

Cancer Council Victoria

Predicted impact of proposed tobacco control strategies

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Summary

In 2007, around 17% of adult Australians smoked tobacco daily. The National Partnership Agreement on Preventive Health (NPAPH)¹ has set a target for smoking prevalence of 10% or less by 2020. The Partnership has committed Commonwealth funding for an anti-smoking social marketing campaign that would commence in June 2009 and would achieve Target Audience Rating Points (TARPs) of around 350 per month throughout Australia over the three-year period from June 2010. The Tobacco Working Group of the Preventative Health Taskforce has proposed a package of measures to reduce smoking, including increased taxes on tobacco products and further investment in social marketing.

We adapted previously published models to investigate the impact of the NPAPH's social marketing investment. We also modelled the impact of an additional investment in social marketing, with and without tax increases of the magnitude proposed by the Taskforce. The three specific add-on strategies we investigated were:

Tax increases. No further increases in media spending above the NPAPH investment, but incremental increases in tobacco excise over three years from 2009, taking the price of cigarettes to \$20 per pack.

Extra media spend. Further investment in anti-smoking advertising taking total spending on media to around \$40 million per year and achieving sustained TARPs of 700 per month until 2020.

Tax increases plus extra media spend. Tobacco excise increases as for the *Tax increases* strategy and mass media increases as for *Extra media spend*.

As a result of the NPAPH-funded investment in social marketing, the prevalence of smoking among adults is predicted to fall to 14.5% by 2020 rather than to 15.1% if the government had not committed these funds. Although smoking rates would decrease under the NPAPH strategy, the number of smokers was predicted to be higher in 2020 than in 2007 because of demographic trends. Key outcomes for the three possible add-on strategies are summarised in the Table below.

Our models predicted that *NPAPH plus tax increases plus extra media spend* was the only strategy that would decrease prevalence to under 10% by 2020. The *Tax increases* and *Extra media spend* strategies would both also result in a substantial decline in the number of people smoking, but smoking rates would not drop to the target 10%.

All three strategies were cost saving, but *NPAPH media plus tax increases plus extra media spend* had the lowest net incremental cost, a saving of over \$5 billion.

We recommend implementing *Tax increases plus extra media spend* in addition to the *NPAPH media* strategy. We predict it would reduce prevalence to just under 10% by 2020, and result in approximately 925,000 fewer Australians smoking than would occur under the NPAPH strategy (and approximately 1,040,000 fewer Australians smoking than would have occurred without the NPAPH investment in

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media). It would prevent around 250,000 premature deaths in addition to the 30,000 premature deaths likely to be prevented by the NPAPH initiative.

Predicted impact of proposed strategies				
	NPAPH media only	NPAPH media plus tax increases	NPAHP media plus extra media spend	NPAHP media plus tax increases plus extra media spend
Health outcomes				
Smoking prevalence in 2020	14.5%	12.7%	11.2%	9.9%
Cumulative number of additional quitters in 2020	-73,800	279,900	575,900	850,900
No. of premature deaths avoided*	n/a	93,100	175,900	248,200
Health economic outcomes				
Incremental cost of strategy*†‡	n/a	\$63.54 m	\$276.16 m	\$276.16 m
Incremental health care costs*†§	n/a	-\$1,890 m	-\$3,668 m	-\$5,139 m
Net incremental cost of strategy*†§	n/a	-\$1,826 m	-\$3,392 m	-\$4,863 m
* Relative to NPAPH media only; † Discounted at 3% p.a.; ‡ Media plus support services for quitters; §Until age 85 years				

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Background

The Tobacco Working Group of the National Preventative Health Taskforce has proposed that Australia aim to reduce the prevalence of daily smoking from its current level of 17%, to 10% or less by the year 2020.² Achieving the target of less than 10% is expected to result in approximately one million fewer Australians smoking. Two of the main measures proposed by the Working Group to achieve the target reduction are:

- Increases in taxes (excise and customs duty) on tobacco products, to achieve an average price of \$20 for a packet of 30 cigarettes within three years.
- An anti-smoking mass media campaign with intensity of at least 700 TARPs per month.

Wakefield and colleagues' study of Australian population survey data from 1995 to 2006 found that both increases in cigarette costliness (the cost of a typical packet of cigarettes expressed as a percentage of average weekly earnings) and intensive and sustained tobacco control mass media campaigns were effective at, and critical for, reducing smoking prevalence.³

Commonwealth, State and Territory governments have recently entered into a Partnership Agreement on Preventive Health,¹ the NPAPH, as a consequence of which the Australian government is expected to invest a total of around \$60 million between 2010-11 and 2012-13 in social marketing campaigns to discourage tobacco use. Although this investment is welcome, the NPAPH-funded media campaigns will achieve only around 350 TARPs per month in 2010-11, 2011-12 and 2012-13, much less than the intensity recommended by the Tobacco Working Group.

