.0)
2017	8526	538.6	(527.1-550.0)	2827	1864.7	(1790.3-1939.2)	794	1449.6	(1341.3-1557.8)	196	163.3	(138.5-188.2)
2018	7862	488.4	(477.6-499.3)	2851	1820.1	(1747.8-1892.4)	768	1327.6	(1226.1-1429.1)	168	124.7	(104.6-144.8)
2019	8271	500.4	(489.6-511.2)	3003	1855.1	(1783.9-1926.3)	781	1308.7	(1209.9-1407.5)	190	133.9	(113.5-154.3)
2020	6041	356.2	(347.2-365.3)	2447	1403.3	(1344.3-1462.3)	585	938.5	(856.1-1020.9)	109	70.8	(56.6-85.0)

Table A 1-85. COPD in adults aged 45+ hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2020, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.61	(2.52 - 2.71)	2.13	(1.99 - 2.28)	0.51	(0.45 - 0.58)
2001	2.85	(2.76 - 2.94)	2.25	(2.13 - 2.38)	0.51	(0.45 - 0.57)
2002	3.03	(2.94 - 3.13)	2.42	(2.29 - 2.55)	0.38	(0.34 - 0.43)
2003	3.02	(2.93 - 3.11)	2.47	(2.35 - 2.59)	0.35	(0.31 - 0.39)
2004	3.06	(2.97 - 3.15)	2.75	(2.63 - 2.88)	0.39	(0.35 - 0.43)
2005	3.00	(2.91 - 3.09)	2.43	(2.31 - 2.56)	0.55	(0.50 - 0.60)
2006	3.17	(3.08 - 3.26)	2.67	(2.54 - 2.79)	0.43	(0.39 - 0.47)
2007	3.52	(3.42 - 3.61)	2.60	(2.48 - 2.72)	0.30	(0.27 - 0.34)
2008	3.40	(3.31 - 3.49)	2.91	(2.79 - 3.03)	0.39	(0.35 - 0.43)
2009	3.31	(3.23 - 3.39)	2.69	(2.58 - 2.80)	0.36	(0.32 - 0.39)
2010	3.20	(3.12 - 3.28)	2.86	(2.75 - 2.98)	0.37	(0.34 - 0.40)
2011	3.54	(3.45 - 3.62)	2.58	(2.47 - 2.69)	0.45	(0.41 - 0.48)
2012	3.25	(3.17 - 3.33)	3.18	(3.06 - 3.31)	0.41	(0.38 - 0.44)
2013	3.42	(3.34 - 3.50)	2.56	(2.46 - 2.67)	0.37	(0.34 - 0.40)
2014	3.01	(2.94 - 3.09)	2.36	(2.27 - 2.47)	0.42	(0.39 - 0.46)
2015	3.16	(3.09 - 3.24)	2.33	(2.23 - 2.43)	0.27	(0.25 - 0.29)
2016	3.43	(3.35 - 3.51)	2.75	(2.64 - 2.86)	0.25	(0.23 - 0.27)
2017	3.46	(3.39 - 3.54)	2.69	(2.59 - 2.79)	0.30	(0.28 - 0.33)
2018	3.73	(3.65 - 3.81)	2.72	(2.62 - 2.82)	0.26	(0.24 - 0.28)
2019	3.71	(3.63 - 3.79)	2.62	(2.52 - 2.72)	0.27	(0.25 - 0.29)
2020	3.94	(3.85 - 4.03)	2.63	(2.52 - 2.75)	0.20	(0.18 - 0.22)

Table A 1-86. 2020 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	1411	941.8	(892.7-991.0)	251	402.4	(352.7-452.2)	36	21.3	(14.3-28.2)	1650	188.8	(179.7-197.9)
65+	1592	3170.3	(3014.6-3326.0)	530	2553.7	(2336.3-2771.1)	154	246.2	(207.3-285)	6621	1056.0	(1030.6-1081.4)

Table A 1-87. 2020 COPD in adults aged 45+ hospitalisation rates by NZDep2018 quintile.

		Rate				
NZDep	n	raw	age adj'd	95% CI	RR	95% CI
1-2	987	223.2	250.4	(234.6-266.1)	1.00	Baseline
3-4	1524	370.6	376.3	(357.4-395.2)	1.50	(1.45-1.56)
5-6	2161	534.5	504.4	(483.1-525.7)	2.01	(1.94-2.09)
7-8	3217	800.4	749.8	(723.8-775.8)	2.99	(2.89-3.10)
9-10	4355	1225.7	1223.7	(1187.3-1260.1)	4.89	(4.73-5.06)

Table A 1-88. COPD in adults 45+ hospitalisation rates by NZDep2018 quintile 2000 – 2020, 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	631	337.3 (310.8-363.8)	1148	528.5 (497.8-559.2)	1391	509.4 (482.5-536.3)	2057	702.1 (671.5-732.7)	2293	895.4 (858.5-932.2)
2001	638	326.0 (300.5-351.4)	1257	566.5 (535.1-598.0)	1700	605.6 (576.6-634.5)	2246	748.5 (717.2-779.7)	2681	1030.0 (990.8-1069.2)
2002	762	375.4 (348.5-402.3)	1330	578.7 (547.4-609.9)	1681	589.5 (561.1-617.8)	2281	744.7 (713.8-775.5)	2795	1052.0 (1012.8-1091.2)
2003	763	369.1 (342.7-395.5)	1291	545.6 (515.7-575.6)	1840	634.3 (605.1-663.4)	2661	852.4 (819.6-885.1)	3148	1174.0 (1132.8-1215.2)
2004	732	345.6 (320.4-370.9)	1382	565.0 (535.0-594.9)	1828	611.4 (583.2-639.6)	2858	897.5 (864.2-930.7)	3376	1233.5 (1191.7-1275.4)
2005	698	314.8 (291.2-338.5)	1198	477.6 (450.4-504.7)	1636	540.2 (513.8-566.5)	2640	810.5 (779.2-841.8)	3256	1175.0 (1134.5-1215.6)
2006	735	325.4 (301.7-349.1)	1244	484.8 (457.7-511.9)	1771	571.0 (544.3-597.8)	2787	839.9 (808.3-871.4)	3548	1255.7 (1214.2-1297.2)
2007	770	322.0 (299.1-345.0)	1317	500.2 (473-527.4)	1663	523.3 (498.0-548.6)	2779	818.6 (787.8-849.3)	3610	1256.6 (1215.4-1297.8)
2008	768	310.2 (288.1-332.4)	1451	534.7 (507-562.4)	1986	610.6 (583.6-637.6)	3008	875.3 (843.7-906.9)	3786	1298.5 (1257.0-1340.0)
2009	839	323.2 (301.1-345.3)	1433	505.2 (478.9-531.5)	2050	620.7 (593.7-647.7)	3023	864.6 (833.5-895.7)	3923	1321.2 (1279.7-1362.7)
2010	803	296.9 (276.2-317.7)	1483	504.9 (479.1-530.7)	2137	629.7 (602.9-656.5)	3180	892.2 (860.9-923.5)	3844	1273.0 (1232.7-1313.4)
2011	912	325.1 (303.8-346.3)	1491	492.6 (467.5-517.7)	2204	634.3 (607.7-660.9)	3246	893.6 (862.6-924.6)	3855	1257.5 (1217.7-1297.3)
2012	919	317.5 (296.8-338.2)	1638	522.4 (497-547.8)	2055	578.0 (553.0-603.1)	3097	834.9 (805.3-864.5)	4162	1331.6 (1291.1-1372.2)
2013	823	274.6 (255.7-293.5)	1438	442.3 (419.4-465.3)	2038	557.9 (533.6-582.1)	3005	793.0 (764.5-821.5)	3930	1234.6 (1196.0-1273.3)
2014	833	262.5 (244.6-280.5)	1518	450.2 (427.5-472.8)	2076	552.3 (528.5-576.1)	3066	796.8 (768.5-825.2)	4077	1256.3 (1217.7-1294.9)
2015	818	247.9 (230.8-265.0)	1560	445.6 (423.4-467.7)	2079	539.7 (516.5-563.0)	2921	744.2 (717.1-771.4)	4277	1294.7 (1255.9-1333.6)
2016	925	265.3 (248.1-282.6)	1481	407.8 (387-428.5)	2040	516.6 (494.2-539.1)	2898	721.9 (695.5-748.3)	3944	1174.3 (1137.6-1211.0)
2017	917	250.5 (234.2-266.9)	1576	417.1 (396.5-437.7)	2220	544.4 (521.7-567.1)	3220	785.1 (757.9-812.4)	4404	1284.2 (1246.2-1322.1)
2018	935	246.8 (230.8-262.7)	1503	384.4 (365-403.9)	1992	477.6 (456.6-498.6)	3040	728.1 (702.1-754.1)	4173	1196.7 (1160.4-1233.1)
2019	987	250.4 (234.6-266.1)	1524	376.3 (357.4-395.2)	2161	504.4 (483.1-525.7)	3217	749.8 (723.8-775.8)	4355	1223.7 (1187.3-1260.1)
2020	686	164.0 (151.6-176.4)	1135	268.4 (252.8-284.1)	1580	357.6 (339.9-375.3)	2345	534.7 (513.0-556.5)	3432	939.8 (908.4-971.3)

