University of Otago
ŌTĀKOU WHAKAIHU WAKA

The impact of respiratory disease in New Zealand: 2023 update

Prepared for

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EXECUTIVE SUMMARY

Overview

Chronic and serious respiratory illnesses continue to make a substantial contribution to New Zealand's health burden. Respiratory diagnoses accounted for roughly 1 in 11 of all 2019 hospital stays 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 national datasets for pharmaceutical prescriptions, hospitalisations and mortality, over the period 2000-2022.

Across the 2000 to 2022 study period, excluding unusually low rates in 2020, hospitalisation rates have increased for bronchiectasis, childhood bronchiolitis, childhood pneumonia, and total respiratory disease, and declined for asthma and COPD. Mortality rates between 2000 and 2019 increased slightly for bronchiectasis, declined for total respiratory disease, childhood pneumonia and COPD, and did not change significantly for asthma.

While inequalities have generally reduced since the previous report, they continue to be unacceptably high, and have widened further for COPD. Admissions for several of these indicators are potentially avoidable, so inequalities in these outcomes indicate potential disparities in case and population health.

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

There were marked inequalities in respiratory hospitalisations by socio-economic deprivation. Differences between the most (NZDep 9-10) and least (NZDep 1-2) deprived quintiles ranged from a rate ratio of 1.9 for childhood pneumonia, to 3.1 for bronchiectasis. 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, though the distribution between adult male and female hospitalisations varied by condition.

Across most indicators, the South Island continued to generally have lower disease rates than the North Island, with the highest total respiratory hospitalisation rates in Lakes, Whanganui and Tairawhiti DHBs, and the lowest rates in Nelson Marlborough.

Total respiratory disease

The 2022 rate of respiratory hospitalisations was 1519.3 per 100,000 people. Total respiratory hospitalisations have increased at a rate of 3.6 hospitalisations per year since 2000. However, this increase appears to have a two-tier effect – rates remained within the same range from 2000 to 2007, then increased to a new level by 2009. They increased slowly from then until 2019, then fell sharply in 2020, and have now returned to rates consistent with the 2000 to 2007 period. Conversely, respiratory mortality rates fell slightly between 2000 and 2019, with an age-adjusted rate of 66.3 per 100,000 people per year in 2000, and 61.7 in 2019. Preliminary data and provisional data indicate markedly lower respiratory mortality rates in 2020 (41.7) and 2021 (47.9).

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 2.4 times higher than for non-MPA. Māori rates were also significantly higher (rate ratio 1.9), 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 (rate ratio 1.6).

There was a significant deprivation gradient in total respiratory hospitalisations and mortality. Hospitalisation rates in the most deprived NZDep quintile were 2.2 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 Māori and non-MPA ethnic groups.

Asthma

Adult medicated asthma prevalence increased significantly between 2012/13 and 2022/23 but reduced for children since 2015/16. The reduction in children may reflect changing trends in the labelling and management of preschool wheeze. The hospitalisation rate for asthma peaked in 2009 at 208 per 100,000 people, and overall declined over the study period, even excluding lows in 2020 and 2021. Asthma mortality rates are not significantly different from previous years, but have not continued the potential increase identified in the previous report.

Risks for asthma were similar across measures. Prevalence, hospitalisation and mortality were all significantly higher for both Māori, and in more socioeconomically deprived neighbourhoods; hospitalisation and mortality rates were also higher for Pacific Peoples. In

children, asthma prevalence and hospitalisation were higher for boys, and there was no significant difference between male and female mortality in children, whereas for adult prevalence, hospitalisations, and deaths, all rates were higher in females.

Socio-economic differences in asthma hospitalisation saw rates 2.2 times higher in the most deprived quintile NZDep2018 9-10, and 2.0 times higher in quintile NZDep2018 7-8, compared to the wealthiest quintile NZDep2018 1-2. The difference was more pronounced for mortality, with rates 2.6 times higher in NZdep2018 quintile 9-10 than in the wealthiest quintile. However, there was no statistically significant deprivation gradient in asthma prevalence for children or adults.

2022 asthma hospitalisation rates were lower than the national average in South Canterbury and six other DHBs across North and South Islands, and higher than the national average in Whanganui and six other North Island DHBs; 2014 to 2019 mortality rates were highest in MidCentral DHB; and lowest in West Coast, where there were no asthma deaths recorded between 2014 and 2019.

Bronchiectasis

Bronchiectasis hospitalisation rates have decreased from a high of 31.2 per 100,000 people in 2017, to 22.9 in 2022, a rate within the low range seen in the early 2000s. Mortality rates more than doubled, from 1.3 per 100,000 in 2000 to 2.9 in 2019, but fell from the 2017 high of 3.2.

Being of Māori, Pacific, or Asian ethnicity was a significant risk factor for bronchiectasis prevalence, 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 490.5 per 100,000 were 5.9 times higher than for non-MPA. Overall, Pacific peoples were 6.1 times more likely to be hospitalised for bronchiectasis than non-MPA, and Māori were 2.6 times more likely to be hospitalised. Mortality differences were higher than hospitalisation differences for Māori (rate ratio 3.3), and marginally lower for Pacific (rate ratio 5.6).

Bronchiectasis also showed strong socio-economic disparity, with hospitalisation rates 3.1 times higher in the most deprived compared to the least deprived neighbourhoods, and mortality rates 2.3 times higher in the most deprived versus the least deprived quintiles. The hospitalisation rate increase for the most deprived quintile was steeper for Māori, Pacific and Asian peoples than for non-MPA

Childhood bronchiolitis

Childhood bronchiolitis hospitalisation rates increased by nearly 40% between 2000 and 2022. Pacific rates were 2.7 times higher than non-MPA, and Māori rates 2.3 times higher. The hospitalisation rate for the most deprived quintile was 2.7 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 three times as likely to be hospitalised as non-MPA children in the wealthiest quintile.

There were few deaths from childhood bronchiolitis, but 4 of the 6 deaths between 2010 and 2019 were in NZDep deciles 7-10; and four were Māori and/or Pacific children.

Childhood pneumonia

Pacific children and children living in more deprived NZDep quintiles had markedly higher childhood pneumonia rates than other groups. Pacific children's pneumonia rates were 2.4 times higher than the non-MPA rate for hospitalisation, and 5.6 times higher for mortality; Māori children's rates were 1.5 and 3.9 times higher respectively. Hospitalisation rates for Asian children were 1.1 times higher, and mortality 1.9 times higher.

Childhood pneumonia rates were highest in the most deprived areas, with hospitalisation rates 1.9 times higher in the most deprived NZDep quintile than in the least deprived. Nearly half of the 92 deaths 2010 to 2019 were in the most deprived quintile, making the ten year NZDep9-10 mortality rate 12.1 times higher than that of NZDep1-2.

COPD

COPD incidence in the total population was higher in women than in men. Prevalence in adults aged 45 years and over was higher in women than in men. Hospitalisation and mortality rates were also higher for women than men in the 45 to 64 year age group. In the 65+ years age group, hospitalisation rates were higher for women, but mortality rates were higher for men. Rates were highest for Māori, with incidence 3.4 times higher than non-MPA, prevalence 3.6 times higher, hospitalisation rates 3.7 times higher, and mortality 2.2 times higher. Pacific peoples' incidence was 2.1 times higher, prevalence was 2.6 times higher, and hospitalisation rates were 2.3 times higher, but mortality rates were not significantly different from non-MPA. All measures were lowest for Asian peoples, at levels between a fifth and two fifths of the non-MPA rate.

There was a strong deprivation gradient, with COPD prevalence 3.4 times higher, hospitalisations 5.2 times higher, and mortality 2.5 times higher in the most deprived NZDep quintile than in the least deprived. There was some level of deprivation gradient for all ethnic groups except Asian peoples.

Whanganui had markedly higher hospitalisation rates than other DHBs, while the highest mortality rates were in West Coast DHB.

Costs

We estimated the minimum cost burden of respiratory disease to New Zealand to be $8.39b in 2019. Of this, $7.81b were indirect costs from mortality and disability affected

life years, and the remaining $575.6m were direct costs from hospitalisations, prescriptions and primary care visits. We have costed asthma separately, at $1.195b, with $276.0m in direct costs, and $918.9m in indirect costs from work days lost, disability affected life years, and mortality.

Total costs have increased substantially since the previous report, due particularly to increases in mortality costs.

INTRODUCTION

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 (NZ). It aims to reduce hospital admissions caused by asthma and other respiratory conditions by 25%, by 2025.

Respiratory illnesses contribute a large part of NZ's total disease burden. In 2013 they were estimated to collectively account 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 seven reports relevant to the burden of respiratory disease in NZ:

- *Trying to Catch Our Breath – The Burden of Preventable Breathing Diseases in Children and Young People* (2006)[2] 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* (2002)[3] 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* (2003)[4] includes data to 2002.
- *The Impact of Respiratory Disease in New Zealand: 2014* (2015),[5] *2016* (2016)[6] and *2018* (2018)[7] *update*s.
- *The Impact of Respiratory Disease in New Zealand: 2020 update* (2021)[8] which this report updates, and refers to as "the previous report".

AIMS

This report updates analysis from earlier reports listed above; and measures indicator respiratory conditions identified in the previous report as markers for changes in levels of respiratory disease in NZ.

The 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 NZ'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 2023 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;[9] 8 – 38% of trained team sport athletes;[10] and 20% of a small sample of pre-surgery duodenal switch patients.[11] Since the last report, Dassanayake et al 2021[12] found 7.9% of 559 Dunedin adults aged 18 to 60 with pharmacologically managed primary hypertension were high risk for OSA, while Campbell et al's 2021 study of 54 Wellington children aged 4 to 15 years whose parents were alternatively diagnosed with, or at low risk for OSA, found 56% and 11% respectively were in turn at high risk of OSA.[13] Neill et al 2022[14] reported that 23% of home-based non-invasive ventilation patients had obstructive pathologies of overlapping COPD, OSA and/or obesity, but did not disaggregate these further. The full extent of OSA in NZ remains unknown, and broader prevalence studies are still needed. We continue to recommend further research.

Across all indicators, hospitalisation rates were substantially lower in 2020 than in all previous years, as public health and social measures (PHSM) introduced to combat the COVID-19 pandemic eliminated influenza and substantially reduced prevalence of other respiratory viruses. We therefore excluded 2020 from analysis of overall trends from 2000 to 2022; and for some indicators, where rates were clearly still affected by PHSM, we also excluded 2021.

INDICATOR SELECTION AND METHODS

CONDITIONS

All respiratory conditions for monitoring were nominated by ARFNZ. The conditions selected had been previously identified as making the largest contribution to NZ's respiratory burden.[15] Justification for age groups measured and disease categorisation are included in the 2014 report.

ICD-10AM codes used to identify indicator conditions in the hospitalisation and mortality data are included in Appendix 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 NZ Health Survey 2022/23; and provisional and preliminary total mortality data for 2020 and 2021 was sourced from the Ministry of Health's online mortality web tool (Table 1). Provisional and preliminary data have not yet been finalised by the Ministry of Health.

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

Indicator condition	Indicator dataset	Measureable risk factors/determinants
Asthma	NZ Health Survey	Age or age group Sex Ethnicity DHB Region NZDep
All measured indicators	NMDS (Hospitalisations)	
All measured indicators	Mortality Collection (deaths 2000 to 2019)	
Total respiratory illness	Pharmaceutical Collection	
All measured indicators	MoH Mortality data web tool ICD 3-character code dataset provisional (2020) and preliminary (2021) mortality data (https://tewhatuora.shinyapps.io/mortality-web-tool/)	Age or age group Sex Ethnicity DHB Region
Total hospitalisations	MoH hospital events web tool latest year of publicly funded hospitalisation data (https://tewhatuora.shinyapps.io/hospitals-web-tool/)	Age or age group Sex Ethnicity DHB Region

Ethnicity data reporting uses total ethnicity for Māori, Pacific, and Asian peoples,[*] and a residual group labelled "Non-MPA" who are neither Māori, Pacific, nor Asian. This group is predominantly NZ European. Under this categorisation, someone who reports their ethnicity as (e.g.) both Māori and Pacific will be included in both Māori and Pacific rates, but someone who reports their ethnicity as both Māori and NZ European will only be included in Māori rates. It should also be noted that people may not report their ethnicity the same way in interactions with the health service as they do in the census, so there is some difference between numerators and denominators.[16]

Socio-economic status is reported using the 'NZDep' Deprivation Index, which uses a range of census data to assign a decile rating from 1 (least deprived) to 10 (most deprived) to Census Area Units.[17] [18] These deciles have been aggregated into quintiles of NZDep 1-2, to NZDep 9-10.

Denominator data are compiled from across Statistics NZ sources. Population data by age, sex, ethnicity, and Data were extrapolated and interpolated from bespoke population data obtained from Statistics NZ for census years 2001, 2006, 2013, and 2018, adjusted to data available from the nzdotstat.stats.govt.nz website in July 2024.

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 NZ population estimates for 2018. 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 comes from differences in the proportion of the population who are in the age-groups with the highest or lowest rates of the disease.

INCIDENCE

Incidence is measured as the number of events per 100,000 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.

[*] Bronchiectasis prevalence is also reported for the aggregated Middle Eastern, Latin American and African (MELAA) ethnic group.

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 NZ Health Surveys in 2006/07, and annually from 2011/12 to 2022/23. 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 bronchiectasis and COPD were estimated as a cumulative count of individuals alive in 2022 who had been hospitalised with the condition since 2000. Reports before 2020 estimated cumulative counts since 1988, making this report's estimate a greater underestimate compared to those previous reports.

COSTS

We report costs for 2019, as this is the most recent year for which mortality data were available.

Table 2. Reported asthma costs 2000 and 2014 to 2024.

Report year	Cost year	Cost	Life years lost (calculated in 2023)	Value of life year
2000[19]	?	$349m	1545	$100,000
2014	2011	$800m	1145	$150,000
2016	2013	$858m	1582	$167,000
2018	2015	$1.01b	1519	$176,000
2020	2017	$1.18b	1894	$170,805
2024	2019	$1.22b	1545	$179,643

Previous estimates of the cost of asthma to the NZ economy are shown in Table 2. We include life years lost and value of a life year to demonstrate the impact of changes in the value of a life year to total costs, as Treasury has recently substantially increased the value of a life year, which may make results for subsequent reports less comparable to this and previous reports even if life years lost remain similar.

We have repeated methods used in the 2020 report, which follow on from previous reports, extending from methods used by Wilson in 2000.[19] Health system costs have been estimated using pharmaceutical, hospitalisation and mortality data, and additional costs extrapolated from the Statistics NZ data on the working age population and total population estimates, the NZ Health Survey, and a report on asthma rates in primary

care[20]. Mortality costs are estimated from years of life lost based on average life expectancy at age of death[21], multiplied by a value per life year of $179,643. The life year value is estimated from the 2019 NZTA value of a statistical life ($4.53m) and a 3% discount rate[22 23], using the formula

$$VSLY = \frac{VSL \cdot (1+r)^{t-1} \cdot r}{(1+r)^t - 1}$$

where VSL= the value of a statistical life, r = the discount rate (3%), and t=the remaining life years of the average-aged member of the population, sourced from Statistics NZ cohort life tables and population data – in this instance, estimated at 44.86.

Hospitalisation costs are summed from all 2019 publicly funded hospitalisation discharges, using the appropriate 2018/19 or 2019/20 Ministry of Health cost weight multiplier.

The method for calculating the total cost of pharmaceuticals is described in Telfar Barnard et al 2011[22]. The total pharmaceutical cost is the sum across all included prescriptions of:

Dispensing fee + retail subsidy - estimated 2019 Pharmac rebate

The estimated Pharmac rebate for 2019[24] was $517.39m total rebates/$1492.61m gross expenditure = 34.66%.

Estimating adult and child prescription and primary care 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[19], giving a ratio of 1.19.

The 2018/19 ratio of child to adult asthma prevalence was 13.2/11.9=1.11.

All 2019 prescriptions included age data. Children aged under 15 years were issued with 168,433 initial (rather than follow-on/repeat) total respiratory prescriptions in 2019, giving a rate of 17.6 prescriptions per 100 people, a substantial reduction from the previous report likely explained by changes in included prescriptions. Applying this rate, reduced by the ratio of child to adult asthma prevalence, gives a figure of 570,868 first prescriptions for adults, or 54% 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, 44.1% for 2013, and 62.1% in 2020.

The WaiMedCa study in 1994 found that 60.9% of respiratory prescriptions were for asthma.[25]

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 47.7% level found if the WaiMedCa 60.9% rate is reduced by the change from the 1996/7 NZ Health Survey 15.5% estimate of asthma prevalence [26] to the 2018/19 level of 11.9%, so potentially provides a better estimate than higher figures.

We assume a primary care visit for each initial prescription date and multiply this estimated number of visits by the $80 estimated consult fee (which includes both patient co-payment and government contribution[27]) to estimate the cost of primary care 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, carried out in winter 2005, found children with asthma had 2.2 additional days off school per winter, compared to children without asthma[28]. No more recent estimate is available. 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.[29]

We have costed each day off school conservatively, as 8 hours at half the 2019 adult minimum wage of $17.70/hr.

Cost of days off school = [2019/20 Asthma prevalence in under 15 year olds] * [Statistics NZ estimated 2019 population under 15 years] * [additional days off school] * [0.5 * adult minimum wage] * 8 hours

=0.137 * 956,000 * 4.4 * 0.5 * $17.70 * 8
= $40,800,397

Estimating the cost of days off work

We used the same method to calculate the cost of days off work as used by Wilson in 2000.[19] As the prevalence of adult asthma has decreased from the 15.2% used in that calculation, to 11.9% in the 2019 adult population, we updated the figures by the increase in the average weekly wage to $1,344[*], and the increase in the 15 – 44 years working age population to 2,008,030 people, then reduced by the change in adult asthma prevalence.

Estimating the cost of Emergency Department and Outpatient visits

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

We estimated the cost of Emergency Department (ED) and Outpatient (OP) visits by extrapolating from data in a 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. In ED03001 was costed at $327.32 in 2018/19 and $374.81 in 2019/20, while ED04001 costs were $350.75 and $358.15 respectively[*], which makes the average $352.76. Working from Statistics NZ's 2019 resident population estimate of 4,979,200, we estimated the total cost of ED and OP visits to be

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

= 4.8% * 4,979,200 * 2.17 * $352.76

= $182,951,847

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.[1] Newer estimates are not available, but as asthma prevalence is roughly similar to 2006 (higher for adults, lower for children), 2006 represents a better estimate than the 2001 figure. Increasing the 13,362 by the 23.6% increase in the population from 4,027,927 in the 2006 census to the 2019 resident population estimate of 4,979,200, takes the 2019 estimate of YLDs to 16,518. With the 2019 value of a life year at $179,643 and applying the same arbitrary 20% value as Holt and Beasley, the cost of YLDs is estimated at $593,458,956.

The estimate of YLDs from total respiratory disease in 2006 was 34,581. Allowing for the population increase to 2019 would take this estimate to 42,748. Respiratory hospitalisation rates increased between 2006 and 2019, so this should be a conservative estimate. At 20% of $179,643 per YLD, the YLD cost of total respiratory disease is estimated at $1,535,878,174.

[*] https://www.health.govt.nz/system/files/documents/information-release/h202200159_response.pdf

NEW ZEALAND'S RESPIRATORY DISEASE BURDEN

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 NZ 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 NZ after 31 December 1999, published after 15 July 2021 to exclude papers included in the 2021 report, and before 1 July 2024.

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 AND (child* OR infant*)"; "COPD OR 'chronic obstructive pulmonary disease'"; "sleep apnoea"; "respiratory AND (illness OR disease OR condition OR hospitalisation OR mortality OR death) NOT (COVID-19 OR SARS-CoV-2)"; with each search limited to publications from 2021 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 returned eight new relevant publications: six on asthma, one on bronchiectasis, one on childhood pneumonia two on adult COPD, and two on total respiratory disease. These publications are discussed in the relevant sections. There were also three new papers on obstructive sleep apnoea, which are discussed under "Aims".

We have also updated our summary of the compelling evidence for the role of cold housing in asthma and respiratory disease.

ASTHMA

ASTHMA PREVALENCE

New research

Published studies of NZ 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 123. Since the previous report, there were six new studies reporting NZ asthma prevalence. A 2023 study reported asthma prevalence from 2010 to 2019 by age group, ethnic group, and NZDep quintile.[30] Detail is provided in Table A 123. Asher et al 2021[31] reported 2018 asthma prevalence

(wheeze in the past 12 months) in Auckland at 17.4% for 6 to 7 year olds, and 14.9% for 13 to 14 year olds. Data collected from the same families showed adult asthma prevalence to be 17.3%.[32] Chan et al 2023[30] reported asthma prevalence rates at 10.3% in 2010 and 2019, based on data aggregated from PHO, NHI, Pharmaceutical Collection (PHARMS), NMDS and Mortality datasets. They found prevalence higher in males than females; in under-5 years than in other age groups; highest in Māori, then Pacific, then NZ European, then Other, then Asian ethnicities; and stratified by NZDep quintile, though prevalence was similar for quintiles 1-2 and 3-4.

Some new papers reported results from less recently collected data. A study of new Asian immigrants to NZ, aged 15 years and older in 2016/17, found 6.0% of them had ever been told by their doctor that they had asthma. [33] 2015 data on male retail and construction workers aged 17 to 70 years found 31.4% had had wheezing or whistling in the chest in the previous 12 months, and 23.1% had an asthma diagnosis.[34] Finally, a 2021 study of rural 25 to 49 year olds in the lower half of the North Island reported 2002 – 2004 "overall asthma" rates to be 14.2% among males and 16.0% among females.

Asthma prevalence 2022/23

Prevalence for medicated asthma was sourced from the most recently published NZ Health Survey data. For current asthma prevalence, data covers the 2022-23 period.

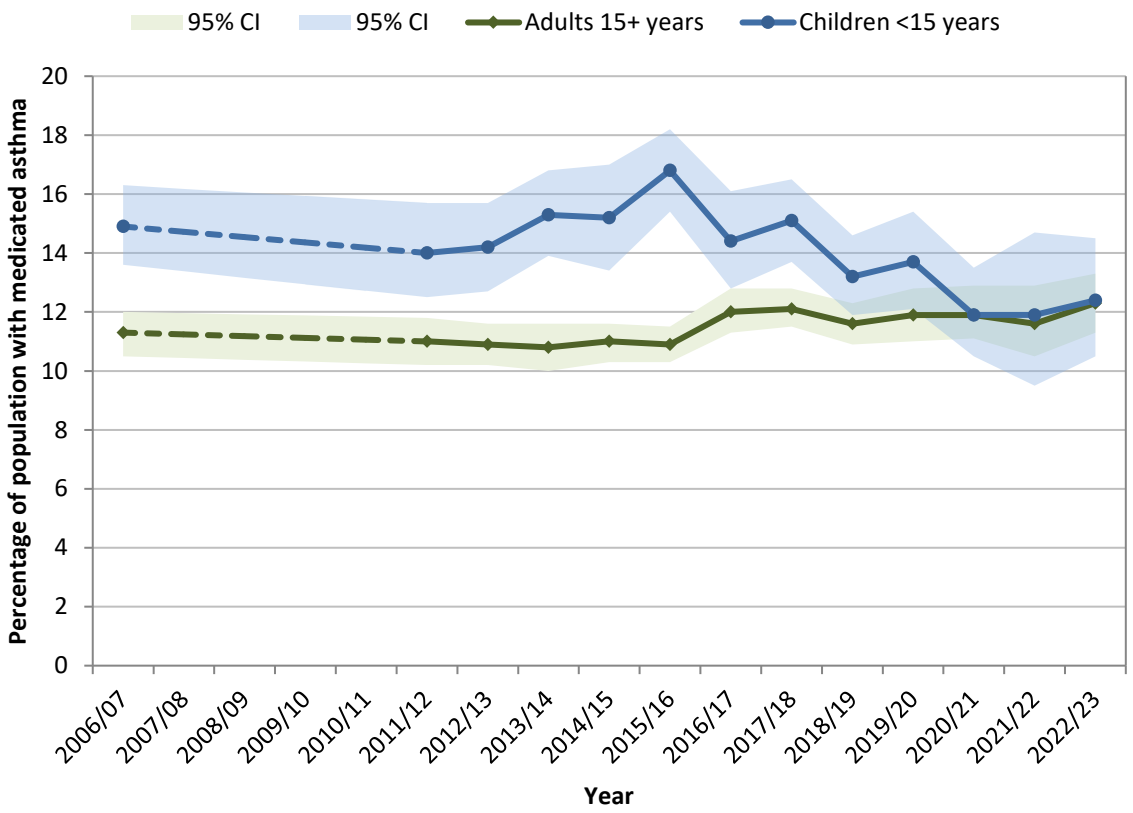
It should be noted that diagnostic practice for childhood asthma changed over the study period. Guidelines released in 2012 mean that children aged under 5 who present with wheeze are now less likely to be diagnosed with asthma than previously[35], and in particular wheeze in children aged under 3 is 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. We observe that the2022/23 NZ Health Survey estimate of medicated asthma rates at 12.4% for under 15 year olds is somewhat lower than GAN asthma surveillance carried out in 2018 reported 17.4% of 6 to 7 year olds, and 14.9% of 13 to 14 year olds;[31] or Chan et al's 2019 medicated or hospitalised asthma prevalence estimates of 16.6% in children under 5 years; though it is similar to Chan et al's estimate of 12.2% for children aged 5 to 14 years.[30]

Trends over time 2006/7 – 2022/23

Adult medicated asthma prevalence has increased since 2012/13, total, and for men and women, though the increase only reached statistical significance (p=0.02) for the total adult population. For children, on the other hand, prevalence has reduced significantly, from a high of 16.8% in 2015/16, to 12.4% in 2022/23. Boys saw more reduction than girls, but neither was statistically significant (Figure 1, Table 3 and Table 4).

Figure 1. Age-standardised medicated asthma prevalence rates, 2006/7 – 2022/23.



(Dotted lines are interpolated)

Table 3. Total child medicated asthma prevalence 2006/07 – 2022/23, 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	(12.5 - 15.7)	16.2	(13.9 - 18.6)	11.8	(9.4 - 14.4)
2012/13	14.2	(12.7 - 15.7)	16.3	(14.3 - 18.5)	12.0	(10.2 - 14.0)
2013/14	15.3	(13.9 - 16.8)	17.2	(15.1 - 19.6)	13.2	(11.3 - 15.3)
2014/15	15.2	(13.4 - 17.0)	16.6	(14.2 - 19.2)	13.6	(11.5 - 16.1)
2015/16	16.8	(15.4 - 18.2)	18.6	(16.7 - 20.7)	14.8	(12.9 - 16.8)
2016/17	14.4	(12.8 - 16.1)	17.3	(15.3 - 19.4)	11.3	(9.3 - 13.6)
2017/18	15.1	(13.7 - 16.5)	17.5	(15.5 - 19.6)	12.5	(10.6 - 14.6)
2018/19	13.2	(11.9 - 14.6)	15.5	(13.4 - 17.7)	10.8	(9.1 - 12.7)
2019/20	13.7	(12.1 - 15.4)	14.8	(12.4 - 17.5)	12.5	(10.5 - 14.7)
2020/21	11.9	(10.5 - 13.5)	13.7	(11.8 - 15.8)	10.0	(7.8 - 12.6)
2021/22	11.9	(9.5 - 14.7)	14.1	(10.7 - 18.1)	9.6	(6.7 - 13.2)
2022/23	12.4	(10.5 - 14.5)	14.2	(11.5 - 17.4)	10.5	(8.2 - 13.3)

Table 4. Total adult medicated asthma prevalence 2006/07 – 2022/23, 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)	8.7	(7.7 - 9.8)	13.2	(12.1 - 14.3)
2012/13	10.9	(10.2 - 11.6)	8.9	(7.9 - 9.9)	12.8	(11.8 - 13.7)
2013/14	10.8	(10.0 - 11.6)	8.3	(7.4 - 9.2)	13.1	(12.0 - 14.3)
2014/15	11.0	(10.3 - 11.6)	9.0	(8.0 - 10.1)	12.8	(12.0 - 13.7)
2015/16	10.9	(10.3 - 11.5)	8.5	(7.7 - 9.3)	13.2	(12.2 - 14.2)
2016/17	12.0	(11.3 - 12.8)	9.9	(8.8 - 11.1)	14.0	(13.0 - 15.1)
2017/18	12.1	(11.5 - 12.8)	10.5	(9.5 - 11.5)	13.7	(12.8 - 14.6)
2018/19	11.6	(10.9 - 12.3)	9.3	(8.4 - 10.3)	13.8	(12.9 - 14.8)
2019/20	11.9	(11.0 - 12.8)	10.3	(9.2 - 11.5)	13.4	(12.3 - 14.6)
2020/21	11.9	(11.1 - 12.9)	10.0	(8.8 - 11.4)	13.8	(12.6 - 15.0)
2021/22	11.6	(10.5 - 12.9)	9.6	(8.1 - 11.4)	13.6	(12.0 - 15.3)
2022/23	12.3	(11.3 - 13.3)	10.4	(9.1 - 11.8)	14.1	(12.7 - 15.5)

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

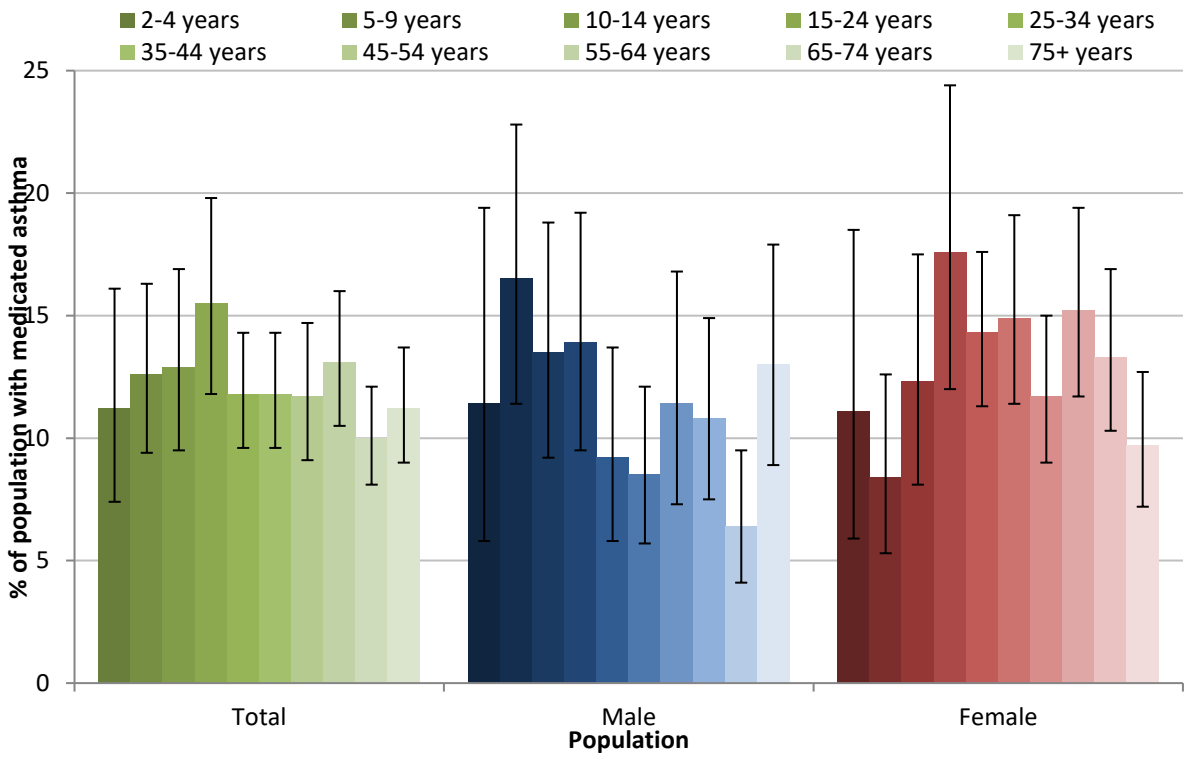
Risks and determinants 2022/23

Boys had higher medicated asthma prevalence than girls (rate ratio 1.35); but the difference was not statistically significant, and men had significantly lower prevalence than women (rate ratio 0.74).

Medicated asthma prevalence was significantly higher for Māori than for the rest of the population in both children (rate ratio 1.85) and adults (rate ratio 1.63). Prevalence for the most deprived NZDep2018 quintile was higher than for the least deprived for children (rate ratio 1.36), and for adults (rate ratio 1.20) but the difference was not statistically significant for either age group.

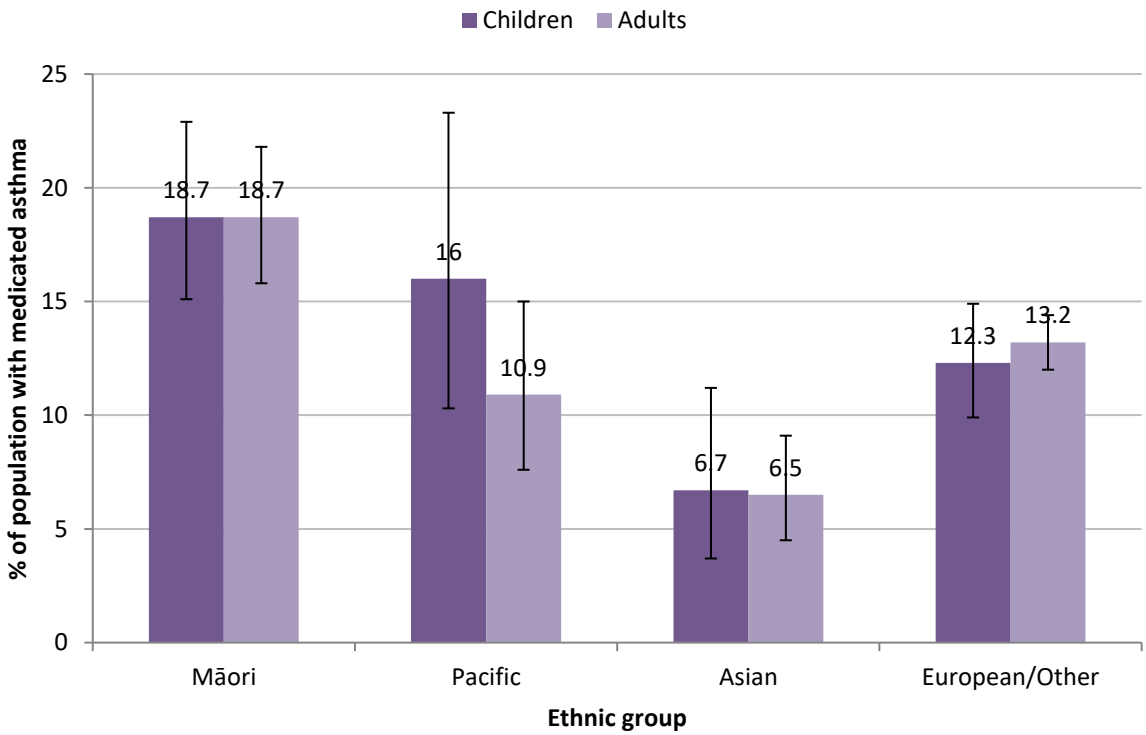
The Ministry of Health does not currently report NZ Health Survey asthma prevalence by DHB.

Figure 2. Age-standardised medicated asthma rates by age group and sex, 2022/23.



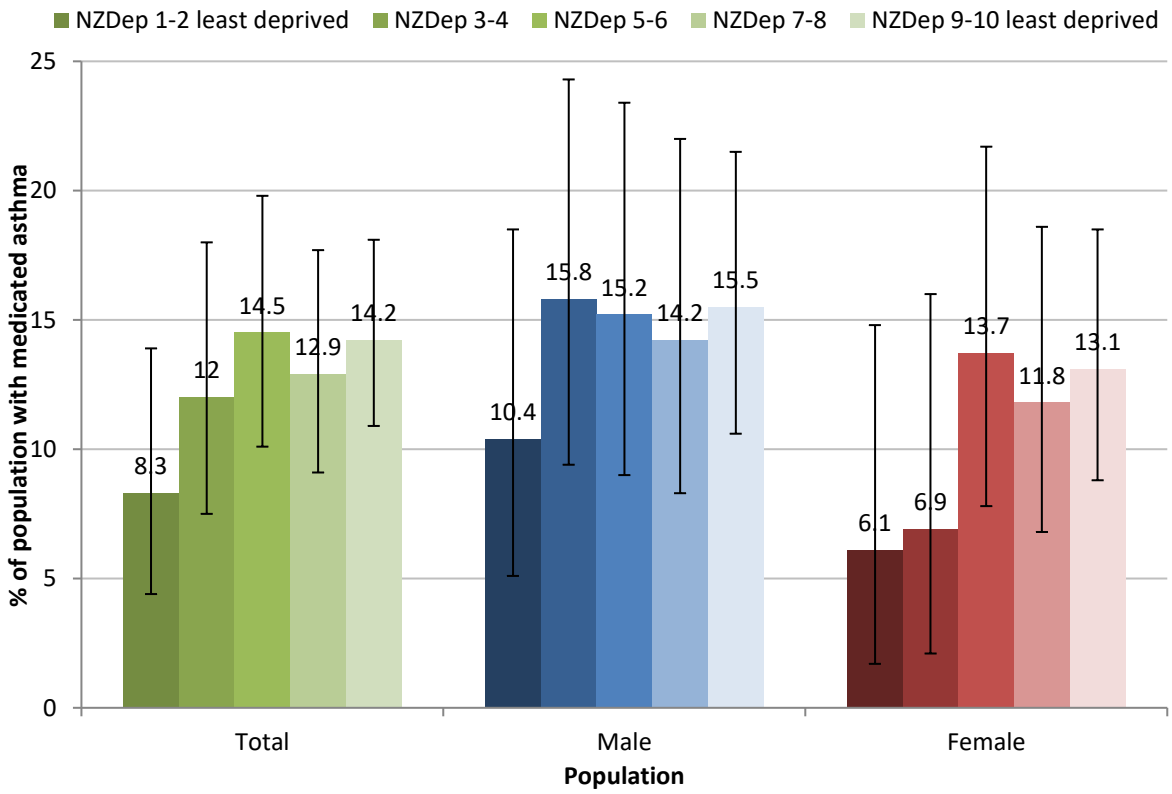
(See Table A 1 for data)

Figure 3. Medicated asthma prevalence by ethnic group 2022/23, children and adults



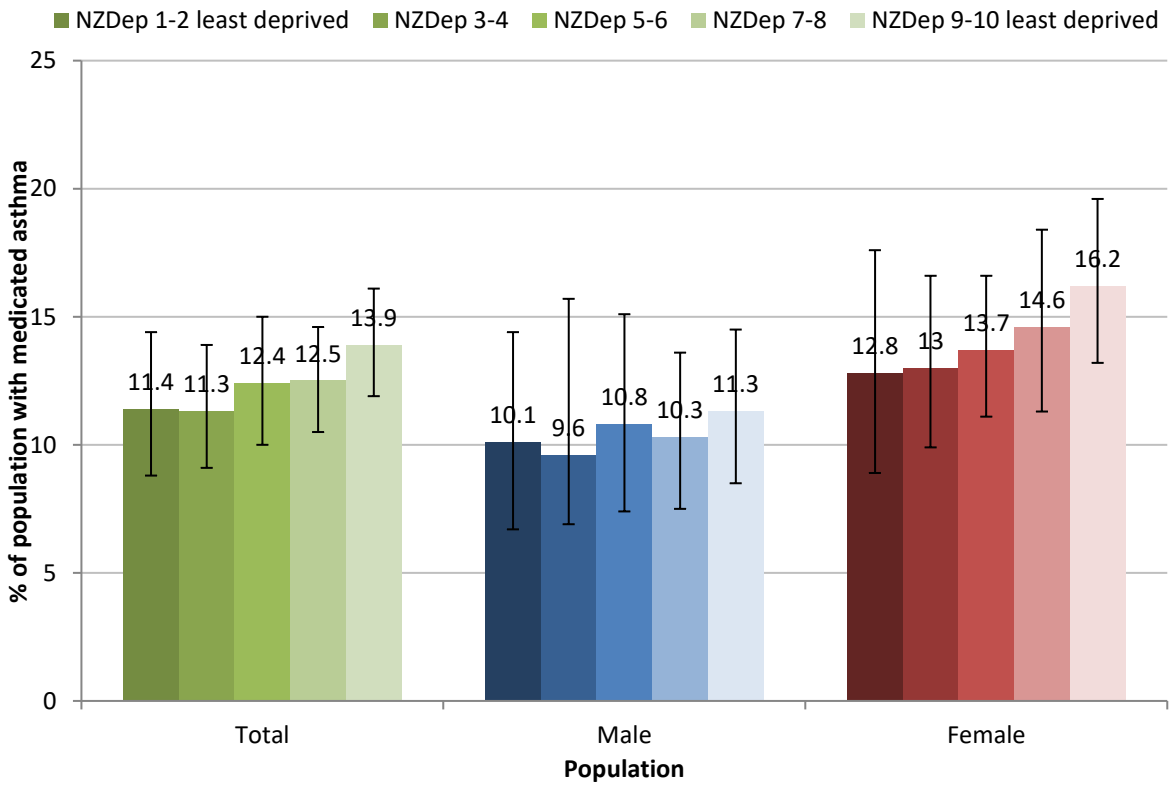
(See Table A 2 for data)

Figure 4. Child medicated asthma prevalence 2022/23 by NZDep2018, unadjusted



(See Table A 3 for data)

Figure 5. Adult medicated asthma prevalence 2022/23 by NZDep2018, unadjusted



(See Table A 4 for data)

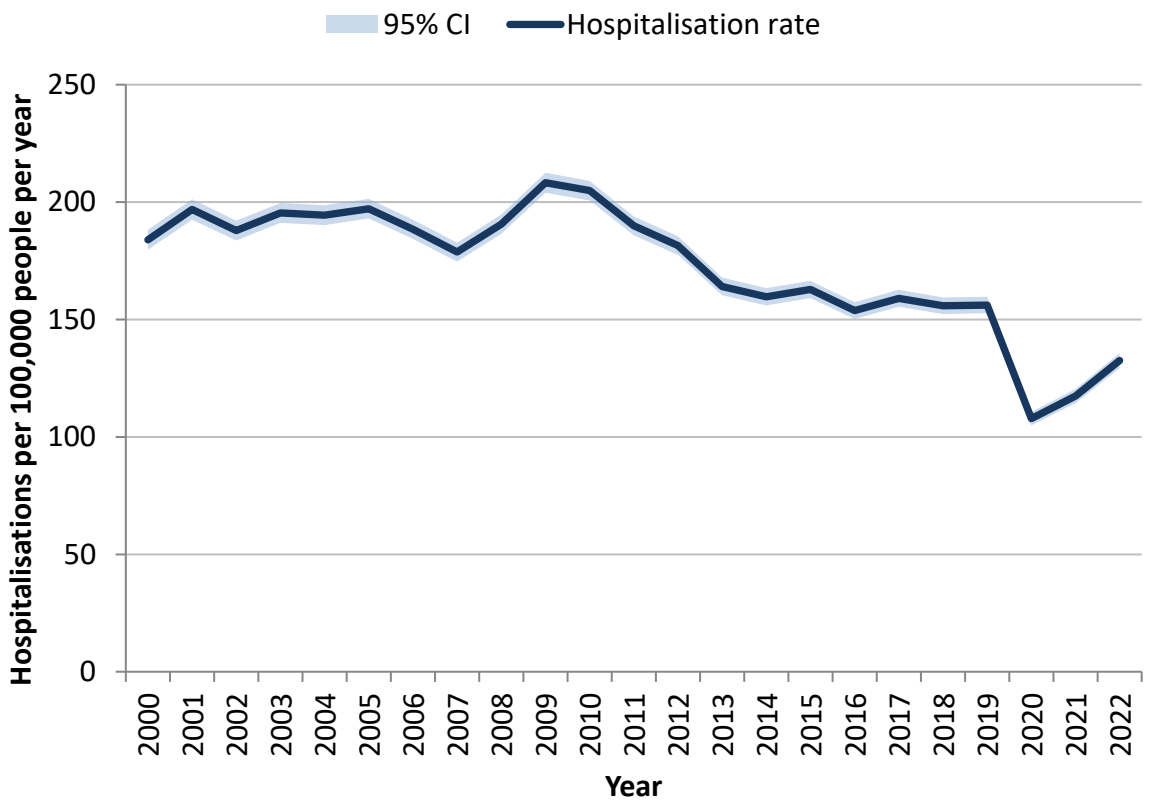
New research

Chan et al[30] found hospital admissions for asthma declined 25% between 2010 and 2019, with acute admissions dropping 30.3%. Despite the reduction, half of all admissions were in Māori or Pacific peoples.

Trends over time 2000 - 2022

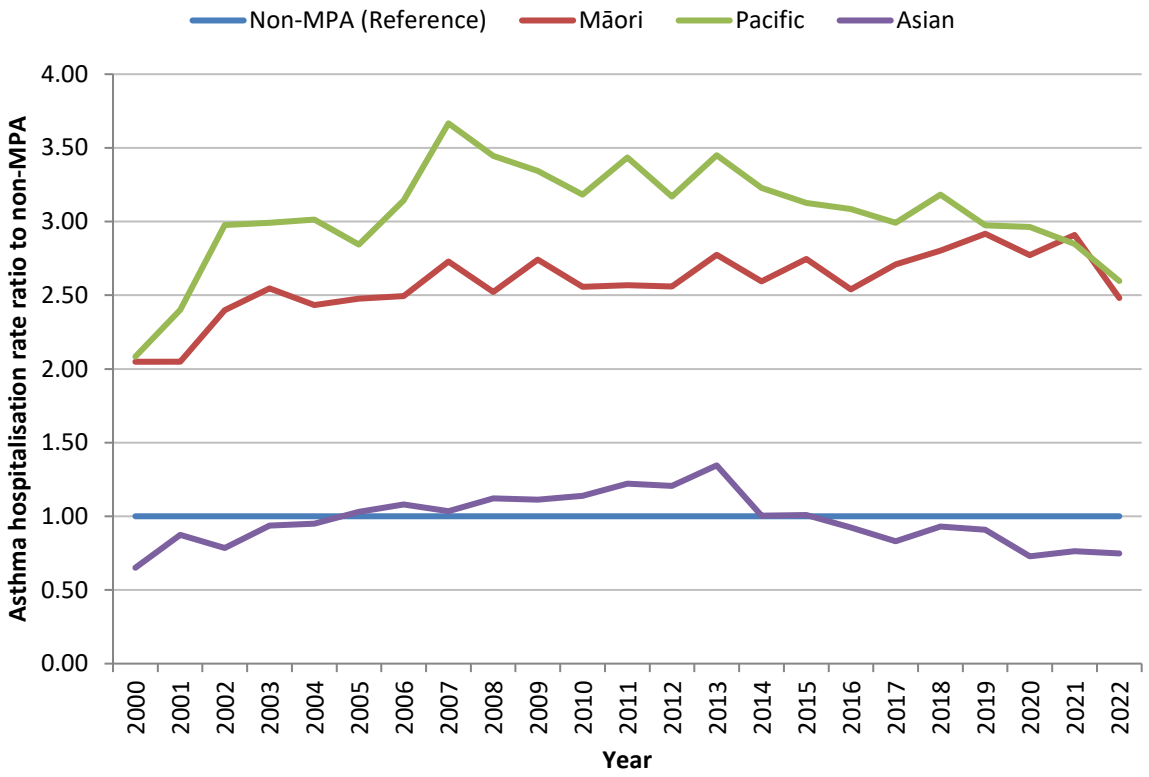
Asthma hospitalisation rates show a small but statistically significant decline over the 23 years 2000-2022. For the ten years from 2013 to 2022, rates continued below 170 hospitalisations per 100,000 people per year. Rates dipped significantly in 2020, to 108, but by 2022 had returned to 133, in line with the previous declining trend. The average rate from 2013 to 2022 was 147 – or 151 excluding 2020. The average from 2000 to 2012 was 192, and never dropped below 180 (Figure 6).

Figure 6. Asthma hospitalisations per 100,000 people per year, 2000-2022.



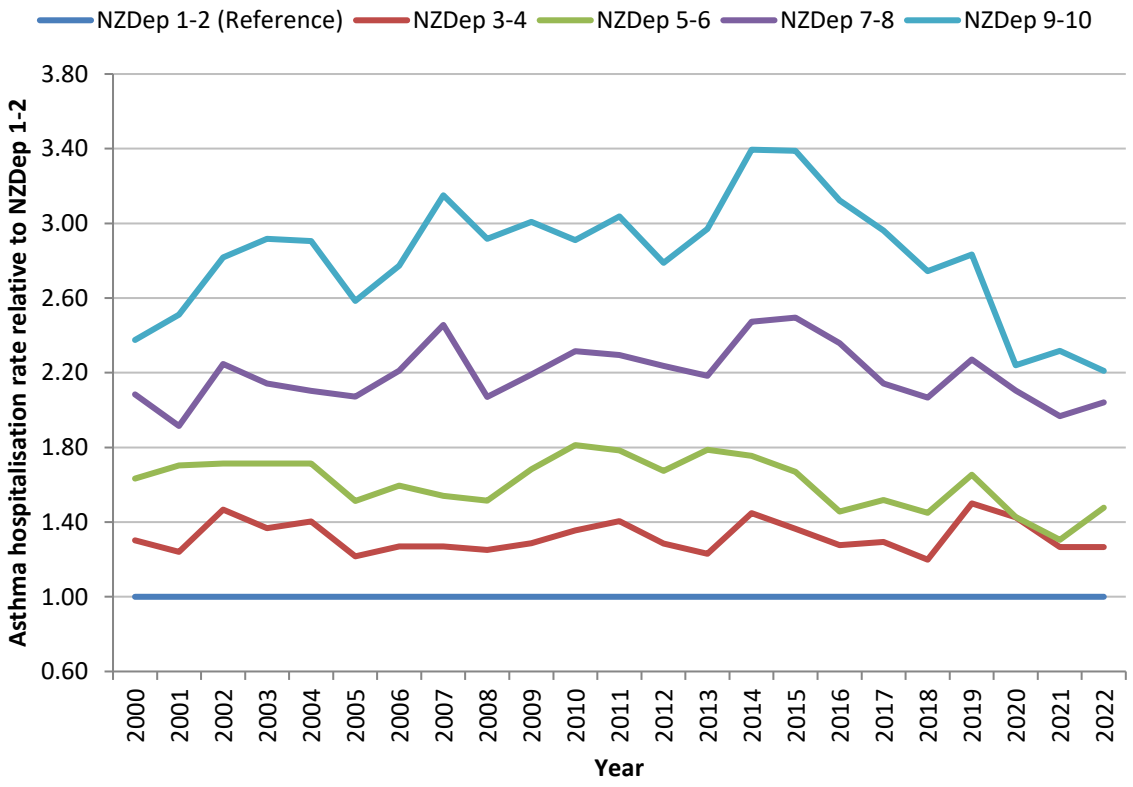
(See Table A 5 for data)

Figure 7. Asthma hospitalisations rates relative to non-MPA by ethnic group, 2000 – 2022, age-adjusted.



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

Figure 8. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile, 2000 - 2022, age-adjusted.



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

Inequalities (Figure 7) between Pacific and non-Māori/Pacific/Asian (non-MPA) hospitalisation rates may be declining, and inequalities between Māori and non-MPA may also have peaked - though we would prefer to see another year or two of data – and post-2023 census population denominator updates – before drawing any firm conclusions. Rates for Asian peoples were higher than for non-MPA between 2005 and 2015, but have remained below non-MPA rates from 2014 onwards.

Socio-economic inequalities in asthma hospitalisation peaked in 2014 and 2015, and appear to have dropped since – but updated population denominator data based on NZDep2023 are also needed to confidently confirm this reduction. (Figure 8).

Risks and determinants 2022

While prevalence risks and determinants were less stark than in previous years, inequities remained significant in hospitalisation. Asthma hospitalisation rates in children under 15 years were nearly 3 times the rates for adults aged 30-64 (rate ratio 3.0). This difference had increased a little, but not significantly, from the 2019 figure of 2.5.[*] Girls had substantially lower rates than boys (rate ratio 0.64), but women's asthma hospitalisation rates were twice or more those of men (Figure 9, Table A 6).

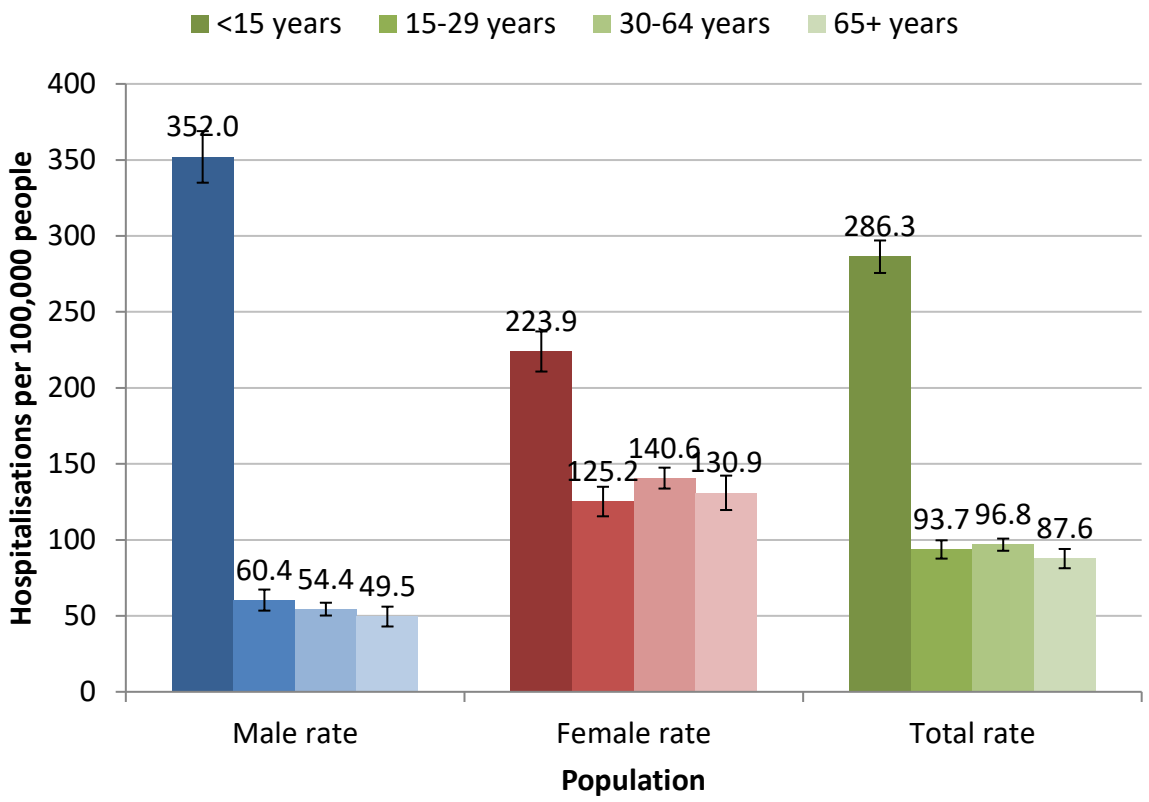
Differences in asthma hospitalisation rates by ethnic group lay in the same direction as prevalence. Māori rates were about two and a half times higher than non-MPA (rate ratio 2.48), as were Pacific rates (rate ratio 2.60), and Asian rates were lower than non-MPA (rate ratio 0.75) (Figure 10). These differences were substantially less than in previous reports, and closer to differences seen in the mid-2000s.

While not quite as steep as in previous reports, there was still a clear socio-economic gradient in asthma hospitalisation (Figure 12), with the most socioeconomically deprived areas having a hospitalisation rate 2.21 times higher than in the wealthiest areas. Socioeconomic inequalities decreased from the previous report (rate ratio 2.89). This change comes from reductions in hospitalisation rates in both NZDep 9-10 and NZDep 1-2, with the larger increase in NZDep 9-10.

Across DHBs, 2022 asthma hospitalisation rates were lowest in South Canterbury, and also significantly lower than the national average in Counties Manukau, Capital and Coast, Wairarapa, Nelson Marlborough, Canterbury and Southern DHBs. Rates were highest in Whanganui, and also significantly higher than the national average in Northland, Auckland, Waikato, Lakes, Bay of Plenty, and Tairawhiti DHBs (Table A 16).

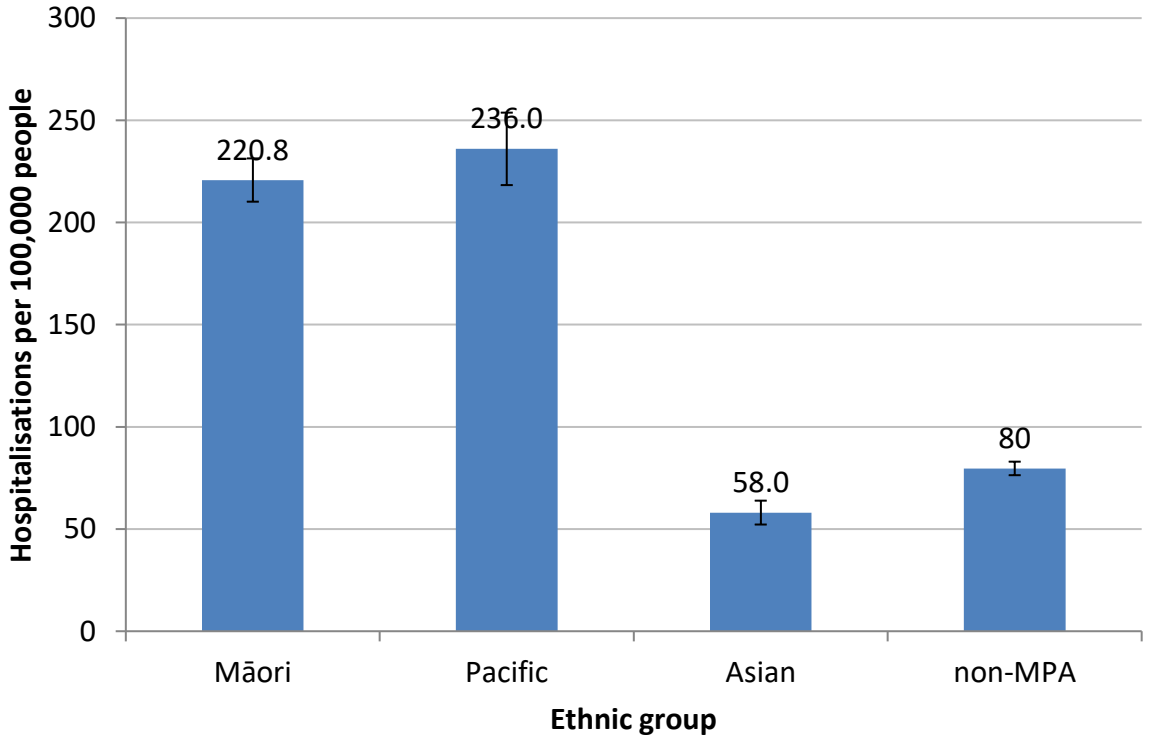
[*] The text of the previous report erroneously reported this ratio as 4.8. This was the rate ratio for boys rather than all children.

Figure 9. Asthma hospitalisations per 100,000 people by age group and sex, 2022.



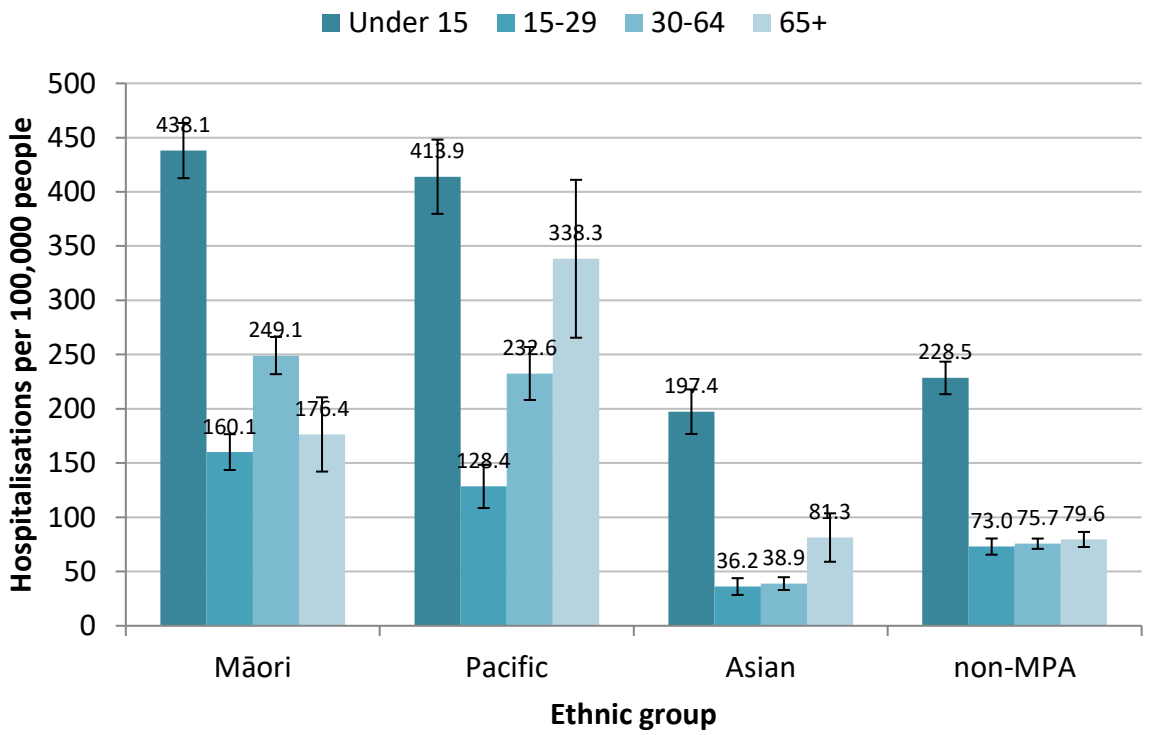
(See Table A 6 and Table A 7 for data)

Figure 10. Asthma hospitalisations per 100,000 people by ethnic group, 2022, age-adjusted.



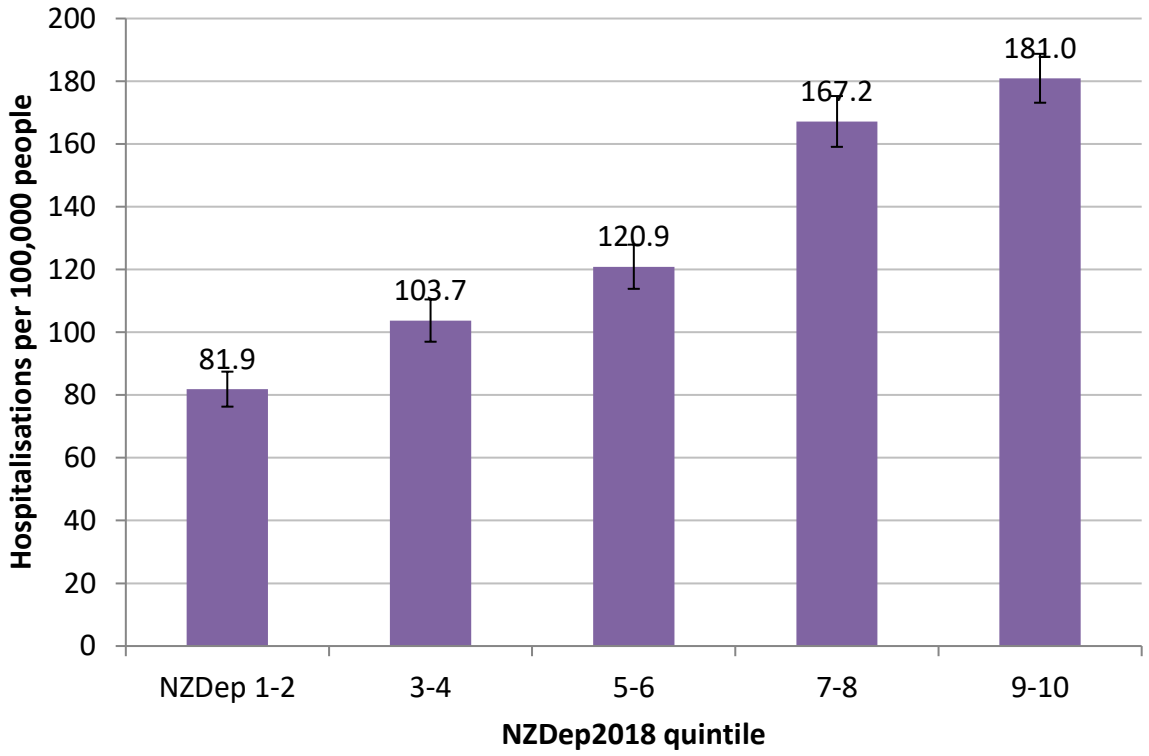
(See Table A 8 for data)

Figure 11. Asthma hospitalisations per 100,000 people by ethnic group and age group, 2022.



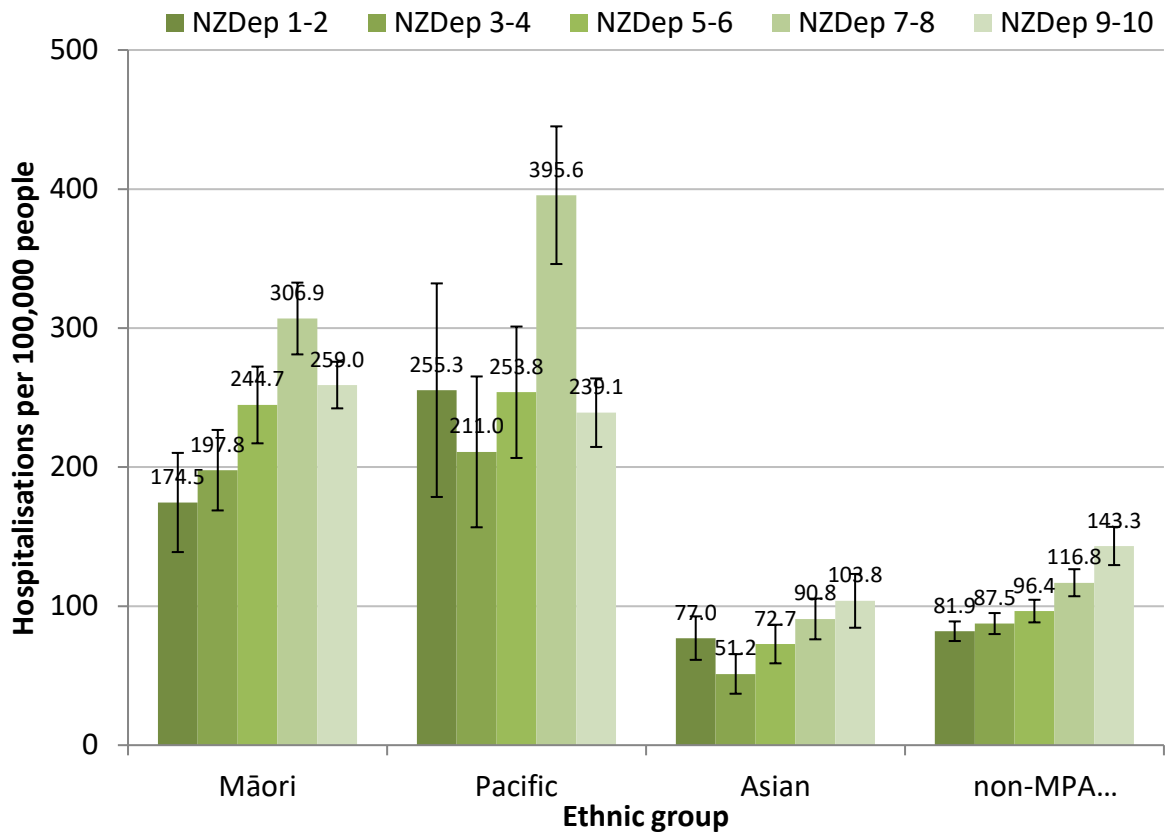
(See Table A 11 for data)

Figure 12. Asthma hospitalisations per 100,000 people by NZDep2018 quintile, 2022, age-adjusted.