Proposed strategies

We predicted the impact of the NPAPH-funded media campaigns, and the impact of the following three possible strategies proposed by the Tobacco Working Group to supplement the NPAPH initiative:

Tax increases. Excise duty per stick of tobacco was \$0.2568 in February 2009.⁴ Under the *Tax increases* strategy, excise duty would increase by 7.5 cents per stick late in 2009 (29%), a further 2.5 cents in 2010 (8%) and a further 7.5 cents in 2011 (21%), taking the price per packet of 30 cigarettes to approximately \$20. There would be no change in the intensity of mass media anti-smoking campaigns.

Extra media spend. Spending on anti-smoking advertising by the Australian government currently achieves an average of around 100 TARPs per month.⁵ With the additional NPAPH funding, monthly TARPs will increase to around 350 up to and including 2012-13. Under the *Extra media spend* strategy, an intensive, sustained anti-smoking campaign with 700 TARPs per month would run from July 2009 to 2020. There would be no increase in excise duty.

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Tax increases plus extra media spend. Under this combined strategy, excise duty would increase as specified in the *Tax increases* strategy, and mass media would increase to 700 TARPs per month in 2009 and remain at that level until 2020, as specified under the *Extra media spend* strategy.

These three strategies were compared with a baseline reflecting the NPAPH investment, i.e. increase in media to 350 TARPs per month for three years, no change in policy on tax, but continuing reforms in other areas of tobacco control. We assumed that cigarette taxes, and hence prices, would remain the same in real terms, and that anti-smoking advertising funded by the Australian government would revert to its current low average level of 100 TARPs per month at the end of the NPAPH campaign. We also assumed that restrictions on the marketing and use of tobacco products would continue to be extended over the next 11 years, at a rate similar to that which occurred from 1995 to 2006.³ Such reforms are likely to include more potent health warnings, further restrictions on promotion of tobacco through retail display and packaging, and continuing restrictions on smoking in public places. Although it is difficult to quantify the impact of these likely reforms on smoking prevalence, such policy changes are expected to exert a downward pressure on smoking prevalence to an extent similar to that which occurred from 1995 to 2006.

Impact on smoking prevalence

The impact of each of the three strategies (*Tax increases*, *Extra media spend*, and *Tax increases plus extra media spend*) on smoking prevalence and the number of additional quitters between 2009 and 2020 was assessed in the following four steps.

- i. *Development of predictive model.* We modified the previous analysis of Wakefield and colleagues³ to develop a Poisson regression model that described smoking prevalence as a function of mass media TARPs, cigarette prices (expressed as costliness), age group and sex over the same period, 1995 to 2006. Under our model, a 450-unit increase in anti-tobacco TARPs was associated with a 0.0025 percentage point decline in smoking prevalence two months later. So, if prevalence was 30% in a particular month, the model predicted that the screening of a campaign which achieved 450 TARPs would be expected to lead to a $0.30 * 0.0025 = 0.00075\%$ decline in prevalence two months later, i.e. to 29.925%. The impact of cigarette price varied with age-group and sex, but, on average, a 5% increase in price was associated with a 0.0111 percentage point decline in smoking prevalence, assuming that average weekly earnings remained constant. If smoking prevalence was 30% for a given month, and the price of cigarettes increased by 5%, say from \$10.00 a packet to \$10.50, then the model suggested that prevalence would immediately decline $0.30 * 0.0111 = .00333\%$, i.e. to 29.7%. To predict future smoking prevalence from the model, we adjusted for the likelihood that the relationship between TARPs and prevalence will be weaker in the future than it was in 1995 to 2006. An attenuation of the effectiveness of media advertising is expected to result from increasing clutter of health and other public interest messages in the

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media and consequential competition to be heard as well as a substantial increase in subscription and internet TV. Message-reach and frequency will therefore be more difficult to achieve. We predicted attenuation would be 20% from 2009 to 2014 and 40% from 2015 to 2020. We also present smoking prevalence predictions for 'no media attenuation' and 'additional media attenuation' (30% from 2009 to 2014 then 60% from 2015 to 2020). See Appendix 1 for further details. For the purpose of this exercise, inflation and average weekly earnings were assumed to remain constant (for all options) over the entire period.

