

Estimating the Impact of Raising Prices and Eliminating Discounts on Cigarette Smoking Prevalence in the United States

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ABSTRACT

The average retail price per pack of cigarettes is less than \$6, which is substantially lower than the \$10 per-pack target established in 2014 by the Surgeon General to reduce the smoking rate. We estimated the impact of three cigarette pricing scenarios on smoking prevalence among teens aged 12–17 years, young adults aged 18–25 years, and adults aged ≥ 26 years, by state: (1) \$0.94 federal tax increase on cigarettes, as proposed in the fiscal year 2017 President's budget; (2) \$10 per-pack retail price, allowing discounts; and (3) \$10 per-pack retail price, eliminating discounts. We conducted Monte Carlo simulations to generate point estimates of reductions in cigarette smoking prevalence by state. We found that each price scenario would substantially reduce cigarette smoking prevalence. A \$10 per-pack retail price eliminating discounts could result in 637,270 fewer smokers aged 12–17 years; 4,186,954 fewer smokers aged 18–25 years; and 7,722,460 fewer smokers aged ≥ 26 years. Raising cigarette prices and eliminating discounts could substantially reduce cigarette smoking prevalence as well as smoking-related death and disease.

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Tobacco price increases discourage smoking initiation among young people, prompt quit attempts, and reduce consumption.¹⁻⁴ According to a 2012 report by the Surgeon General, teens and young adults who are transitioning from relying on peers for cigarettes to buying their own—and who are, therefore, at greatest risk of becoming established smokers—are significantly more price-sensitive than adults.²

The 2014 Surgeon General's report on the health consequences of smoking outlined evidence-based actions to reduce the smoking rate to <10% within 10 years. Raising cigarette excise taxes was a key recommendation to prevent smoking initiation among young people and encourage cessation, with an initial target of \$10 per-pack or higher average retail price.¹ Federal, state, and local taxes can be combined to achieve this target. However, as of November 2014, the average retail price per pack of cigarettes in the United States was \$5.84, ranging from a low of \$4.38 in Missouri to a high of \$10.03 in New York State.⁵ Primary drivers of this price differential are state tobacco excise taxes, which range from \$0.17 per pack in Missouri to \$4.35 per pack in New York State.⁵ The fiscal year 2017 President's budget proposes a \$0.94 per-pack excise tax increase on cigarettes and small cigars; at the federal level, no tobacco excise tax has been enacted since a 2009 increase from \$0.39 to \$1.01 per pack.⁶

Tobacco industry promotions, including direct mail, Internet, and point-of-sale coupons; buy-one-get-one-free offers; and multipack discounts, undermine local, state, and federal pricing policies.² To maintain higher prices on tobacco products, some localities now prohibit the redemption of coupons and multipack discounts at retail.⁷

We examined the potential effects of (1) a \$0.94 per-pack federal tax on cigarettes; (2) a \$10 per-pack average retail price, allowing discounts; and (3) a \$10 per-pack average retail price, eliminating discounts, on cigarette smoking among youth, young adults, and adults, nationally and by state. To date, no study has modeled the impact of the three selected cigarette price scenarios on smoking prevalence. Assessing the potential impact of tobacco price policies on smoking prevalence can inform public health policy, planning, and prioritization.

METHODS

This study used state cigarette smoking prevalence estimates among youth aged 12–17 years, young adults aged 18–25 years, and adults aged ≥26 years from the 2012/2013 National Survey on Drug Use and Health.⁸

We obtained state cigarette prices from the 2010–2011 Tobacco Use Supplement to the Current Population Survey (TUS-CPS), which captures self-reported data on average prices paid per pack, including consumer-targeted discounts.⁹ We obtained the measure of price-related discounts from an existing analysis that estimated per-pack price reductions associated with price promotions after controlling for other price minimization strategies.¹⁰ We adjusted self-reported cigarette prices to 2013 U.S. dollars using the Consumer Price Index.¹¹ We obtained state populations, by age, from the U.S. Census Bureau¹² and short-run price elasticity estimates for youth, young adult, and adult smokers from a literature review by the Community Preventive Services Task Force, which included studies that controlled for general time trend or year fixed effects.¹³

