

California, Age 21 for Nicotine/Tobacco: A Near-Term Fiscal Analysis Based on the Projected Reductions in Low Birth Weight and Premature Births.

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Abstract

Because many of the deaths and illnesses caused by tobacco use do not manifest for decades, legislators considering tobacco use reduction policies must weigh initial investment costs (including tobacco tax revenue lost) against longer-term health and financial benefits. This analysis examines near-term reductions in premature and low birth weight infants as projected by the Institute of Medicine report, *The Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products* (March 14, 2015) and expresses those health savings in financial terms. **In the first five years of this policy, health care cost savings solely from preventing prematurity and low birth weight exceeds \$102,000,000 of which \$82,000,000 is Medi-Cal Savings, which easily surpasses the tobacco tax revenue loss of \$74,000,000.**

Introduction

This analysis estimates the effects of raising the minimum legal sales age (MLSA) of tobacco to 21 over five and twenty-five year time spans on rates of preterm birth (PTB) and low birth weight (LBW) and compares these effects to a reduction in tobacco taxes caused by raising the MLSA. These two conditions were chosen because they are included in the projective model adopted by the Institute of Medicine (IOM) during the production of its comprehensive report on the effects of raising the MLSA to 21, *The Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products*.

However, this focus cannot begin to account for the enormous human suffering of these babies and their families or the myriad other conditions caused by tobacco use that also have substantial financial and human costs. Finally, this analysis only examines costs accrued during the first year of life and does not account for long-term care costs for children who may have lasting neurological or physical injuries from these conditions.

Methods, Sources, Assumptions, and Estimates

Methods

This is a direct mathematical analysis using birth statistics by smoking-attributable diseases and projected incidence reduction from the IOM report. Those results allowed us to project the total number of cases averted, which were multiplied by the cost of treating each specific condition. We then compared this total to the projection of tax



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revenue lost to sales to individuals between 18 and 21. The details of each number used in the calculation is sourced or explained below.

Births per year

The California Department of Finance keeps historical data on the number of births in California and projects the number of births expected in the near future.ⁱ From the start of 2016 through 2020, there are projected to be 2,568,421 live births. However, the California Department stops projecting at 2023. That year's numbers are projected forward for the ensuing two years. From 2021 through 2025, we therefore project 2,612,520 live births.¹

Preterm births attributable to smoking

The incidence of preterm birth attributable to smoking among women of childbearing age is 0.51 percent in 2015.ⁱⁱ Since this analysis ranges from 2015 to 2040, which is less than half the way to 2100, we have used the incidence of 0.51%. This number was applied to the state level birth projections. However, one should note that this number departs considerably upward in California compared to the national estimate applied to the state level.

Low Birth Weight cases attributable to smoking

Under the status quo, in 2015 the incidence rate of smoking-attributable LBW babies is about 0.8 percent among the total births for all the women of childbearing age (ages 14–49), but 1.3 percent for the ages 20–24 years². We have chosen this rate as more representative of the population affected by raising the MLSA to 21.

Cases averted

The Institute of Medicine report on raising the minimum legal age of purchase to 21² estimates that this policy will reduce PTB by 4.3% over the first five years of the policy and 11.6% over the subsequent 20 years. The report also estimates that the policy will reduce LBW by 4.1% over the first five years and 10.7% over the subsequent 20 years. These numbers were reduced by 4.5% in order to better estimate the results in California as explained below. Thus, the PTB reductions at 5 and 25 years after policy inaction were estimated at 4.28% and 11.08% respectively while the LBW reductions used were 3.92% and 10.21%

Cost of treating conditions

A report by Truven Analytics has estimated that the average cost of treating LBW and PTB is \$55,393ⁱⁱⁱ in the first year of treatment billed to private insurance. While the equivalent cost to Medi-Cal could not be found, it is not likely to differ by much, since newborn costs are the 2nd most expensive type of condition to cover for both private insurance and Medi-Cal^{iv}. Additionally, when comparing the initial hospital costs of PTB and LBW between private insurance and Medi-Cal, the cost of PTB to Medi-Cal was \$900 more than private insurance and the cost of LBW to Medi-Cal was \$700 less.^v Therefore, we expect the differences to be negligible and have used \$55,393 in our model.