- ii. *Estimation of smoking prevalence at commencement of proposed tobacco control strategies.* Our own analysis of the most recent National Drug Strategy Household Survey data⁶ showed that 17.4% of Australians aged 18 and over smoked daily in 2007. We estimated smoking prevalence in June 2009, the suggested commencement date of the proposed tobacco control strategies, using the Poisson regression model, current cigarette prices, and actual national anti-smoking TARPs during 2007 and 2008. Prevalence in June 2009 was predicted to be 16.3%.
- iii. *Prediction of smoking prevalence from 2010 to 2020.* The Poisson regression model was then used to predict smoking prevalence from 2010 to 2020 for the three proposed strategies, as well as for the NPAPH media strategy and for continuation of policies in place before commitment of the NPAPH funding, i.e. media at 100 TARPs per month. We used current average weekly earnings as the basis for calculating cigarette costliness throughout the intervention period.
- iv. *Prediction of number of additional quitters from 2010 to 2020.* The number of quitters each year from June 2010 to June 2020 was then estimated assuming population trends specified in the Australian Bureau of Statistics (ABS) Population Predictions, Series B, which are based on current trends in fertility, life expectancy at birth and migration.⁷

Predicted smoking prevalence with and without NPAPH-funded media is shown in Figure 1. Predicted smoking prevalence and the cumulative number of quitters for NPAPH media and the three proposed strategies are shown in Figures 2 and 3, respectively. Table 1 summarises predicted smoking prevalence in 2010, 2015 and 2020, and the cumulative number of quitters by June 2020. The term "quitters" here includes both smokers who become non-smokers as well as young non-smokers or experimenting smokers who do not progress to regular smoking, but may otherwise have done so.

Figure 1 shows that, without NPAPH media, smoking prevalence was predicted to decline slightly, to 15.1% over the next 11 years. With the NPAPH-funded media campaigns, we predicted a 1.7% fall, to 14.5% by 2020. However, the *number* of smokers was predicted to actually increase because the population of Australia was predicted (by the ABS) to grow to around 25.29 million over this period. Therefore, the number of quitters in the population was predicted to decline by about 73,800 with the NPAPH-funded media strategy. Without the predicted media

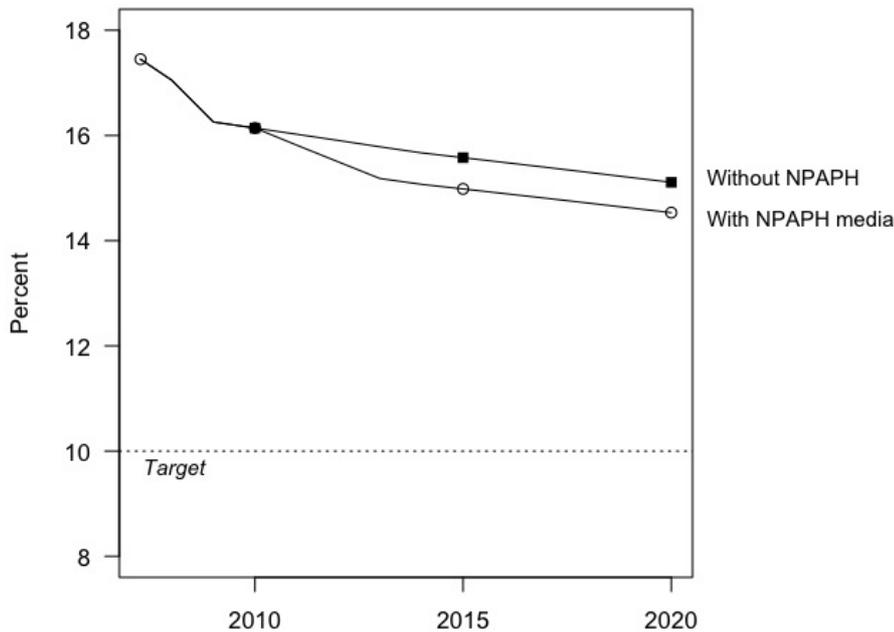
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attenuation, our model predicted that smoking prevalence would be 14.1% in 2020. With additional media attenuation, 2020 prevalence was predicted to be 14.53%.

Although the falls in smoking prevalence were greater when *Tax increases* or *Extra media spend* were added to the NPAPH-funded media strategy, the target of 10% or lower smoking prevalence by 2020 was not reached (Figure 2 and Table 1). Smoking prevalence was predicted to be 12.7% by 2020 with the *Tax increases* strategy and 11.2% with *Extra media spend*. With *Tax increases plus extra media spend* added to the NPAPH media strategy, smoking prevalence was predicted to achieve the target and reach 9.9% by 2020. Our model predicted that compared with the *NPAPH media* strategy, there would be 924,700 additional quitters by 2020 with the *NPAPH media plus tax increases plus extra media spend* strategy.

Figure 4 shows a sensitivity analysis of different predictive models (no media attenuation and additional media attenuation) for the *NPAPH media plus tax increases plus extra media spend* strategy. Under the additional media attenuation model this strategy achieved a smoking prevalence of 10.6% by 2020.