Table A 1-89. COPD in adults 45+ hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2020, 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	1.57 (1.49 - 1.64)	1.51 (1.44 - 1.58)	2.08 (1.99 - 2.17)	2.65 (2.54 - 2.77)
2001	1.74 (1.66 - 1.82)	1.86 (1.78 - 1.94)	2.30 (2.20 - 2.40)	3.16 (3.03 - 3.30)
2002	1.54 (1.48 - 1.61)	1.57 (1.51 - 1.64)	1.98 (1.91 - 2.06)	2.80 (2.69 - 2.91)
2003	1.48 (1.42 - 1.54)	1.72 (1.65 - 1.79)	2.31 (2.22 - 2.40)	3.18 (3.06 - 3.31)
2004	1.63 (1.56 - 1.71)	1.77 (1.70 - 1.84)	2.60 (2.50 - 2.70)	3.57 (3.43 - 3.71)
2005	1.52 (1.45 - 1.59)	1.72 (1.64 - 1.79)	2.57 (2.47 - 2.68)	3.73 (3.59 - 3.88)
2006	1.49 (1.43 - 1.56)	1.75 (1.68 - 1.83)	2.58 (2.48 - 2.69)	3.86 (3.71 - 4.01)
2007	1.55 (1.49 - 1.62)	1.62 (1.56 - 1.69)	2.54 (2.44 - 2.64)	3.90 (3.76 - 4.05)
2008	1.72 (1.65 - 1.80)	1.97 (1.89 - 2.05)	2.82 (2.71 - 2.93)	4.19 (4.03 - 4.35)
2009	1.56 (1.50 - 1.63)	1.92 (1.85 – 2.00)	2.67 (2.58 - 2.78)	4.09 (3.94 - 4.24)
2010	1.70 (1.63 - 1.77)	2.12 (2.04 - 2.21)	3.00 (2.89 - 3.12)	4.29 (4.13 - 4.45)
2011	1.52 (1.46 - 1.58)	1.95 (1.88 - 2.03)	2.75 (2.65 - 2.85)	3.87 (3.73 - 4.01)
2012	1.65 (1.58 - 1.71)	1.82 (1.75 - 1.89)	2.63 (2.54 - 2.73)	4.19 (4.05 - 4.34)
2013	1.61 (1.54 - 1.68)	2.03 (1.95 - 2.11)	2.89 (2.78 – 3.00)	4.50 (4.33 - 4.66)
2014	1.71 (1.65 - 1.79)	2.10 (2.02 - 2.19)	3.04 (2.92 - 3.15)	4.79 (4.61 - 4.96)
2015	1.80 (1.72 - 1.87)	2.18 (2.09 - 2.26)	3.00 (2.89 - 3.12)	5.22 (5.04 - 5.42)
2016	1.54 (1.48 - 1.60)	1.95 (1.87 - 2.02)	2.72 (2.62 - 2.82)	4.43 (4.27 - 4.58)
2017	1.67 (1.60 - 1.73)	2.17 (2.09 - 2.26)	3.13 (3.02 - 3.25)	5.13 (4.95 - 5.31)
2018	1.56 (1.50 - 1.62)	1.94 (1.86 - 2.01)	2.95 (2.85 - 3.06)	4.85 (4.68 - 5.02)
2019	1.50 (1.45 - 1.56)	2.01 (1.94 - 2.09)	2.99 (2.89 - 3.10)	4.89 (4.73 - 5.06)
2020	1.64 (1.56 - 1.71)	2.18 (2.09 - 2.28)	3.26 (3.13 - 3.40)	5.73 (5.51 - 5.97)

Table A 1-90. 2019 COPD in adults aged 45+ hospitalisation rates by ethnic group and NZDep2018 quintile.

		NZDep quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	86	174	362	709	1672
	Rate (raw)	444.3	711.0	1146.7	1542.8	2126.6
	Rate (age adj'd)	689.5	970.9	1457.6	1815.8	2552.5
	95%CI	(524.1-854.9)	(811.5-1130.3)	(1299.2-1616.0)	(1675.1-1956.4)	(2421.0-2684.0)
Pacific	Hosp_Num	17	40	67	171	486
	Rate (raw)	328.4	558.1	729.4	1045.7	1074.3
	Rate (age adj'd)	700.4	875.5	1078.1	1446.9	1456.9
	95%CI	(290.8-1109.9)	(589.0-1162.0)	(803.4-1352.9)	(1213.5-1680.2)	(1317.8-1596.1)
Asian	Hosp_Num	15	25	38	59	53
	Rate (raw)	31.2	46.7	85.2	138.4	123.3
	Rate (age adj'd)	62.1	84.2	125.1	190.7	271.5
	95%CI	(29.2-95.1)	(50.4-118.0)	(82.6-167.6)	(139.8-241.6)	(185.4-357.7)
NZ European/ Other	Hosp_Num	869	1285	1694	2278	2144
	Rate (raw)	235.0	394.1	531.1	767.0	1137.7
	Rate (age adj'd)	250.8	371.6	464.4	650.8	981.4
	95%CI	(234.1-267.6)	(351.3-392)	(442.1-486.8)	(623.6-678)	(939.0-1023.7)

