Burden of disease from second-hand smoke exposure in New Zealand

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ABSTRACT

AIM: To estimate the number of deaths and disability-adjusted life years (DALYs) attributable to second-hand smoke in New Zealand.

METHOD: Comparative risk assessment methods were used to estimate the attributable burden from second-hand smoke in children and non-smoking adults in New Zealand. Disease outcomes included were: ischaemic heart disease; stroke and lung cancer in adults; asthma; lower respiratory infections; otitis media; sudden unexpected death in infancy (SUDI); and low birthweight at term in children. Mortality data from 2009–2011 and DALY data from 2006 were used.

RESULTS: In New Zealand, second-hand smoke was estimated to have caused 104 deaths (plausible range: 66–137) in 2010, and led to the loss of 2,286 healthy years of life (DALYs) (1,465–3,177) in 2006. The main conditions accounting for this health burden were ischaemic heart disease and stroke in older adults. Children accounted for 34% of the attributable health loss in 2006, particularly due to SUDI. Māori experienced five times the health loss of non-Māori, after standardising for age differences.

CONCLUSION: Second-hand smoke continues to cause substantial health loss in New Zealand, and disproportionately affects children and Māori. Substantial health gains can be made by reducing exposure to second-hand smoke in New Zealand.

Second-hand smoke is a major source of indoor air pollution, and can cause illness and premature death. Health effects from second-hand smoke include cardiovascular disease, respiratory disease, cancer, reproductive outcomes and effects on childhood development.[1,2]

Globally, second-hand smoke was estimated to cause over 600,000 deaths in 2010.[3] In New Zealand, an estimated 347 people died from second-hand smoke exposure in 1996/97 (plausible range 174–490), from ischaemic heart disease, stroke, lung cancer and sudden infant death syndrome (SIDS).[4] An earlier study estimated that 273 people died from second-hand smoke exposure (due to heart disease and lung cancer) in 1989.[5]

More recently, the New Zealand Burden of Disease Study estimated that second-hand smoke led to 2,800 DALYs (disability-adjusted life years) in 2006.[6] DALYs give an overall measure of healthy years of life lost from illness, disability and premature death, taking into account the age at which people die (through the years of life lost (YLL) component) and the severity of the illness or disability (through the years lived with disability (YLD) component). Additionally, the Global Burden of Disease Study 2010 suggested that 1,600 DALYs were caused by second-hand smoke in New Zealand.[7] Since these studies were published, updated evidence on health effects[1] and data on exposure to second-hand smoke for New Zealand[8] have become available.

This study used recently published data to update estimates of the health burden from second-hand smoke in New Zealand, and identified any population groups (by age, sex and ethnic group) that were disproportionately affected, and potential sources of uncertainty in these estimates.

Method

A comparative risk assessment method, outlined by the World Health Organization (WHO),[9] was used to estimate the burden of

Table 1: Relative risks for second-hand smoke exposure.

Health outcome	Age group	Risk estimate* (95% confidence intervals)	Exposure	Reference
Lung cancer (in non-smokers)	15+ years	RR 1.21 (1.13–1.30)	At home	US Surgeon General[2]
Ischaemic heart disease (in non-smokers)	15+ years	RR 1.27 (1.19–1.36)	At home or at work	US Surgeon General[2]
Stroke (in non-smokers)	35+ years	RR 1.25 (1.12–1.38)	At home or at work	Oono et al[11]
Lower respiratory infections	0–1 year	OR 1.54 (1.40–1.69)	Any household member smoking	Jones et al[12]
Sudden infant death syndrome (SIDS/ SUDI)	0 year	OR 1.94 (1.55–2.43)	Maternal postnatal exposure	Anderson and Cook[13]
Low birthweight at term	0 year	OR 1.38 (1.13–1.69)	Non-smoking mother exposed at home or work during pregnancy	Windham et al[14]
Otitis media (middle ear infection)	0–14 years	OR 1.32 (1.20–1.45)	Household smoker	Jones et al[15]
Asthma	0–14 years	OR 1.32 (1.23–1.42)	Either parent smokes	Tinuoye et al[16]

* RR = relative risk, OR = odds ratio. Where possible, risk estimates adjusting for potential confounders were used.

disease attributable to second-hand smoke in New Zealand, in terms of deaths (for 2010) and DALYs (for 2006).