Figure 1. Projected prevalence of daily smoking, with and without NPAPH-funded media campaigns



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Figure 2: Projected prevalence of daily smoking for NPAPH and proposed tobacco control strategies

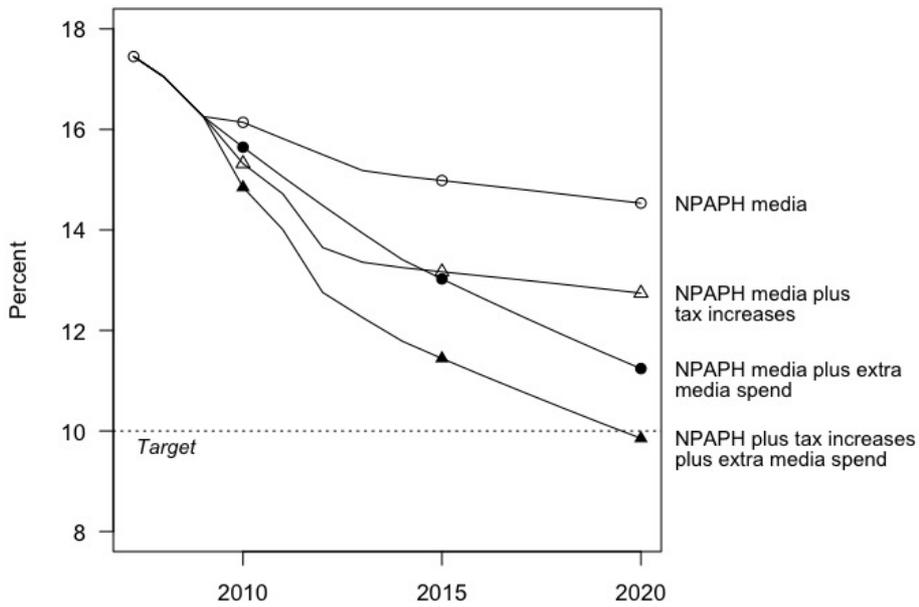


Figure 3: Cumulative number of 'quitters' for NPAPH-funded media campaigns and proposed tobacco control strategies