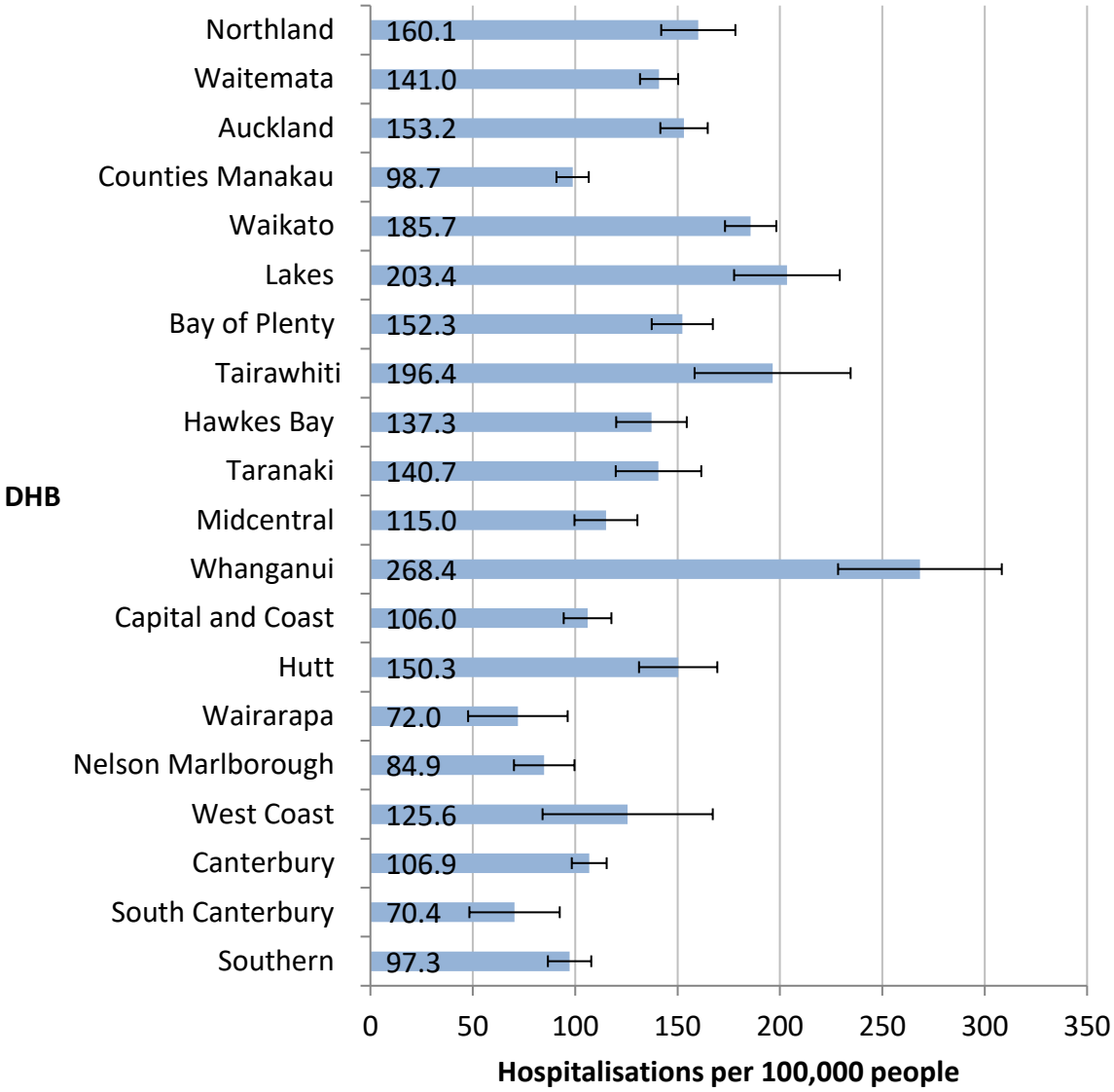
(See Table A 12 for data)

Figure 13. Asthma hospitalisations per 100,000 people by ethnic group and NZDep2018, 2022, age-adjusted.



(See Table A 15 for data)

Figure 14. Asthma hospitalisations per 100,000 people by DHB, 2022.



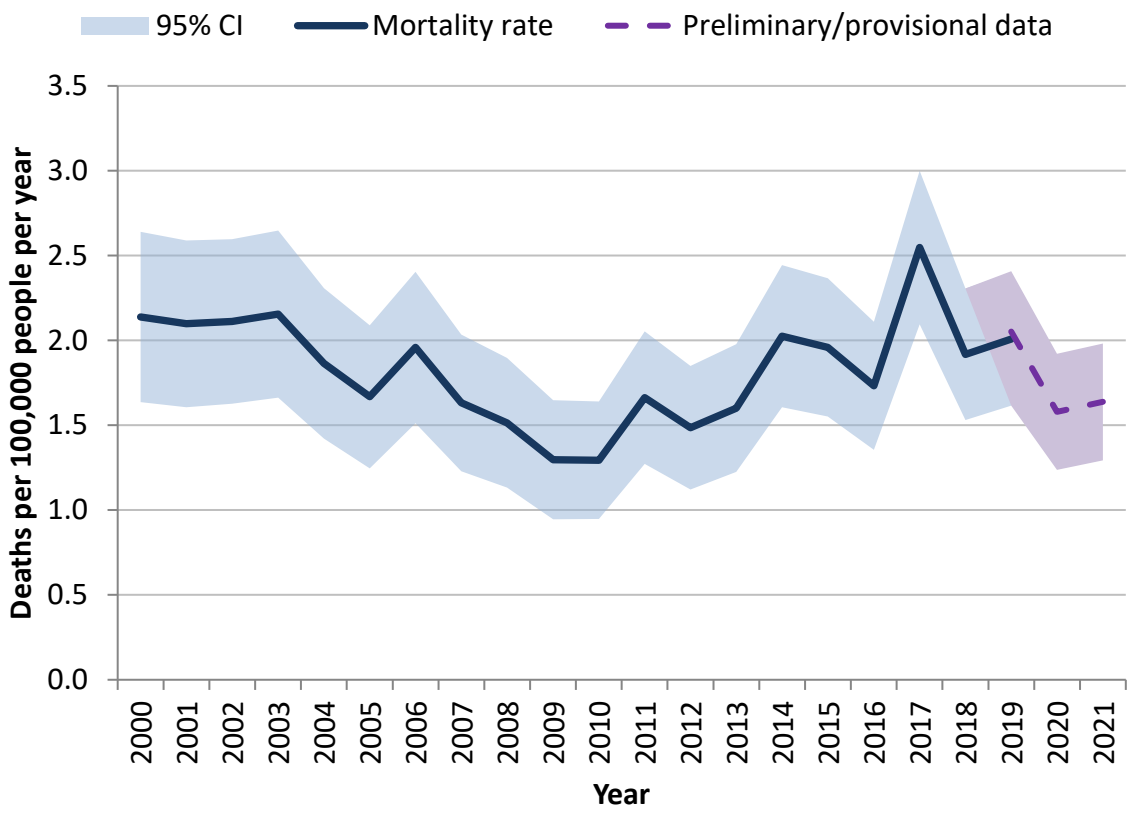
(see Table A 16 for data)

ASTHMA MORTALITY

Trends over time 2000 - 2019

There were 101 deaths from asthma in 2019, a significant increase from the lows of 2009 and 2010 (55 and 56 deaths respectively), but a reduction from 2017's highest rate (2.55 per 100,000 people per year, age-adjusted) since 2000. Provisional (2020) and preliminary (2021) data indicate there were 82 deaths in 2020 and 87 in 2021.

Figure 15. Asthma mortality rates 2000-2021, age-adjusted.



(See Table A 17 for data)

Risks and determinants 2014 - 2019

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 2.79 and 2.29 times higher than rates for non-MPA (Figure 17 and Figure 18). Since the previous report, Māori rates have dropped by 0.29 deaths per 100,000 people per year, Pacific rates by 0.23, and Asian rates by 0.09, whereas non-MPA rates have risen by 0.20.

There were socio-economic differences in asthma mortality, with rates 2.63 times higher in the most deprived NZDep2018 quintile 9-10, and 1.74 times higher in NZDep2018 quintile 7-8, compared to the least deprived NZDep2018 quintile 1-2 (Figure 19). This inequity has increased for NZDep2018 quintile 9-10 since the previous report, but reduced for quintile 7-8. There was insufficient data to measure socioeconomic gradients across ethnic groups (Figure 20).

Ethnic inequalities are lower in this report than in previous reports. Socioeconomic inequalities are lower than in reports for periods from 2006 to 2013, but higher than in 2015 - 2017 (Table 5).

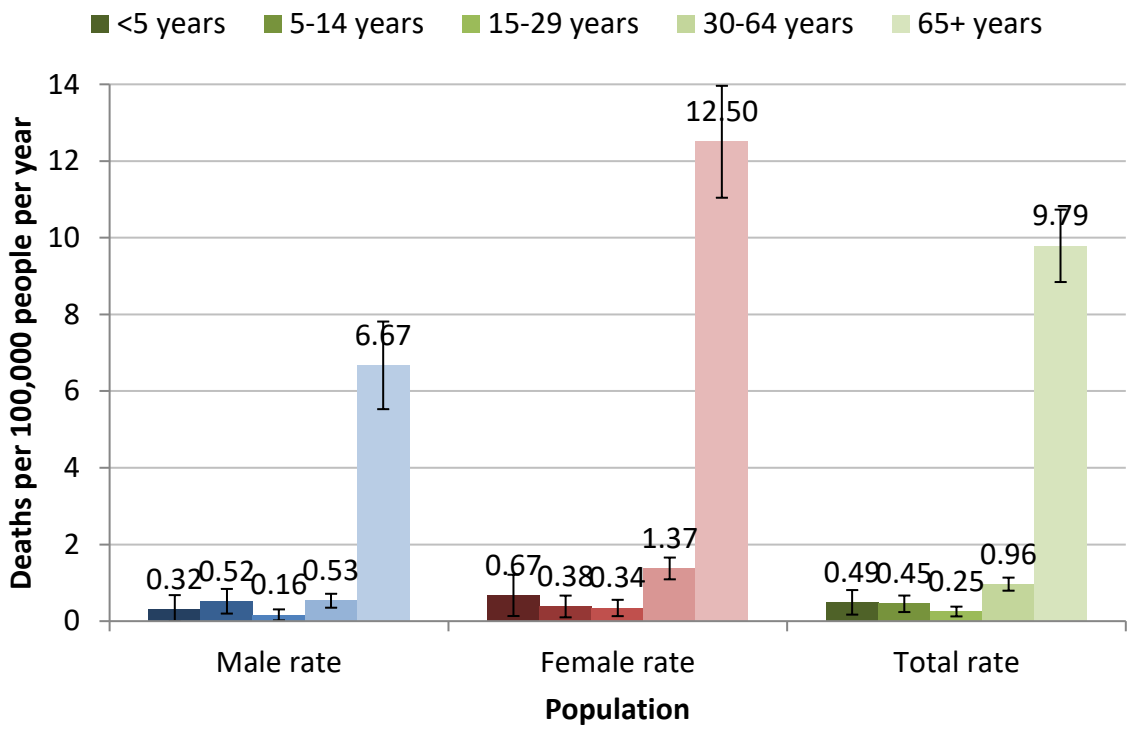
Asthma mortality rates were again highest in the MidCentral DHB (Figure 21), followed by Northland, and lowest in West Coast (where no asthma deaths were recorded between 2014 and 2019) and Southern DHBs.

Table 5. 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)
2024	2014-2019	2.79 (2.50-3.11)	2.29 (1.92-2.74)	2.63 (2.29-3.02)

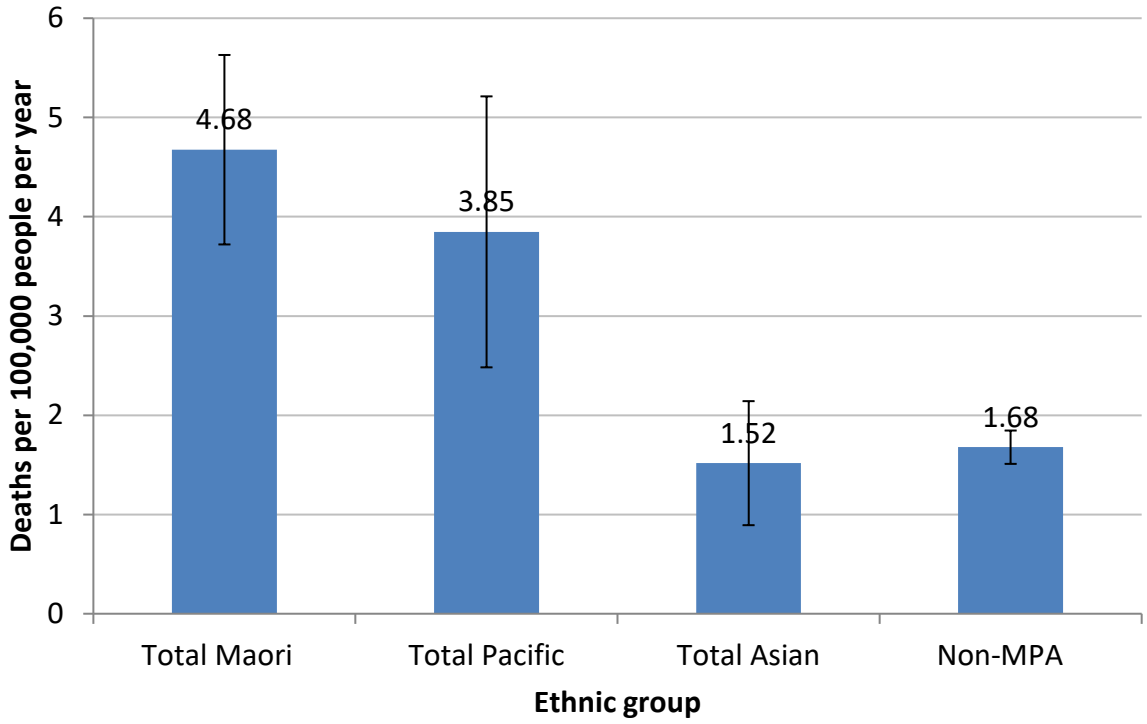
*2020 ethnicity data was prioritised rather than total ethnicity

Figure 16. Asthma deaths per 100,000 people by age group and sex, 2014-2019.



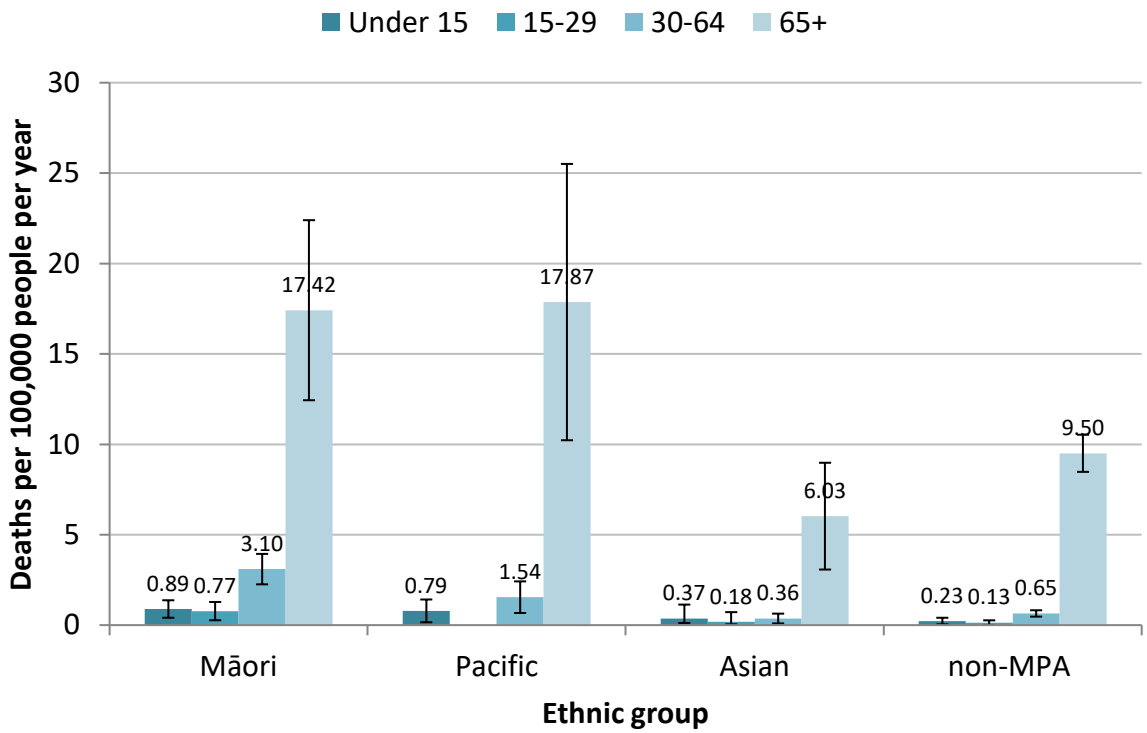
(See Table A 18 and Table A 19 for data)

Figure 17. Asthma mortality per 100,000 people per year by ethnic group, 2014-2019.



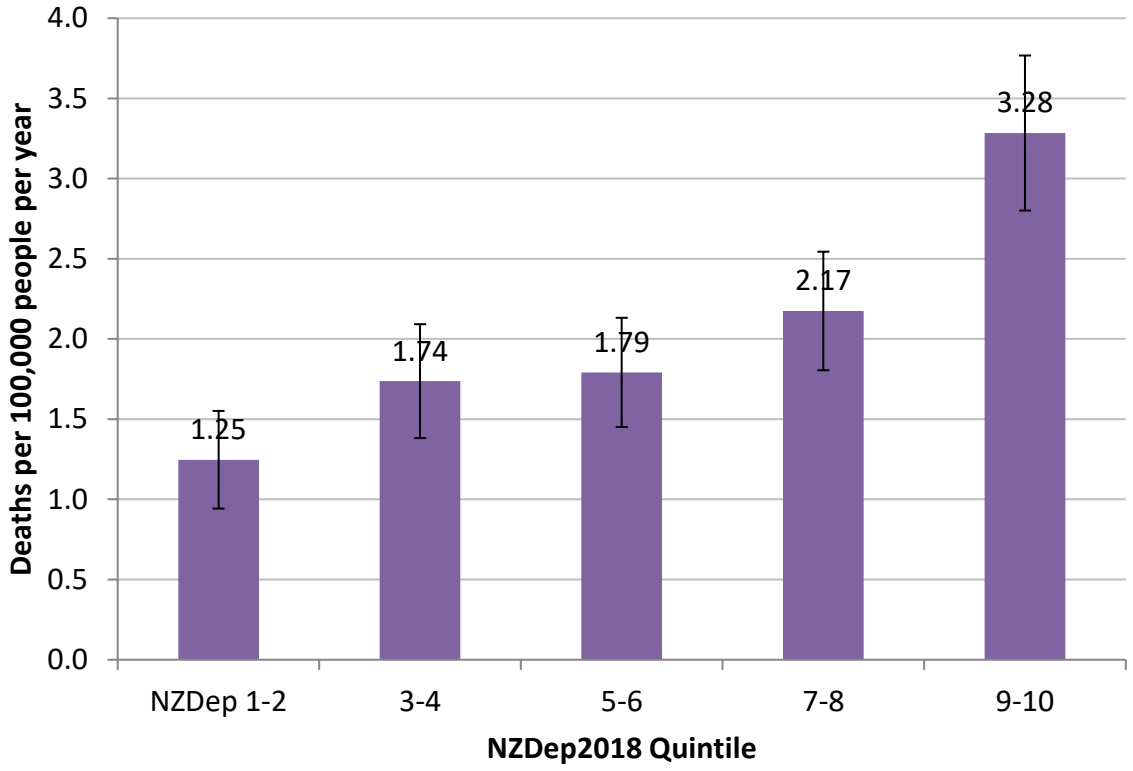
(See Table A 20 for data)

Figure 18. Asthma deaths per 100,000 people per year, by ethnic group and age group, 2014-2019.



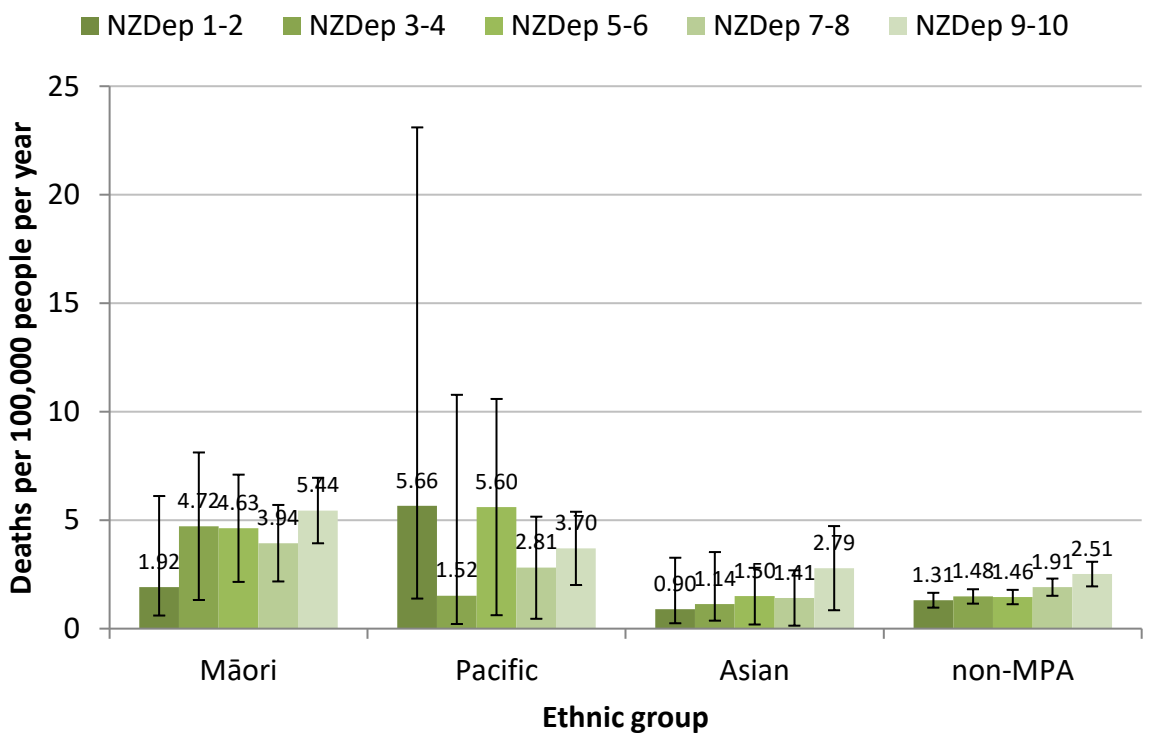
(See Table A 21 for data)

Figure 19. Asthma deaths per 100,000 people by NZDep2018 quintile, 2014-2019, age-adjusted.



(See Table A 22 for data)

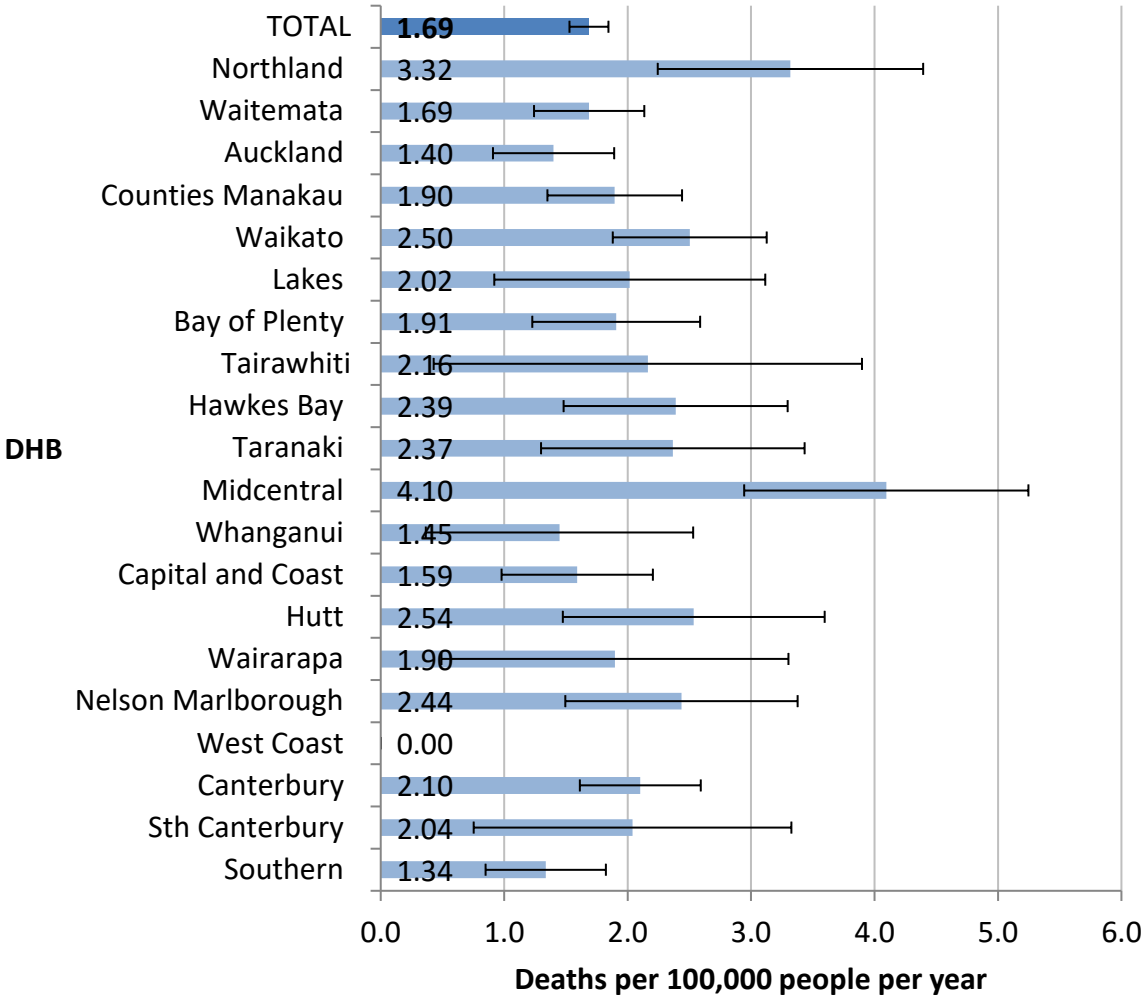
Figure 20. Asthma deaths per 100,000 people by ethnic group and NZDep2018, 2014-2019, age-adjusted.



(See Table A 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, 2014-2019, age-adjusted



(see Table A 24 for data)

ASTHMA SEASONALITY

Asthma in adults aged 15 years and over showed a strong winter excess for hospitalisations and deaths, with the winter: non-winter ratio averaging 1.47 between 2000 and 2022, and showed a small but statistically significant decrease over that period (Figure 22).

For children aged one to 14 years, for whom the winter: non-winter ratio ranged from 0.92 (a summer excess) to 1.75 in 2020, winter excess has increased slightly over time. However, the effect of winter was less dramatic than the effect of return to school following school holidays (with the exception of 2020, when schools were closed for some periods). 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 6.

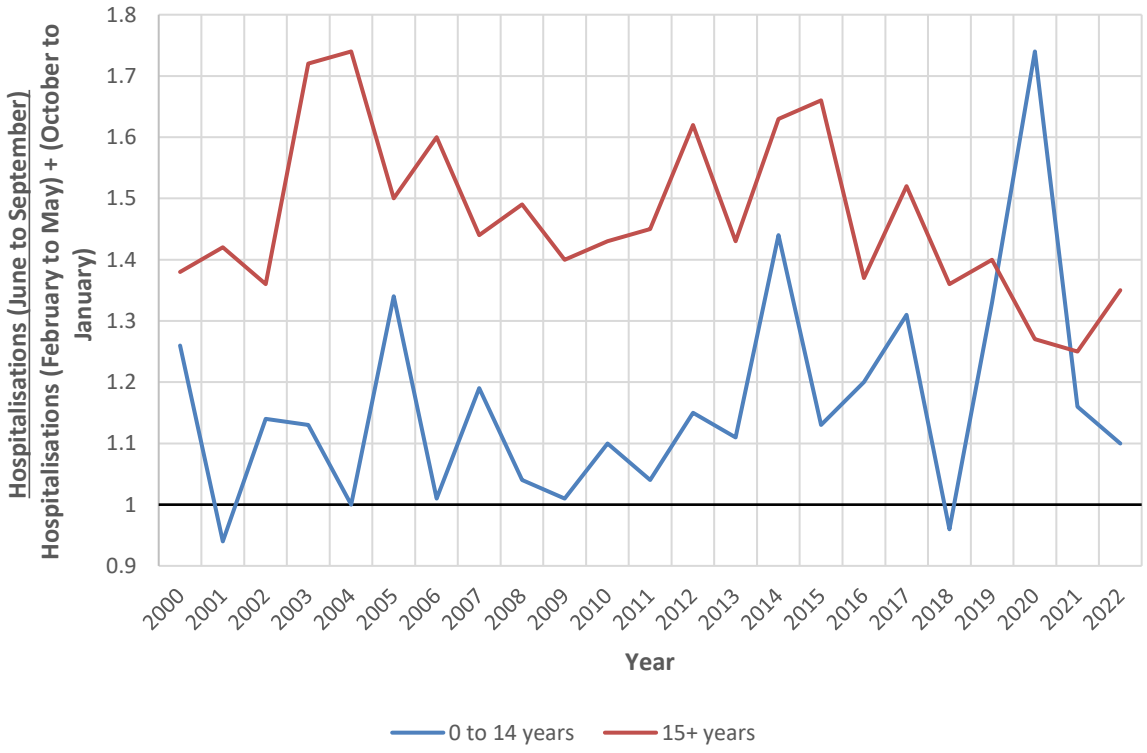
Table 6. Peak asthma hospitalisation risk day and rate ratios Day 1 to peak, children aged 3 to 14 years, 2000 - 2022.

	Peak day	Rate ratio to day 1	95%CI
Period			
Term 1	18	2.53	(2.31 – 2.77)
Term 2	21	1.94	(1.79 – 2.10)
Term 3	18	1.96	(1.80 – 2.12)
Term 4	14	1.66	(1.53 – 1.81)

While peak hospitalisation rates were higher in terms two and three than in the first term, the steepest rise in asthma hospitalisations occurred after the return to school in term 1. The risk of hospitalisation was two and a half times higher on the peak day in the third week of term 1, than on the first day of term. 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.

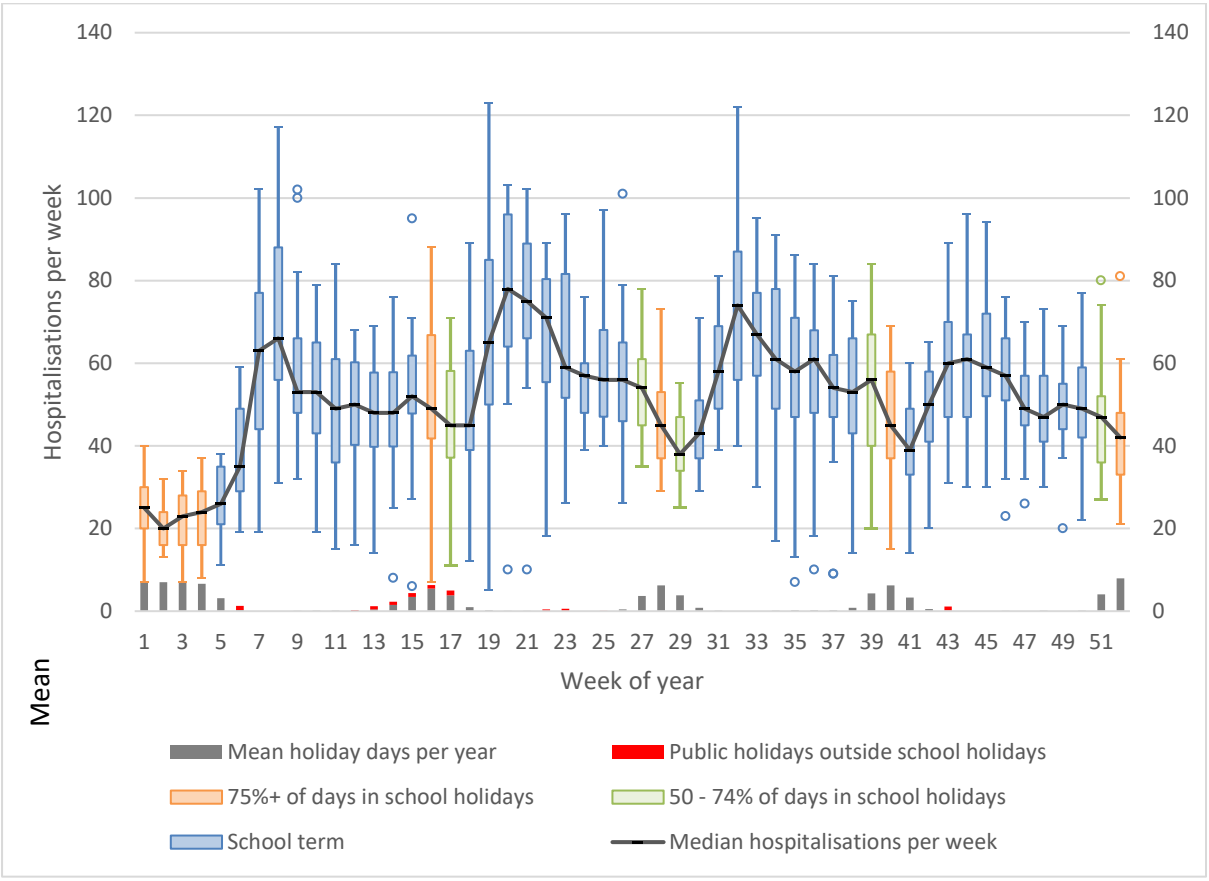
These findings closely resemble results for a similar analysis of asthma hospitalisations in Sydney between 1994 and 2000, except that NZ's Term 3 effect was stronger than in Sydney.[36]

Figure 22. Asthma winter: non-winter hospitalisation rate ratio, 2000 – 2022.



(See Table 7 for data)

Figure 23. Mean asthma hospitalisations per week of year in children aged 3 to 14 years, 2000 – 2022.



These results have important implications for asthma management in school children. We note ARFNZ has prepared advice targeted at back-to-school asthma management.

BRONCHIECTASIS

BRONCHIECTASIS PREVALENCE

No new research on NZ bronchiectasis prevalence was found published since the previous report.

We estimated the prevalence of severe bronchiectasis in 2022 by identifying living individuals hospitalised with bronchiectasis, as either primary or secondary diagnosis,* since 2000. Please note that data for some earlier reports started in 1988 – and this report has more years' data than the last - so results are not directly comparable.

On 31 December 2022 there were 8,689 people previously hospitalised with bronchiectasis (636 more than in 2019), giving a population prevalence of 170 per 100,000 people. 2022 prevalence rates were 21% higher in women than in men, with an age-standardised rate of 184.6 per 100,000 for women compared to 152.3 for men. Rates were highest in adults

* 2013 report included only primary diagnoses.

aged 65+. Among ethnic groups, Pacific peoples' prevalence rates were highest, with an age-standardised population rate of 384.9 per 100,000 (rate ratio 4.77 compared to non-MPA), followed by Māori, with 226.8 (rate ratio 2.83 compared to non-MPA), and Middle Eastern, Latin American and African (MELAA) with 200.5 (rate ratio 2.33 compared to non-MPA). Asian peoples' rates of 69.0 per 100,000 were significantly lower than the 87.3 rate for non-MPA (Table A 27), with a rate ratio of 0.86.

There was also a strong socio-economic gradient, with people in the most deprived NZDep quintile having 2.72 times higher bronchiectasis prevalence than people in the least deprived NZDep quintile (Table A 28).

After standardising by age, severe bronchiectasis prevalence was highest in Counties Manukau DHB, where prevalence was 308.0 cases per 100,000 people; and lowest in South Canterbury, with 85.7 cases per 100,000 people (Table A 29). In previous years some of the difference has been due to demography, but population denominator data were not available for such an analysis for this report.

CHILDHOOD BRONCHIECTASIS INCIDENCE

Previous research

New Zealand incidence of new cases of bronchiectasis in children aged under 15 was estimated at 3.7 per 100,000 in 2001/2002[37]. "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."

New research

In a 2023 study, Everitt et al[38] found a mean incidence rate of 526 cases per 100,000 children per year in the 95 children who had received a kidney transplant in the years 2001 to 2016, however this incidence rate is not generalisable to the total population.

2022 bronchiectasis incidence estimates for children aged under 15 years

We measured the 2022 incidence of new cases of severe bronchiectasis in children aged under 15 years 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, or where the patient was aged 15 years or older at the date of first admission. This measure found 73 new cases of bronchiectasis in 2022, compared to 73 in 2021, and 85 in 2020. The 2022 incidence rate was 7.7 per 100,000. There was no significant difference in incidence between boys and girls. Age-adjusted incidence was highest in Pacific children at 11.8 compared with 9.6 in Māori, 4.5 in Asian children, and 8.0

in non-MPA children. Pacific rates were markedly lower, but Māori rates much higher, than those measured by Twiss et al in 2001/2002. Rates for Asian and non-MPA were not measured in 2001/2002. However, we note that rates for Māori and Pacific children improved substantially since the previous report, though rates for Asian children were a little higher; and that unlike in previous reports, differences in rates by ethnicity were not statistically significant.

While hospitalised bronchiectasis incidence in children was 1.6 times higher in the NZDep 9-10 quintile than in NZDep 1-2, the difference was not statistically significant – nor was the overall gradient across NZDep quintiles.

The findings of higher incidence in Māori and Pacific peoples are consistent with the findings of Bibby et al in 2015,[39] but the lack of statistically significant difference by ethnicity or deprivation is a positive departure from previous years.

BRONCHIECTASIS HOSPITALISATIONS

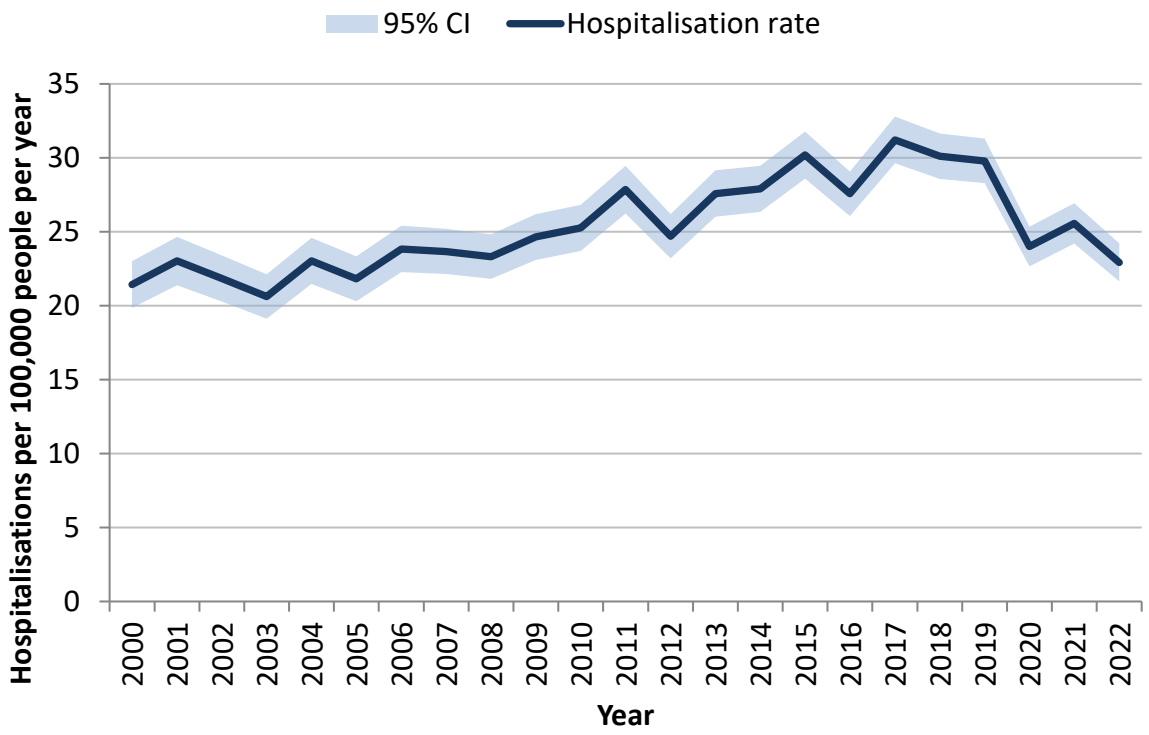
Trends over time 2000 - 2022

After adjusting for age, the bronchiectasis hospitalisation rate increased significantly over the period 2000 to 2022 (see Figure 24), but within that period it has trended downwards since 2017. The 2022 age-adjusted rate of 22.9 hospitalisations per 100,000 people was much closer to rates in the 2000s, and a significant departure from the peak of 31.2 in 2017. The increase has been highest in children aged under 15 years, and adults aged 65 years and over – rates for the 30 to 64 year age group have reduced significantly over the study period. As noted in previous reports, personal communication with respiratory specialists suggested that some of the increase for children aged under 15 years may be the result of diagnosing bronchiectasis at increasing earlier ages; this assessment is supported by changes in the age distribution of incidence. Rates for both children under 15 years and adults 65 years and over peaked in 2017, and have reduced since.

Ethnic inequalities continue, but bronchiectasis rates have reduced since 2019 for all ethnic groups (Table A 35). The 2022 difference between Māori and non-MPA rates was the lowest it has been in that period. However, inequities for Pacific Peoples have not reduced further since 2017 (Figure 26). Rates for Asian Peoples now approximate those for non-MPA.

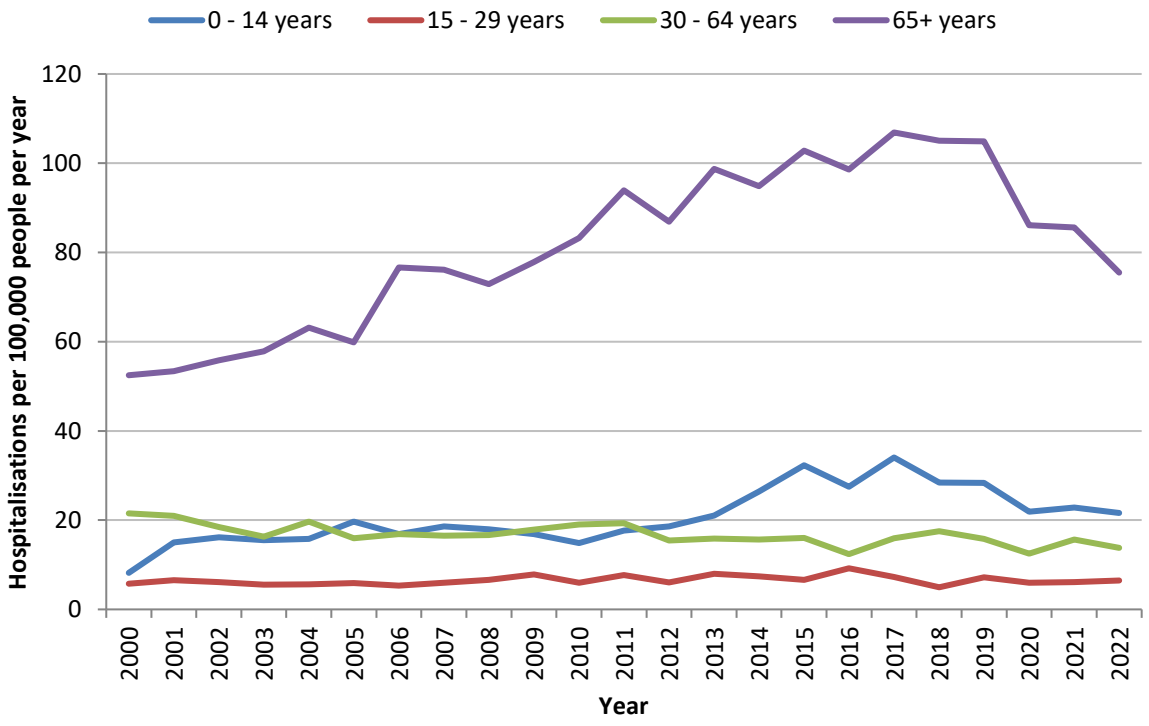
Socio-economic disparities show no clear pattern over the study period, but may have been increasing since 2013, particularly for the most deprived quintile (Figure 27).

Figure 24. Bronchiectasis hospitalisations per 100,000 people per year, 2000-2022.



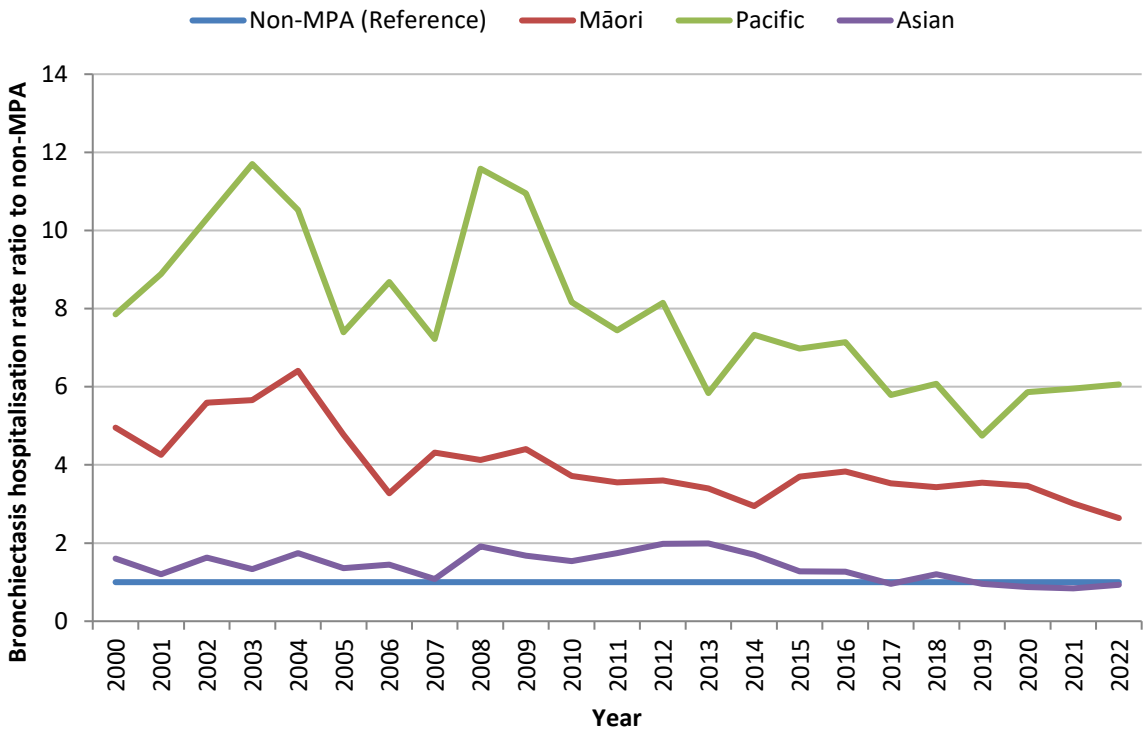
(See Table A 30 for data)

Figure 25. Bronchiectasis hospitalisations per 100,000 people per year by age group, 2000-2022.



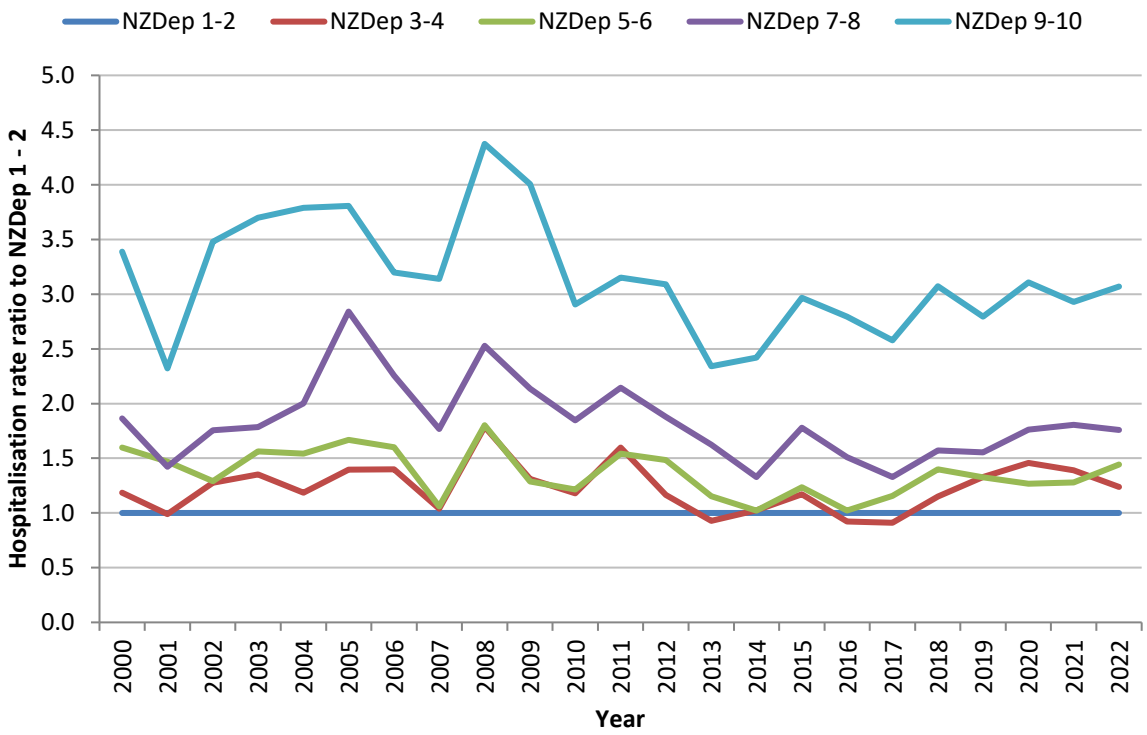
See Table A 31 for data.

Figure 26. Bronchiectasis hospitalisation rate ratios to non-MPA by ethnic group, 2000 – 2022, age-adjusted.



(See Table A 35 and Table A 36 for data)

Figure 27. Bronchiectasis hospitalisations rate ratios to NZDep 1 - 2e by NZDep2018 quintile, 2000 - 2022, age-adjusted.



See Table A 40 for data.

Risks and determinants 2022

Bronchiectasis hospitalisation rates were highest in the elderly, with 75.5 hospitalisations per 100,000 people aged 65+. Female rates were significantly higher than males in age in adults aged 65 years and older, but lower for children aged under 15 years (Figure 28).

Bronchiectasis hospitalisation rates also varied by ethnicity (Figure 29). Pacific peoples were 6.06 times more likely to be hospitalised, and Māori 2.64 times more likely to be hospitalised, than non-MPA. Asian peoples' hospitalisation rates were not significantly different from non-MPA.

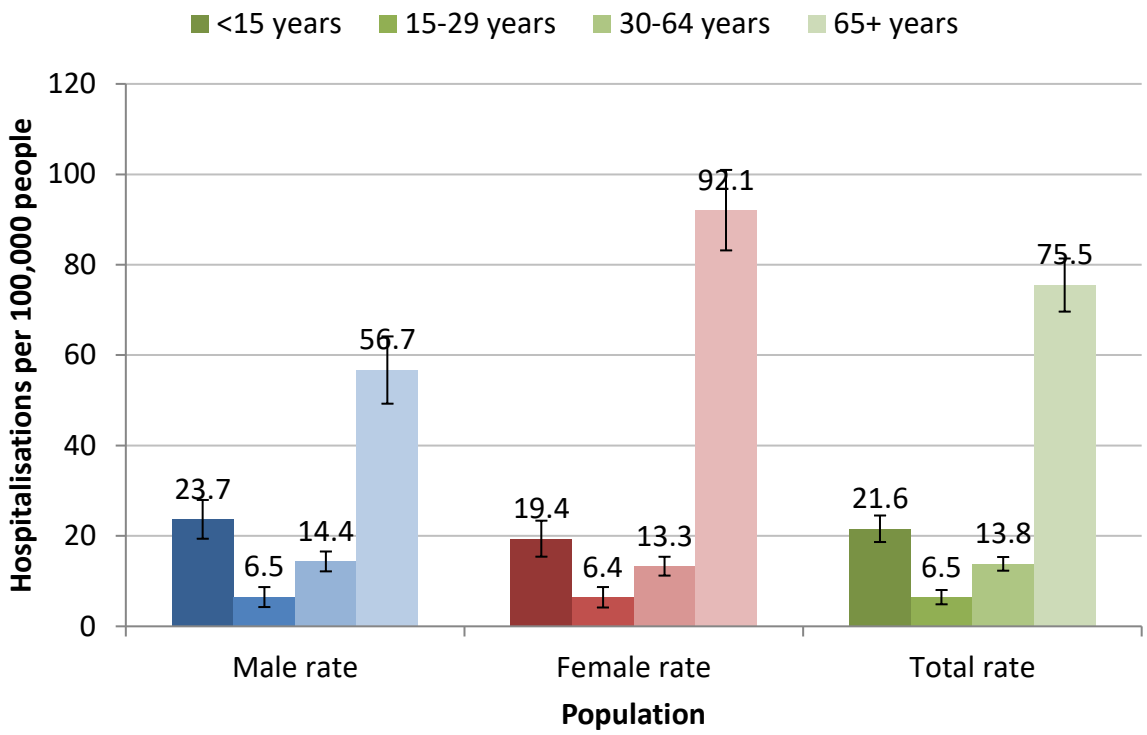
Māori and Pacific hospitalisation rate disparities showed across all age-groups. The highest rate ratio disparity by age and ethnicity was for Pacific peoples aged 65 years and over, whose bronchiectasis hospitalisation rates of 375.0 per 100,000 were 5.4 times higher than the rate of 69.0 per 100,000 for non-MPA (Figure 30).

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 (less deprived) 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 3.07 times higher than for NZDep 1-2, it was also much higher than the next most deprived NZDep 7-8 neighbourhoods (Figure 31).

There was some socioeconomic trend in 2022 hospitalisation rates for Māori, but no significant trend for other ethnic groups (Figure 32).

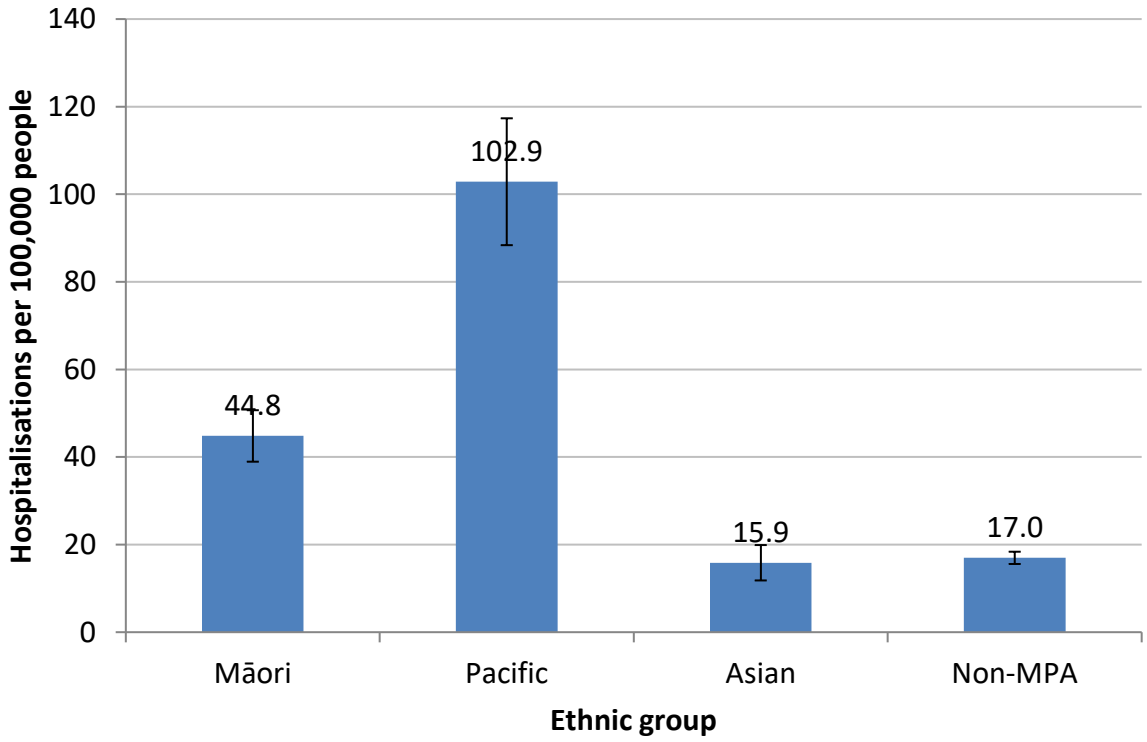
There was a rough north to south gradient in bronchiectasis hospitalisations. The highest rates, both significantly above the national average rate of 22.9, were in Counties Manukau (36.5 per 100,000 people) and Waikato (32.3) (Figure 33), while rates in MidCentral, Whanganui, Wairarapa, Capital and Coast, and all South Island DHBs except South Canterbury, were significantly below the national average.

Figure 28. Bronchiectasis hospitalisations per 100,000 people by age group and sex, 2022.



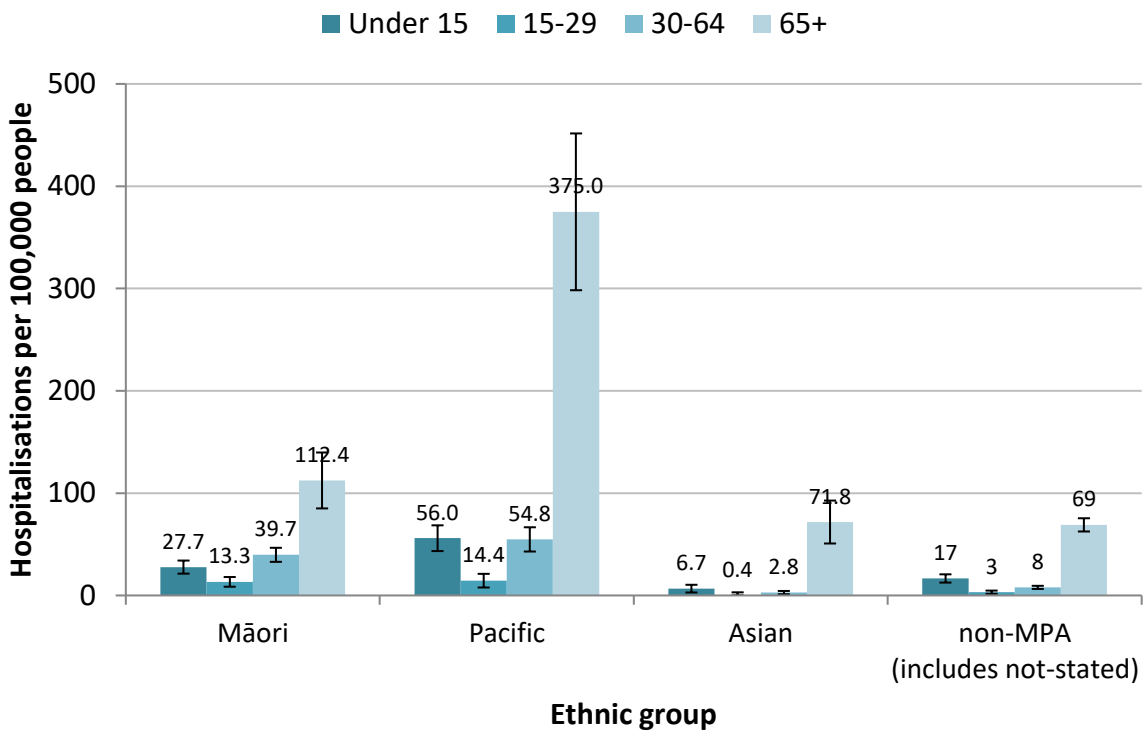
(See Table A 32 and Table A 33 for data)

Figure 29. Bronchiectasis hospitalisations per 100,000 people by prioritised ethnic group, 2022.



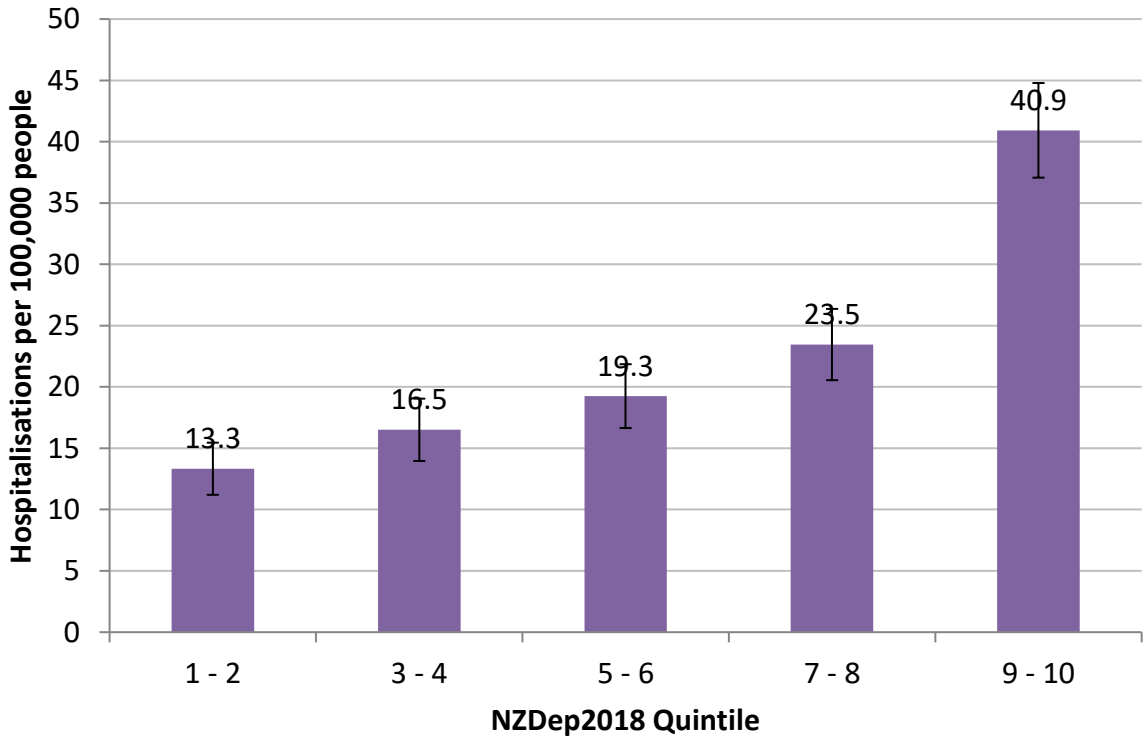
(See Table A 34 for data)

Figure 30. Bronchiectasis hospitalisations per 100,000 people by ethnic group and age group, 2022.



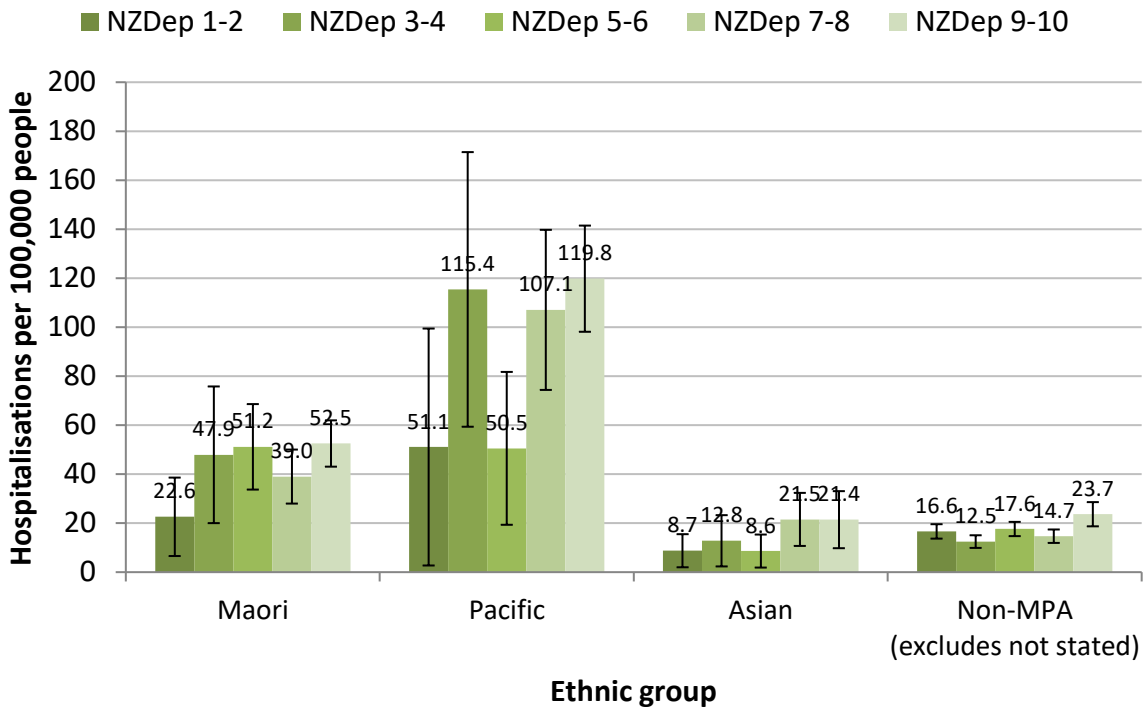
(See Table A 37 for data)

Figure 31. Bronchiectasis hospitalisations per 100,000 people by NZDep2018 quintile, 2022, age-adjusted.



