

# SECOND-HAND CIGARETTE SMOKE EXPOSURE

## Introduction

Beginning before birth, there are adverse health effects for children exposed to second-hand smoke. Children who are exposed to second-hand smoke have higher rates of sudden infant death, respiratory infections, wheeze and asthma, middle ear infections and meningitis [340]. It has been estimated that, in New Zealand each year, second-hand smoke exposure contributes to approximately 15,000 episodes of childhood asthma, more than 27,000 medical consultations for childhood respiratory problems and 1,500 operations to treat glue ear [341]. In New Zealand, as in other developed countries, as smoking rates in the general population have fallen, smoking has increasingly become concentrated in the most socio-economically disadvantaged sections of society [342]. Exposure to secondhand smoke is likely to be a significant contributor to socio-economic disparities in rates of many common childhood illnesses [340]. Children who grow up in smoking households are more likely than other children to grow up to be smokers [343].

The most recent New Zealand Tobacco Use Survey (2009) found that in just over 10% of households including one or more children aged 0–14 years, it was reported that at least one resident had smoked inside the house in the past week [342]. Māori households with children were significantly more likely to report that a resident had smoked inside the house than European/Other households and households with children in the most deprived NZDep quintile were five times more likely to report that a resident had smoked inside compared to such households in the least deprived quintile.

The 2010 National Year 10 ASH Snapshot Survey of tobacco use by students aged 14–15 years found that 38% of students reported that one or both of their parents smoked and 19% of students reported that people smoked inside their home [344]. Māori students were almost twice as likely as European students to report that a parent smoked. Between 2006 and 2010, there were small decreases in the percentage of students having a parent who smoked for Māori, Pacific and Asian students but not for European or Other students. There were, however, more significant decreases in the percentages of students reporting that people smoked inside their home suggesting that awareness of the danger of secondhand smoke may have increased.

The following section uses data from the 1996, 2006, and 2013 Censuses to review the proportion of children who lived in a household with a smoker.

## Census Data

At the 1996, 2006, and 2013 Censuses, respondents aged 15 years or older were asked “Do you smoke cigarettes regularly (that is one or more per day)? This section considers the proportion of children aged 0–14 years who live in a household with someone who answered yes to this question.

### Data Source and Methods

#### Indicator

*Proportion of children aged 0–14 years who lived in a household with a smoker*

**Numerator:** Number of children aged 0–14 years who lived in a household with someone who answered yes to the Census question “Do you smoke cigarettes regularly (that is one or more per day)?”

**Denominator:** The number of children aged 0–14 years at the 1996, 2006, and 2013 Censuses who lived in a household

#### Data Source

1996, 2006, and 2013 Censuses

#### Notes on Interpretation

Note 1: Census data categorises those aged 15 or more years into two groups: smokers and non-smokers, with missing responses in this analysis being assigned to the non-smoking category. Thus this data may underestimate the proportion of children living in a household with a smoker.



Note 2: Differences in the way ethnicity questions were structured between the 1996 and 2001 Censuses mean that ethnic specific rates for these two periods may not be strictly comparable. This must be kept in mind when interpreting the figures in this section.