In May 2015, we conducted Monte Carlo simulations to generate estimates using Stata[®] version 14.0.¹⁴ The simulation used uniform distributions for model inputs, including smoking prevalence, price elasticity, and discounts, to generate random outcomes for reductions in smoking prevalence and number of smokers. We calculated point estimates and 95% confidence intervals (CIs) (available from the authors) overall and by state.

We conducted the simulation according to the following specification:

$$\text{ChangeSP}_{ijt} = \frac{\text{CurrentSP}_{ij} \times \text{PriceElasticity}_i \times \text{PriceDiff}_{jt}}{\text{PricePaidperpack}_j}$$

where the change in smoking prevalence among age group i , in state j , under the scenario t (ChangeSP_{ijt}) is a function of current smoking prevalence of age group i , in state j (CurrentSP_{ij}); the price elasticity of the age group (PriceElasticity_i); the price difference in state j , under the scenario t (PriceDiff_{jt}); and the average per-pack price paid in state j ($\text{PricePaidperpack}_j$). The price differences varied by simulated scenarios. In the first scenario, the retail per-pack price was assumed to be increased by \$0.94. In the second scenario, the price was assumed to be increased by the difference between the self-reported price paid per pack and the targeted price, \$10. In the third scenario, we used the price difference from the second scenario plus the price promotion estimate from Pesko et al.¹⁰ Each simulation was repeated 1,000 times to generate 95% CIs, using uniform distributions for model inputs. We calculated the estimated impacts on smoking population at runtime of each simulation based on fixed values of the state population, by age.

RESULTS

A \$0.94 per-pack cigarette price increase could result in 129,167 fewer youth cigarette smokers aged 12–17 years, a 0.5 percentage-point decrease in prevalence; 861,357 fewer young adult smokers aged 18–25 years, a 2.5 percentage-point decrease in prevalence; and 1,569,024 fewer adult smokers aged ≥ 26 years, a 0.8 percentage-point decrease in prevalence (Tables 1 and 2). A \$10 per-pack retail price, allowing discounts, could result in 602,425 fewer teen cigarette smokers, a 2.4 percentage-point decrease in prevalence; 3,957,946 fewer young adult cigarette smokers, an 11.6 percentage-point decrease in prevalence; and 7,305,585 fewer adult smokers aged ≥ 26 years, a 3.6 percentage-point decrease in prevalence. The effects of a \$10 per-pack average retail price, eliminating discounts, were most robust: 637,270 fewer teen cigarette smokers, a 2.5 percentage-point decrease in prevalence; 4,186,954 fewer young adult cigarette smokers, a 12.2 percentage-point decrease in prevalence; and 7,722,460 fewer adult cigarette smokers ≥ 26 years of age, a 3.8 percentage-point decrease in prevalence. This third scenario, which eliminated discounts, resulted in 680,728 total fewer smokers—more than the total population of Vermont—compared with the second scenario, which allowed discounts.¹² Reductions in smoking prevalence would be expected to occur within one year of implementation of the price interventions.

Findings varied by state according to state smoking prevalence, population, and baseline retail cigarette price, including state excise taxes. For all three scenarios, states with the lowest excise tax rates and highest smoking prevalence would experience the greatest declines in smoking prevalence. For example, with a \$10 per-pack retail price and no discounts, the smoking prevalence among West Virginia's teens, young adults, and adults ≥ 26 years of age could decline by 6.7, 27.7, and 10.2 percentage points, respectively.