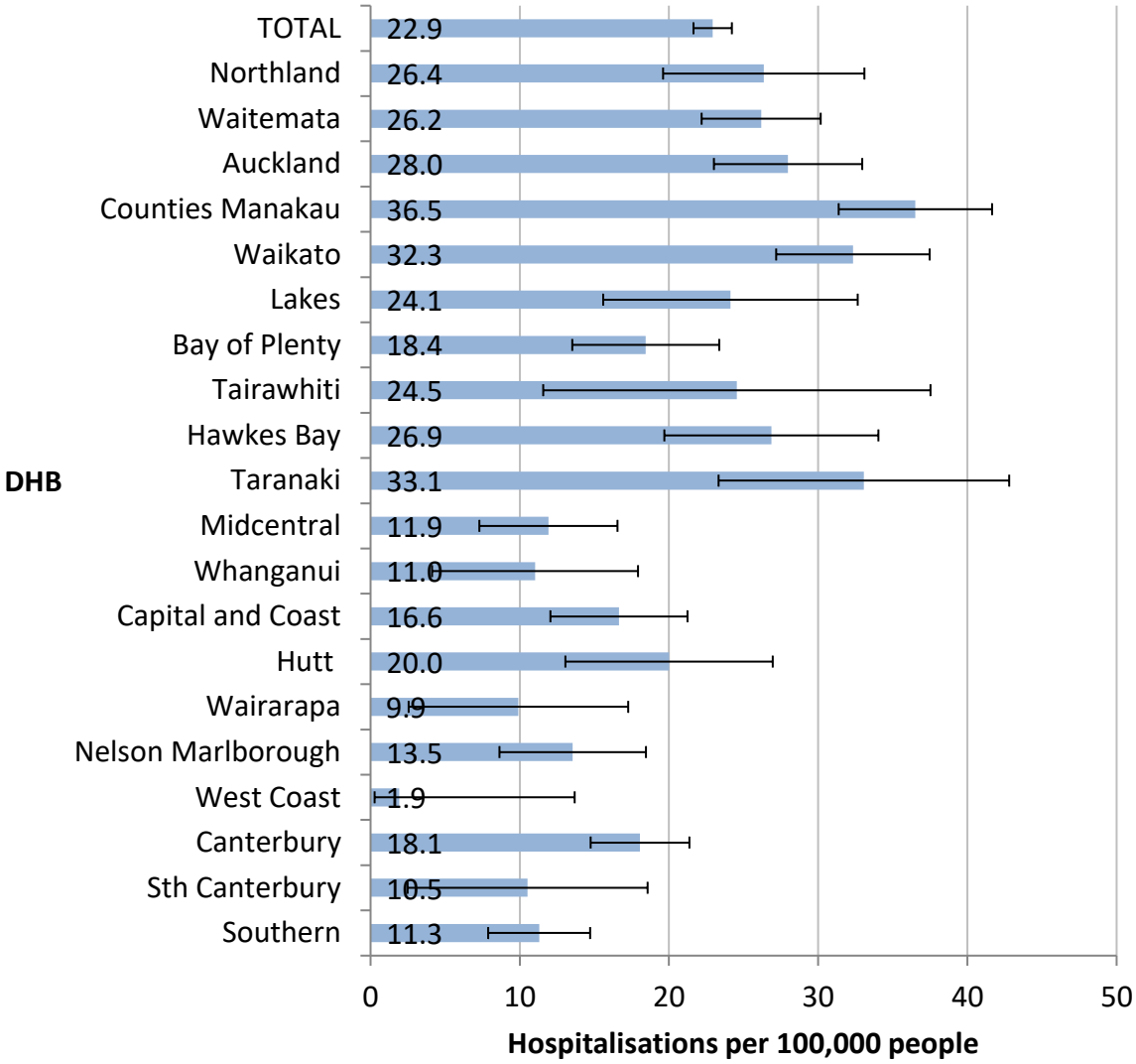
(See Table A 38 for data)

Figure 32. Bronchiectasis hospitalisations per 100,000 people by prioritised ethnic group and NZDep2018 quintile, 2022, age-adjusted.



(See Table A 41 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, 2022.



(see Table A 42 for data)

BRONCHIECTASIS MORTALITY

Trends over time 2000 - 2019

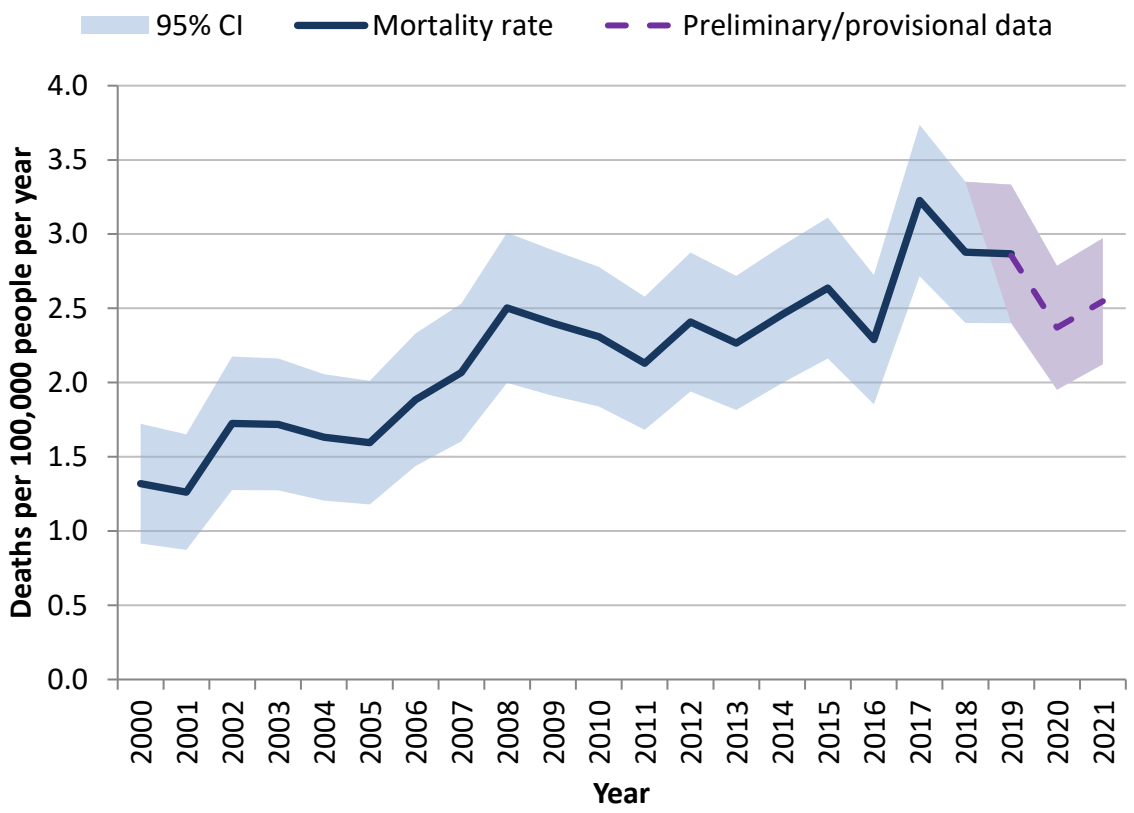
Bronchiectasis mortality increased significantly over the study period, from 42 deaths per year in 2000, to 145 deaths in 2019. This represented an age-adjusted increase of 0.08 deaths per 100,000 people per year. The trend was unchanged from the two previous reports. Provisional (2020) and preliminary (2021) data indicate there were 124 deaths in 2020 and 138 deaths in 2021.

Risks and determinants 2012 - 2019

Bronchiectasis mortality rates were highest in people aged 65+, and were significantly higher in women than in men in this eldest age group (Figure 35).

Bronchiectasis mortality was highest for Pacific peoples, with rates 5.61 times higher than for non-MPA. Rates were also significantly higher for Māori, (rate ratio 3.35), while the 1.13 rate ratio for Asian peoples was not statistically significant (Figure 36). Most of the difference was due to in differences in rates in the two older age groups (Figure 37).

Figure 34. Bronchiectasis mortality rates 2000-2021, age-adjusted.

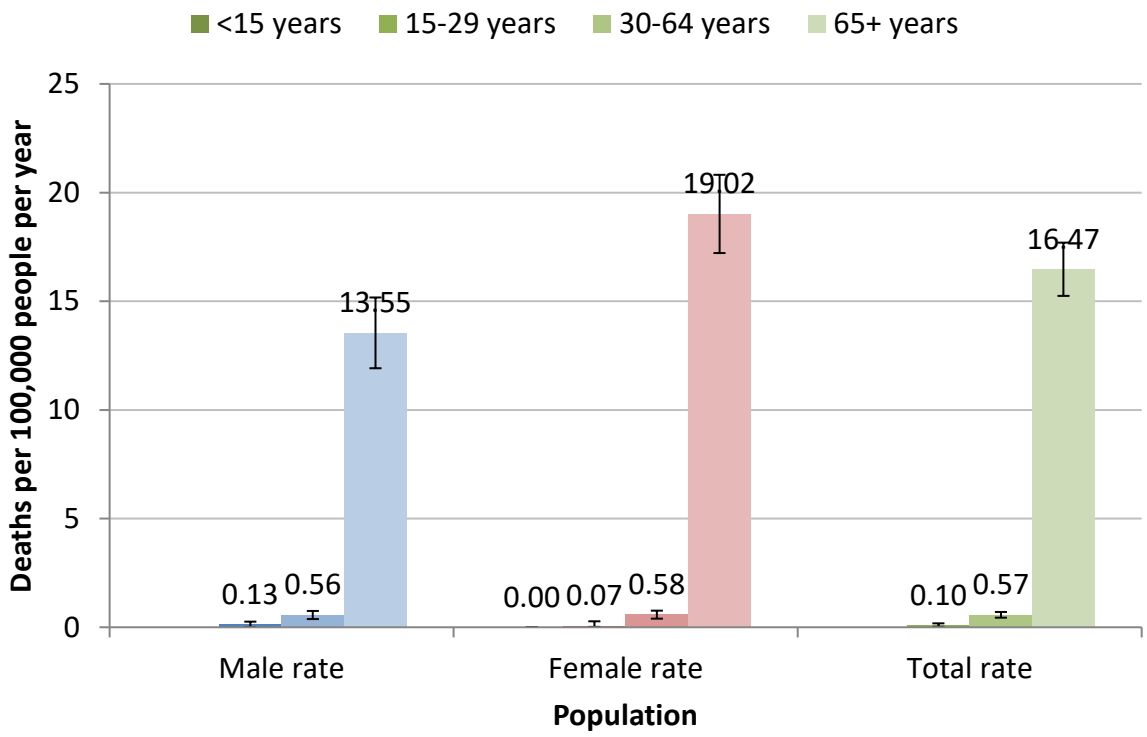


(See Table A 43 for data)

There were socio-economic differences in bronchiectasis mortality, with mortality rates increasing with increasing NZDep2018 quintile. People in NZDep 9-10 were more than twice as likely to die of bronchiectasis as those in NZDep 1-2 (RR 2.3) (Figure 38). However, gradients within ethnic groups were more complex. There was no socio-economic gradient in the non-MPA or Asian ethnic groups, and possible gradients for Māori and Pacific Peoples were not statistically significant (Figure 39).

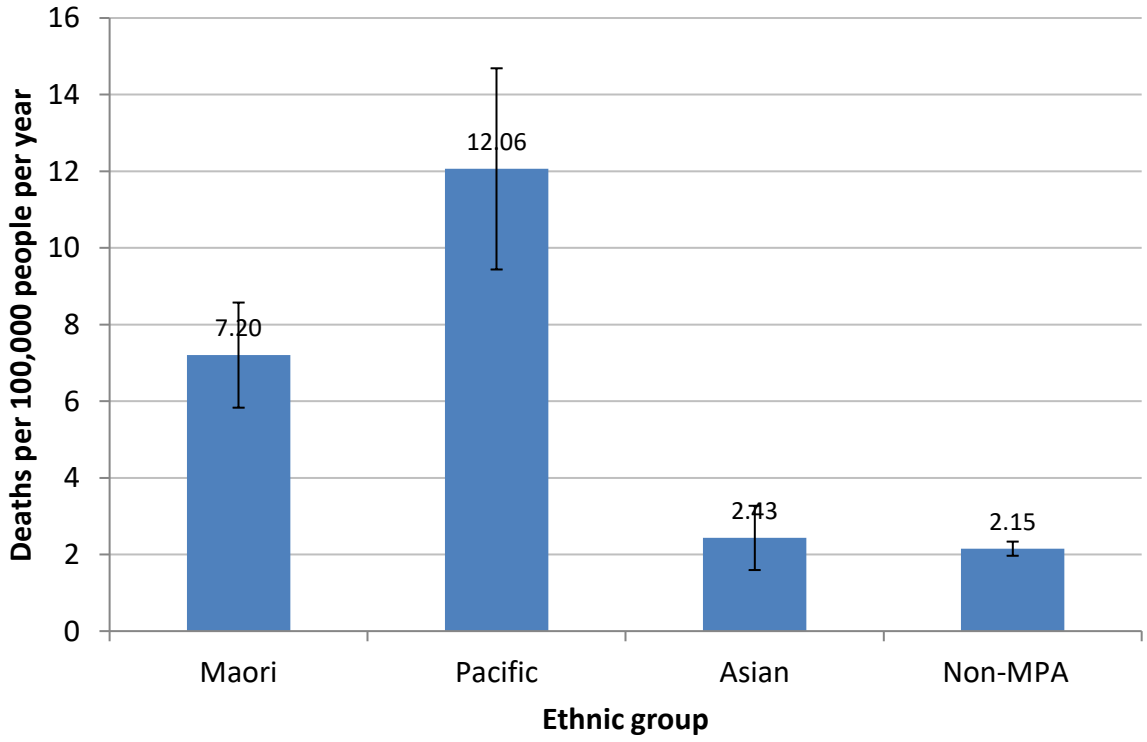
Bronchiectasis mortality rates were highest in Counties Manukau and Tairawhiti, and lowest in Whanganui, West Coast, and South Canterbury (Figure 40).

Figure 35. Bronchiectasis deaths per 100,000 people by age group and sex, 2014-2019.



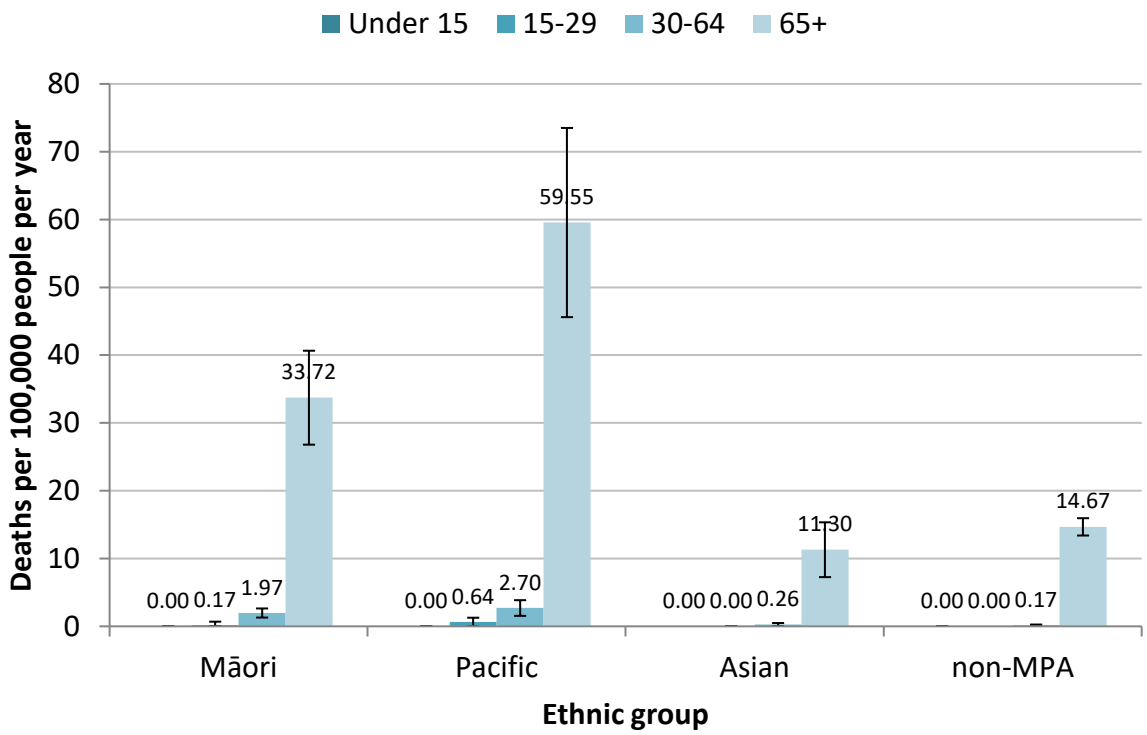
(See Table A 44 and Table A 45 for data)

Figure 36. Bronchiectasis mortality per 100,000 people per year by ethnic group, 2014-2019.



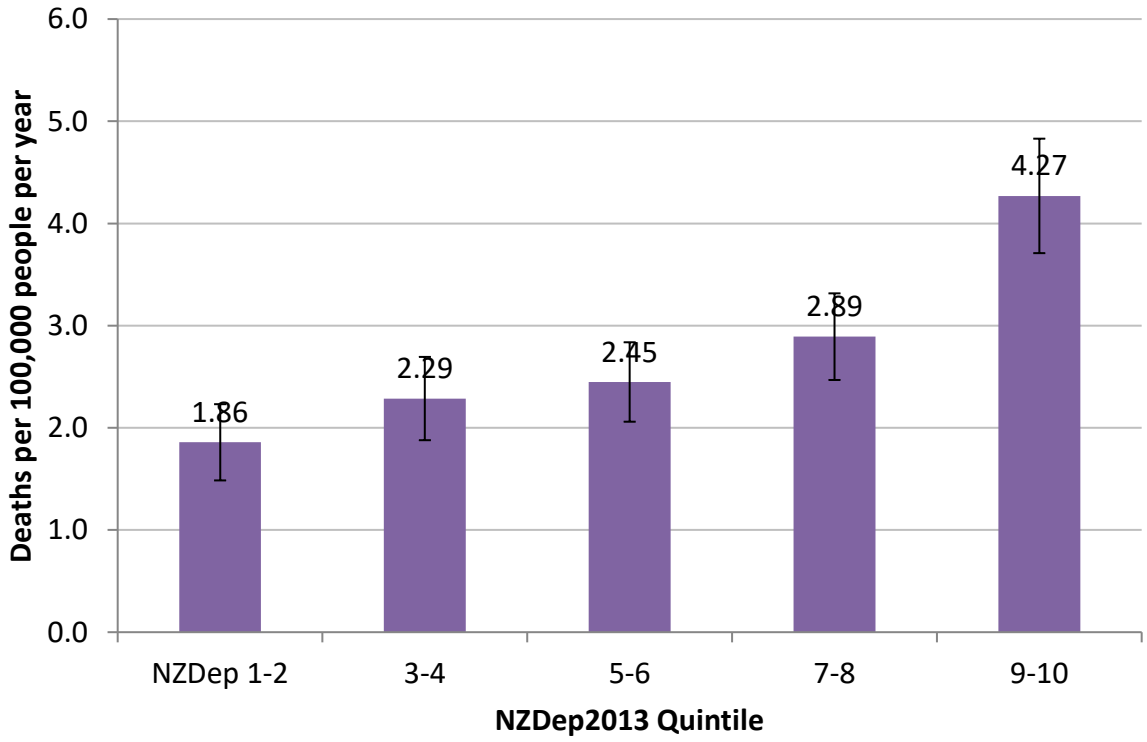
(See Table A 46 for data)

Figure 37. Bronchiectasis deaths per 100,000 people per year, by ethnic group and age group, 2014-2019.



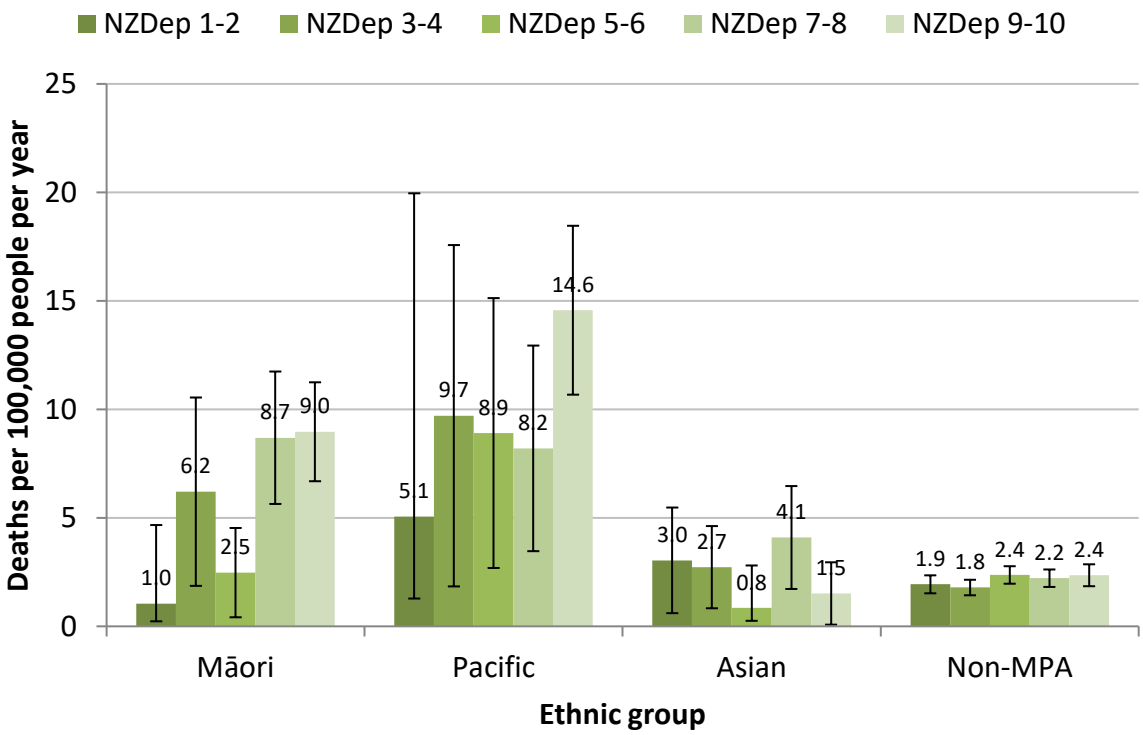
(See Table A 47 for data)

Figure 38. Bronchiectasis deaths per 100,000 people by NZDep2018 quintile, 2014-2019, age-adjusted.



(See Table A 48 for data)

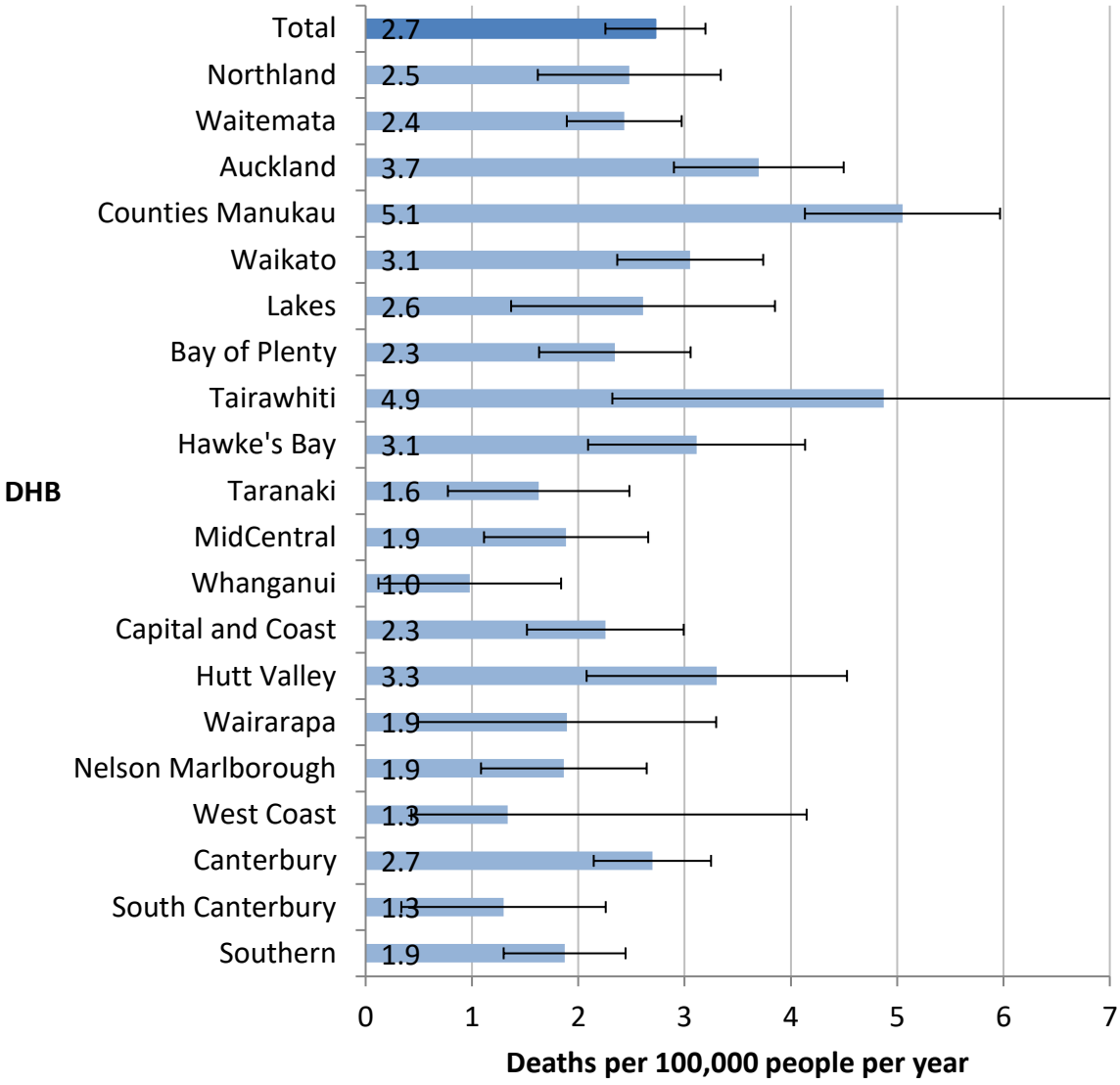
Figure 39. Bronchiectasis deaths per 100,000 people by ethnic group and NZDep2018, 2014-2019, age-adjusted.



(See Table A 49 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, 2014-2019, age-adjusted



(see Table A 50 for data)

CHILDHOOD BRONCHIOLITIS

There was no new research on the prevalence of childhood bronchiolitis since previous reports.

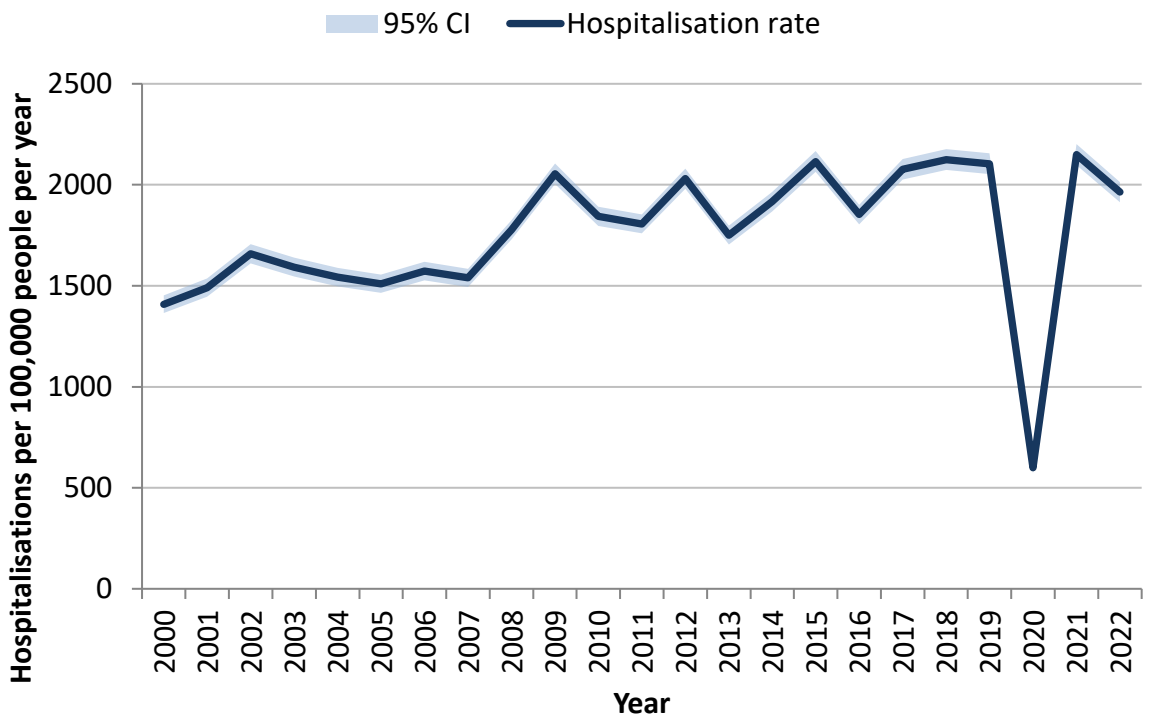
CHILDHOOD BRONCHIOLITIS HOSPITALISATIONS

Trends over time 2000 - 2022

2020 saw a dramatic drop in the childhood bronchiolitis hospitalisation rate. However, this drop was not retained in 2021 or 2022, which were consistent with the previous trend of increasing rates since 2000 (Figure 41), with rates increasing by an estimated 31.0

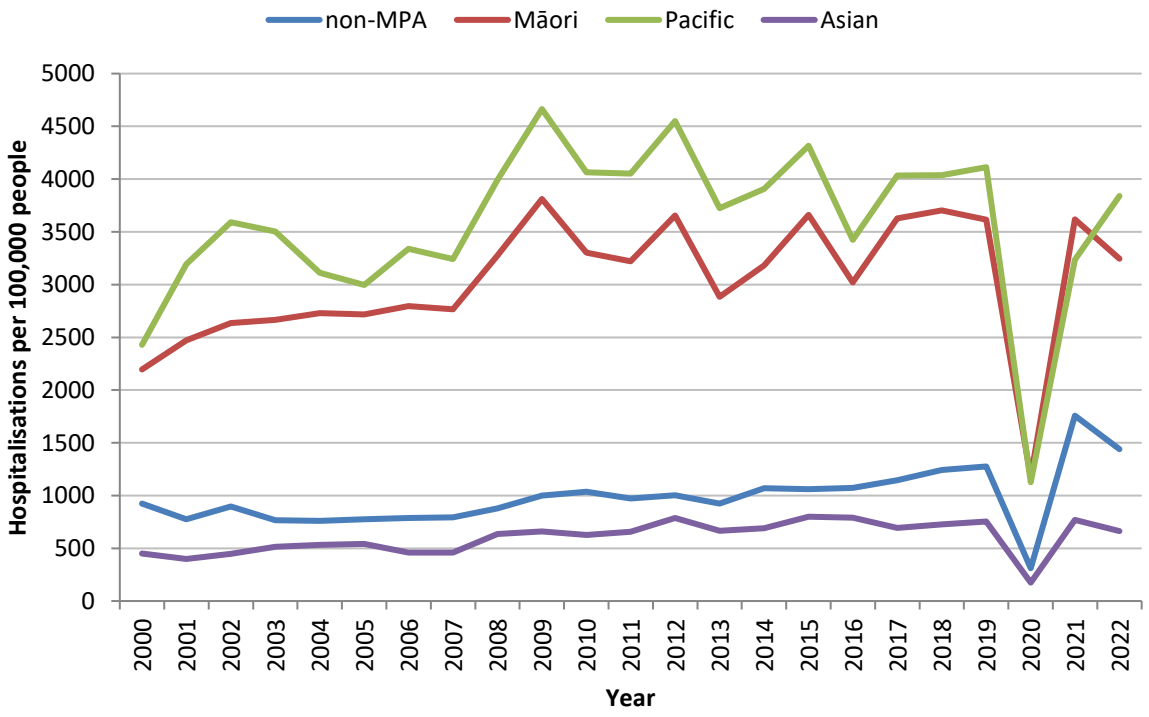
hospitalisations per year if 2020 is excluded. The overall hospitalisation rate has increased almost a half over the study period.

Figure 41. Childhood bronchiolitis hospitalisations per 100,000 people per year, 2000-2022.



(See Table A 51 for data)

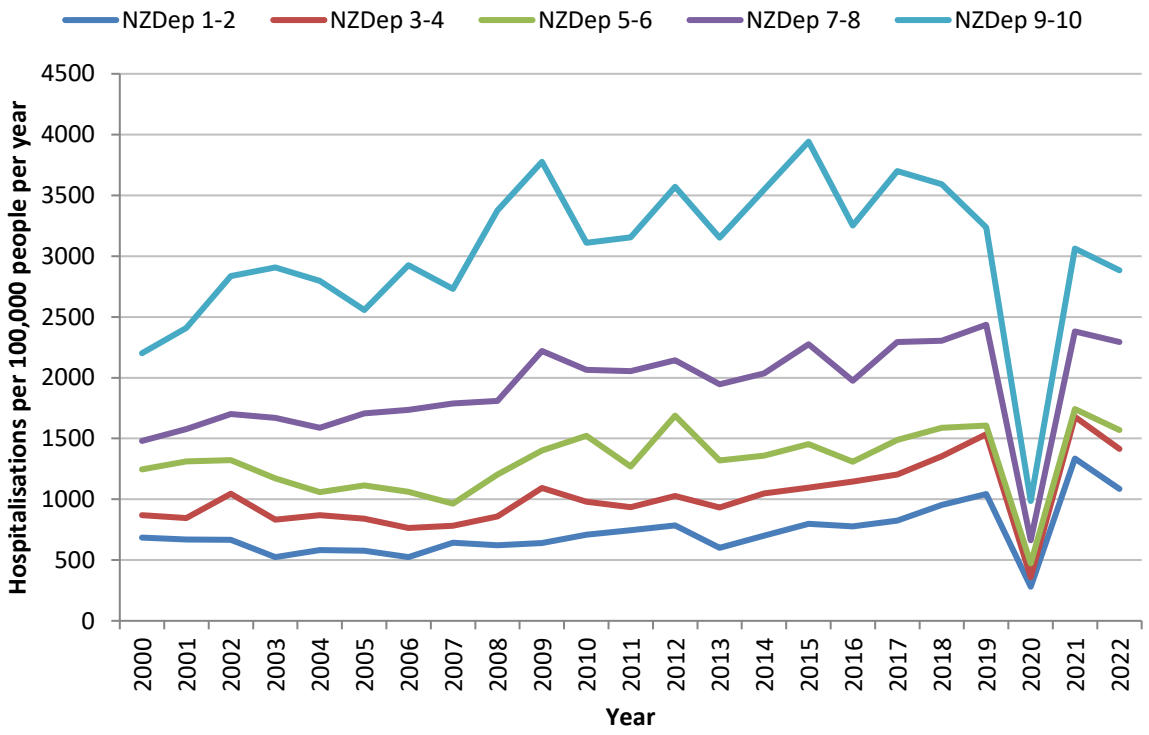
Figure 42. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2000 - 2022.



(See Table A 54 and Table A 55 for data.)

Ethnic disparities reduced slightly from 2009 to 2019, fell strongly in 2020, and have retained some of that improvement. however the recent improvement was primarily due to a marked increase in rates for non-MPA rather than a meaningful decrease in rates for Māori or Pacific peoples (Figure 42). Socio-economic inequalities increased between 2000 and 2003, but have reduced since the mid 2010s. They dropped further in 2020, and are now less than in 2000. However, they remain high overall (Figure 43).

Figure 43. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2018 quintile, 2000 - 2022.



(See Table A 58 and Table A 59 for data.)

Risks and determinants 2022

Bronchiolitis hospitalisation rates were higher for boys than for girls (rate ratio 0.62) (Figure 44).

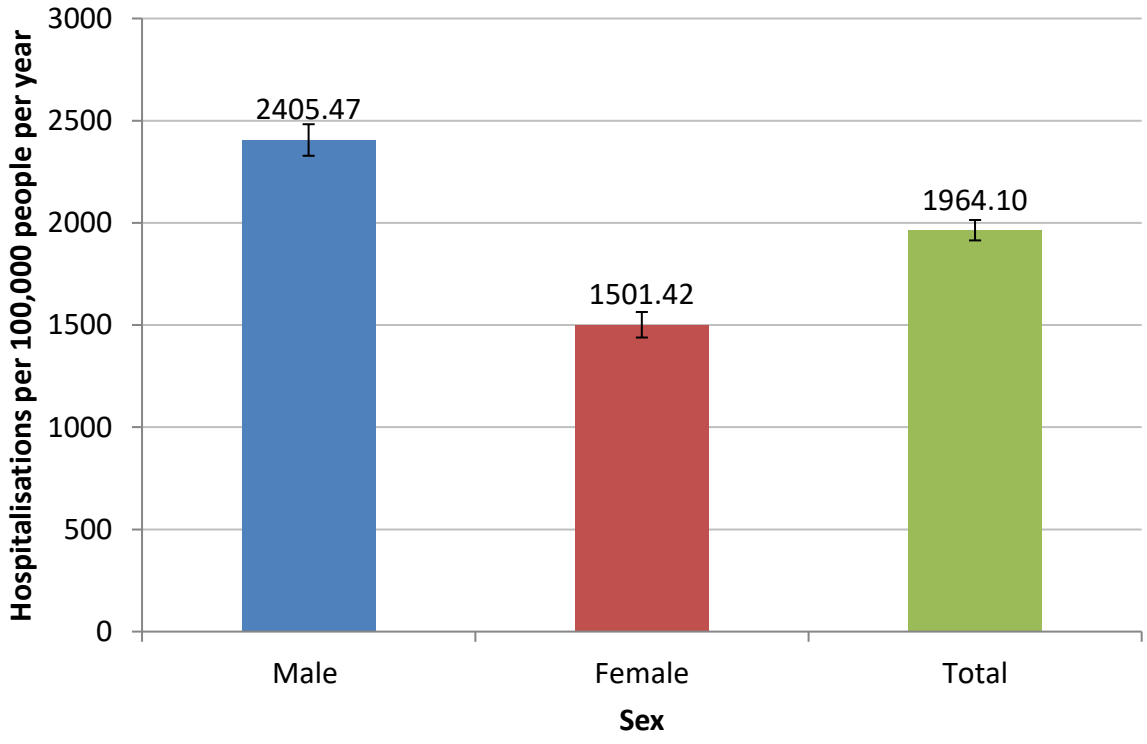
While we report rates for the 0 to 4 years age group, it should be noted that the vast majority of bronchiolitis hospitalisations – 78% in 2022 - occur in children aged less than 1 year old. A further 20% of all hospitalisations were in children aged 12 – 23 months, and only 1.84% in children aged 2 to 4 years.

Rates were lowest for Asian children, at 663.5 per 100,000, highest for Pacific children, at 3840.7 per 100,000, and also high for Māori, at 3245.3, while non-MPA rates sat in between, at 1439.0 per 100,000 children (Figure 45). These differences were significant: Pacific rates were 2.7 times higher than non-MPA, Māori rates 2.3 times higher, and Asian rates 0.5 times lower than non-MPA rates.

The deprivation gradient for childhood bronchiolitis was more exponential than linear. There were 2381 bronchiolitis hospitalisations for children in the most deprived neighbourhoods, making their rates 2.7 times the 582 hospitalisations in the least deprived neighbourhoods (Figure 46). 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 three times as likely to be hospitalised as NZ non-MPA children in the wealthiest quintile (Figure 47). However, this difference is less than the five-fold difference in the previous report.

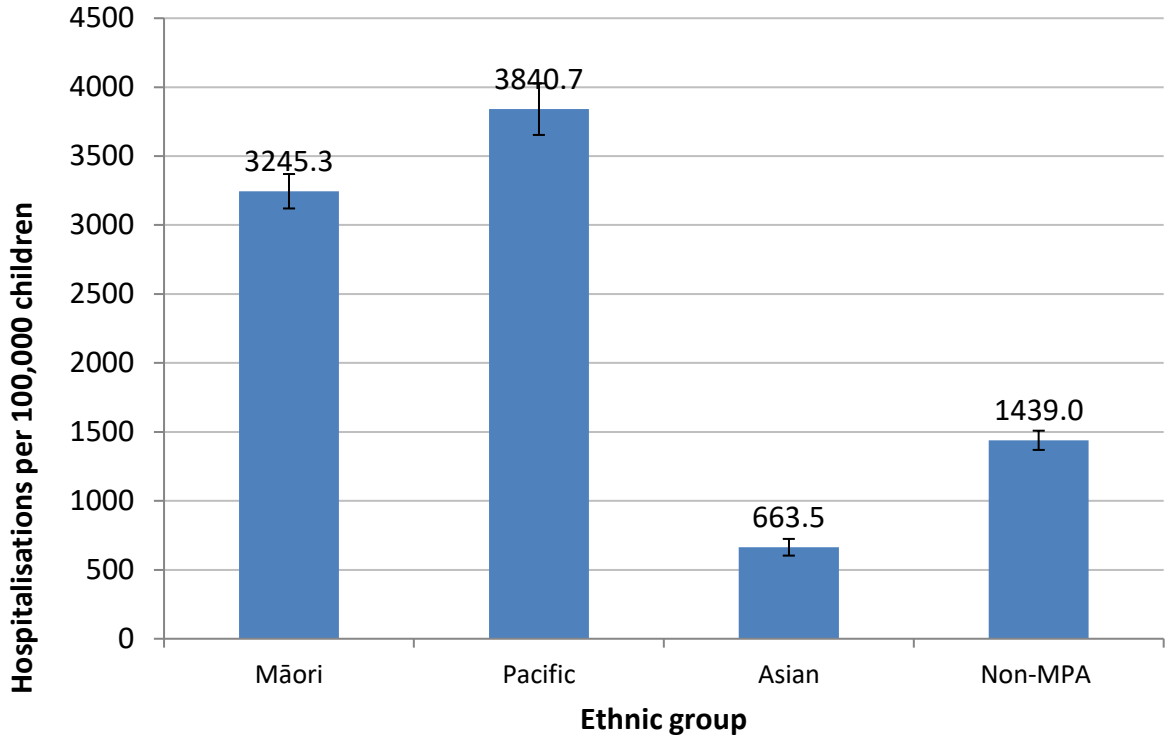
Across DHBs, childhood bronchiolitis rates were highest in Tairawhiti, Bay of Plenty, and Northland, and lowest in West Coast, South Canterbury, and Nelson Marlborough (Figure 48).

Figure 44. Childhood bronchiolitis hospitalisations per 100,000 people by sex, 2022.



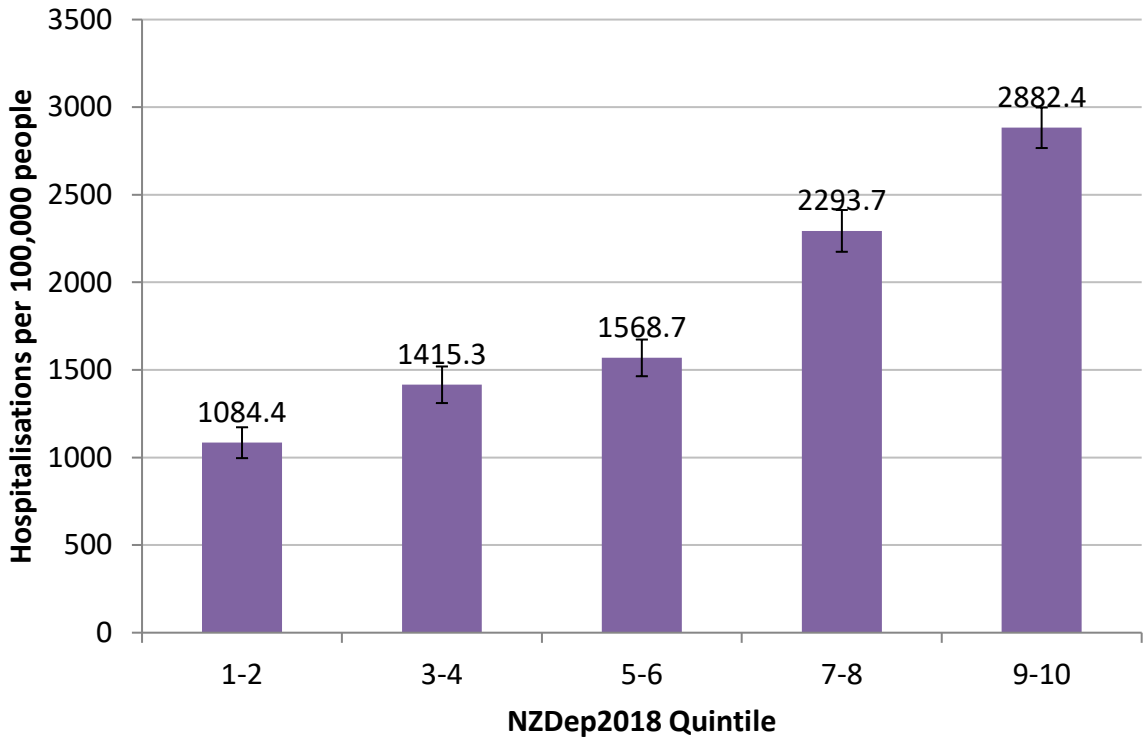
(See Table A 52 for data)

Figure 45. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group, 2022.



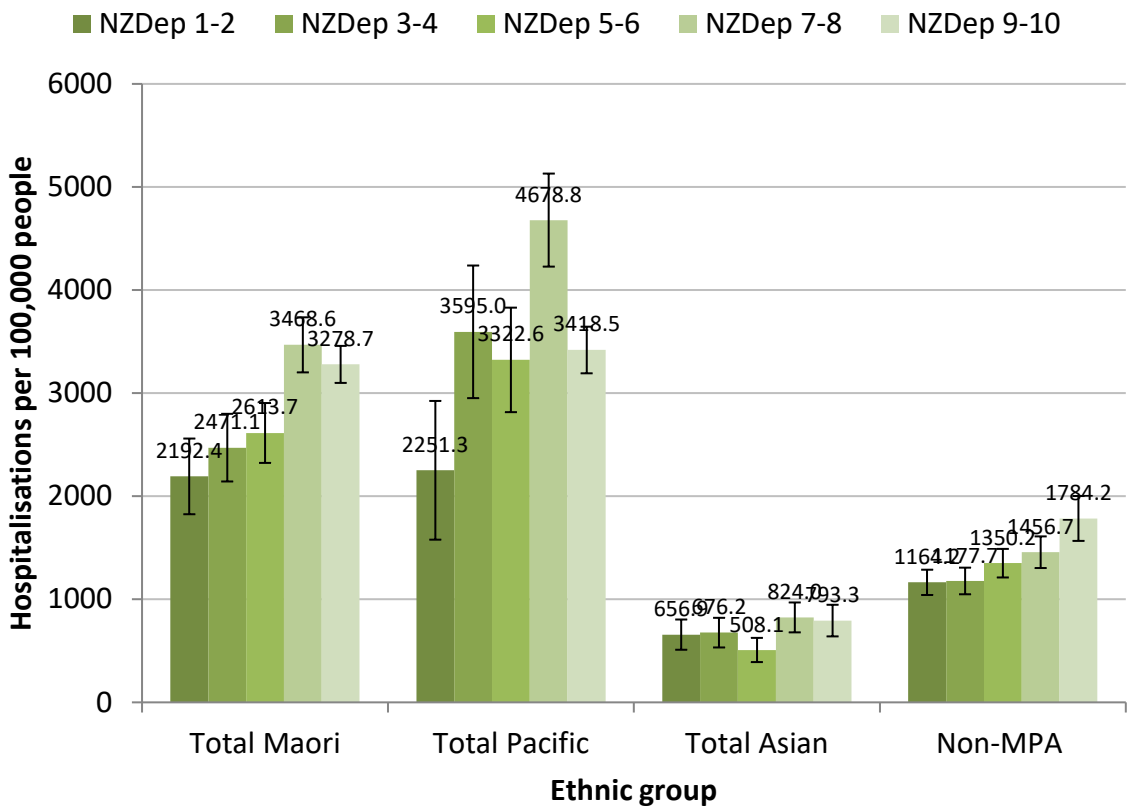
(See Table A 53 for data)

Figure 46. Childhood bronchiolitis hospitalisations per 100,000 people by NZDep2018 quintile, 2022.



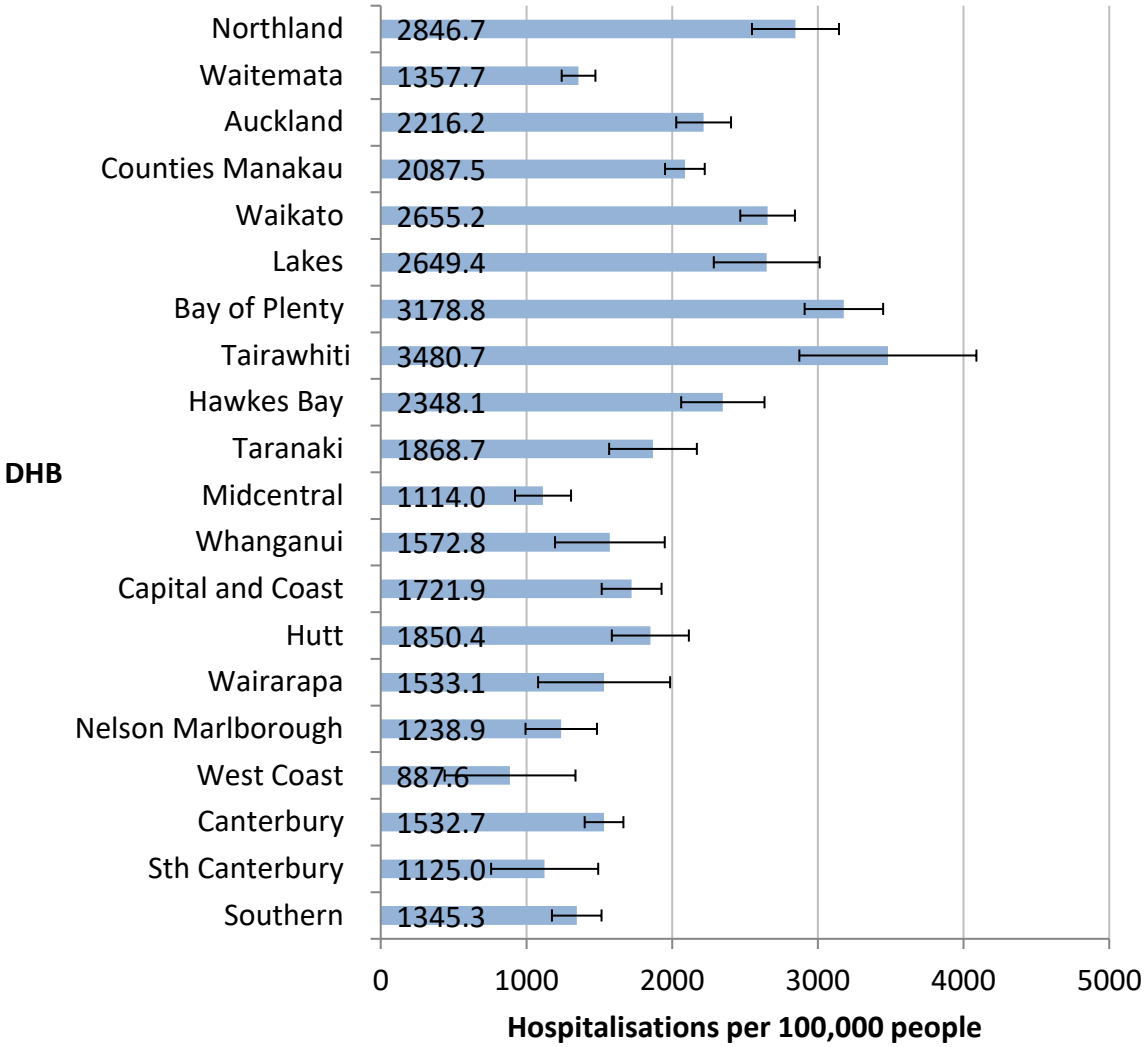
(See Table A 56 for data)

Figure 47. Childhood bronchiolitis hospitalisations per 100,000 people by ethnic group and NZDep2018, 2022.



(See Table A 60 for data)

Figure 48. Childhood bronchiolitis hospitalisations per 100,000 people by DHB, 2022.



(see Table A 61 for data)

CHILDHOOD BRONCHIOLITIS MORTALITY

Trends over time 2000 - 2019

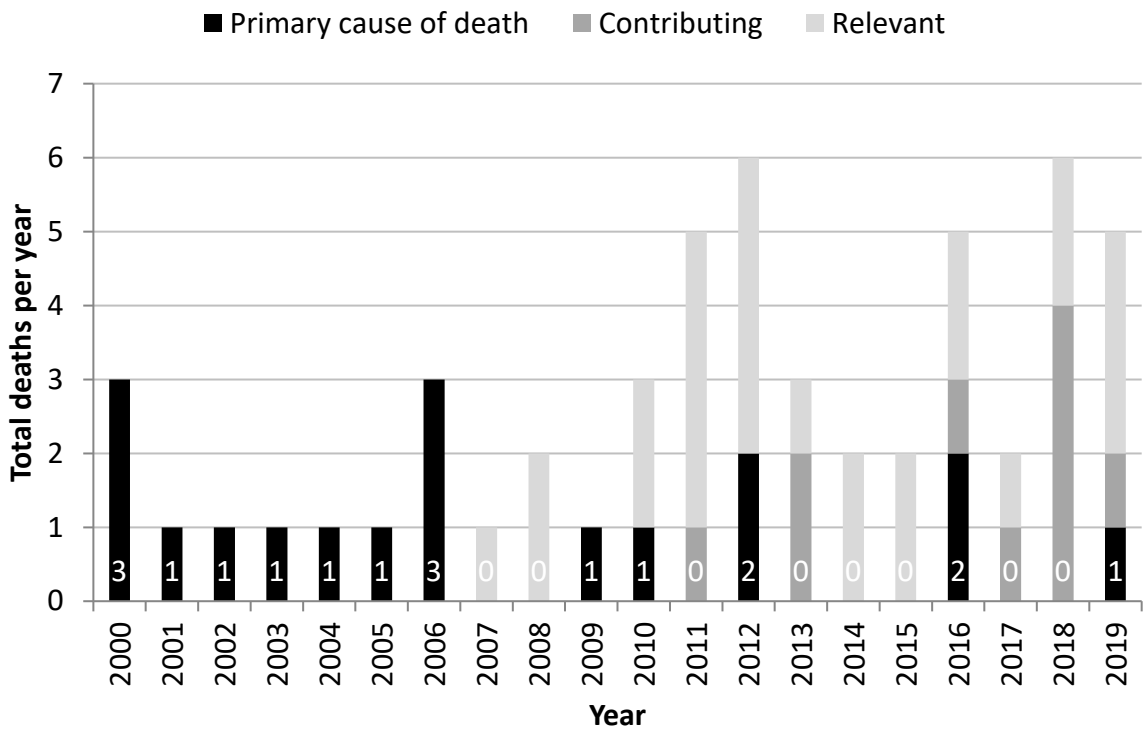
Deaths with childhood bronchiolitis as the primary cause were rare, totalling 18 over the period 2000-2019. An additional 36 deaths under the age of 5 years noted bronchiolitis as contributing (10) or relevant to the death (26). Provisional (2020) and preliminary (2021) data indicate there were no deaths in 2020, and 1 death in 2021. There was no significant trend in childhood bronchiolitis deaths over time (Figure 49).

Risks and determinants 2008 - 2019

Since the previous report there was one new death attributed to bronchiolitis, and 10 deaths where bronchiolitis was contributing (5) or relevant (5). For the six deaths over the ten years 2010 to 2019, 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 six deaths, by total ethnicity, there was one Māori/Pacific child, three other Pacific children, one Asian child, and one non-MPA child. One child died in each of NZDep deciles 4, 5 and 8; three died in NZDep decile 10.

Figure 49. Childhood bronchiolitis mortality numbers 2000-2019.



*Numbers shown are for primary cause of death

CHILDHOOD PNEUMONIA

New Research

Paynter et al[40] found 1763 of 53,635 children were hospitalised for pneumonia in the 6 years following first vaccination, a prevalence rate of 5.48 first hospitalisations per 1000 children per year in children aged approximately 6 years and under.

CHILDHOOD PNEUMONIA HOSPITALISATIONS

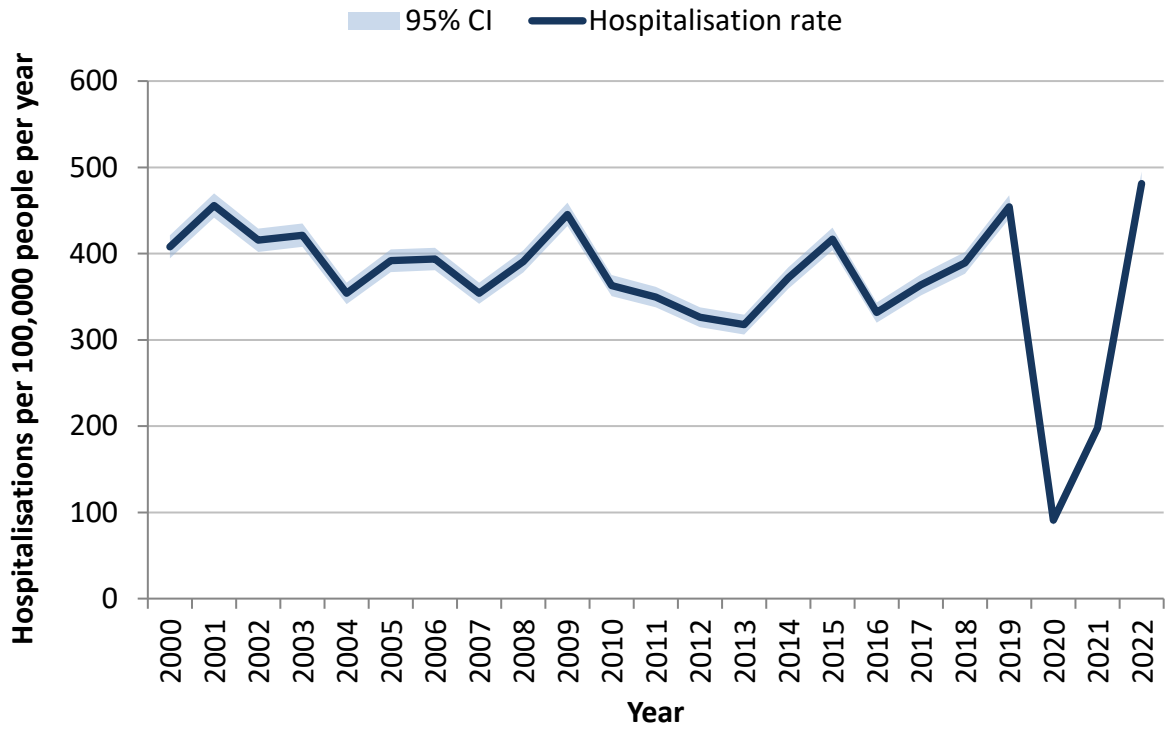
Trends over time 2000 - 2022

Childhood pneumonia rates were dramatically lower than the previous range in 2020 and 2021 but returned to – and exceeded – that range in 2022. The 2022 rate of 481.1 hospitalisations per 100,000 children per year is now higher than the 2000 to 2019 average of 385.6 (Figure 50).

Ethnic disparities in childhood pneumonia rates have decreased for Māori and Pacific children over the study period, and in general the improvement came as Māori and Pacific rates have declined while non-MPA rates remained static (Figure 51). Of concern, however, is the increase between 2000 and 2022 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 227 hospitalisations per 100,000 children per year in 2000 – 2004, to 345 in 2015 – 2019 and 2022. 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 -2022.

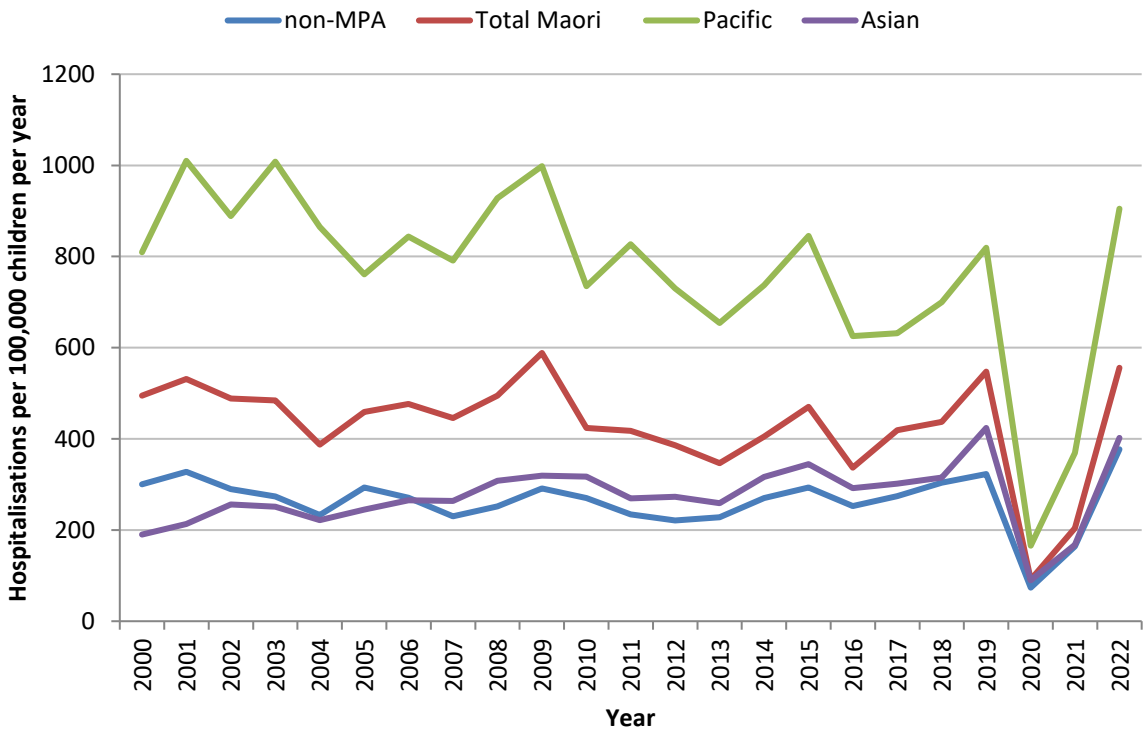
Socio-economic disparities in childhood pneumonia hospitalisations have decreased over the study period, as rates have fallen faster in the most deprived quintiles than in the least deprived quintiles. Nonetheless, NZDep 9-10 areas continue to have hospitalisation rates close to double those of NZDep 1-2 areas (Figure 52).

Figure 50. Childhood pneumonia hospitalisations per 100,000 people per year, 2000-2022.



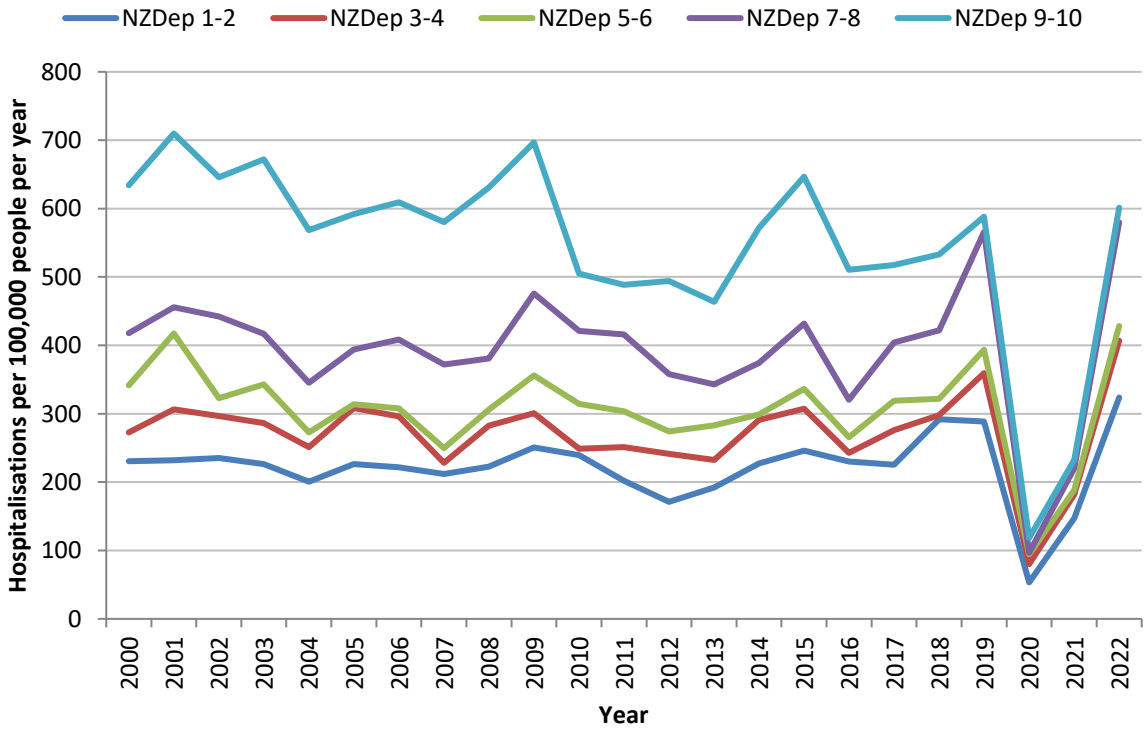
(See Table A 62 for data)

Figure 51. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2000 – 2022, age-adjusted.



See Table A 66 and Table A 67 for data.

Figure 52. Childhood pneumonia hospitalisations per 100,000 people by NZDep2018 quintile, 2000 - 2022, age-adjusted.



See Table A 70 and Table A 71 for data.

Risks and determinants 2022

Male and female childhood pneumonia rates were not significantly different in either age sub-group (Figure 53). This is a change from the previous report, when male rates were higher.

Pacific children had the highest childhood pneumonia rates, at 905.1 hospitalisations per 100,000 children. This rate was 2.4 times higher than the non-MPA rate of 377.1 hospitalisations per 100,000. Rates for Māori children were 1.5 times higher, while rates for Asian children were 1.1 times higher (Figure 54).

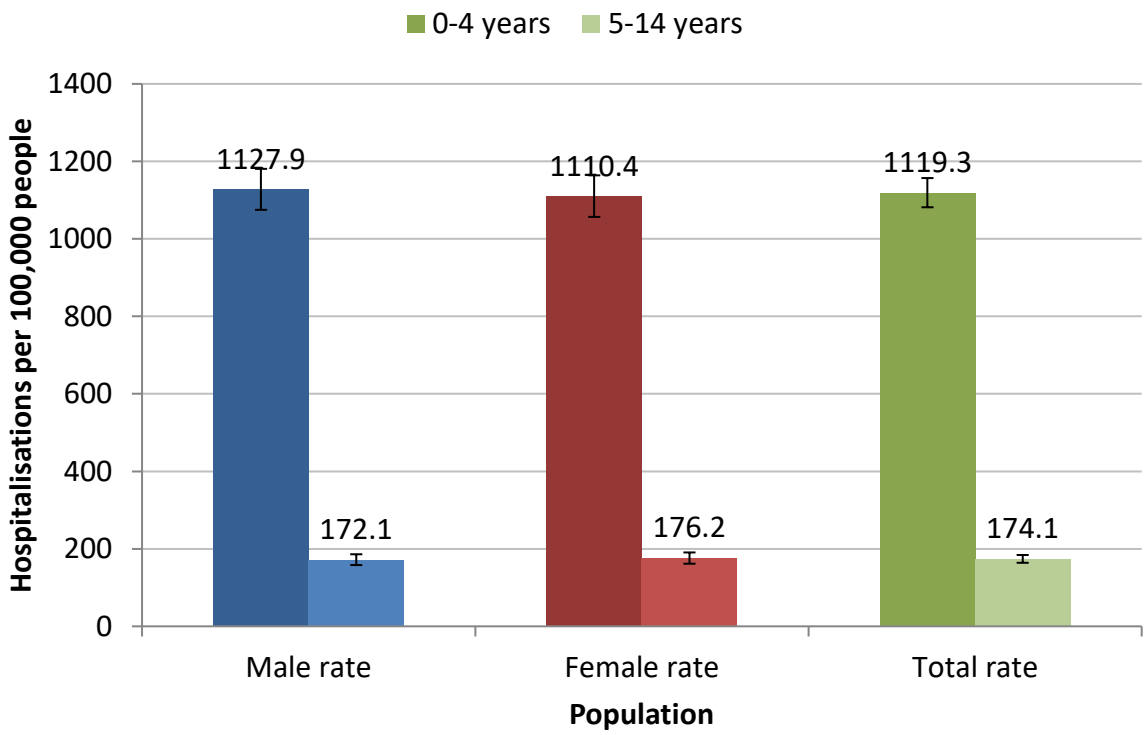
For Māori children, these differences were more pronounced in children aged 5 to 14 years, whereas for Pacific children, the reverse was true. Asian children's rates were lower than non-MPA in children aged under 5 years, but higher in children aged 5 to 14 years (Figure 55). All these differences were statistically significant.

Childhood pneumonia rates were highest in the most deprived areas, with rates 1.9 times higher in the most deprived NZDep quintile than in the least deprived (Figure 56).

Considering both ethnicity and deprivation, both Māori and Asian children had strong socioeconomic gradients in childhood pneumonia rates. The highest overall rate was for Pacific children in the NZDep quintile 7-8 (Figure 57).