Study population

This study estimated the attributable burden from second-hand smoke exposure for children and non-smoking adults in New Zealand. Current smokers were excluded from the main analysis, because most epidemiological evidence is for non-smokers, and therefore the health impact on current smokers is uncertain.[9] Ex-smokers were included on the assumption that their risk is similar to never-smokers.[5]

Estimating the attributable burden

The number of deaths and DALYs attributable to second-hand smoke was calculated using the population attributable fraction (PAF). The PAF is the proportion of health outcomes attributable to a specific exposure, and is calculated with the standard formula PAF = [p(RR–1)]/ [p(RR–1)+1], where p is the prevalence of exposure, and RR is the relative risk. When the relative risk was not available, the odds ratio was used as an approximation, as per standard procedures.[9]

The attributable burden was estimated by multiplying the PAF by the total health burden for each health outcome. For adults, the attributable burden was only estimated for non-smoking adults. To calculate this, the total burden of disease not due to smoking was calculated (by subtracting the attributable burden due to active smoking from the total burden), and the proportion of this burden among non-smokers was estimated, before applying the PAF.

Health conditions and relative risks

Health outcomes were selected if evidence from recent meta-analyses and reviews[1,2,9,10] showed they were caused by second-hand smoke exposure, and if the health outcomes were quantifiable by health statistics. Eight conditions were identified as being causally related to second-hand smoke exposure, including stroke in non-smoking adults, for which evidence of causality was only confirmed in 2014.[1] Other conditions included ischaemic heart disease and lung cancer in non-smoking adults, and lower respiratory infections, asthma, otitis media (middle ear infection), SUDI and low birthweight at term in children (Table 1).

SUDI was used in preference to SIDS, due to coding issues seen in New Zealand and advice given by the New Zealand Child and Youth Mortality Review Committee,[17]

consistent with the New Zealand Burden of Disease Study approach.[18]

Relative risks for current smoking were used to estimate the attributable burden due to active smoking.[1,19-21]

Sources of health outcomes data

Data on deaths came from the New Zealand Mortality Collection, using annual averages for the three-year period of 2009–2011. Deaths coded to improbable or imprecise ICD codes ('garbage codes') were redistributed to other codes according to the algorithm used in the 2006 New Zealand Burden of Disease Study.[18]

For health loss, data on DALYs, YLLs and YLDs from the 2006 New Zealand Burden of Disease Study were used. Data were available by health outcome, age group, sex and ethnic group (Māori, non-Māori).

Sources of exposure data

For exposure in the home, the confidentialised unit record data from the New Zealand Health Surveys (1996/97, 2006/07 and 2012/13) were analysed, which included information on whether anyone smoked inside the respondent's home and/or in the car they (or their child) travelled in, and on their smoking status. These data were used to estimate or interpolate exposure to second-hand smoke in the home (based on an exponential decay curve) for the required time periods, for children and non-smoking adults.

Appropriate time lags were applied to exposure data for health outcomes occurring in adults, to account for disease latency periods. Exposure data were lagged by 10–20 years for lung cancer (14 years for the 2010 analysis, and 10 years for the 2006 analysis), and 1–5 years for ischaemic heart disease and stroke (4 years for the 2010 analysis), based on recommendations by the WHO.[9]

For low birthweight at term, data from the antenatal interview in the "Growing Up in New Zealand" longitudinal study[22] were used to estimate the proportion of non-smoking pregnant women who had a partner who smoked, which was used as a proxy for exposure to second-hand smoke in the home.

For SUDI, exposure data were sourced from the nationwide Well Child/Tamariki Ora health checks programme for infants, which collects maternal smoking status at two weeks after birth.[23]

Estimating the attributable burden by population group

For each health outcome, the attributable burden was estimated for each age-sex group, and summed to give the total attributable burden. To examine differences between Māori and non-Māori, the attributable burden was directly estimated for non-Māori; the Māori burden was then indirectly estimated as the difference between the non-Māori and total burden. This approach was chosen because using the direct measure for Māori gave results similar or greater than the total burden, likely due to uncertainties in the estimates for Māori. Differences between Māori and non-Māori were estimated using standardised rate ratios, based on direct age-standardisation using the WHO world standard population.[24]

Sensitivity analyses

Estimates of attributable burden have many sources of uncertainty, including data inputs (such as relative risks and prevalence estimates) and assumptions. Following standard approaches,[9] a sensitivity analysis approach was used, changing various inputs and assumptions one at a time, to test the impact of these sources of uncertainty. These sensitivity analyses provide an indication of the uncertainty, but cannot be interpreted as statistical bounds or confidence limits.

