



REVIEW ARTICLE

Respiratory infections in Tamariki (children) and Taitamariki (young people) Māori, New Zealand

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Abstract: The Māori population is young, with 53% aged less than 25 years and with a higher prevalence of both acute (bronchiolitis, pneumonia, pertussis, tuberculosis) and chronic (bronchiectasis) respiratory tract infections than non-Māori. Environmental, economic and poorer access to health promotion programmes and health care rather than specific or genetic underlying disorders appear to contribute to this burden. While new initiatives are needed, we can do better with current public health programmes and building on regional initiatives that have already proven successful.

Key words: infection; general paediatrics; Indigenous population; respiratory.

Introduction

From a historical context, it is not surprising that Māori are affected by respiratory illnesses. From first contact with European settlers, exposure to diseases such as pneumonia, measles, tuberculosis (TB), influenza and the common cold meant that by the 1860s, almost half the Māori population had died. In the 1918 influenza epidemic, the mortality rate for Māori was seven times higher than for New Zealand (NZ) Europeans (42.3/1000 vs. 5.8/1000).¹ Inequality in the rates of respiratory diseases in Māori compared with non-Māori continues for adults and children. In the past, data collection regarding ethnicity was inaccurate, limiting the ability to determine exact figures. Prior to the 1986 Census, identifying as Māori required the 'presence of

greater than half Māori blood'. In 1988, this became a social construct definition of ethnicity, and while this definition has remained unchanged, the question used in the census has varied over time and in health-care records.^{2,3} In the 2006 Census, 15% of the total population identified as Māori and 18% indicated Māori ancestry. The Māori population is young: 35% aged <15 years and 53% aged <25 years.⁴ The aim of this review is threefold: first, to document the disparity seen in number and severity of lower respiratory tract infections (LRTIs) in tamariki (children) and taitamariki (young people) Māori compared with non-Māori; second, to consider factors that could be contributing to these high disease rates; and third, to suggest strategies to prevent and reduce this disease burden. For the purposes of this paper, 'Māori' refers to the Māori Indigenous population of NZ, and where mentioned, 'Pacifica' refers to descendants of peoples from the Pacific Islands (predominantly Cook Islands, Niue, Samoa, Tonga, Tokelau and Tuvalu) residing in NZ.

Key Points

- 1 There is a higher incidence and prevalence of acute respiratory infection and long term sequelae such as bronchiectasis and chronic obstructive pulmonary disease in Māori compared to non-Māori in New Zealand.
- 2 Contributory factors appear to be environmental and access to healthcare rather than genetic or immune deficiency.
- 3 Recent national initiatives such as the immunisation database and paediatric epidemiology service ensure greater visibility of regional and/or ethnic disparities. A more co-ordinated health approach and targeting areas of reduced access to care and/or high disease rates, as well as building on successful regional initiatives could drive future improvements.

Respiratory Infective Diseases

A review of Māori Health Providers in primary care in 2001–2002 showed respiratory problems accounted for 12.2/100 visits overall but were higher in the <25-year age group (38/100 for males, 28/100 for females).⁵ Rates of hospital admissions for asthma, bronchiolitis, pneumonia, bronchitis, bronchiectasis and chronic obstructive pulmonary disease are all higher in Māori compared with non-Māori.² In 2000–2004, respiratory diseases in Māori children were the first to third most common reason for admission to hospital in the age groups <1 year of age, 1–4 years of age, 5–14 years of age, 15–24 years of age.² The relative risk for admission with LRTI was 1 European: 2.9 Māori: 5.2 Pacific.³ This ethnic disparity is demonstrated from 1990 to 2006 in Figure 1 where European and Asian/Indian children