Table A 1-91. 2019 COPD in adults aged 45+ hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	621	693.2	652.3	(600.7-703.9)
Waitemata	1082	447.8	466.0	(438.2-493.7)
Auckland	820	471.8	508.9	(474.0-543.9)
Counties Manakau	1007	505.6	553.1	(518.7-587.4)
Waikato	1435	824.5	798.2	(756.8-839.5)
Lakes	332	694.0	679.6	(606.4-752.8)
Bay of Plenty	804	693.0	631.0	(587.1-675.0)
Tairawhiti	164	803.9	794.1	(672.4-915.9)
Hawkes Bay	605	777.4	735.8	(677.0-794.6)
Taranaki	503	934.6	884.8	(807.3-962.2)
Midcentral	488	618.7	571.3	(520.4-622.1)
Whanganui	355	1133.1	1039.7	(931.1-1148.4)
Capital and Coast	506	419.8	442.0	(403.5-480.5)
Hutt	381	613.9	637.8	(573.7-701.9)
Wairarapa	172	720.9	663.5	(563.4-763.6)
Nelson Marlborough	386	488.7	451.6	(406.4-496.8)
West Coast	150	902.5	872.9	(732.6-1013.2)
Canterbury	1298	553.9	549.3	(519.4-579.2)
Sth Canterbury	163	542.1	473.7	(400.4-547.0)
Southern	973	674.4	643.2	(602.7-683.6)

A 1.5.2 ADULT 45+ YEARS COPD MORTALITY

Table A 1-92. COPD in adults 45+ mortality rates and age-adjusted rates 2000-2017.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	1441	111.9	116.4	(110.4-122.4)
2001	1709	129.7	133.6	(127.3-140.0)
2002	1598	118.2	122.4	(116.4-128.4)
2003	1641	118.1	122.6	(116.7-128.5)
2004	1704	119.3	124.6	(118.7-130.6)
2005	1473	100.4	105.6	(100.2-111.0)
2006	1541	102.0	107.1	(101.8-112.5)
2007	1471	94.9	99.6	(94.5-104.7)
2008	1671	105.2	110.2	(104.9-115.5)
2009	1563	96.1	100.2	(95.2-105.2)
2010	1482	89.1	92.4	(87.7-97.2)
2011	1591	93.7	96.7	(91.9-101.4)
2012	1540	89.0	91.0	(86.5-95.6)
2013	1499	85.0	86.6	(82.2-91.0)
2014	1616	89.5	91.2	(86.7-95.6)
2015	1605	86.9	88.5	(84.2-92.8)
2016	1542	81.5	82.7	(78.6-86.8)
2017	1626	84.0	84.7	(80.6-88.8)
Trend 2000 -2017			-2.70	(-3.28 - -2.13), p<0.001

Table A 1-93. COPD in adults aged 45+ mortality rates and rate ratios by age group and sex, 2017.

	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	185	15.1	(13.0-17.3)	78	13.1	(10.2-16.0)	107	17.0	(13.8-20.3)	1.30	(1.13-1.49)
65+	1441	201.9	(191.5-212.3)	724	217.6	(201.7-233.5)	717	188.1	(174.4-201.9)	0.86	(0.82-0.91)

Table A 1-94. COPD in adults aged 45+ age group mortality rate ratios by sex, 2017.

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+	13.34	(12.38-14.36)	16.57	(14.80-18.56)	11.05	(10.01-12.19)

Table A 1-95. COPD in adults aged 45+ mortality rates and rate ratios by ethnic group, 2017.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	232	122.8	186.4	(160.6-212.3)	2.32	(2.16-2.50)
Pacific	51	65.1	118.2	(84.1-152.4)	1.47	(1.28-1.70)
Asian	21	10.4	18.7	(10.4-27.1)	0.23	(0.19-0.29)
Non-MPA	1322	90.0	80.3	(76.0-84.6)	1.00	Baseline

Table A 1-96. COPD in adults aged 45+ mortality rates by ethnic group and age, 2017.

	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	76	53.0	(41.1-64.9)	7	11.8	(3.1-20.6)	1	0.7	(0.1-4.7)	101	11.6	(9.4-13.9)
65+	156	343.4	(289.5-397.3)	44	230.9	(162.7-299.1)	20	38.9	(21.9-56.0)	1221	203.9	(192.5-215.4)

Table A 1-97. COPD in adults aged 45+ mortality rates by NZDep2018 quintile, 2017.

NZDep	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	164	39.3	47.9	(40.6-55.3)	1.00	Baseline
3-4	215	54.9	58.1	(50.3-65.8)	1.21	(1.10-1.34)
5-6	345	88.4	81.9	(73.3-90.6)	1.71	(1.56-1.87)
7-8	475	121.8	110.4	(100.4-120.4)	2.30	(2.11-2.51)
9-10	426	122.8	125.2	(113.3-137.1)	2.61	(2.39-2.85)

Table A 1-98. COPD in adults aged 45+ mortality rates by ethnic group and NZDep2018 quintile, 2017.

		NZDep2018 quintile				
Ethnic group		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	6	9	28	60	129
	Rate (raw)	34.1	39.9	94.6	138.2	170.5
	Rate (age adj'd)	67.8	87.7	152.6	205.9	236.5
	95%CI	(4.4-131.2)	(26.7-148.6)	(93.3-212.0)	(150.4-261.4)	(192.8-280.3)
Pacific	Hosp_Num	2	3	6	11	29
	Rate (raw)	42.6	45.3	70.5	71.5	67.2
	Rate (age adj'd)	86.4	78.6	141.2	120.0	122.1
	95%CI	(20.8-359.3)	(23.9-258.9)	(25.4-256.9)	(45.7-194.4)	(74.9-169.3)
Asian	Hosp_Num	0	5	5	6	4
	Rate (raw)	0	10.8	12.8	16.2	10.6
	Rate (age adj'd)	0	19.5	25.8	27.0	19.4
	95%CI	-	(2.0-36.9)	(2.5-49.2)	(4.9-49.0)	(6.6-56.6)
NZ European/ Other	Hosp_Num	156	198	306	398	264
	Rate (raw)	44.1	62.6	97.7	135.4	138.5
	Rate (age adj'd)	50.4	60.1	81.1	108.5	109.8
	95%CI	(42.5-58.4)	(51.7-68.4)	(72.0-90.2)	(97.7-119.3)	(96.4-123.2)

Table A 1-99. COPD in adults aged 45+ mortality rates by DHB, 2017.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	99	116.8	112.3	(90.1-134.5)
Waitemata	154	66.4	71.4	(60.1-82.6)
Auckland	77	45.7	51.8	(40.2-63.4)
Counties Manukau	110	57.9	68.6	(55.7-81.6)
Waikato	154	92.8	90.9	(76.5-105.2)
Lakes	56	122.1	125.4	(92.5-158.2)
Bay of Plenty	98	89.9	79.4	(63.7-95.2)
Tairawhiti	23	116.4	119.0	(70.3-167.8)
Hawkes Bay	94	125.4	116.5	(92.9-140.1)
Taranaki	75	144.1	134.8	(104.2-165.4)
MidCentral	81	106.5	97.6	(76.3-118.9)
Whanganui	44	144.8	128.1	(90.2-166.1)
Capital and Coast	56	48.3	51.8	(38.2-65.4)
Hutt	55	91.2	96.2	(70.7-121.6)
Wairarapa	25	110.7	100.1	(60.9-139.4)
Nelson Marlborough	54	71.4	66.9	(49.0-84.7)
West Coast	15	91.9	95.2	(46.9-143.6)
Canterbury	183	80.6	80.2	(68.6-91.9)
South Canterbury	37	124.5	107.4	(72.7-142.1)
Southern	135	97.2	93.2	(77.5-109.0)