The sensitivity analyses tested the lower and upper limits of estimates of the relative risks to give plausible ranges for results, and the lower and upper confidence intervals of exposure prevalence estimates. Assumptions about the study population were also explored, by firstly including current smokers in the analysis, and secondly excluding ex-smokers. Other sources of exposure to second-hand smoke were also explored, including exposure in cars and workplaces.[25,26] The sensitivity analyses also examined the impact of including health outcomes with less robust evidence, including asthma in adults,[27] preterm births,[10] pre-menopausal breast cancer[1] and invasive meningococcal disease.[28]

Table 2: Estimated deaths attributable to second-hand smoke, 2010, total and in Māori.

Health outcome	Age group	Total deaths in children and non-smoking adults	Deaths attributable to second-hand smoke (2010)				
			Number (%)		Deaths per 100,000*	% of total deaths in non-smokers	Deaths in Māori (% of total)
Ischaemic heart disease	15+ years	4,649	65	(63)	1.9	1.4	8 (12%)
Stroke	35+ years	2,236	28	(27)	1.2	1.2	3 (11%)
Lung cancer	15+ years	250	5	(5)	0.1	1.9	1 (20%)
Sudden unexpected death in infancy (SUDI)	0 year	54	6	(6)	9.6	11.3	5 (83%)
Asthma	0–14 years	2	0	(0)	0.0	1.9	0
Lower respiratory infections	0–1 year	9	0	(0)	0.1	1.8	0
Otitis media	0–14 years	0	0	(0)	0.0	–	0
Low birthweight at term	0 year	3	0	(0)	0.1	2.5	0
Total		**7,203**	**104**	**(100)**	**2.4**	**1.4**	**17 (17%)**

*Within age-group. Note: Figures may not sum to totals due to rounding.

Table 3: Estimated DALYs attributable to second-hand smoke, in children and non-smoking adults, total and in Māori, 2006.

Health outcome	Age group	Total estimated DALYs in children and non-smoking adults	DALYs attributable to second-hand smoke (2006)						
			Number (%)		DALYs per 100,000*	% of total DALYs in non-smokers	% of DALYs that were fatal	DALYs in Māori (% of total)	
Ischaemic heart disease	15+ years	68,820	1,033	(45)	31.4	1.5	86	207	(20%)
Stroke	35+ years	30,379	389	(17)	18.1	1.3	79	57	(15%)
Lung cancer	15+ years	4,377	96	(4)	2.9	2.2	98	20	(21%)
SUDI	0 year	5,289	596	(26)	997.5	11.3	100	505	(85%)
Asthma	0–14 years	2,969	93	(4)	10.5	3.1	7	44	(47%)
Lower respiratory infections	0–1 year	1,387	42	(2)	14.7	3.1	96	31	(73%)
Otitis media	0–14 years	1,189	31	(1)	3.5	2.6	0	17	(56%)
Low birthweight at term	0 year	244	6	(<1)	10.3	2.5	100	2	(34%)
Total		**114,654**	**2,286**	**(100)**	**54.7**	**2.0**	**85**	**883**	**(39%)**

* Within age-group. Note: Figures may not sum to totals due to rounding.

Table 4: Estimated number of deaths and DALYs attributable to second-hand smoke, by sex and ethnic group.

Sex	Ethnic group	Attributable deaths (2010)			Attributable DALYs (2006)			
		Number	Rate*	SRR (Māori vs non -Māori)	Number	Rate*	SRR (Māori vs non -Māori)	% of DALYs that were fatal
Total	Māori	17	3.6	2.93	883	144	5.09	90%
	Non-Māori	87	1.2		1,403	28		82%
	Total	104	1.5		2,286	48		85%
Males	Māori	10	3.9	2.48	506	174	4.57	90%
	Non-Māori	49	1.6		889	38		83%
	Total	58	1.9		1,395	60		86%
Females	Māori	8	3.2	3.49	378	117	5.97	89%
	Non-Māori	38	0.9		514	20		79%
	Total	46	1.1		892	37		84%

* Rates are per 100,000 population, and have been age-standardised to the WHO world standard population. SRR = standardised rate ratio. Figures may not sum to totals due to rounding.