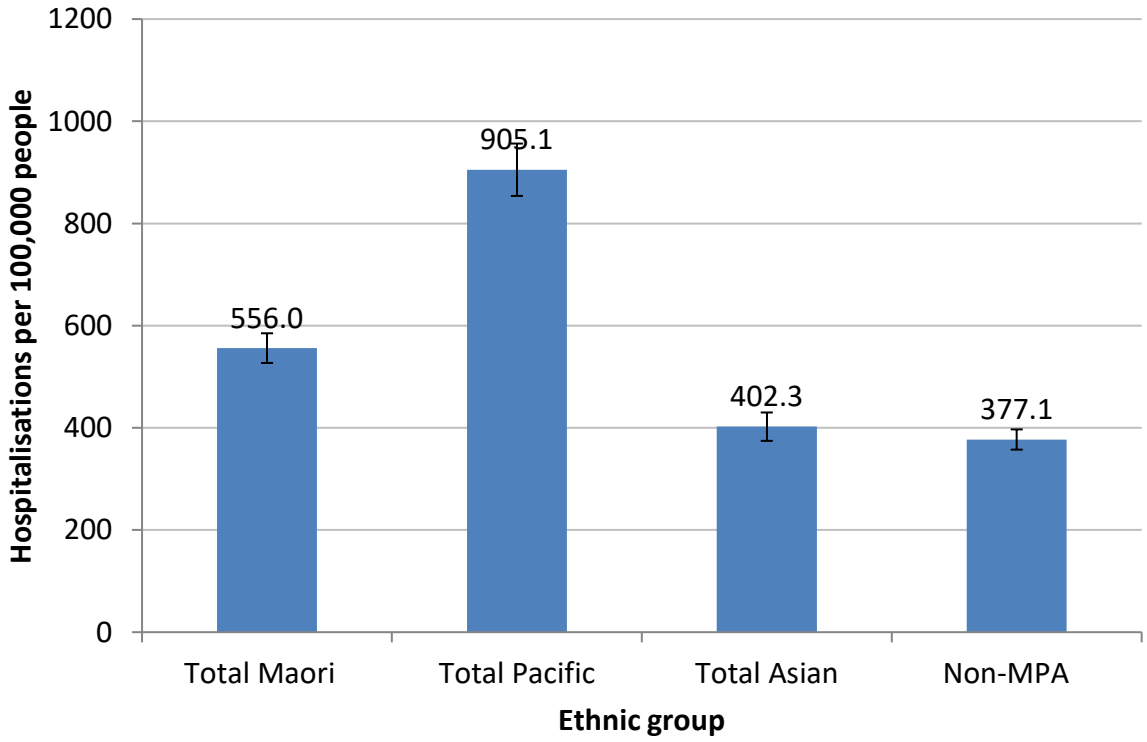
Across DHBs, the highest childhood pneumonia rates were in Auckland, Lakes, and Northland. Rates were lowest in West Coast, South Canterbury, Whanganui, and MidCentral (Figure 58).

Figure 53. Childhood pneumonia hospitalisations per 100,000 people by age group and sex, 2022.



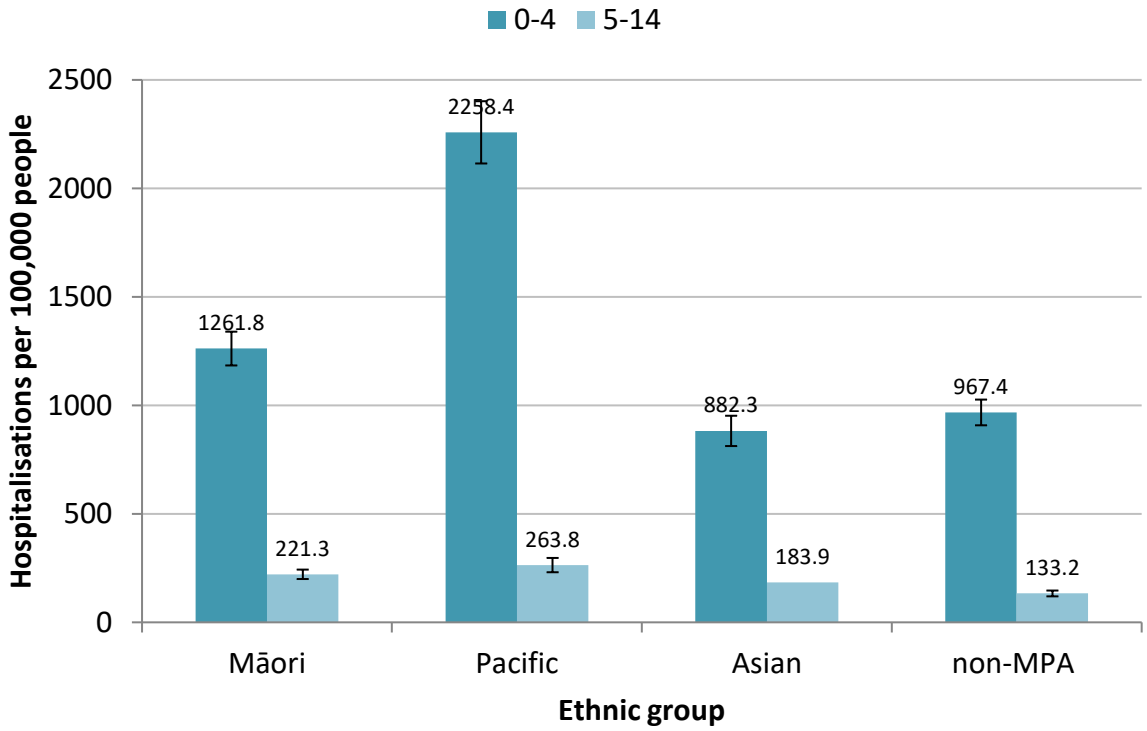
(See Table A 63 and Table A 64 for data)

Figure 54. Childhood pneumonia hospitalisations per 100,000 people by ethnic group, 2022, age-adjusted.



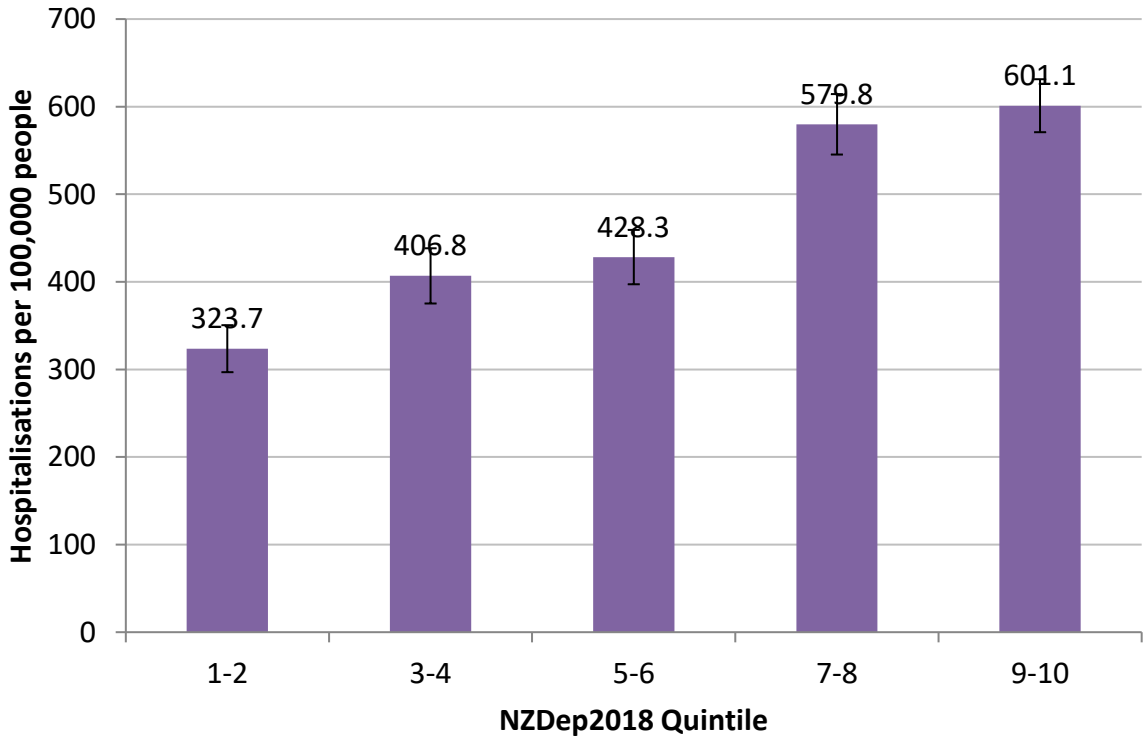
(See Table A 65 for data)

Figure 55. Childhood pneumonia hospitalisations per 100,000 people by ethnic group and age group, 2022.



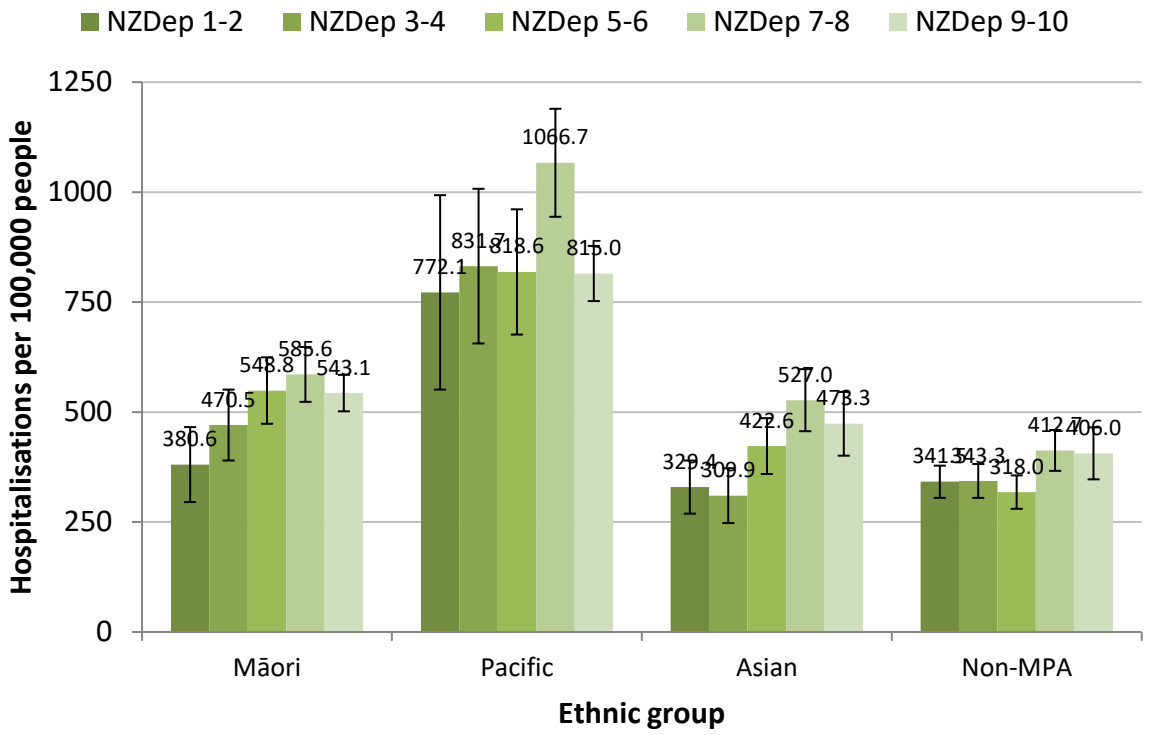
(See Table A 68 for data)

Figure 56. Childhood pneumonia hospitalisations per 100,000 people by NZDep2018 quintile, 2022, age-adjusted.



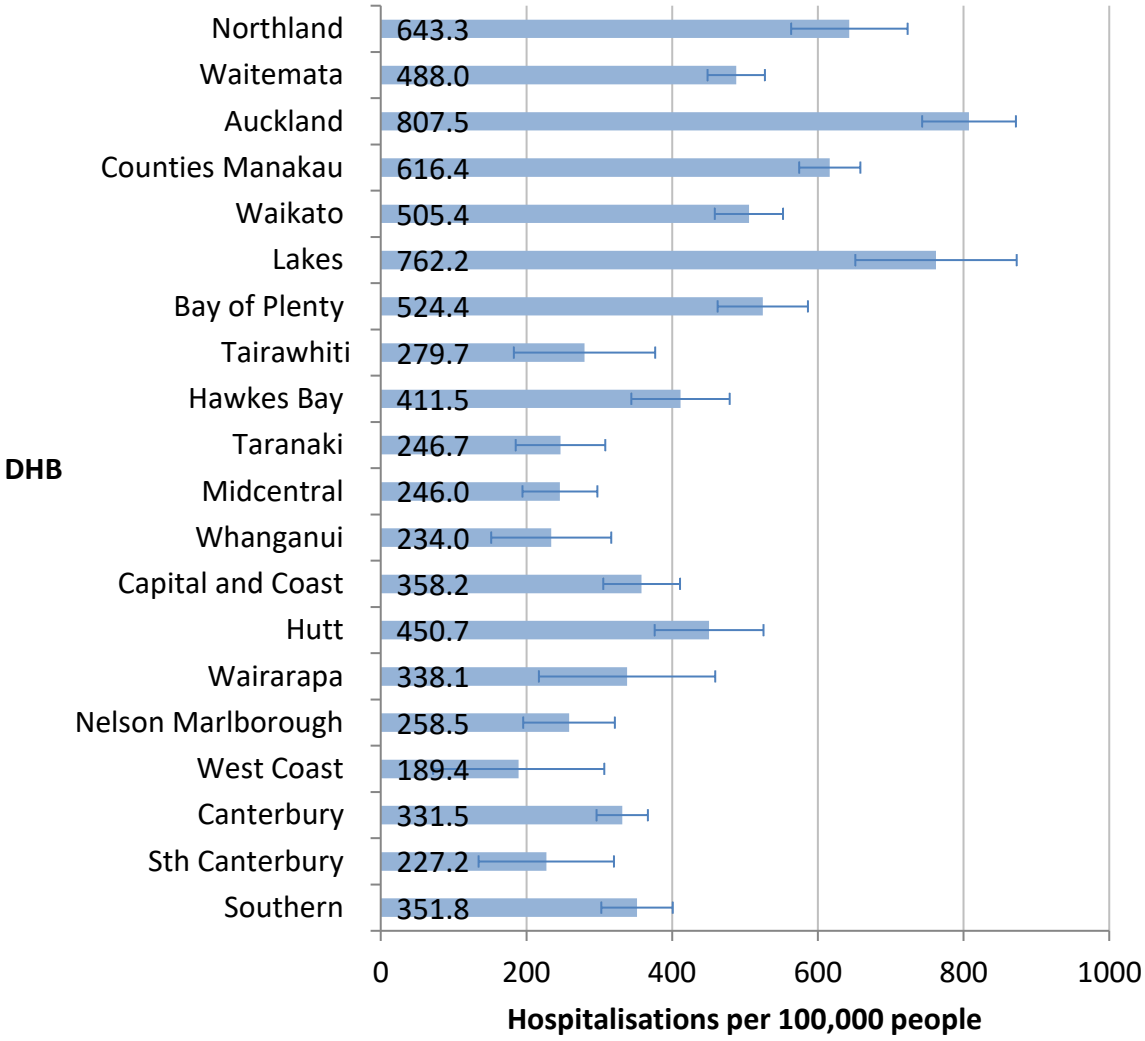
(See Table A 69 for data)

Figure 57. 2022 childhood pneumonia hospitalisations per 100,000 people by ethnic group and NZDep2018, age-adjusted.



(See Table A 72 for data)

Figure 58. 2022 childhood pneumonia hospitalisations per 100,000 people by DHB.

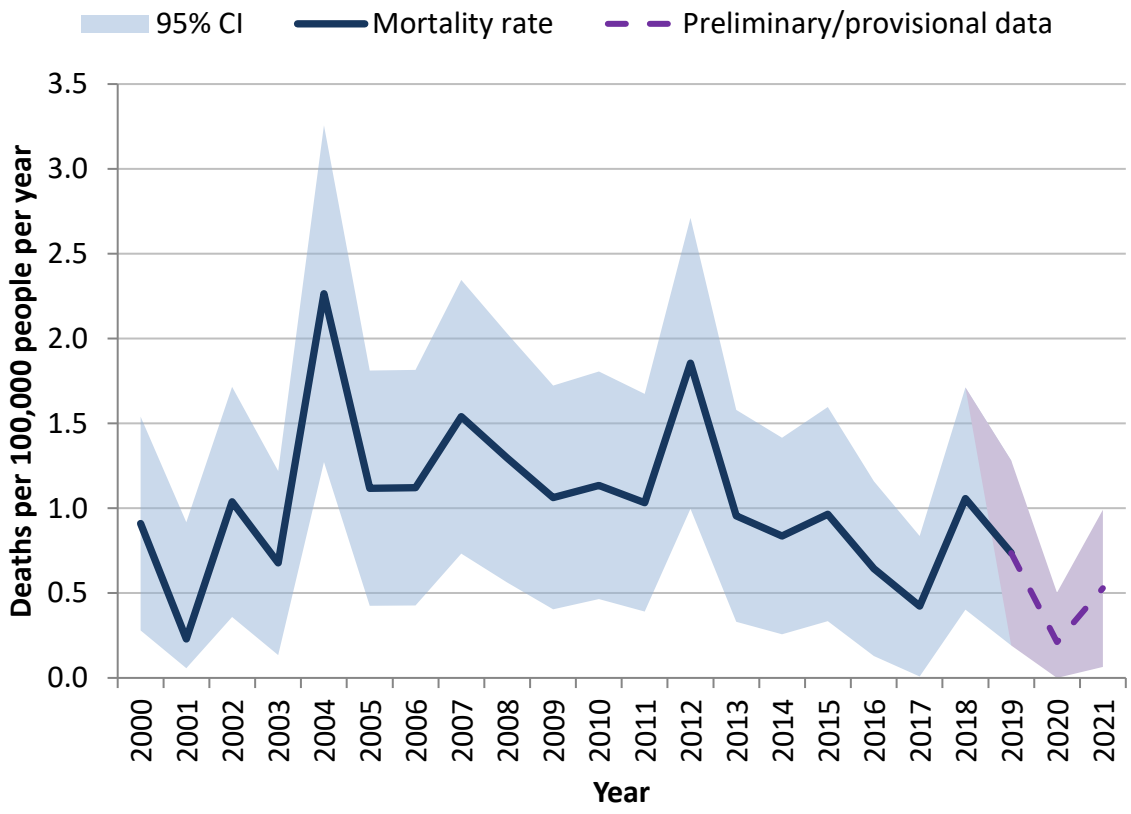


(see Table A 73 for data)

Trends over time 2000 - 2019

There were 7 deaths in children aged under 15 years in 2019. Provisional (2020) and preliminary (2021) data indicate there were 2 deaths in 2020 and 5 in 2021. Mortality from childhood pneumonia showed a very small but statistically significant trend downwards over the study period (Figure 59), despite the fact rates in the early 2000s were lower than rates 2004 to 2012.

Figure 59. Childhood pneumonia mortality rates 2000-2021, age-adjusted.



(See Table A 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

Risks and determinants 2010 - 2019

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).

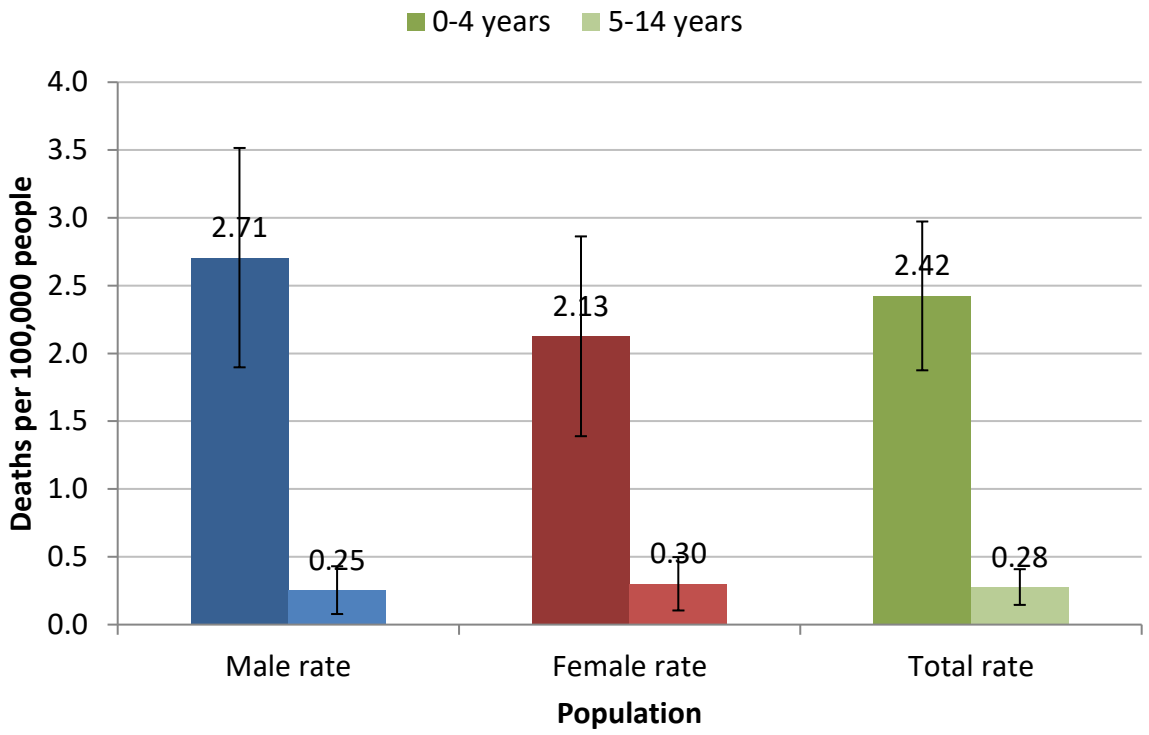
There was high inequality in the distribution of childhood pneumonia mortality by ethnicity. Rates for non-MPA and Asian peoples were 0.8 and 0.4 deaths per 100,000 children per year respectively. Rates for Māori and Pacific peoples were 1.6 and 2.3 respectively, making rates 3.9 times higher for Māori and 5.6 times higher for Pacific

peoples (Figure 61). In absolute numbers, this meant that across the 122 deaths between 2010 and 2019, 40 deaths were Māori, 30 Pacific, 11 Asian, and 19 non-MPA. These differences worsened for Māori and Pacific children from the previous report.

Socio-economic inequalities were even more marked. In the previous 2008-2017 study period, there was a clear trend of higher mortality with increasing deprivation. Well over half (54) of all 92 deaths were in the most deprived quintile (Figure 62), for whom the mortality rate was 12.1 times higher than in the least deprived quintile. This difference has worsened since the last report, which was in turn worse than the report before that.

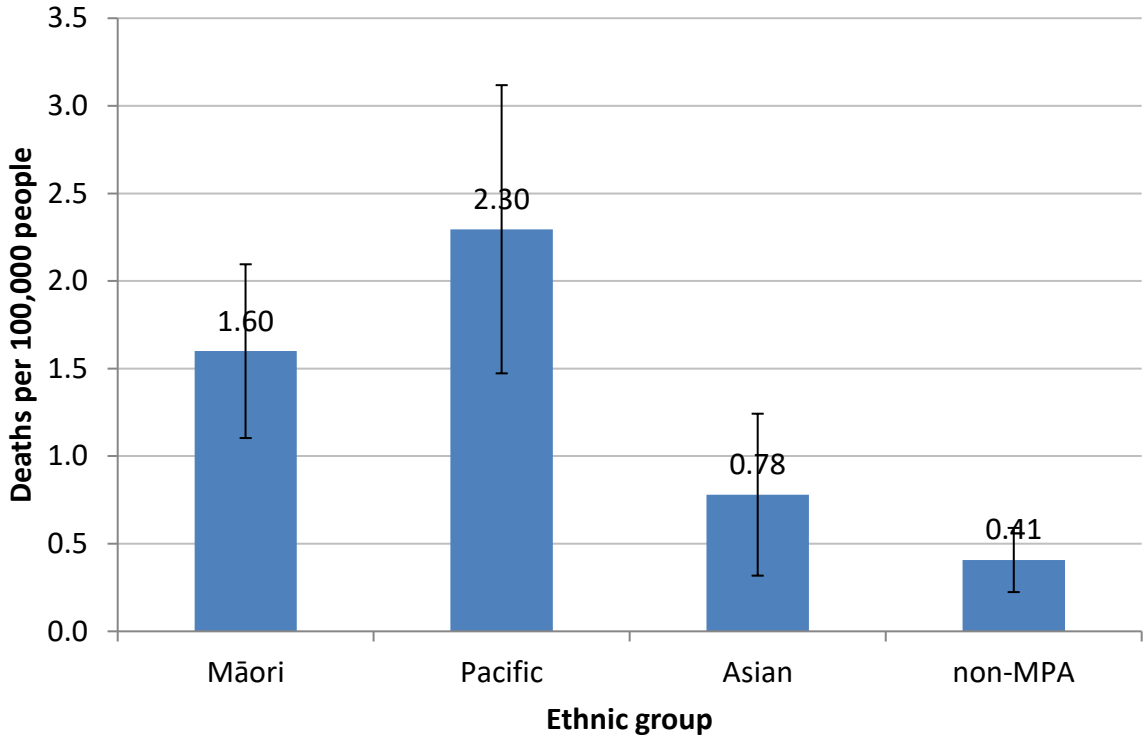
Childhood pneumonia mortality rates were highest in Counties Manukau, Bay of Plenty and West Coast DHBs. There were three DHBs (Wairarapa, Nelson Marlborough and South Canterbury) with no childhood pneumonia deaths (Figure 63).

Figure 60. Childhood pneumonia deaths per 100,000 people by age group and sex, 2010-2019.



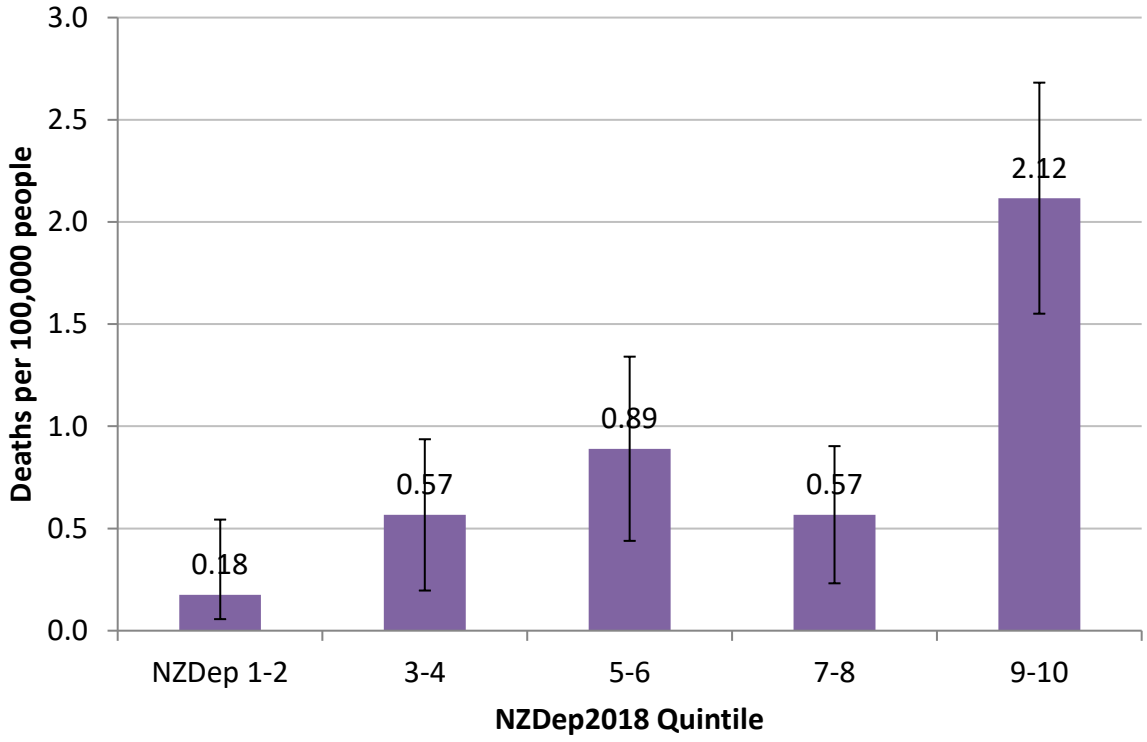
(See Table A 75 and Table A 76 for data)

Figure 61. Childhood pneumonia mortality per 100,000 people per year by ethnic group, 2010-2019.



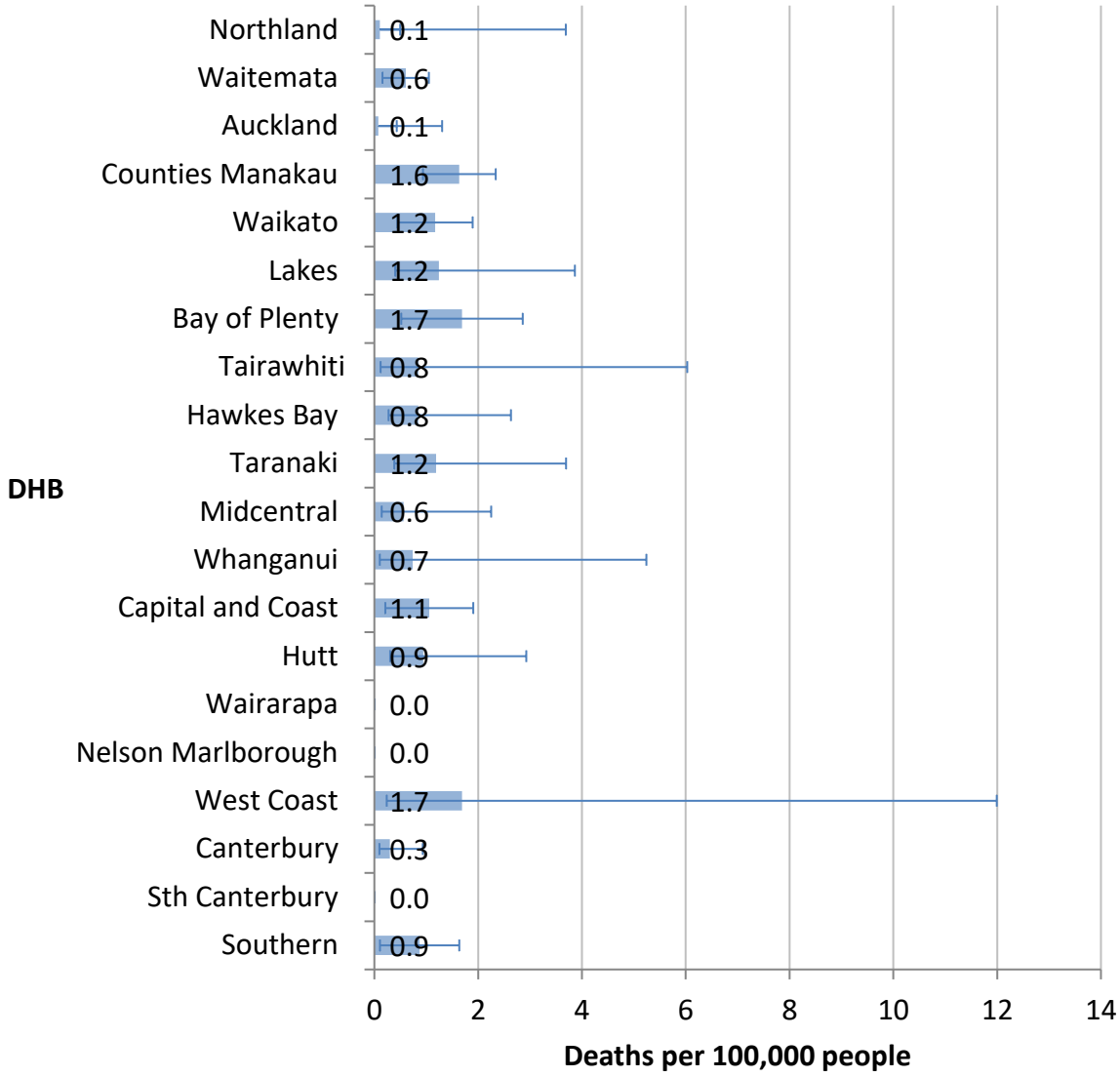
(See Table A 77 for data)

Figure 62. Childhood pneumonia deaths per 100,000 people by NZDep2018 quintile, 2010-2019, age-adjusted.



(See Table A 78 for data)

Figure 63. Childhood pneumonia deaths per 100,000 people per year, by DHB, 2010-2019, age-adjusted



(see Table A 79 for data)

COPD IN OLDER ADULTS (45+ YEARS)

ADULT 45+ YEARS COPD PREVALENCE

Previous reseach

The 2003/4 prevalence of COPD in adults aged 40 and over was estimated to be 14.2%.[41 42] 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 NZ 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.[43]

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.[44]

A 2019 study of Australian and NZ 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.[45]

New research

Shantakumar et al 2021 found 0.898% of patients aged 40 years and over in NZ HealthStat data had COPD.[46]

A systematic review of global, national and regional COPD rates estimated NZ's 2019 population prevalence of COPD among adults aged 30 to 79 years to be 7.5%.[47]

Underwood et al 2024[48] found 7% of households had a household member with COPD, but did not report incidence at individual level. Household-level prevalence increased with increasing deprivation (NZDep quintile).

2022 prevalence estimates

We estimated the 31 December 2022 prevalence of severe COPD by identifying people who had been hospitalised with COPD as a primary or secondary diagnosis between 2000 and 2022 inclusive and excluding those deceased before 31 December 2022. This method identified 43,496 New Zealanders living with previously hospitalised COPD on 31 December 2022, giving a total population prevalence of 0.85%.

Ninety-six percent of people with COPD in 2022 were aged 45 and over, making the population prevalence of people with COPD hospitalised after 2000 2.0% in people aged 45 and over. Age-standardised prevalence for people aged 45 years and over was lower for women (1.9% prevalence) than men (2.0% prevalence) with a rate ratio of 0.97; and highest for Māori, at 5.7%, followed by Pacific peoples at 4.6% and MELAA at 3.8%, and trailed by non-MPA and Asian peoples at 1.7% and 0.8% respectively.

The average age of Māori with hospitalised COPD was 64.4 years, compared with 66.4 for Pacific peoples, 70.5 for Asian peoples, 71.7 for MELAA, and 73.2 for non-MPA.

There was a steep deprivation gradient to prevalence in adults aged 45 years and older. In this age group, the age-standardised population prevalence in NZDep quintile 9-10 was 172.1 per 100,000 people, compared to 52.3 in NZDep 1-2, making the age-adjusted rate ratio 3.4.

It is important to note that the prevalence 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. The 2.0% hospitalised prevalence in adults

aged 45 and over reported here was close to the 2.3% found in the 2014 primary care cohort. [7] For ages 35 years and over, hospitalised COPD prevalences of 4.5% and 3.6% for Māori and Pacific peoples inversed the Dunedin primary care prevalences of 3.7% for Māori and 4.3% for Pacific found by Stokes et al in 2016.[44]

COPD INCIDENCE

We estimated the 2022 incidence of severe COPD by identifying COPD hospital admissions in 2022 where the patient had not previously been hospitalised with COPD (since 2000, the start of data availability). There were 6,596 new cases of COPD in 2022, a total incidence rate of 128.9 per 100,000 people.

Incidence was significantly lower in women than in men (rate ratio 0.85). Incidence rates were highest for Māori, at 341.1 per 100,000, with a rate ratio to non-MPA of 3.4; followed by Pacific at 228.7 (rate ratio 2.1), and lower for non-MPA and MELAA at 109.7 and 94.3 respectively. Incidence was lowest for Asian peoples, at 44.0 per 100,000. (rate ratio 0.3). There was also a strong socioeconomic gradient, with 3.0 times higher incidence in NZDep 9-10 than in NZDep 1-2. Average age of first hospitalisation was 71.6 years, and was earliest for Pacific peoples and Māori, at 65.8 and 64.8 years respectively, followed by Asian at 72.3 years, and MELAA at 72.6 years. The latest average age of first hospitalisation was for non-MPA, at 74.4 years.

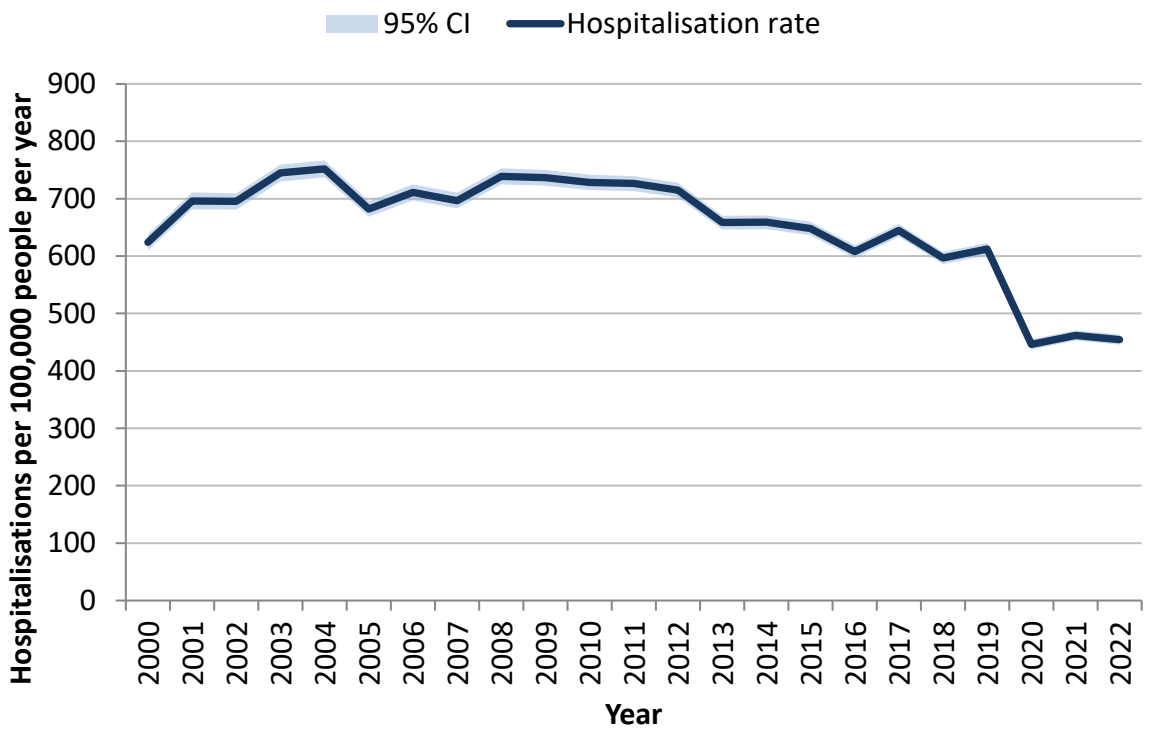
ADULT 45+ YEARS COPD HOSPITALISATIONS

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 2022 bronchiectasis hospitalisations in adults aged 45 years and over were in fact misdiagnosed COPD, it would increase COPD rates by about 42 hospitalisations per 100,000 people per year, about 8.8% 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 - 2022

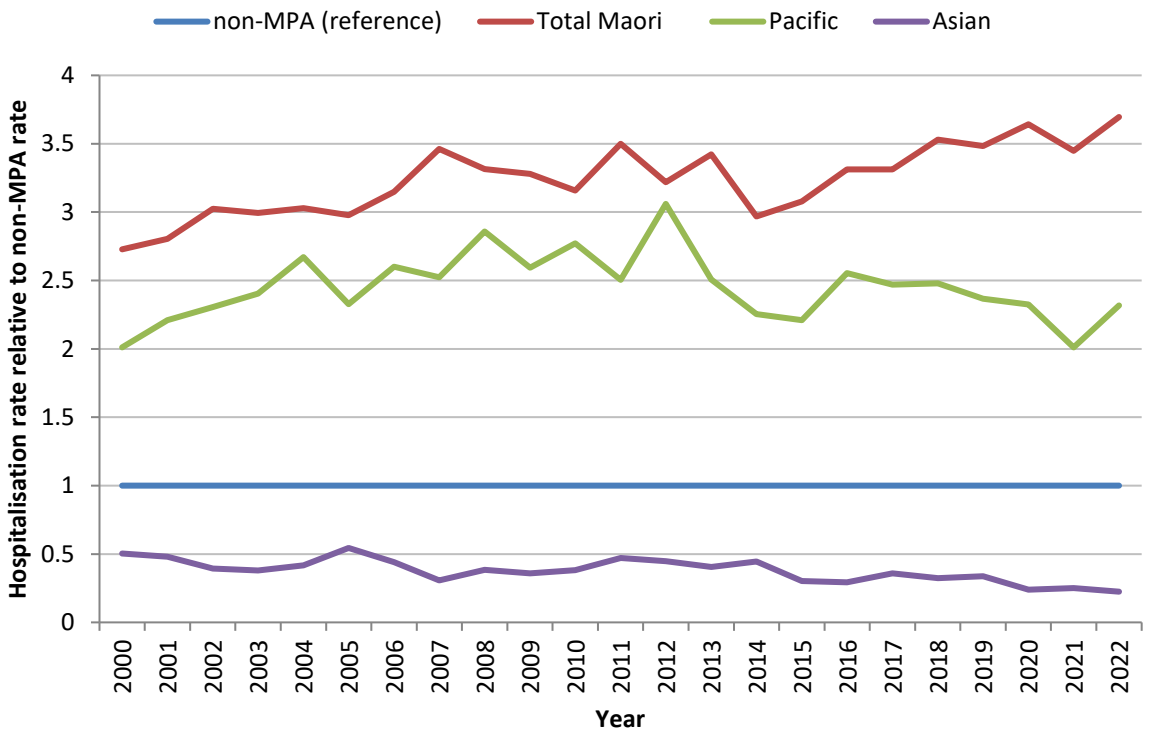
The overall decline in COPD hospitalisations since 2008 was further reduced in 2020, and that reduction continued through 2021 and 2022 (Figure 64). However, socio-economic disparities in COPD hospitalisation rates widened between 2000 and 2022 (Figure 66), as did differences between Māori and non-MPA COPD rates. Differences between Pacific and non-MPA rates have changed little since 2014 (Figure 65).

Figure 64. COPD hospitalisations in adults aged 45+, per 100,000 people per year, 2000-2022, age-adjusted.



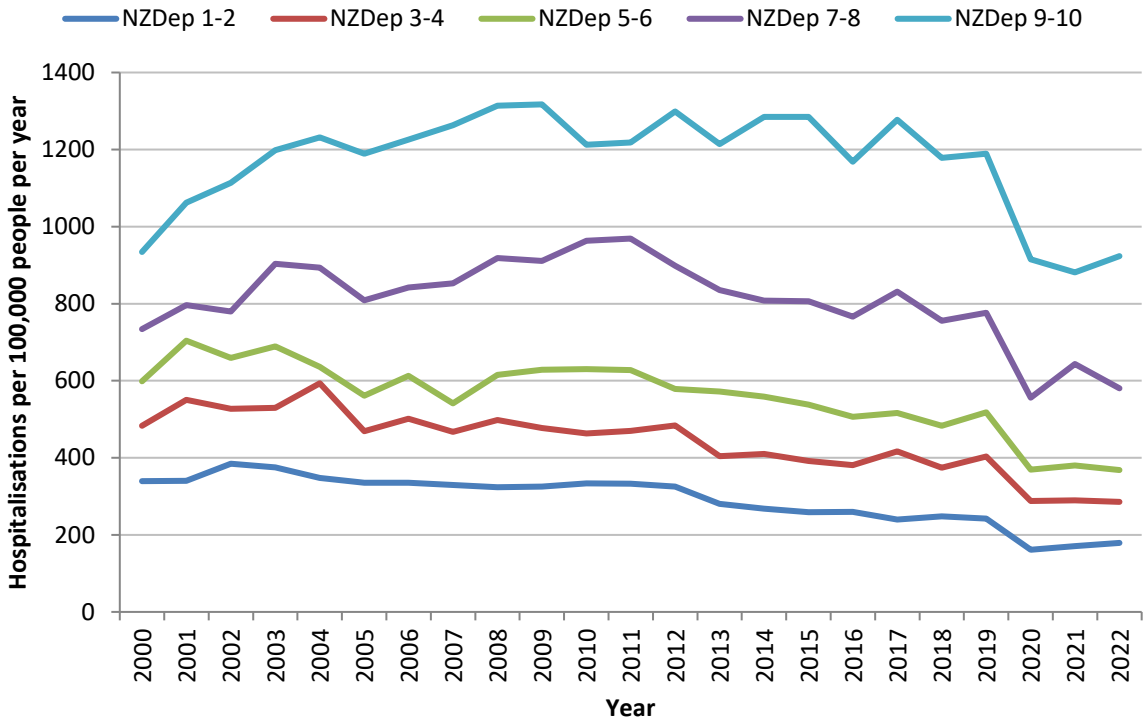
(See Table A 80 for data)

Figure 65. COPD hospitalisation rate in adults aged 45, by ethnic group, relative to non-MPA reference rate, 2000 - 2022, age-adjusted.



See Table A 84 and Table A 85 for data.

Figure 66. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2018 quintile, 2000 - 2022, age-adjusted.



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

Risks and determinants 2022

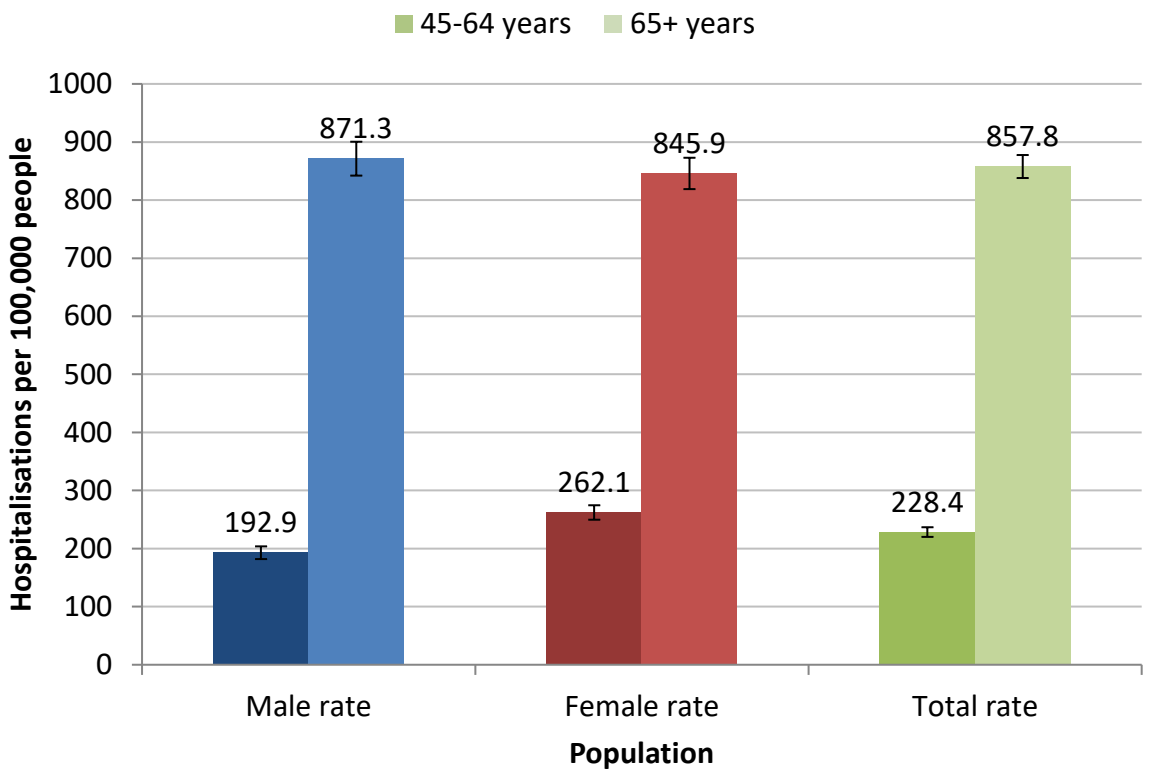
COPD hospitalisation rates were higher for women than men in the 45 to 64 year age group (rate ratio 1.20), but there was no difference in the 65+ age group (rate ratio 1.00) (Figure 67). These differences have remained constant since the last report despite the overall reduction in COPD rates for each group.

COPD rates were highest for Māori, at 3.70 times the non-MPA rate, and Pacific peoples (rate ratio 2.32), and lowest for Asian peoples (rate ratio 0.22) (Figure 68).

There was a strong deprivation gradient, with COPD rates 5.17 times higher in the most deprived NZDep quintile than in the least deprived (Figure 70). Some deprivation gradient was present across all ethnic groups, though for Māori and Pacific there was a step change difference between rates for NZDep 1 to 6 and rates for NZDep 7 to 10 (Figure 71).

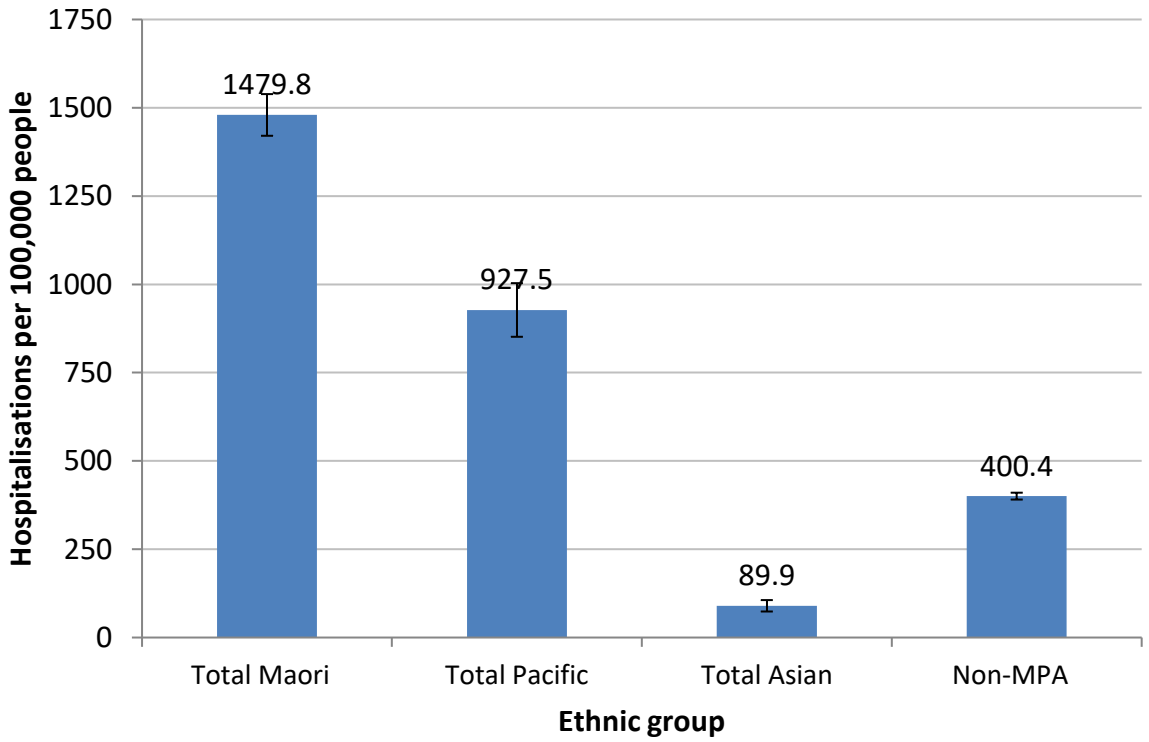
COPD hospitalisation rates were highest in Whanganui, Tairawhiti, and Hawkes Bay; and lowest in Capital and Coast, Nelson Marlborough, and Canterbury (Figure 72).

Figure 67. COPD hospitalisations in adults aged 45+, per 100,000 people, by age group and sex, 2022.



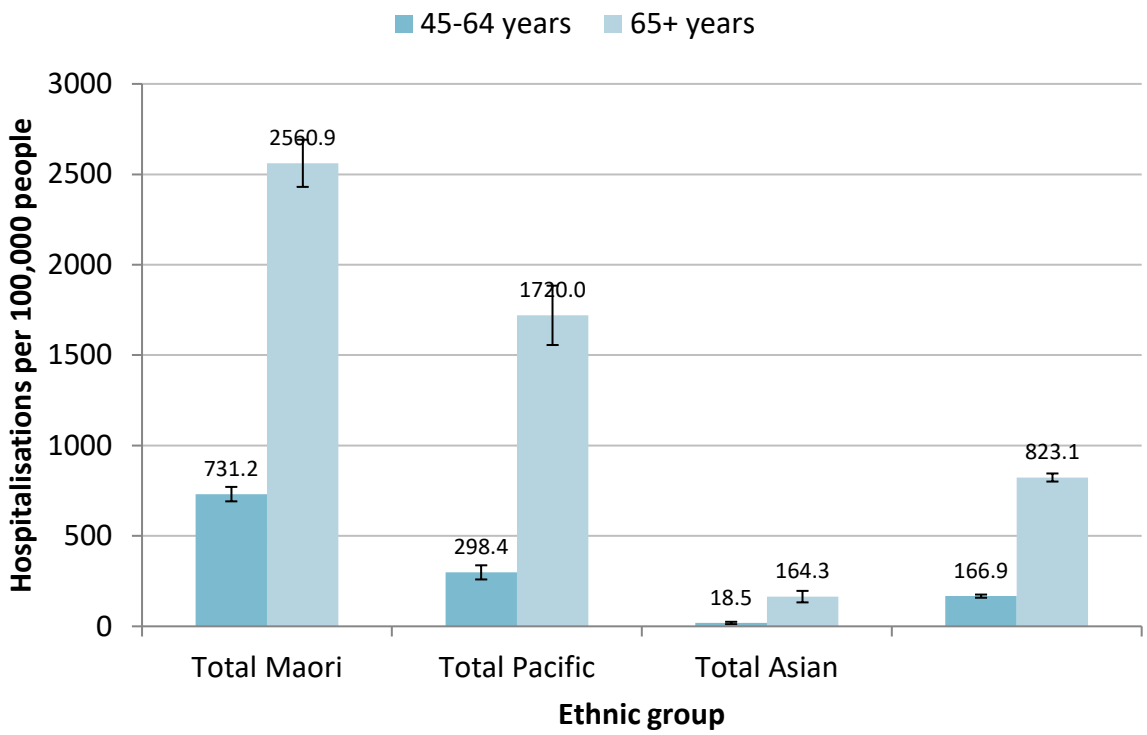
(See Table A 81 and Table A 82 for data)

Figure 68. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group, 2022, age-adjusted.



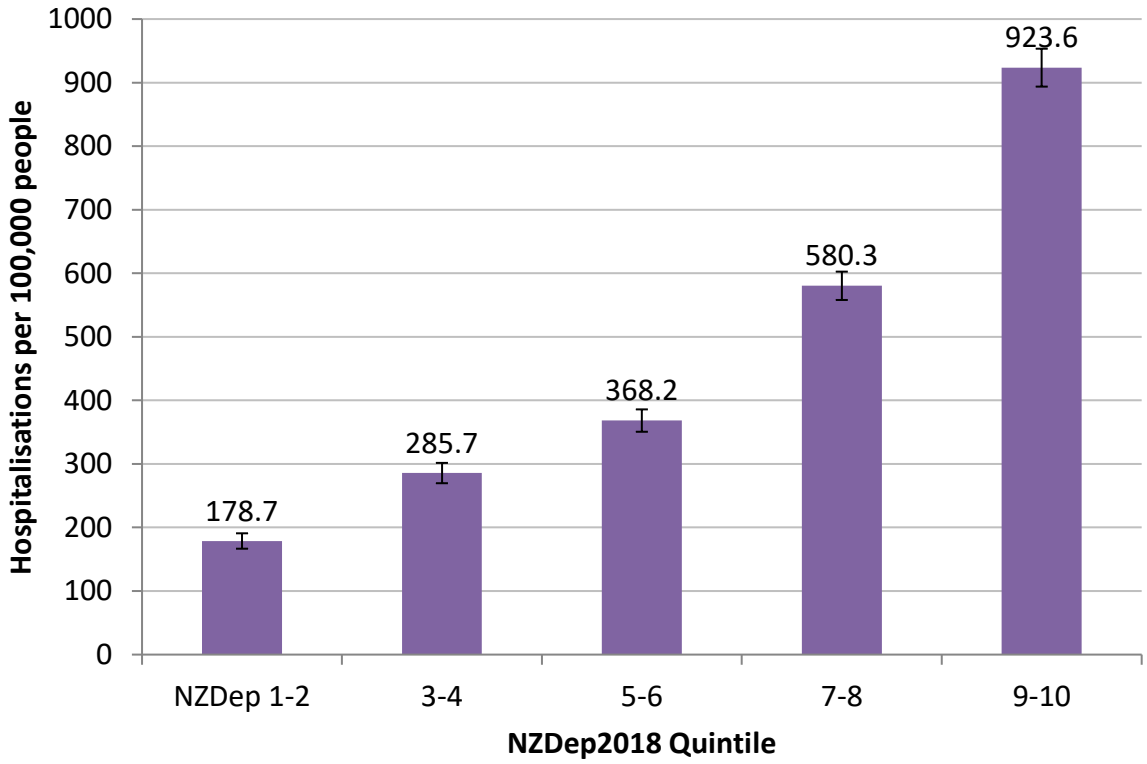
(See Table A 83 for data)

Figure 69. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and age group, 2022.



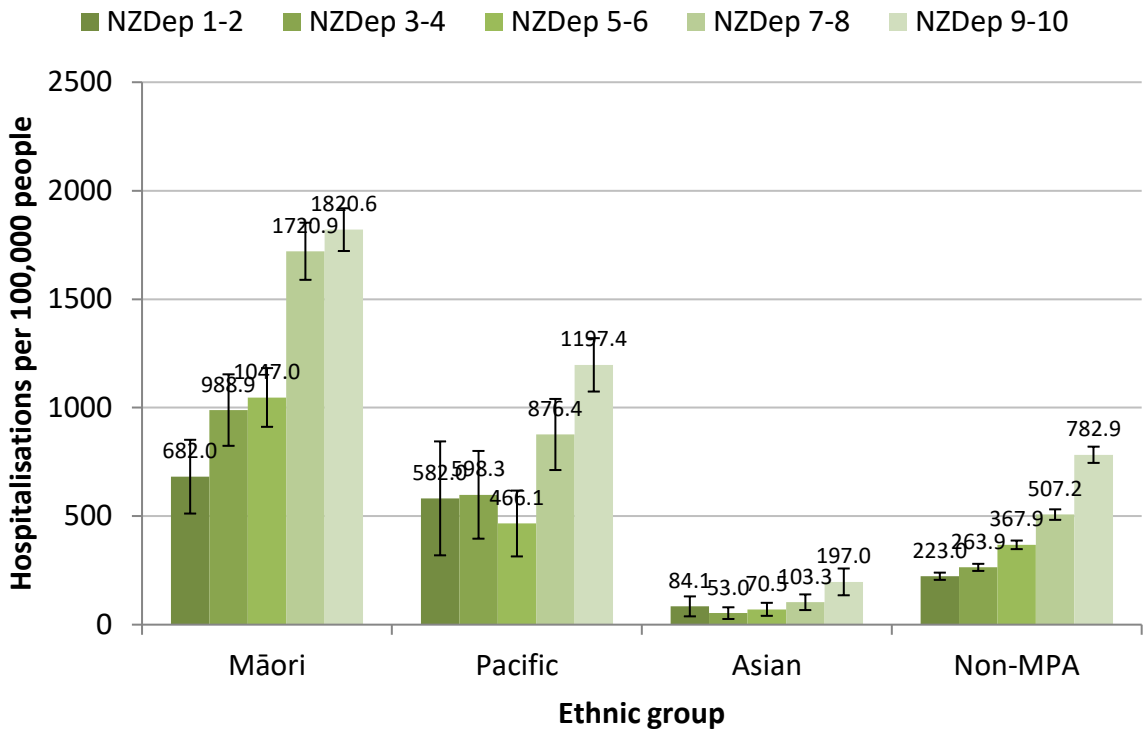
(See Table A 86 for data)

Figure 70. COPD hospitalisations in adults 45+, per 100,000 people, by NZDep2018 quintile, 2022, age-adjusted.



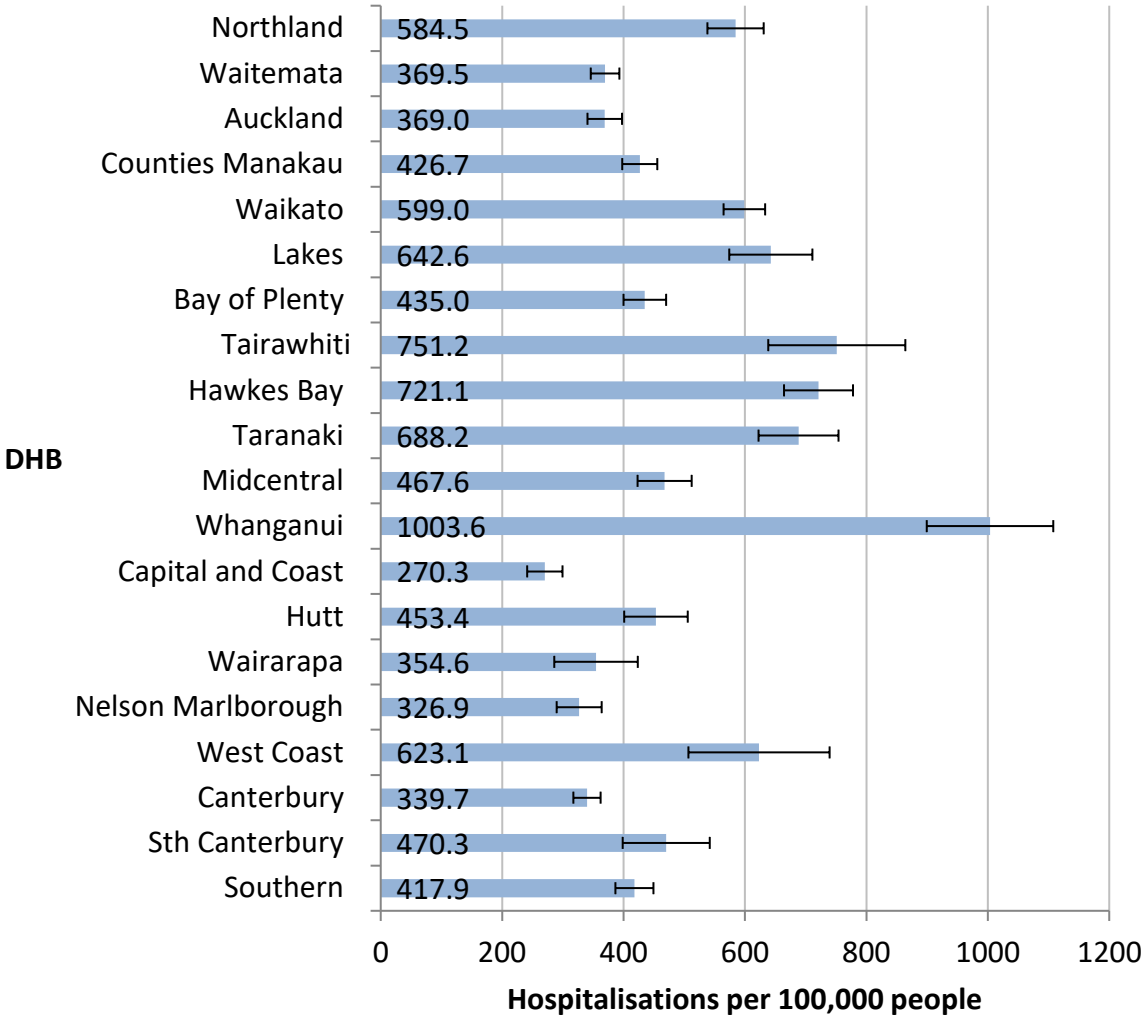
(See Table A 87 for data)

Figure 71. COPD hospitalisations in adults aged 45+, per 100,000 people, by ethnic group and NZDep2018, 2022, age-adjusted.



(See Table A 90 for data)

Figure 72. COPD hospitalisations in adults aged 45+, per 100,000 people, by DHB, 2022.



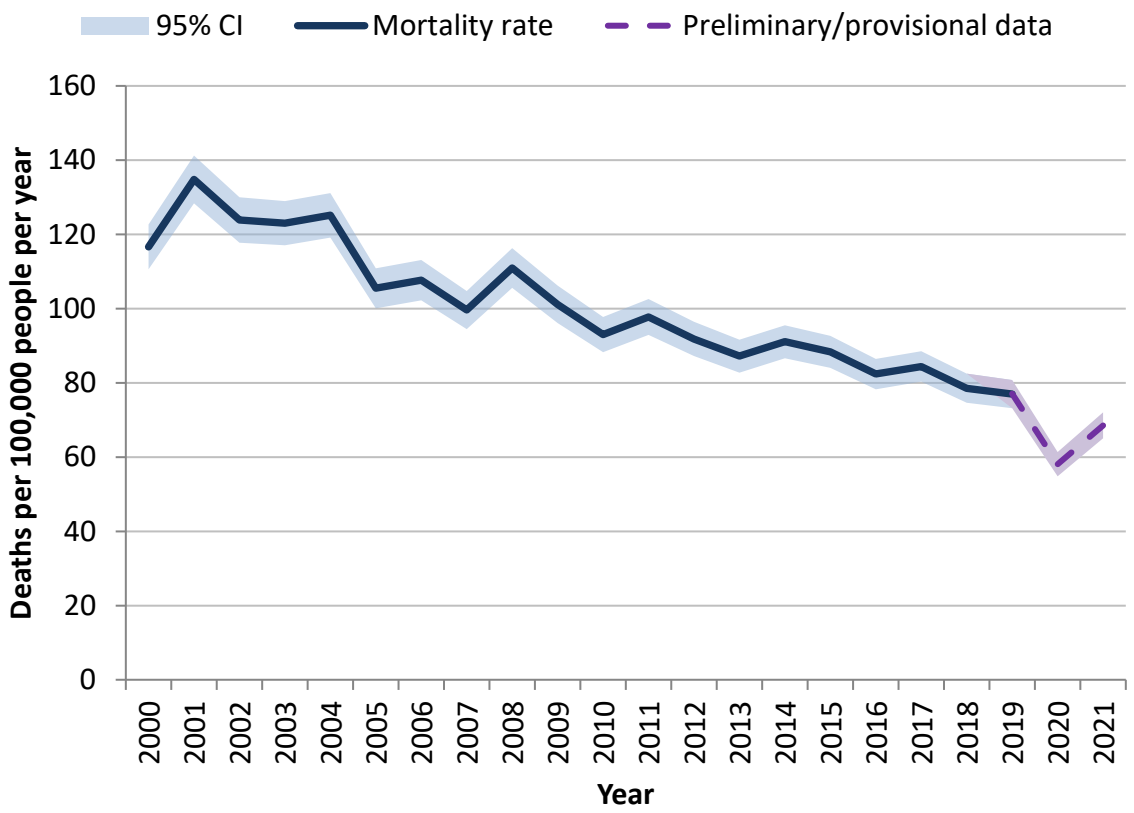
(see Table A 91 for data)

ADULT 45+ YEARS COPD MORTALITY

Trends over time 2000 - 2019

There were 1,568 deaths due to COPD in adults aged 45 years and over in 2019. Rates of mortality due to COPD declined over the study period, from an age-adjusted 116.6 deaths per 100,000 in 2000, to 77.0 deaths per 100,000 in 2019. This represented a decline of 2.74 deaths per 100,000 people per year. Provisional (2020) and preliminary (2021) data indicate there were 1,227 deaths in 2020 and 1,498 in 2021. Further research is needed to explore any connection between the decline in COPD deaths and the increase in asthma deaths since 2010.