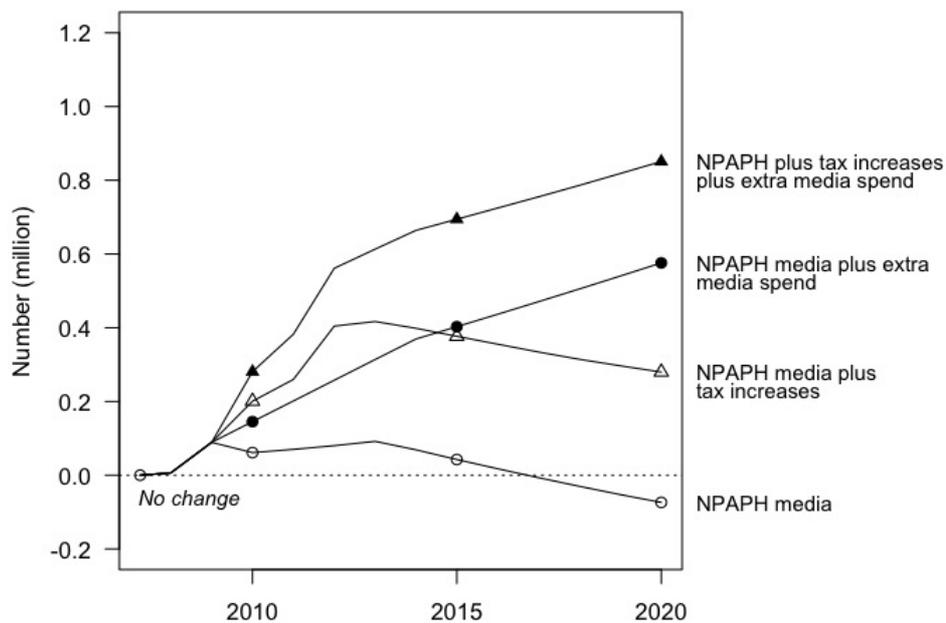


Table 1. Predicted smoking prevalence and cumulative number of quitters*

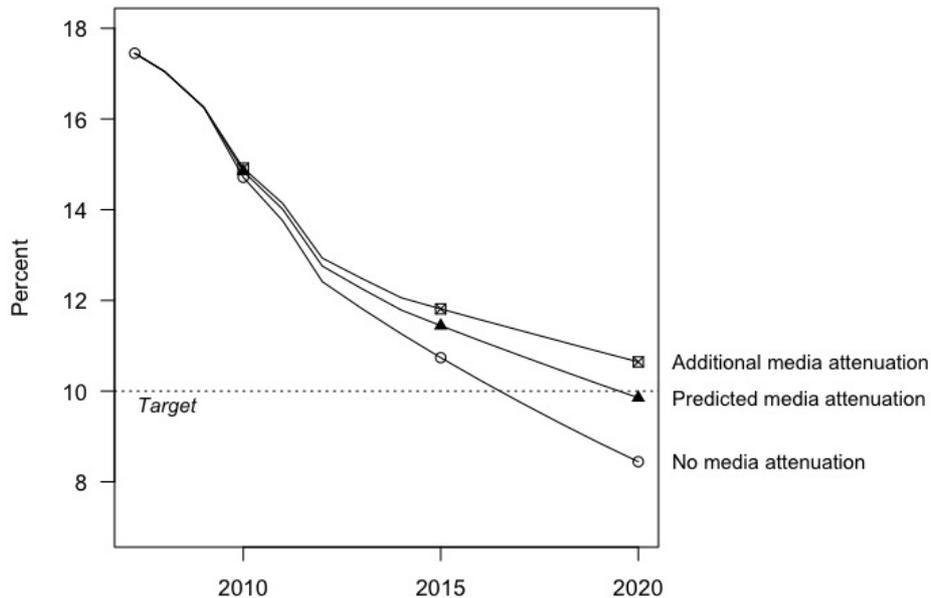
	NPAPH media only	NPAPH media plus	NPAPH media plus extra media	NPAPH media plus tax increases plus
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		tax increases	spend	extra media spend
Smoking prevalence				
2010	16.1%	15.3%	15.6%	14.8%
2015	15%	13.2%	13%	11.4%
2020	14.5%	12.7%	11.2%	9.9%
Cumulative number of quitters				
2010-2020	-73,800	279,900	575,900	850,900

*Predicted media attenuation

**Figure 4. NPAPH and extra media and tax increase package:
Sensitivity analysis of media impact**



Health consequences

We used the Quit Benefits Model (QBM), developed by Hurley and Matthews,⁸ to estimate the number of premature deaths avoided and the number of quality-adjusted life-years (QALYs) saved, through reduced incidence of the four most common smoking-associated illnesses: lung cancer, chronic obstructive pulmonary disease (COPD), stroke and coronary heart disease. Predicted benefits were calculated for people who quit in the 11 years from June 2009 to June 2020, from the time of quitting until age 85 years. Implementation of the NPAPH was predicted to avoid around 30,900 premature deaths, compared with pre-NPAPH policies. The predicted health consequences of the three possible add-on strategies, relative to the NPAPH, are summarised in Table 2. The *Tax increases* strategy was predicted to

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avoid almost 100,000 premature deaths, and the *Extra media spend* strategy was predicted to avoid about 176,000 premature deaths. The *Tax increases plus extra media spend* strategy was predicted to avoid the most premature deaths—almost 250,000—and would result in a gain of almost 2 million QALYs (discounted at 3% pa).

Table 2. Predicted number of premature deaths avoided and QALYs gained,* compared with NPAPH media only†

	NPAPH media plus		
	Tax increases	Extra media spend	Tax increases plus extra media spend
Number of premature deaths avoided	93,100	175,900	248,200
QALYs gained			
Undiscounted	1.93 m	3.68 m	5.18 m
Discounted at 3% p.a.	0.74 m	1.40 m	1.98 m

* Predicted media attenuation model; Due to reduced incidence of lung cancer, COPD, stroke and coronary heart disease; †From time of quitting to age 85 years

Incremental costs

We estimated the net incremental cost of each proposed strategy compared with *NPAPH media*, using standard health economics methodology.⁹ The analyses were conducted from a societal perspective from the time a person quit until they were aged 85 years. The net incremental cost was calculated by summing the incremental cost of the strategy and the predicted incremental cost of health care for lung cancer, COPD, stroke and coronary heart disease. Both undiscounted and discounted costs were calculated; the discount rate was 3% per year.

The incremental cost of each strategy was estimated as the sum of incremental expenditure on mass media campaigns associated with that strategy, and the additional costs of support services for smokers who attempted to quit as a consequence of the strategy. The current average expenditure on mass media campaigns by the Australian government is understood to be around \$5 million per year. The NPAPH has committed around \$20 million per year for three years from 2010-11. We assumed that mass media expenditure under the *NPAPH media* strategy would revert to \$5 million per year after 2012-13. We assumed the *Extra media spend* would cost \$40 million per year, so the incremental cost of media for this and the *Tax increases plus extra media spend* strategy, compared with NPAPH media, was \$340 million over the period 2010 to 2020.