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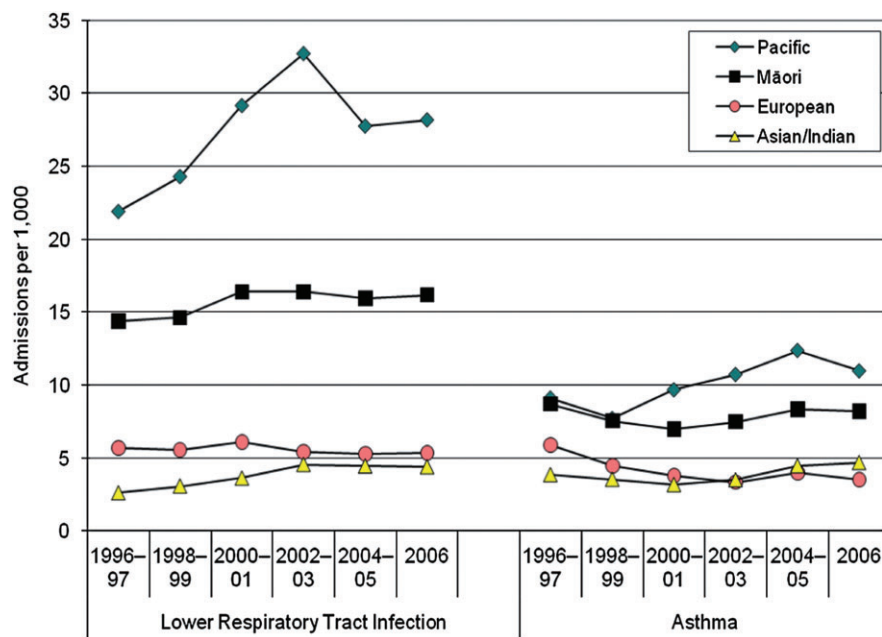


Fig. 1 Hospital admissions due to lower respiratory tract infections and asthma in children 0–14 years of age by ethnicity, New Zealand 1996–2006.

have a LRTI admission rate of around 5/1000/population, while for Māori and Pacific children, the rates vary from between 14 and 34/1000/population.

A pilot study reviewing hospital admissions in South Auckland (which has a high Indigenous population) recorded 5749 children <2 years admitted 8180 times with LRTI (215/1000 Māori, 280/1000 Pacifica & 43/1000 'others') in 2002–2006. The overall rate was 154/1000 compared with contemporaneous international rates of 12–65/1000.³ Bronchiolitis admissions increased 118% over a decade (1988–1998), accompanied by an increase in severity: from 25% requiring any support to 59% requiring oxygen, 21% nasogastric fluids, 22% intravenous fluids, 8% admitted with apnoea and 3.1% requiring ventilation.⁶ Although mortality was low, it is associated with shorter gestational age, low five-minute Apgar score, multiple birth, greater number of siblings and maternal characteristics of young age (<25 years), smoking during pregnancy, solo parenthood and a lower educational level – risk factors more prevalent in Indigenous families.⁷ Pneumonia had an annual increase of 5% over seven years to 1995, also with increased severity. Admissions were skewed towards the younger age group (e.g. 1534/100 000 <2 years compared with 73/100 000 10–14 years) and Māori ethnicity (6.7/1000 Māori, 14/1000 Pacifica compared with 2.7/1000 European/other children).⁸ Pertussis became a notifiable disease in 1996 and, with only 6–25% of true cases notified, was seven times greater than in the USA despite their recorded epidemic.⁹ In the 1990s, only 60% of children, including 42% of Māori, were fully immunised. The national immunisation database shows while 80–90% of children now receive the three recommended vaccinations, only 50–60% are 'on time'.¹⁰ Delayed receipt is associated with five times greater risk of hospitalisation with pertussis.¹¹ In contrast, better immunisation coverage is achieved in Samoa, Tonga and the Cook Islands, suggesting these communities are not against immunisation per se with lower reported pertussis rates.¹²