Figure 73. Adult COPD mortality rates 2000-2021, age-adjusted.



(See Table A 92 for data)

Risks and determinants 2019

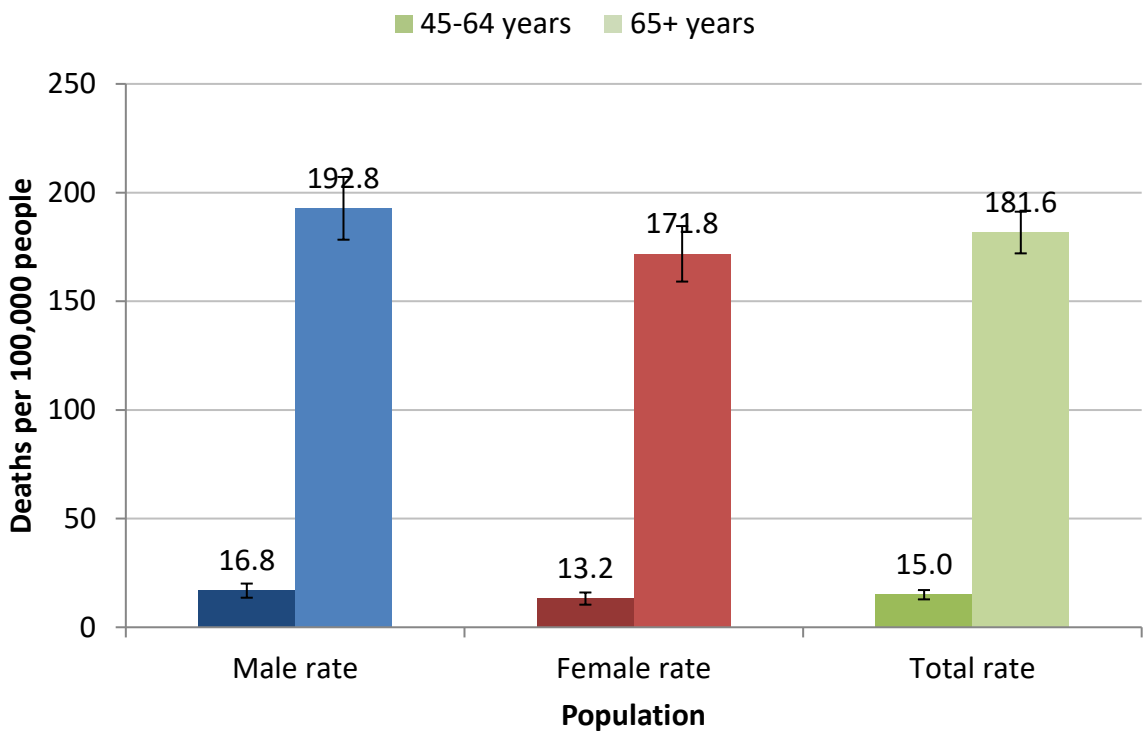
COPD mortality rates were lower for women than for men in both the 45-64 years age group (rate ratio 0.78), and the 65+ years age group (rate ratio 0.89) (Figure 74).

COPD mortality rates were highest in Māori, whose rate of 111.8 deaths per 100,000 people per year was 2.24 times higher than the 75.5 rate for non-MPA. For the first time since reporting began in 2014, Pacific rates were not significantly different from non-MPA rates. The COPD mortality rate for Asian peoples was nearly under a quarter of the non-MPA rate (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 2.5 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).

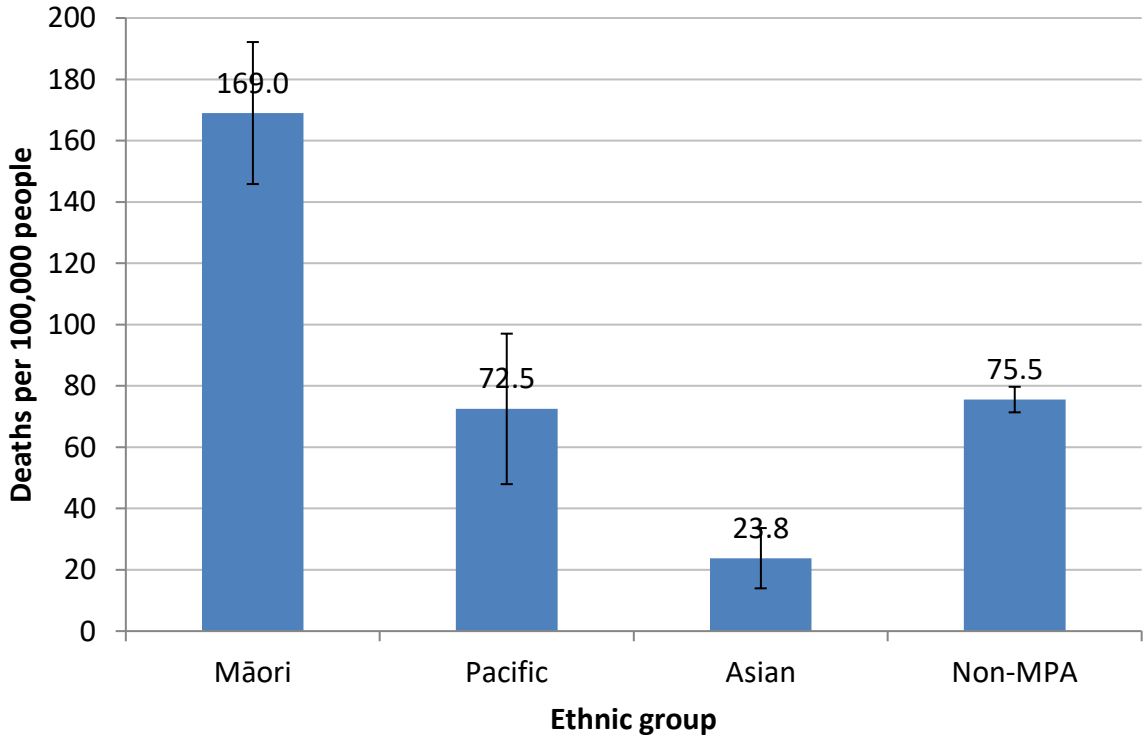
Adult COPD mortality rates for 2019 were highest in West Coast, Tairawhiti and Wairarapa DHBs; and lowest in Auckland, Waitemata, and Counties Manukau.

Figure 74. Adult COPD deaths per 100,000 people by age group and sex, 2019.



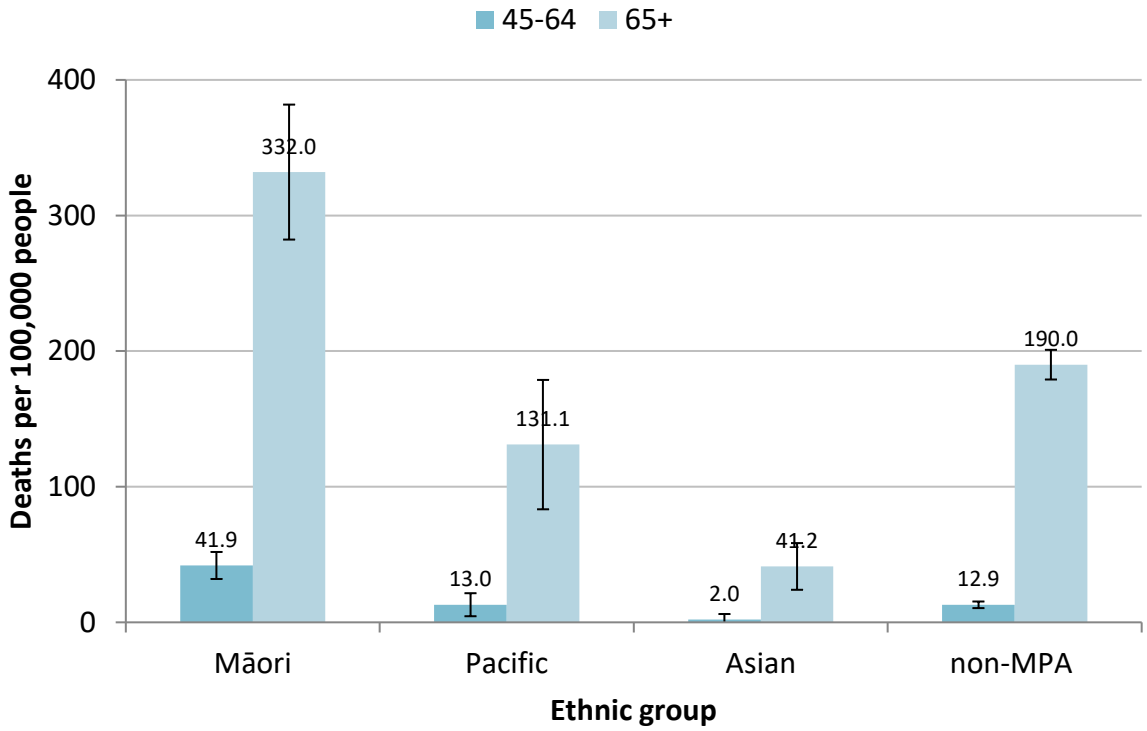
(See Table A 93 and Table A 94 for data)

Figure 75. Adult COPD mortality per 100,000 people per year by ethnic group, 2019.



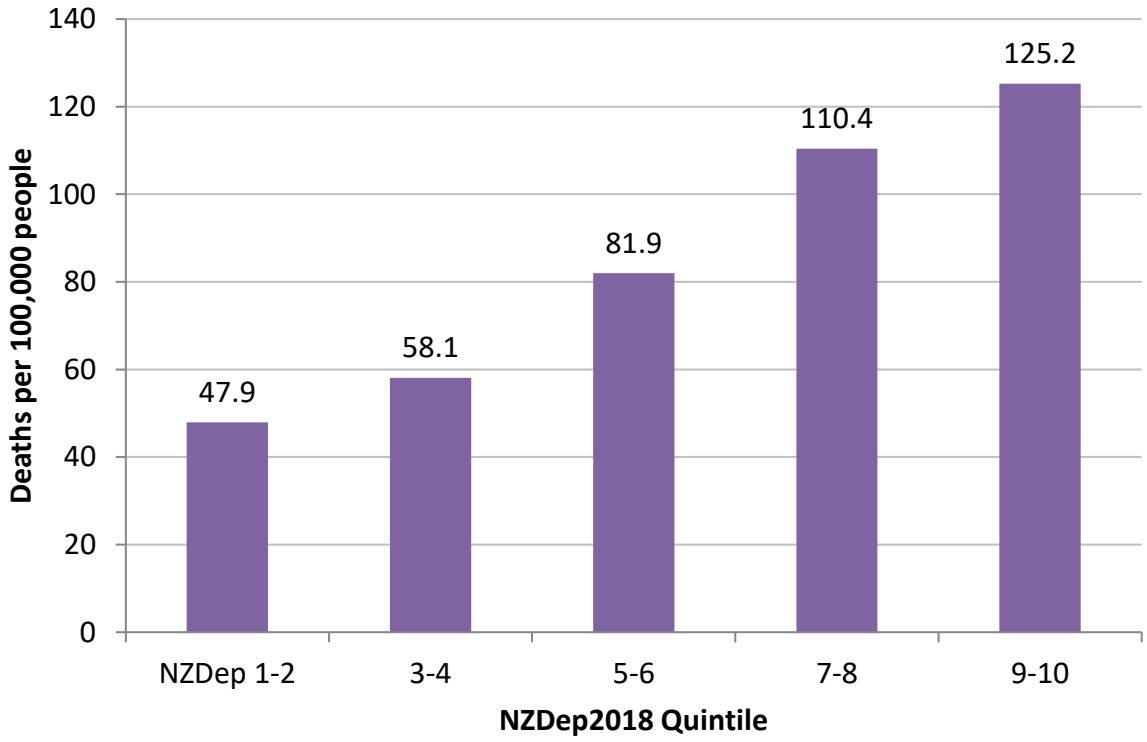
(See Table A 95 for data)

Figure 76. Adult COPD deaths per 100,000 people per year, by ethnic group and age group, 2019.



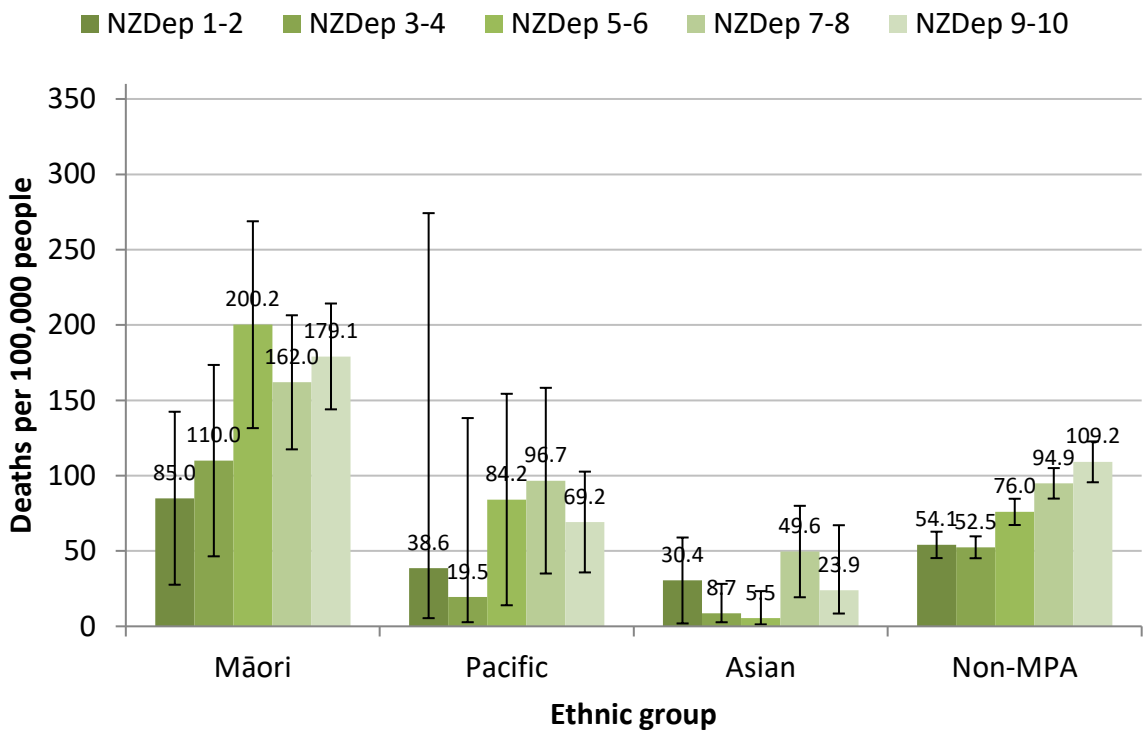
(See Table A 96 for data).

Figure 77. 2019 adult COPD deaths per 100,000 people by NZDep2018 quintile,, age-adjusted.



(See Table A 97 for data)

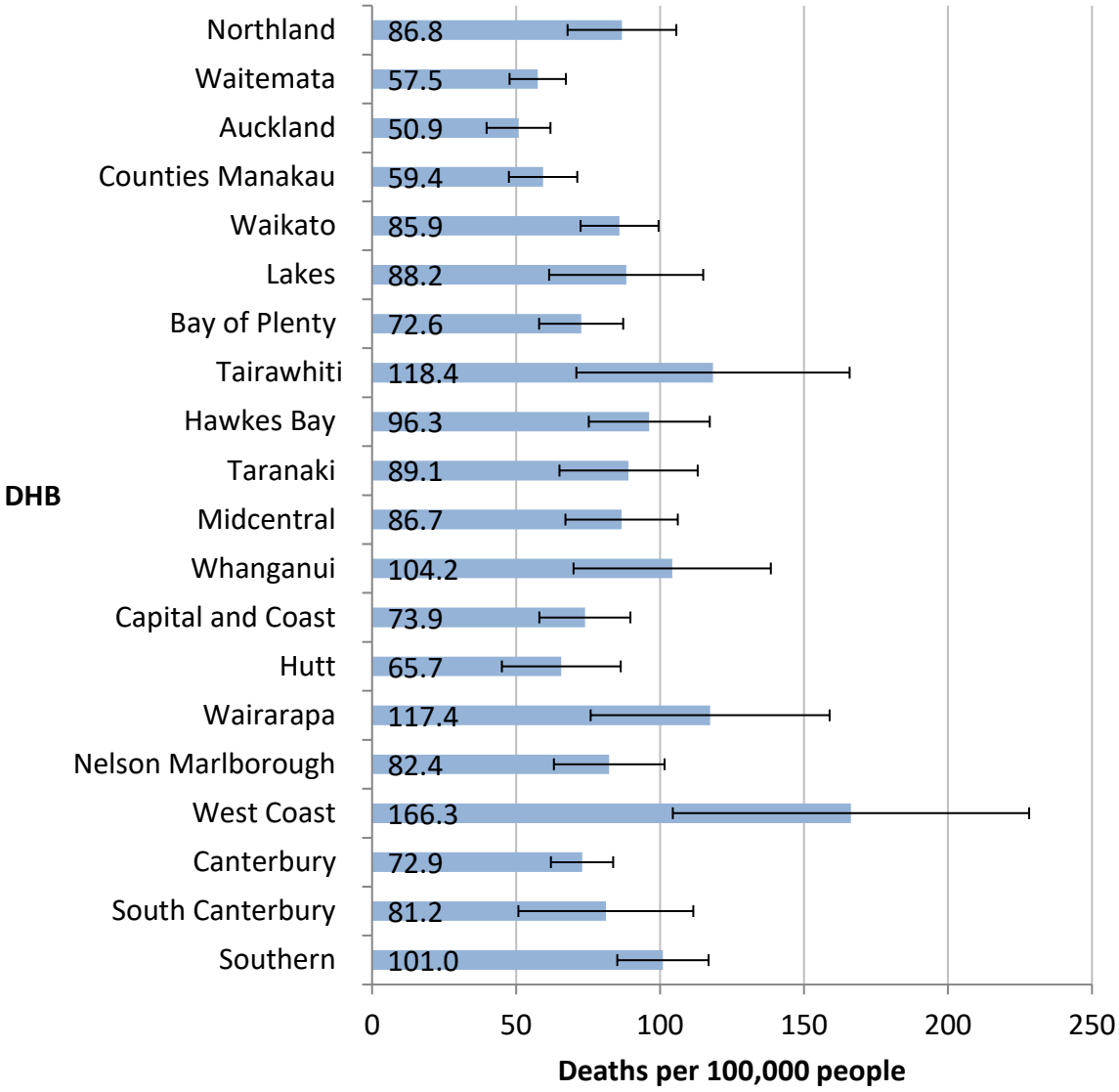
Figure 78. 2019 adult COPD deaths per 100,000 people by ethnic group and NZDep2018, age-adjusted.



(See Table A 98 for data)

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

Figure 79. 2019 adult COPD deaths per 100,000 people per year, by DHB, age-adjusted



(see Table A 99 for data)

TOTAL SERIOUS RESPIRATORY DISEASE

New research

Duque et al 2023[49] reported 0.6% of pregnant people between 2003 and 2018 were hospitalised with acute respiratory infections. We also note Walker et al's 2022 finding that, during the winters of 2013 and 2014, children experienced acute respiratory infections at a rate of 1.04 per month.[50]

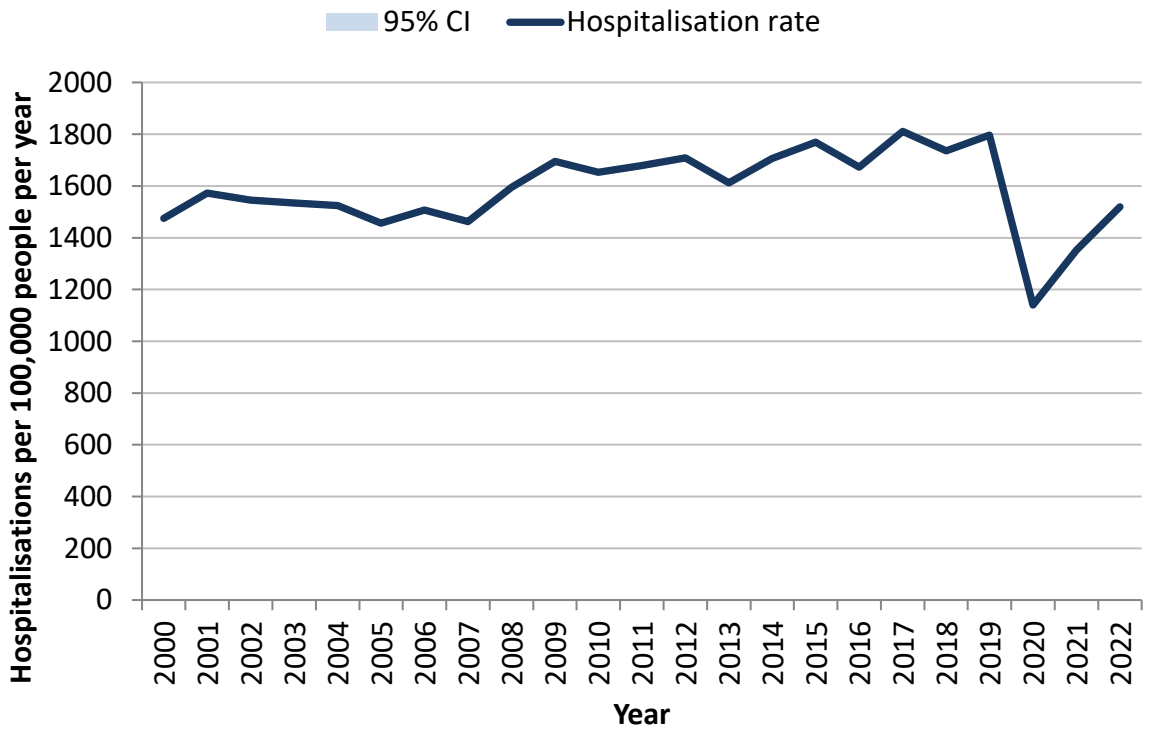
Trends over time 2000 - 2022

The 2022 rate of respiratory hospitalisations was 1541.0 per 100,000 people. Total respiratory hospitalisations increased at a rate of 17.2 hospitalisations per year over the period 2000 to 2019, then dropped substantially in 2020. While 2021 and 2022 rates were higher than in 2020, they have not returned to levels seen through the previous decade (Figure 80).

Tobacco smoking prevalence as tracked by the Tobacco Control Data Repository* and the NZ Health Survey has declined over the study period, from 25% in 2000, to 8.3% in 2022/23.[51] Vaping prevalence now exceeds smoking prevalence (Figure 81).

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 82). The ratio of Pacific respiratory hospitalisations to non-MPA was particularly low in 2020 and 2021, but has since returned to within the previous decade's range. Socio-economic disparities peaked in 2015 and have since declined somewhat (Figure 83).

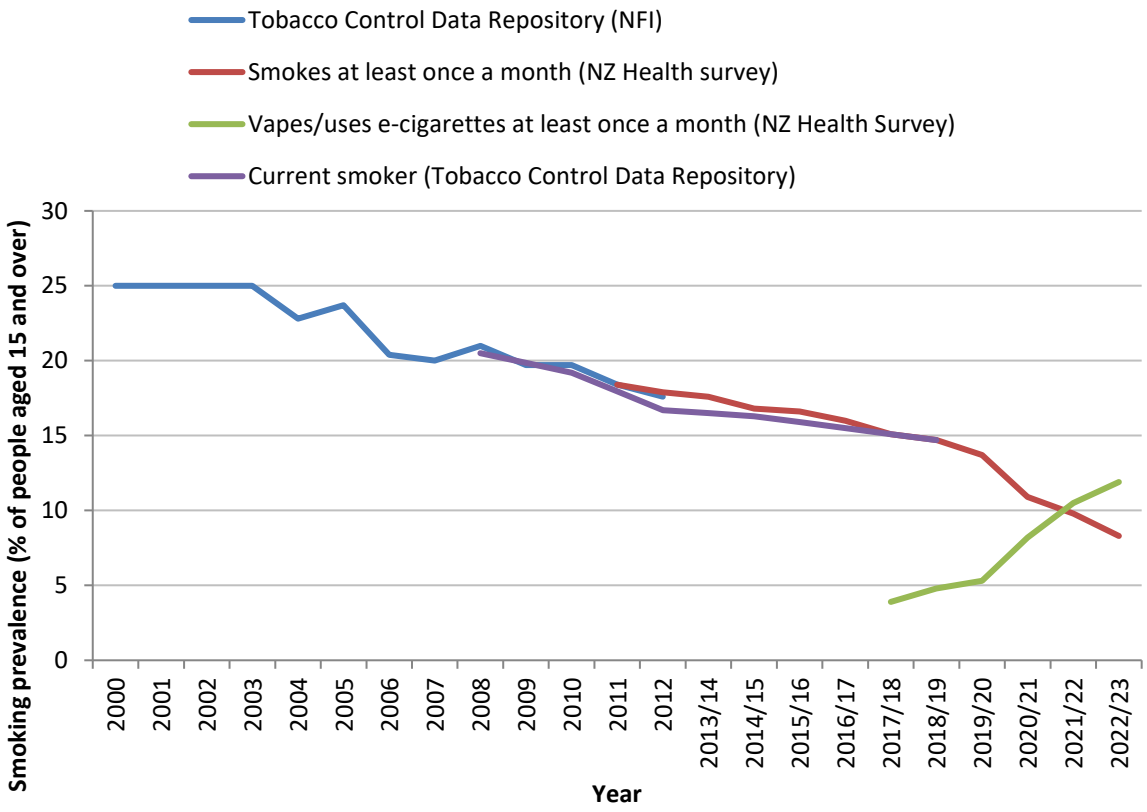
Figure 80. Total respiratory hospitalisations per 100,000 people per year, 2000-2022, age-adjusted.



(See Table A 100 for data)

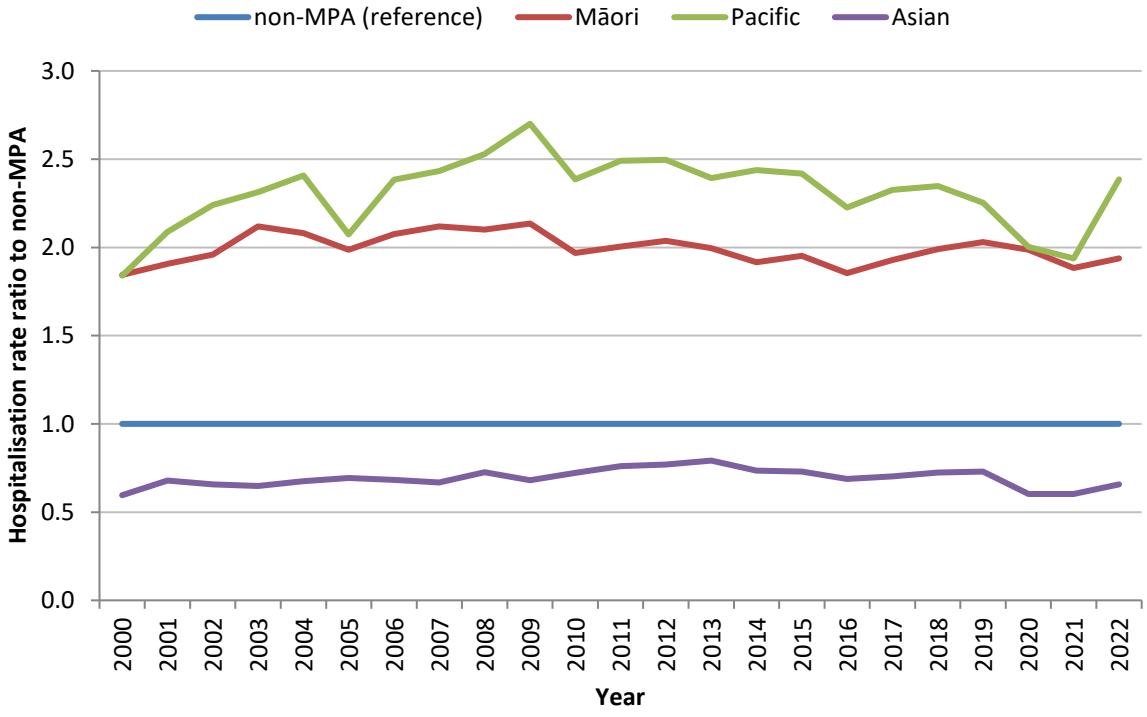
* http://www.tcdata.org.nz/TobaccoSectorOverview.aspx,

Figure 81. New Zealand smoking prevalence 2000-2022/23.



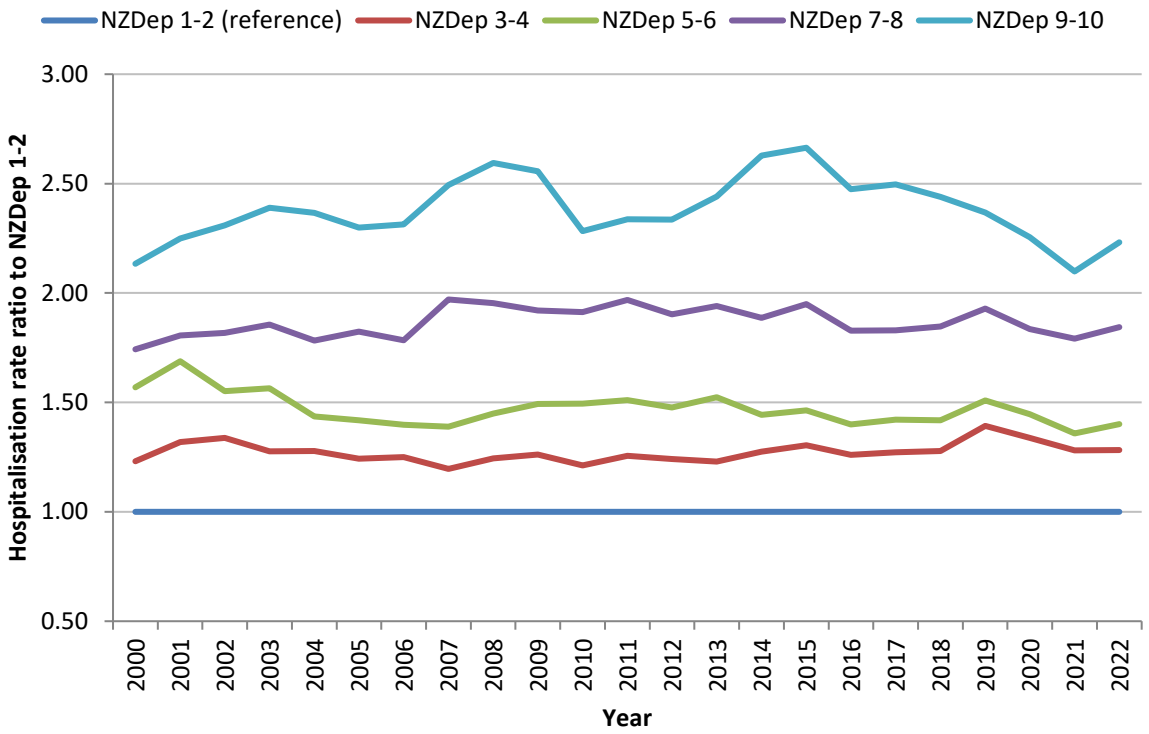
Data sourced from NZ Health Survey data 2011/12 – 2022/23 and Tobacco Control Data Repository, http://www.tcdata.org.nz/TobaccoSectorOverview.aspx, accessed 11 August 2016.

Figure 82. Respiratory hospitalisation rate ratio to non-MPA by ethnic group, 2000 – 2022, age-adjusted.



See Table A 104 and Table A 105 for data.

Figure 83. Total respiratory hospitalisation rate ratio to NZDep 1-2 by NZDep2018 quintile, 2000-2022, age-adjusted.



(See Table A 108 for data)

Risks and determinants 2022

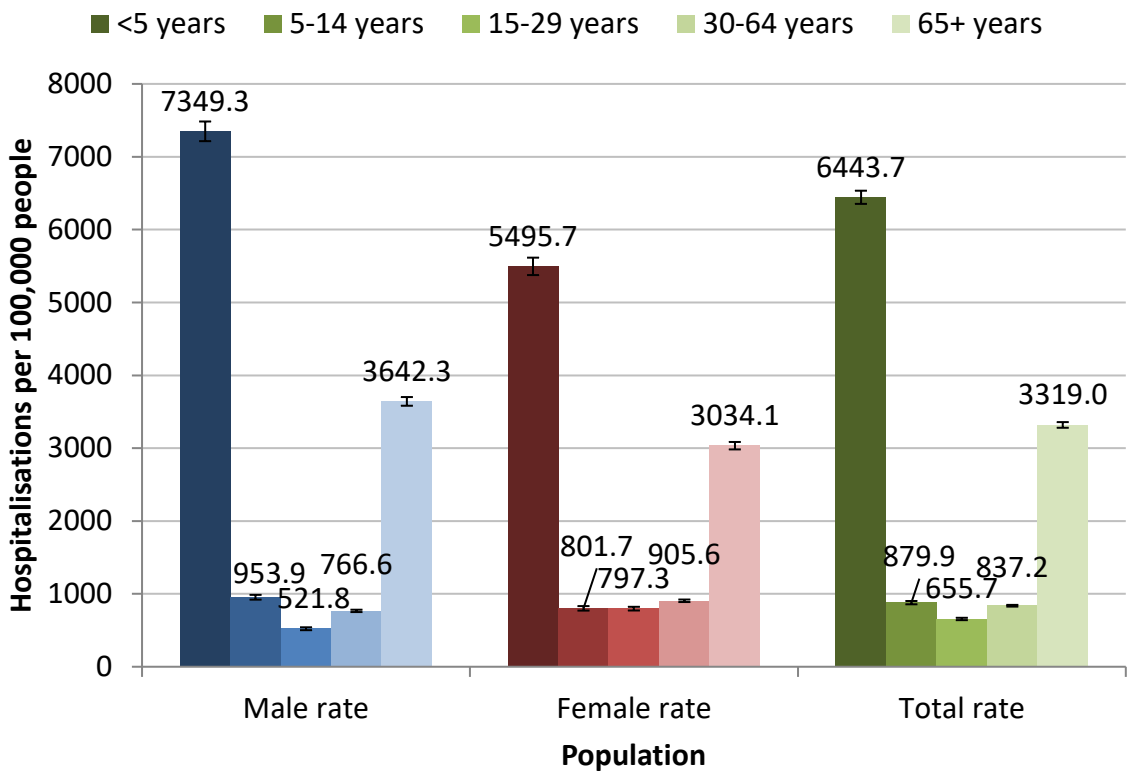
Respiratory hospitalisation rates were highest for the young (children aged under 15 years) and the elderly (adults aged over 65 years). Rates were higher for males than females in the young and the elderly, but higher for females than males in both age groups for adults aged 15 to 64 (Figure 84).

Respiratory hospitalisation rates were highest for Pacific peoples, with rates 2.39 times higher than for non-MPA. Māori rates were also significantly higher (rate ratio 1.94), and lower (rate ratio 0.66) for Asian peoples. These trends were repeated across all age groups (Figure 86), and were a little less than in the previous report.

There was a significant deprivation gradient in total respiratory hospitalisations, with rates in the most deprived NZDep quintile 2.23 times higher than rates in the least deprived quintile (Figure 87). The deprivation gradient was present for all ethnic groups. Further, 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).

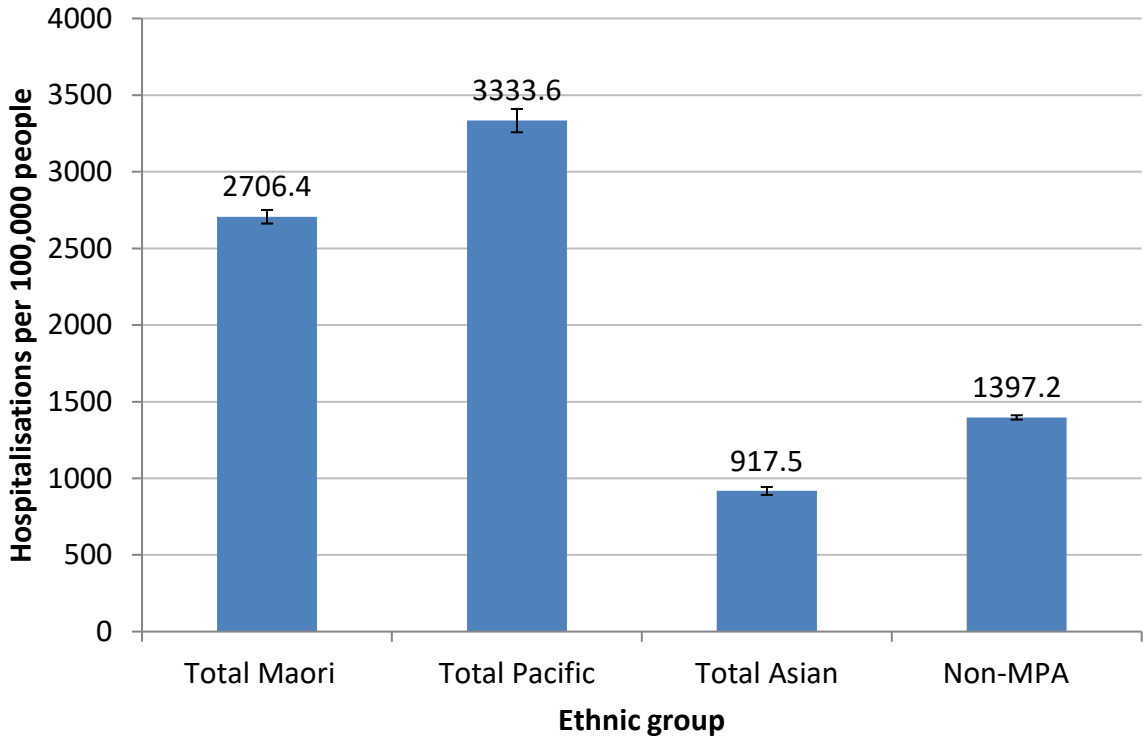
Total respiratory hospitalisation rates were highest in Lakes, Whanganui and Tairawhiti DHBs, and lowest in Nelson Marlborough (Figure 89).

Figure 84. Total respiratory hospitalisations per 100,000 people by age group and sex, 2022.



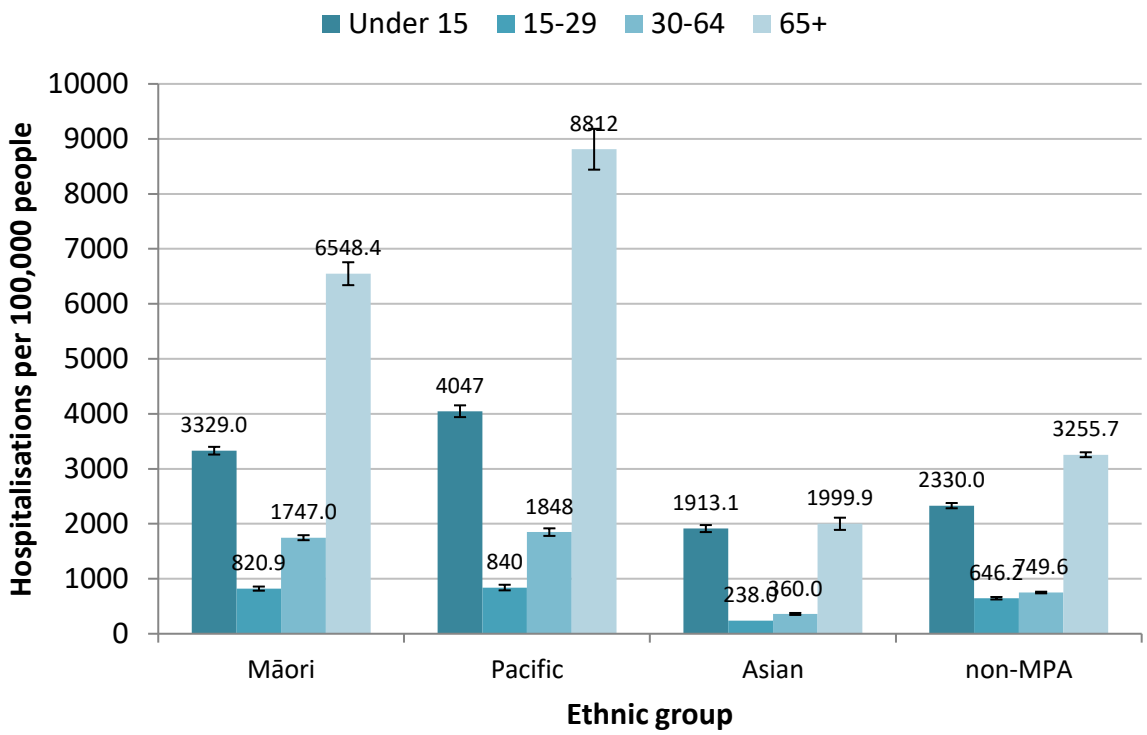
(See Table A 101 and Table A 102 for data)

Figure 85. Total respiratory hospitalisations per 100,000 people by ethnic group, 2022 age-adjusted.



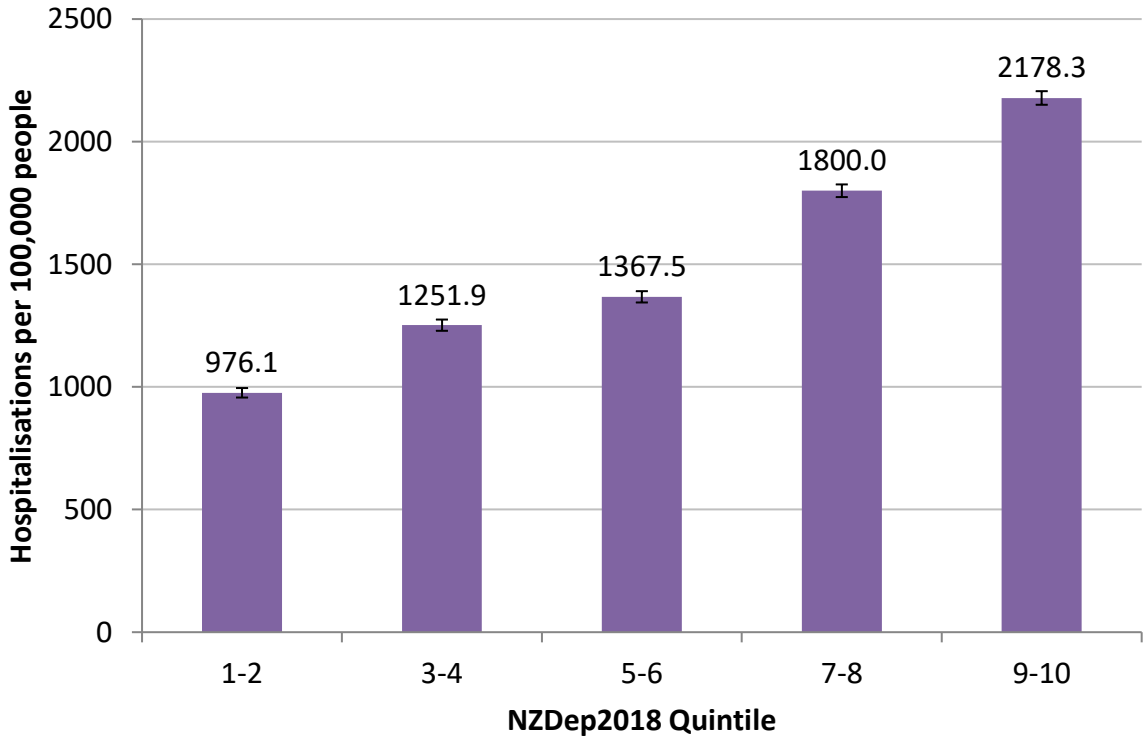
(See Table A 103 for data)

Figure 86. Total respiratory hospitalisations per 100,000 people by ethnic group and age group, 2022.



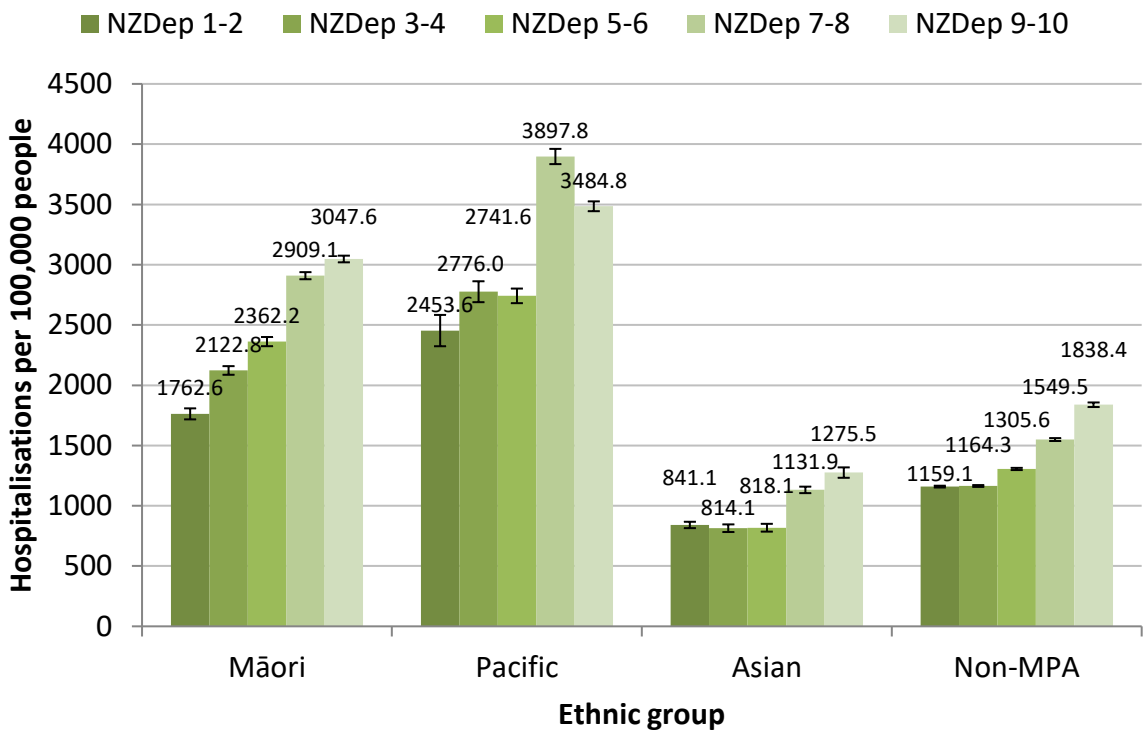
(See Table A 106 for data)

Figure 87. Total respiratory hospitalisations per 100,000 people by NZDep2018 quintile, 2022, age-adjusted.



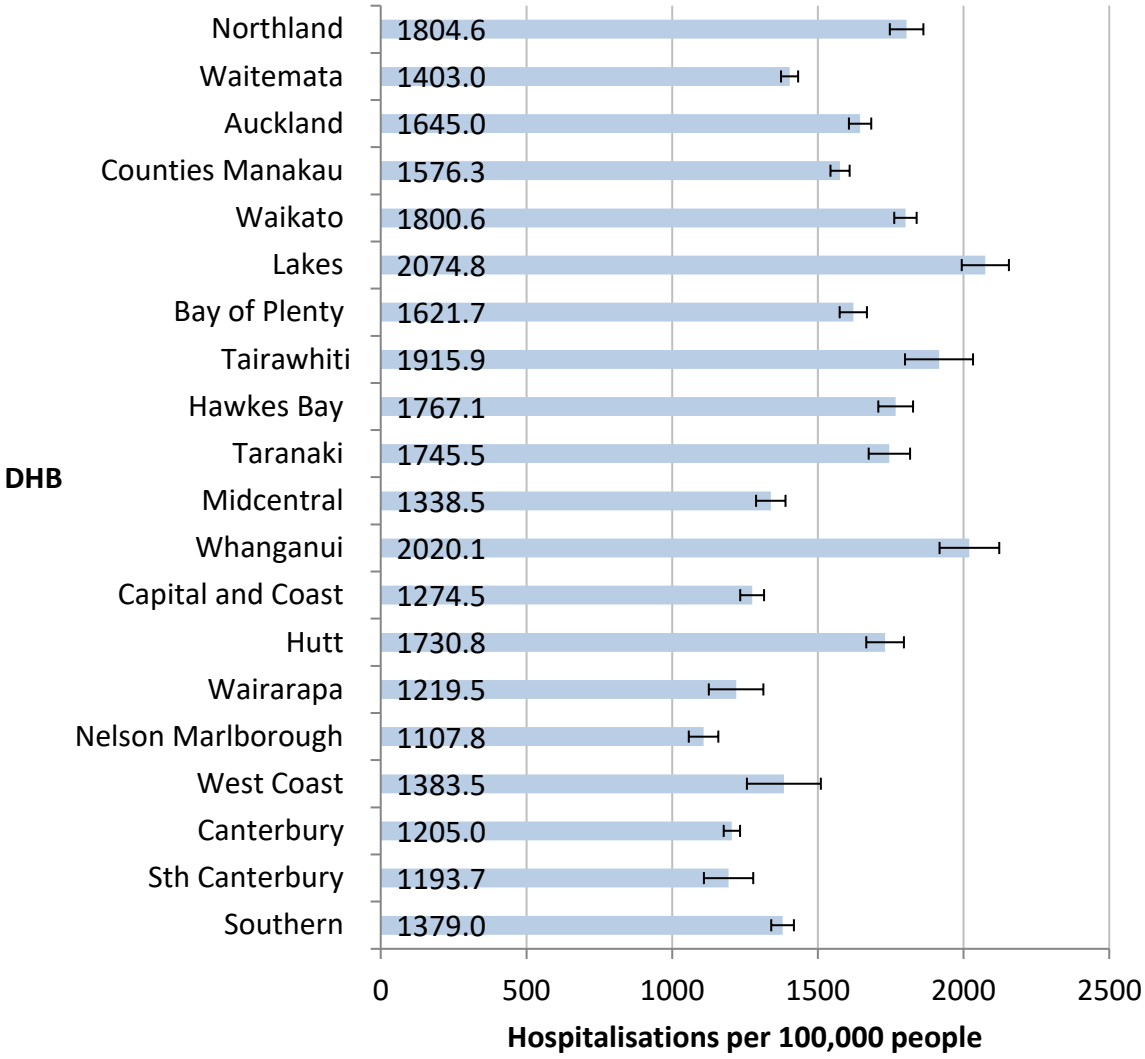
(See Table A 107 for data)

Figure 88. Total respiratory hospitalisations per 100,000 people by ethnic group and NZDep2018, age-adjusted, 2022



(See Table A 111 for data)

Figure 89. Total respiratory hospitalisations per 100,000 people by DHB, 2022.



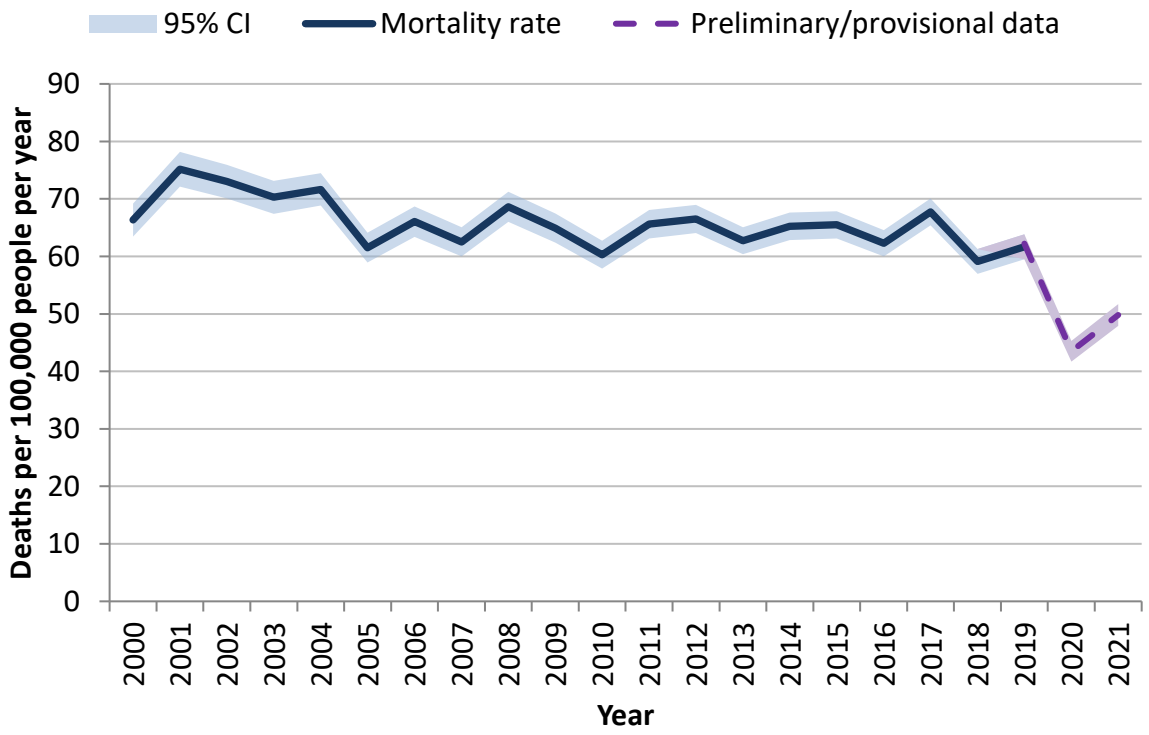
(see Table A 112 for data)

TOTAL RESPIRATORY MORTALITY

Trends 2000 - 2021

Respiratory disease was the cause of 3118 deaths in 2019. Provisional (2020) and preliminary (2021) data indicate there were 2252 deaths in 2020 and 2657 in 2021. In 2019 there were 61.7 deaths per 100,000 people, significantly less than the 66.3 deaths in 2000. While the decline in respiratory mortality rates plateaued somewhat after 2004, there was an overall decline between 2005 and 2019 (Figure 90).

Figure 90. Total respiratory mortality rates 2000-2021, age-adjusted.



(See Table A 113 for data)

Risks and determinants 2019

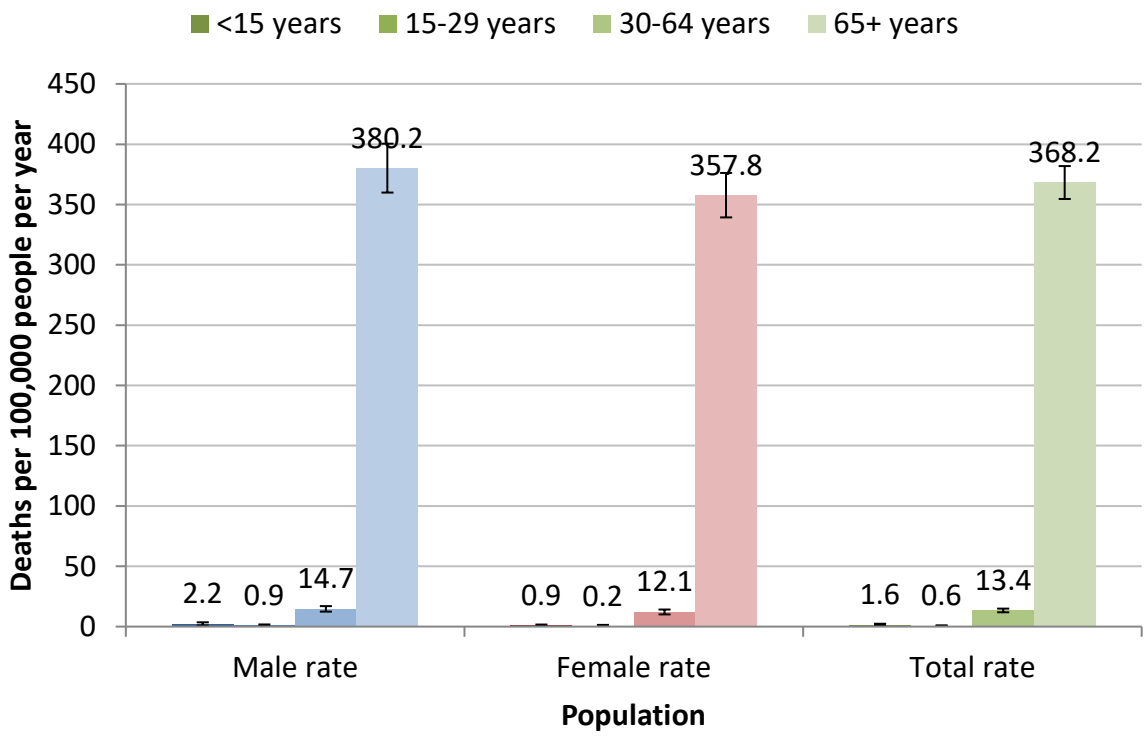
For the year 2019, mortality rates due to any respiratory disease were 25.8 times higher in people aged 65+ than in adults aged 30-64. Male mortality rates were significantly higher than female rates in all age brackets (Figure 91).

Respiratory mortality rates were highest in Māori, with a rate ratio to non-MPA of 1.61; and also higher for Pacific peoples (rate ratio 1.13). These differences are smaller than in the previous report. The rate for Asian peoples was less than half that of non-MPA (rate ratio 0.43) (Figure 92).

Respiratory mortality rates also increased with increasing socio-economic deprivation. Rates for the most deprived quintile were had a rate ratio of 1.88 to rates for the least deprived quintile (Figure 94). The deprivation gradient was also statistically significant for Māori and non-MPA ethnic groups, but not for Pacific or Asian peoples (Figure 95).

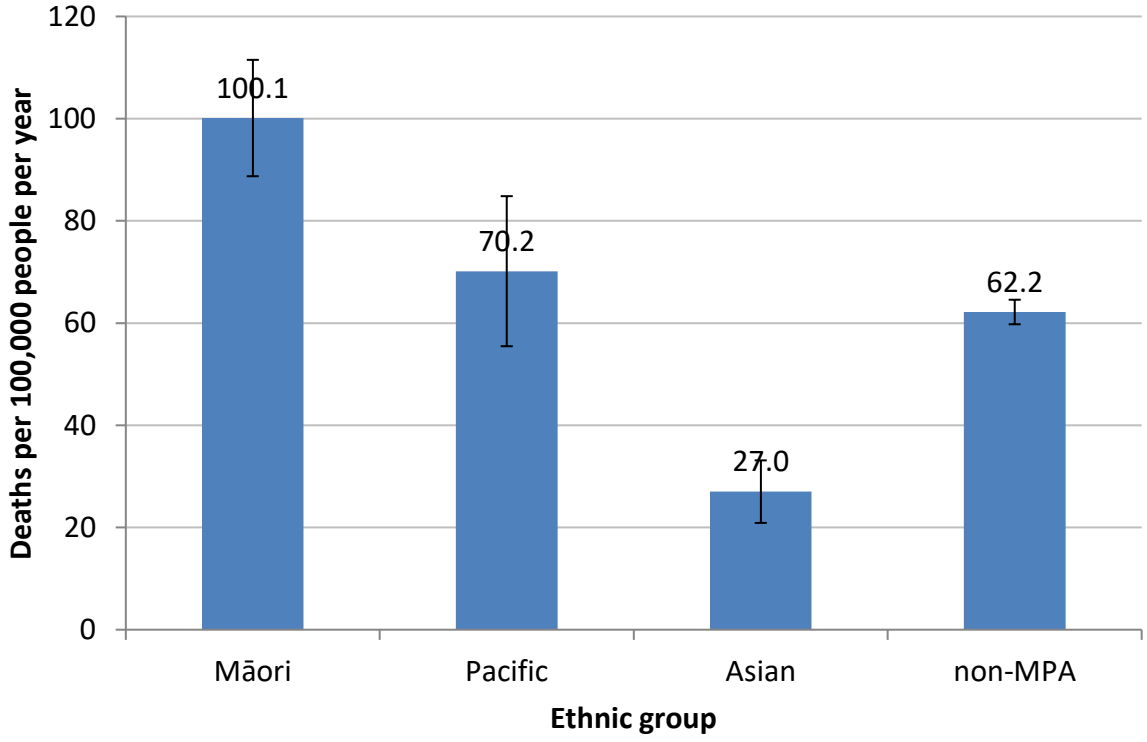
Total respiratory mortality rates were highest, and significantly higher than the national average, in West Coast DHB. Rates were significantly lower than the national average in Auckland and Waitemata DHBs (Figure 96).

Figure 91. Total respiratory deaths per 100,000 people by age group and sex, 2019.



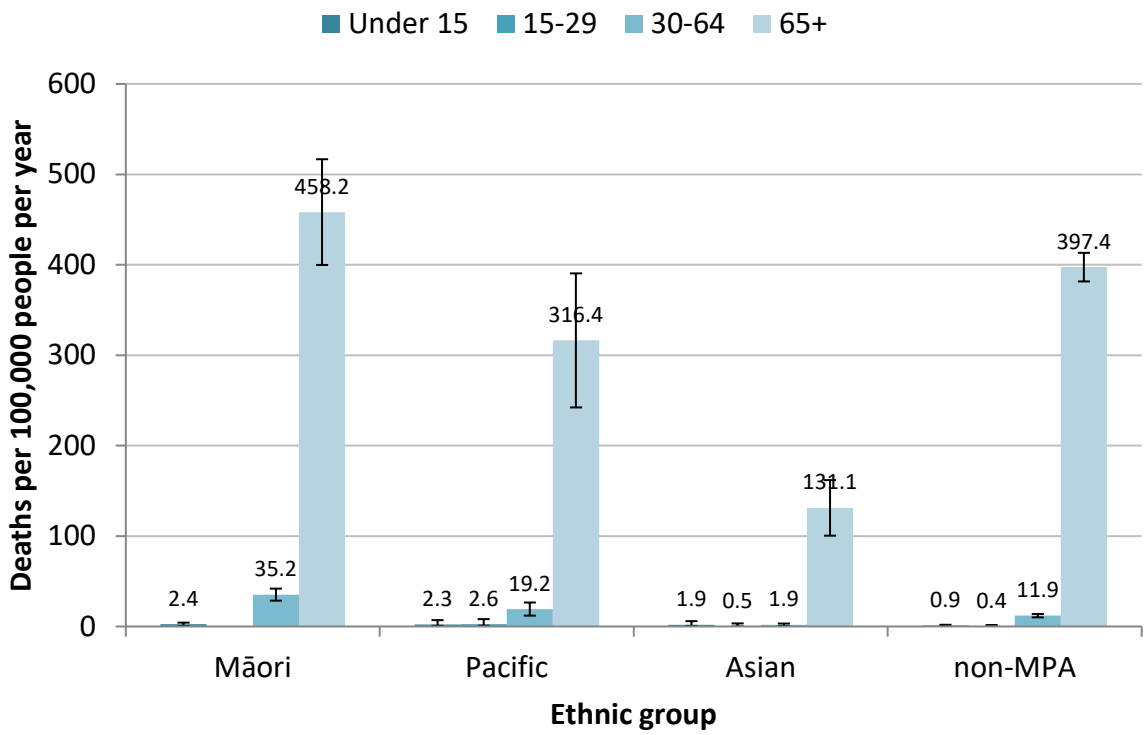
(See Table A 114 and Table A 115 for data)

Figure 92. Total respiratory mortality per 100,000 people per year by ethnic group, 2019.



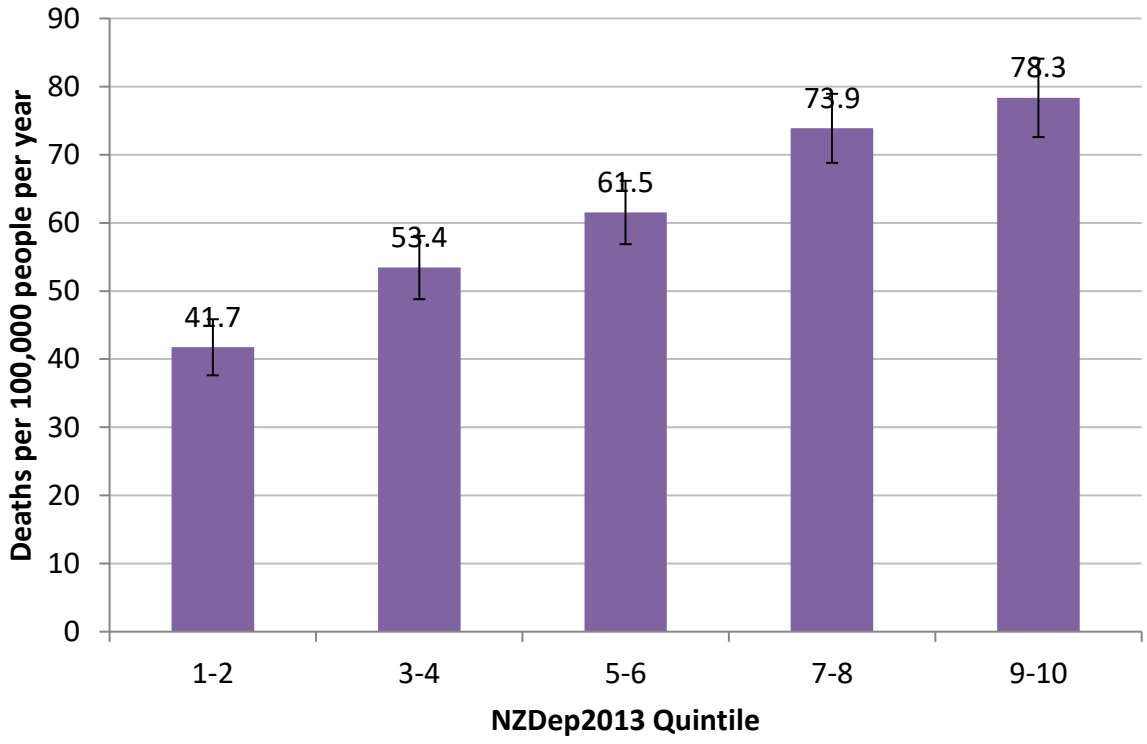
(See Table A 116 for data)

Figure 93. Total respiratory deaths per 100,000 people per year, by ethnic group and age group, 2019.



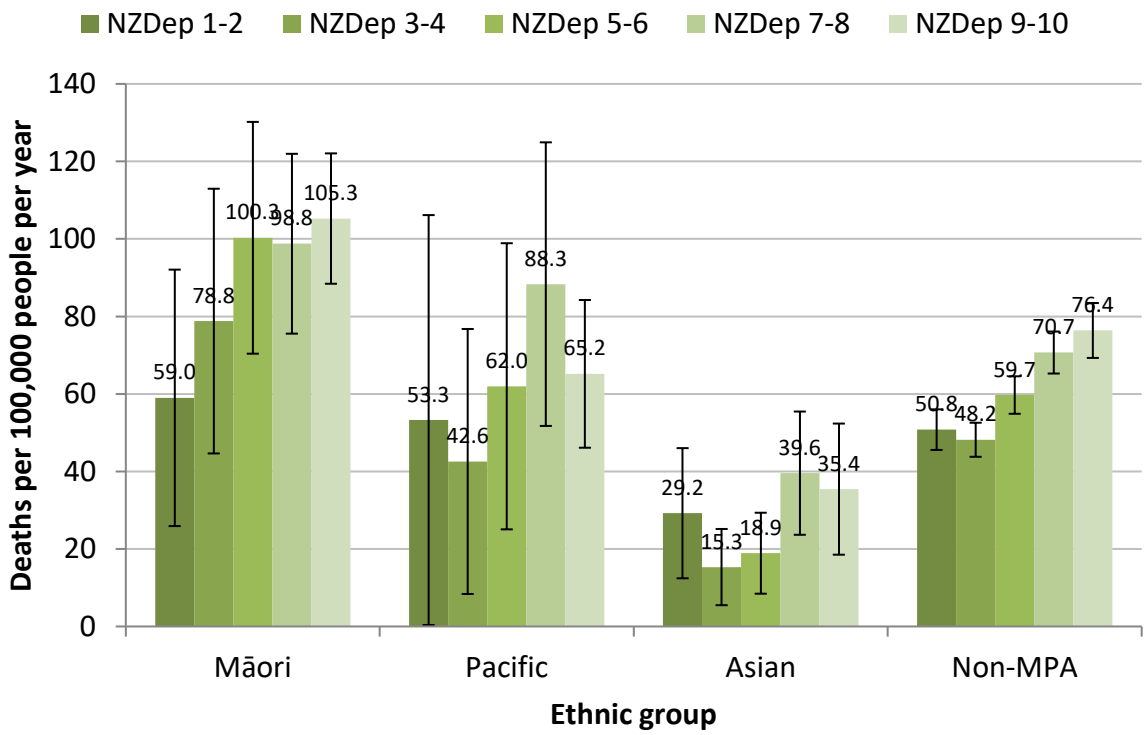
(See Table A 117 for data)

Figure 94. Total respiratory deaths per 100,000 people by NZDep2018 quintile, age-adjusted, 2019.