A 1.6. TOTAL SERIOUS RESPIRATORY DISEASE

A 1.6.1 TOTAL RESPIRATORY HOSPITALISATIONS

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

Table A 1-100. Total respiratory hospitalisations, rates and age-adjusted rates 2000-2020.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	54886	1422.8	1458.1	(1445.7-1470.6)
2001	58335	1503.3	1543.0	(1530.3-1555.8)
2002	58215	1474.4	1517.4	(1504.9-1530.0)
2003	58737	1458.5	1516.6	(1504.2-1529.1)
2004	59328	1451.4	1511.5	(1499.1-1523.8)
2005	58217	1408.3	1456.0	(1444.1-1468.0)
2006	60898	1455.3	1506.7	(1494.6-1518.8)
2007	60206	1425.4	1462.0	(1450.2-1473.9)
2008	66707	1566.0	1594.3	(1582.1-1606.6)
2009	72429	1683.4	1694.8	(1682.3-1707.2)
2010	71806	1650.5	1652.5	(1640.3-1664.7)
2011	73800	1683.4	1679.3	(1667.1-1691.5)
2012	75971	1723.5	1709.0	(1696.8-1721.2)
2013	72252	1626.5	1611.8	(1600.0-1623.6)
2014	77716	1720.7	1706.7	(1694.7-1718.7)
2015	81987	1778.7	1768.8	(1756.7-1780.9)
2016	79047	1676.8	1673.2	(1661.5-1684.8)
2017	87253	1812.6	1810.0	(1798.0-1822.1)
2018	84578	1725.9	1725.9	(1714.2-1737.5)
2019	88794	1783.3	1779.8	(1768.1-1791.5)
2020	56527	1111.8	1105.9	(1096.8-1115.0)
Trend 2000 -2019			17.23	(12.66-21.80), p<0.001

Table A 1-101. 2019 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	26176	2738.018033	(2704.8-2771.2)	15161	3086.6	(3037.5-3135.8)	11014	2369.4	(2325.1-2413.6)	0.77	(0.76-0.78)
15-29	8291	804.0537264	(786.7-821.4)	3436	648.1	(626.5-669.8)	4854	968.8	(941.6-996.1)	1.49	(1.46-1.53)
30-64	22186	993.8583799	(980.8-1006.9)	10125	925.1	(907.1-943.1)	12061	1060.0	(1041.1-1078.9)	1.15	(1.13-1.16)
65+	32141	4230.136482	(4183.9-4276.4)	16214	4562.8	(4492.6-4633.1)	15927	3937.8	(3876.7-3999.0)	0.86	(0.85-0.87)

Table A 1-102. 2019 total respiratory hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	2.75	(2.73-2.78)	3.34	(3.30-3.38)	2.24	(2.21-2.26)
15-29	0.81	(0.80-0.82)	0.70	(0.69-0.71)	0.91	(0.90-0.93)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	4.26	(4.22-4.29)	4.93	(4.87-4.99)	3.72	(3.67-3.76)

Table A 1-103. 2019 total respiratory hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	22034	2822.6	3292.1	(3239.6-3344.7)	2.19	(2.17-2.21)
Pacific	10075	3129.3	3884.2	(3791.7-3976.8)	2.59	(2.55-2.62)
Asian	6551	850.4	1030.7	(1001.9-1059.6)	0.69	(0.68-0.70)
Non-MPA	50134	1613.8	1502.3	(1488.6-1515.9)	1.00	Baseline

Table A 1-104. Total respiratory hospitalisation rates and rate ratios by ethnic group, 2000 – 2019, 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	2408.6	(2339.0-2478.1)	5054	2699.5	(2587.5-2811.5)	1349	796.8	(734.5-859.2)	37198	1354.0	(1340.1-1367.8)
2001	12239	2646.7	(2573.8-2719.7)	6188	3147.4	(3029.9-3265.0)	1668	941.8	(879.8-1003.8)	38240	1381.8	(1367.9-1395.8)
2002	12638	2645.9	(2575.1-2716.7)	6504	3320.9	(3198.7-3443.2)	1753	868.5	(812.2-924.8)	37320	1339.1	(1325.4-1352.8)
2003	13037	2811.1	(2738.0-2884.2)	6802	3342.9	(3224.6-3461.1)	1897	793.2	(744.1-842.3)	37001	1313.2	(1299.7-1326.7)
2004	12929	2764.8	(2692.7-2836.9)	6901	3440.9	(3322.2-3559.6)	2024	830.1	(781.0-879.2)	37474	1311.1	(1297.7-1324.5)
2005	12887	2558.3	(2493.2-2623.3)	6142	2861.1	(2757.4-2964.9)	2176	865.6	(815.2-916.0)	37012	1285.0	(1271.8-1298.3)
2006	13404	2715.4	(2648.5-2782.3)	6924	3323.6	(3211.1-3436.2)	2295	868.4	(821.2-915.5)	38275	1308.1	(1294.9-1321.3)
2007	13604	2674.8	(2609.7-2739.8)	7012	3267.2	(3160.1-3374.3)	2427	832.0	(789.0-875.0)	37163	1256.2	(1243.3-1269.1)
2008	15076	2864.2	(2798.7-2929.7)	8055	3678.6	(3566.7-3790.4)	2856	973.8	(926.9-1020.8)	40720	1360.9	(1347.5-1374.3)
2009	17261	3033.0	(2969.6-3096.3)	9312	4101.4	(3987.9-4214.9)	3179	946.1	(904.2-988.1)	42677	1417.7	(1404.1-1431.3)
2010	16330	2832.0	(2771.6-2892.5)	8347	3643.3	(3538.3-3748.3)	3534	1023.4	(981.0-1065.9)	43595	1433.0	(1419.4-1446.7)
2011	16631	2905.3	(2844.9-2965.7)	8861	3818.2	(3711.6-3924.8)	3707	1069.9	(1025.7-1114.2)	44601	1442.6	(1429.0-1456.2)
2012	17259	2990.9	(2929.8-3052.0)	9116	3885.9	(3780.0-3991.8)	4062	1097.9	(1055.3-1140.4)	45534	1465.3	(1451.6-1479.0)
2013	16106	2775.4	(2719.1-2831.7)	8459	3569.4	(3470.2-3668.6)	4147	1056.5	(1016.4-1096.6)	43540	1395.3	(1382.0-1408.7)
2014	17231	2881.4	(2825.2-2937.6)	9302	3921.9	(3819.9-4024.0)	4565	1059.3	(1021.3-1097.3)	46618	1479.3	(1465.6-1493.0)
2015	18886	3041.1	(2985.1-3097.0)	9926	4047.8	(3946.6-4149.0)	5080	1070.4	(1035.0-1105.9)	48095	1512.1	(1498.3-1525.9)
2016	17766	2843.7	(2791.2-2896.3)	9015	3679.6	(3584.2-3774.9)	5101	971.7	(940.2-1003.3)	47165	1470.7	(1457.1-1484.3)
2017	20227	3193.4	(3138.8-3248.0)	9958	4133.0	(4031.8-4234.1)	5685	1044.5	(1012.7-1076.4)	51383	1567.6	(1553.7-1581.6)
2018	20879	3114.5	(3062.7-3166.2)	9882	3915.7	(3820.8-4010.6)	6049	999.7	(970.7-1028.8)	47768	1465.1	(1451.6-1478.7)
2019	22034	3292.1	(3239.6-3344.7)	10075	3884.2	(3791.7-3976.8)	6551	1030.7	(1001.9-1059.6)	50134	1502.3	(1488.6-1515.9)
2020	13854	2154.5	(2112.8-2196.3)	5731	2291.3	(2220.3-2362.2)	3803	564.3	(543.8-584.8)	33139	967.7	(956.8-978.5)