## New Zealand Distribution and Trends

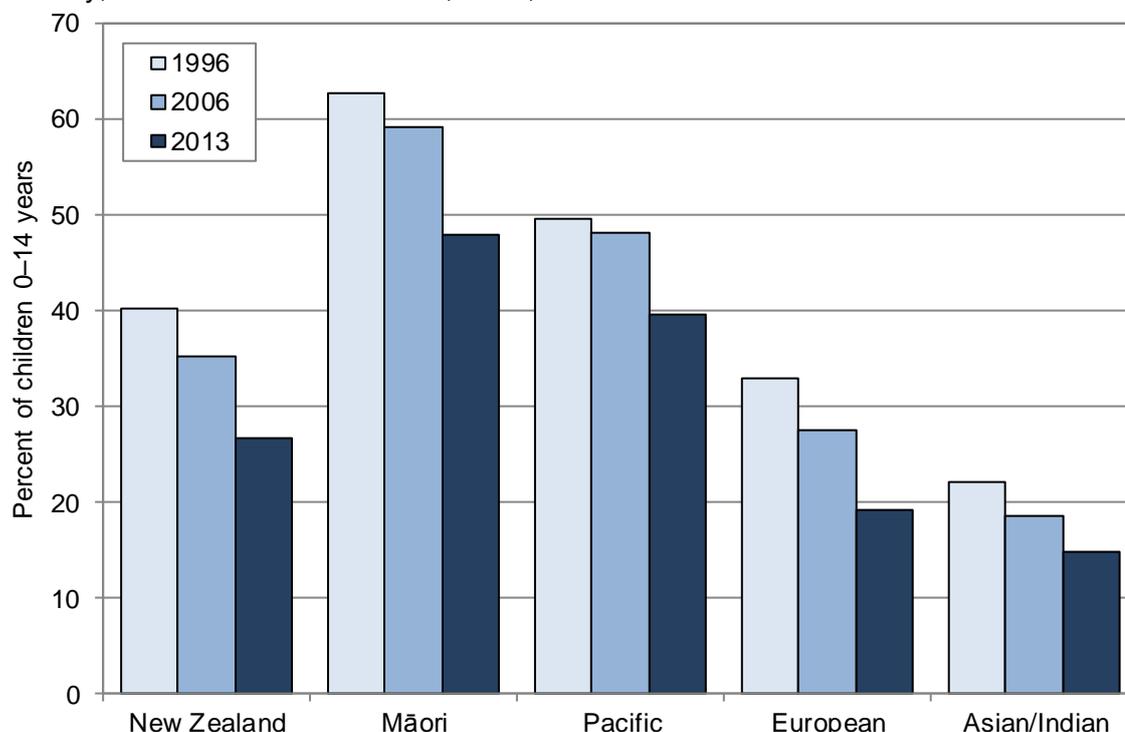
### New Zealand Trends

In New Zealand, the proportion of children living in a household with a smoker declined from 40.2% in 1996 to 26.7% in 2013 (Figure 1).

### Distribution by Ethnicity

At the 2013 Census, 48.0% of Māori and 39.5% of Pacific children lived in a household with a smoker, as compared to 19.1% of European and 14.8% of Asian/Indian children. The proportion of Māori (RR 2.51 95% CI 2.49–2.53) and Pacific (RR 2.06 95% CI 2.04–2.09) children living in a household with a smoker was *significantly higher* than for European children. In contrast, rates for Asian/Indian children (RR 0.77 95% CI 0.76–0.79) were *significantly lower* (Figure 1, Figure 3, Table 1). However, the proportion of children living in a household with a smoker declined for all ethnic groups between 1996 and 2013.

Figure 1. Percentage of children aged 0–14 years living in a household with a smoker by ethnicity, New Zealand at the 1996, 2006, and 2013 Censuses