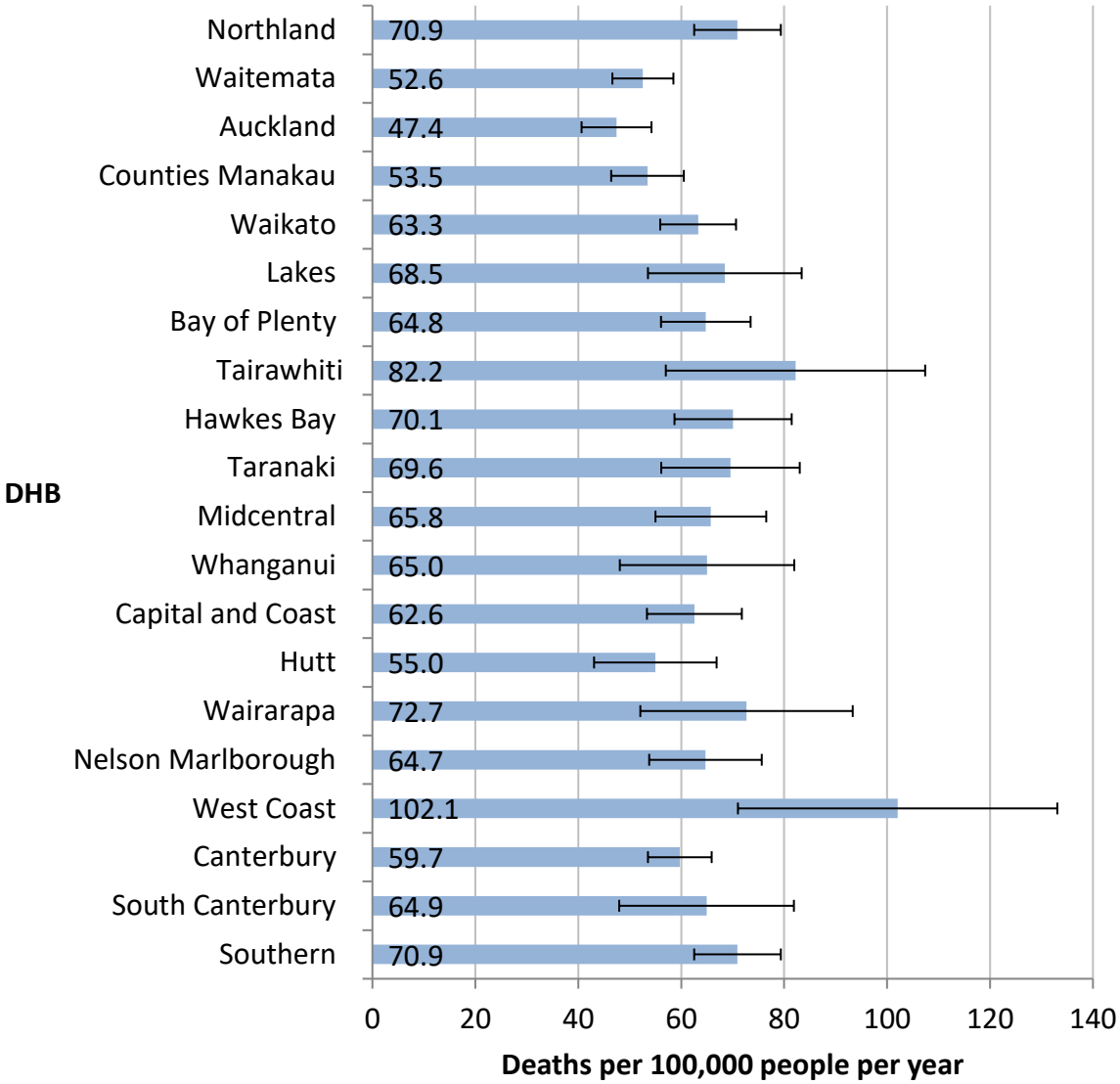
(See Table A 118 for data)

Figure 95. 2019 total respiratory deaths per 100,000 people by ethnic group and NZDep2018, age-adjusted.



(See Table A 119 for data)

Figure 96. 2019 total respiratory deaths per 100,000 people per year, by DHB, age-adjusted



(see Table A 120 for data)

COST SUMMARY

The total cost of respiratory (ICD-10 Chapter 10) deaths in 2019 was $6,275,662,234, from 34,934 life years lost. The total cost of asthma (J45 and J46) deaths in 2019 was $277,495,147, from 2,133 life years lost. Life years lost per year are provided in Table A 121, as the value of a life year changes from year to year.

The total cost of respiratory (ICD-10 Chapter 10) hospitalisations in 2019 was $406,057,591.

The total cost of asthma (J45 and J46) hospitalisations in 2019 was $18,315,349.

The total cost to NZ (whether paid by patients or the State) of respiratory prescriptions in 2019 was estimated at $81,629,512.

Combining public and private costs of primary care visits for any respiratory condition, we estimate a minimum total cost of $87,919,200.

The cost of primary care visits for asthma, for adults aged 15+ was estimated at $33,417,280 and the cost of prescriptions was estimated at $34,497,820. For children these estimates were $5,355,120 and $1,500,796 respectively.

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

Therefore, across all costs, for 2019 we estimate the minimum total cost of asthma and respiratory disease to the NZ economy to be:

	Childhood (0 - 14) asthma	Adult (15+ asthma)	Total asthma
Work days lost	$40,800,397	$ 7,106,516	$ 47,906,913
Primary care visits:	$ 5,355,120	$ 33,417,280	$ 38,772,400
Prescriptions:	$ 1,500,796	$ 34,497,820	$ 35,998,616
ED and OP visits:			$ 182,951,847
Hospitalisations:	$ 6,358,076	$ 11,957,272	$ 18,315,349
YLDs:			$ 593,458,956
Mortality:	$41,803,017	$235,692,129	$ 277,495,147
TOTAL:	$95,817,406	$322,671,017	$1,194,899,227

	All respiratory
Primary care visits:	$ 87,919,200
Prescriptions:	$ 81,629,512
Hospitalisations:	$ 406,057,591
YLDs:	$1,535,878,174
Mortality:	$6,275,662,234
Total	$8,387,146,710

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 primary care visits has reduced somewhat, due to fine-tuning included prescriptions. Hospitalisation costs and costs from years lost to disability have changed little. Mortality costs have increased substantially, due to changes in the value of a statistical life year

The cost of mortality attributed to total respiratory disease has increased substantially, due to using the median life years remaining rather than a lower estimate.

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 NZ) 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 46% (excluding 2020's extraordinary 12%).

For children aged 14 years and younger, winter excesses were higher, ranging from 74% to 105%, and averaging 91%, excluding the extraordinary low of 9% in 2020, and high of 157% in 2021.

Table 7. Ratio of asthma hospitalisations June to September, to hospitalisations February to May and October to January combined, 2000 to 2022

Year	Asthma		Total respiratory	
	0 – 14 years	15+ years	0 – 14 years	15+ years
2000	1.26	1.38	1.74	1.25
2001	0.94	1.42	1.90	1.51
2002	1.14	1.36	1.93	1.41
2003	1.13	1.72	2.05	1.64
2004	1.00	1.74	1.78	1.58
2005	1.34	1.50	1.86	1.37
2006	1.01	1.60	1.89	1.51
2007	1.19	1.44	1.87	1.39
2008	1.04	1.49	1.95	1.53
2009	1.01	1.40	1.87	1.42
2010	1.10	1.43	1.89	1.40
2011	1.04	1.45	1.84	1.42
2012	1.15	1.62	1.91	1.53
2013	1.11	1.43	1.75	1.40
2014	1.44	1.63	2.00	1.53
2015	1.13	1.66	1.91	1.59
2016	1.20	1.37	1.77	1.37
2017	1.31	1.52	1.96	1.61
2018	0.96	1.36	1.86	1.40
2019	1.33	1.40	2.00	1.46
2020	1.74	1.27	1.09	1.12
2021	1.16	1.25	2.57	1.31
2022	1.10	1.35	1.66	1.40

RECOMMENDATIONS

Our recommendations are little changed 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 recommend research into the current national prevalence of obstructive sleep apnoea, in order to better estimate its impact on national health outcomes.
4. Based on compelling evidence, 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 into what aspects of COVID-19 pandemic control – including measures to reduce viral load in indoor air - have the potential to reduce respiratory illness on an ongoing basis.

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. Telfar Barnard L, Zhang J. The impact of respiratory disease in New Zealand: 2018 update. New Zealand: Asthma and Respiratory Foundation, 2018.
8. Telfar Barnard L, Zhang J. The impact of respiratory disease in New Zealand: 2020 update. Wellington: Asthma and Respiratory Foundation NZ, 2021.
9. 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]
10. 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]
11. 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]
12. Dassanayake S, Sole G, Wilkins G, et al. The prevalence of individuals at high risk of true resistant hypertension and obstructive sleep apnoea in a New Zealand cohort. *The New Zealand medical journal* 2021;134(1541):75-85. [published Online First: 20210903]
13. Campbell AJ, Mather SJ, Elder DE. Obstructive sleep apnea risk factors and symptoms in children with a known parental obstructive sleep apnea diagnosis. *Sleep Med* 2021;78:149-52. doi: 10.1016/j.sleep.2020.12.030 [published Online First: 20201230]
14. Neill A, Ingham TR, Perry M, et al. Noninvasive ventilation in New Zealand: a national prevalence survey. *Internal medicine journal* 2023;53(8):1458-68. doi: 10.1111/imj.15960 [published Online First: 20221103]

15. Ministry of Health. Health of older people in New Zealand: a statistical reference. Wellington: Ministry of Health, 2002:116.
16. Harris R, Tobias M, Jeffreys M, et al. Effects of self-reported racial discrimination and deprivation on Māori health and inequalities in New Zealand: cross-sectional study. *The Lancet* 2006;367(9527):2005-09.
17. Atkinson J, Salmond C, Crampton P. NZDep2018 Index of Deprivation, Final Research Report, December 2020. Wellington: University of Otago, 2020.
18. University of Otago. Socioeconomic Deprivation Indexes: NZDep and NZiDep, Department of Public Health 2020 [Available from: https://www.otago.ac.nz/wellington/departments/publichealth/research/hirp/otago020194.html accessed 15 August 2022.
19. Wilson N. The Cost Burden of Asthma in New Zealand: Asthma and Respiratory Foundation of New Zealand, 2000.
20. 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.
21. National and subnational period life tables: 2017-2019: Statistics New Zealand, 2021.
22. 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.
23. Surgical mesh registry: cost benefit analysis. Ministry of Health: Deloitte Access Economics, 2018.
24. Annual report of Pharmaceutical Management Agency (Pharmac) Te Pātaka Whaioranga for the year ended 30 June 2019. New Zealand: Pharmaceutical Management Agency (Pharmac), 2019.
25. 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.
26. Taking the pulse: The 1996/97 New Zealand Health Survey. Wellington, New Zealand: Ministry of Health, 1999.
27. Cost Resource Manual Version 3: Pharmac, 2018.
28. 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.
29. A picture of health. Wellington, NZ: Statistics New Zealand and Ministry of Health, 1993.
30. Chan AHY, Tomlin A, Beyene K, et al. Asthma exacerbations in New Zealand 2010-2019: A national population-based study. *Respir Med* 2023;217:107365. doi: 10.1016/j.rmed.2023.107365 [published Online First: 20230721]
31. Asher MI, Rutter CE, Bissell K, et al. Worldwide trends in the burden of asthma symptoms in school-aged children: Global Asthma Network Phase I cross-sectional study. *Lancet* 2021;398(10311):1569-80. doi: 10.1016/s0140-6736(21)01450-1 [published Online First: 20211028]

32. Mortimer K, Lesosky M, García-Marcos L, et al. The burden of asthma, hay fever and eczema in adults in 17 countries: GAN Phase I study. *Eur Respir J* 2022;60(3) doi: 10.1183/13993003.02865-2021 [published Online First: 20220915]
33. Montayre J, Ho MH. Factors Associated With ED Use Among New Asian Immigrants in New Zealand: A Cross-Sectional Analysis of Secondary Data. *J Emerg Nurs* 2021;47(1):157-66.e4. doi: 10.1016/j.jen.2020.07.011 [published Online First: 20200919]
34. Fix J, Annesi-Maesano I, Baldi I, et al. Gender differences in respiratory health outcomes among farming cohorts around the globe: findings from the AGRICOH consortium. *J Agromedicine* 2021;26(2):97-108. doi: 10.1080/1059924x.2020.1713274 [published Online First: 20200317]
35. Diagnosing and managing asthma in children. *Best Practice Journal* 2012;42
36. 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]
37. 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.
38. Everitt J, Mulholland A, Kim V, et al. Bronchiectasis in children following kidney transplantation in New Zealand. *Journal of paediatrics and child health* 2023;59(1):47-52. doi: 10.1111/jpc.16233 [published Online First: 20221012]
39. 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.
40. Paynter J, Howe AS, Best E, et al. A retrospective cohort study investigating the comparative effectiveness of pneumococcal vaccines against hospitalisation with otitis media and pneumonia in New Zealand. *Vaccine* 2023;41(28):4121-28. doi: 10.1016/j.vaccine.2023.05.040 [published Online First: 20230525]
41. Shirtcliffe P, Weatherall M, Beasley R. From the authors. *European Respiratory Journal* 2008;31(1):218-19.
42. 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.
43. Milne RJ, Beasley R. Hospital admissions for chronic obstructive pulmonary disease in New Zealand. *New Zealand medical journal* 2015(Jan 30):23-35.
44. 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]
45. 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
46. Shantakumar S, Ho YF, Beale J, et al. Burden of illness in blood eosinophilic phenotype COPD patients in New Zealand. *Respir Investig* 2021;59(4):487-97. doi: 10.1016/j.resinv.2021.03.009 [published Online First: 20210514]

47. Adeloye D, Song P, Zhu Y, et al. Global, regional, and national prevalence of, and risk factors for, chronic obstructive pulmonary disease (COPD) in 2019: a systematic review and modelling analysis. *The Lancet Respiratory medicine* 2022;10(5):447-58. doi: 10.1016/s2213-2600(21)00511-7 [published Online First: 20220310]
48. Underwood L, Teng A, Bowden N, et al. Long-term health conditions among household families in Aotearoa New Zealand: cross-sectional analysis of integrated Census and administrative data. *The New Zealand medical journal* 2024;137(1596):20-34. doi: 10.26635/6965.6370 [published Online First: 20240607]
49. Duque J, Howe AS, Azziz-Baumgartner E, et al. Multi-decade national cohort identifies adverse pregnancy and birth outcomes associated with acute respiratory illness hospitalisations during the influenza season. *Influenza and other respiratory viruses* 2023;17(1):e13063. doi: 10.1111/irv.13063 [published Online First: 20221028]
50. Walker GJ, Stelzer-Braid S, Shorter C, et al. Viruses associated with acute respiratory infection in a community-based cohort of healthy New Zealand children. *J Med Virol* 2022;94(2):454-60. doi: 10.1002/jmv.25493 [published Online First: 20190507]
51. Annual Data Explorer. New Zealand Health Survey. December 2023 ed. New Zealand: Ministry of Health, 2023.
52. 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]
53. 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]
54. 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.
55. 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.
56. 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.
57. 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.
58. 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.
59. 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.

60. 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.
61. 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.
62. 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.
63. Fyfe C, Barnard LT, Douwes J, et al. Retrofitting home insulation reduces incidence and severity of chronic respiratory disease. *Indoor Air* 2022;32(8):e13101. doi: 10.1111/ina.13101
64. 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]
65. 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]
66. 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.
67. 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]
68. 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]
69. 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]
70. 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]

APPENDIX 1. DATA TABLES

All rates other than rates by age-group are age-adjusted. Rate ratios in bold are statistically significant (p<0.05)

ASTHMA

ASTHMA PREVALENCE

Table A 1. Age-standardised medicated asthma rates by age-group and sex, 2022/23

Population group	Total %	95% CI	Male %	95% CI	Female %	95% CI	M vs F RR	95% CI
Total children 2 - 14 years	12.4	(10.5 - 14.5)	14.2	(11.5 - 17.4)	10.5	(8.2 - 13.3)	**1.35**	**(1.00–1.81)**
2–4 years	11.2	(7.4 - 16.1)	11.4	(5.8 - 19.4)	11.1	(5.9 - 18.5)		
5–9 years	12.6	(9.4 - 16.3)	16.5	(11.4 - 22.8)	8.4	(5.3 - 12.6)		
10–14 years	12.9	(9.5 - 16.9)	13.5	(9.2 - 18.8)	12.3	(8.1 - 17.5)		
Total adults	12.3	(11.3 - 13.3)	10.4	(9.1 - 11.8)	14.1	(12.7 - 15.5)	**0.74**	**(0.64–0.87)**
15–24 years	15.5	(11.8 - 19.8)	13.9	(9.5 - 19.2)	17.6	(12.0 - 24.4)		
25–34 years	11.8	(9.6 - 14.3)	9.2	(5.8 - 13.7)	14.3	(11.3 - 17.6)		
35–44 years	11.8	(9.6 - 14.3)	8.5	(5.7 - 12.1)	14.9	(11.4 - 19.1)		
45–54 years	11.7	(9.1 - 14.7)	11.4	(7.3 - 16.8)	11.7	(9.0 - 15.0)		
55–64 years	13.1	(10.5 - 16.0)	10.8	(7.5 - 14.9)	15.2	(11.7 - 19.4)		
65–74 years	10.0	(8.1 - 12.1)	6.4	(4.1 - 9.5)	13.3	(10.3 - 16.9)		
75+ years	11.2	(9.0 - 13.7)	13.0	(8.9 - 17.9)	9.7	(7.2 - 12.7)		

Table A 2. Medicated asthma prevalence by ethnic group 2022/23, children and adults

Population group	Children %	95% CI	RR* to rest of population	Adults %	95% CI	RR* to rest of population
Total	12.4	(10.5 - 14.5)		12.3	(11.3 - 13.3)	
Māori	18.7	(15.1 - 22.9)	1.85 (1.38–2.49)	18.7	(15.8 - 21.8)	**1.63 (1.31–2.02)**
Pacific	16.0	(10.3 - 23.3)	1.36 (0.87–2.13)	10.9	(7.6 - 15.0)	0.81 (0.58–1.13)
Asian	6.7	(3.7 - 11.2)	0.48 (0.28–0.83)	6.5	(4.5 - 9.1)	**0.47 (0.33–0.68)**
European/Other	12.3	(9.9 - 14.9)	Not provided	13.2	(12.0 - 14.4)	Not provided

Table A 3. Child medicated asthma prevalence 2022/23 by NZDep2018, unadjusted

NZDep quintile	Total %	95% CI	Boys %	95% CI	Girls %	95% CI
1-2	8.3	(4.4 - 13.9)	10.4	(5.1 - 18.5)	6.1 e	(1.7 - 14.8)
3-4	12.0	(7.5 - 18.0)	15.8	(9.4 - 24.3)	6.9 e	(2.1 - 16.0)
5-6	14.5	(10.1 - 19.8)	15.2	(9.0 - 23.4)	13.7	(7.8 - 21.7)
7-8	12.9	(9.1 - 17.7)	14.2	(8.3 - 22.0)	11.8	(6.8 - 18.6)
9-10	14.2	(10.9 - 18.1)	15.5	(10.6 - 21.5)	13.1	(8.8 - 18.5)
Rate ratio 9-10 vs 1-2	1.36	(0.79–2.36)	0.97	(0.47–1.99)	2.08	(0.72–6.06)

Table A 4. Adult medicated asthma prevalence 2022/23 by NZDep2018, unadjusted

NZDep quintile	Total %	95% CI	Men %	95% CI	Women %	95% CI
1-2	11.4	(8.8 - 14.4)	10.1	(6.7 - 14.4)	12.8	(8.9 - 17.6)
3-4	11.3	(9.1 - 13.9)	9.6	(6.9 - 12.9)	13.0	(9.9 - 16.6)
5-6	12.4	(10.0 - 15.0)	10.8	(7.4 - 15.1)	13.7	(11.1 - 16.6)
7-8	12.5	(10.5 - 14.6)	10.3	(7.5 - 13.6)	14.6	(11.3 - 18.4)
9-10	13.9	(11.9 - 16.1)	11.3	(8.5 - 14.5)	16.2	(13.2 - 19.6)
Rate ratio 9-10 vs 1-2	1.20	(0.84–1.72)	1.16	(0.66–2.05)	1.25	(0.79–1.97)

ASTHMA HOSPITALISATIONS

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

Table A 5. Asthma hospitalisations, rates and age-adjusted rates 2000-2022

Year	n	Rate		
		raw	age adj'd	95% CI
2000	7569	196.2	183.9	(179.7-188.1)
2001	8150	210.0	196.9	(192.6-201.2)
2002	7790	197.3	187.8	(183.6-192.1)
2003	8246	204.8	195.4	(191.1-199.6)
2004	8370	204.8	194.4	(190.2-198.6)
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	7688	159.7	159.0	(155.5-162.6)
2018	7637	155.8	155.8	(152.3-159.3)
2019	7750	155.6	156.2	(152.7-159.7)
2020	5455	107.2	107.8	(104.9-110.7)
2021	5941	116.2	117.4	(114.5-120.4)
2022	6672	130.4	132.5	(129.3-135.7)
Trend 2000 -2022			**-3.15**	**(-3.16 - -3.13), p<0.001**

Table A 6. 2022 asthma hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			F v M	
	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	RR	95% CI
<15	2759	286.3	(275.6-297)	1652	352.0	(335-368.9)	1107	223.9	(210.7-237.1)	**0.64**	**(0.61-0.66)**
15-29	929	93.7	(87.7-99.7)	291	60.4	(53.4-67.3)	638	125.2	(115.5-134.9)	**2.07**	**(1.94-2.22)**
30-64	2248	96.8	(92.8-100.8)	642	54.4	(50.2-58.6)	1606	140.6	(133.7-147.5)	**2.58**	**(2.47-2.7)**
65+	736	87.6	(81.3-94)	221	49.5	(43-56)	515	130.9	(119.6-142.2)	**2.64**	**(2.45-2.85)**

Table A 7. 2022 asthma hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	**2.96**	**(2.88-3.04)**	**6.47**	**(6.19-6.76)**	**1.59**	**(1.53-1.65)**
15-29	0.97	(0.93-1.00)	**1.11**	**(1.04-1.19)**	**0.89**	**(0.85-0.93)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**0.91**	**(0.87-0.94)**	**0.91**	**(0.84-0.98)**	**0.93**	**(0.89-0.98)**

Table A 8. 2022 asthma hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	1956	230.8	220.8	(210.2-231.4)	**2.48**	**(2.41-2.55)**
Pacific	942	222.4	236.0	(218.3-253.7)	**2.60**	**(2.50-2.70)**
Asian	446	52.9	58.0	(52.2-63.9)	**0.75**	**(0.71-0.78)**
Non-MPA	2347	78.9	79.7	(76.4-83.0)	1.00	Baseline

Table A 9. Asthma hospitalisation rates and rate ratios by ethnic group 2000 - 2022.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
2000	2202	323.2	(305.2-341.1)	984	328.7	(300.7-356.6)	252	102.7	(86.2-119.1)	4254	157.7	(153.0-162.5)
2001	2364	330.0	(313.0-347.0)	1248	386.3	(357.3-415.4)	356	140.7	(122.1-159.2)	4322	161.0	(156.1-165.8)
2002	2444	346.7	(329.2-364.1)	1246	430.3	(397.6-462.9)	336	113.3	(99.0-127.7)	3906	144.6	(140.0-149.1)
2003	2561	374.6	(355.4-393.8)	1474	439.8	(410.4-469.2)	408	137.9	(120.3-155.4)	3993	147.1	(142.5-151.7)
2004	2606	353.5	(336.5-370.4)	1536	437.6	(408.6-466.6)	459	138.0	(122.9-153.1)	3965	145.3	(140.7-149.8)
2005	2733	364.6	(347.1-382.1)	1527	418.6	(390.7-446.4)	529	151.6	(136.4-166.7)	3983	147.2	(142.6-151.8)
2006	2645	343.0	(327.0-358.9)	1516	432.3	(402.2-462.3)	555	148.4	(134.1-162.8)	3757	137.5	(133.1-142.0)
2007	2611	339.9	(324.3-355.5)	1615	456.6	(426.8-486.4)	527	129.0	(116.8-141.1)	3398	124.5	(120.3-128.8)
2008	2680	344.0	(328.4-359.7)	1732	470.1	(441.6-498.7)	632	153.0	(139.2-166.8)	3711	136.4	(132.0-140.9)
2009	3191	398.5	(382.6-414.4)	1864	486.1	(458.4-513.7)	707	161.9	(148.6-175.2)	3983	145.4	(140.8-149.9)
2010	3126	378.1	(362.4-393.8)	1778	470.7	(442.9-498.6)	757	168.3	(154.4-182.2)	4038	147.9	(143.3-152.5)
2011	2855	350.2	(334.6-365.7)	1721	468.5	(440.1-496.9)	761	166.6	(152.3-181.0)	3730	136.4	(131.9-140.8)
2012	2714	334.4	(319.8-349.1)	1627	414.3	(388.9-439.8)	725	157.7	(143.8-171.5)	3562	130.7	(126.4-135.1)
2013	2517	312.0	(297.9-326.0)	1495	388.1	(363.0-413.2)	730	151.3	(138.5-164.2)	3062	112.5	(108.4-116.5)
2014	2458	298.8	(285.3-312.4)	1393	371.9	(347.9-396.0)	629	115.6	(105.4-125.8)	3154	115.2	(111.1-119.3)
2015	2687	318.6	(304.9-332.3)	1382	362.9	(339.1-386.7)	660	116.9	(106.9-127.0)	3173	116.0	(111.9-120.1)
2016	2478	288.8	(276.1-301.6)	1367	350.8	(328.2-373.4)	658	105.0	(96.1-113.8)	3104	113.7	(109.6-117.7)
2017	2682	324.4	(310.0-338.7)	1352	358.4	(335.2-381.5)	642	99.3	(90.8-107.8)	3323	119.8	(115.6-123.9)
2018	2778	308.7	(295.9-321.6)	1443	350.4	(329.0-371.8)	718	102.4	(94.2-110.6)	3057	110.1	(106.2-114.1)
2019	2906	324.9	(312.0-337.8)	1355	331.2	(310.2-352.1)	730	101.1	(93.0-109.2)	3149	111.4	(107.4-115.4)
2020	1956	220.8	(210.2-231.4)	942	236.0	(218.3-253.7)	446	58.0	(52.2-63.9)	2347	79.7	(76.4-83.0)
2021	2281	246.4	(235.3-257.5)	1006	241.3	(223.8-258.8)	520	64.7	(58.7-70.7)	2410	84.7	(81.2-88.2)
2022	2411	254.8	(243.8-265.8)	1153	266.6	(248.5-284.7)	657	76.8	(70.3-83.3)	2742	102.7	(98.7-106.6)

Table A 10. Asthma hospitalisation ethnic group rate ratios to non-MPA, 2000 – 2022.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	**2.05**	**(1.99 - 2.11)**	**2.08**	**(1.99 - 2.18)**	**0.65**	**(0.60 - 0.70)**
2001	**2.05**	**(1.99 - 2.11)**	**2.40**	**(2.31 - 2.50)**	**0.87**	**(0.82 - 0.93)**
2002	**2.40**	**(2.33 - 2.47)**	**2.98**	**(2.86 - 3.10)**	**0.78**	**(0.74 - 0.84)**
2003	**2.55**	**(2.47 - 2.62)**	**2.99**	**(2.89 - 3.10)**	0.94	(0.88 – 1.00)
2004	**2.43**	**(2.37 - 2.50)**	**3.01**	**(2.91 - 3.12)**	0.95	(0.90 – 1.00)
2005	**2.48**	**(2.41 - 2.55)**	**2.84**	**(2.74 - 2.95)**	1.03	(0.98 - 1.08)
2006	**2.49**	**(2.43 - 2.56)**	**3.14**	**(3.03 - 3.26)**	**1.08**	**(1.03 - 1.13)**
2007	**2.73**	**(2.65 - 2.81)**	**3.67**	**(3.54 - 3.80)**	1.04	(0.99 - 1.09)
2008	**2.52**	**(2.45 - 2.59)**	**3.45**	**(3.33 - 3.56)**	**1.12**	**(1.07 - 1.17)**
2009	**2.74**	**(2.68 - 2.81)**	**3.34**	**(3.24 - 3.45)**	**1.11**	**(1.07 - 1.16)**
2010	**2.56**	**(2.49 - 2.62)**	**3.18**	**(3.08 - 3.29)**	**1.14**	**(1.09 - 1.19)**
2011	**2.57**	**(2.50 - 2.64)**	**3.44**	**(3.32 - 3.55)**	**1.22**	**(1.17 - 1.28)**
2012	**2.56**	**(2.49 - 2.63)**	**3.17**	**(3.06 - 3.28)**	**1.21**	**(1.15 - 1.26)**
2013	**2.77**	**(2.70 - 2.85)**	**3.45**	**(3.33 - 3.58)**	**1.35**	**(1.29 - 1.41)**
2014	**2.59**	**(2.52 - 2.67)**	**3.23**	**(3.12 - 3.35)**	1.00	(0.96 - 1.05)
2015	**2.75**	**(2.67 - 2.82)**	**3.13**	**(3.02 - 3.24)**	1.01	(0.96 - 1.05)
2016	**2.54**	**(2.47 - 2.61)**	**3.09**	**(2.98 - 3.20)**	**0.92**	**(0.88 - 0.96)**
2017	**2.71**	**(2.64 - 2.78)**	**2.99**	**(2.89 - 3.10)**	**0.83**	**(0.79 - 0.87)**
2018	**2.80**	**(2.73 - 2.88)**	**3.18**	**(3.07 - 3.29)**	**0.93**	**(0.89 - 0.97)**
2019	**2.92**	**(2.84 - 2.99)**	**2.97**	**(2.87 - 3.08)**	**0.91**	**(0.87 - 0.95)**
2020	**2.77**	**(2.69 - 2.86)**	**2.96**	**(2.84 - 3.09)**	**0.73**	**(0.69 - 0.77)**
2021	**2.91**	**(2.82 – 3.00)**	**2.85**	**(2.74 - 2.97)**	**0.76**	**(0.73 - 0.80)**
2022	**2.48**	**(2.41 - 2.55)**	**2.60**	**(2.50 - 2.70)**	**0.75**	**(0.71 - 0.78)**

Table A 11. 2022 asthma hospitalisation rates by ethnic group and age.

Age	Māori			Pacific			Asian			non-MPA		
(years)	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	1138	438.1	(412.6-463.5)	562	413.9	(379.7-448.1)	355	197.4	(176.8-217.9)	894	228.5	(213.5-243.5)
15-29	362	160.1	(143.6-176.6)	160	128.4	(108.5-148.3)	84	36.2	(28.4-43.9)	367	73.0	(65.5-80.5)
30-64	809	249.1	(231.9-266.3)	348	232.6	(208.1-257.0)	167	38.9	(33.0-44.8)	977	75.7	(70.9-80.4)
65+	102	176.4	(142.1-210.6)	83	338.3	(265.5-411.1)	51	81.3	(59-103.7)	504	79.6	(72.6-86.5)

Table A 12. 2022 asthma hospitalisation rates by NZDep2018 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	845	79.5	81.9	(76.3-87.5)	1.00	Baseline
3-4	923	100.2	103.7	(97.0-110.5)	**1.27**	**(1.21-1.33)**
5-6	1146	118.0	120.9	(113.8-127.9)	**1.48**	**(1.41-1.54)**
7-8	1653	160.4	167.2	(159.1-175.3)	**2.04**	**(1.96-2.13)**
9-10	2105	186.0	181.0	(173.2-188.8)	**2.21**	**(2.13-2.30)**

Table A 13. Asthma hospitalisation rates by NZDep2018 quintile 2000 - 2022.

	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	787	107.2	(99.6-114.8)	1057	139.5	(131.0-148.0)	1324	175.0	(165.4-184.5)	1863	223.4	(213.2-233.7)	2538	254.6	(244.2-264.9)
2001	840	114.7	(106.8-122.6)	1099	142.4	(133.9-150.9)	1491	195.3	(185.3-205.3)	1842	219.7	(209.5-229.8)	2870	288.0	(277.0-298.9)
2002	735	99.1	(91.8-106.4)	1108	145.4	(136.7-154.0)	1310	169.8	(160.5-179.1)	1860	222.6	(212.4-232.8)	2768	279.2	(268.4-290.0)
2003	782	103.7	(96.3-111.1)	1123	141.8	(133.4-150.2)	1384	177.7	(168.3-187.2)	1901	222.1	(212.1-232.2)	3021	302.5	(291.3-313.7)
2004	752	102.4	(95.0-109.9)	1058	143.8	(135.1-152.6)	1459	175.6	(166.6-184.7)	1959	215.4	(205.8-225.0)	3136	297.7	(286.9-308.5)
2005	846	112.9	(105.2-120.6)	1006	137.3	(128.7-145.8)	1435	170.8	(161.9-179.6)	2126	234.0	(224.0-244.0)	3108	291.8	(281.2-302.3)
2006	785	102.4	(95.1-109.7)	958	130.1	(121.8-138.4)	1394	163.5	(154.8-172.1)	2055	226.5	(216.6-236.3)	3015	284.1	(273.7-294.5)
2007	704	91.0	(84.1-97.8)	866	115.5	(107.8-123.3)	1190	140.1	(132.1-148.1)	2068	223.4	(213.7-233.1)	3039	286.5	(276.0-297.0)
2008	823	104.8	(97.5-112.1)	990	131.0	(122.8-139.2)	1376	158.8	(150.4-167.2)	2023	217.0	(207.5-226.6)	3237	305.8	(295.0-316.6)
2009	887	109.4	(102.1-116.6)	1083	140.6	(132.2-149.1)	1605	184.0	(175.0-193)	2267	239.5	(229.6-249.5)	3533	329.0	(317.9-340.1)
2010	916	106.2	(99.2-113.1)	1132	143.9	(135.4-152.3)	1657	192.5	(183.2-201.8)	2280	245.8	(235.7-256.0)	3359	309.1	(298.4-319.8)
2011	850	97.3	(90.7-103.9)	1083	136.7	(128.5-144.9)	1494	173.7	(164.8-182.5)	2059	223.4	(213.7-233.2)	3158	295.6	(285.0-306.2)
2012	871	98.7	(92.1-105.4)	1009	127.0	(119.1-134.9)	1419	165.4	(156.8-174.0)	2049	220.8	(211.2-230.4)	2940	275.4	(265.2-285.5)
2013	773	87.6	(81.4-93.9)	861	107.8	(100.5-115.0)	1352	156.6	(148.2-165)	1765	191.3	(182.4-200.3)	2746	260.2	(250.3-270.1)
2014	701	77.3	(71.5-83.1)	905	111.9	(104.6-119.2)	1179	135.6	(127.9-143.4)	1766	191.2	(182.2-200.1)	2804	262.4	(252.6-272.3)
2015	749	79.8	(74.0-85.5)	896	108.8	(101.7-116)	1163	133.1	(125.5-140.8)	1874	199.0	(190.0-208.1)	2918	270.2	(260.3-280.2)
2016	783	81.3	(75.6-87.0)	862	103.8	(96.8-110.7)	1052	118.4	(111.2-125.6)	1839	191.7	(182.9-200.4)	2777	253.8	(244.2-263.4)
2017	861	87.6	(81.7-93.5)	962	113.3	(106.1-120.5)	1209	132.9	(125.4-140.4)	1817	187.7	(179.0-196.3)	2836	259.5	(249.8-269.1)
2018	909	90.2	(84.3-96.1)	932	108.1	(101.2-115.1)	1190	130.7	(123.3-138.1)	1816	186.4	(177.8-195.0)	2789	247.6	(238.3-256.9)
2019	845	83.0	(77.3-88.6)	1104	124.5	(117.1-131.8)	1278	137.2	(129.6-144.7)	1854	188.4	(179.8-197)	2668	235.1	(226.1-244.2)
2020	679	65.1	(60.2-70.1)	851	92.8	(86.5-99.1)	888	92.9	(86.8-99.0)	1372	137.0	(129.7-144.3)	1663	145.8	(138.8-152.9)
2021	762	73.6	(68.4-78.9)	854	93.3	(87.0-99.6)	909	96.1	(89.8-102.4)	1442	144.9	(137.4-152.4)	1974	170.6	(163.0-178.2)
2022	845	81.9	(76.3-87.5)	923	103.7	(97-110.5)	1146	120.9	(113.8-127.9)	1653	167.2	(159.1-175.3)	2105	181.0	(173.2-188.8)

Table A 14. Asthma hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2022.

	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	1.30	(1.24 - 1.36)	1.63	(1.56 - 1.7)	2.08	(2.00 - 2.17)	2.38	(2.28 - 2.47)
2001	1.24	(1.19 - 1.30)	1.70	(1.63 - 1.78)	1.91	(1.84 - 1.99)	2.51	(2.42 - 2.61)
2002	1.47	(1.40 - 1.54)	1.71	(1.64 - 1.79)	2.25	(2.15 - 2.34)	2.82	(2.71 - 2.93)
2003	1.37	(1.31 - 1.43)	1.71	(1.64 - 1.79)	2.14	(2.06 - 2.23)	2.92	(2.81 - 3.03)
2004	1.40	(1.34 - 1.47)	1.71	(1.64 - 1.79)	2.10	(2.02 - 2.19)	2.91	(2.79 - 3.02)
2005	1.22	(1.16 - 1.27)	1.51	(1.45 - 1.58)	2.07	(1.99 - 2.16)	2.58	(2.49 - 2.68)
2006	1.27	(1.21 - 1.33)	1.60	(1.53 - 1.67)	2.21	(2.12 - 2.30)	2.77	(2.67 - 2.88)
2007	1.27	(1.21 - 1.33)	1.54	(1.47 - 1.61)	2.46	(2.35 - 2.56)	3.15	(3.03 - 3.28)
2008	1.25	(1.19 - 1.31)	1.51	(1.45 - 1.58)	2.07	(1.99 - 2.15)	2.92	(2.81 - 3.03)
2009	1.29	(1.23 - 1.34)	1.68	(1.62 - 1.75)	2.19	(2.11 - 2.28)	3.01	(2.90 - 3.12)
2010	1.35	(1.30 - 1.41)	1.81	(1.74 - 1.89)	2.32	(2.23 - 2.40)	2.91	(2.81 - 3.02)
2011	1.40	(1.34 - 1.47)	1.78	(1.71 - 1.86)	2.30	(2.21 - 2.39)	3.04	(2.93 - 3.15)
2012	1.29	(1.23 - 1.34)	1.67	(1.61 - 1.75)	2.24	(2.15 - 2.32)	2.79	(2.69 - 2.89)
2013	1.23	(1.17 - 1.29)	1.79	(1.71 - 1.87)	2.18	(2.09 - 2.28)	2.97	(2.86 - 3.09)
2014	1.45	(1.38 - 1.52)	1.75	(1.68 - 1.84)	2.47	(2.37 - 2.58)	3.39	(3.26 - 3.54)
2015	1.36	(1.30 - 1.43)	1.67	(1.60 - 1.75)	2.50	(2.39 - 2.60)	3.39	(3.26 - 3.52)
2016	1.28	(1.22 - 1.34)	1.46	(1.39 - 1.52)	2.36	(2.26 - 2.46)	3.12	(3.00 - 3.25)
2017	1.29	(1.24 - 1.35)	1.52	(1.45 - 1.58)	2.14	(2.06 - 2.23)	2.96	(2.85 - 3.08)
2018	1.20	(1.15 - 1.25)	1.45	(1.39 - 1.51)	2.07	(1.99 - 2.15)	2.74	(2.65 - 2.85)
2019	1.50	(1.44 - 1.57)	1.65	(1.58 - 1.72)	2.27	(2.18 - 2.36)	2.83	(2.73 - 2.94)
2020	1.43	(1.36 - 1.50)	1.43	(1.36 - 1.50)	2.10	(2.01 - 2.20)	2.24	(2.14 - 2.34)
2021	1.27	(1.21 - 1.33)	1.31	(1.25 - 1.37)	1.97	(1.88 - 2.05)	2.32	(2.22 - 2.41)
2022	1.27	(1.21 - 1.33)	1.48	(1.41 - 1.54)	2.04	(1.96 - 2.13)	2.21	(2.13 - 2.30)

All differences were statistically significant

Table A 15. 2022 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	134	214	339	630	1094
	Rate (raw)	188.9	224.2	270.7	321.4	286.0
	Rate (age adj'd)	174.5	197.8	244.7	306.9	259.0
	95%CI	(138.9-210.2)	(168.8-226.7)	(217.1-272.3)	(281.1-332.7)	(242.3-275.8)
Pacific	Hosp_Num	56	77	142	335	543
	Rate (raw)	261.0	225.5	269.0	381.9	227.1
	Rate (age adj'd)	255.3	211.0	253.8	395.6	239.1
	95%CI	(178.5-332.1)	(156.7-265.2)	(206.6-301.1)	(346.1-445.1)	(214.5-263.8)
Asian	Hosp_Num	112	101	131	169	144
	Rate (raw)	80.3	59.1	66.2	83.8	91.6
	Rate (age adj'd)	77.0	65.5	72.7	90.8	103.8
	95%CI	(61.4-92.6)	(51.2-79.7)	(58.9-86.6)	(76.1-105.5)	(84.5-123.1)
NZ European/ Other	Hosp_Num	557	550	578	600	457
	Rate (raw)	78.3	81.3	90.9	103.5	123.0
	Rate (age adj'd)	81.9	87.5	96.4	116.8	143.3
	95%CI	(74.9-89.0)	(79.9-95.0)	(88.3-104.6)	(107.1-126.6)	(129.5-157.0)

Table A 16. 2022 asthma hospitalisation rates by DHB.

DHB	n	Rate		
		raw)	age adj'd	95%CI
Northland	311	154.6	160.1	(142.0-178.2)
Waitemata	886	139.9	141.0	(131.7-150.3)
Auckland	692	143.8	153.2	(141.6-164.7)
Counties Manakau	613	101.6	98.7	(90.8-106.6)
Waikato	847	188.8	185.7	(173.2-198.2)
Lakes	242	204.7	203.4	(177.6-229.2)
Bay of Plenty	407	148.6	152.3	(137.4-167.2)
Tairawhiti	104	200.0	196.4	(158.3-234.5)
Hawkes Bay	247	135.2	137.3	(120.0-154.5)
Taranaki	178	139.6	140.7	(119.8-161.6)
Midcentral	218	114.8	115.0	(99.7-130.4)
Whanganui	176	253.7	268.4	(228.4-308.3)
Capital and Coast	325	100.7	106.0	(94.4-117.7)
Hutt	239	149.3	150.3	(131.2-169.4)
Wairarapa	35	69.1	72.0	(47.7-96.3)
Nelson Marlborough	133	80.5	84.9	(70.1-99.7)
West Coast	37	112.9	125.6	(84.1-167.2)
Canterbury	611	103.6	106.9	(98.3-115.4)
Sth Canterbury	41	65.9	70.4	(48.3-92.5)
Southern	330	93.6	97.3	(86.7-107.9)

ASTHMA MORTALITY

Table A 17. Asthma mortality rates and age-adjusted rates 2000-2019.

Year	n	Rate		
		raw	age adj'd	95% CI
2000	71	1.84	2.14	(1.64 - 2.64)
2001	71	1.83	2.10	(1.61 - 2.59)
2002	74	1.87	2.11	(1.63 - 2.60)
2003	75	1.86	2.15	(1.66 - 2.65)
2004	69	1.69	1.86	(1.42 - 2.31)
2005	61	1.48	1.67	(1.25 - 2.09)
2006	75	1.79	1.96	(1.51 - 2.40)
2007	64	1.52	1.63	(1.23 - 2.03)
2008	61	1.43	1.51	(1.13 - 1.90)
2009	53	1.23	1.30	(0.95 - 1.65)
2010	54	1.24	1.29	(0.95 - 1.64)
2011	70	1.60	1.66	(1.27 - 2.05)
2012	64	1.45	1.49	(1.12 - 1.85)
2013	70	1.58	1.60	(1.23 - 1.98)
2014	90	1.99	2.03	(1.61 - 2.44)
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)
2018	94	1.92	1.92	(1.53 - 2.31)
2019	101	2.03	2.01	(1.62 - 2.40)
2020	*82*	*1.61*	*1.58*	*(1.24 – 1.92)*
2021	*87*	*1.70*	*1.64*	*(1.29 - 2.98)*
Trend 2000 -2019			0.00	(0.00 - 0.01), p=0.015

Data in italics are provisional or preliminary.

Table A 18. Asthma mortality rates and rate ratios by age group and sex, 2014-2019.

Age (years)	Total			Male			Female			F v M	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	9	0.5	(0.2-0.8)	3	0.3	(0-0.7)	6	0.7	(0.1-1.2)	2.11	(0.53-8.45)
5-14	17	0.5	(0.2-0.7)	10	0.5	(0.2-0.8)	7	0.4	(0.1-0.7)	0.74	(0.28-1.94)
15-29	15	0.3	(0.1-0.4)	5	0.2	(0-0.3)	10	0.3	(0.1-0.6)	2.10	(0.72-6.15)
30-64	123	1.0	(0.8-1.1)	33	0.5	(0.4-0.7)	90	1.4	(1.1-1.7)	**2.58**	**(1.73-3.85)**
65+	413	9.8	(8.8-10.7)	131	6.7	(5.5-7.8)	282	12.5	(11-14)	**1.87**	**(1.52-2.31)**

Table A 19. Asthma mortality rate ratios by age group and sex, 2014-2019.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	0.51	(0.26-1.00)	0.60	(0.18-1.95)	0.49	(0.21-1.12)
5-14	**0.47**	**(0.28-0.78)**	0.97	(0.48-1.98)	**0.28**	**(0.13-0.6)**
15-29	**0.26**	**(0.15-0.45)**	**0.31**	**(0.12-0.79)**	**0.25**	**(0.13-0.48)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**10.15**	**(8.3-12.41)**	**12.54**	**(8.56-18.37)**	**9.10**	**(7.17-11.53)**

Table A 20. Asthma mortality rates and rate ratios by ethnic group, 2014-2019.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	121	2.6	4.7	(3.7-5.6)	**2.79**	**(2.50-3.11)**
Pacific	39	1.7	3.8	(2.5-5.2)	**2.29**	**(1.92-2.74)**
Asian	28	0.7	1.5	(0.9-2.1)	0.90	(0.74-1.11)
Non-MPA	391	2.2	1.7	(1.5-1.8)	1.00	Baseline

Table A 21. Asthma mortality rates by ethnic group and age, 2014-2019

Age (years)	Māori			Pacific			Asian			non-MPA		
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	13	0.9	(0.4-1.4)	6	0.8	(0.2-1.4)	3	0.4	(0.1-1.1)	6	0.2	(0-0.4)
15-29	9	0.8	(0.3-1.3)	0	0.0	(0-0)	2	0.2	(0-0.7)	4	0.1	(0-0.3)
30-64	52	3.1	(2.3-3.9)	12	1.5	(0.7-2.4)	7	0.4	(0.1-0.6)	52	0.6	(0.5-0.8)
65+	47	17.4	(12.4-22.4)	21	17.9	(10.2-25.5)	16	6.0	(3.1-9.0)	329	9.5	(8.5-10.5)

Table A 22. Asthma mortality rates NZDep2018 quintile, 2014-2019.

NZDep quintile	n	Rate				
		Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	65	1.1	1.2	(0.9-1.6)	1.00	Baseline
3-4	92	1.8	1.7	(1.4-2.1)	**1.39**	**(1.19-1.63)**
5-6	107	2.0	1.8	(1.5-2.1)	**1.44**	**(1.24-1.67)**
7-8	134	2.3	2.2	(1.8-2.5)	**1.74**	**(1.51-2.01)**
9-10	179	2.9	3.3	(2.8-3.8)	**2.63**	**(2.29-3.02)**

Table A 23. Asthma mortality rates by ethnic group and NZDep quintile, 2014-2019.

Ethnic group		NZDep quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	3	10	19	24	65
	Rate (raw)	0.8	1.9	2.7	2.3	3.3
	Rate (age adj'd)	1.9	4.7	4.6	3.9	5.4
	95%CI	(0.6-6.1)	(1.3-8.1)	(2.2-7.1)	(2.2-5.7)	(3.9-7.0)
Pacific	Hosp_Num	2	1	6	7	23
	Rate (raw)	1.7	0.5	2.1	1.5	1.8
	Rate (age adj'd)	5.7	1.5	5.6	2.8	3.7
	95%CI	(1.4-23.1)	(0.2-10.8)	(0.6-10.6)	(0.5-5.2)	(2.0-5.4)
Asian	Hosp_Num	3	3	6	6	10
	Rate (raw)	0.4	0.4	0.6	0.6	1.3
	Rate (age adj'd)	0.9	1.1	1.5	1.4	2.8
	95%CI	(0.2-3.3)	(0.4-3.5)	(0.2-2.8)	(0.1-2.7)	(0.8-4.7)
NZ European/ Other	Hosp_Num	57	78	76	98	82
	Rate (raw)	1.3	1.9	2.0	3.0	3.9
	Rate (age adj'd)	1.3	1.5	1.5	1.9	2.5
	95%CI	(1.0-1.7)	(1.2-1.8)	(1.1-1.8)	(1.5-2.3)	(1.9-3.1)

Table A 24. Asthma mortality rates by DHB, 2014-2019.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	38	3.54	3.32	(2.24-4.39)
Waitemata	55	1.54	1.69	(1.24-2.14)
Auckland	32	1.13	1.40	(0.91-1.89)
Counties Manukau	48	1.47	1.90	(1.35-2.44)
Waikato	62	2.54	2.50	(1.88-3.13)
Lakes	13	1.97	2.02	(0.92-3.11)
Bay of Plenty	31	2.17	1.91	(1.23-2.59)
Tairawhiti	6	2.05	2.16	(0.43-3.9)
Hawkes Bay	27	2.68	2.39	(1.48-3.3)
Taranaki	19	2.66	2.37	(1.3-3.43)
MidCentral	49	4.60	4.10	(2.94-5.25)
Whanganui	7	1.79	1.45	(0.37-2.53)
Capital and Coast	26	1.40	1.59	(0.98-2.2)
Hutt	22	2.44	2.54	(1.48-3.6)
Wairarapa	7	2.57	1.90	(0.49-3.3)
Nelson Marlborough	27	2.97	2.44	(1.5-3.38)
West Coast	0			(0-0)
Canterbury	71	2.18	2.10	(1.61-2.59)
South Canterbury	10	2.78	2.04	(0.75-3.33)
Southern	29	1.48	1.34	(0.85-1.82)

BRONCHIECTASIS

SEVERE BRONCHIECTASIS PREVALENCE

Table A 25. 2022 bronchiectasis prevalence numbers, rates and rate ratios by age group and sex

Age (years)	Total		Male		Female		F v M	
	n	Rate	n	Rate	n	Rate	RR	95% CI
<15	834	86.5	487	98.4	387	74.0	**0.75**	**(0.65-0.86)**
15-29	927	93.5	484	95.0	443	91.9	0.97	(0.83-1.10)
30-64	2282	98.3	1001	88.1	1281	108.0	**1.23**	**(1.13-1.33)**
65+	4686	553.3	1763	459.4	2883	632.6	**1.38**	**(1.30-1.46)**
Total	8689	169.8	3735	152.3	4954	184.6	**1.21**	**(1.16-1.26)**

Table A 26. 2022 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)**	**1.12**	**(1.01-1.25)**	**0.68**	**(0.60-0.77)**
15-29	0.95	(0.88-1.03)	1.08	(0.97-1.21)	**0.85**	**(0.76-0.94)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**5.63**	**(5.35-5.92)**	**5.11**	**(4.73-5.53)**	**5.95**	**(5.57-6.35)**

Table A 27. 2022 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	1970	226.8	226.8	(216.8-236.8)	**2.83**	**(2.68-3.00)**
Pacific	1552	357.2	384.9	(365.7-404.1)	**4.77**	**(4.49-5.07)**
Asian	617	68.2	69.0	(63.4-74.6)	**0.86**	**(0.79-0.94)**
MELAA	137	150.4	200.5	(165.8-235.1	**2.33**	**(1.96-2.77)**
Non-MPA	4563	161.9	87.3	(114.9-122.0)	1.00	Baseline

Table A 28. 2022 bronchiectasis prevalence rates by NZDep2018 quintile, age-standardised

NZDep quintile	n	Rate				
		raw	age adj'd	95% CI	RR	95% CI
1-2	1103	103.8	103.7	(89.0-101.4)	1.00	Baseline
3-4	1324	143.7	137.8	(116.0-130.0)	**1.33**	**(1.24-1.46)**
5-6	1502	154.7	144.9	(125.3-139.5)	**1.42**	**(1.31-1.53)**
7-8	1943	188.5	186.0	(160.7-176.5)	**1.80**	**(1.67-1.94)**
9-10	2810	248.3	276.0	(259.9-280.9)	**2.72**	**(2.54-2.92)**

Table A 29. 2022 bronchiectasis prevalence rates by DHB, age-standardised.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	382	189.9	173.1	(155.5-190.7)
Waitemata	1,087	171.7	180.9	(170.1-191.6)
Auckland	1,034	214.9	243.1	(228.2-258.0)
Counties Manukau	1,561	258.8	308.0	(292.5-323.5)
Waikato	899	200.3	196.9	(184.1-209.8)
Lakes	191	161.5	159.5	(136.8-182.1)
Bay of Plenty	619	226.1	198.9	(183.1-214.7)
Tairawhiti	98	188.4	189.3	(151.8-226.9)
Hawkes Bay	288	157.6	147.8	(130.6-164.9)
Taranaki	166	130.2	124.1	(105.1-143.1)
MidCentral	180	94.8	87.3	(74.5-100.1)
Whanganui	65	93.7	82.0	(61.8-102.2)
Capital and Coast	365	113.1	123.0	(110.3-135.6)
Hutt	230	143.7	153.0	(133.3-172.8)
Wairarapa	53	104.7	86.7	(62.8-110.7)
Nelson Marlborough	170	102.9	87.4	(73.9-100.8)
West Coast	46	140.4	116.6	(81.9-151.4)
Canterbury	756	128.2	127.3	(118.2-136.3)
South Canterbury	66	106.0	85.7	(64.6-106.8)
Southern	431	122.3	116.3	(105.4-127.3)

BRONCHIECTASIS HOSPITALISATIONS

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

Table A 30. Bronchiectasis hospitalisations, rates and age-adjusted rates 2000-2022.

		Rate		
Year	**n**	**Raw**	**(age adj'd)**	**95% CI**
2000	728	18.9	21.4	(19.8 – 23.0)
2001	798	20.6	23.0	(21.4 - 24.6)
2002	784	19.9	21.8	(20.3 - 23.4)
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	1476	30.1	30.1	(28.6 - 31.7)
2019	1495	30.0	29.8	(28.3 - 31.3)
2020	1243	24.4	24.0	(22.7 - 25.3)
2021	1345	26.3	25.6	(24.2 - 26.9)
2022	1227	24.0	22.9	(21.6 - 24.2)
Trend			**0.29**	**(0.29 – 0.30**
2000 -2022				**p<0.001**

Table A 31. Bronchiectasis hospitalisation rates and rate ratios by age group, 2000 - 2022

	<15 years			15-29 years			30 – 64 years			65+ years		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	72	8.2	(6.3 - 10.1)	46	5.8	(4.1 - 7.4)	372	21.5	(19.3 - 23.7)	238	52.5	(45.8 - 59.2)
2001	132	15.0	(12.5 - 17.6)	52	6.6	(4.8 - 8.4)	368	21.0	(18.9 - 23.1)	246	53.4	(46.7 - 60.1)
2002	143	16.2	(13.5 - 18.8)	49	6.1	(4.4 - 7.8)	331	18.5	(16.5 - 20.5)	261	55.8	(49.1 - 62.6)
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)
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	269	28.4	(25.0 - 31.8)	51	5.0	(3.6 - 6.3)	384	17.5	(15.8 - 19.3)	772	105.0	(97.6 - 112.5)
2019	271	28.3	(25.0 - 31.7)	74	7.2	(5.5 - 8.8)	353	15.8	(14.2 - 17.5)	797	104.9	(97.6 - 112.2)
2020	212	21.9	(19.0 - 24.9)	62	6.0	(4.5 - 7.4)	287	12.5	(11.1 – 14.0)	682	86.1	(79.7 - 92.6)
2021	221	22.8	(19.8 - 25.8)	62	6.1	(4.6 - 7.6)	362	15.7	(14.1 - 17.3)	700	85.6	(79.3 – 92.0)
2021	208	21.6	(18.7 - 24.5)	64	6.5	(4.9 – 8.0)	321	13.8	(12.3 - 15.3)	634	75.5	(69.6 - 81.4)

Table A 32. 2022 bronchiectasis hospitalisation rates and rate ratios by age group and sex

Age	Total			Male			Female			F v M	
(years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	208	21.6	(18.7-24.5)	117	23.7	(19.4-28.0)	91	19.4	(15.4-23.4)	**0.82**	**(0.72-0.94)**
15-29	64	6.5	(4.9-8.0)	33	6.5	(4.3-8.7)	31	6.4	(4.2-8.7)	0.99	(0.78-1.26)
30-64	321	13.8	(12.3-15.3)	164	14.4	(12.2-16.6)	157	13.3	(11.2-15.4)	0.93	(0.83-1.03)
65+	634	75.5	(69.6-81.4)	223	56.7	(49.3-64.1)	411	92.1	(83.2-101.0)	**1.62**	**(1.50-1.76)**

Table A 33. 2022 bronchiectasis hospitalisation age group rate ratios by sex

Age	Total		Male		Female	
(years)	RR	95% CI	RR	95% CI	RR	95% CI
<15	**1.56**	**(1.43-1.70)**	**1.65**	**(1.47-1.85)**	**1.46**	**(1.29-1.65)**
15-29	**0.47**	**(0.41-0.53)**	**0.45**	**(0.38-0.54)**	**0.48**	**(0.40-0.58)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**5.46**	**(5.12-5.83)**	**3.95**	**(3.58-4.35)**	**6.92**	**(6.33-7.56)**

Table A 34. 2022 bronchiectasis hospitalisation rates and rate ratios by prioritised ethnic group.

Total		Rate				
Ethnicity	n	Raw	Age adj'd	95% CI	RR	95%CI
Māori	296	34.1	44.8	(38.9-50.7)	**2.64**	**(2.45-2.85)**
Pacific	268	61.7	102.9	(88.4-117.3)	**6.06**	**(5.60-6.56)**
Asian	70	7.7	15.9	(11.8-19.9)	0.93	(0.82-1.06)
Non-MPA	620	21.3	17.0	(15.6-18.4)	1.00	Baseline

Table A 35. Bronchiectasis hospitalisation rates by prioritised ethnic group 2000 - 2022.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	198	68.9	(56.3-81.4)	135	109.3	(86.0-132.6)	18	22.4	(9.7-35.0)	380	13.9	(12.5-15.3)
2001	212	63.3	(51.8-74.8)	175	132.2	(106.9-157.4)	23	17.9	(9.7-26.2)	400	14.9	(13.4-16.3)
2002	237	69.4	(58.2-80.6)	185	127.9	(103.8-152.0)	26	20.2	(10.2-30.2)	343	12.4	(11.1-13.7)
2003	231	64.6	(53.3-75.9)	183	133.7	(107.1-160.2)	22	15.2	(7.2-23.2)	328	11.4	(10.2-12.7)
2004	268	81.3	(67.9-94.7)	197	133.6	(108.2-159.0)	34	22.1	(13.4-30.9)	370	12.7	(11.4-14.0)
2005	243	62.2	(51.4-73.1)	182	96.4	(77.5-115.2)	27	17.7	(9.3-26.0)	381	13.0	(11.7-14.4)
2006	211	50.4	(41.9-59.0)	207	133.8	(109.3-158.3)	37	22.3	(12.8-31.8)	462	15.4	(14.0-16.8)
2007	268	63.6	(53.8-73.4)	192	106.4	(86.6-126.3)	35	15.9	(10.1-21.7)	453	14.7	(13.4-16.1)
2008	261	53.7	(45.4-62.0)	249	150.7	(125.5-176.0)	51	24.9	(16.4-33.4)	404	13.0	(11.7-14.3)
2009	288	60.6	(52.2-69.1)	244	150.7	(126.8-174.6)	51	23.1	(15.4-30.7)	438	13.8	(12.5-15.1)
2010	255	58.8	(49.8-67.8)	223	129.1	(108.2-150.0)	55	24.3	(17.0-31.7)	513	15.8	(14.4-17.2)
2011	290	64.0	(55.1-72.8)	251	134.1	(113.1-155.1)	64	31.4	(22.3-40.4)	585	18.0	(16.5-19.5)
2012	269	56.6	(48.1-65.0)	215	127.9	(106.4-149.4)	70	31.1	(22.4-39.9)	523	15.7	(14.3-17.1)
2013	310	62.6	(54.3-70.9)	215	107.4	(89.4-125.5)	75	36.6	(26.9-46.4)	623	18.4	(16.9-19.9)
2014	299	53.0	(45.6-60.4)	291	131.7	(113.2-150.1)	72	30.5	(22.2-38.9)	620	18.0	(16.5-19.4)
2015	388	71.3	(62.6-80.0)	269	134.5	(115.0-154.0)	81	24.6	(18.6-30.6)	669	19.3	(17.8-20.8)
2016	370	67.0	(58.7-75.3)	249	124.9	(105.6-144.3)	82	22.2	(16.8-27.7)	617	17.5	(16.1-18.9)
2017	413	75.6	(66.6-84.6)	275	124.1	(106.1-142.1)	74	20.4	(15.2-25.7)	759	21.4	(19.9-23.0)
2018	394	69.5	(61.2-77.9)	291	123.2	(106.1-140.3)	91	24.4	(18.7-30.1)	742	20.3	(18.8-21.7)
2019	437	74.8	(66.2-83.5)	235	100.2	(84.5-115.9)	90	20.1	(15.4-24.8)	781	21.1	(19.6-22.6)
2020	344	58.7	(51.3-66.0)	218	99.3	(83.9-114.7)	65	14.9	(10.9-18.8)	630	16.9	(15.6-18.3)
2021	329	56.3	(49.2-63.5)	277	111.4	(95.9-126.9)	71	15.7	(11.7-19.8)	686	18.7	(17.3-20.2)
2022	296	44.8	(38.9-50.7)	268	102.9	(88.4-117.3)	70	15.9	(11.8-19.9)	620	17.0	(15.6-18.4)

Table A 36. Bronchiectasis hospitalisation rate ratios to non-MPA by prioritised ethnic group 2000 - 2022.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	**4.95**	**(4.48-5.48)**	**7.86**	**(7.01-8.81)**	**1.61**	**(1.22-2.13)**
2001	**4.26**	**(3.85-4.71)**	**8.89**	**(8.01-9.87)**	1.21	(0.96-1.52)
2002	**5.59**	**(5.09-6.14)**	**10.30**	**(9.28-11.44)**	**1.63**	**(1.27-2.08)**
2003	**5.66**	**(5.12-6.25)**	**11.70**	**(10.48-13.06)**	**1.33**	**(1.03-1.73)**
2004	**6.41**	**(5.83-7.04)**	**10.53**	**(9.48-11.69)**	**1.74**	**(1.43-2.13)**
2005	**4.77**	**(4.33-5.26)**	**7.39**	**(6.64-8.23)**	**1.36**	**(1.07-1.71)**
2006	**3.27**	**(2.98-3.59)**	**8.68**	**(7.86-9.59)**	**1.45**	**(1.17-1.79)**
2007	**4.31**	**(3.95-4.71)**	**7.22**	**(6.53-7.99)**	1.08	(0.90-1.30)
2008	**4.13**	**(3.78-4.51)**	**11.59**	**(10.55-12.73)**	**1.92**	**(1.61-2.28)**
2009	**4.41**	**(4.06-4.78)**	**10.95**	**(10.01-11.97)**	**1.67**	**(1.42-1.98)**
2010	**3.72**	**(3.42-4.05)**	**8.17**	**(7.47-8.93)**	**1.54**	**(1.32-1.79)**
2011	**3.55**	**(3.28-3.84)**	**7.44**	**(6.83-8.11)**	**1.74**	**(1.51-2.01)**
2012	**3.61**	**(3.32-3.92)**	**8.15**	**(7.43-8.93)**	**1.98**	**(1.72-2.29)**
2013	**3.40**	**(3.16-3.67)**	**5.84**	**(5.34-6.39)**	**1.99**	**(1.74-2.28)**
2014	**2.95**	**(2.73-3.19)**	**7.33**	**(6.78-7.93)**	**1.70**	**(1.48-1.95)**
2015	**3.70**	**(3.45-3.97)**	**6.98**	**(6.44-7.55)**	**1.28**	**(1.13-1.44)**
2016	**3.83**	**(3.56-4.12)**	**7.14**	**(6.57-7.77)**	**1.27**	**(1.12-1.44)**
2017	**3.53**	**(3.30-3.77)**	**5.79**	**(5.35-6.26)**	0.95	(0.84-1.08)
2018	**3.43**	**(3.21-3.68)**	**6.08**	**(5.63-6.56)**	**1.20**	**(1.07-1.36)**
2019	**3.55**	**(3.32-3.79)**	**4.75**	**(4.37-5.16)**	0.95	(0.85-1.07)
2020	**3.46**	**(3.22-3.73)**	**5.87**	**(5.39-6.38)**	0.88	(0.77-1.01)
2021	**3.01**	**(2.8-3.24)**	**5.95**	**(5.51-6.43)**	**0.84**	**(0.74-0.96)**
2022	**2.64**	**(2.45-2.85)**	**6.06**	**(5.60-6.56)**	0.93	(0.82-1.06)

Table A 37. 2022 bronchiectasis hospitalisation rates by prioritised ethnic group and age.

Age	Māori			Pacific			Asian			non-MPA		
(years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<15	72	27.7	(21.3-34.1)	76	56.0	(43.4-68.6)	12	6.7	(2.9-10.4)	65	16.6	(12.6-20.7)
15-29	30	13.3	(8.5-18.0)	18	14.4	(7.8-21.1)	1	0.4	(0.1-3.1)	16	3.2	(1.6-4.7)
30-64	129	39.7	(32.9-46.6)	82	54.8	(42.9-66.7)	12	2.8	(1.2-4.4)	102	7.9	(6.4-9.4)
65+	65	112.4	(85.1-139.7)	92	375.0	(298.4-451.6)	45	71.8	(50.8-92.7)	437	69.0	(62.5-75.5)

Table A 38. 2022 bronchiectasis hospitalisation rates by NZDep2018 quintile.