Proportion of costs attributable to Medi-Cal

Medi-Cal covered slightly more than 80% of all births to maternal smokers in California in 2011, the last year with publically available numbers. Therefore, this report will attribute 80% of savings to Medi-Cal.^{vi}

Tobacco tax estimate

The Governor of California's budget summary for 2015-2016 lists both the current and projected tobacco tax revenue. The preliminary estimate for the 2013-2014 fiscal year was \$833,100,000 with forecasts for the subsequent fiscal years at \$791,800,000 and \$770,500,000. Additionally, the report assumes a 3.6% decline in consumption, thus this decline was used in this analysis^{vii}. The Institute of Medicine's report projected a reduction in smoking prevalence of 2% in the first 5 years and 8.3% in the subsequent 20 years as a result of raising the MLSA to 21. As such, these proportions of tax revenue were removed from projected tax revenue as a result of the Tobacco 21 policy itself.^{viii}

One might consider the loss of tax revenue as a result of the reduction in smoking prevalence as a cost of this policy. That said, many tobacco control policies, such as education and enforcement, do not consider the reduction in tobacco tax revenue as a result of a drop in prevalence as a cost of the policy. Consequently, we will not consider this part of the cost here. Additionally, while there are other taxes on tobacco products such as sales taxes, this money will not likely be saved but be spent on other items similarly taxed, thus the only true tax revenue losses come from tobacco taxes themselves.

Tobacco tax revenue lost to Tobacco 21

A recent study by Winickoff, et al, has shown those aged 18-21 to be responsible for only 2.12% of tobacco sales, thus we project a 2.12% reduction in annual tobacco tax revenue and have included this in our analysis.^{ix}

Application of IOM predictions to California and other limitations

The IOM report's advice to policy makers suggests they keep enforcement and effectiveness of tobacco laws into account when applying their results to individual states, particularly compared to the average state as well as other characteristics. In this respect, California conducts better enforcement of restrictions of sales to underage smokers and their compliance-violation rate with respect to age limits is 8.7%. This is lower than the national average of 9.6%.^x Furthermore, the IOM report refers to California as an "aggressive tobacco control state." Therefore, we conclude that the IOM estimate can be reasonably extended to California. However, the maternal smoking rate in California is around 8.3%^{xi}, which is lower than the national average of 10.2%.^{xii}

To compensate for these deviations from the national average, two adjustments to the IOM estimates in order to incorporate the differences in enforcement and maternal smoking in California compared to the national average. Since enforcement in California



is about 10% more effective than the national average, the reductions projected by the IOM were increased by 10%.

Additionally, the maternal smoking rate in California was 8.3% in 2012.^{xi} The national maternal smoking rate is 10.2% and to account for this difference, the reductions were multiplied by the ratio of the California maternal smoking rate (in 2012) over the national maternal smoking rate.^{xii} It is worth noting that the national maternal smoking rate is from 2011, the last year available, which is not the same year as the California maternal smoking rate that was used. Also, the national smoking rate does not include California.

These factors offset each other, yielding a combined reduction of 4.5% in efficacy, which has been factored into the analysis. This analysis uses the median values of the IOM estimates in its forecast. Additionally, costs are based on national averages and are not specific to California.

Results

Applying the results of Institute of Medicine's model to California, in the first five years, this policy would prevent about 530 cases of PTB and 1,300 cases of LBW, leading to a total health care savings of around \$102,000,000 of which 80%, \$82,000,000, will be accrued by Medi-Cal. The tobacco tax revenue lost during this period is about \$75,000,000.