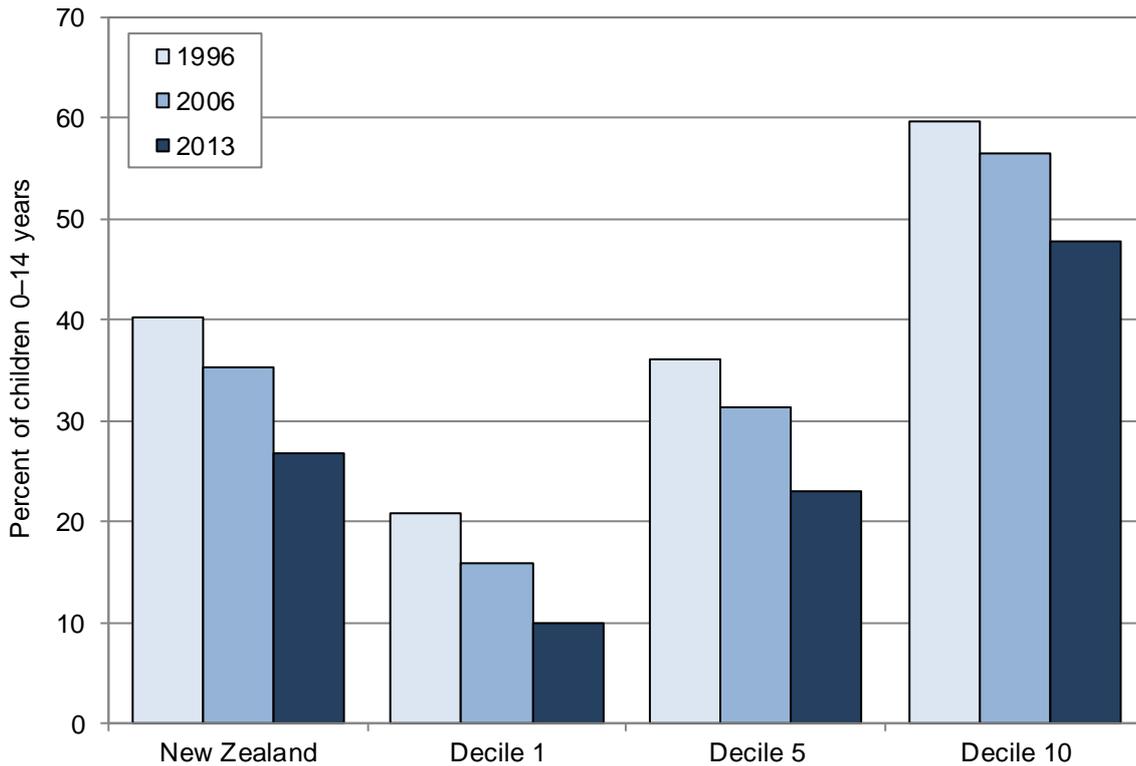


Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised

### Distribution by NZ Deprivation Index Decile

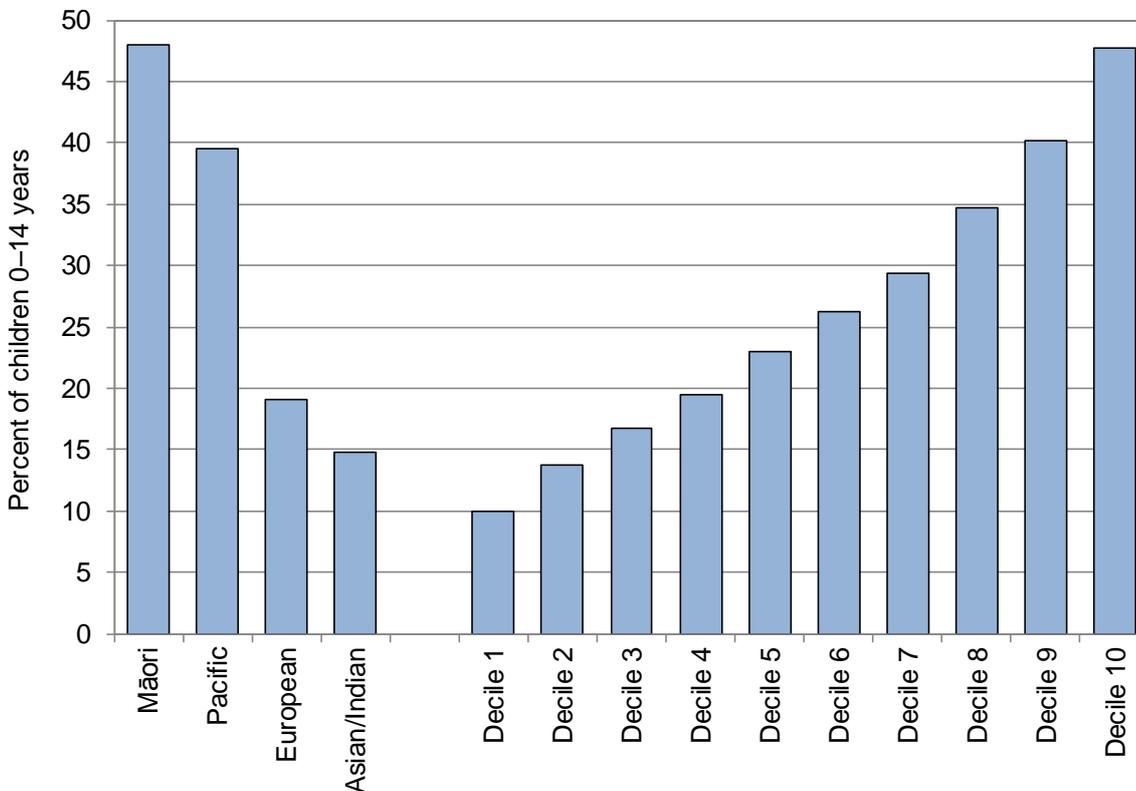
At the 2013 Census, the proportion of children living in a household with a smoker increased from 9.9% for those in the least deprived areas (NZDep decile 1) to 47.7% for those in the most deprived areas (NZDep decile 10). During this period, rates for children in the most deprived areas were 4.81 (95% CI 4.71–4.91) times higher than for those in the least deprived areas (Figure 2, Figure 3, Table 1).

Figure 2. Percentage of children aged 0–14 years living in a household with a smoker by NZ Deprivation Index decile, New Zealand at the 1996, 2006 and 2013 Censuses



Source: Statistics New Zealand; Note: Decile is NZDep13

Figure 3. Percentage of children aged 0–14 years living in a household with a smoker by ethnicity and by NZ Deprivation Index decile, New Zealand at the 2013 Census



Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; Decile is NZDep13

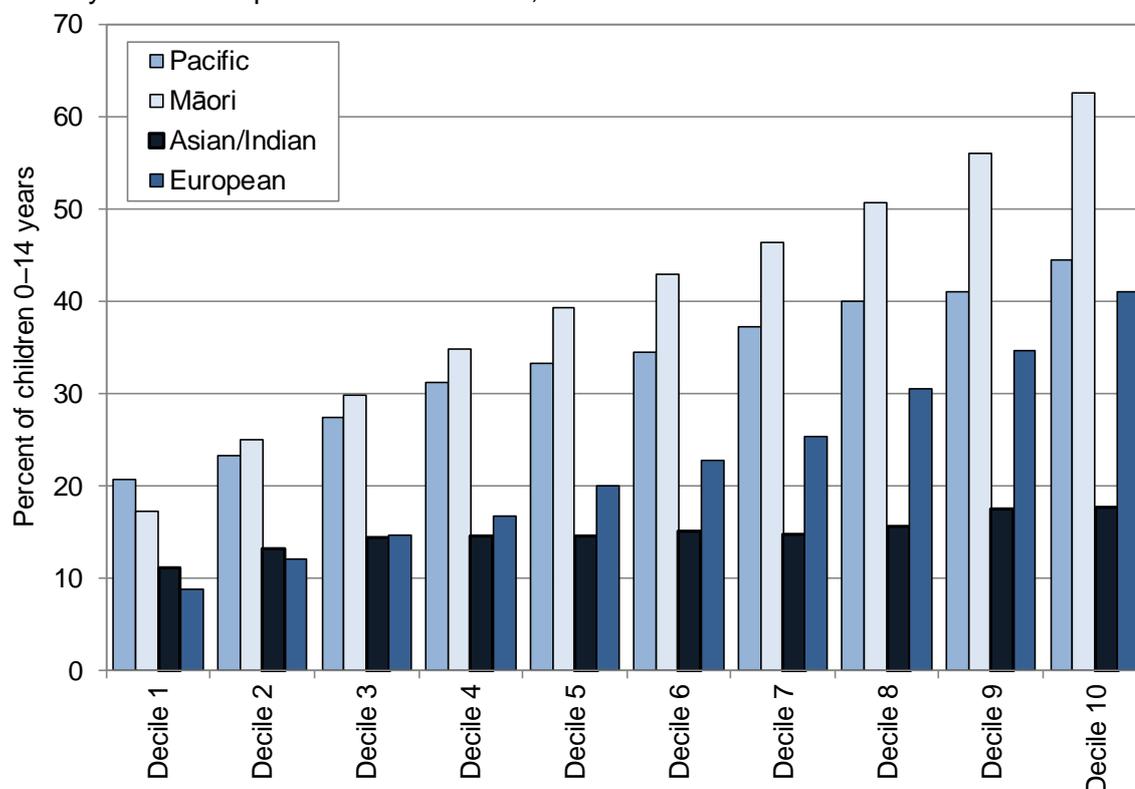


Table 1. Children aged 0–14 years living in a household with a smoker by ethnicity and NZ Deprivation Index decile, New Zealand at the 2013 Census

Variable	Number of children	Percent of children	Rate ratio	95% CI
Children 0–14 years living in a household with a smoker				
Ethnicity				
Māori	94,188	48.0	2.51	2.49–2.53
Pacific	29,589	39.5	2.06	2.04–2.09
Asian/Indian	12,987	14.8	0.77	0.76–0.79
European	82,353	19.1	1.00	
NZ Deprivation Index decile				
Decile 1	8,646	9.9	1.00	
Decile 2	11,583	13.8	1.39	1.35–1.42
Decile 3	13,500	16.7	1.69	1.64–1.73
Decile 4	15,378	19.4	1.96	1.91–2.01
Decile 5	18,036	23.0	2.32	2.26–2.37
Decile 6	20,400	26.2	2.65	2.59–2.71
Decile 7	22,620	29.4	2.96	2.90–3.03
Decile 8	27,705	34.7	3.51	3.43–3.58
Decile 9	35,625	40.2	4.06	3.97–4.15
Decile 10	51,507	47.7	4.81	4.71–4.91

Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; Decile is NZDep13

Figure 4. Percentage of children aged 0–14 years living in a household with a smoker by ethnicity and NZ Deprivation Index decile, New Zealand at the 2013 Census



Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised; Decile is NZDep13



## Distribution by Ethnicity and NZ Deprivation Index Decile

At the 2013 Census, the proportion of children living in a household with a smoker increased with increasing NZDep deprivation for each of New Zealand's largest ethnic groups. At each level of NZDep deprivation, however, a higher proportion of Māori than European or Asian/Indian children lived in a household with a smoker. For Pacific children, rates in the least deprived areas (NZDep decile 1–2) were similar to those of Māori children. However, in the most deprived areas (NZDep decile 10), rates for Pacific children were more similar to those of European children (**Figure 4**).

## South Island DHBs Distribution and Trends

### South Island DHBs Distribution

In the South Island at the 2013 Census, the proportion of children living in a household with a smoker ranged from 22.9% in Nelson Marlborough to 31.0% in the West Coast. The proportion of children living in a household with a smoker were *significantly higher* than the New Zealand rate in South Canterbury, the West Coast, and in the Southland area, while rates were *significantly lower* in Nelson Marlborough, Canterbury, and in the Otago area (**Table 2**).