DISCUSSION

Our findings revealed that the three price scenarios would produce rapid and dramatic declines in smoking prevalence. Each price intervention would produce the greatest reductions in smoking prevalence among young adults aged 18–25 years, which has important implications for reducing future tobacco-related disease and death. Given that approximately one in three smokers is projected to die early of a smoking-related disease, a \$10 per-pack retail price and no discounts would be expected to avert the early deaths of approximately 1.5 million U.S. youth and young adults.¹ Even a \$0.94 per-pack federal cigarette tax increase would be

expected to avert more than 300,000 early deaths, while reducing geographic disparities in tobacco use, with the greatest declines in underage smoking occurring in Kentucky, Mississippi, Missouri, and West Virginia.

Tobacco price increases help reduce smoking-related health disparities, including among teen and lower-income smokers.^{13,15} Calls to state quitlines increase after cigarette tax increases, and quitlines improve the chances of quitting success and are effective with low-income and racially/ethnically diverse populations.^{15,16} By dedicating a portion of local, state, and federal tax revenues to tobacco control efforts, governments at each level can (1) invest in evidence-based tobacco prevention efforts and (2) help smokers, who bear the greatest burden of cigarette taxes, with support and encouragement to quit, including high-impact media campaigns, tobacco quitlines, and evidence-based cessation treatment and counseling. Medicaid enrollees who attempt to quit smoking in response to a tax increase have an increased chance of successfully quitting smoking if their state Medicaid programs cover additional cessation treatments and remove barriers to coverage.¹⁷

Price-discounting promotions increase youths' progression from experimentation to established smoking and undermine smokers' attempts to quit.^{18–20} The tobacco industry, which is aware of the inverse relationship between cigarette prices and smoking, spent \$6.99 billion on cigarette discounts in 2012.²¹ Internal industry documents note that “price . . . is the main driving force for quitting” and that price promotions target young adults.^{22,23} Local tobacco control efforts have begun to address this issue, beginning with bans in New York City and Providence, Rhode Island, on the retail redemption of coupons and multipack discounts. Courts have since upheld these bans.^{24,25}

Limitations

This study had several limitations. First, the models did not account for non-cigarette combusted tobacco products (e.g., cigars) because state data were not available on current use of any combusted tobacco product or on self-reported prices paid for any combusted tobacco product. Declines in cigarette smoking prevalence may not signify declines of the same magnitude in any combusted tobacco use and smoking-related deaths. Similarly, the model did not account for potential increases in dual use of cigarettes and lower-priced non-combusted tobacco products, including electronic cigarettes and smokeless tobacco. Second, the model used 2012/2013 NSDUH smoking prevalence estimates, which were the latest state representative data by age group available at the time of analysis and, therefore,

Table 1. Projected reductions in cigarette smoking prevalence one year after implementation of three price scenarios, by age and state, United States^{a,b}