Results

Exposure to second-hand smoke

In 2012/13, an estimated 150,000 non-smoking adults and children were exposed to second-hand smoke in their home in New Zealand. Exposure to second-hand smoke in the home almost halved between 2006/07 and 2012/13, among non-smoking adults (7.5% to 3.7%) and children aged 0–14 years (9.6% to 5.0%). In 2012/13, Māori continued to have higher rates of second-hand smoke exposure in the home (9.4% among non-smoking adults, and 9.2% among children), although these rates had decreased since 2006/07 (down from 16.0% and 18.9% respectively). The prevalence of exposure to second-hand smoke in cars (3.3% of non-smoking adults, and 6.1% of children) was similar to the prevalence of exposure in homes in 2012/13. Overall, 5.4% of non-smoking adults and 8.7% of children were exposed to second-hand smoke in their home and/or car in 2012/13.

For maternal smoking, from July to December 2012, 13% of mothers with newborns were smoking at two weeks after birth.[23] The rate was much higher among Māori mothers (35%).

Deaths attributable to second-hand smoke

Exposure to second-hand smoke caused an estimated 104 deaths in New Zealand in 2010 (Table 2). The majority of deaths (98 of 104 deaths) were in non-smoking adults, with the main causes of death being ischaemic heart disease (65 deaths, 63% of deaths) and stroke (28 deaths, 27% of deaths). SUDI was the primary cause of death due to second-hand smoke in children, contributing six deaths (5% of deaths).

DALYs attributable to second-hand smoke

In 2006, an estimated 2,286 DALYS were caused by second-hand smoke exposure (Table 3). Ischaemic heart disease accounted for the largest proportion of the burden (1,033 DALYs, 45% of DALYs). Most health loss in adults was fatal, particularly for ischaemic heart disease (86% fatal), stroke (79%) and lung cancer (98%). For children, SUDI had a considerable health burden (78% of the attributable burden in children), while asthma, lower respiratory infections and otitis media also contributed to the burden in children.

Population differences

Health loss due to second-hand smoke was almost twice as high in males (1,395 DALYs) as in females (892 DALYs). Standardising for age, males had about 60% higher health loss from second-hand smoke exposure than females (standardised rate ratio, SRR = 1.62).

Children were disproportionately affected, experiencing 34% of the total health loss due to second-hand smoke in 2006, particularly from SUDI. About 11% of total DALYs

Table 5: Sensitivity analyses showing the effect of changing assumptions on deaths and DALYs due to second-hand smoke.

Assumption in best estimate	Alternative condition	Effect on attributable burden (resulting total attributable burden)	
		Deaths (2010)	DALYs (2006)
Baseline scenario		104 deaths	2,286 DALYs
Best estimate for relative risk / odds ratio from meta-analysis	Use lower bounds of relative risks	Decrease by 36% (66 deaths)	Decrease by 36% (1,465 DALYs)
	Use upper bounds of relative risks	Increase by 31% (137 deaths)	Increase by 39% (3,177 DALYs)
Best estimate for prevalence	Use lower bounds of 95% confidence interval	Decrease by 32% (71 deaths)	Decrease by 22% (1,786 DALYs)
	Use upper bounds of 95% confidence intervals	Increase by 28% (133 deaths)	Increase by 24% (2,827 DALYs)
Use exposure in the home as proxy for regular exposure	Include exposure in the workplace for working-age population	Increase by 14% (119 deaths)	Increase by 27% (2,896 DALYs)
	Ischaemic heart disease (exposure in 2006)	Increase by 9.2 deaths	Increase by 413 DALYs
	Stroke (exposure in 2006)	Increase by 2.7 deaths	Increase by 115 DALYs
	Lung cancer (exposure in 1996)	Increase by 3.2 deaths	Increase by 82 DALYs
Use exposure to second-hand smoke in the home	Use exposure to second-hand smoke in home and/or car	Increase by 18% (123 deaths)	Increase by 17% (2,665 DALYs)
Include health outcomes with best evidence (Level 1 conditions only)	Include conditions suggestive of causal relationships:	Increase by 5% (109 deaths)	Increase by 38% (3,162 DALYs)
	Preterm birth complications	Increase by 2.7 deaths	Increase by 237 DALYs
	Asthma in adults	Increase by 1.5 deaths	Increase by 604 DALYs
	Pre-menopausal breast cancer	Increase by 0.4 deaths	Increase by 35 DALYs
	Invasive meningococcal disease	Increase by 0.2 deaths	N/A
Current smokers are not included in the analysis	Include non-smoking burden in smokers (and exposure data for total population, not just non-smokers)	Increase by 90% (198 deaths)	Increase by 70% (3,882 DALYs)
Ex-smokers are included in the analysis	Exclude burden in ex-smokers	Decrease by 42% (60 deaths)	Decrease by 38% (1,407 DALYs)
Estimate Māori burden as the difference between Total and non-Māori	Directly calculate Māori estimates, and sum Māori and non-Māori estimates to get total burden	Increase by 5% (109 deaths) Increase Māori deaths from 17 to 22 deaths; increase the standardised rate ratios for Māori vs non-Māori	Increase by 17% (2,673 DALYs) Increase Māori burden by 44% (from 883 to 1,270 DALYs); increase standardised rate ratios for Māori vs non-Māori