Table 2. Children aged 0–14 years living in a household with a smoker, South Island DHBs vs. New Zealand at the 2013 Census

DHB/Area	Number of children	Percent of children	Rate ratio	95% CI
Children 0–14 years living in a household with a smoker				
Nelson Marlborough	5,778	22.9	0.86	0.84–0.87
South Canterbury	2,778	28.4	1.06	1.03–1.10
Canterbury	20,082	23.1	0.86	0.85–0.88
West Coast	1,758	31.0	1.16	1.11–1.20
Southern	13,878	26.5	0.99	0.97–1.00
New Zealand	225,048	26.7	1.00	

Source: Statistics New Zealand

### South Island DHBs Trends

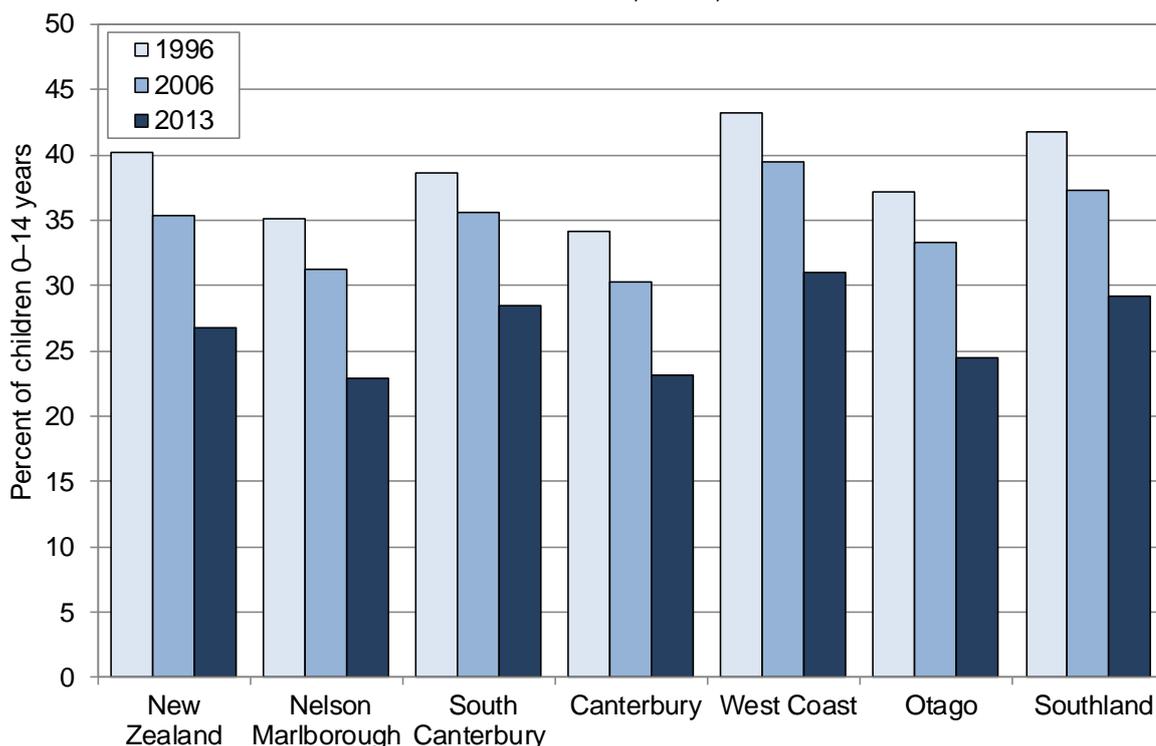
The proportion of children living in a household with a smoker declined in all of the South Island DHBs between 1996 and 2013 (**Figure 5**).

### Distribution by Ethnicity

In Canterbury, a higher proportion of Māori > Pacific > European > Asian/Indian children lived in a household with a smoker at the 2013 Census, while in the remaining South Island DHBs a higher proportion of Māori than European children lived in a household with a smoker (**Figure 6**).