State	Percentage-point reduction in smoking prevalence											
	\$0.94 per-pack price increase				\$10 per-pack retail price, allowing discounts				\$10 per-pack retail price, eliminating discounts			
	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age
United States	0.50	2.52	0.77	2.35	11.57	3.60	2.49	12.24	3.81			
Alabama	0.64	3.31	1.16	3.65	18.91	6.67	3.84	19.89	7.01			
Alaska	0.36	1.82	0.54	0.58	2.96	0.87	0.69	3.49	1.03			
Arizona	0.38	2.04	0.59	1.33	7.19	2.10	1.44	7.78	2.28			
Arkansas	0.69	3.01	1.10	3.64	15.86	5.78	3.84	16.74	6.10			
California	0.36	2.12	0.58	1.70	10.04	2.70	1.81	10.67	2.87			
Colorado	0.54	2.85	0.75	2.56	13.64	3.62	2.72	14.47	3.84			
Connecticut	0.30	1.73	0.46	0.73	4.31	1.16	0.81	4.82	1.30			
Delaware	0.57	2.80	0.83	2.72	13.25	3.91	2.89	14.07	4.15			
District of Columbia	0.32	2.11	0.67	1.07	7.07	2.21	1.16	7.69	2.40			
Florida	0.41	2.32	0.75	1.98	11.03	3.54	2.10	11.71	3.76			
Georgia	0.62	3.10	0.99	3.76	18.38	6.02	3.95	19.28	6.31			
Hawaii	0.29	1.41	0.39	0.42	2.03	0.57	0.51	2.44	0.68			
Idaho	0.62	2.76	0.84	3.25	14.48	4.56	3.44	15.29	4.66			
Illinois	0.43	2.38	0.72	1.68	9.39	2.82	1.81	10.09	3.04			
Indiana	0.74	3.36	1.09	4.10	18.46	5.97	4.32	19.45	6.28			
Iowa	0.61	2.91	0.82	2.88	13.60	3.83	3.06	14.46	4.07			
Kansas	0.51	2.58	0.82	2.36	11.85	3.84	2.51	12.60	4.08			
Kentucky	0.95	4.10	1.34	5.48	23.75	7.83	5.76	24.91	8.22			
Louisiana	0.78	3.25	1.07	4.25	17.76	5.83	4.48	18.71	6.15			
Maine	0.51	2.25	0.69	1.75	7.79	2.33	1.90	8.45	2.52			
Maryland	0.36	1.95	0.54	1.34	7.19	2.04	1.44	7.76	2.20			
Massachusetts	0.33	1.62	0.46	0.77	3.77	1.08	0.86	4.24	1.22			
Michigan	0.53	2.57	0.85	2.20	10.64	3.48	2.36	11.39	3.73			
Minnesota	0.59	2.84	0.75	2.78	13.29	3.51	2.96	14.12	3.73			
Mississippi	0.80	3.79	1.33	4.47	21.15	7.44	4.71	22.25	7.84			
Missouri	0.90	3.98	1.30	5.32	23.59	7.61	5.59	24.76	7.99			
Montana	0.60	2.73	0.80	2.52	11.43	3.35	2.70	12.23	3.58			
Nebraska	0.66	2.90	0.91	3.60	15.89	5.11	3.80	16.74	5.38			
Nevada	0.56	3.00	0.99	2.96	15.85	5.17	3.12	16.73	5.46			
New Hampshire	0.55	2.56	0.66	2.36	11.08	2.76	2.52	11.83	2.95			
New Jersey	0.32	1.74	0.44	0.84	4.61	1.19	0.93	5.12	1.33			
New Mexico	0.55	2.58	0.70	2.16	10.15	2.85	2.32	10.91	3.06			
New York	0.26	1.48	0.45	0.31	1.75	0.53	0.39	2.18	0.66			
North Carolina	0.62	3.08	1.02	3.52	17.42	5.60	3.71	18.33	5.89			
North Dakota	0.79	3.33	1.03	4.40	18.37	5.57	4.59	19.36	5.87			
Ohio	0.63	3.00	0.99	3.08	14.69	4.95	3.26	15.57	5.24			
Oklahoma	0.56	3.19	1.10	2.72	15.49	5.45	2.88	16.43	5.78			

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Table 1 (continued). Projected reductions in cigarette smoking prevalence one year after implementation of three price scenarios, by age and state, United States^{a,b}