Table A 1-105. Total respiratory hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2020, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.78	(1.75 - 1.81)	1.99	(1.95 - 2.04)	0.59	(0.57 - 0.61)
2001	1.92	(1.89 - 1.94)	2.28	(2.24 - 2.32)	0.68	(0.66 - 0.70)
2002	1.98	(1.95 – 2.00)	2.48	(2.43 - 2.53)	0.65	(0.63 - 0.67)
2003	2.14	(2.11 - 2.17)	2.55	(2.50 - 2.59)	0.60	(0.59 - 0.62)
2004	2.11	(2.08 - 2.14)	2.62	(2.58 - 2.67)	0.63	(0.61 - 0.65)
2005	1.99	(1.96 - 2.02)	2.23	(2.19 - 2.27)	0.67	(0.65 - 0.69)
2006	2.08	(2.05 - 2.10)	2.54	(2.50 - 2.58)	0.66	(0.65 - 0.68)
2007	2.13	(2.10 - 2.16)	2.60	(2.56 - 2.64)	0.66	(0.65 - 0.68)
2008	2.10	(2.08 - 2.13)	2.70	(2.66 - 2.75)	0.72	(0.70 - 0.73)
2009	2.14	(2.12 - 2.16)	2.89	(2.85 - 2.93)	0.67	(0.65 - 0.68)
2010	1.98	(1.95 – 2.00)	2.54	(2.51 - 2.58)	0.71	(0.70 - 0.73)
2011	2.01	(1.99 - 2.04)	2.65	(2.61 - 2.68)	0.74	(0.73 - 0.76)
2012	2.04	(2.02 - 2.06)	2.65	(2.62 - 2.69)	0.75	(0.73 - 0.76)
2013	1.99	(1.97 - 2.01)	2.56	(2.52 - 2.59)	0.76	(0.74 - 0.77)
2014	1.95	(1.93 - 1.97)	2.65	(2.62 - 2.69)	0.72	(0.70 - 0.73)
2015	2.01	(1.99 - 2.03)	2.68	(2.64 - 2.71)	0.71	(0.70 - 0.72)
2016	1.93	(1.91 - 1.95)	2.50	(2.47 - 2.54)	0.66	(0.65 - 0.67)
2017	2.04	(2.02 - 2.06)	2.64	(2.60 - 2.67)	0.67	(0.66 - 0.68)
2018	2.13	(2.11 - 2.15)	2.67	(2.64 - 2.71)	0.68	(0.67 - 0.69)
2019	2.19	(2.17 - 2.21)	2.59	(2.55 - 2.62)	0.69	(0.68 - 0.70)
2020	2.23	(2.20 - 2.25)	2.37	(2.33 - 2.41)	0.58	(0.57 - 0.59)

Table A 1-106. 2019 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	9388	3702.1	(3627.3-3777.0)	4278	4727.1	(4585.5-4868.8)	2960	2058.0	(1983.8-2132.1)	9550	2040.9	(2000.0-2081.8)
15-29	2409	1236.9	(1187.5-1286.3)	1099	1299.0	(1222.2-1375.8)	633	348.2	(321.1-375.4)	4150	728.2	(706.0-750.3)
30-64	6211	2202.0	(2147.3-2256.8)	2675	2121.3	(2040.9-2201.7)	1599	418.4	(397.9-438.9)	11701	811.6	(796.9-826.3)
65+	4026	8017.4	(7769.7-8265.0)	2023	9747.5	(9322.8-10172.3)	1359	2172.3	(2056.8-2287.8)	24733	3944.7	(3895.5-3993.9)

Table A 1-107. 2019 total respiratory hospitalisation rates by NZDep2018 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	10643	1070.8	1134.8	(1113.0-1156.6)	1.00	Baseline
3-4	13509	1409.7	1426.9	(1402.7-1451.0)	1.26	(1.24-1.27)
5-6	15987	1672.4	1617.5	(1592.3-1642.7)	1.43	(1.41-1.44)
7-8	21278	2080.4	2018.4	(1991.2-2045.7)	1.78	(1.76-1.80)
9-10	27359	2611.6	2685.9	(2653.6-2718.2)	2.37	(2.34-2.39)

Table A 1-108. Total respiratory hospitalisation rates by NZDep2018 quintile 2000 – 2020, 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	5485	938.5	(912.9-964.1)	8067	1256.2	(1228.3-1284.1)	10001	1317.8	(1291.7-1343.9)	13398	1588.6	(1561.3-1615.9)	17738	1954.9	(1924.5-1985.3)
2001	5515	924.1	(899.0-949.1)	8634	1329.2	(1300.7-1357.7)	10610	1391.6	(1364.9-1418.3)	14221	1684.7	(1656.6-1712.7)	18816	2082.0	(2050.8-2113.3)
2002	5585	919.2	(894.4-943.9)	8359	1261.6	(1234.2-1289.1)	10775	1395.8	(1369.2-1422.3)	13859	1627.2	(1599.8-1654.6)	19564	2134.1	(2102.7-2165.5)
2003	5526	894.6	(870.4-918.8)	8163	1209.3	(1182.7-1236.0)	10387	1329.9	(1304.1-1355.7)	14408	1679.3	(1651.6-1707.1)	19918	2177.6	(2145.9-2209.3)
2004	5693	892.6	(868.8-916.4)	8109	1179.1	(1153.1-1205.1)	9982	1265.3	(1240.3-1290.3)	14777	1702.1	(1674.3-1729.8)	20710	2263.9	(2231.6-2296.1)
2005	5714	860.8	(837.9-883.7)	7907	1117.3	(1092.4-1142.3)	10001	1250.5	(1225.8-1275.2)	14897	1697.6	(1670.1-1725.1)	19626	2122.2	(2091.3-2153.2)
2006	6138	912.8	(889.4-936.2)	8301	1160.3	(1135.0-1185.5)	10179	1258.9	(1234.3-1283.5)	15366	1734.5	(1706.9-1762.2)	20851	2244.2	(2212.6-2275.8)
2007	5919	853.7	(831.4-875.9)	8181	1113.3	(1088.9-1137.7)	10008	1216.4	(1192.4-1240.3)	15411	1715.8	(1688.5-1743.1)	20634	2207.3	(2176.1-2238.6)
2008	6411	900.6	(878.1-923.1)	9269	1237.2	(1211.7-1262.6)	11383	1363.0	(1337.8-1388.2)	16354	1798.5	(1770.7-1826.3)	23140	2443.4	(2410.7-2476.0)
2009	7028	953.4	(930.6-976.1)	10313	1341.1	(1315.0-1367.3)	12476	1471.9	(1445.9-1497.8)	17576	1901.7	(1873.4-1930)	24982	2583.5	(2550.3-2616.7)
2010	7353	972.7	(950.1-995.3)	10620	1345.2	(1319.5-1371.0)	12813	1487.4	(1461.6-1513.3)	17581	1872.3	(1844.5-1900.2)	23407	2415.9	(2383.9-2448.0)
2011	7536	976.6	(954.2-999.0)	10982	1372.9	(1347.0-1398.7)	13316	1525.5	(1499.5-1551.5)	18060	1904.6	(1876.6-1932.6)	23870	2455.7	(2423.5-2487.9)
2012	7952	1012.8	(990.2-1035.4)	11547	1422.7	(1396.6-1448.7)	13364	1514.1	(1488.3-1539.8)	18423	1924.4	(1896.5-1952.4)	24653	2531.9	(2499.4-2564.5)
2013	7565	946.3	(924.7-967.9)	10740	1304.2	(1279.5-1329.0)	12859	1443.9	(1418.8-1468.9)	17521	1820.7	(1793.6-1847.8)	23513	2425.8	(2394.0-2457.6)
2014	8166	993.7	(971.9-1015.5)	11691	1388.9	(1363.7-1414.2)	13697	1515.1	(1489.7-1540.6)	18952	1947.1	(1919.2-1974.9)	25167	2576.6	(2544.0-2609.1)
2015	8729	1035.2	(1013.3-1057.2)	12303	1428.4	(1403.1-1453.7)	14288	1555.0	(1529.4-1580.5)	19688	1988.5	(1960.6-2016.4)	26781	2715.6	(2682.5-2748.8)
2016	9145	1052.7	(1030.9-1074.4)	12064	1365.8	(1341.4-1390.2)	13846	1478.0	(1453.3-1502.7)	18971	1886.3	(1859.3-1913.2)	24994	2519.1	(2487.3-2550.9)
2017	10058	1121.5	(1099.4-1143.6)	13425	1478.5	(1453.4-1503.5)	15604	1628.5	(1602.8-1654.1)	20756	2028.6	(2000.9-2056.3)	27364	2742.6	(2709.6-2775.6)
2018	9935	1081.6	(1060.1-1103.1)	12920	1394.4	(1370.3-1418.5)	14964	1545.9	(1521.1-1570.8)	20178	1949.9	(1922.9-1976.9)	26559	2617.9	(2585.9-2649.9)
2019	10643	1134.8	(1113.0-1156.6)	13509	1426.9	(1402.7-1451.0)	15987	1617.5	(1592.3-1642.7)	21278	2018.4	(1991.2-2045.7)	27359	2685.9	(2653.6-2718.2)
2020	7065	724.5	(707.4-741.6)	8674	885.8	(867.1-904.5)	10229	1008.9	(989.2-1028.6)	13427	1253.2	(1231.9-1274.6)	17116	1691.6	(1666.0-1717.3)