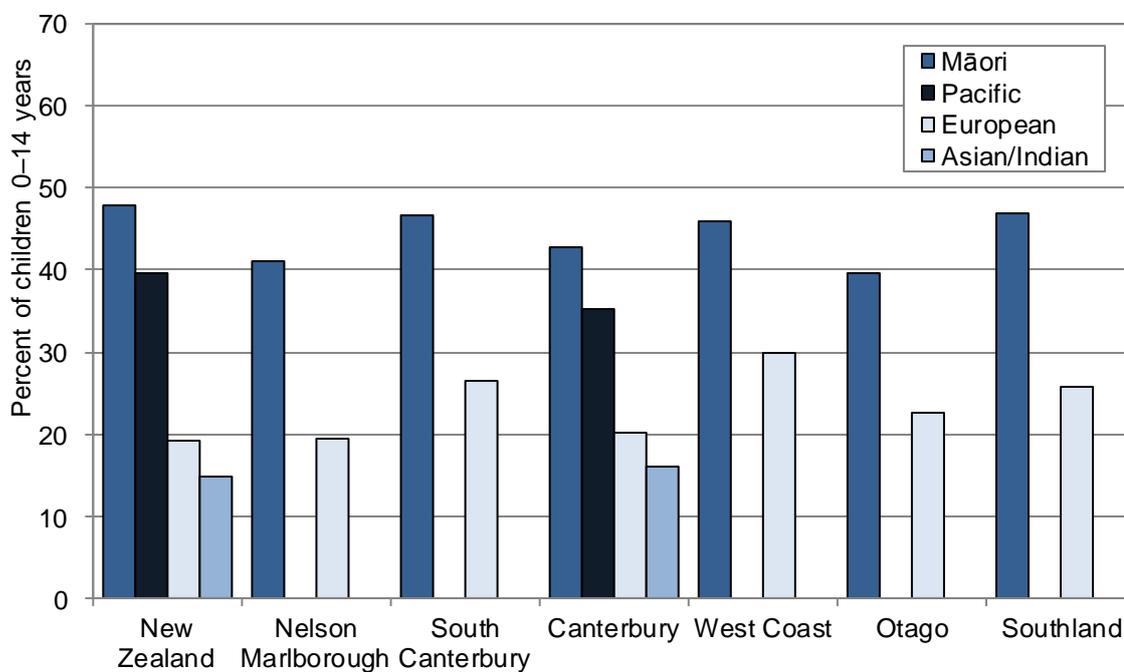


Figure 5. Percentage of children aged 0–14 years living in a household with a smoker, South Island DHBs vs. New Zealand at the 1996, 2006, and 2013 Censuses



Source: Statistics New Zealand

Figure 6. Percentage of children aged 0–14 years living in a household with a smoker by ethnicity, South Island DHBs vs. New Zealand at the 2013 Census



Source: Statistics New Zealand; Note: Ethnicity is level 1 prioritised



## Local Policy Documents and Evidence Based Reviews Relevant to Second-Hand Smoke Exposure in Children

In New Zealand, there is no national strategy focused on the prevention of second-hand cigarette exposure in children. Any local strategies developed will need to incorporate evidence from a variety of sources. **Table 3** (below) provides an overview of a range of New Zealand policy documents and evidence-based reviews which may be useful in this context. In addition, Error! Reference source not found. (page **Error! Bookmark not defined.**) provides an overview of publications relevant to the cessation of smoking in pregnancy, and Error! Reference source not found. (page **Error! Bookmark not defined.**) and Error! Reference source not found. (page **Error! Bookmark not defined.**) address the prevention and cessation of smoking in young people.

Table 3. Local policy documents and evidence based reviews relevant to the prevention of exposure to second-hand cigarette smoke in children

Ministry of Health publications
<p>Ministry of Health. 2014. <b>Well Child / Tamariki Ora Programme Practitioner Handbook: Supporting families and whānau to promote their child's health and development. Revised 2014.</b> Wellington: Ministry of Health.  <a href="http://www.health.govt.nz/publication/well-child-tamariki-ora-programme-practitioner-handbook-2013">http://www.health.govt.nz/publication/well-child-tamariki-ora-programme-practitioner-handbook-2013</a></p> <p>This handbook states that all healthcare workers have a responsibility to assist people to stop smoking and that Māori, Pacific peoples, pregnant women and breastfeeding mothers are priority population groups for cessation support. At each well child contact, practitioners should ask about the child's smoke exposure, explain the effects of smoke inhalation on infants and children, encourage families to give their children a smokefree environment and give positive reinforcement for any behaviour changes identified. Practitioners should implement the ABC approach (Ask, Brief advice, cessation support) for smoking support.</p>
New Zealand guidelines
<p>Ministry of Health. 2007. <b>New Zealand Smoking Cessation Guidelines.</b> Wellington: Ministry of Health.  <a href="http://www.health.govt.nz/publication/new-zealand-smoking-cessation-guidelines">http://www.health.govt.nz/publication/new-zealand-smoking-cessation-guidelines</a></p> <p>The smoking cessation guidelines recommend that all health workers should be aware of the risks of second-hand smoke to children and young people exposed to smoking in their families and homes. Brief advice and cessation support to should be offered to all family members who smoke.</p>
Evidence-based medicine reviews
<p>Been JV, Nurmatov UB, Cox B, et al. 2014. <b>Effect of smoke-free legislation on perinatal and child health: a systematic review and meta-analysis.</b> <i>Lancet</i>, 383(9928), 1549–60</p> <p>This review reported on a random-effects meta-analysis of the results of 11 interrupted time-series studies looking at the effects of smoking bans in workplaces, public places or both and one or more predefined early life indicators (preterm birth, low birthweight and hospital attendance for asthma). Five studies from North America described district or state-wide bans and six European studies described national bans. One study was considered at high risk of bias, six at moderate risk and four at low risk. Smoke-free legislation was associated with reductions in preterm birth (four studies, 1,366,862 individuals; <math>-10.4\%</math> [95% CI <math>-18.8</math> to <math>-2.0</math>]; <math>p=0.016</math>) and hospital attendances for asthma (three studies, 225,753 events: <math>-10.1\%</math> [95% CI <math>-15.2</math> to <math>-5.0</math>]; <math>p=0.0001</math>). No significant effect on low birthweight was identified (six studies, &gt;1.9 million individuals: <math>-1.7\%</math> [95% CI <math>-5.1</math> to <math>1.6</math>]; <math>p=0.31</math>). The review authors concluded that smokefree legislation is associated with substantial reductions in rates of pre-term birth and hospital attendances for asthma and that their study provided strong support for WHO's recommendation of smoke free environments.</p>
<p>Baxi R, Sharma M, Roseby R, et al. 2014. <b>Family and carer smoking control programmes for reducing children's exposure to environmental tobacco smoke.</b> <i>Cochrane Database Syst Rev</i>, 3, CD001746  <a href="http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001746.pub3/abstract">http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001746.pub3/abstract</a></p> <p>This updated review included 57 controlled trials (21 more than the 2008 review) assessing the effectiveness of interventions to reduce children's exposure to environmental tobacco smoke (ETS). Most of the interventions were conducted in healthcare settings ("well child", "ill child" or both) and but seven were targeted at populations or communities. Only 14 studies found a statistically significant effect of the intervention in reducing children's exposure to ETS. Of these 14 studies, only six used objective measures of children's ETS exposure, such as measurement of urinary or salivary cotinine or household air nicotine. Eight were considered to be at high risk of bias, two at low risk and four at unclear risk. In the 14 studies finding a significant effect, a variety of interventions were used: seven used intensive counselling or motivational interviewing, one used telephone counselling, one a school-based strategy, one picture books, two educational home visits, and one brief intervention. One study did not describe the intervention. The review authors noted that in 32 of the 57 studies included in the review there was a reduction in children's ETS exposure irrespective of whether the children were in the intervention or the control group. They concluded that their review was unable to determine if any one intervention reduced parental smoking and child ETS exposure more than any other but they stated that they had identified seven studies reporting that motivational interviewing or intensive counselling provided in clinical settings were effective.</p>