State	Percentage-point reduction in smoking prevalence											
	\$0.94 per-pack price increase				\$10 per-pack retail price, allowing discounts				\$10 per-pack retail price, eliminating discounts			
	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age
Oregon	0.55	2.54	0.83	2.83	12.93	4.16	2.99	13.68	4.40			
Pennsylvania	0.60	2.76	0.82	2.64	12.17	3.54	2.81	12.99	3.78			
Rhode Island	0.37	1.78	0.52	0.83	4.04	1.17	0.94	4.56	1.32			
South Carolina	0.71	3.47	1.11	3.96	19.47	6.24	4.17	20.49	6.56			
South Dakota	0.63	2.82	0.88	2.78	12.34	3.84	2.97	13.18	4.10			
Tennessee	0.70	2.99	1.02	3.67	15.69	5.36	3.87	16.56	5.66			
Texas	0.41	2.36	0.69	1.84	10.60	3.10	1.96	11.29	3.30			
Utah	0.44	1.88	0.62	0.20	8.51	2.89	2.13	9.06	3.08			
Vermont	0.45	1.90	0.48	0.76	3.18	0.81	0.89	3.73	0.96			
Virginia	0.63	3.20	1.01	3.66	18.52	5.84	3.84	19.46	6.13			
Washington	0.39	1.78	0.49	0.87	3.96	1.12	0.98	4.48	1.27			
West Virginia	1.01	4.19	1.53	6.38	26.46	9.75	6.67	27.68	10.20			
Wisconsin	0.52	2.13	0.67	1.83	7.55	2.37	1.98	8.18	2.56			
Wyoming	0.71	2.79	0.82	2.97	11.59	3.37	3.18	12.40	3.61			

^a95% confidence intervals are available from the author.

^bReductions were estimated based on state-specific smoking prevalence from the 2012/2013 National Survey on Drug Use and Health. Average per-pack retail prices by state came from the 2010–2011 Tobacco Use Supplement to the Current Population Survey, adjusted to 2013 U.S. dollars. Price elasticity estimates by age group were obtained from a literature review by the Community Preventive Services Task Force. Data sources: (1) Census Bureau (US). Population estimates: historical data. 2014 [cited 2015 Jul 21]. Available from: <http://www.census.gov/popest/data/historical/index.html>; (2) Guide to Community Preventive Services. Reducing tobacco use and secondhand smoke exposure: interventions to increase the unit price for tobacco products [cited 2014 Jul 21]. Available from: www.thecommunityguide.org/tobacco/increasingunitprice.html; and (3) Department of Health and Human Services (US). Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health [cited 2015 Jul 21]. Available from: <https://nsduhweb.rti.org/respweb/homepage.cfm>

Table 2. Projected reductions in the number of cigarette smokers one year after implementation of three price scenarios, by age and state, United States^{a,b}