N/A = data not available.

from SUDI were attributable to second-hand smoke exposure. For children, health loss was mostly fatal (84%), including from SUDI (100%), low birthweight (100%) and lower respiratory infections (96%). However, for asthma and otitis media, most of the health loss was due to illness (7% and 0% of the health loss was fatal, respectively).

Disparities in health impacts from second-hand smoke were also seen for Māori. Māori experienced 17 deaths attributable to second-hand smoke, about 17% of the total (Table 4). Additionally, Māori experienced 883 DALYs attributable to second-hand smoke, about 39% of the total health loss experienced. Moreover, the attributable health loss was more likely to be fatal for Māori (90% fatal) than for non-Māori (82%). Standardising for age, Māori were about three times as likely to die from second-hand smoke exposure as non-Māori (SRR = 2.93), and they experienced five times the health loss from second-hand smoke as non-Māori (SRR = 5.09).

Five of the six SUDI deaths (and 85% of SUDI DALYs) attributable to second-hand smoke were in Māori children, despite Māori infants making up about 27–30% of children aged 0–12 months in New Zealand. Māori children also accounted for a disproportionately large amount of the attributable health loss from lower respiratory infections (73%), otitis media (56%) and asthma (47%).

Sensitivity analyses

The sensitivity analyses showed the effect of a range of alternative scenarios on the attributable deaths and DALYs (Table 5).

Using the lower and upper bounds of the relative risk estimates gave a plausible range of 66–137 deaths, and of 1,465–3,177 DALYs, for the attributable burden from second-hand smoke.

Including additional sources of exposure increased the attributable burden from second-hand smoke. Including workplace exposure to second-hand smoke for adults (with appropriate lag times between exposure and disease) resulted in a 14% increase in deaths (to 119 deaths) and a 27% increase in DALYs (to 2,896 DALYs), based on workplace exposure to second-hand smoke of 7.8% of non-smokers in 2006,[26] and 19% and 6% in non-smoking men and women respectively in 1996.[25] Including exposure in cars as well as homes increased the burden by 18% for deaths (to 123 deaths) and 17% for DALYs (to 2,665 DALYs).

Including health conditions with evidence suggesting (but not yet proving) a causal link, such as asthma in adults and preterm births, increased the attributable deaths by 5% (to 109 deaths) and the attributable DALYs by 38% (to 3,162 DALYs).

The largest impact was if current smokers were considered to be susceptible to second-hand smoke exposure. Including current smokers increased the attributable deaths by 90% (to 198 deaths) and the attributable DALYs by 70% (to 3,882 DALYs). Conversely, excluding ex-smokers from the analysis decreased the attributable deaths by 42% (to 60 deaths) and the attributable DALYs by 38% (to 1,407 DALYs).

Additionally, calculating the Māori attributable burden directly (rather than indirectly) increased the attributable deaths (by 5 deaths) and attributable DALYs (by 17%) among Māori, and increased the standardised rate ratios for Māori compared with non-Māori. These findings suggest that the main results for Māori are conservative.

Discussion

Exposure to second-hand smoke led to an estimated 104 deaths (plausible range: 66–137) in New Zealand in 2010, and health loss of 2,286 DALYs (1,465–3,177) in 2006. The majority of the health loss (84%) was due to premature death, mainly from ischaemic heart disease and stroke in adults, and SUDI in infants. Males experienced about 60% more health loss than females due to second-hand smoke, mainly driven by a higher attributable burden from ischaemic heart disease in males.

Children experienced 34% of the health loss from second-hand smoke in 2006, despite making up only 21% of the population. Much of this health loss was fatal, through SUDI deaths. Additionally, asthma and middle ear infections carried a substantial non-fatal burden for children, showing children are experiencing ill-health as a result of their exposure to second-hand smoke. Data from the Global Burden of Disease Study 2010 suggested that New Zealand children aged 0–4 years

experienced a higher health loss from second-hand smoke than Australia, the US and Canada, when examining the health conditions of lower respiratory infections, upper respiratory infections and asthma.[7] This study did not include SUDI in the list of health effects, so will be missing a sizeable amount of the attributable burden; given New Zealand's high SUDI rates,[29] the disparity between New Zealand and other countries is likely to have been larger.