Table A 1-109. Total respiratory hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2020, 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	1.34	(1.32 - 1.36)	1.40	(1.38 - 1.43)	1.69	(1.67 - 1.72)	2.08	(2.05 - 2.11)
2001	1.44	(1.41 - 1.46)	1.51	(1.48 - 1.53)	1.82	(1.80 - 1.85)	2.25	(2.22 - 2.29)
2002	1.37	(1.35 - 1.40)	1.52	(1.49 - 1.54)	1.77	(1.74 - 1.8)	2.32	(2.29 - 2.36)
2003	1.35	(1.33 - 1.37)	1.49	(1.46 - 1.51)	1.88	(1.85 - 1.91)	2.43	(2.40 - 2.47)
2004	1.32	(1.30 - 1.34)	1.42	(1.39 - 1.44)	1.91	(1.88 - 1.94)	2.54	(2.50 - 2.57)
2005	1.30	(1.28 - 1.32)	1.45	(1.43 - 1.48)	1.97	(1.94 – 2.00)	2.47	(2.43 - 2.50)
2006	1.27	(1.25 - 1.29)	1.38	(1.36 - 1.40)	1.90	(1.87 - 1.93)	2.46	(2.42 - 2.49)
2007	1.30	(1.28 - 1.33)	1.42	(1.40 - 1.45)	2.01	(1.98 - 2.04)	2.59	(2.55 - 2.62)
2008	1.37	(1.35 - 1.40)	1.51	(1.49 - 1.54)	2.00	(1.97 - 2.03)	2.71	(2.68 - 2.75)
2009	1.41	(1.39 - 1.43)	1.54	(1.52 - 1.57)	1.99	(1.97 - 2.02)	2.71	(2.67 - 2.75)
2010	1.38	(1.36 - 1.40)	1.53	(1.51 - 1.55)	1.92	(1.90 - 1.95)	2.48	(2.45 - 2.52)
2011	1.41	(1.39 - 1.43)	1.56	(1.54 - 1.58)	1.95	(1.92 - 1.98)	2.51	(2.48 - 2.55)
2012	1.40	(1.39 - 1.42)	1.49	(1.47 - 1.52)	1.90	(1.88 - 1.92)	2.50	(2.47 - 2.53)
2013	1.38	(1.36 - 1.40)	1.53	(1.50 - 1.55)	1.92	(1.90 - 1.95)	2.56	(2.53 - 2.60)
2014	1.40	(1.38 - 1.42)	1.52	(1.50 - 1.55)	1.96	(1.93 - 1.98)	2.59	(2.56 - 2.62)
2015	1.38	(1.36 - 1.40)	1.50	(1.48 - 1.52)	1.92	(1.90 - 1.94)	2.62	(2.59 - 2.65)
2016	1.30	(1.28 - 1.31)	1.40	(1.39 - 1.42)	1.79	(1.77 - 1.81)	2.39	(2.37 - 2.42)
2017	1.32	(1.30 - 1.34)	1.45	(1.43 - 1.47)	1.81	(1.79 - 1.83)	2.45	(2.42 - 2.47)
2018	1.29	(1.27 - 1.31)	1.43	(1.41 - 1.45)	1.80	(1.78 - 1.82)	2.42	(2.39 - 2.45)
2019	1.26	(1.24 - 1.27)	1.43	(1.41 - 1.44)	1.78	(1.76 - 1.80)	2.37	(2.34 - 2.39)
2020	1.22	(1.20 - 1.24)	1.39	(1.37 - 1.41)	1.73	(1.71 - 1.75)	2.33	(2.30 - 2.37)

Table A 1-110. 2020 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	1099	1897	2962	5123	10952
	Rate (raw)	1503.2	2040.8	2402.1	2798.6	3554.4
	Rate (age adj'd)	1777.0	2315.0	2860.3	3226.3	4137.9
	95%CI	(1640.5-1913.5)	(2183.2-2446.8)	(2737.2-2983.5)	(3120.3-3332.2)	(4045.0-4230.7)
Pacific	Hosp_Num	329	680	931	2338	5795
	Rate (raw)	1935.6	2576.0	2772.5	3673.2	3195.8
	Rate (age adj'd)	2406.8	3155.4	3503.1	4465.2	4046.7
	95%CI	(2060.4-2753.2)	(2870.0-3440.8)	(3234.3-3772)	(4243.7-4686.8)	(3918.8-4174.7)
Asian	Hosp_Num	945	1256	1306	1699	1342
	Rate (raw)	695.4	770.3	905.1	1096.1	779.9
	Rate (age adj'd)	775.1	888.8	1139.7	1319.6	1107.4
	95%CI	(719.9-830.2)	(834.6-943)	(1068-1211.5)	(1247.1-1392)	(1027.2-1187.6)
NZ European/ Other	Hosp_Num	8270	9676	10788	12118	9270
	Rate (raw)	1076.9	1431.6	1647.6	1951.2	2401.0
	Rate (age adj'd)	1116.6	1379.8	1490.6	1740.9	2137.0
	95%CI	(1091.9-1141.3)	(1351.5-1408.2)	(1461.2-1520.1)	(1708.1-1773.8)	(2090.6-2183.5)