State	Reduction in number of smokers											
	\$0.94 per-pack price increase				\$10 per-pack retail price, allowing discounts				\$10 per-pack retail price, eliminating discounts			
	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age
United States ^c	129,167	861,357	1,569,024	602,425	3,957,946	7,305,585	637,270	4,186,954	7,722,460			
Alabama	2,695	16,661	36,771	15,403	95,206	211,843	16,190	100,105	222,730			
Alaska	234	1,604	2,275	378	2,617	3,706	445	3,086	4,367			
Arizona	2,176	13,893	25,408	7,575	48,882	90,791	8,209	52,946	98,388			
Arkansas	1,753	9,416	20,607	9,235	49,561	108,527	9,747	52,305	114,609			
California	11,547	95,786	139,672	54,103	453,149	653,171	57,449	481,252	693,552			
Colorado	2,412	16,474	24,804	11,527	78,857	119,974	12,232	83,642	127,295			
Connecticut	925	7,077	10,620	2,267	17,599	26,902	2,533	19,677	30,079			
Delaware	418	2,736	4,916	1,984	12,961	23,187	2,107	13,758	24,615			
District of Columbia	101	1,931	2,860	340	6,469	9,481	370	7,038	10,313			
Florida	6,149	43,907	99,085	29,347	209,134	468,763	31,156	222,087	497,881			
Georgia	5,177	33,088	60,489	31,197	196,348	366,185	32,729	206,027	384,165			
Hawaii	292	2,027	3,526	425	2,902	5,139	512	3,494	6,115			
Idaho	990	4,026	8,546	5,160	21,119	46,197	5,450	22,301	47,202			
Illinois	4,364	34,100	59,719	17,036	134,403	234,461	18,300	144,351	252,098			
Indiana	4,348	20,520	44,768	24,170	112,657	245,938	25,456	118,690	259,081			
Iowa	1,608	9,266	16,034	7,530	43,386	75,119	8,002	46,128	79,822			
Kansas	1,178	8,628	14,588	5,416	39,678	68,227	5,760	42,192	72,563			
Kentucky	2,915	22,688	37,581	16,857	131,204	218,763	17,714	137,836	229,833			
Louisiana	3,255	16,305	30,238	17,762	88,982	164,980	18,725	93,713	173,826			
Maine	474	2,979	6,435	1,643	10,314	21,805	1,781	11,190	23,641			
Maryland	1,664	12,151	21,460	6,137	44,810	80,583	6,627	48,356	86,994			
Massachusetts	1,689	12,392	20,305	3,930	28,826	47,551	4,428	32,452	53,488			
Michigan	4,207	27,947	54,156	17,450	115,932	222,729	18,698	124,106	238,376			
Minnesota	2,743	15,876	26,028	12,850	74,383	122,277	13,654	79,009	129,960			
Mississippi	2,076	12,679	23,902	11,583	70,735	133,897	12,192	74,419	140,976			
Missouri	4,041	24,840	51,007	23,944	147,173	298,904	25,144	154,468	313,659			
Montana	470	2,633	5,418	1,967	11,011	22,763	2,106	11,778	24,353			
Nebraska	911	6,290	10,720	5,001	34,516	59,903	5,269	36,367	63,109			
Nevada	1,290	9,856	17,186	6,822	52,097	89,865	7,199	55,005	94,826			
New Hampshire	559	3,077	6,030	2,413	13,286	25,324	2,578	14,186	27,049			
New Jersey	2,279	17,129	25,395	6,038	45,385	68,063	6,705	50,389	75,664			
New Mexico	973	6,155	9,270	3,827	24,217	37,529	4,109	26,025	40,309			
New York	3,920	33,338	57,372	4,645	39,498	67,991	5,783	49,224	84,896			
North Carolina	4,961	31,565	63,728	28,094	178,771	351,649	29,552	188,054	369,936			
North Dakota	373	2,917	4,609	2,059	16,084	25,028	2,168	16,948	26,374			
Ohio	5,943	38,721	73,793	29,067	189,388	369,154	30,791	200,673	391,294			
Oklahoma	1,645	11,242	26,682	7,983	54,554	131,656	8,467	57,865	139,608			

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Table 2 (continued). Projected reductions in the number of cigarette smokers one year after implementation of three price scenarios, by age and state, United States^{a,b}

State	Reduction in number of smokers											
	\$0.94 per-pack price increase				\$10 per-pack retail price, allowing discounts				\$10 per-pack retail price, eliminating discounts			
	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age	12-17 years of age	18-25 years of age	≥26 years of age	≥26 years of age
Oregon	1,626	10,281	21,679	8,285	52,366	108,775	8,760	55,394	115,114			
Pennsylvania	5,955	37,058	70,171	26,254	163,381	304,455	27,997	174,368	324,815			
Rhode Island	311	2,085	3,603	704	4,719	8,154	795	5,331	9,211			
South Carolina	2,639	17,284	34,216	14,805	96,955	192,378	15,573	102,022	202,417			
South Dakota	396	2,655	4,663	1,730	11,608	20,295	1,846	12,396	21,658			
Tennessee	3,236	19,018	44,037	16,952	99,642	231,198	17,891	105,200	243,996			
Texas	9,318	70,654	111,935	41,785	316,843	500,138	44,525	337,345	532,536			
Utah	1,249	6,469	9,975	5,668	29,360	46,441	6,033	31,263	49,449			
Vermont	192	1,150	2,085	322	1,930	3,525	378	2,266	4,134			
Virginia	4,365	26,190	53,231	25,285	151,709	308,535	26,551	159,373	323,940			
Washington	2,182	12,339	22,531	4,862	27,498	51,024	5,504	31,108	57,700			
West Virginia	1,431	6,258	19,286	9,029	39,472	122,987	9,447	41,296	128,689			
Wisconsin	2,571	12,561	24,989	9,107	44,488	87,764	9,859	48,173	95,026			
Wyoming	318	1,788	3,077	1,320	7,426	12,685	1,413	7,946	13,581			

^a95% confidence intervals are available from the author.