For the purpose of this report, the incremental cost of support services for smokers attempting to quit was estimated as the sum of additional Quitline services and subsidisation of nicotine replacement therapy (NRT). Additional Quitline services were estimated to cost an average of \$2.65 million per year over the 11-year intervention period for both the *Extra media spend* strategy, and the *Tax increases plus extra media spend* strategy. Because higher cigarette price increases alone have not been associated with increased calls to Quitlines, we assumed there would be no increase in the cost of such services for the *Tax increases* strategy. (Announcement of large increases have been associated with a short-term spike in

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calls, but we have assumed this could be accommodated within existing budgets.) We assumed that the current Pharmaceutical Benefits Scheme (PBS) subsidy for nicotine replacement therapy (NRT) would be extended to all people with health care cards, and costs would average \$7.2 million per annum for each of the three strategies. Details of the assumptions underpinning these estimates are summarised in Appendix 2, and the total undiscounted and discounted incremental costs for each strategy are presented in Tables 3 and 4, respectively.

We used the QBM⁸ to estimate the incremental cost of health care for lung cancer, COPD, stroke and coronary heart disease, for each strategy relative to the NPAPH media strategy. The QBM health care cost results were adjusted from 2001 to 2008 prices using the ratio of index numbers for the health consumer price index (CPI) for these years.⁹ Because each strategy was predicted to result in an increased number of quitters compared with NPAPH media, the incidence of all smoking-associated illnesses was predicted to decrease, and the estimated total incremental cost of health care for the four smoking-associated illnesses analysed was negative, i.e. cost savings relative to NPAPH media were predicted. Incremental health care costs are presented in Tables 3 and 4.

The predicted health care cost savings were about \$5 billion (discounted) for the *Tax increases plus extra media spend* strategy, about \$3.6 billion for the *Extra media spend* strategy and about \$1.9 billion for the *Tax increases* strategy. The net incremental cost of all three strategies was negative, i.e. they were cost saving. The *Tax increases plus extra media spend* strategy was associated with the greatest savings, around \$4.8 billion, because more people were predicted to quit smoking (Table 4).

Table 3. Incremental costs of proposed strategies relative to NPAPH media only, future costs undiscounted			
	NPAPH media plus		
	Tax increases	Extra media spend	Tax increases plus extra media spend
Incremental cost of strategy*, 2010-2020	\$79.26 m	\$448.45 m	\$448.45 m
Incremental health care costs†			
until quitters reach age 85	-\$4,237 m	-\$8,066 m	-\$11,365 m
Net incremental cost of strategy			
until quitters reach age 85	-\$4,157 m	-\$7,618 m	-\$10,917 m

* Mass media campaign plus support services for smokers attempting to quit.
†For lung cancer, COPD, stroke and coronary heart disease

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Table 4. Incremental costs of proposed strategies relative to NPAPH media only strategy, future costs discounted at 3% p.a.

	NPAPH media plus		
	Tax increases	Extra media spend	Tax increases plus extra media spend
Incremental cost of strategy*, 2010-2020	\$63.54 m	\$276.16 m	\$276.16 m
Incremental health care costs†			
until quitters reach age 85	-\$1,890 m	-\$3,668 m	-\$5,139 m
Net incremental cost of strategy			
until quitters reach age 85	-\$1,826 m	-\$3,392 m	-\$4,863 m

* Mass media campaign plus support services for smokers attempting to quit.
†For lung cancer, COPD, stroke and coronary heart disease

Cost-effectiveness

All three potential strategies were more effective than *NPAPH media* alone, and had lower net costs. In cost-effectiveness analysis terminology, each strategy is therefore referred to as “dominant” relative to the NPAPH, i.e. the case is compelling on efficiency grounds for adopting any one of the strategies rather than only the *NPAPH media* strategy. The *Tax increases plus extra media spend* strategy is the preferred strategy on cost-effectiveness as well as effectiveness grounds, because it was the most effective and was also the most efficient from a health economic perspective.

In this analysis, we did not consider productivity gains associated with the reduced illness and mortality consequential to quitting. The issue of whether and how productivity costs should be included in health economic evaluations is controversial.¹⁰ The PBS, for example, discourages the inclusion of productivity costs in analyses submitted to support subsidisation of pharmaceuticals.¹¹ In our analysis, consideration of productivity costs was in fact unnecessary, as all strategies were cost saving.

Conclusion

Our analysis predicted that the *NPAPH media* strategy alone will not achieve the goal of smoking prevalence of 10% or less by 2020. However, we predict that if cigarette taxes are also increased and additional funds are committed to anti-tobacco media to the levels suggested by the Preventative Health Taskforce, the goal will be reached. The *Tax increases and extra media spend* strategy was the

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most effective of the three possible add-on strategies we considered by a large margin, reducing prevalence to 9.9%, resulting in around one million additional Australians quitting smoking, and avoiding almost 250,000 premature deaths in addition to the 30,000 likely to be avoided as a result of the NPAPH initiative. If none of these three additional strategies are implemented, our model predicted that there would be over 70,000 additional smokers in Australia by 2020 and that smoking prevalence would still be around 14.5%.