Māori experienced five times as much health loss from second-hand smoke exposure than non-Māori after standardising for age. Much of this difference was accounted for by SUDI, although a higher burden was also seen in older Māori. Factors likely to have contributed to these higher rates include a higher total disease burden in Māori than non-Māori, with inequalities seen for many health conditions.[6] Māori also had higher rates of current smoking (39%) than non-Māori (14%) in 2012/13, and higher levels of exposure to second-hand smoke among those who did not smoke (about 9%). Māori mothers were also more likely to smoke at 2 weeks after birth (35%) than the national rate (13%).[23] These findings suggest that even among Māori who do not smoke, tobacco use still impacts on their health, through second-hand smoke exposure.

A previous study estimated that second-hand smoke caused 347 attributable deaths in New Zealand in 1996/97, of which 247 deaths were from exposure in the home.[4] In part, the higher burden estimate from this earlier study may be explained by the methods and data sources used. While our study included similar health conditions in attributable death calculations, the relative risks used in the earlier study were different from our study, and in particular were higher for stroke (RR=2.10 and 1.66 for men and women respectively) and SIDS (RR=5.3). Using the most current relative risks for health conditions would have lowered the attributable death count for exposure in the home in 1996/97 from 247 to 168 deaths. Additionally, the exposure data were not as robust or detailed (by age group) in the earlier study, which may have affected the precision of the results. The underlying burden of disease has also decreased over the past few decades (particularly for ischaemic heart disease and SUDI).[7]

Nonetheless, a sizeable difference in attributable burdens from exposure in the home and workplace still remains unexplained by these methodological differences, and likely represents a true decreased burden from second-hand smoke. Many public health initiatives in New Zealand since the 1990s have worked to reduce smoking rates and exposure to second-hand smoke, starting with the Smoke-Free Environments Act 1990, which banned smoking in many indoor workplaces. These changes may have contributed to changed attitudes towards, and increased awareness of, the health dangers of second-hand smoke. During this period, smoking rates have dropped substantially[8], as have rates of exposure to second-hand smoke in the home[8] and workplace,[25,26] all of which would have contributed to a lower overall burden of disease attributable to second-hand smoke exposure in both the home and workplace. Taken together, these results suggest that the burden of disease from second-hand smoke has reduced considerably in New Zealand over the past 15 years.

Sensitivity analyses were useful in providing a plausible range for the estimated burden in our study, as well as investigating the impact of extending the analysis to include inputs and assumptions with a less robust evidence base. For example, if current smokers were as susceptible to second-hand smoke as non-smokers, as some evidence suggests,[9] the attributable burden from second-hand smoke exposure would have almost doubled. Including in-car exposure would have also led to an increased burden; further evidence is needed about whether exposure in cars increases the health risk to the same extent as being exposed in homes. Including health conditions with suggestive evidence of causality with second-hand smoke (asthma in adults, preterm births, invasive meningococcal disease and pre-menopausal breast cancer) would have also led to a 20% increase in the potential attributable burden. These sensitivity analyses suggest that our estimates of the attributable burden may be conservative, and could be updated as the evidence base improves in the future.

Conclusions and implications for policy and public health initiatives

Second-hand smoke exposure is an entirely preventable cause of ill-health and premature death in New Zealand. This study found that 104 deaths were attributable to second-hand smoke exposure in New Zealand in 2010. While these results suggest a potential reduction in the burden over the last 15 years, they also highlight that there is no room for complacency, as some population groups remain disproportionately affected by second-hand smoke, particularly Māori and children. These findings also show scope for continuing health gains through providing smokefree environment in homes and cars, and ensuring women and their partners are smokefree during pregnancy and after their infant is born.

Competing interests:
The authors report grants from the New Zealand Ministry of Health during the conduct of the study.**Acknowledgements:**
The authors acknowledge the funding for this project by the Ministry of Health. We would also like to thank Professor Stephen Haslett (Massey University) for reviewing an earlier draft of this manuscript, and Associate Professor Deborah Read, Kirstin Lindberg (Massey University), Dr Martin Tobias, Maria Turley and Matthew Everett (Ministry of Health) for their input into earlier stages of this project.

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URL:
www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1432-1-april-2016/6844

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