		Rate				
NZDep quintile	n	raw	age adj'd	95% CI	RR	95% CI
1-2	153	14.4	13.3	(11.2-15.5)	1.00	Baseline
3-4	165	17.9	16.5	(14-19)	**1.24**	**(1.11-1.38)**
5-6	215	22.1	19.3	(16.6-21.9)	**1.44**	**(1.31-1.60)**
7-8	255	24.7	23.5	(20.6-26.4)	**1.76**	**(1.60-1.94)**
9-10	439	38.8	40.9	(37.1-44.8)	**3.07**	**(2.81-3.36)**

Table A 39. Bronchiectasis hospitalisation rates by NZDep2018 quintile 2000 - 2022.

	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	74	11.8 (9-14.6)	91	14.0 (11.1-16.9)	125	18.9 (15.5-22.2)	155	22.0 (18.5-25.5)	283	40.0 (35.2-44.8)
2001	96	15.8 (12.6-19)	102	15.6 (12.6-18.7)	157	23.2 (19.5-26.9)	162	22.5 (19.0-26.0)	280	36.7 (32.2-41.1)
2002	75	12.2 (9.4-15.0)	103	15.6 (12.5-18.6)	111	15.7 (12.8-18.7)	161	21.4 (18.0-24.7)	334	42.4 (37.6-47.1)
2003	67	10.8 (8.2-13.5)	103	14.6 (11.8-17.5)	125	16.9 (13.9-19.9)	150	19.3 (16.2-22.4)	310	40.0 (35.3-44.6)
2004	74	11.9 (9.1-14.6)	95	14.0 (11.2-16.9)	140	18.3 (15.2-21.4)	192	23.7 (20.3-27.1)	360	44.9 (40.1-49.7)
2005	60	9.9 (7.3-12.4)	91	13.8 (10.9-16.6)	130	16.4 (13.6-19.3)	231	28.0 (24.4-31.6)	313	37.5 (33.2-41.9)
2006	79	12.3 (9.6-15.1)	114	17.3 (14.1-20.5)	159	19.8 (16.7-22.8)	239	27.9 (24.3-31.4)	321	39.5 (35.0-43.9)
2007	99	14.5 (11.6-17.4)	106	15.1 (12.2-18)	129	15.4 (12.7-18.1)	221	25.7 (22.3-29.1)	383	45.6 (40.9-50.3)
2008	69	9.9 (7.5-12.3)	127	17.7 (14.6-20.8)	147	17.8 (14.9-20.7)	217	25.0 (21.7-28.4)	375	43.3 (38.8-47.9)
2009	91	12.3 (9.8-14.9)	116	16.2 (13.2-19.1)	134	15.9 (13.2-18.6)	227	26.3 (22.9-29.8)	430	49.4 (44.6-54.2)
2010	120	15.3 (12.5-18.1)	134	18.0 (15.0-21.1)	156	18.6 (15.6-21.5)	239	28.2 (24.6-31.8)	386	44.5 (39.9-49.0)
2011	114	14.6 (11.9-17.3)	173	23.3 (19.8-26.8)	191	22.5 (19.3-25.8)	272	31.3 (27.6-35.1)	411	46.0 (41.5-50.6)
2012	114	14.2 (11.5-16.8)	128	16.5 (13.6-19.4)	182	21.0 (18.0-24.1)	238	26.6 (23.2-30.0)	393	43.8 (39.4-48.2)
2013	162	19.3 (16.3-22.3)	142	17.9 (15.0-20.9)	199	22.3 (19.2-25.4)	284	31.4 (27.7-35.0)	412	45.2 (40.8-49.6)
2014	175	20.3 (17.3-23.4)	170	20.8 (17.7-24.0)	188	20.8 (17.8-23.8)	249	27.0 (23.6-30.4)	460	49.2 (44.6-53.7)
2015	163	18.2 (15.4-21.0)	179	21.3 (18.2-24.4)	211	22.5 (19.4-25.5)	308	32.4 (28.8-36.1)	516	54.0 (49.3-58.8)
2016	169	18.7 (15.9-21.6)	149	17.3 (14.5-20.0)	181	19.2 (16.4-22.0)	276	28.3 (24.9-31.6)	511	52.4 (47.8-57.0)
2017	209	22.1 (19.1-25.1)	179	20.1 (17.2-23.1)	250	25.5 (22.4-28.7)	292	29.4 (26.0-32.8)	568	57.0 (52.2-61.7)
2018	185	18.2 (15.5-20.8)	189	20.9 (17.9-23.9)	255	25.4 (22.3-28.5)	290	28.5 (25.3-31.8)	557	55.8 (51.1-60.5)
2019	190	18.5 (15.8-21.1)	228	24.6 (21.4-27.7)	251	24.5 (21.5-27.6)	300	28.7 (25.5-32.0)	526	51.7 (47.2-56.1)
2020	149	13.9 (11.6-16.1)	196	20.2 (17.4-23.1)	188	17.6 (15.1-20.1)	259	24.4 (21.5-27.4)	450	43.1 (39.1-47.1)
2021	168	15.1 (12.8-17.4)	208	21.0 (18.1-23.9)	210	19.3 (16.7-21.9)	289	27.3 (24.1-30.4)	470	44.2 (40.2-48.3)
2022	153	13.3 (11.2-15.5)	165	16.5 (14.0-19.0)	215	19.3 (16.6-21.9)	255	23.5 (20.6-26.4)	439	40.9 (37.1-44.8)

Table A 40. Bronchiectasis hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2022.

	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	1.18	(1.02 - 1.38)	1.60	(1.39 - 1.84)	1.86	(1.62 - 2.14)	3.39	(2.98 - 3.85)
2001	0.99	(0.86 - 1.14)	1.47	(1.30 - 1.67)	1.42	(1.26 - 1.61)	2.32	(2.07 - 2.61)
2002	1.28	(1.1 - 1.48)	1.29	(1.12 - 1.49)	1.76	(1.53 - 2.01)	3.48	(3.07 - 3.94)
2003	1.35	(1.16 - 1.57)	1.56	(1.35 - 1.81)	1.79	(1.55 - 2.06)	3.70	(3.24 - 4.22)
2004	1.19	(1.02 - 1.38)	1.54	(1.34 - 1.77)	2.00	(1.75 - 2.28)	3.79	(3.35 - 4.29)
2005	1.40	(1.19 - 1.64)	1.67	(1.44 - 1.94)	2.84	(2.47 - 3.27)	3.81	(3.32 - 4.36)
2006	1.40	(1.21 - 1.61)	1.60	(1.40 - 1.83)	2.26	(1.99 - 2.56)	3.20	(2.83 - 3.61)
2007	1.04	(0.91 - 1.19)	1.06	(0.93 - 1.21)	1.77	(1.57 - 1.99)	3.14	(2.81 - 3.5)
2008	1.79	(1.55 - 2.06)	1.80	(1.57 - 2.07)	2.53	(2.21 - 2.89)	4.37	(3.85 - 4.97)
2009	1.31	(1.15 - 1.50)	1.29	(1.13 - 1.47)	2.13	(1.89 - 2.41)	4.01	(3.58 - 4.48)
2010	1.18	(1.05 - 1.33)	1.21	(1.08 - 1.36)	1.85	(1.66 - 2.06)	2.91	(2.63 - 3.22)
2011	1.60	(1.42 - 1.79)	1.54	(1.38 - 1.73)	2.14	(1.93 - 2.39)	3.15	(2.84 - 3.49)
2012	1.17	(1.03 - 1.32)	1.48	(1.32 - 1.66)	1.88	(1.68 - 2.10)	3.09	(2.79 - 3.42)
2013	0.93	(0.83 - 1.04)	1.15	(1.04 - 1.27)	1.62	(1.48 - 1.78)	2.34	(2.14 - 2.56)
2014	1.03	(0.93 - 1.14)	1.02	(0.92 - 1.13)	1.33	(1.21 - 1.46)	2.42	(2.22 - 2.63)
2015	1.17	(1.06 - 1.30)	1.23	(1.12 - 1.36)	1.78	(1.62 - 1.95)	2.97	(2.72 - 3.24)
2016	0.92	(0.83 - 1.03)	1.02	(0.92 - 1.13)	1.51	(1.37 - 1.66)	2.79	(2.57 - 3.04)
2017	0.91	(0.83 – 1.00)	1.15	(1.06 - 1.26)	1.33	(1.22 - 1.45)	2.58	(2.39 - 2.79)
2018	1.15	(1.04 - 1.27)	1.40	(1.28 - 1.53)	1.57	(1.44 - 1.72)	3.07	(2.83 - 3.33)
2019	1.33	(1.21 - 1.46)	1.33	(1.21 - 1.45)	1.55	(1.42 - 1.70)	2.79	(2.58 - 3.03)
2020	1.46	(1.31 - 1.62)	1.27	(1.14 - 1.41)	1.76	(1.6 0- 1.94)	3.11	(2.84 - 3.40)
2021	1.39	(1.26 - 1.53)	1.28	(1.16 - 1.41)	1.81	(1.65 - 1.98)	2.93	(2.69 - 3.19)
2022	1.24	(1.11 - 1.38)	1.44	(1.31 - 1.60)	1.76	(1.6 - 1.94)	3.07	(2.81 - 3.36)

All differences were statistically significant

Table A 41. 2022 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	10	25	41	62	158
	Rate (raw)	14.1	26.2	32.7	31.6	41.3
	Rate (age adj'd)	22.6	47.9	51.2	39.0	52.5
	95%CI	(6.6-38.6)	(20-75.8)	(33.7-68.6)	(28-50)	(43.1-62)
Pacific	Hosp_Num	5	20	14	60	169
	Rate (raw)	23.3	58.6	26.5	68.4	70.7
	Rate (age adj'd)	51.1	115.4	50.5	107.1	119.8
	95%CI	(2.7-99.5)	(59.4-171.5)	(19.3-81.7)	(74.4-139.7)	(98.1-141.5)
Asian	Hosp_Num	7	22	7	17	17
	Rate (raw)	5.0	12.9	3.5	8.4	10.8
	Rate (age adj'd)	8.7	23.3	8.6	21.5	21.4
	95%CI	(2-15.5)	(12.8-33.7)	(1.9-15.4)	(10.7-32.4)	(9.8-33.1)
NZ European/ Other	Hosp_Num	131	101	156	125	107
	Rate (raw)	18.4	14.9	24.5	21.6	28.8
	Rate (age adj'd)	16.6	12.5	17.6	14.7	23.7
	95%CI	(13.7-19.6)	(9.9-15.1)	(14.7-20.5)	(11.9-17.4)	(18.7-28.6)

Table A 42. 2022 bronchiectasis hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	61	30.3	26.4	(19.6-33.1)
Waitemata	166	26.2	26.2	(22.2-30.2)
Auckland	123	25.6	28.0	(23.0-33.0)
Counties Manukau	200	33.2	36.5	(31.4-41.7)
Waikato	154	34.3	32.3	(27.2-37.5)
Lakes	31	26.2	24.1	(15.6-32.6)
Bay of Plenty	55	20.1	18.4	(13.5-23.4)
Tairawhiti	14	26.9	24.5	(11.6-37.5)
Hawkes Bay	55	30.1	26.9	(19.7-34.0)
Taranaki	45	35.3	33.1	(23.3-42.8)
MidCentral	26	13.7	11.9	(7.3-16.5)
Whanganui	10	14.4	11.0	(4.1-17.9)
Capital and Coast	51	15.8	16.6	(12.1-21.2)
Hutt	32	20.0	20.0	(13.1-27.0)
Wairarapa	7	13.8	9.9	(2.6-17.3)
Nelson Marlborough	31	18.8	13.5	(8.6-18.5)
West Coast	1	3.1	1.9	(0.3-13.7)
Canterbury	115	19.5	18.1	(14.8-21.4)
South Canterbury	7	11.2	10.5	(2.5-18.6)
Southern	43	12.2	11.3	(7.9-14.7)

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Table A 43. Bronchiectasis mortality rates and age-adjusted rates 2000-2019.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	42	1.09	1.32	(0.92-1.72)
2001	41	1.06	1.26	(0.87-1.65)
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	77	1.82	2.07	(1.60-2.53)
2008	95	2.23	2.50	(2.00-3.01)
2009	93	2.16	2.40	(1.91-2.89)
2010	93	2.14	2.31	(1.84-2.78)
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)
2018	141	2.88	2.88	(2.40-3.35)
2019	145	2.91	2.87	(2.40-3.33)
2020	*124*	*2.44*	*2.37*	*(1.95-2.79)*
2021	*138*	*2.70*	*2.55*	*(2.12-2.97)*
Trend 2000 -2019			0.08	(0.08 - 0.08), p<0.001

Data in italics are provisional or preliminary.

Table A 44. Bronchiectasis mortality rates and rate ratios by age group and sex, 2014-2019.

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	0.0	(0-0)	0	0.0.	(0-0)	.	
15-29	6	0.1	(0-0.2)	4	0.1	(0-0.3)	2	0.1	(0-0.3)	0.53	(0.23-1.20)
30-64	73	0.6	(0.4-0.7)	35	0.6	(0.4-0.8)	38	0.6	(0.4-0.8)	1.03	(0.82-1.28)
65+	695	16.5	(15.2-17.7)	266	13.5	(11.9-15.2)	429	19.0	(17.2-20.8)	**1.40**	**(1.30-1.51)**

Table A 45. Bronchiectasis mortality rate ratios by age group and sex, 2014-2019.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	.	.	.	.	.	.
15-29	**0.18**	**(0.12-0.26)**	**0.23**	**(0.14-0.38)**	**0.12**	**(0.06-0.24)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**28.77**	**(25.6-32.34)**	**26.17**	**(21.63-31.65)**	**32.77**	**(27.9-38.49)**

Table A 46. Bronchiectasis mortality rates and rate ratios by ethnic group, 2014-2019.

Prioritised Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	126	2.8	7.2	(5.8-8.6)	**3.35**	**(3.03-3.71)**
Pacific	95	4.2	12.1	(9.4-14.7)	**5.61**	**(5.01-6.28)**
Asian	35	0.9	2.4	(1.6-3.3)	1.13	(0.95-1.34)
Non-MPA	522	3.0	2.2	(2.0-2.3)	1.00	Baseline

Table A 47. Bronchiectasis mortality rates by prioritised ethnic group and age, 2014-2019

	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	(0-0.7)	4	0.6	(0-1.3)	0	0		0	0	
30-64	33	2.0	(1.3-2.6)	21	2.7	(1.5-3.9)	5	0.3	(0-0.5)	14	0.2	(0.1-0.3)
65+	91	33.7	(26.8-40.7)	70	59.6	(45.6-73.5)	30	11.3	(7.3-15.3)	508	14.7	(13.4-15.9)

Table A 48. Bronchiectasis mortality rates NZDep2018 quintile, 2014-2019.

NZDep quintile	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	96	1.6	1.9	(1.5-2.2)	1.00	Baseline
3-4	121	2.3	2.3	(1.9-2.7)	**1.23**	**(1.08-1.40)**
5-6	153	2.8	2.4	(2.1-2.8)	**1.32**	**(1.16-1.49)**
7-8	180	3.1	2.9	(2.5-3.3)	**1.56**	**(1.38-1.76)**
9-10	224	3.6	4.3	(3.7-4.8)	**2.30**	**(2.05-2.58)**

Table A 49. Bronchiectasis mortality rates by ethnic group and NZDep2018 quintile, 2014-2019.

Ethnic group		NZDep2018 quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Deaths	2	10	7	36	71
	Rate (raw)	0.5	1.9	1.0	3.4	3.6
	Rate (age adj'd)	1.0	6.2	2.5	8.7	9.0
	95%CI	(0.2-4.7)	(1.9-10.5)	(0.4-4.5)	(5.6-11.7)	(6.7-11.2)
Pacific	Deaths	3	6	9	13	64
	Rate (raw)	2.5	3.3	3.2	2.7	5.0
	Rate (age adj'd)	5.1	9.7	8.9	8.2	14.6
	95%CI	(1.3-20)	(1.8-17.6)	(2.7-15.1)	(3.5-12.9)	(10.7-18.5)
Asian	Deaths	6	9	3	12	5
	Rate (raw)	0.9	1.1	0.3	1.3	0.7
	Rate (age adj'd)	3.0	2.7	0.8	4.1	1.5
	95%CI	(0.6-5.5)	(0.8-4.6)	(0.3-2.8)	(1.7-6.5)	(0.1-3)
NZ European/ Other	Deaths	85	96	134	121	86
	Rate (raw)	2.0	2.4	3.6	3.7	4.1
	Rate (age adj'd)	1.9	1.8	2.4	2.2	2.4
	95%CI	(1.5-2.4)	(1.4-2.1)	(2-2.8)	(1.8-2.6)	(1.8-2.9)

Table A 50. Bronchiectasis mortality rates by DHB, 2014-2019.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	32	3.0	2.5	(1.6-3.3)
Waitemata	78	2.2	2.4	(1.9-3.0)
Auckland	83	2.9	3.7	(2.9-4.5)
Counties Manukau	118	3.6	5.1	(4.1-6.0)
Waikato	76	3.1	3.1	(2.4-3.7)
Bay of Plenty	17	2.6	2.6	(1.4-3.9)
Taranaki	42	2.9	2.3	(1.6-3.1)
Lakes	14	4.8	4.9	(2.3-7.4)
Tairawhiti	36	3.6	3.1	(2.1-4.1)
Whanganui	14	2.0	1.6	(0.8-2.5)
MidCentral	23	2.2	1.9	(1.1-2.7)
Hawke's Bay	5	1.3	1.0	(0.1-1.8)
Capital and Coast	36	1.9	2.3	(1.5-3.0)
Hutt Valley	28	3.1	3.3	(2.1-4.5)
Wairarapa	7	2.6	1.9	(0.5-3.3)
Nelson Marlborough	22	2.4	1.9	(1.1-2.6)
West Coast	3	1.5	1.3	(0.4-4.1)
Canterbury	92	2.8	2.7	(2.1-3.2)
South Canterbury	7	1.9	1.3	(0.3-2.3)
Southern	41	2.1	1.9	(1.3-2.4)

CHILDHOOD BRONCHIOLITIS

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

Table A 51. Childhood bronchiolitis hospitalisations, rates and age-adjusted rates 2000-2022.

Year	n	Rate	95% CI
2000	3993	1408.9	(1365.2 - 1452.6)
2001	4190	1491.1	(1446.0 - 1536.3)
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	6344	2076.5	(2025.4 - 2127.6)
2018	6481	2124.7	(2073.0 - 2176.4)
2019	6431	2104.1	(2052.7 - 2155.5)
2020	1833	599.3	(571.9 - 626.8)
2021	6559	2149.4	(2097.4 - 2201.5)
2022	5952	1964.1	(1914.2 – 2014.0)
Trend 2000 - 2022, not 2020		31.0	(30.9-31.1), p<0.000

Table A 52. 2022 childhood bronchiolitis hospitalisation rates and rate ratios by sex

Total			Male			Female			F v M	
n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
5952	1964.1	(1914.2-2014)	3728	2405	(2328.3-2482.7)	2223	1501.4	(1439-1563.8)	**0.62**	**(0.61-0.64)**

Table A 53. 2022 childhood bronchiolitis hospitalisation rates and rate ratios by ethnic group.

Prioritised Ethnicity	n	Rate			
		Raw	95% CI	RR	95%CI
Māori	2595	3245.3	(3120.4-3370.2)	**2.26**	**(2.19-2.32)**
Pacific	1619	3840.7	(3653.6-4027.8)	**2.67**	**(2.58-2.76)**
Asian	461	663.5	(602.9-724.1)	**0.46**	**(0.44-0.48)**
Non-MPA	1636	1439.0	(1369.3-1508.7)	1.00	Baseline

Table A 54. Childhood bronchiolitis hospitalisation rates by ethnic group 2000 - 2022.

	Māori			Pacific			Asian			non-MPA		
Year	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
2000	1639	2194.0	(2087.8-2300.2)	875	2429.3	(2268.3-2590.2)	86	451.7	(356.2-547.1)	1490	922.5	(875.7-969.3)
2001	1819	2470.4	(2356.9-2583.9)	1154	3192.7	(3008.5-3376.9)	80	397.5	(310.4-484.6)	1237	774.3	(731.2-817.5)
2002	1934	2633.8	(2516.4-2751.2)	1318	3592.1	(3398.1-3786)	96	447.8	(358.3-537.4)	1433	896.4	(850.0-942.8)
2003	1956	2664.2	(2546.1-2782.2)	1308	3503.0	(3313.2-3692.9)	117	512.9	(420.0-605.9)	1230	766.8	(724.0-809.7)
2004	1995	2730.4	(2610.6-2850.2)	1177	3112.6	(2934.8-3290.4)	128	531.5	(439.4-623.6)	1217	759.7	(717.0-802.4)
2005	1968	2715.5	(2595.5-2835.5)	1143	2995.2	(2821.6-3168.8)	137	542.1	(451.4-632.9)	1236	775.1	(731.9-818.4)
2006	2013	2797.2	(2675.0-2919.4)	1287	3338.6	(3156.2-3521.0)	122	460.8	(379.0-542.5)	1252	787.9	(744.3-831.6)
2007	2034	2766.9	(2646.6-2887.1)	1275	3243.1	(3065.1-3421.1)	131	459.8	(381.1-538.6)	1261	793.9	(750.1-837.7)
2008	2457	3275.7	(3146.2-3405.2)	1598	3990.1	(3794.5-4185.7)	194	636.6	(547.0-726.1)	1393	877.9	(831.8-924.0)
2009	2920	3811.0	(3672.8-3949.2)	1905	4663.6	(4454.2-4873.1)	214	658.2	(570.0-746.4)	1586	999.1	(949.9-1048.3)
2010	2587	3302.7	(3175.4-3429.9)	1695	4064.9	(3871.4-4258.5)	217	627.3	(543.8-710.7)	1647	1035.7	(985.7-1085.8)
2011	2569	3220.3	(3095.8-3344.9)	1719	4053.5	(3861.9-4245.1)	240	656.5	(573.4-739.5)	1542	971.4	(922.9-1019.9)
2012	2961	3653.4	(3521.8-3785.0)	1957	4548.5	(4347.0-4750.0)	303	788.2	(699.5-877.0)	1584	1001.6	(952.3-1050.9)
2013	2378	2882.5	(2766.6-2998.3)	1629	3724.5	(3543.6-3905.3)	269	665.8	(586.3-745.4)	1459	923.9	(876.5-971.4)
2014	2613	3180.6	(3058.7-3302.6)	1701	3907.8	(3722.1-4093.5)	301	688.7	(610.9-766.5)	1634	1069.8	(1017.9-1121.7)
2015	3007	3660.2	(3529.4-3791.0)	1878	4317.1	(4121.9-4512.4)	377	799.2	(718.5-879.8)	1572	1060.5	(1008.0-1112.9)
2016	2488	3020.8	(2902.1-3139.5)	1492	3423.4	(3249.6-3597.1)	401	789.9	(712.5-867.2)	1546	1072.9	(1019.4-1126.4)
2017	2991	3626.6	(3496.6-3756.6)	1760	4035.3	(3846.8-4223.8)	377	694.1	(624.0-764.2)	1601	1145.4	(1089.3-1201.5)
2018	3051	3703.9	(3572.5-3835.3)	1757	4035.9	(3847.2-4224.6)	420	727.7	(658.1-797.3)	1677	1241.3	(1181.9-1300.7)
2019	2970	3615.9	(3485.8-3745.9)	1784	4112.2	(3921.4-4303.0)	459	752.3	(683.5-821.1)	1661	1275.5	(1214.1-1336.8)
2020	970	1176.6	(1102.6-1250.7)	490	1126.1	(1026.4-1225.8)	113	174.6	(142.4-206.8)	392	310.6	(279.9-341.4)
2021	2941	3617.6	(3486.8-3748.3)	1388	3236.6	(3066.3-3406.8)	517	769.0	(702.8-835.3)	2109	1757.2	(1682.2-1832.2)
2022	2595	3245.3	(3120.4-3370.2)	1619	3840.7	(3653.6-4027.8)	461	663.5	(602.9-724.1)	1636	1439.0	(1369.3-1508.7)

Table A 55. Childhood bronchiolitis hospitalisation rate ratios to non-MPA by ethnic group 2000 - 2022.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.38	(2.30 - 2.46)	2.63	(2.53 - 2.74)	0.49	(0.44 - 0.54)
2001	3.19	(3.08 - 3.30)	4.12	(3.97 - 4.29)	0.51	(0.46 - 0.57)
2002	2.94	(2.84 - 3.04)	4.01	(3.86 - 4.16)	0.50	(0.45 - 0.55)
2003	3.47	(3.36 - 3.60)	4.57	(4.40 - 4.74)	0.67	(0.61 - 0.73)
2004	3.59	(3.47 - 3.72)	4.10	(3.94 - 4.26)	0.70	(0.64 - 0.76)
2005	3.50	(3.38 - 3.63)	3.86	(3.72 - 4.02)	0.70	(0.64 - 0.76)
2006	3.55	(3.43 - 3.67)	4.24	(4.08 - 4.40)	0.58	(0.53 - 0.64)
2007	3.49	(3.37 - 3.61)	4.09	(3.93 - 4.24)	0.58	(0.53 - 0.63)
2008	3.73	(3.61 - 3.85)	4.54	(4.39 - 4.71)	0.73	(0.67 - 0.78)
2009	3.81	(3.70 - 3.93)	4.67	(4.52 - 4.82)	0.66	(0.61 - 0.71)
2010	3.19	(3.09 - 3.29)	3.92	(3.80 - 4.06)	0.61	(0.57 - 0.65)
2011	3.32	(3.22 - 3.42)	4.17	(4.04 - 4.31)	0.68	(0.63 - 0.72)
2012	3.65	(3.54 - 3.76)	4.54	(4.40 - 4.69)	0.79	(0.74 - 0.84)
2013	3.12	(3.02 - 3.22)	4.03	(3.90 - 4.17)	0.72	(0.68 - 0.77)
2014	2.97	(2.89 - 3.06)	3.65	(3.53 - 3.78)	0.64	(0.61 - 0.68)
2015	3.45	(3.35 - 3.56)	4.07	(3.94 - 4.21)	0.75	(0.71 - 0.80)
2016	2.82	(2.73 - 2.90)	3.19	(3.08 - 3.30)	0.74	(0.70 - 0.78)
2017	3.17	(3.07 - 3.26)	3.52	(3.41 - 3.64)	0.61	(0.57 - 0.64)
2018	2.98	(2.90 - 3.07)	3.25	(3.15 - 3.36)	0.59	(0.56 - 0.62)
2019	2.83	(2.75 - 2.92)	3.22	(3.12 - 3.33)	0.59	(0.56 - 0.62)
2020	3.79	(3.58 - 4.01)	3.63	(3.40 - 3.87)	0.56	(0.51 - 0.62)
2021	2.06	(2.00 - 2.12)	1.84	(1.78 - 1.90)	0.44	(0.42 - 0.46)
2022	2.26	(2.19 - 2.32)	2.67	(2.58 - 2.76)	0.46	(0.44 - 0.48)

All differences were statistically significant

Table A 56. 2022 childhood bronchiolitis hospitalisation rates by NZDep2018 quintile.

NZDep quintile	n	Rate	95% CI	RR	95% CI
1-2	582	1084.4	(996.3-1172.5)	1.00	Baseline
3-4	706	1415.3	(1310.9-1519.7)	**1.31**	**(1.24-1.38)**
5-6	863	1568.7	(1464-1673.3)	**1.45**	**(1.37-1.52)**
7-8	1419	2293.7	(2174.3-2413)	**2.12**	**(2.02-2.22)**
9-10	2381	2882.4	(2766.6-2998.2)	**2.66**	**(2.54-2.78)**

Table A 57. Childhood bronchiolitis hospitalisation numbers by NZDep2018 quintile 2000 - 2022.

	NZDep quintile (n)				
Year	1-2	3-4	5-6	7-8	9-10
2000	316	421	629	859	1768
2001	313	414	662	901	1873
2002	314	515	668	963	2202
2003	251	420	583	952	2232
2004	271	398	566	960	2196
2005	272	378	598	1012	2022
2006	253	349	577	1037	2281
2007	315	371	525	1104	2194
2008	313	413	682	1160	2762
2009	326	537	800	1459	3184
2010	388	499	863	1337	2708
2011	412	487	725	1337	2774
2012	435	533	955	1403	3082
2013	333	477	748	1261	2639
2014	385	530	772	1286	2935
2015	444	554	799	1417	3229
2016	424	577	710	1245	2686
2017	457	606	828	1439	3008
2018	525	681	875	1424	2974
2019	573	780	887	1491	2699
2020	152	181	262	410	827
2021	725	835	969	1481	2549
2022	582	706	863	1419	2381

Table A 58. Childhood bronchiolitis hospitalisation rates by NZDep2018 quintile 2000 - 2022.

	NZDep 1-2		NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
2000	686.0	(610.4-761.7)	867.8	(784.9-950.7)	1245.9	(1148.5-1343.3)	1479.2	(1380.3-1578.2)	2202.0	(2099.4-2304.7)
2001	669.6	(595.4-743.8)	846.7	(765.1-928.2)	1311.4	(1211.5-1411.3)	1576.9	(1474.0-1679.9)	2409.1	(2300-2518.2)
2002	665.6	(592.0-739.3)	1046.2	(955.9-1136.6)	1323.0	(1222.7-1423.3)	1700.8	(1593.4-1808.3)	2836.5	(2718.0-2955.0)
2003	523.8	(459.0-588.6)	832.3	(752.7-911.9)	1172.3	(1077.1-1267.5)	1670.9	(1564.7-1777.0)	2907.8	(2787.2-3028.5)
2004	582.1	(512.8-651.5)	868.9	(783.5-954.2)	1060.0	(972.7-1147.3)	1589.2	(1488.7-1689.7)	2797.6	(2680.6-2914.6)
2005	576.2	(507.7-644.7)	839.4	(754.8-924.0)	1114.1	(1024.8-1203.4)	1706.7	(1601.5-1811.8)	2555.9	(2444.5-2667.3)
2006	524.6	(460.0-589.2)	764.0	(683.9-844.2)	1062.4	(975.7-1149.0)	1734.5	(1628.9-1840.1)	2924.6	(2804.6-3044.6)
2007	641.6	(570.8-712.5)	781.1	(701.6-860.6)	964.6	(882.0-1047.1)	1787.7	(1682.3-1893.2)	2731.4	(2617.1-2845.7)
2008	622.8	(553.8-691.9)	859.0	(776.1-941.8)	1202.3	(1112-1292.5)	1808.6	(1704.5-1912.7)	3375.2	(3249.3-3501.1)
2009	640.9	(571.3-710.4)	1091.7	(999.4-1184.1)	1401.6	(1304.5-1498.7)	2220.1	(2106.1-2334.0)	3774.8	(3643.7-3906.0)
2010	707.9	(637.5-778.4)	979.2	(893.2-1065.1)	1520.9	(1419.5-1622.4)	2063.7	(1953.0-2174.3)	3110.8	(2993.6-3228.0)
2011	746.1	(674.0-818.1)	934.4	(851.4-1017.4)	1269.2	(1176.8-1361.6)	2054.1	(1944.0-2164.2)	3155.5	(3038.1-3273.0)
2012	784.3	(710.6-858.0)	1026.3	(939.2-1113.5)	1687.8	(1580.7-1794.8)	2143.6	(2031.5-2255.8)	3571.2	(3445.1-3697.3)
2013	599.9	(535.4-664.3)	932.2	(848.5-1015.8)	1318.5	(1224.1-1413.0)	1946.3	(1838.9-2053.8)	3151.8	(3031.5-3272.1)
2014	699.8	(629.9-769.8)	1047.4	(958.2-1136.6)	1358.6	(1262.7-1454.4)	2035.0	(1923.8-2146.3)	3546.9	(3418.5-3675.2)
2015	799.0	(724.7-873.3)	1096.6	(1005.3-1187.9)	1454.5	(1353.7-1555.4)	2275.6	(2157.1-2394.1)	3941.7	(3805.7-4077.6)
2016	777.0	(703.1-851.0)	1146.1	(1052.6-1239.7)	1309.6	(1213.2-1405.9)	1975.8	(1866.1-2085.6)	3253.2	(3130.2-3376.3)
2017	824.8	(749.2-900.4)	1203.3	(1107.5-1299.1)	1486.8	(1385.6-1588.1)	2292.8	(2174.3-2411.2)	3700.1	(3567.8-3832.3)
2018	954.0	(872.4-1035.6)	1354.9	(1253.1-1456.6)	1587.7	(1482.5-1692.9)	2303.1	(2183.5-2422.8)	3592.0	(3462.9-3721.1)
2019	1042.7	(957.3-1128.1)	1534.5	(1426.8-1642.2)	1606.5	(1500.8-1712.2)	2435.7	(2312.0-2559.3)	3235.2	(3113.1-3357.2)
2020	280.4	(235.8-325.0)	359.2	(306.9-411.5)	472.4	(415.2-529.6)	662.7	(598.5-726.8)	985.6	(918.4-1052.8)
2021	1334.9	(1237.7-1432.0)	1677.9	(1564.1-1791.7)	1742.2	(1632.5-1851.9)	2381.6	(2260.3-2502.9)	3061.2	(2942.4-3180.1)
2022	1084.4	(996.3-1172.5)	1415.3	(1310.9-1519.7)	1568.7	(1464-1673.3)	2293.7	(2174.3-2413.0)	2882.4	(2766.6-2998.2)

Table A 59. Childhood bronchiolitis hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 - 2022.

	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	1.26 (1.18 - 1.36)	1.82 (1.70 - 1.94)	2.16 (2.03 - 2.30)	3.21 (3.03 - 3.4)
2001	1.26 (1.18 - 1.36)	1.96 (1.83 - 2.09)	2.35 (2.21 - 2.51)	3.60 (3.39 - 3.81)
2002	1.57 (1.47 - 1.68)	1.99 (1.86 - 2.12)	2.56 (2.40 - 2.72)	4.26 (4.02 - 4.51)
2003	1.59 (1.47 - 1.71)	2.24 (2.08 - 2.40)	3.19 (2.98 - 3.41)	5.55 (5.21 - 5.91)
2004	1.49 (1.38 - 1.61)	1.82 (1.70 - 1.95)	2.73 (2.56 - 2.91)	4.81 (4.52 - 5.11)
2005	1.46 (1.35 - 1.57)	1.93 (1.80 - 2.07)	2.96 (2.78 - 3.16)	4.44 (4.17 - 4.72)
2006	1.46 (1.35 - 1.58)	2.03 (1.89 - 2.18)	3.31 (3.09 - 3.53)	5.57 (5.23 - 5.94)
2007	1.22 (1.13 - 1.31)	1.50 (1.40 - 1.61)	2.79 (2.62 - 2.96)	4.26 (4.02 - 4.51)
2008	1.38 (1.28 - 1.48)	1.93 (1.81 - 2.06)	2.90 (2.73 - 3.08)	5.42 (5.12 - 5.73)
2009	1.70 (1.59 - 1.82)	2.19 (2.05 - 2.33)	3.46 (3.27 - 3.67)	5.89 (5.57 - 6.22)
2010	1.38 (1.30 - 1.47)	2.15 (2.03 - 2.28)	2.92 (2.76 - 3.08)	4.39 (4.17 - 4.63)
2011	1.25 (1.18 - 1.33)	1.70 (1.60 - 1.8.)	2.75 (2.61 - 2.90)	4.23 (4.02 - 4.45)
2012	1.31 (1.23 - 1.39)	2.15 (2.04 - 2.27)	2.73 (2.59 - 2.88)	4.55 (4.34 - 4.78)
2013	1.55 (1.45 - 1.66)	2.20 (2.06 - 2.34)	3.24 (3.06 - 3.44)	5.25 (4.97 - 5.55)
2014	1.50 (1.40 - 1.59)	1.94 (1.83 - 2.06)	2.91 (2.75 - 3.07)	5.07 (4.81 - 5.34)
2015	1.37 (1.29 - 1.46)	1.82 (1.72 - 1.93)	2.85 (2.70 – 3.00)	4.93 (4.70 - 5.18)
2016	1.48 (1.39 - 1.57)	1.69 (1.59 - 1.79)	2.54 (2.41 - 2.68)	4.19 (3.98 - 4.4)
2017	1.46 (1.38 - 1.55)	1.80 (1.71 - 1.91)	2.78 (2.64 - 2.93)	4.49 (4.28 - 4.71)
2018	1.42 (1.34 - 1.5)	1.66 (1.58 - 1.75)	2.41 (2.30 - 2.53)	3.77 (3.60 - 3.94)
2019	1.47 (1.40 - 1.55)	1.54 (1.46 - 1.62)	2.34 (2.23 - 2.45)	3.10 (2.97 - 3.24)
2020	1.28 (1.15 - 1.42)	1.68 (1.53 - 1.86)	2.36 (2.16 - 2.59)	3.51 (3.23 - 3.82)
2021	1.26 (1.20 - 1.32)	1.31 (1.25 - 1.37)	1.78 (1.71 - 1.86)	2.29 (2.20 - 2.39)
2022	1.31 (1.24 - 1.38)	1.45 (1.37 - 1.52)	2.12 (2.02 - 2.22)	2.66 (2.54 - 2.78)

All differences are statistically significant

Table A 60. 2022 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	137	2192.4 (1825.2-2559.5)	43	2251 (1578.4-2924.2)	77	657 (510.2-803.7)	346	1164 (1041.5-1286.8)
3-4	218	2471.1 (2143.1-2799.1)	120	3595 (2951.7-4238.2)	85	676 (532.5-820.0)	320	1178 (1048.6-1306.7)
5-6	311	2613.7 (2323.2-2904.2)	165	3323 (2815.6-3829.6)	72	508 (390.7-625.4)	365	1350 (1211.6-1488.7)
7-8	648	3468.6 (3201.5-3735.6)	413	4679 (4227.6-5130.1)	124	824 (679.0-969.1)	346	1457 (1303.2-1610.1)
9-10	1281	3278.7 (3099.2-3458.3)	878	3418 (3192.3-3644.6)	103	793 (640.1-946.5)	258	1784 (1566.5-2002.0)

Table A 61. 2022 childhood bronchiolitis hospitalisation rates by DHB.

DHB	n	Rate	95%CI
Northland	349	2846.7	(2548.0-3145.3)
Waitemata	528	1357.7	(1241.9-1473.5)
Auckland	533	2216.2	(2028.1-2404.4)
Counties Manakau	902	2087.5	(1951.2-2223.7)
Waikato	770	2655.2	(2467.6-2842.7)
Lakes	204	2649.4	(2285.8-3012.9)
Bay of Plenty	535	3178.8	(2909.5-3448.2)
Tairawhiti	126	3480.7	(2872.9-4088.4)
Hawkes Bay	259	2348.1	(2062.2-2634.1)
Taranaki	148	1868.7	(1567.6-2169.8)
Midcentral	129	1114.0	(921.8-1306.2)
Whanganui	67	1572.8	(1196.2-1949.4)
Capital and Coast	270	1721.9	(1516.5-1927.3)
Hutt	188	1850.4	(1585.9-2114.9)
Wairarapa	44	1533.1	(1080.1-1986.1)
Nelson Marlborough	98	1238.9	(993.6-1484.2)
West Coast	15	887.6	(438.4-1336.7)
Canterbury	511	1532.7	(1399.8-1665.6)
Sth Canterbury	36	1125.0	(757.5-1492.5)
Southern	240	1345.3	(1175.1-1515.5)

CHILDHOOD PNEUMONIA

CHILDHOOD PNEUMONIA HOSPITALISATIONS

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

Table A 62. Childhood pneumonia hospitalisations, rates and age-adjusted rates 2000-2022.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	3582	407.6	407.8	(394.4 - 421.1)
2001	3971	452.7	455.6	(441.4 - 469.7)
2002	3627	410.5	415.5	(402.0 – 429.0)
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	3684	389.2	389.2	(376.7 - 401.8)
2019	4315	451.4	454.1	(440.5 - 467.6)
2020	868	89.8	90.9	(84.9 – 97.0)
2021	1877	193.9	197.7	(188.7 - 206.6)
2022	4542	471.3	481.1	(467.1 - 495.1)
Trend 2000 -2019 and 2022			**0.43**	**(0.39-0.48), p<0.001**

Table A 63. 2022 childhood pneumonia hospitalisation rates and rate ratios by age group and sex

	Total			Male			Female			F v M	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	3392	1119.3	(1081.7-1157)	1748	1127.9	(1075.0-1180.8)	1644	1110.4	(1056.7-1164.0)	0.98	(0.95-1.02)
5-14	1150	174.1	(164.0-184.1)	584	172.1	(158.1-186.0)	566	176.2	(161.6-190.7)	1.02	(0.97-1.08)

Table A 64. 2022 childhood pneumonia hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	**6.43**	**(6.23-6.64)**	**6.55**	**(6.26-6.86)**	**6.30**	**(6.02-6.60)**
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 65. 2022 childhood pneumonia hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	1407	541.6	556.0	(526.9-585)	**1.47**	**(1.42-1.53)**
Pacific	1199	883.1	905.1	(853.8-956.3)	**2.40**	**(2.31-2.49)**
Asian	816	453.7	402.3	(374.5-430)	**1.07**	**(1.02-1.11)**
Non-MPA	1405	340.8	377.1	(357.3-396.9)	1.00	Baseline

Table A 66. Childhood pneumonia hospitalisation rates by ethnic group 2000 – 2022, 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	1537	300.3(285.3-315.4)	1122	495.1(466.1-524.1)	869	809.2 (755.2-863.2)	110	190.0(154.5-225.6)
2001	1659	327.5(311.8-343.3)	1186	531.6(501.3-561.9)	1097	1009.9 (950.0-1069.9)	131	213.6(177.0-250.1)
2002	1461	289.8(274.9-304.7)	1093	488.8(459.8-517.8)	979	888.8 (832.9-944.6)	168	256.2(217.4-295.0)
2003	1377	273.6(259.2-288.1)	1085	484.1(455.3-512.9)	1137	1007.9 (949.2-1066.6)	176	251.0(213.9-288.1)
2004	1170	233.2(219.8-246.5)	865	387.5(361.7-413.4)	992	864.8 (810.9-918.7)	163	221.6(187.6-255.6)
2005	1470	293.6(278.6-308.6)	1010	459.0(430.7-487.4)	874	760.9 (710.3-811.4)	189	245.2(210.2-280.2)
2006	1342	270.8(256.3-285.3)	1046	476.4(447.5-505.3)	989	844.1 (791.4-896.7)	216	265.4(230.0-300.8)
2007	1138	230.0(216.7-243.4)	995	445.7(418.0-473.4)	937	791.2 (740.4-841.9)	229	263.5(229.4-297.7)
2008	1243	251.8(237.8-265.8)	1121	494.8(465.8-523.8)	1119	928.1 (873.6-982.6)	282	307.9(271.9-343.9)
2009	1436	291.0(275.9-306).0	1351	588.5(557.0-619.9)	1220	998.3 (942.1-1054.5)	310	319.2(283.6-354.8)
2010	1331	270.1(255.6-284.6)	995	424.1(397.7-450.5)	912	734.9 (687.1-782.7)	322	317.3(282.5-352.1)
2011	1149	234.1(220.6-247.7)	996	417.4(391.4-443.4)	1047	826.7 (776.5-876.9)	288	269.7(238.4-301.0)
2012	1077	220.7(207.5-233.9)	938	386.1(361.3-410.8)	943	730.4 (683.7-777.2)	304	272.7(241.8-303.5)
2013	1109	228.4(214.9-241.8)	849	346.4(323.0-369.8)	857	654.5 (610.6-698.5)	301	259.3(229.7-288.8)
2014	1281	270.5(255.6-285.3)	997	404.9(379.7-430.1)	963	737.5 (690.8-784.1)	397	316.4(285.1-347.8)
2015	1359	293.3(277.7-308.9)	1168	470.3(443.3-497.3)	1110	845.4 (795.6-895.2)	468	344.7(313.3-376.2)
2016	1146	252.6(237.9-267.2)	843	336.7(314.0-359.5)	828	625.2 (582.5-667.8)	431	291.8(264.1-319.5)
2017	1220	274.2(258.8-289.6)	1059	418.9(393.7-444.2)	841	631.5 (588.8-674.2)	472	301.8(274.4-329.2)
2018	1320	303.9(287.5-320.3)	1111	437.0(411.3-462.7)	939	700.1 (655.3-744.8)	526	314.9(287.8-342.0)
2019	1365	322.8(305.6-339.9)	1395	547.4(518.6-576.1)	1100	819.0 (770.6-867.4)	741	424.0(393.2-454.8)
2020	304	73.7(65.4-82.0)	235	91.2(79.5-102.8)	225	165.7 (144.1-187.4)	164	89.9(76.1-103.8)
2021	634	164.4(151.6-177.3)	521	204.4(186.8-221.9)	494	369.2 (336.7-401.8)	339	167.6(149.7-185.5)
2022	1405	377.1(357.3-396.9)	1407	556.0(526.9-585.0)	1199	905.1 (853.8-956.3)	816	402.3(374.5-430.0)

Table A 67. Childhood pneumonia hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2022, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	**1.65**	**(1.59 - 1.71)**	**2.69**	**(2.59 - 2.81)**	**0.63**	**(0.58 - 0.69)**
2001	**1.62**	**(1.57 - 1.68)**	**3.08**	**(2.97 - 3.20)**	**0.65**	**(0.60 - 0.71)**
2002	**1.69**	**(1.62 - 1.75)**	**3.07**	**(2.95 - 3.19)**	**0.88**	**(0.82 - 0.96)**
2003	**1.77**	**(1.70 - 1.84)**	**3.68**	**(3.55 - 3.83)**	**0.92**	**(0.85 - 0.99)**
2004	**1.66**	**(1.59 - 1.73)**	**3.71**	**(3.56 - 3.86)**	0.95	(0.88 - 1.03)
2005	**1.56**	**(1.50 - 1.63)**	**2.59**	**(2.49 - 2.70)**	**0.84**	**(0.78 - 0.90)**
2006	**1.76**	**(1.69 - 1.83)**	**3.12**	**(3.00 - 3.24)**	0.98	(0.91 - 1.05)
2007	**1.94**	**(1.86 - 2.02)**	**3.44**	**(3.30 - 3.59)**	**1.15**	**(1.07 - 1.23)**
2008	**1.96**	**(1.89 - 2.04)**	**3.69**	**(3.54 - 3.83)**	**1.22**	**(1.15 - 1.30)**
2009	**2.02**	**(1.95 - 2.10)**	**3.43**	**(3.31 - 3.56)**	**1.10**	**(1.03 - 1.16)**
2010	**1.57**	**(1.51 - 1.63)**	**2.72**	**(2.61 - 2.83)**	**1.17**	**(1.11 - 1.25)**
2011	**1.78**	**(1.71 - 1.86)**	**3.53**	**(3.39 - 3.68)**	**1.15**	**(1.08 - 1.23)**
2012	**1.75**	**(1.68 - 1.83)**	**3.31**	**(3.17 - 3.45)**	**1.24**	**(1.16 - 1.31)**
2013	**1.52**	**(1.45 - 1.58)**	**2.87**	**(2.74 - 2.99)**	**1.14**	**(1.07 - 1.21)**
2014	**1.50**	**(1.44 - 1.56)**	**2.73**	**(2.62 - 2.84)**	**1.17**	**(1.11 - 1.24)**
2015	**1.60**	**(1.54 - 1.67)**	**2.88**	**(2.77 – 3.00)**	**1.18**	**(1.12 - 1.24)**
2016	**1.33**	**(1.28 - 1.39)**	**2.48**	**(2.37 - 2.58)**	**1.16**	**(1.09 - 1.22)**
2017	**1.53**	**(1.47 - 1.59)**	**2.30**	**(2.21 - 2.40)**	**1.10**	**(1.05 - 1.16)**
2018	**1.44**	**(1.38 - 1.49)**	**2.30**	**(2.21 - 2.40)**	1.04	(0.99 - 1.09)
2019	**1.70**	**(1.64 - 1.76)**	**2.54**	**(2.44 - 2.64)**	**1.31**	**(1.26 - 1.37)**
2020	**1.24**	**(1.14 - 1.34)**	**2.25**	**(2.07 - 2.45)**	**1.22**	**(1.11 - 1.34)**
2021	**1.24**	**(1.17 - 1.31)**	**2.25**	**(2.12 - 2.38)**	1.02	(0.96 - 1.09)
2022	**1.47**	**(1.42 - 1.53)**	**2.40**	**(2.31 - 2.49)**	**1.07**	**(1.02 - 1.11)**

Table A 68. 2022 childhood pneumonia hospitalisation rates by ethnic group and age.

Age	Māori			Pacific			Asian			non-MPA		
(years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI
<5	1009	1261.8	(1184-1339.7)	952	2258.4	(2114.9-2401.8)	613	882.3	(812.4-952.1)	1025	967.4	(908.2-1026.6)
5-14	398	221.3	(199.6-243.1)	247	263.8	(230.9-296.7)	203	183.9	(158.6-209.2)	380	133.2	(119.8-146.6)

Table A 69. 2022 childhood pneumonia hospitalisation rates by NZDep2018 quintile.

		Rate			
NZDep quintile	n	raw	age adj'd	95% CI	RR 95% CI
1-2	563	288.6	323.7	(296.9-350.5)	1.00 Baseline
3-4	641	389.9	406.8	(375.3-438.3)	**1.26 (1.19-1.33)**
5-6	732	421.3	428.3	(397.2-459.3)	**1.32 (1.25-1.40)**
7-8	1086	595.3	579.8	(545.3-614.4)	**1.79 (1.70-1.88)**
9-10	1520	612.8	601.1	(570.9-631.3)	**1.86 (1.77-1.95)**

Table A 70. Childhood pneumonia hospitalisation rates by NZDep2018 quintile 2000 – 2022, 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	340	230.4 (205.8-254.9)	419	272.8 (246.7-298.9)	535	341.7 (312.8-370.7)	746	418.0 (388.0-448.0)	1540	633.9 (602.2-665.6)
2001	346	232.0 (207.5-256.5)	477	306.6 (279.0-334.1)	654	417.1 (385.2-449.1)	797	455.9 (424.2-487.6)	1682	709.9 (675.9-743.8)
2002	354	235.4 (210.9-260.0)	460	296.4 (269.3-323.5)	506	322.7 (294.6-350.9)	771	442.1 (410.9-473.3)	1534	645.8 (613.5-678.2)
2003	343	226.2 (202.2-250.2)	455	286.1 (259.8-312.4)	531	342.9 (313.7-372.1)	731	416.6 (386.4-446.9)	1584	672.0 (638.9-705.1)
2004	297	200.7 (177.8-223.5)	362	251.0 (225.1-276.8)	450	272.8 (247.6-298.0)	638	345.3 (318.5-372.1)	1372	568.4 (538.3-598.5)
2005	341	226.4 (202.4-250.5)	442	308.5 (279.7-337.3)	520	313.8 (286.8-340.7)	715	393.7 (364.9-422.6)	1424	592.2 (561.4-622.9)
2006	339	221.9 (198.3-245.5)	426	296.2 (268.1-324.4)	514	307.6 (281.0-334.2)	746	408.5 (379.2-437.8)	1452	609.2 (577.8-640.5)
2007	328	211.8 (188.8-234.7)	335	228.3 (203.9-252.8)	418	249.9 (225.9-273.9)	695	372.2 (344.5-399.9)	1409	580.4 (550.1-610.7)
2008	351	222.4 (199.1-245.7)	419	282.5 (255.4-309.6)	526	305.7 (279.6-331.9)	733	380.9 (353.3-408.5)	1546	630.8 (599.3-662.3)
2009	401	250.8 (226.3-275.4)	456	301.0 (273.3-328.6)	616	356.1 (327.9-384.2)	928	475.7 (445.0-506.4)	1728	696.7 (663.7-729.6)
2010	410	239.5 (216.3-262.7)	386	248.8 (224.0-273.7)	534	314.5 (287.8-341.2)	796	421.2 (391.8-450.6)	1288	504.9 (477.2-532.6)
2011	348	201.9 (180.6-223.1)	396	251.2 (226.4-275.9)	517	303.5 (277.3-329.7)	794	415.9 (386.8-445.0)	1266	488.4 (461.3-515.4)
2012	299	171.1 (151.7-190.5)	381	241.2 (217-265.5)	467	274.3 (249.4-299.2)	686	357.7 (330.8-384.6)	1262	494.2 (466.8-521.6)
2013	338	192.3 (171.7-212.8)	365	232.2 (208.4-256.1)	481	282.9 (257.6-308.2)	650	342.9 (316.4-369.4)	1157	463.7 (436.9-490.5)
2014	399	227.3 (205.0-249.7)	454	290.8 (264.0-317.6)	512	298.9 (273.0-324.8)	699	374.1 (346.3-401.9)	1420	571.7 (541.9-601.5)
2015	440	246.2 (223.2-269.2)	481	307.3 (279.8-334.8)	565	336.5 (308.7-364.3)	807	431.7 (401.9-461.6)	1599	646.9 (615.2-678.7)
2016	406	230.1 (207.7-252.6)	380	243.0 (218.5-267.4)	445	265.5 (240.8-290.2)	603	320.3 (294.7-345.9)	1277	510.7 (482.6-538.7)
2017	409	225.3 (203.4-247.2)	435	276.0 (250.1-302)	546	319.2 (292.4-346)	761	404.1 (375.4-432.9)	1283	517.6 (489.3-545.9)
2018	527	291.9 (266.9-316.9)	472	298.1 (271.2-325.0)	548	322.0 (295.0-348.9)	790	422.0 (392.5-451.4)	1347	533.0 (504.5-561.4)
2019	526	288.7 (263.9-313.4)	575	359.5 (330.1-388.9)	675	393.4 (363.8-423.1)	1048	565.7 (531.4-600.0)	1489	588.0 (558.1-617.9)
2020	96	53.4 (42.6-64.1)	128	80.1 (66.2-93.9)	163	94.4 (79.9-108.9)	181	96.7 (82.6-110.8)	300	118.2 (104.8-131.6)
2021	256	147.3 (129.2-165.4)	284	182.1 (160.9-203.3)	325	188.7 (168.2-209.2)	419	220.5 (199.4-241.6)	593	232.3 (213.6-251.0)
2022	563	323.7 (296.9-350.5)	641	406.8 (375.3-438.3)	732	428.3 (397.2-459.3)	1086	579.8 (545.3-614.4)	1520	601.1 (570.9-631.3)

Table A 71. Childhood pneumonia hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2022, 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	1.18 (1.1 - 1.27)	1.48 (1.39 - 1.58)	1.81 (1.71 - 1.93)	2.75 (2.60 - 2.91)
2001	1.32 (1.24 - 1.41)	1.80 (1.69 - 1.92)	1.97 (1.85 - 2.09)	3.06 (2.89 - 3.24)
2002	1.26 (1.18 - 1.35)	1.37 (1.28 - 1.46)	1.88 (1.77 – 2.00)	2.74 (2.59 - 2.90)
2003	1.26 (1.18 - 1.35)	1.52 (1.42 - 1.62)	1.84 (1.73 - 1.96)	2.97 (2.81 - 3.14)
2004	1.25 (1.16 - 1.35)	1.36 (1.27 - 1.46)	1.72 (1.61 - 1.84)	2.83 (2.67 - 3.01)
2005	1.36 (1.27 - 1.46)	1.39 (1.30 - 1.48)	1.74 (1.63 - 1.85)	2.62 (2.47 - 2.77)
2006	1.33 (1.25 - 1.43)	1.39 (1.30 - 1.48)	1.84 (1.73 - 1.96)	2.75 (2.59 - 2.91)
2007	1.08 (1.00 - 1.16)	1.18 (1.10 - 1.27)	1.76 (1.65 - 1.87)	2.74 (2.59 - 2.91)
2008	1.27 (1.19 - 1.36)	1.37 (1.29 - 1.47)	1.71 (1.61 - 1.82)	2.84 (2.68 – 3.00)
2009	1.20 (1.12 - 1.28)	1.42 (1.34 - 1.51)	1.90 (1.79 - 2.01)	2.78 (2.63 - 2.93)
2010	1.04 (0.97 - 1.11)	1.31 (1.23 - 1.40)	1.76 (1.66 - 1.86)	2.11 (2.00 - 2.22)
2011	1.24 (1.16 - 1.33)	1.50 (1.41 - 1.61)	2.06 (1.94 - 2.19)	2.42 (2.28 - 2.56)
2012	1.41 (1.31 - 1.52)	1.60 (1.49 - 1.72)	2.09 (1.96 - 2.23)	2.89 (2.72 - 3.07)
2013	1.21 (1.12 - 1.30)	1.47 (1.38 - 1.57)	1.78 (1.67 - 1.90)	2.41 (2.27 - 2.56)
2014	1.28 (1.20 - 1.37)	1.31 (1.23 - 1.40)	1.65 (1.55 - 1.75)	2.51 (2.38 - 2.65)
2015	1.25 (1.17 - 1.33)	1.37 (1.29 - 1.45)	1.75 (1.66 - 1.86)	2.63 (2.50 - 2.77)
2016	1.06 (0.99 - 1.13)	1.15 (1.08 - 1.23)	1.39 (1.31 - 1.48)	2.22 (2.10 - 2.34)
2017	1.23 (1.15 - 1.31)	1.42 (1.33 - 1.51)	1.79 (1.69 - 1.90)	2.30 (2.18 - 2.42)
2018	1.02 (0.96 - 1.08)	1.10 (1.04 - 1.17)	1.45 (1.37 - 1.52)	1.83 (1.74 - 1.92)
2019	1.25 (1.18 - 1.32)	1.36 (1.29 - 1.44)	1.96 (1.86 - 2.06)	2.04 (1.94 - 2.14)
2020	1.50 (1.32 - 1.71)	1.77 (1.57 – 2.00)	1.81 (1.61 - 2.04)	2.21 (1.98 - 2.48)
2021	1.24 (1.14 - 1.34)	1.28 (1.18 - 1.39)	1.50 (1.39 - 1.61)	1.58 (1.47 - 1.69)
2022	1.26 (1.19 - 1.33)	1.32 (1.25 - 1.40)	1.79 (1.70 - 1.88)	1.86 (1.77 - 1.95)

All differences are statistically significant

Table A 72. 2022 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	77	131	203	339	657
	Rate (raw)	351.1	458.6	545.2	584.0	544.9
	Rate (age adj'd)	380.6	470.5	548.8	585.6	543.1
	95%CI	(295.4-465.8)	(389.9-551.1)	(473.3-624.4)	(523.2-647.9)	(501.6-584.7)
Pacific	Hosp_Num	47	86	127	290	649
	Rate (raw)	735.2	832.1	809.8	1074.8	815.0
	Rate (age adj'd)	772.1	831.7	818.6	1066.7	815.0
	95%CI	(551.1-993.1)	(655.9-1007.5)	(676.2-960.9)	(943.9-1189.5)	(752.3-877.7)
Asian	Hosp_Num	115	138	173	221	169
	Rate (raw)	361.3	401.1	466.7	594.3	529.1
	Rate (age adj'd)	329.4	372.3	422.6	527.0	473.3
	95%CI	(269-389.8)	(309.9-434.6)	(359.2-486.1)	(456.4-597.6)	(400.8-545.8)
NZ European/ Other	Hosp_Num	340	309	270	304	182
	Rate (raw)	286.9	307.5	302.2	402.8	398.4
	Rate (age adj'd)	341.5	343.3	318.0	412.7	406.0
	95%CI	(304.9-378.2)	(304.9-381.8)	(280.1-356)	(366.3-459.2)	(347-465.1)

Table A 73. 2022 childhood pneumonia hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	249	620.8	643.3	(563.4-723.3)
Waitemata	590	481.9	488.0	(448.6-527.3)
Auckland	605	787.1	807.5	(743.2-871.9)
Counties Manakau	827	611.0	616.4	(574.4-658.4)
Waikato	448	505.6	505.4	(458.6-552.2)
Lakes	182	742.6	762.2	(651.5-873.0)
Bay of Plenty	275	517.6	524.4	(462.4-586.4)
Tairawhiti	32	276.8	279.7	(182.7-376.7)
Hawkes Bay	143	394.8	411.5	(344.0-479.0)
Taranaki	62	239.1	246.7	(185.3-308.2)
Midcentral	88	241.3	246.0	(194.6-297.4)
Whanganui	31	228.8	234.0	(151.6-316.4)
Capital and Coast	178	342.6	358.2	(305.5-410.8)
Hutt	140	451.5	450.7	(376.0-525.4)
Wairarapa	30	330.8	338.1	(217.1-459.1)
Nelson Marlborough	65	240.9	258.5	(195.5-321.4)
West Coast	10	183.8	189.4	(71.9-306.9)
Canterbury	340	329.4	331.5	(296.2-366.7)
Sth Canterbury	23	216.2	227.2	(134.3-320.2)
Southern	198	339.8	351.8	(302.8-400.8)

CHILDHOOD PNEUMONIA MORTALITY

Table A 74. Childhood pneumonia mortality rates and age-adjusted rates 2000-2019.

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)
2018	10	1.06	1.06	(0.40-1.71)
2019	7	0.73	0.74	(0.19-1.28)
2020	*2*	*0.21*	*0.21*	*(0.00-0.50)*
2021	*5*	*0.52*	*0.53*	*(0.07-0.99)*
Trend 2000 -2019			-0.03	(-0.04 - -0.16), p<0.001

Data in italics are provisional or preliminary.

Table A 75. Childhood pneumonia mortality rates and rate ratios by age group and sex, 2010-2019.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	75	2.4	(1.9-3.0)	43	2.7	(1.9-3.5)	32	2.1	(1.4-2.9)	**0.79**	**(0.63-0.98)**
5-14	17	0.3	(0.1-0.4)	8	0.3	(0.1-0.4)	9	0.3	(0.1-0.5)	1.18	(0.75-1.88)

Table A 76. Childhood pneumonia hospitalisation age group rate ratios by sex, 2010-2019.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	**8.75**	**(6.78-11.29)**	**10.64**	**(7.38-15.34)**	**7.06**	**(4.93-10.10)**
5-14	1.00	Baseline	1.00	Baseline	1.00	Baseline

Table A 77. Childhood pneumonia mortality rates and rate ratios by ethnic group, 2010-2019.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	40	1.7	1.6	(1.1-2.1)	**3.93**	**(3.01-5.12)**
Pacific	30	2.4	2.3	(1.5-3.1)	**5.63**	**(4.26-7.45)**
Asian	11	0.9	0.8	(0.3-1.2)	**1.92**	**(1.34-2.75)**
Non-MPA	19	0.4	0.4	(0.2-0.6)	1.00	Baseline

Table A 78. Childhood pneumonia mortality rates NZDep2018 quintile, 2010-2019.

NZDep	n	Rate			RR	95% CI
		raw	age adj'd	95% CI		
1-2	3	0.2	0.2	(0.1-0.5)	1.00	Baseline
3-4	9	0.6	0.6	(0.2-0.9)	**3.23**	**(1.72-6.09)**
5-6	15	0.9	0.9	(0.4-1.3)	**5.08**	**(2.78-9.26)**
7-8	11	0.6	0.6	(0.2-0.9)	**3.24**	**(1.74-6.01)**
9-10	54	2.3	2.1	(1.6-2.7)	**12.07**	**(6.87-21.21)**

Table A 79. Childhood pneumonia mortality rates by DHB, 2010 - 2019.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	9	0.30	0.10	(0.50-3.69)
Waitemata	7	0.61	0.60	(0.16-1.05)
Auckland	8	0.25	0.08	(0.43-1.31)
Counties Manakau	21	1.71	1.64	(0.94-2.34)
Waikato	10	1.19	1.17	(0.44-1.89)
Lakes	3	1.26	1.25	(0.40-3.86)
Bay of Plenty	8	1.70	1.69	(0.52-2.86)
Tairawhiti	1	0.86	0.85	(0.12-6.03)
Hawkes Bay	3	0.86	0.85	(0.27-2.63)
Taranaki	3	1.23	1.19	(0.38-3.69)
Midcentral	2	0.58	0.56	(0.14-2.25)
Whanganui	1	0.76	0.74	(0.10-5.24)
Capital and Coast	6	1.09	1.06	(0.21-1.91)
Hutt	3	0.99	0.94	(0.30-2.93)
Wairarapa	0			(0-0)
Nelson Marlborough	0			(0-0)
West Coast	1	1.65	1.69	(0.24-11.99)
Canterbury	3	0.31	0.30	(0.10-0.93)
Sth Canterbury	0			(0-0)
Southern	5	0.88	0.87	(0.11-1.64)

COPD IN ADULTS AGED 45+ YEARS

ADULT 45+ YEARS COPD HOSPITALISATIONS

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

Table A 80. COPD hospitalisations in adults aged 45+, rates and age-adjusted rates 2000-2022.