Regarding longer-term sequelae, high rates of bronchiectasis in Māori adults were noted in the 1950s¹³ and in children, also predominantly Māori, after adenovirus 21 bronchiolitis in the 1970s.¹⁴ In 2005, a prospective national study of newly diagnosed bronchiectasis in all children aged 0–15 years determined an incidence of 3.7/100 000/year,¹⁵ 7–18 times greater than other developed countries. While overall this equates to a prevalence of 1 in 3000, it is as high as 1 in 1700 in Māori and 1 in 650 in Pacifica. Similarly, an Auckland study of all children with bronchiectasis seen at Starship Children's Health determined 80% were of Māori and/or Pacifica origin.¹⁶ The disease was more severe in NZ than described in other countries in both studies with 83–93% having bilateral disease and 61–64% having four or more lobes involved.^{15,16} Significant mortality does not begin until adulthood and while estimated at 50/100 000 Māori, is likely to be under-reported. While less common than other adult respiratory diseases, the disparities are more extreme with death rates 5.9 times for females and 7.6 times for males compared with non-Māori.²

Hospital admissions for TB 1990–2006 in 0- to 24-year-olds was 6–10/100,000 with a resurgence in NZ from 1992–2001 with Māori making up 15%, Pacifica 17% and European 3% of cases.^{3,17} Finally, of interest, Māori and non-Māori had similar admission rates for acute upper respiratory tract infections and Māori admission rates for tonsillar and adenoid disease were significantly lower at 65% the non-Māori rate.²

Possible Causes for High Respiratory Disease Rates

Factors that have been associated with the development of respiratory diseases in other populations are reviewed in Table 1. Whether each specific factor is likely to contribute to the high rates of LRTIs seen in NZ Māori and the strength of

Table 1 Factors potentially contributing to high respiratory disease rates in Tamariki and Taitamariki Māori