Rosen LJ, Myers V, Hovell M, et al. 2014. **Meta-analysis of parental protection of children from tobacco smoke exposure.** *Pediatrics*, 133(4), 698–714. <http://pediatrics.aappublications.org/content/133/4/698.long>

This systematic review and meta-analysis aimed to quantify the effect of interventions aimed at decreasing children's tobacco smoke exposure (TSE). It included 30 studies (RCTs, quasi-RCTs and controlled trials) involving parents of 0–6 year old children. The studies examined various types of interventions that had, as one of their aims, helping parents to decrease their children's TSE. Interventions included various components: self-help materials (20 studies), face to face counselling (20 studies), telephone counselling (13 studies), biochemical feedback (4 studies), air cleaners (2 studies) and free nicotine replacement therapy for parents (1 study). Study outcomes were parentally-reported tobacco or protection (PREP), parentally reported number of cigarettes smoked around the child, and biomarkers of tobacco exposure such as levels of nicotine or cotinine in urine, blood, saliva or hair. PREP included home smoking bans, changing location of smoking, and moving the child away from others' smoking. For the 17 studies assessing PREP at follow-up (6,820 participants), there was evidence of small benefit from the interventions: relative risk (RR) 1.12, (95% CI 1.07 to 1.18,  $p < 0.0001$ ) and 7% more children were protected in the intervention than the control groups (risk difference (RD) 0.07, 95% CI 0.05 to 0.09). Overall, for the 8 studies (908 participants) reporting of numbers of cigarettes smoked, at follow up, intervention parents smoked fewer cigarettes around children than control parents ( $p = 0.03$ ). For the 13 studies using biomarkers (2,601 participants) results suggested that there was lower child TSE in the intervention groups but the overall risk difference was not statistically significant (RD  $-0.05$ , 95% CI  $-0.13$  to  $0.03$ ,  $p = 0.20$ ). The review authors concluded that interventions to prevent children's TSE are moderately beneficial at the individual level and that, at the population level, the benefits from these interventions could have significant public health impact.

Rosen LJ, Noach MB, Winickoff JP, et al. 2012. **Parental Smoking Cessation to Protect Young Children: A Systematic Review and Meta-analysis.** *Pediatrics*, 129(1), 141–52.

<http://pediatrics.aappublications.org/content/129/1/141.abstract>

The eighteen controlled trials included in this review (7,053 participants in total) were all included in the Cochrane review above. Unlike the Cochrane review, which included interventions for family members other than parents, and child care workers and teachers, and both smoking prevention and cessation interventions, this review included only controlled trials of interventions targeting smoking parents of young children (0–6 years). Interventions included self-help, counselling and medication and they took place in a range of settings. Thirteen of the studies found a positive effect from the intervention and in four of them the effect was statistically significant. The weighted mean quit rate for the intervention groups was 23.1% and for the control groups, 18.4%. Meta-analysis gave an overall risk ratio (RR) of 1.34 (95% CI 1.05–1.71) and a risk difference of 0.04 (95% CI 0.01–0.07,  $p = 0.005$ ) indicating that an additional 4% of parents quit smoking in the intervention groups compared to the control groups. In subgroup analyses, interventions were beneficial when they were provided to parents of children four years and over, when they included the use of cessation medication, when they had cessation as their primary purpose and when they had high follow up rates (>80%). The review authors concluded that smoking cessation interventions for parents are worthwhile but that additional strategies are needed to protect children from harm due to tobacco smoke.