Table A 1-111. 2019 total respiratory hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	4179	2203.9	2046.5	(1983.4-2109.6)
Waitemata	9639	1542.9	1588.7	(1557.0-1620.5)
Auckland	7973	1600.7	1800.5	(1760.5-1840.6)
Counties Manakau	10177	1757.1	1874.1	(1836.8-1911.4)
Waikato	9465	2206.6	2130.0	(2087.1-2173.0)
Lakes	2511	2181.4	2115.8	(2032.8-2198.8)
Bay of Plenty	5129	2002.7	1843.9	(1792.7-1895.1)
Tairawhiti	1180	2354.3	2236.7	(2108.1-2365.2)
Hawkes Bay	3718	2124.3	2003.8	(1938.8-2068.7)
Taranaki	2866	2331.6	2178.5	(2098.1-2258.9)
Midcentral	3440	1867.4	1755.5	(1696.5-1814.5)
Whanganui	1834	2720.3	2459.8	(2345.3-2574.3)
Capital and Coast	4341	1359.2	1464.4	(1420.6-1508.2)
Hutt	2864	1836.7	1853.3	(1785.3-1921.3)
Wairarapa	757	1586.3	1421.6	(1317.1-1526.1)
Nelson Marlborough	2257	1427.7	1298.8	(1243.7-1354.0)
West Coast	606	1876.7	1698.6	(1559.5-1837.7)
Canterbury	8865	1556.0	1557.2	(1524.7-1589.7)
Sth Canterbury	998	1625.4	1448.9	(1356.0-1541.7)
Southern	5995	1747.7	1732.8	(1688.7-1777.0)

A 1.6.2 TOTAL RESPIRATORY MORTALITY

Table A 1-112. Total respiratory mortality rates and age-adjusted rates 2000-2017.

		Rate		
Year	n	Raw	(age adj'd)	95% CI
2000	2060	53.40	66.54	(63.66-69.42)
2001	2407	62.03	75.37	(72.36-78.39)
2002	2392	60.58	73.13	(70.20-76.07)
2003	2357	58.53	70.41	(67.56-73.26)
2004	2467	60.35	71.81	(68.97-74.65)
2005	2164	52.35	61.74	(59.13-64.35)
2006	2396	57.26	66.18	(63.53-68.84)
2007	2329	55.14	62.64	(60.09-65.19)
2008	2623	61.58	68.82	(66.18-71.46)
2009	2557	59.43	65.15	(62.62-67.68)
2010	2439	56.06	60.52	(58.11-62.93)
2011	2718	62.00	65.68	(63.21-68.16)
2012	2833	64.27	66.63	(64.17-69.08)
2013	2720	61.23	62.80	(60.44-65.16)
2014	2903	64.28	65.50	(63.12-67.89)
2015	2974	64.52	65.71	(63.35-68.08)
2016	2900	61.52	62.42	(60.15-64.69)
2017	3243	67.37	67.95	(65.61-70.29)
Trend 2000 -2017			-0.39	(-0.74 - -0.05), p=0.029

Table A 1-113. Total respiratory mortality rates and rate ratios by age group and sex, 2017.

	Total			Male			Female			M v F	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	9	1.0	(0.3-1.6)	7	1.5	(0.4-2.5)	2	0.4	(0.1-1.8)	0.30	(0.14-0.65)
15-29	9	0.9	(0.3-1.5)	6	1.1	(0.2-2.1)	3	0.6	(0.2-1.9)	0.53	(0.27-1.04)
30-64	308	14.4	(12.8-16)	143	13.7	(11.4-15.9)	165	15.0	(12.7-17.3)	1.10	(0.98-1.22)
65+	2917	408.7	(393.8-423.5)	1374	413.0	(391.1-434.8)	1543	404.9	(384.7-425.1)	0.98	(0.95-1.02)

Table A 1-114. Total respiratory mortality rate ratios by age group and sex, 2017.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	0.07	(0.05-0.09)	0.11	(0.07-0.15)	0.03	(0.01-0.06)
15-29	0.06	(0.04-0.08)	0.08	(0.06-0.12)	0.04	(0.02-0.07)
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	28.44	(26.87-30.11)	30.17	(27.76-32.8)	26.97	(24.95-29.15)

Table A 1-115. Total respiratory mortality rates and rate ratios by ethnic group, 2017.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	347	46.0	113.6	(100.6-126.6)	1.74	(1.64-1.84)
Pacific	114	36.7	98.3	(78.9-117.8)	1.50	(1.36-1.66)
Asian	81	11.8	28.9	(22.2-35.6)	0.44	(0.39-0.49)
Non-MPA	2701	88.1	65.4	(62.9-67.8)	1.00	Baseline

Table A 1-116. Total respiratory mortality rates by ethnic group and age, 2017

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	3	1.2	(0.4-3.8)	1	1.1	(0.2-8.0)	2	1.6	(0.4-6.3)	3	0.6	(0.2-2.0)
15-29	2	1.0	(0.3-4.2)	3	3.6	(1.2-11.2)	2	1.1	(0.3-4.6)	2	0.4	(0.1-1.4)
30-64	108	39.9	(32.4-47.4)	24	20.1	(12.1-28.1)	13	3.9	(1.8-6.1)	163	11.5	(9.7-13.2)
65+	234	515.1	(449.1-581.1)	86	451.3	(355.9-546.7)	64	124.5	(94-155)	2533	423.1	(406.6-439.6)

Table A 1-117. Total respiratory mortality rates NZDep2018 quintile, 2017.

NZDep quintile	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	377	39.8	45.3	(40.7-49.9)	1.00	Baseline
3-4	490	53.3	53.6	(48.8-58.3)	1.18	(1.11-1.26)
5-6	714	76.9	67.8	(62.9-72.8)	1.50	(1.41-1.59)
7-8	922	92.8	84.2	(78.8-89.7)	1.86	(1.75-1.97)
9-10	729	71.1	86.0	(79.8-92.3)	1.90	(1.79-2.02)

Table A 1-118. Total respiratory mortality rates by ethnic group and NZDep2018 quintile, 2017.

Ethnic group		NZDep2018 quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	10	15	46	91	185
	Rate (raw)	14.7	17.1	38.9	51.5	61.0
	Rate (age adj'd)	53.1	55.8	99.6	127.6	137.9
	95%CI	(16.5-89.7)	(25.6-86.0)	(69.1-130.2)	(99.6-155.7)	(116.3-159.5)
Pacific	Hosp_Num	4	6	11	27	65
	Rate (raw)	25.2	24.1	34.4	44.0	36.8
	Rate (age adj'd)	54.4	47.8	102.9	106.5	106.3
	95%CI	(18.9-156.2)	(5-90.5)	(40.5-165.3)	(63.5-149.6)	(78.4-134.2)
Asian	Hosp_Num	12	11	21	19	13
	Rate (raw)	10.0	7.6	16.2	13.8	8.5
	Rate (age adj'd)	22.7	17.5	43.7	31.3	23.7
	95%CI	(9.2-36.3)	(6.8-28.2)	(24.4-63.1)	(16.3-46.3)	(9.2-38.1)
NZ European/ Other	Hosp_Num	351	458	636	785	466
	Rate (raw)	47.2	69.1	98.1	127.1	118.8
	Rate (age adj'd)	46.5	55.8	67.1	82.9	76.3
	95%CI	(41.6-51.4)	(50.7-61)	(61.9-72.4)	(77-88.8)	(69.3-83.3)

Table A 1-119. Total respiratory mortality rates by DHB, 2017.