^bReductions were estimated based on state-specific smoking prevalence from the 2012/2013 National Survey on Drug Use and Health. Average per-pack retail prices by state came from the 2010–2011 Tobacco Use Supplement to the Current Population Survey, adjusted to 2013 U.S. dollars. Price elasticity estimates by age group were obtained from a literature review by the Community Preventive Services Task Force. Data sources: (1) Census Bureau (US). Population estimates: historical data. 2014 [cited 2015 Jul 21]. Available from: <http://www.census.gov/popest/data/historical/index.html>; (2) Guide to Community Preventive Services. Reducing tobacco use and secondhand smoke exposure: interventions to increase the unit price for tobacco products [cited 2014 Jul 21]. Available from: www.thecommunityguide.org/tobacco/increasingunitprice.html; and (3) Department of Health and Human Services (US). Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health [cited 2015 Jul 21]. Available from: <https://nsduhweb.rti.org/respsweb/homepage.cfm>

^cBecause the results for the United States are generated from an independent simulation, they are not necessarily the sum of state estimates.

did not account for declines that have occurred since 2013. Estimates of smoking prevalence tend to be higher in NSDUH than in other surveillance systems because of differing definitions of current smoker; NSDUH does not require past-30-day smokers to also report having smoked 100 cigarettes in a lifetime. Thus, use of NSDUH estimates may have generated larger declines in smoking prevalence than use of estimates from other surveys, such as the Behavioral Risk Factor Survey. Third, the latest available TUS-CPS estimates for cigarette prices paid did not account for tax increases or price discounts that occurred since 2011. Finally, the models did not account for non-price factors proven to reduce smoking prevalence, such as smoke-free air laws, high-impact media campaigns, or comprehensive statewide tobacco-control programs.¹

CONCLUSION

Cigarette prices are far below the Surgeon General's \$10 per-pack retail price target. Raising prices by \$0.94 or to \$10 per pack, eliminating price discounts, and dedicating a portion of revenues to evidence-based tobacco control efforts could substantially reduce cigarette smoking prevalence and smoking-related deaths among youth, young adults, and older adults.