Over 25 years, this policy would avert about 6,500 incidences of PTB and almost 15,500 cases of LBW. This leads to savings of about \$1,200,000,000, while again, 80%, \$978,000,000, is saved by Medi-Cal^{xiii}. The projected tobacco tax revenue loss during this 25-year period is \$257,000,000. These numbers have been depicted graphically below and a table of outcomes is presented at the end of this document. Examining only the near-term, first year of life costs for LBW and PTB, this policy is revenue neutral. Over time, the health savings from other tobacco related diseases become more manifest.

Conclusion

This analysis clearly shows that this policy not only saves lives, but also almost immediately saves money, even when offset by projections of tax revenue losses. Additionally, the wealth of other conditions affected by this policy would also be expected to benefit the state. In the long term, the California Board of Equalization estimates this policy would reduce medical costs by as much as \$2 billion per year.^{xiv} While there are limitations to this analysis, it does provide a meaningful picture of the policy implications of raising the MLSA to 21. Both mounting scientific evidence and common sense suggest that this policy would save hundreds of thousands of California lives and save billions of dollars of taxpayer money.

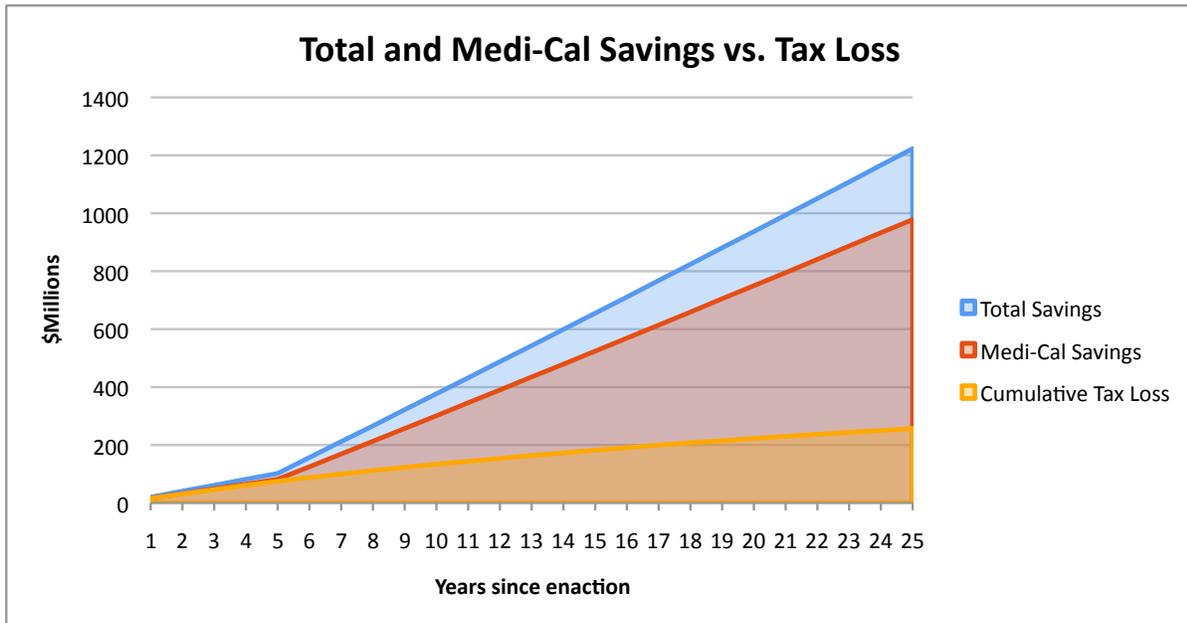


Figure 1: Projected cumulative low birth weight(LBW) and pre-term birth (PTB) cases and deaths averted, Medi-Cal and total health savings, and tax revenue lost due to no sales to persons aged 18-21 by year. Dollar amounts expressed in millions.