Factors	Contribution to disease development	Comment
Pollution – cigarette smoking	Yes Strong evidence	Māori smoking prevalence rates are double those of non-Māori. Up to 60% of Māori women of childbearing age and 40–80% pregnant Māori women smoke, ¹⁸ and 30% of Māori are exposed to second-hand smoke in the home. ¹⁹ In a paediatric bronchiectasis cohort, 58% of household members were smoking daily. ¹⁶ Of 1398 Pacific infants born in 2000, 24.5% and 29.8% of the mothers reported smoking when the infant was 6 weeks and 12 months of age, respectively. ²⁰ The estimated additional annual burden of illnesses due to smoke exposure for all children range from 1.5 to 4 times for otitis media, pharyngo-tonsillitis, rhinitis and sinusitis, bronchitis, bronchiolitis and pneumonia. ²¹
Pollution – biomass burning	No	Indoor open biomass burning is a contributing factor for recurrent lower respiratory tract problems in children in other Indigenous groups but does not appear such an issue for NZ Māori. ²²
Pollution – environmental	Possible Weak evidence	The main source of air pollution in NZ is vehicle exhaust emissions. ²³ Increases in respiratory morbidity including upper respiratory tract infection, acute bronchitis, cough, asthma and pneumonia in children have been recorded with severe air pollution episodes but no specific ethnicity data is available.
Socioeconomic Status	Yes Strong evidence	An increase in Māori experiencing 'severe hardship' from 7% in 2000 to 17% in 2004 and an additional 40% of Māori families living in 'hardship' has been recorded. ²⁴ The mortality rate among Māori living in the least deprived deciles remains higher than non-Māori living in the most deprived deciles with mortality increasing 8% per decile. ²
Overcrowding	Yes Strong evidence	Living standards for Māori are significantly lower on average than the total population. ^{24,25} In NZ, paediatric studies of deprivation and overcrowding has been associated with bronchiolitis, ⁶ pneumonia ⁸ and bronchiectasis. ^{15,16} and TB. ^{17,26}
Poor Housing	Yes Moderate evidence	50% of Māori in 2001 were in rental or temporary accommodation. ²⁵ Colder houses place more physiological stress on young and/or sick children who have less robust thermoregulatory systems. Mould was reported in one or more rooms in 35.1% of households. ²⁷
Immunisation	YES Strong evidence	NZ immunisation coverage is below national targets. Children fully immunised at 2 years was <60% in 1992 and 77.4% in 2005. Corresponding data in Māori children were 44.6% in 1996 and 69% in 2005. ¹⁰ Indigenous : non-Indigenous ratios for receiving the primary series of vaccines was 0.62–0.87. ²⁸ Missed opportunities have been identified in both primary care and hospital settings. ^{29,30} The influenza vaccine is also underutilised. While free to high-risk groups from 1999, average annual paediatric hospitalisation rates for influenza have increased 1997–2006 compared with the previous 6 years. ³¹
Nutrition	Yes Moderate evidence	Elsewhere, poor overall nutrition and micronutrient deficiencies have individually been shown to be associated with increased respiratory infections. ³² Obesity, ³³ iron, ³⁴ zinc ³⁵ and vitamin D ^{36,37} deficiencies have been documented in the Māori paediatric population.
Breastfeeding rates	Yes Moderate evidence	Breastfeeding rates have compared favourably with other developed countries but remain below set targets – with 41% at 3 months and 13% at 6 months infant age fully breastfeeding meant rates were lowest for Māori women. ³⁸ In addition, the lowest breastfeeding rates were seen in most deprived socioeconomic deciles.
Immunodeficiency	No Moderate evidence	No suggestion of increased immunodeficiency disease predisposing Māori to respiratory diseases. In children with bronchiectasis only 6–10% were designated secondary to an underlying primary immune diagnosis, lower than most paediatric bronchiectasis series in the literature. ^{15,16}
Primary Ciliary Dyskinesia	Unlikely Weak evidence	Increased primary cilia abnormalities in Māori were suggested from earlier studies of adults with bronchiectasis. ³⁹ Recent studies in children instead found high numbers of secondary cilia abnormalities, three times that reported in other control groups. ⁴⁰ Respiratory disease may cause the cilia abnormalities, which could predispose to the new infections.
Genetics	No Data	There has been little research regarding a genetic predisposition for respiratory infection, but for known genetically determined respiratory diseases, Māori have the same (primary ciliary dyskinesia, ⁴⁰ immunodeficiency ^{15,16}) or lower (cystic fibrosis ⁴¹) rates as non-Māori.

evidence currently as to that contribution is given. Comments to support this opinion are included from published research where available.

Strategies to Reduce Respiratory Infective Disease

A NZ Child and Youth Indicator project was recently established to ensure greater visibility and to develop a more co-ordinated approach in monitoring our national paediatric health statistics.³ While new initiatives are needed, we can do better with existing public systems and build on programmes already proven successful.

Improved access to health care

Early treatment will likely have good effect in reducing chronic respiratory disease in this population. The median age of diagnosis of bronchiectasis was 8.0 years and 5.2 years, respectively, in two studies, but mean first hospitalisation for respiratory disease was four years and mean duration of persistent cough was two years previously.^{15,16} In the majority of children, bronchiectasis was deemed secondary to a significant pneumonia or 'unknown aetiology' (likely also post-infectious). This could be prevented. The higher rates of secondary cilia defects seen may also respond to early treatment and reduce the risk of further infective episodes.⁴⁰

Smoking cessation

A review of smoking cessation programmes for Māori women suggested emphasising their roles as whanau (family), mothers and role models, thereby promoting a positive perception of self with a Māori approach contributed to successful programmes.⁴² 'It's About Whanau' showed the majority retained information a year later with 54%, stating the campaign had made them more likely to attempt to quit.⁴³ As maternal and paternal smoking have been separately associated with an increased risk of daily adolescent smoking, targeted campaigns could reduce adult and adolescent rates.

