Title

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THE EFFECT OF A $2.00 PER PACK INCREASE IN THE TOBACCO EXCISE TAX ON SMOKING AND HEALTHCARE EXPENDITURES: 2017-2020

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EXECUTIVE SUMMARY

A $2.00 per pack increase in the tobacco excise tax in California will reduce smoking prevalence and save billions of dollars in healthcare expenditures

Smoking prevalence in California will be more than 2 percentage points lower in 2020 with the tobacco tax increase

- Without the tax increase, 9.4% of California adults will smoke in 2020
- With the tax increase, just 7.1% of California adults will smoke in 2020, and the remaining smokers will smoke less
- Smoking rates will drop quickly because of the combined effect of higher prices and a larger reinvigorated tobacco control program
- As fewer people smoke, there will be fewer smoking-caused deaths and fewer nonsmokers exposed to secondhand smoke

The tobacco tax increase will save billions of dollars in healthcare expenditures because fewer people will get sick

- Annual savings in healthcare expenditures will be $900 million in 2017, increasing to $1.12 billion in 2020
- Cumulative savings will total $4.1 billion between 2017 and 2020
- Hospitalization costs will be $2 billion lower
- Outpatient costs will be $1 billion lower
- Medication costs will be $650 million lower

INTRODUCTION

This report describes the methodology used to determine the impact of a $2.00 per pack increase in the California tobacco excise tax to be implemented on January 1, 2017. The impact is measured in terms of smoking prevalence, including intensity of smoking (light, moderate, and heavy) and healthcare expenditures. The estimates are based on the approach previously published,[1,2] but use more current data.

METHODS

Changes in smoking prevalence and smoking-attributable healthcare expenditures for 2017-2020 are estimated for 2 different scenarios:

- *No change in the tobacco tax*. The California tobacco excise tax remains unchanged at $0.87 per pack of cigarettes.
- *Increase in the tobacco tax*. The California tobacco excise tax is increased by $2.00 per pack, to a level of $2.87 per pack, beginning January 1, 2017. It is assumed that after backfill obligations are met, 11.5% of tax revenues would go to tobacco control efforts with the remainder going towards physician training, enforcement of tobacco sales and marketing laws, tobacco-related research and education programs, and healthcare for low income residents.

Data sources. Data sets used in the analyses to project smoking behavior under alternative scenarios, estimate the national healthcare cost of smoking models, and apply the models to California include

- *Behavioral Risk Factor Surveillance System (BRFSS)*, a telephone-based survey of adults conducted by all states' health departments, which includes information on smoking status, other health risk behaviors, chronic health conditions, use of preventive services, and sociodemographic characteristics.
- *California Health Interview Survey (CHIS)*, a telephone-based survey of California adults containing information on individuals' smoking status, other health risk behaviors, health conditions, and demographic and socioeconomic characteristics.
- *Tobacco Use Supplement of the Current Population Survey (TUS-CPS), a* national survey of adults aged 15 and older (data starting in 2007 are for persons aged 18+) containing information on detailed cigarette smoking history and consumption patterns, nicotine dependence, other tobacco product use, workplace and home smoking restrictions, and attitudes toward smoke-free policies in public places.
- *Medical Expenditures Panel Survey (MEPS) and the National Health Interview Survey (NHIS).* The MEPS is a nationally representative survey containing detailed information about healthcare utilization, expenditures, payment sources, diagnostic codes for healthcare services used, health status, health insurance coverage, and demographic and socioeconomic characteristics. Information about individual smoking history is collected in the NHIS which can be linked with the MEPS data.

Smoking prevalence. Smoking prevalence for California was estimated using the 1984-2000 BRFSS and the TUS-CPS (available years 1992-2007) and a cointegrated time series regression model. Each of the four smoking prevalence variables, including current smoking prevalence, and the proportion of current smokers who are light (1-9 cigarettes per day or nondaily smokers), moderate (10-19 cigarettes per day), and heavy (20+ cigarettes per day) smokers, wass regressed on average current smoking prevalence for a group of control states, difference in cumulative real per capita tobacco control funding between California and the control states, and difference in real per capita income between California and the control states. The estimated coefficients were validated using forecasts for 2009-2014 compared to historical data. Then the model was used to forecast the long-run current smoking prevalence and proportions of current smokers by intensity for 2015-2020 under each scenario. It is assumed that changes in current smoking prevalence are equally attributed to increased cessation and reduced initiation. The resulting prevalence rates were adjusted to reflect the 2014 smoking prevalence rates derived from the 2014 CHIS data because the healthcare expenditure model (described below) was applied to the CHIS data, and hence smoking estimates need to reflect the smoking status of CHIS respondents. Further details are available elsewhere.[1]