Year	Total Savings	Medi-Cal Savings	Cumulative Tax Loss	Cumulative PTB Averted	Cumulative LBW Averted
2016	\$20	\$16	\$16	106	259
2017	\$41	\$32	\$31	213	519
2018	\$61	\$49	\$46	321	780
2019	\$82	\$65	\$61	429	1043
2020	\$102	\$82	\$75	538	1307
2021	\$157	\$125	\$88	832	1999
2022	\$212	\$169	100	1127	2692
2023	\$266	\$213	\$112	1423	3387
2024	\$322	\$257	\$123	1719	4085
2025	\$377	\$301	\$134	2017	4785
2026	\$432	\$346	\$144	2315	5486
2027	\$488	\$390	\$154	2614	6190
2028	\$543	\$435	\$164	2915	6895
2029	\$599	\$479	\$173	3215	7603
2030	\$655	\$524	\$182	3517	8312
2031	\$711	\$569	\$191	3820	9024
2032	\$768	\$614	\$200	4123	9737
2033	\$824	\$659	\$208	4427	10452
2034	\$881	\$705	\$215	4732	11168
2035	\$937	\$750	\$223	5037	11887
2036	\$994	\$795	\$230	5344	12607
2037	\$1051	\$841	\$237	5651	13329
2038	\$1108	\$887	\$244	5958	14052
2039	\$1166	\$933	\$250	6267	14777
2040	\$1223	\$978	\$257	6576	15504



Figure 2: Cumulative savings, tax revenue, and Medi-Cal savings



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- ⁱ <http://www.dof.ca.gov/research/demographic/reports/projections/births/>
- ⁱⁱ *The Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products*. United States Food and Drug Administration. Consensus report compiled by the Institute of Medicine. March 12, 2015. <https://www.iom.edu/Reports/2015/TobaccoMinimumAgeReport.aspx>
- ⁱⁱⁱ <http://www.marchofdimes.org/news/premature-babies-cost-employers-127-billion-annually.aspx> and <http://www.marchofdimes.org/materials/premature-birth-the-financial-impact-on-business.pdf>
- ^{iv} Wier, L.M. (Thomson Reuters), and Andrews, R.M. (AHRQ). The National Hospital Bill: The Most Expensive Conditions by Payer, 2008. HCUP Statistical Brief #107. March 2011. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb107.pdf>.
- ^v <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb163.pdf>
- ^{vi} These numbers are from 2011, which is before the Medi-Cal expansion due to the Affordable Care Act. However, this is from the most recent birth report.
- ^{vii} <http://www.ebudget.ca.gov/2015-16/pdf/BudgetSummary/RevenueEstimates.pdf>
- ^{viii} *The Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products*. United States Food and Drug Administration. Consensus report compiled by the Institute of Medicine. March 12, 2015.
- ^{ix} Winickoff JP, Hartman L, Chen ML, Gottlieb M, Nabi-Burza E, DiFranza JR. Minimal Retail Impact of Raising Tobacco Sales Age to 21. *American Journal of Public Health* 2014.
- ^x <http://www.samhsa.gov/sites/default/files/synar-annual-report-2013.pdf>
- ^{xi} <http://www.cdph.ca.gov/data/surveys/MIHA/Pages/AnnualReports.aspx>
- ^{xii} Floyd RL, Jack BW, Cefalo R, et al. The clinical content of preconception care: alcohol, tobacco, and illicit drug exposures. *American Journal of Obstetrics and Gynecology*. 2008;199(6 Suppl 2):S333–S339. Via <http://mchb.hrsa.gov/chusa14/health-status-behaviors/infants/smoking-before-during-pregnancy.html>
- ^{xiii} http://images.info.truvenhealth.biz/Web/TruvenHealthAnalytics/GOV_13441_0414_MarchOfDimes_RB.pdf
- ^{xiv} http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0151-0200/sb_151_cfa_20150427_101336_sen_comm.html