As well as being the most effective, the *Tax increases and extra media spend* strategy was the most cost-effective. When the experience of people who quit smoking was analysed until they reached 85 years of age, the net saving with the *Tax increases and extra media spend* strategy was almost \$5 billion, two and a half times the saving predicted for the *Tax increases* strategy and about 50% higher than the saving predicted for *Extra media spend*.

In summary, our models predicted that the *Tax increases plus extra media spend* strategy would be an effective means of achieving the proposed goal of 10% or less smoking prevalence by 2020, and would be efficient compared with the *NPAPH media* strategy and the two other add-on strategies we considered.

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Appendix One: Modelling of scenarios under different assumptions about future effectiveness

The analysis employed in this document applies results of a study by Wakefield et al[1] which found significant effects on smoking prevalence resulting from increases in the reach of anti-smoking advertising in the mass media and increases in cigarette costliness. In the current study we predicted the impact on smoking prevalence of the four specified tobacco control interventions. We used three different predictive models. For our base case (most likely) model, we predicted attenuation in the effectiveness of media. A sensitivity analysis was undertaken with a model in which we assumed 'no attenuation' in media, and a model in which we assumed 'additional media attenuation'. The reasoning for our assumptions about the likelihood and magnitude of media attenuation is outlined below.

Factors that may impinge upon the future effectiveness of changes in costliness

The analysis of Wakefield et al[1] yielded the average effects of tax increases on smoking prevalence for the period 1995 to 2006. There were no consistent differences in size of effect of tax increases from the first half to the second half of the period. This suggests that there was no underlying trend toward increasing or decreasing effectiveness over time of tax increases on smoking prevalence.

The Australian economy is presently in recession and growth is expected to be negative and then weak for some years.[2] It is sometimes argued that people smoke more during difficult financial times however it is also known that Australians on low incomes are more price sensitive than those on higher incomes.[3] Three quarters of Victorian smokers reported in November 2008 that they would try to quit if the price of cigarettes increased by 50%.[4] On balance it was judged that the economic climate would tend to increase the impact of increasing costliness over the next five years compared with the period covered by the Wakefield analysis.

Another factor that would alter the effect size of increases in costliness would be changes in the percentage of Australians who purchase tobacco products on which taxes have been evaded. Reductions in prevalence have occurred in response to increases in price in Australia even during periods when there were very large increases in taxes (during the 1990s and in 1999) and reportedly quite widespread evasion of state franchise fees on tobacco until 1997[5] and illegal sales of roughly processed tobacco (know as 'chop chop') between 1999 and 2006.[6, 7] The estimated impact of increases in costliness on prevalence from the Wakefield *et al.* analysis thus already takes into account the countervailing impact of evasion, including through periods when policing and deterrence was more limited than is presently the case. It is possible that evasion could increase to levels higher than those that existed over period covered by the Wakefield analysis, however on the other hand surveillance and other policing activities are also likely to be increased in this event. Further, effectiveness of tax policy could be expected to be enhanced by adoption of measures to be incorporated in the Protocol on Illicit Trade currently being developed by parties to the World Health Organization's Framework Convention on Tobacco Control.[8]

Taking into account all these factors, for the purposes of this exercise we applied the effect size for increases in costliness found in the Wakefield *et al.* analysis without adjustment over the future period of interest.

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Factors that may impinge upon future effectiveness of media campaigns

The analysis of Wakefield et al[1] yielded the average effects of media campaign exposure on smoking prevalence for the period 1995 to 2006. There were no consistent differences in size of effect of media campaigns from the first half to the second half of the period. This suggests there was no underlying trend toward increasing or decreasing effectiveness over time of media campaigns on smoking prevalence.

It is possible that higher levels of media spending may not yield the same rate of returns on reducing smoking prevalence. Although higher media exposure is predicted to yield greater effects, in the broader advertising literature, there begins to be diminishing returns at some higher level of investment with repeated exposure.[9, 10] Though possible, such an effect has not been observed with regard to smoking prevalence in jurisdictions to date. It is also expected that this effect could be avoided to at least some extent through regular development of new creative material, with messages guided by peer-reviewed behavioural research and draft concepts and materials carefully pre-tested with target audiences.

Less easy to avoid will be the effects of the increasing fragmentation of media. With increasing numbers of Australians subscribing to Pay-TV and the emergence of many new forms of delivery of news and entertainment, it is likely that the capacity of commercial television to reach (and therefore influence) large numbers of smokers will diminish in future years.