Healthcare expenditures. Estimating healthcare expenditures involves several steps. First, the relative risks (RRs) of healthcare expenditures for hospital care, ambulatory care, prescriptions, and home health care were estimated using the econometric models that we have developed and refined over the last 20 years. The models use national data from the linked 2004-2009 MEPS–NHIS and control for smoking status, smoking intensity, other risk behaviors (obesity, and binge drinking), health insurance coverage, and sociodemographic characteristics. The estimated parameters were then applied to the 2009 CHIS data to obtain California-specific RR estimates for 2009.[3] Second, we determine the smoking-attributable fraction (SAF), a function of RR and smoking prevalence, using the formula described in our previous publications.[1,4] Applying the projected smoking prevalence rates for 2014-2020 under each scenario as well as the California-specific RR estimates for 2009 to this formula, we projected the SAFs for California for 2014-2020, assuming that the RRs would remain constant over time from 2009 to 2020. . Third, state-specific healthcare expenditures by type of healthcare services were available only until 2009. Thus, we projected healthcare expenditures by type of health service in 2014-2020 for California adults by multiplying the ratio of California to national health expenditures for each service type in 2009 by the National Health Expenditures projections through 2020, and applying the ratio of adult expenditure to all-age healthcare expenditures for each service type estimated from the 2014 MEPS data. Finally, the SAFs were multiplied by California healthcare expenditures for each type of healthcare services to obtain smoking-attributable expenditures for each year from 2014 to 2020 under each scenario, which were then converted into 2015 constant dollars using Consumer Price Index for Medical Care. Because the price index data were not available for the years 2011-2016, we used a deflator estimated by averaging the annual growth rates in Consumer Price Index for Medical Care over the latest five years from 2011-2015.

RESULTS

Smoking prevalence. Predicted smoking prevalence under the two scenarios is shown below in Figure 1 and Table 1. Smoking prevalence drops quickly under the tax increase because there is

a dual effect of increased prices and increased tobacco control program funding and efforts, both of which lead to reduced smoking. By 2020, smoking prevalence is over 2 percentage points lower (7.1% vs. 9.4%) under the tax increase scenario. This lower smoking prevalence will result in fewer sick smokers, fewer smoking-attributable deaths, and fewer nonsmokers exposed to secondhand smoke.

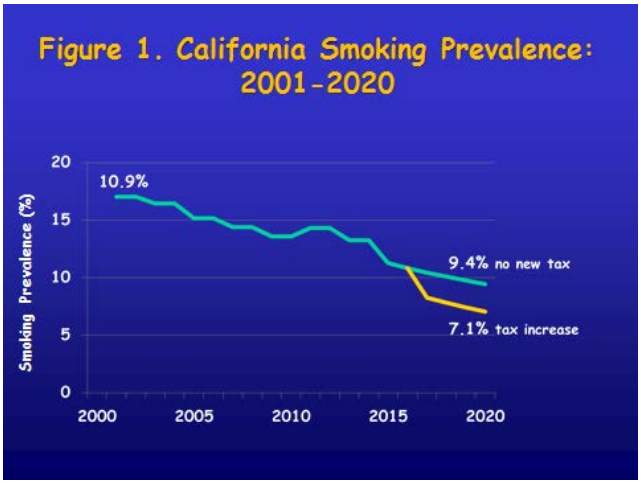
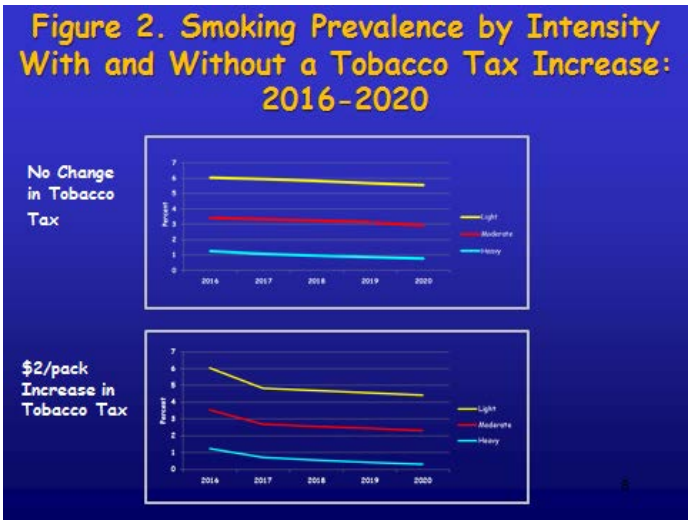


Table 1. Forecasts of smoking prevalence under two scenarios (No change in excise tax, $2.00 per pack increase in excise tax)