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REFERENCES

1. Department of Health and Human Services (US). The health consequences of smoking—fifty years of progress: a report of the Surgeon General. Atlanta: HHS, Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
2. Department of Health and Human Services (US). Preventing tobacco use among youth and young adults: a report of the Surgeon General. Atlanta: HHS, Centers for Disease Control and Prevention (US), National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
3. Institute of Medicine, Bonnie RJ, editor. Ending the tobacco problem: a blueprint for the nation. Washington: National Academies Press; 2007.
4. Wilson LM, Avila Tang E, Chander G, Hutton HE, Odelola OA, Elf JL, et al. Impact of tobacco control interventions on smoking initiation, cessation, and prevalence: a systematic review. *J Environ Public Health* 2012;2012:961724.
5. Orzechowski W, Walker RC. The tax burden on tobacco: historical compilation. Vol. 49. Arlington (VA): Orzechowski and Walker; 2014.
6. The White House (US), Office of Management and Budget. Analytical perspectives: budget of the U.S. government, fiscal year 2017 [cited 2016 Mar 17]. Available from: <https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/spec.pdf>
7. Roeseler A, Solomon M, Beatty C, Sipler AM. The Tobacco Control Network's policy readiness and stage of change assessment: what the results suggest for moving tobacco control efforts forward at the state and territorial levels. *J Public Health Manag Pract* 2016;22:9-19.
8. Department of Health and Human Services (US), Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health [cited 2015 Jul 21]. Available from: <https://nsduhweb.rti.org/respweb/homepage.cfm>
9. Department of Commerce (US), Census Bureau. National Cancer Institute-sponsored Tobacco Use Supplement to the Current Population Survey (2010–2011) [cited 2015 Apr 1]. Available from: <http://appliedresearch.cancer.gov/tus-cps>
10. Pesko MF, Xu X, Tynan MA, Gerzoff RB, Malarcher AM, Pechacek TF. Per-pack price reductions available from different cigarette purchasing strategies: United States, 2009–2010. *Prev Med* 2014;63:13-9.
11. Department of Labor (US), Bureau of Labor Statistics. Consumer Price Index [cited 2015 Jul 21]. Available from: www.bls.gov/cpi
12. Census Bureau (US). Population estimates: historical data. 2014 [cited 2015 Jul 21]. Available from: <http://www.census.gov/popest/data/historical/index.html>
13. Guide to Community Preventive Services. Reducing tobacco use and secondhand smoke exposure: interventions to increase the unit price for tobacco products [cited 2014 Jul 21]. Available from: www.thecommunityguide.org/tobacco/increasingunitprice.html
14. StataCorp. Stata®: Release 14. College Station (TX): StataCorp; 2015.
15. Farrelly MC, Bray JW. Responses to cigarette prices by race/ethnicity, income, and age groups—United States, 1976–1993. *MMWR Morb Mortal Wkly Rep* 1998;47(29):605-9.
16. Fiore MC, Jaen CR, Baker TB, Bailey WC, Benowitz NL, Curry SJ, et al. Treating tobacco use and dependence: 2008 update. *Clinical Practice Guideline*. Rockville (MD): Department of Health and Human Services (US), Public Health Service; 2008.
17. Singleterry J, Jump Z, DiGiulio A, Babb S, Sneegas K, MacNeil A, et al. State Medicaid coverage for tobacco cessation treatments and barriers to coverage—United States, 2014–2015. *MMWR Morb Mortal Wkly Rep* 2015;64(42):1194-9.
18. Slater SJ, Chaloupka FJ, Wakefield M, Johnston LD, O'Malley PM. The impact of retail cigarette marketing practices on youth smoking uptake. *Arch Pediatr Adolesc Med* 2007;161:440-5.
19. Davis RM, Gilpin EA, Loken B, Viswanath K, Wakefield SA, editors. Monograph 19: the role of the media in promoting and reducing tobacco use. Bethesda (MD): National Institutes of Health (US), National Cancer Institute; 2008. Also available from: <http://cancercontrol.cancer.gov/brp/tcrb/monographs/19/index.html> [cited 2016 Mar 9].
20. Paynter J, Edwards R. The impact of tobacco promotion at the point of sale: a systematic review. *Nicotine Tob Res* 2009;11:25-35.
21. Federal Trade Commission (US). Federal Trade Commission cigarette report for 2012. 2015 [cited 2015 Jul 6]. Available from: <https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-cigarette-report-2012/150327-2012cigaretterpt.pdf>
22. Campaign for Tobacco-Free Kids. Raising cigarette taxes reduces smoking, especially among kids (and the cigarette companies know it) [cited 2015 Jul 24]. Available from: <http://www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf>
23. Chaloupka FJ, Cummings KM, Morley CP, Horan JK. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tob Control* 2002;11(Suppl 1):62-72.
24. *National Association of Tobacco Outlets, Inc. v. City of New York*, 27 F.Supp.3d 415 (S.D.N.Y. June 18, 2014).
25. *National Association of Tobacco Outlets, Inc. v. City of Providence, Rhode Island*, 731 F.3d 71 (1st Cir. 2013).