Breastfeeding

Countries that protect breastfeeding through statutory mechanisms have higher rates and longer duration of breastfeeding. Stated Ministry of Health goals include increasing breastfeeding rates to >90% at six weeks, >70% at three months and 27% at six months of age by 2010.³⁸ The 'Baby Friendly Hospital Initiative' encourages hospitals to adopt practices to support breastfeeding. For Māori, this requires targeting factors identified with lower rates such as 'lack of support when establishing breastfeeding, lack of support when life circumstances change, lack of timely, culturally relevant and comprehensible information, confusion about smoking and breastfeeding, uncertainty about the safety of bed-sharing, and perceived lack of acceptability of breastfeeding in public'.⁴⁴

Immunisation coverage

Regional initiatives have demonstrated higher coverage rates than achieved nationally.⁴⁵ Barriers identified have included

lack of funding to providers and parental concerns expressed from the Māori community.⁴⁶ A national immunisation register commenced in 2004 with gradual increased coverage being attained.¹⁰ However, all opportunities from family and health-care provider interactions should be taken.⁴⁷ In the USA, improved Indigenous rates were achieved with tribal health programmes and immunisation given at home visits, community centres, schools, by tracking immunisation status and by providing free immunisations.⁴⁸ Influenza vaccine uptake also needs to be improved.^{31,49}

Cultural specific programmes and cultural health workers

A review of primary care Māori providers showed while 10% of doctors and 25% of nurses were themselves Māori, 59% of patients nominated Māori ethnicity.⁵ Investigations and referral were more common from Māori providers than from general practitioner practices (17.2% vs. 6.3% of consultations, respectively). The costs to the family were also significantly lower when using Māori providers, but the reduced workforce meant fewer facilities were available outside normal hours.⁵ The percentage of Māori doctors (and likely other health-care workers) is still less than the percentage of Māori in the population. Policies and support that encourage Māori health workforce development is required.

Insulation and improved housing design

Retrofitting 1350 houses in which at least one person had symptoms of respiratory disease in low-income communities has resulted in improved indoor temperatures and significantly reduced self-reported wheezing, general practice visits, school absenteeism and reduced hospitalisations.⁵⁰ A 'Healthy Housing Programme' targeting localities with high health needs reduced 'housing related potentially avoidable hospitalisations' in 2007.⁵¹ Regulations regarding housing design, house position, access to sunlight and insulation for both new and existing housing stock is cost-effective from environmental, energy and health perspectives.⁵²

Socio-economic and financial improvement

The disparity seen with wealth and health for our Indigenous population and suggestions for improvement is described elsewhere.² Improving socio-economic conditions for Māori and, in particular, families with young children, would reduce those diseases for which poverty is shown to have an adverse effect (described in Table 1).

Summary

Māori have higher rates than non-Māori of LRTIs historically since European settlement and the disparity remains current. Factors contributing to these rates appear to be environmental and reduced access to health promotion programmes and health care rather than underlying genetic or medical disorders. Studies have revealed a number of gaps in health and economic

support, which if improved, would most likely reduce respiratory disease in this population. Subsequent to submission of this article, the 'Whanau ora' ('family well-being') programme was launched in NZ in May 2010. This is a new initiative of interaction between government and Māori service providers. It seeks to provide a framework for better coordination of government agencies in meeting the social service and health needs of families including the use of 'navigators' to help families' better access these services. It can be seen that in many of the diseases documented earlier, rates in Pacifica children are greater than Māori. As the focus of this paper is the Indigenous population, we have predominantly presented statistics and described strategies that align with this population. However, most programmes would also be applicable to the Pacifica population.

Tamariki (children) and taitamariki (young people) currently make up 25% of all children living in NZ. They represent a national 'tonga' or 'treasure' whose health needs to be safeguarded to ensure future prosperity.^{3,53} Investment in the positive development of Māori children will be an advantage for the whole NZ population in future years.

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