Alpert HR, Behm I, Clancy L, et al. 2010. **Effect of smoke-free home and workplace policies on second-hand smoke exposure levels in children: an evidence summary.** *Pediatric Health*, 4, 391.

This article reviews and summarises evidence from studies reporting on laws for the protection of non-smokers, 'voluntary' home smoking restrictions and smoking behaviour of continuing smokers in households with children aged 0–17 years. The authors were unable to perform a full systematic review due to the paucity of studies in this area. Most of the 19 relevant studies identified were observational cross-sectional studies and the review authors noted that these are susceptible to selection bias, recall bias and misclassification bias. Three studies examined the effect of 'voluntary' home smoking restrictions and four examined the effects of 'mandated' workplace smoke-free policies on children's health and smoking status. Household smoking restrictions generally had a positive effect on children's SHS exposure, producing significant reductions of between 20 and 50% following the introduction of smoke-free home policies. Workplace smoke-free policies also had positive effects, as shown by the results of national surveys in Scotland, Ireland, Wales and Spain although a Hong Kong study showed the opposite effect (according to self-report) one year after the introduction of comprehensive smoke-free legislation in 2007. The Scottish survey included measurements of children's urinary cotinine and found a significant reduction of 50%, confirming reductions in children's SHS exposure one year after smoke free legislation. The Irish study found a significant reduction in pre-term births (25%) and a quasi-experimental U.S. study reported a significant 16% reduction in hospital diagnosed emergency asthma visits in people aged under 19 years after the introduction of comprehensive smoke-free legislation. The authors concluded that the current evidence suggests that reduction in SHS in public settings will eventually lead to reductions in SHS in private settings but that smoke-free home policies will provide additional benefits.

In their commentary on this review, which can be found here:

[http://www.crd.york.ac.uk/crdweb/ShowRecord.asp?ID=12011000974#\\_U4OzxvmSx8E](http://www.crd.york.ac.uk/crdweb/ShowRecord.asp?ID=12011000974#_U4OzxvmSx8E) the CRD stated that the reviews conclusions should be interpreted with caution given the limited methodological rigour of the studies included.

#### Other relevant publications

Healey B, Edwards R, Wilson N, et al. 2013. **The important persisting problem of smoking in cars with children: new data from a multi-year national survey of young people.** New Zealand Medical Journal, 126(1369), 86–9

Currently smoking in cars with children is not prohibited in New Zealand. This article reports on an analysis of unpublished data from the national-level annual ASH surveys of New Zealand's Year-10 students from 2006–2012. In each of the seven years more than 20% of the adolescents reported exposure to others' smoking in a car or van and while there had been a decline in the percentage over the period, it was relatively small, suggesting that, at the current rate of decline it will be 2028 before it drops below 2%. The authors stated that there is a strong public health case for New Zealand to follow other nations in banning smoking in vehicles with children.

Royal College of Physicians. 2010. **Passive Smoking and Children. A report by the Tobacco Advisory Group.** London: Royal College of Physicians. <http://www.rcplondon.ac.uk/sites/default/files/documents/passive-smoking-and-children.pdf>

This comprehensive report from the U.K. used both reviews of relevant literature and some new analysis to estimate the prevalence, determinants and trends in passive smoking exposure (PSE), report on the evidence of the effects of PSE on fetal and reproductive health and on children's health, and to estimate the effect of PSE on the numbers of children taking up smoking. It also considered the costs of PSE to the NHS and to wider society, and the ethical issues relating to PSE and children, before concluding with policy options to reduce children's PSE.

U.S. Department of Health and Human Services. 2006. **The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General.** Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. <http://www.ncbi.nlm.nih.gov/books/NBK44324/>

Chapter 6 of this report reviews the evidence concerning the effects of secondhand smoke on respiratory illness in children. It concludes that the evidence is sufficient to infer a causal relationship between secondhand smoke exposure from parental smoking and lower respiratory illness (in infants and children), acute and recurrent middle ear infection and chronic middle ear effusion ("glue ear") in children, phlegm, wheeze, breathlessness and ever having had asthma in school aged children, and a lower level of lung function during childhood. The report also states that eliminating smoking from indoor spaces entirely is the only way to protect non-smokers from secondhand smoke.

Note: The publications listed were identified using the search methodology outlined in Appendix 1.