DHB	n	Rate		
		Raw	Age adj'd	95%CI
Northland	176	97.1	82.5	(70.2-94.7)
Waitemata	332	50.8	57.0	(50.6-63.4)
Auckland	192	38.1	49.4	(42.3-56.6)
Counties Manukau	253	44.4	63.1	(55.2-71.1)
Waikato	312	74.7	73.2	(65.0-81.4)
Lakes	87	74.5	75.3	(59.1-91.5)
Bay of Plenty	213	88.2	69.6	(60.2-79.0)
Tairawhiti	47	95.5	98.1	(70.0-126.2)
Hawkes Bay	173	102.0	86.8	(73.8-99.7)
Taranaki	135	112.4	95.7	(79.5-111.9)
MidCentral	152	84.9	73.0	(61.4-84.6)
Whanganui	70	106.2	82.8	(63.3-102.3)
Capital and Coast	146	45.0	52.0	(43.4-60.6)
Hutt	91	59.8	63.9	(50.7-77.0)
Wairarapa	41	89.8	66.3	(46.0-86.6)
Nelson Marlborough	131	85.7	66.1	(54.8-77.4)
West Coast	21	64.2	54.4	(31.1-77.8)
Canterbury	357	60.3	58.3	(52.0-64.6)
South Canterbury	59	97.6	68.8	(51.2-86.5)
Southern	244	73.2	66.8	(58.4-75.3)

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)

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

APPENDIX 4. LITERATURE SEARCH RESULTS

Table A 4-1. Literature search publication numbers and filtering

(Publications since previous report only)

Condition	Medline publications returned + other sources	Remaining after abstract screening	Remaining after full text screening, + other sources
Asthma	66	9	3+1
Bronchiectasis	4	1	1+1
Childhood bronchiolitis	6	2	0
Childhood pneumonia	120	0	0
COPD in adults	43	3	1
OSA	6	1	0
Total respiratory	164	6	1

Table A 4-2. Asthma prevalence in published studies

(Three new since previous report: Stokes et al 2018, Wickens et al 2018; and Win et al 2019)

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
Cohet et al 2004[43]	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%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
Bates et al 2013[44]	2008-2010	Rotorua	1637	18-65 years; all	current asthma, defined as: "*ever been diagnosed by a doctor as having asthma",* plus either wheeze in the last 12 months or current use of asthma medication.	16.7%
					Wheeze or whistling	28.5%
					Woken with chest tightness	14.7%
					Shortness of breath at rest	9.7%
					Woken by shortness of breath	8.7%
					Woken by coughing	23.3%
					Ever asthma diagnosis	24.2%
					Current asthma treatment	13.1%
Crampton et al 2004[45]	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[46] 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[47]	2003-2004	Greater Wellington	1017	24-74 years; all;	Asthma ever diagnosed	23.9%
Ellison-Loschmann et al 2009[25] 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		Wheezing ever	46.5%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
				13-14 years; all (extrapolated)	Current wheeze	27.6%
					>=4 wheezing attacks	6.4%
					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[48], Eng et al 2011[49]	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%
Stokes et al 2018[39]	2016	Dunedin	422	Maori enrolled patients aged ≥ 35 years	Asthma – not further defined	16.7%
			180	Pacific enrolled patients aged ≥ 35 years		18.6%
Watson et al 2013[50]		Northern New Zealand	369	18 months; European & Polynesian (not disaggregated)	Wheeze in the last 12 months	118/369= 32.0%
Wickens et al 2018[24]	2015 - 2016	Auckland & Wellington in 2004 - 2005	357	11 years, trial participants		
				Placebo	Wheezing or whistling in the chest in the last 12 months	33.0%
				Treatment		25.4 – 25.9%
				Placebo	ISAAC-defined asthma, ie "asthma in the last 12 months"	29.0%
				Treatment		17.0 – 18.4%
Win et al 2019[23]	2011-12	Auckland	5,088	50 – 84 years & not taking more than recommended daily vitamin D dose	Current asthma, defined as "have you ever been told by a doctor that you have asthma?"	13.8%

Publication	Data year	NZ Location	n	Age; Ethnicity	Outcome measured	Rate/ prevalence
			1142	50 – 59 years		15.8%
			2228	60 - 69 years		13.7%
			1411	70 – 79 years		13.7%
			307	80 – 84 years		7.5%
			2960	Male		11.4%
			2128	Female		17.2%
			270	Māori		22.6%
			333	Pacific		14.1%
			246	South Asian		14.6%
			4239	European		13.2$

APPENDIX 5.HOUSING AND RESPIRATORY ILLNESS

On 16 July 2021 we carried out a rapid literature review, using the search terms ((("New Zealand") AND ("rate" OR "prevalence")) AND (("respiratory" AND (illness OR disease OR condition OR hospitalisations OR mortality OR death)))) AND housing NOT ("SARS-CoV-2" OR "COVID-19"). We limited the results to humans, and to publications since 1995.

The search returned 18 results, published between 1996 and 2020. Ten were excluded based on their abstract, for not having been conducted in New Zealand, or not examining a link between cold/damp/mould and respiratory illness. One was excluded as a methods paper - the results of that study, which had not appeared in the literature search results, were added instead.

The eight included studies demonstrated that insulating housing reduced wheezing (statistically significant in one study),[51] hospital admissions for respiratory conditions (statistically significant in one of two studies), [51 52] and mortality risk for people aged 65 years and older with respiratory hospitalisation (not statistically significant).[53] Results which were not statistically significant in a 2007 study, the study being underpowered to measure hospitalisation effects,[51] were statistically significant in later, larger studies. Another intervention study demonstrated that improving home heating reduced GP and pharmacy visits for asthma, as well as reducing sleep disturbance due to wheezing, dry cough at night, and overall lower respiratory tract symptoms, among children with doctor-diagnosed asthma; though improvements in lung function were not statistically significant.[54] However, a modelling study using the same data concluded that lung function was strongly associated with severity of exposure to low bedroom temperatures.[55]

Meanwhile, a 2013 observational study found a high prevalence of exposure to cold, damp and overcrowded houses among children admitted to hospital in winter, with respiratory disease the most common cause of admission.[56] Su and Wu's 2020 study of Māori communities in the central North Island found poor respiratory health conditions were closely related to poor living conditions, including poor thermal performance and insufficient insulation.[57]

In a case-control study, Ingham et al's 2019 study of children hospitalised for acute respiratory infection found a dose-response relationship between housing quality measures, particularly dampness and mould, and hospitalisation rates.[41]

Finally, while not specific to respiratory disease, and therefore not included in the rapid review above, we note Morton et al's 2020 large study finding that children's wellbeing (general health status) was lower when their measured indoor temperature at weekday bedtime was lower than 19°C, or above a Humidex of 28.[58]

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NEW ZEALAND

The impact of respiratory disease in New Zealand: 2020 update