Given the strong likelihood of increasing media fragmentation and the possibility of diminishing effectiveness of media at higher levels of spending over time, the modelling contained in this document has assessed the impact of the four policy scenarios, given a likely moderate decline in effectiveness of media advertising in the future, and a possible more severe diminution of effectiveness of media. In addition, we also included modelling of a scenario where the size of effects of media campaigns was the same as in past years. The three future media attenuation scenarios are:

- *A diminution by 20% of the past observed effect of media campaign exposure on smoking prevalence for the period 2009 to 2014, and a further diminution of 40% for the period 2015 to 2020.* Based on US trends over the past five years in 'hours spent watching each media channel' [11] as well as discussions with people working in the Australian advertising industry with knowledge of media and communication policy, we consider that attenuation of this order to be the most likely scenario ("predicted attenuation") and so this scenario is used to generate the estimated effects on numbers of smokers, premature deaths avoided, the health care savings and tax revenue that are included in this report.
- *A diminution by 30% of the past observed effect of media campaign exposure on smoking prevalence for the period 2009 to 2014, and a further diminution of 60% for the period 2015 to 2020.* We consider this ("additional attenuation") to be the most pessimistic scenario that is possible, though less plausible than the predicted attenuation.
- *The same size of effect of the relationship between media campaign exposure and smoking prevalence observed in the past is applied to the entire future period.* For the reasons given above, we consider this to be an overly optimistic scenario ("no attenuation").

The impact on smoking prevalence assuming no media attenuation and additional media attenuation are compared to the predicted scenario in Figure 4 of the main document.

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Appendix Two: Estimation of incremental costs of Quitline and NRT subsidisation

Incremental Quitline costs

Telephone Quitline services currently operate in each State and Territory of Australia, receiving approximately 100,000 calls per year. Increased calls to Quitlines following increases in anti-smoking television advertising have been consistently documented in Australia and overseas.^{1,2} The Centre for Behavioural Research in Cancer at the Cancer Council Victoria analysed calls to the Victorian Quitline from December 2006 to July 2008, and Victorian anti-smoking TARPs data for the same period. They developed a function describing the relationship between TARPs and calls,³ which predicted that Quitline calls would increase by 27% (95% CI: 8% to 51%) if monthly TARPs increased from the current level of 100 (pre-*NPAPH media* strategy) to 700 (*Extra media spend* strategy and *Tax increases plus extra media spend* strategy). We used the 75th percentile of this estimate (39%) to predict Australia-wide increases in Quitline calls for these strategies, because, on average, Victorian smokers have been exposed to much more consistent anti-tobacco advertising (especially featuring the Quitline number) over the past 15 years than other states. It is therefore likely that the national increase in calls to the Quitline in response to increased advertising will be greater than the Victorian increase. There is no evidence that tax increases are associated with anything but temporary increases in Quitline calls, so we assumed no change in such calls for the *Tax increases* strategy.

Costs for Quitline services were estimated from 2008 Victorian Quitline records. The cost of an incoming call (to LINK services) was \$6, 42% of calls were referred to a Quitline counsellor, and the cost of such referrals was \$133. Note that people who are referred to a counsellor are offered a call-back service to assist with their efforts to quit. Approximately 70% of smokers referred to a counsellor accepted the call-back service and subsequently received an additional three calls, on average. The cost of this service is incorporated in the cost of \$133 per counsellor referral.

Incremental costs of NRT subsidisation

In Australia, NRT is currently only subsidised for Aboriginal and Torres Strait Islander people under the PBS, and for Repatriation concession card holders under the Repatriation Pharmaceutical Benefits Scheme. A concurrent project also conducted in response to the report of the Tobacco Working Group of the National Preventative Health Taskforce⁴ will argue that NRT, an effective and cost-effective medication, should be subsidised under the PBS for *all* health care card holders for whom NRT is clinically appropriate. We estimated the likely average cost of such subsidisation as follows.

- i. We estimated the number of non-Indigenous smokers who hold a health care card from age-specific smoking prevalence data for people on income support, sourced from the 2006 wave of the Household, Income and Labour Dynamics in Australia (HILDA) Survey,⁵ (analysis provided by Dr Roger Wilkins,

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The University of Melbourne, 20th December 2008) and Centrelink data on the number of non-indigenous Health Care card holders.

- ii. We assumed that half of these smokers would try to quit using NRT at some time during the 11-year intervention period, and that this usage pattern would not differ between strategies.
- iii. We assumed that the cost of the necessary consultation with a General Practitioner for prescription of NRT would be the Medicare rebate, Level C; that smokers would get 8 weeks supply of nicotine patches, provided as one prescription plus one repeat, and that the cost would be the currently listed Dispensed Price for Maximum Quantity on the PBS.⁶

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