Smoking Status	2016	2017	2018	2019	2020
No change in excise tax					
Current	10.8%	10.4%	10.1%	9.8%	9.4%
Light	6.0%	5.9%	5.8%	5.7%	5.6%
Moderate	3.6%	3.4%	3.3%	3.2%	3.1%
Heavy	1.3%	1.1%	1.0%	0.9%	0.8%
Former	22.8%	23.0%	23.2%	23.4%	23.5%
$2.00 per pack increase in excise tax					
Current	10.8%	8.3%	7.8%	7.4%	7.1%
Light	6.0%	4.8%	4.7%	4.6%	4.4%
Moderate	3.6%	2.7%	2.6%	2.4%	2.3%
Heavy	1.3%	0.7%	0.6%	0.4%	0.3%
Former	22.8%	24.1%	24.3%	24.5%	24.7%

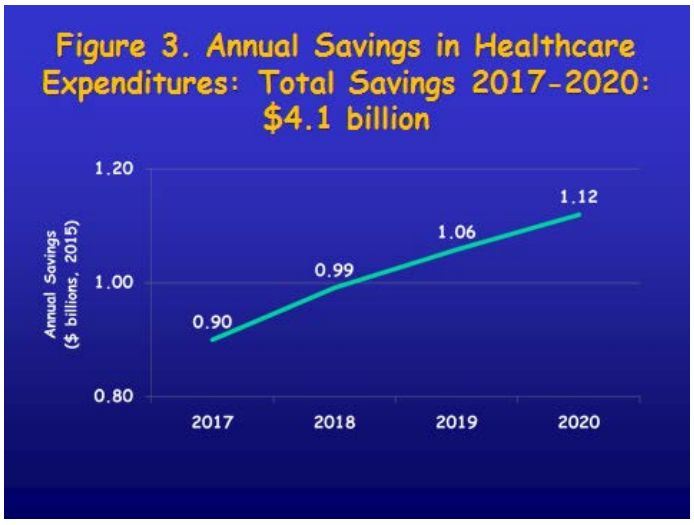
Smoking prevalence falls for current smokers regardless of intensity of smoking. As shown in Table 1 and Figure 2, smoking prevalence by intensity in 2020 for the tax increase scenario compared to the no tax change scenario would be 4.4% vs. 5.6% for light smoking, 2.3% vs. 3.1% for moderate smoking, and 0.3% vs. 0.8% for heavy smoking.



Healthcare expenditures. Healthcare expenditures will drop by $900 million in 2017, and by $1.12 billion in 2020 under the tax increase scenario compared to the no tax change scenario, as shown in Figure 3 and Table 2. The savings over the 4 years between 2017 and 2020 totals $4.1 billion, resulting from fewer people with smoking-attributable diseases.

The tax increase would lead to savings in healthcare expenditures for all types of services:

- Hospital care expenditures would fall by over $2 billion
- Ambulatory care expenditures would fall by nearly $1 billion
- Expenditures for prescription medications would fall by over $650 million
- Home health care expenditures would fall by nearly $450 million



Conclusion. A $2.00 per pack increase in the California tobacco excise tax would reduce smoking prevalence, cause those who continue to smoke to smoke fewer cigarettes, and would reduce healthcare expenditures by over $4 billion dollars between 2017 and 2020 compared to not changing the tax rate. In addition, fewer sick smokers would die prematurely and fewer nonsmokers would be exposed to secondhand smoke.

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Table 2. Healthcare expenditures under two scenarios (No change in excise tax, $2.00 per pack increase in excise tax) and savings: 2017 - 2020 ($ billions, 2015)

	No change in tobacco tax				$2.00 per pack tobacco tax increase				Savings from the tax increase compared to no change in tax				
	2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020	2016-2020
Ambulatory care	$2.34	$2.36	$2.39	$2.42	$2.12	$2.12	$2.13	$2.15	$0.22	$0.24	$0.25	$0.27	$0.97
Prescription meds	1.48	1.52	1.54	1.57	1.34	1.36	1.37	1.39	0.14	0.16	0.17	0.18	0.65
Hospitalization	4.93	4.98	5.05	5.13	4.49	4.49	4.53	4.57	0.45	0.49	0.52	0.55	2.01
Home health care	0.90	0.91	0.93	0.94	0.81	0.81	0.81	0.82	0.09	0.10	0.11	0.12	0.43
TOTAL	$9.65	$9.77	$9.90	$10.05	$8.75	$8.78	$8.85	$8.93	$0.90	$0.99	$1.06	$1.12	$4.07

REFERENCES

1. Max W, Sung H-Y, Lightwood J. The impact of changes in tobacco control funding on healthcare expenditures in California, 2012 - 2016. *Tobacco Control.* 2013;22(e1):e10-15.

2. Lightwood JL, Glantz SA. The effect of the California tobacco control program on smoking prevalence, cigarette consumption, and healthcare costs: 1989-2008. *PLoS One.* 2013;8(2).

3. Max W, Sung H-Y, Shi Y, Stark B. The cost of smoking in California. *Nicotine & Tobacco Research.* 2015.

4. Max W, Sung H-Y, Shi Y, Stark B. *The Cost of Smoking in California, 2009.* San Francisco, CA: Institute for Health & Aging, University of California, San Francisco;2014.

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