		Rate		
Year	**n**	**Raw**	**(age adj'd)**	**95% CI**
2000	7703	598.2	623.9	(609.9-637.9)
2001	8821	669.5	696.2	(681.6-710.8)
2002	9016	666.7	695.2	(680.7-709.6)
2003	9846	708.6	744.9	(730.1-759.7)
2004	10202	714.2	752.0	(737.3-766.7)
2005	9448	643.7	682.3	(668.4-696.1)
2006	10113	669.7	711.3	(697.3-725.2)
2007	10162	655.7	696.6	(683.0-710.2)
2008	11036	694.6	739.0	(725.2-752.9)
2009	11294	694.3	736.6	(722.9-750.2)
2010	11480	690.1	728.5	(715.2-741.9)
2011	11747	692.0	726.5	(713.4-739.7)
2012	11896	687.6	715.1	(702.2-728.0)
2013	11267	638.6	658.3	(646.2-670.5)
2014	11609	643.3	659.1	(647.1-671.1)
2015	11741	636.0	648.2	(636.4-659.9)
2016	11325	598.7	607.8	(596.6-619.0)
2017	12399	640.5	644.7	(633.4-656.1)
2018	11791	596.7	596.7	(585.9-607.5)
2019	12464	618.5	612.1	(601.3-622.8)
2020	9419	456.0	446.2	(437.2-455.3)
2021	10017	478.8	461.9	(452.8-470.9)
2022	10109	478.7	454.6	(445.8-463.5)
Trend 2000 -2022			**-10.13**	**(-10.16 - -10.09), p<0.001**

Table A 81. 2022 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	2906	228.4	(220.1-236.7)	1197	192.9	(181.9-203.8)	1708	262.1	(249.7-274.6)	**1.36**	**(1.31-1.41)**
65+	7203	857.8	(838.0-877.6)	3427	871.3	(842.1-900.5)	3776	845.9	(818.9-872.9)	**0.97**	**(0.95-0.99)**

Table A 82. 2022 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+	**3.76**	**(3.68-3.83)**	**4.52**	**(4.38-4.66)**	**3.23**	**(3.14-3.32)**

Table A 83. 2022 COPD in adults aged 45+ hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate			RR	95%CI
		Raw	Age adj'd	95% CI		
Māori	2769	1183.5	1479.8	(1420.8-1538.8)	**3.70**	**(3.61-3.78)**
Pacific	646	648.6	927.5	(851.6-1003.5)	**2.32**	**(2.22-2.41)**
Asian	134	58.2	89.9	(73.7-106.0)	**0.22**	**(0.21-0.25)**
Non-MPA	6599	445.1	400.4	(390.7-410.2)	1.00	Baseline

Table A 84. COPD in adults aged 45+ hospitalisation rates by ethnic group 2000 – 2022, 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	6380	574.5	(560.2-588.7)	1001	1567.0	(1457.3-1676.7)	254	1155.1	(997.6-1312.5)	71	289.7	(214.5-365.0)
2001	7146	632.7	(617.9-647.5)	1228	1774.4	(1664.8-1884.0)	364	1398.6	(1243.3-1553.9)	86	303.5	(233.2-373.7)
2002	7162	619.4	(605-633.9)	1378	1873.4	(1762.5-1984.4)	406	1428.1	(1275.7-1580.6)	81	243.2	(185.2-301.2)
2003	7766	657.9	(643.2-672.6)	1527	1969.4	(1859.1-2079.6)	460	1581.0	(1425.7-1736.3)	101	249.9	(195.5-304.2)
2004	8011	662.5	(647.9-677.1)	1539	2007.4	(1894.4-2120.5)	554	1769.1	(1609.7-1928.5)	113	276.0	(221.1-331.0)
2005	7387	604.6	(590.7-618.5)	1504	1799.9	(1698.9-1900.8)	436	1406.5	(1263.6-1549.4)	127	329.1	(265.6-392.6)
2006	7796	628.3	(614.2-642.3)	1678	1978.2	(1871.9-2084.4)	528	1633.4	(1480.9-1785.9)	124	276.9	(223.8-329.9)
2007	7651	602.9	(589.3-616.5)	1870	2086.8	(1982.0-2191.5)	561	1522.0	(1387.2-1656.9)	101	185.7	(145.0-226.4)
2008	8321	642.2	(628.3-656.1)	1955	2128.0	(2024.2-2231.8)	641	1835.9	(1683.8-1988.0)	136	246.3	(200.3-292.4)
2009	8415	635.8	(622.1-649.4)	2100	2085.5	(1987.2-2183.8)	667	1649.3	(1514.9-1783.7)	135	228.4	(185.9-270.8)
2010	8494	627.0	(613.6-640.4)	2149	1979.7	(1888.0-2071.4)	705	1737.9	(1600.6-1875.2)	172	239.3	(200.8-277.8)
2011	8544	617.4	(604.2-630.5)	2386	2160.2	(2065.0-2255.3)	648	1547.0	(1417.3-1676.7)	206	290.6	(246.5-334.7)
2012	8658	615.6	(602.6-628.7)	2285	1981.9	(1891.7-2072.0)	788	1883.9	(1741.1-2026.6)	210	274.9	(234.2-315.6)
2013	8123	567.5	(555.2-579.9)	2328	1942.0	(1855.6-2028.5)	665	1422.9	(1305.6-1540.3)	185	230.4	(194.1-266.8)
2014	8493	585.5	(573.0-598.0)	2288	1737.4	(1659.4-1815.4)	649	1320.5	(1210.7-1430.3)	214	261.1	(222.6-299.6)
2015	8438	568.5	(556.4-580.7)	2483	1749.3	(1674.2-1824.4)	689	1256.4	(1155.3-1357.4)	171	172.1	(144.6-199.7)
2016	7905	520.5	(509.0-532.0)	2532	1724.1	(1651.1-1797.2)	740	1329.8	(1228.0-1431.5)	177	153.0	(129.0-177.0)
2017	8560	551.0	(539.3-562.8)	2845	1824.9	(1751.9-1897.8)	810	1361.2	(1261.9-1460.4)	227	197.0	(169.5-224.5)
2018	7965	504.7	(493.6-515.8)	2884	1781.1	(1710.3-1851.9)	796	1251.6	(1159.2-1344)	203	162.7	(139.1-186.4)
2019	8429	523.5	(512.3-534.8)	3055	1824.0	(1754.0-1894.1)	814	1239.3	(1149.2-1329.4)	230	176.5	(152.3-200.7)
2020	6220	378.6	(369.2-388.1)	2499	1378.7	(1320.7-1436.7)	609	880.3	(806.1-954.5)	128	90.9	(74.2-107.6)
2021	6715	406.0	(396.2-415.8)	2596	1399.8	(1341.9-1457.6)	592	816.3	(747.0-885.6)	154	102.3	(85.3-119.3)
2022	6599	400.4	(390.7-410.2)	2769	1479.8	(1420.8-1538.8)	646	927.5	(851.6-1003.5)	134	89.9	(73.7-106.0)

Table A 85. COPD in adults aged 45+ hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2022, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	2.73	(2.63 - 2.83)	2.01	(1.88 - 2.15)	0.50	(0.44 - 0.57)
2001	2.80	(2.72 - 2.90)	2.21	(2.09 - 2.34)	0.48	(0.43 - 0.54)
2002	3.02	(2.93 - 3.12)	2.31	(2.19 - 2.43)	0.39	(0.35 - 0.44)
2003	2.99	(2.91 - 3.08)	2.40	(2.29 - 2.52)	0.38	(0.34 - 0.42)
2004	3.03	(2.94 - 3.12)	2.67	(2.55 - 2.79)	0.42	(0.38 - 0.46)
2005	2.98	(2.89 - 3.07)	2.33	(2.21 - 2.45)	0.54	(0.50 - 0.60)
2006	3.15	(3.06 - 3.24)	2.60	(2.48 - 2.72)	0.44	(0.40 - 0.48)
2007	3.46	(3.37 - 3.55)	2.52	(2.41 - 2.64)	0.31	(0.28 - 0.34)
2008	3.31	(3.23 - 3.40)	2.86	(2.74 - 2.98)	0.38	(0.35 - 0.42)
2009	3.28	(3.20 - 3.36)	2.59	(2.49 - 2.70)	0.36	(0.33 - 0.39)
2010	3.16	(3.08 - 3.24)	2.77	(2.66 - 2.88)	0.38	(0.35 - 0.41)
2011	3.50	(3.42 - 3.58)	2.51	(2.40 - 2.61)	0.47	(0.44 - 0.51)
2012	3.22	(3.14 - 3.30)	3.06	(2.95 - 3.18)	0.45	(0.42 - 0.48)
2013	3.42	(3.34 - 3.51)	2.51	(2.41 - 2.61)	0.41	(0.38 - 0.44)
2014	2.97	(2.90 - 3.04)	2.26	(2.16 - 2.35)	0.45	(0.41 - 0.48)
2015	3.08	(3.01 - 3.15)	2.21	(2.12 - 2.30)	0.30	(0.28 - 0.33)
2016	3.31	(3.24 - 3.39)	2.55	(2.46 - 2.66)	0.29	(0.27 - 0.32)
2017	3.31	(3.24 - 3.39)	2.47	(2.38 - 2.56)	0.36	(0.33 - 0.38)
2018	3.53	(3.45 - 3.61)	2.48	(2.39 - 2.57)	0.32	(0.30 - 0.35)
2019	3.48	(3.41 - 3.56)	2.37	(2.28 - 2.46)	0.34	(0.32 - 0.36)
2020	3.64	(3.56 - 3.73)	2.33	(2.23 - 2.43)	0.24	(0.22 - 0.26)
2021	3.45	(3.37 - 3.53)	2.01	(1.93 - 2.10)	0.25	(0.23 - 0.27)
2022	3.70	(3.61 - 3.78)	2.32	(2.22 - 2.41)	0.22	(0.21 - 0.25)

All differences were statistically significant

Table A 86. 2022 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	1288	731.2	(691.3-771.2)	224	298.4	(259.3-337.5)	31	18.5	(12.0-25.0)	1386	166.9	(158.1-175.7)
65+	1481	2560.9	(2430.5-2691.3)	422	1720.0	(1555.9-1884.1)	103	164.3	(132.5-196)	5213	823.1	(800.8-845.5)

Table A 87. 2022 COPD in adults aged 45+ hospitalisation rates by NZDep2018 quintile.

		Rate				
NZDep	n	raw	age adj'd	95% CI	RR	95% CI
1-2	842	176.4	178.7	(166.6-190.9)	1.00	Baseline
3-4	1233	302.1	285.7	(269.7-301.6)	**1.60**	**(1.53-1.67)**
5-6	1703	407.9	368.2	(350.6-385.8)	**2.06**	**(1.98-2.14)**
7-8	2633	632.8	580.3	(558.0-602.6)	**3.25**	**(3.13-3.37)**
9-10	3694	939.9	923.6	(893.7-953.4)	**5.17**	**(4.98-5.36)**

Table A 88. COPD in adults 45+ hospitalisation rates by NZDep2018 quintile 2000 – 2022, 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	738	339.5 (314.8-364.2)	1151	483.1 (455.1-511.2)	1535	598.9 (568.7-629.0)	2072	733.7 (701.7-765.6)	2206	933.9 (894.7-973.0)
2001	751	340.0 (315.5-364.5)	1357	550.5 (521.1-579.9)	1834	704.0 (671.6-736.4)	2316	796.2 (763.4-829.0)	2546	1062.0 (1020.6-1103.5)
2002	891	384.6 (359.1-410.1)	1331	527.2 (498.7-555.6)	1760	659.1 (628.1-690.1)	2313	779.4 (747.3-811.5)	2716	1113.6 (1071.5-1155.6)
2003	874	375.0 (349.9-400.1)	1380	529.7 (501.6-557.8)	1883	689.0 (657.7-720.4)	2709	903.5 (869.1-937.9)	2970	1198.6 (1155.3-1241.9)
2004	798	347.7 (323.4-372.1)	1460	593.4 (562.8-624.0)	1901	635.7 (606.9-664.5)	2836	893.4 (860.2-926.7)	3196	1231.9 (1189.0-1274.8)
2005	794	335.1 (311.5-358.7)	1183	468.9 (442.0-495.8)	1713	560.9 (534.2-587.7)	2598	808.5 (777.1-839.9)	3155	1189.2 (1147.5-1230.9)
2006	810	335.3 (312.0-358.6)	1279	501.4 (473.8-529.0)	1912	613.1 (585.5-640.8)	2775	841.9 (810.2-873.6)	3334	1226.0 (1184.2-1267.8)
2007	829	329.3 (306.7-351.9)	1232	467.0 (440.8-493.2)	1740	541.5 (515.9-567.1)	2856	853.1 (821.5-884.7)	3500	1263.4 (1221.3-1305.4)
2008	848	323.4 (301.4-345.4)	1351	498.5 (471.8-525.2)	2041	615.1 (588.2-641.9)	3108	918.5 (885.8-951.1)	3675	1313.6 (1270.9-1356.3)
2009	883	325.6 (303.9-347.3)	1334	477.3 (451.5-503.0)	2106	628.9 (601.9-655.9)	3154	910.6 (878.5-942.7)	3813	1317.2 (1275.3-1359.2)
2010	947	333.9 (312.4-355.4)	1342	462.8 (437.9-487.7)	2113	629.8 (602.8-656.7)	3297	963.6 (930.5-996.7)	3772	1212.3 (1173.4-1251.1)
2011	986	332.5 (311.5-353.4)	1395	470.0 (445.2-494.7)	2157	627.4 (600.8-654.0)	3379	969.0 (936.1-1001.8)	3826	1217.9 (1179.2-1256.6)
2012	1001	325.4 (305.1-345.7)	1496	483.6 (459.1-508.2)	2032	578.4 (553.2-603.6)	3225	898.4 (867.2-929.6)	4139	1298.7 (1259.1-1338.4)
2013	895	280.8 (262.2-299.3)	1287	404.3 (382.2-426.5)	2075	571.8 (547.1-596.5)	3062	835.4 (805.6-865.1)	3941	1214.5 (1176.5-1252.5)
2014	904	268.2 (250.6-285.8)	1352	410.2 (388.3-432.1)	2072	558.9 (534.7-583.0)	3010	807.8 (778.9-836.8)	4263	1285.2 (1246.6-1323.8)
2015	902	258.8 (241.8-275.8)	1332	392.1 (371.1-413.2)	2051	537.9 (514.6-561.2)	3091	806.0 (777.5-834.5)	4346	1284.8 (1246.6-1323.0)
2016	952	259.7 (243.1-276.3)	1332	381.1 (360.6-401.6)	1993	506.8 (484.5-529.1)	3004	766.0 (738.5-793.5)	4042	1168.6 (1132.5-1204.7)
2017	915	239.9 (224.3-255.6)	1520	416.4 (395.5-437.3)	2092	516.4 (494.2-538.6)	3341	830.8 (802.6-859.1)	4526	1277.5 (1240.3-1314.8)
2018	986	248.3 (232.7-263.8)	1404	374.7 (355.1-394.3)	2006	483.5 (462.3-504.7)	3108	755.4 (728.8-782.1)	4281	1178.8 (1143.5-1214.1)
2019	1006	242.4 (227.3-257.5)	1563	403.4 (383.4-423.4)	2190	517.6 (495.9-539.4)	3286	776.5 (749.9-803.2)	4418	1189.0 (1153.9-1224.0)
2020	704	161.3 (149.4-173.3)	1168	288.2 (271.6-304.7)	1635	369.4 (351.5-387.4)	2393	556.1 (533.8-578.5)	3514	915.1 (884.9-945.4)
2021	771	170.5 (158.4-182.6)	1217	289.5 (273.3-305.8)	1729	380.3 (362.3-398.4)	2832	643.2 (619.4-667.0)	3467	881.2 (851.9-910.6)
2022	842	178.7 (166.6-190.9)	1233	285.7 (269.7-301.6)	1703	368.2 (350.6-385.8)	2633	580.3 (558.0-602.6)	3694	923.6 (893.7-953.4)

Table A 89. COPD in adults 45+ hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2022, 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	1.42 (1.36 - 1.49)	1.76 (1.69 - 1.84)	2.16 (2.07 - 2.25)	2.75 (2.64 - 2.87)
2001	1.62 (1.55 - 1.69)	2.07 (1.99 - 2.16)	2.34 (2.25 - 2.44)	3.12 (3.00 - 3.25)
2002	1.37 (1.31 - 1.43)	1.71 (1.65 - 1.78)	2.03 (1.95 - 2.10)	2.90 (2.79 - 3.00)
2003	1.41 (1.36 - 1.47)	1.84 (1.77 - 1.91)	2.41 (2.32 - 2.50)	3.20 (3.08 - 3.32)
2004	1.71 (1.64 - 1.78)	1.83 (1.76 - 1.90)	2.57 (2.47 - 2.67)	3.54 (3.41 - 3.68)
2005	1.40 (1.34 - 1.46)	1.67 (1.61 - 1.74)	2.41 (2.32 - 2.51)	3.55 (3.42 - 3.69)
2006	1.50 (1.43 - 1.56)	1.83 (1.76 - 1.90)	2.51 (2.42 - 2.61)	3.66 (3.52 - 3.80)
2007	1.42 (1.36 - 1.48)	1.64 (1.58 - 1.71)	2.59 (2.49 - 2.69)	3.84 (3.70 - 3.98)
2008	1.54 (1.48 - 1.61)	1.90 (1.83 - 1.98)	2.84 (2.74 - 2.95)	4.06 (3.92 - 4.21)
2009	1.47 (1.41 - 1.53)	1.93 (1.86 - 2.01)	2.80 (2.70 - 2.90)	4.05 (3.90 - 4.19)
2010	1.39 (1.33 - 1.44)	1.89 (1.82 - 1.96)	2.89 (2.79 - 2.99)	3.63 (3.51 - 3.76)
2011	1.41 (1.36 - 1.47)	1.89 (1.82 - 1.96)	2.91 (2.82 - 3.02)	3.66 (3.54 - 3.79)
2012	1.49 (1.43 - 1.55)	1.78 (1.71 - 1.84)	2.76 (2.67 - 2.86)	3.99 (3.86 - 4.13)
2013	1.44 (1.38 - 1.50)	2.04 (1.96 - 2.12)	2.98 (2.87 - 3.09)	4.33 (4.18 - 4.48)
2014	1.53 (1.47 - 1.59)	2.08 (2.01 - 2.16)	3.01 (2.90 - 3.12)	4.79 (4.63 - 4.96)
2015	1.52 (1.45 - 1.58)	2.08 (2.00 - 2.16)	3.11 (3.00 - 3.23)	4.96 (4.79 - 5.14)
2016	1.47 (1.41 - 1.53)	1.95 (1.88 - 2.03)	2.95 (2.85 - 3.06)	4.50 (4.35 - 4.66)
2017	1.74 (1.67 - 1.81)	2.15 (2.07 - 2.24)	3.46 (3.34 - 3.59)	5.32 (5.14 - 5.51)
2018	1.51 (1.45 - 1.57)	1.95 (1.88 - 2.02)	3.04 (2.94 - 3.15)	4.75 (4.59 - 4.91)
2019	1.66 (1.60 - 1.73)	2.14 (2.06 - 2.21)	3.20 (3.10 - 3.32)	4.90 (4.74 - 5.07)
2020	1.79 (1.71 - 1.87)	2.29 (2.19 - 2.39)	3.45 (3.31 - 3.59)	5.67 (5.45 - 5.90)
2021	1.70 (1.63 - 1.77)	2.23 (2.14 - 2.33)	3.77 (3.63 - 3.92)	5.17 (4.98 - 5.37)
2022	1.60 (1.53 - 1.67)	2.06 (1.98 - 2.14)	3.25 (3.13 - 3.37)	5.17 (4.98 - 5.36)

All differences are statistically significant

Table A 90. 2022 COPD in adults aged 45+ 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	83	175	269	733	1508
	Rate (raw)	417.4	694.6	817.3	1425.8	1508.5
	Rate (age adj'd)	682.0	988.9	1047.0	1720.9	1820.6
	95%CI	(512.0-852.0)	(824.1-1153.8)	(911.7-1182.4)	(1589.2-1852.6)	(1722.1-1919.2)
Pacific	Hosp_Num	20	36	41	122	427
	Rate (raw)	372.5	444.2	338.7	619.8	810.6
	Rate (age adj'd)	582.0	598.3	466.1	876.4	1197.4
	95%CI	(319.4-844.5)	(396.2-800.5)	(314.5-617.8)	(712.6-1040.3)	(1074.3-1320.5)
Asian	Hosp_Num	15	17	23	34	45
	Rate (raw)	36.7	34.7	45.1	73.3	126.9
	Rate (age adj'd)	84.1	53.0	70.5	103.3	197.0
	95%CI	(38.2-130.1)	(26.1-79.9)	(40.5-100.5)	(67.2-139.3)	(135.3-258.7)
NZ European/ Other	Hosp_Num	727	1007	1371	1755	1736
	Rate (raw)	198.2	290.8	427.6	597.5	901.0
	Rate (age adj'd)	223.0	263.9	367.9	507.2	782.9
	95%CI	(206.4-239.6)	(247.5-280.2)	(348.1-387.6)	(483.0-531.5)	(745.4-820.4)

Table A 91. 2022 COPD in adults aged 45+ hospitalisation rates by DHB.

DHB	n	Rate		
		raw	age adj'd	95%CI
Northland	623	649.6	584.5	(538.1-630.8)
Waitemata	946	374.7	369.5	(345.9-393.1)
Auckland	648	361.5	369.0	(340.6-397.5)
Counties Manakau	846	403.4	426.7	(397.8-455.5)
Waikato	1187	644.3	599.0	(564.7-633.2)
Lakes	341	677.7	642.6	(574.1-711.0)
Bay of Plenty	608	490.7	435.0	(399.9-470.1)
Tairawhiti	171	798.3	751.2	(638.3-864.1)
Hawkes Bay	628	771.0	721.1	(664.3-777.9)
Taranaki	423	748.1	688.2	(622.3-754.1)
Midcentral	431	525.5	467.6	(423.1-512.2)
Whanganui	364	1121.4	1003.6	(899.4-1107.8)
Capital and Coast	332	266.7	270.3	(241.2-299.4)
Hutt	289	453.8	453.4	(401.0-505.7)
Wairarapa	105	412.1	354.6	(285.9-423.4)
Nelson Marlborough	305	365.3	326.9	(289.8-363.9)
West Coast	115	662.8	623.1	(506.8-739.4)
Canterbury	885	359.8	339.7	(317.3-362.2)
Sth Canterbury	170	552.8	470.3	(398.6-542.0)
Southern	689	456.4	417.9	(386.6-449.2)

ADULT 45+ YEARS COPD MORTALITY

Table A 92. COPD in adults 45+ mortality rates and age-adjusted rates 2000-2019.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	1435	111.4	116.6	(110.6-122.7)
2001	1706	129.5	134.8	(128.4-141.2)
2002	1597	118.1	123.9	(117.8-130.0)
2003	1639	118.0	123.0	(117.0-129.0)
2004	1701	119.1	125.1	(119.1-131.1)
2005	1468	100.0	105.5	(100.0-110.9)
2006	1541	102.0	107.7	(102.2-113.1)
2007	1468	94.7	99.6	(94.5-104.7)
2008	1670	105.1	111.0	(105.6-116.3)
2009	1562	96.0	101.1	(96.1-106.2)
2010	1480	89.0	93.0	(88.2-97.7)
2011	1591	93.7	97.7	(92.9-102.6)
2012	1540	89.0	91.8	(87.2-96.4)
2013	1499	85.0	87.2	(82.8-91.6)
2014	1609	89.2	91.1	(86.6-95.5)
2015	1603	86.8	88.3	(84.0-92.6)
2016	1542	81.5	82.4	(78.2-86.5)
2017	1626	84.0	84.4	(80.3-88.5)
2018	1552	78.5	78.5	(74.6-82.4)
2019	1568	77.8	77.0	(73.2-80.8)
2020	*1227*	*59.4*	*58.1*	*(54.8-61.3)*
2021	*1498*	*71.6*	*68.5*	*(65.1-72.0)*
Trend 2000 -2019			**-2.74**	**(-2.75 - -2.73), p<0.001**

Data in italics are provisional or preliminary.

Table A 93. COPD in adults aged 45+ mortality rates and rate ratios by age group and sex, 2019.

Age (years)	Total			Male			Female			M v F	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
45-64	188	15.0	(12.8-17.1)	103	16.8	(13.6-20.1)	85	13.2	(10.4-16)	**0.78**	**(0.68-0.90)**
65+	1380	181.6	(172-191.2)	685	192.8	(178.3-207.2)	695	171.8	(159.1-184.6)	**0.89**	**(0.85-0.94)**

Table A 94. COPD in adults aged 45+ age group mortality rate ratios by sex, 2019.

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+	**12.13**	**(11.26-13.06)**	**11.44**	**(10.35-12.65)**	**13.02**	**(11.67-14.52)**

Table A 95. COPD in adults aged 45+ mortality rates and rate ratios by ethnic group, 2019.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	239	111.8	169.0	(145.8-192.2)	**2.24**	**(2.08-2.40)**
Pacific	38	41.6	72.5	(47.9-97.0)	0.96	(0.81-1.13)
Asian	25	12.2	23.8	(14.0-33.6)	**0.31**	**(0.26-0.39)**
Non-MPA	1268	86.3	75.5	(71.4-79.7)	1.00	Baseline

Table A 96. COPD in adults aged 45+ mortality rates by ethnic group and age, 2019.

	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	68	41.9	(32.0-51.9)	9	13.0	(4.5-21.5)	3	2.0	(0.6-6.1)	109	12.9	(10.5-15.4)
65+	171	332.0	(282.3-381.8)	29	131.1	(83.4-178.8)	22	41.2	(24.0-58.4)	1159	190.0	(179.1-200.9)

Table A 97. COPD in adults aged 45+ mortality rates by NZDep2018 quintile, 2019.

NZDep	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	168	37.2	43.8	(37.1-50.4)	1.00	Baseline
3-4	221	57.1	57.5	(49.9-65.1)	**1.31**	**(1.19-1.45)**
5-6	345	86.5	78.4	(70.1-86.7)	**1.79**	**(1.64-1.96)**
7-8	434	108.9	98.0	(88.7-107.2)	**2.24**	**(2.05-2.44)**
9-10	399	106.3	109.0	(98.3-119.7)	**2.49**	**(2.28-2.72)**

Table A 98. COPD in adults aged 45+ mortality rates by ethnic group and NZDep2018 quintile, 2019.

		NZDep2018 quintile				
Ethnic group		**1-2**	**3-4**	**5-6**	**7-8**	**9-10**
Māori	Hosp_Num	10	16	39	56	118
	Rate (raw)	52.2	65.9	122.6	114.0	124.7
	Rate (age adj'd)	85.0	110.0	200.2	162.0	179.1
	95%CI	(27.6-142.4)	(46.5-173.5)	(131.5-268.8)	(117.5-206.5)	(144-214.3)
Pacific	Hosp_Num	1	1	6	11	19
	Rate (raw)	19.2	12.9	52.1	58.4	37.8
	Rate (age adj'd)	38.6	19.5	84.2	96.7	69.2
	95%CI	(5.4-274.2)	(2.7-138.2)	(14.0-154.3)	(35.0-158.3)	(35.8-102.7)
Asian	Hosp_Num	5	3	2	11	4
	Rate (raw)	12.8	6.4	4.2	25.3	12.0
	Rate (age adj'd)	30.4	8.7	5.5	49.6	23.9
	95%CI	(1.9-58.9)	(2.7-28.2)	(1.3-23.4)	(19.3-80)	(8.5-67.1)
NZ European/ Other	Hosp_Num	153	201	299	356	259
	Rate (raw)	42.1	59.1	95.2	124.4	137.9
	Rate (age adj'd)	54.1	52.5	76.0	94.9	109.2
	95%CI	(45.3-62.8)	(45.2-59.7)	(67.3-84.7)	(84.8-105)	(95.6-122.7)

Table A 99. COPD in adults aged 45+ mortality rates by DHB, 2019.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	82	91.8	86.8	(67.9-105.7)
Waitemata	133	54.9	57.5	(47.7-67.3)
Auckland	81	46.5	50.9	(39.8-62.0)
Counties Manukau	97	48.7	59.4	(47.5-71.3)
Waikato	155	89.0	85.9	(72.4-99.5)
Lakes	42	87.9	88.2	(61.5-115)
Bay of Plenty	96	82.8	72.6	(58.0-87.2)
Tairawhiti	24	117.4	118.4	(70.9-165.8)
Hawkes Bay	81	104.2	96.3	(75.2-117.3)
Taranaki	53	98.3	89.1	(65.1-113.1)
MidCentral	76	96.5	86.7	(67.1-106.2)
Whanganui	36	115.0	104.2	(70.0-138.5)
Capital and Coast	84	69.9	73.9	(58.1-89.7)
Hutt	39	62.9	65.7	(45.1-86.3)
Wairarapa	31	130.3	117.4	(75.9-158.9)
Nelson Marlborough	71	90.0	82.4	(63.1-101.6)
West Coast	28	167.7	166.3	(104.4-228.2)
Canterbury	175	74.7	72.9	(62.1-83.7)
South Canterbury	28	93.0	81.2	(50.8-111.5)
Southern	156	108.1	101.0	(85.1-116.9)

TOTAL SERIOUS RESPIRATORY DISEASE

TOTAL RESPIRATORY HOSPITALISATIONS

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

Table A 100. Total respiratory hospitalisations, rates and age-adjusted rates 2000-2022.

Year	n	Rate		
		Raw	(age adj'd)	95% CI
2000	55451	1437.4	1475.3	(1462.7-1487.8)
2001	59367	1529.9	1572.1	(1559.3-1585.0)
2002	59245	1500.5	1545.4	(1532.8-1558.1)
2003	59435	1475.8	1534.7	(1522.2-1547.2)
2004	59843	1464.0	1524.0	(1511.5-1536.4)
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	87298	1813.6	1811.0	(1799.0-1823.0)
2018	85045	1735.4	1735.4	(1723.7-1747.1)
2019	89632	1800.1	1796.6	(1784.8-1808.3)
2020	58329	1145.9	1139.9	(1130.7-1149.2)
2021	69734	1364.3	1352.4	(1342.4-1362.5)
2022	78857	1541.0	1519.3	(1508.7-1529.9)
Trend 2000 -2022			**3.58**	**(3.54-3.62), p<0.001**

Table A 101. 2022 total respiratory hospitalisation rates and rate ratios by age group and sex

Age (years)	Total			Male			Female			F v M	
	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<5	19527	6443.704	(6353.3-6534.1)	11390	7349.3	(7214.4-7484.3)	8137	5495.7	(5376.3-5615.2)	**0.75**	**(0.73-0.77)**
5-14	5813	879.8777	(857.3-902.5)	3237	953.9	(921-986.7)	2576	801.7	(770.8-832.7)	**0.84**	**(0.80-0.89)**
15-29	6503	655.7162	(639.8-671.7)	2659	521.8	(501.9-541.6)	3844	797.3	(772.1-822.5)	**1.53**	**(1.45-1.61)**
30-64	19440	837.2021	(825.4-849)	8755	766.6	(750.5-782.6)	10685	905.6	(888.4-922.7)	**1.18**	**(1.15-1.22)**
65+	27870	3319.003	(3280-3358)	14326	3642.3	(3582.7-3702)	13544	3034.1	(2983-3085.2)	**0.83**	**(0.81-0.85)**

Table A 102. 2022 total respiratory hospitalisation age group rate ratios by sex

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<5	**7.70**	**(7.55-7.85)**	**9.59**	**(9.32-9.86)**	**6.07**	**(5.90-6.25)**
5-14	**1.05**	**(1.02-1.08)**	**1.24**	**(1.20-1.30)**	**0.89**	**(0.85-0.92)**
15-29	**0.78**	**(0.76-0.81)**	**0.68**	**(0.65-0.71)**	**0.88**	**(0.85-0.91)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**3.96**	**(3.89-4.04)**	**4.75**	**(4.63-4.88)**	**3.35**	**(3.27-3.44)**

Table A 103. 2022 total respiratory hospitalisation rates and rate ratios by ethnic group.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	19965	2298.8	2706.4	(2662.2-2750.6)	**1.94**	**(1.92-1.96)**
Pacific	11470	2639.6	3333.6	(3257.6-3409.6)	**2.39**	**(2.36-2.41)**
Asian	6794	751.2	917.5	(891.7-943.4)	**0.66**	**(0.65-0.67)**
Non-MPA	42665	1466.3	1397.2	(1383.1-1411.3)	1.00	Baseline

Table A 104. Total respiratory hospitalisation rates and rate ratios by ethnic group, 2000 – 2022, 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	11404	2543.7	(2468.9-2618.5)	5380	2537.3	(2429.6-2644.9)	1463	821.7	(760.6-882.7)	37639	1379.4	(1365.3-1393.4)
2001	12391	2725.7	(2651.4-2800.0)	6632	2983.6	(2869.3-3097.9)	1835	970.4	(909.1-1031.7)	39097	1429.4	(1415.2-1443.7)
2002	12748	2705.2	(2633.5-2776.9)	6926	3091.5	(2975.2-3207.9)	1915	907.3	(851.2-963.4)	38222	1380.2	(1366.3-1394.1)
2003	13096	2832.5	(2759.6-2905.4)	7253	3091.0	(2979.0-3203.1)	2096	865.6	(814.8-916.3)	37621	1336.8	(1323.2-1350.4)
2004	12967	2772.0	(2700.8-2843.1)	7376	3205.0	(3092.5-3317.6)	2234	899.2	(848.9-949.4)	37934	1331.6	(1318.1-1345.1)
2005	12887	2572.2	(2507.6-2636.9)	6711	2684.4	(2585.4-2783.5)	2383	897.3	(847.9-946.7)	37012	1294.6	(1281.3-1307.9)
2006	13404	2751.9	(2684.4-2819.4)	7583	3160.0	(3050.7-3269.2)	2523	905.1	(857.8-952.4)	38275	1325.8	(1312.4-1339.2)
2007	13604	2699.8	(2635.4-2764.3)	7728	3099.3	(2995.9-3202.8)	2665	850.7	(808.7-892.7)	37163	1274.2	(1261.1-1287.2)
2008	15076	2899.6	(2834.9-2964.3)	8938	3490.1	(3382.5-3597.8)	3196	1001.3	(956.0-1046.6)	40720	1380.5	(1366.9-1394.0)
2009	17261	3071.8	(3009.2-3134.4)	10348	3885.0	(3776.3-3993.7)	3554	980.4	(939.6-1021.2)	42677	1438.6	(1424.8-1452.4)
2010	16330	2868.5	(2808.7-2928.3)	9370	3477.3	(3376.7-3577.9)	3927	1054.0	(1012.8-1095.2)	43595	1457.9	(1444.0-1471.8)
2011	16631	2946.0	(2885.8-3006.1)	10023	3659.2	(3557.0-3761.5)	4168	1117.1	(1073.9-1160.4)	44601	1468.9	(1455.1-1482.7)
2012	17259	3039.3	(2978.0-3100.6)	10302	3724.0	(3622.4-3825.6)	4502	1147.1	(1104.9-1189.3)	45534	1492.1	(1478.1-1506.0)
2013	16106	2829.9	(2772.5-2887.4)	9407	3392.7	(3296.9-3488.5)	4585	1122.6	(1081.9-1163.3)	43540	1417.7	(1404.1-1431.3)
2014	17231	2900.2	(2844.0-2956.4)	10410	3691.8	(3595.6-3787.9)	5047	1113.4	(1075.3-1151.4)	46618	1514.2	(1500.2-1528.3)
2015	18886	3028.4	(2972.9-3083.8)	11128	3751.5	(3658.0-3845.0)	5603	1131.8	(1095.8-1167.8)	48095	1551.9	(1537.7-1566.1)
2016	17766	2805.4	(2753.6-2857.1)	10042	3367.7	(3281.0-3454.4)	5620	1039.5	(1006.8-1072.1)	47165	1512.6	(1498.6-1526.6)
2017	20236	3122.8	(3069.5-3176.2)	11233	3766.4	(3676.0-3856.8)	6213	1137.3	(1103.3-1171.2)	51413	1619.2	(1604.8-1633.7)
2018	20970	3040.3	(2989.8-3090.8)	11409	3585.7	(3501.2-3670.1)	6660	1107.1	(1075.4-1138.8)	48096	1527.3	(1513.2-1541.5)
2019	22216	3213.7	(3162.5-3265.0)	11827	3566.9	(3485.0-3648.7)	7215	1154.2	(1122.4-1186.0)	50724	1582.9	(1568.6-1597.3)
2020	14098	2104.5	(2063.6-2145.4)	6686	2121.8	(2059.0-2184.6)	4198	638.1	(615.3-661.0)	34567	1059.8	(1048.1-1071.5)
2021	17617	2392.1	(2350.2-2434.0)	8633	2462.7	(2397.9-2527.6)	5487	765.3	(741.4-789.1)	39712	1270.8	(1257.6-1284.0)
2022	19965	2706.4	(2662.2-2750.6)	11470	3333.6	(3257.6-3409.6)	6794	917.5	(891.7-943.4)	42665	1397.2	(1383.1-1411.3)

Table A 105. Total respiratory hospitalisation rate ratios to non-MPA by ethnic group 2000 – 2022, age-adjusted.

	Māori		Pacific		Asian	
Year	RR	95% CI	RR	95% CI	RR	95% CI
2000	1.84	(1.82 - 1.87)	1.84	(1.80 - 1.88)	0.60	(0.57 - 0.62)
2001	1.91	(1.88 - 1.93)	2.09	(2.05 - 2.13)	0.68	(0.66 - 0.70)
2002	1.96	(1.93 - 1.99)	2.24	(2.20 - 2.28)	0.66	(0.64 - 0.68)
2003	2.12	(2.09 - 2.15)	2.31	(2.27 - 2.35)	0.65	(0.63 - 0.67)
2004	2.08	(2.05 - 2.11)	2.41	(2.36 - 2.45)	0.68	(0.66 - 0.69)
2005	1.99	(1.96 - 2.01)	2.07	(2.04 - 2.11)	0.69	(0.67 - 0.71)
2006	2.08	(2.05 - 2.10)	2.38	(2.34 - 2.43)	0.68	(0.67 - 0.70)
2007	2.12	(2.09 - 2.15)	2.43	(2.39 - 2.47)	0.67	(0.65 - 0.68)
2008	2.10	(2.08 - 2.13)	2.53	(2.49 - 2.57)	0.73	(0.71 - 0.74)
2009	2.14	(2.11 - 2.16)	2.70	(2.66 - 2.74)	0.68	(0.67 - 0.70)
2010	1.97	(1.95 - 1.99)	2.39	(2.35 - 2.42)	0.72	(0.71 - 0.74)
2011	2.01	(1.98 - 2.03)	2.49	(2.46 - 2.53)	0.76	(0.75 - 0.78)
2012	2.04	(2.02 - 2.06)	2.50	(2.46 - 2.53)	0.77	(0.75 - 0.78)
2013	2.00	(1.97 - 2.02)	2.39	(2.36 - 2.43)	0.79	(0.78 - 0.81)
2014	1.92	(1.90 - 1.94)	2.44	(2.41 - 2.47)	0.74	(0.72 - 0.75)
2015	1.95	(1.93 - 1.97)	2.42	(2.39 - 2.45)	0.73	(0.72 - 0.74)
2016	1.85	(1.84 - 1.87)	2.23	(2.20 - 2.26)	0.69	(0.68 - 0.70)
2017	1.93	(1.91 - 1.95)	2.33	(2.30 - 2.36)	0.70	(0.69 - 0.71)
2018	1.99	(1.97 - 2.01)	2.35	(2.32 - 2.38)	0.72	(0.71 - 0.74)
2019	2.03	(2.01 - 2.05)	2.25	(2.23 - 2.28)	0.73	(0.72 - 0.74)
2020	1.99	(1.96 - 2.01)	2.00	(1.97 - 2.03)	0.60	(0.59 - 0.61)
2021	1.88	(1.86 - 1.90)	1.94	(1.91 - 1.96)	0.60	(0.59 - 0.61)
2022	1.94	(1.92 - 1.96)	2.39	(2.36 - 2.41)	0.66	(0.65 - 0.67)

All differences are statistically significant

Table A 106. 2022 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	8648	3329.0	(3258.8-3399.1)	5495	4047.1	(3940.1-4154.1)	3441	1913.1	(1849.2-1977)	9117	2330.0	(2282.2-2377.8)
15-29	1856	820.9	(783.5-858.2)	1047	840.4	(789.5-891.3)	553	238.0	(218.2-257.9)	3249	646.2	(624.0-668.4)
30-64	5674	1747.0	(1701.6-1792.5)	2766	1848.5	(1779.6-1917.3)	1546	360.0	(342.0-377.9)	9680	749.6	(734.7-764.6)
65+	3787	6548.4	(6339.8-6757)	2162	8811.9	(8440.5-9183.3)	1254	1999.9	(1889.2-2110.6)	20619	3255.7	(3211.3-3300.2)

Table A 107. 2022 total respiratory hospitalisation rates by NZDep2018 quintile.

	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
NZDep 1-2	10054	946.3	976.1	(956.8-995.4)	1.00	Baseline
3-4	11700	1270.0	1251.9	(1229.0-1274.8)	**1.28**	**(1.27-1.30)**
5-6	13857	1426.8	1367.5	(1344.4-1390.5)	**1.40**	**(1.38-1.42)**
7-8	19009	1844.2	1800.0	(1774.3-1825.8)	**1.84**	**(1.82-1.87)**
9-10	24228	2141.2	2178.3	(2150.6-2206.0)	**2.23**	**(2.21-2.26)**

Table A 108. Total respiratory hospitalisation numbers by NZDep2018 quintile 2000 – 2022.

Year	NZDep quintile				
	1-2	3-4	5-6	7-8	9-10
2000	6187	8099	10667	13113	17374
2001	6350	8927	11693	13844	18446
2002	6392	9100	10787	13936	18991
2003	6372	8680	10743	14074	19251
2004	6287	8216	10784	14513	19996
2005	6271	7873	10503	14455	19052
2006	6637	8267	10940	14940	20059
2007	6369	7585	10264	15617	20330
2008	6949	8535	11680	16681	22721
2009	7593	9412	12950	17853	24572
2010	8182	9519	13086	17895	23092
2011	8345	9984	13385	18471	23584
2012	8821	10380	13632	18761	24350
2013	8299	9605	13183	17759	23357
2014	8916	10607	13263	18262	26632
2015	9309	11241	13831	19528	27890
2016	9529	11056	13494	18667	26278
2017	10590	12399	15129	20440	28698
2018	10437	12127	14655	20049	27755
2019	10764	13673	16131	21513	27533
2020	7388	9006	10610	13863	17444
2021	9107	10631	12296	16878	20815
2022	10054	11700	13857	19009	24228

Table A 109. Total respiratory hospitalisation rates by NZDep2018 quintile 2000 – 2022, age-adjusted.

	NZDep 1-2		NZDep 3-4		NZDep 5-6		NZDep 7-8		NZDep 9-10	
Year	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
2000	944.8	(920.6-968.9)	1163.2	(1137.5-1189)	1482.1	(1453.6-1510.5)	1646.5	(1617.9-1675.1)	2016.3	(1984.4-2048.2)
2001	957.5	(933.4-981.7)	1263.3	(1236.7-1289.9)	1616.4	(1586.7-1646)	1728.8	(1699.7-1758)	2153.0	(2120.1-2185.9)
2002	946.7	(922.9-970.4)	1266.6	(1240.3-1293)	1468.2	(1440.3-1496.2)	1721.1	(1692.2-1750)	2186.2	(2153.4-2219.1)
2003	927.4	(904.1-950.7)	1183.6	(1158.3-1208.8)	1450.9	(1423.2-1478.6)	1720.4	(1691.7-1749.2)	2216.6	(2183.6-2249.6)
2004	944.1	(920.2-968)	1206.3	(1179.9-1232.7)	1356.1	(1330.3-1381.9)	1682.5	(1654.8-1710.2)	2234.2	(2201.7-2266.8)
2005	912.0	(888.9-935.1)	1133.6	(1108.3-1158.9)	1293.1	(1268.2-1318)	1662.7	(1635.4-1690.1)	2096.8	(2065.6-2128)
2006	950.2	(926.8-973.5)	1188.5	(1162.6-1214.3)	1328.5	(1303.5-1353.6)	1694.7	(1667.3-1722.2)	2197.7	(2166-2229.4)
2007	885.5	(863.3-907.6)	1059.1	(1035-1083.1)	1229.8	(1205.9-1253.7)	1744.8	(1717.2-1772.4)	2207.4	(2175.8-2239)
2008	942.6	(920.1-965.2)	1173.2	(1148.1-1198.2)	1366.0	(1341.1-1390.9)	1841.7	(1813.4-1869.9)	2445.8	(2412.7-2478.9)
2009	1003.8	(980.8-1026.8)	1266.4	(1240.7-1292.2)	1498.7	(1472.8-1524.7)	1927.7	(1899.2-1956.2)	2566.1	(2532.8-2599.4)
2010	1025.3	(1002.7-1047.9)	1243.1	(1218-1268.3)	1531.7	(1505.4-1558.1)	1961.1	(1932.2-1990.1)	2340.0	(2308.9-2371.2)
2011	1022.4	(1000.1-1044.7)	1283.9	(1258.6-1309.3)	1543.6	(1517.4-1569.9)	2012.6	(1983.3-2041.8)	2389.1	(2357.6-2420.5)
2012	1057.8	(1035.4-1080.2)	1313.6	(1288.3-1339)	1562.2	(1535.9-1588.5)	2012.7	(1983.7-2041.7)	2470.6	(2438.7-2502.5)
2013	977.0	(955.7-998.3)	1202.0	(1177.8-1226.1)	1488.7	(1463.2-1514.2)	1896.4	(1868.4-1924.5)	2385.0	(2353.7-2416.3)
2014	1023.2	(1001.7-1044.6)	1304.2	(1279.3-1329.1)	1476.9	(1451.7-1502.1)	1930.4	(1902.2-1958.5)	2688.5	(2655.5-2721.4)
2015	1039.6	(1018.3-1060.9)	1355.5	(1330.4-1380.6)	1522.2	(1496.7-1547.6)	2026.6	(1998.1-2055.1)	2769.4	(2736.3-2802.5)
2016	1039.4	(1018.3-1060.4)	1309.3	(1284.8-1333.8)	1455.1	(1430.5-1479.7)	1899.4	(1872.1-1926.8)	2572.4	(2540.8-2604.1)
2017	1120.3	(1098.8-1141.8)	1425.4	(1400.3-1450.5)	1591.8	(1566.4-1617.3)	2050.2	(2022-2078.4)	2796.9	(2764-2829.7)
2018	1078.3	(1057.5-1099.1)	1377.2	(1352.7-1401.8)	1529.8	(1504.9-1554.7)	1991.6	(1964-2019.3)	2630.6	(2599.2-2662.1)
2019	1090.9	(1070.1-1111.6)	1519.3	(1493.8-1544.8)	1646.0	(1620.5-1671.6)	2103.5	(2075.3-2131.7)	2582.4	(2551.5-2613.4)
2020	725.3	(708.6-741.9)	970.5	(950.3-990.6)	1049.2	(1029.1-1069.3)	1330.8	(1308.6-1353.1)	1635.2	(1610.7-1659.7)
2021	896.3	(877.7-914.8)	1147.7	(1125.7-1169.7)	1217.3	(1195.6-1239)	1605.2	(1580.9-1629.5)	1880.7	(1854.9-1906.5)
2022	976.1	(956.8-995.4)	1251.9	(1229-1274.8)	1367.5	(1344.4-1390.5)	1800.0	(1774.3-1825.8)	2178.3	(2150.6-2206)

Table A 110. Total respiratory hospitalisation rates relative to NZDep 1-2 by NZDep2018 quintile 2000 – 2022, 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	1.23	(1.21 - 1.25)	1.57	(1.54 - 1.59)	1.74	(1.72 - 1.77)	2.13	(2.10 - 2.17)
2001	1.32	(1.30 - 1.34)	1.69	(1.66 - 1.71)	1.81	(1.78 - 1.83)	2.25	(2.22 - 2.28)
2002	1.34	(1.32 - 1.36)	1.55	(1.53 - 1.57)	1.82	(1.79 - 1.84)	2.31	(2.28 - 2.34)
2003	1.28	(1.26 - 1.30)	1.56	(1.54 - 1.59)	1.86	(1.83 - 1.88)	2.39	(2.36 - 2.42)
2004	1.28	(1.26 - 1.30)	1.44	(1.41 - 1.46)	1.78	(1.76 - 1.81)	2.37	(2.33 - 2.40)
2005	1.24	(1.22 - 1.26)	1.42	(1.40 - 1.44)	1.82	(1.80 - 1.85)	2.30	(2.27 - 2.33)
2006	1.25	(1.23 - 1.27)	1.40	(1.38 - 1.42)	1.78	(1.76 - 1.81)	2.31	(2.28 - 2.35)
2007	1.20	(1.18 - 1.22)	1.39	(1.37 - 1.41)	1.97	(1.94 – 2.00)	2.49	(2.46 - 2.53)
2008	1.24	(1.23 - 1.26)	1.45	(1.43 - 1.47)	1.95	(1.93 - 1.98)	2.59	(2.56 - 2.63)
2009	1.26	(1.24 - 1.28)	1.49	(1.47 - 1.51)	1.92	(1.90 - 1.95)	2.56	(2.52 - 2.59)
2010	1.21	(1.19 - 1.23)	1.49	(1.47 - 1.51)	1.91	(1.89 - 1.94)	2.28	(2.25 - 2.31)
2011	1.26	(1.24 - 1.27)	1.51	(1.49 - 1.53)	1.97	(1.94 - 1.99)	2.34	(2.31 - 2.37)
2012	1.24	(1.22 - 1.26)	1.48	(1.46 - 1.50)	1.90	(1.88 - 1.93)	2.34	(2.31 - 2.36)
2013	1.23	(1.21 - 1.25)	1.52	(1.50 - 1.54)	1.94	(1.92 - 1.97)	2.44	(2.41 - 2.47)
2014	1.27	(1.26 - 1.29)	1.44	(1.42 - 1.46)	1.89	(1.86 - 1.91)	2.63	(2.60 - 2.66)
2015	1.30	(1.29 - 1.32)	1.46	(1.45 - 1.48)	1.95	(1.93 - 1.97)	2.66	(2.63 - 2.69)
2016	1.26	(1.24 - 1.28)	1.40	(1.38 - 1.42)	1.83	(1.81 - 1.85)	2.47	(2.45 - 2.50)
2017	1.27	(1.26 - 1.29)	1.42	(1.40 - 1.44)	1.83	(1.81 - 1.85)	2.50	(2.47 - 2.52)
2018	1.28	(1.26 - 1.29)	1.42	(1.40 - 1.44)	1.85	(1.83 - 1.87)	2.44	(2.41 - 2.47)
2019	1.39	(1.38 - 1.41)	1.51	(1.49 - 1.53)	1.93	(1.91 - 1.95)	2.37	(2.34 - 2.39)
2020	1.34	(1.32 - 1.36)	1.45	(1.43 - 1.47)	1.83	(1.81 - 1.86)	2.25	(2.22 - 2.28)
2021	1.28	(1.26 - 1.30)	1.36	(1.34 - 1.38)	1.79	(1.77 - 1.81)	2.10	(2.07 - 2.12)
2022	1.28	(1.27 - 1.30)	1.40	(1.38 - 1.42)	1.84	(1.82 - 1.87)	2.23	(2.21 - 2.26)

All differences are statistically significant

Table A 111. 2022 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	1054	1725	2567	4937	9681
	Rate (raw)	1486.0	1807.1	2050.0	2518.9	2531.0
	Rate (age adj'd)	1762.6	2122.8	2362.2	2909.1	3047.6
	95%CI	(1622.8-1902.5)	(1990.5-2255.1)	(2252.4-2472.1)	(2814.6-3003.6)	(2975.4-3119.8)
Pacific	Hosp_Num	435	823	1194	2807	6211
	Rate (raw)	2027.8	2410.3	2262.1	3199.8	2597.5
	Rate (age adj'd)	2453.6	2776.0	2741.6	3897.8	3484.8
	95%CI	(2173.5-2733.7)	(2547.6-3004.5)	(2546.8-2936.4)	(3716.5-4079.1)	(3373-3596.7)
Asian	Hosp_Num	997	1155	1274	1808	1560
	Rate (raw)	714.8	675.7	644.1	896.8	992.0
	Rate (age adj'd)	841.1	814.1	818.1	1131.9	1275.5
	95%CI	(777.1-905.2)	(759.9-868.3)	(765.7-870.5)	(1069.7-1194.2)	(1197.6-1353.5)
NZ European/ Other	Hosp_Num	7671	8186	9121	10009	7670
	Rate (raw)	1078.3	1210.7	1434.5	1726.1	2063.7
	Rate (age adj'd)	1159.1	1164.3	1305.6	1549.5	1838.4
	95%CI	(1132.2-1186.1)	(1137.6-1191)	(1277-1334.1)	(1516.7-1582.3)	(1793.7-1883.2)

Table A 112. 2022 total respiratory hospitalisation rates by DHB.

DHB	n	Rate (raw)	Rate (age adj'd)	95%CI
Northland	3951	1964.1	1804.6	(1747.0-1862.2)
Waitemata	8840	1396.0	1403.0	(1373.7-1432.3)
Auckland	7218	1500.2	1645.0	(1606.7-1683.3)
Counties Manakau	9115	1511.3	1576.3	(1543.4-1609.2)
Waikato	8488	1891.6	1800.6	(1762.2-1839.1)
Lakes	2554	2160.0	2074.8	(1993.8-2155.7)
Bay of Plenty	4773	1743.2	1621.7	(1574.9-1668.5)
Tairawhiti	1048	2015.0	1915.9	(1799.2-2032.6)
Hawkes Bay	3453	1890.1	1767.1	(1707.5-1826.7)
Taranaki	2385	1870.9	1745.5	(1674.5-1816.6)
Midcentral	2758	1452.9	1338.5	(1288.0-1389.0)
Whanganui	1563	2253.1	2020.1	(1917.7-2122.6)
Capital and Coast	3783	1172.0	1274.5	(1233.5-1315.5)
Hutt	2769	1729.4	1730.8	(1666.2-1795.4)
Wairarapa	707	1396.1	1219.5	(1125.9-1313.1)
Nelson Marlborough	2004	1213.4	1107.8	(1057.2-1158.5)
West Coast	502	1531.9	1383.5	(1256.6-1510.4)
Canterbury	7164	1214.5	1205.0	(1177.0-1233.1)
Sth Canterbury	835	1341.2	1193.7	(1109.1-1278.4)
Southern	4943	1402.3	1379.0	(1340.0-1417.9)

TOTAL RESPIRATORY MORTALITY

Table A 113. Total respiratory mortality rates and age-adjusted rates 2000-2019.

Year	n	Rate Raw	(age adj'd)	95% CI
2000	2053	53.22	66.32	(63.44-69.20)
2001	2400	61.85	75.16	(72.15-78.18)
2002	2387	60.45	73.00	(70.07-75.94)
2003	2352	58.40	70.27	(67.43-73.12)
2004	2462	60.23	71.66	(68.82-74.50)
2005	2157	52.18	61.53	(58.93-64.13)
2006	2391	57.14	66.05	(63.40-68.71)
2007	2325	55.05	62.53	(59.98-65.08)
2008	2616	61.41	68.63	(65.99-71.27)
2009	2548	59.22	64.92	(62.39-67.45)
2010	2430	55.85	60.30	(57.89-62.70)
2011	2715	61.93	65.60	(63.13-68.08)
2012	2829	64.18	66.53	(64.07-68.98)
2013	2717	61.16	62.73	(60.37-65.09)
2014	2891	64.01	65.22	(62.84-67.60)
2015	2964	64.30	65.49	(63.13-67.85)
2016	2894	61.39	62.29	(60.02-64.56)
2017	3233	67.16	67.74	(65.41-70.08)
2018	2897	59.11	59.11	(56.96-61.27)
2019	3118	62.62	61.65	(59.49-63.82)
2020	*2252*	*44.24*	*43.49*	*(41.70-45.28)*
2021	*2657*	*51.98*	*49.83*	*(47.94-51.71)*
Trend 2000 -2019			**-0.45**	**(-0.45 - -0.44), p<0.001**

Data in italics are provisional or preliminary

Table A 114. Total respiratory mortality rates and rate ratios by age group and sex, 2019.

	Total			Male			Female			M v F	
Age (years)	n	Rate	95% CI	n	Rate	95% CI	n	Rate	95% CI	RR	95% CI
<15	15	1.6	(0.8-2.4)	11	2.2	(0.9-3.6)	4	0.9	(0-1.7)	**0.38**	**(0.22-0.67)**
15-29	6	0.6	(0.1-1.0)	5	0.9	(0.1-1.8)	1	0.2	(0-1.4)	**0.21**	**(0.07-0.60)**
30-64	299	13.4	(11.9-14.9)	161	14.7	(12.4-17)	138	12.1	(10.1-14.2)	**0.82**	**(0.74-0.92)**
65+	2798	368.2	(354.6-381.9)	1351	380.2	(359.9-400.4)	1447	357.8	(339.3-376.2)	**0.94**	**(0.91-0.98)**

Table A 115. Total respiratory mortality rate ratios by age group and sex, 2019.

Age (years)	Total		Male		Female	
	RR	95% CI	RR	95% CI	RR	95% CI
<15	**0.12**	**(0.09-0.15)**	**0.15**	**(0.11-0.20)**	**0.07**	**(0.04-0.11)**
15-29	**0.04**	**(0.03-0.06)**	**0.06**	**(0.04-0.10)**	**0.02**	**(0.01-0.04)**
30-64	1.00	Baseline	1.00	Baseline	1.00	Baseline
65+	**27.49**	**(25.95-29.13)**	**25.84**	**(23.88-27.97)**	**29.50**	**(27.10-32.10)**

Table A 116. Total respiratory mortality rates and rate ratios by ethnic group, 2019.

Total Ethnicity	n	Rate				
		Raw	Age adj'd	95% CI	RR	95%CI
Māori	349	42.5	100.1	(88.7-111.5)	**1.61**	**(1.52-1.71)**
Pacific	103	25.1	70.2	(55.5-84.8)	**1.13**	**(1.02-1.25)**
Asian	81	10.2	27.0	(20.9-33.1)	**0.43**	**(0.39-0.49)**
Non-MPA	2589	87.7	62.2	(59.8-64.6)	1.00	Baseline

Table A 117. Total respiratory mortality rates by ethnic group and age, 2019

	Māori			Pacific			Asian			non-MPA		
Age (years)	n	Rate	95% CI	n	Rate	95% CI	N	Rate	95% CI	n	Rate	95% CI
<15	6	2.4	(0.5-4.3)	3	2.3	(0.7-7)	3	1.9	(0.6-5.9)	4	0.9	(0-1.9)
15-29	0	0.0	(0-0)	3	2.6	(0.8-8.1)	1	0.5	(0.1-3.4)	2	0.4	(0.1-1.6)
30-64	107	35.2	(28.5-41.9)	27	19.2	(12.0-26.5)	7	1.9	(0.5-3.3)	159	11.9	(10.1-13.8)
65+	236	458.2	(399.8-516.7)	70	316.4	(242.2-390.5)	70	131.1	(100.4-161.8)	2424	397.4	(381.6-413.2)

Table A 118. Total respiratory mortality rates NZDep2018 quintile, 2019.

NZDep quintile	n	Rate (raw)	Rate (age adj'd)	95% CI	RR	95% CI
1-2	398	38.7	41.7	(37.6-45.9)	1.00	Baseline
3-4	509	56.7	53.4	(48.8-58.1)	**1.28**	**(1.20-1.36)**
5-6	675	71.3	61.5	(56.9-66.2)	**1.47**	**(1.39-1.57)**
7-8	822	81.8	73.9	(68.8-78.9)	**1.77**	**(1.67-1.88)**
9-10	714	64.9	78.3	(72.6-84.1)	**1.88**	**(1.77-1.99)**

Table A 119. Total respiratory mortality rates by ethnic group and NZDep2018 quintile, 2019.

Ethnic group		NZDep2018 quintile				
		1-2	3-4	5-6	7-8	9-10
Māori	Hosp_Num	15	27	50	79	178
	Rate (raw)	21.7	29.0	40.7	41.6	48.6
	Rate (age adj'd)	59.0	78.8	100.3	98.8	105.3
	95%CI	(25.9-92.1)	(44.7-113)	(70.4-130.2)	(75.6-122)	(88.4-122.1)
Pacific	Hosp_Num	4	6	12	27	54
	Rate (raw)	19.1	18.2	23.6	31.8	23.4
	Rate (age adj'd)	53.3	42.6	62.0	88.3	65.2
	95%CI	(0.4-106.2)	(8.4-76.8)	(25.1-98.9)	(51.7-124.9)	(46.1-84.2)
Asian	Hosp_Num	12	10	14	26	19
	Rate (raw)	9.1	6.2	7.6	13.8	12.8
	Rate (age adj'd)	29.2	15.3	18.9	39.6	35.4
	95%CI	(12.4-46)	(5.5-25.2)	(8.5-29.3)	(23.7-55.5)	(18.5-52.4)
NZ European/ Other	Hosp_Num	367	466	600	691	465
	Rate (raw)	51.5	69.3	95.4	121.3	127.4
	Rate (age adj'd)	50.8	48.2	59.7	70.7	76.4
	95%CI	(45.5-56)	(43.8-52.6)	(54.9-64.6)	(65.3-76.1)	(69.3-83.5)

Table A 120. Total respiratory mortality rates by DHB, 2019.

DHB	n	Rate		
		Raw	Age adj'd	95%CI
Northland	273	79.6	70.9	(62.5-79.4)
Waitemata	302	48.3	52.6	(46.6-58.5)
Auckland	188	37.7	47.4	(40.6-54.2)
Counties Manukau	223	38.5	53.5	(46.4-60.5)
Waikato	284	66.2	63.3	(55.9-70.7)
Lakes	81	70.4	68.5	(53.5-83.4)
Bay of Plenty	215	83.9	64.8	(56.1-73.5)
Tairawhiti	41	81.6	82.2	(57-107.4)
Hawkes Bay	146	83.5	70.1	(58.7-81.5)
Taranaki	103	83.6	69.6	(56.1-83)
MidCentral	144	78.1	65.8	(55-76.5)
Whanganui	57	84.6	65.0	(48.1-82)
Capital and Coast	177	55.4	62.6	(53.3-71.8)
Hutt	82	52.5	55.0	(43.1-66.9)
Wairarapa	48	100.8	72.7	(52.1-93.3)
Nelson Marlborough	136	86.3	64.7	(53.8-75.7)
West Coast	42	129.3	102.1	(71.0-133.1)
Canterbury	358	62.9	59.7	(53.5-65.9)
South Canterbury	57	92.9	64.9	(48-81.9)
Southern	273	79.6	70.9	(62.5-79.4)

LIFE YEARS LOST

Table A 121. Life years lost 2000 to 2019

	Asthma		Total
Year	<15 years	15+ years	respiratory deaths
2000	232.7	1312.0	24163.5
2001	79.4	1707.9	26619.9
2002	148.1	1574.0	26593.5
2003	0	1651.7	25864.5
2004	74.4	1276.0	27929.9
2005	154.6	1794.2	24578.8
2006	405.8	1248.5	27179.4
2007	86.6	1476.9	26296.1
2008	241.9	1380.6	30014.5
2009	251.0	1327.5	30357.9
2010	0	1474.7	28020.9
2011	248.1	896.7	28774.9
2012	248.3	1281.2	30076.4
2013	331.4	1250.2	28418.1
2014	253.8	1381.8	31468.8
2015	316.2	1202.9	31690.5
2016	321.3	2020.9	31300.4
2017	424.1	1469.8	35129.0
2018	502.6	1630.7	32583.5
2019	232.7	1312.0	34933.6

Years of life lost are calculated using median life years remaining.

HOSPITALISATION COST WEIGHTS

Table A 122. Total hospitalisation cost weights per year 2000 to 2019.

	Asthma		Total
Year	<15 years	15+ years	respiratory deaths
2000	1529.7	2446.6	60325.1
2001	1750.4	2677.7	64579.4
2002	1621.0	2853.1	64317.7
2003	1829.6	2802.6	64085.5
2004	1940.5	2691.7	67258.4
2005	2082.7	2921.1	66509.8
2006	1884.0	2811.1	73649.3
2007	1800.9	2753.2	74231.9
2008	1832.9	2824.1	80276.5
2009	1938.4	2596.4	86937.9
2010	1979.6	2480.4	87115.9
2011	1713.0	2506.8	89129.7
2012	1612.0	2677.7	85225.8
2013	1509.7	2400.4	80369.3
2014	1494.7	2852.5	88920.6
2015	1558.6	2490.7	90068.0
2016	1418.0	2417.2	84127.7
2017	1333.4	2459.1	85767.9
2018	1336.5	2438.5	78188.6
2019	1234.2	2322.4	78502.5

N.B. These do not translate directly to total cost as cost weight multipliers vary within a given year's discharges.

APPENDIX 2. INDICATOR CONDITIONS

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 (excluding tablets);
- Inhaled Anticholinergic agents;
- Inhaled Corticosteroids;
- Inhaled Long-acting Beta-adrenoceptor Agonists;
- Methylxanthines;

And also spacer devices and masks.

In 2019 these had the following chemical IDs:

1056	1816	4043
1065	1827	4056
1066	1829	4057
1083	1832	4058
1108	2096	4059
1168	2404	4060
1332	3345	4079
1385	3758	4108
1492	3805	4112
1580	3858	6311
1810	3967	
1812	4042	

APPENDIX 4. ASTHMA LITERATURE SEARCH RESULTS

There were six new relevant papers published since the previous report – Asher 2021, Chan 2023, Fix 2021, Keer et al 2022, Montayre 2021, Mortimer 2022; they are shaded in grey in the following table.

Studies are sorted in order of date of data collection

Table A 123. Asthma prevalence in published studies

Publication	Data year	NZ Location	n	Age; Ethnicity (or other demography)	Outcome measured	Rate/ prevalence (%)
Chan et al 2023[30]	2019	All NZ		<5 years	Asthma medication or hospitalisation in past 12 months	16.6
				5 – 14 years		12.2
				15 – 44 years		8.5
				45 – 64 years		10.6
				65+ years		10.2
				Māori		12.9
				Pacific		11.0
				Asian		7.5
				European		10.3
				Other		8.6
				NZDep quintile (Q) 1		9.8
				NZDep Q2		9.8
				NZDep Q3		10.1
				NZDep Q4		10.5
				NZDep Q5		11.1
				Male		9.3
				Female		11.3
	2010			<5 years		19.5
				5 – 14 years		12.0
				15 – 44 years		9.1
				45 – 64 years		9.4
				65+ years		9.1
				Māori		13.1
				Pacific		10.4
				Asian		7.6
				European		10.1
				Other		8.2
				NZDep Q1		9.2
				NZDep Q2		9.2
				NZDep Q3		9.4
				NZDep Q4		9.9
				NZDep Q5		10.2
				Male		9.4
				Female		11.1
Asher et al 2021[31]	2018	Auckland	1538	6 – 7 years; all ethnic groups	Wheeze in past 12 months	17.4
					Asthma ever	19.2
					Severe asthma symptoms in past 12 months	6.7
					Exercise wheeze in past 12 months	12.0
					Night cough in past 12 months	24.8
			1885		Wheeze in past 12 months	14.9

Publication	Data year	NZ Location	n	Age; Ethnicity (or other demography)	Outcome measured	Rate/ prevalence (%)
				13 – 14 years; all ethnic groups	Asthma ever	22.6
					Severe asthma symptoms in past 12 months	5.1
					Exercise wheeze in past 12 months	22.7
					Night cough in past 12 months	24.9
Mortimer et al[32]	2018	Auckland	3002	adults; all ethnic groups	Wheeze in past 12 months	17.3
					Asthma ever	18.3
					Severe asthma symptoms in those with wheezing in last 12 months	37.3
					Severe asthma in study population	6.4
Montayre et al 2021[33]	2016/17	All NZ	414	15+ years; New Asian immigrants	Asthma, defined as "ever been told by your doctor you have asthma"	6.0
Stokes et al 2018[44]	2016	Dunedin	422	Maori enrolled patients aged ≥ 35 years	Asthma – not further defined	16.7
			180	Pacific enrolled patients aged ≥ 35 years		18.6
Wickens et al 2018[52]	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
Keer et al 2022[34]	2015 (est)		350	Retail and construction workers; 17 – 70 years; Male; all ethnic groups	Wheezing/whistling in chest in past 12 months	31.4%
					Woken by shortness of breath past 12 months	5.7%
					Asthma attack past 12 months	5.4%
					Asthma diagnosis	23.1%
					On medication for asthma	8.0%
					ECRHS asthma definition	11.1%
Win et al 2019[53]	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
			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

Publication	Data year	NZ Location	n	Age; Ethnicity (or other demography)	Outcome measured	Rate/ prevalence (%)
Bates et al 2013[54]	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
Eng et al 2010[55], Eng et al 2011[56]	2004-2006	All NZ	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
Douwes et al 2007[57] N.B. High (23.2%) smoking rate in population	2002 – 2004	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
Fix et al 2021[34]	2002 – 2004	Rural, lower half North Island	1328	25-49 years; Male	"Overall asthma"	14.2
				25-49 years; Female		16.0
Cohet et al 2004[58]	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
Ellison-Loschmann et al 2009[59] and various; aka ISAAC III	2001-2003	All NZ	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

Publication	Data year	NZ Location	n	Age; Ethnicity (or other demography)	Outcome measured	Rate/ prevalence (%)
					Asthma ever	30.3
					Exercise wheeze	16.0
					Night cough	28.2
			13317	13-14 years; all (extrapolated)	Wheezing ever	46.5
					Current wheeze	27.6
					>=4 wheezing attacks	6.4
					Night waking from wheeze	11.2
					Speech-limiting wheeze	6.2
					Asthma ever	33.4
					Exercise wheeze	38.3
					Night cough	28.8
Crampton et al 2004[60]	2001-2002	All NZ	10 506 GP visits	All; all	"For profit" GP visit for asthma	5.0
					"Not for profit" GP visit for asthma	9.1
Watson et al 2013[61]	1998 - 2000	Northern NZ	369	18 months; European & Polynesian (not disaggregated)	Wheeze in the last 12 months	118/369= 32.0

APPENDIX 5. HOUSING AND RESPIRATORY ILLNESS

On 14 August 2024 we carried out a rapid literature review in Pubmed, 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 26 results between 1996 and 2024. Fifteen were excluded based on abstract as not having been conducted in NZ, 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, were added instead.

The included nine studies demonstrated that insulating housing reduced wheezing (statistically significant in one study),[62] prescriptions for new and exacerbated chronic respiratory disease medications (statistically significant in one study),[63] hospital admissions for respiratory conditions (statistically significant in one of two studies), [62 64] and mortality risk for people aged 65 years and older with respiratory hospitalisation (not statistically significant).[65] Results were not statistically significant in a 2007 study, which was underpowered to measure hospitalisation effects,[62] but 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.[66] However, a modelling study using the same data concluded that lung function was strongly associated with severity of exposure to low bedroom temperatures.[67]

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.[68] 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.[69]

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.[70]