

The Role of Public Policies in Reducing Smoking: Minnesota SimSmoke Tobacco Policy Model 1993-2017



Minnesota has been a leader in pursuing tobacco control policies that reduce smoking rates. In 2011, researchers in Minnesota worked with Dr. David Levy to develop a Minnesota specific

version of SimSmoke, a well-established model used to examine the effect of tobacco control policies over time.^{1,2} Results from this first study demonstrated that tobacco control policies, most notably taxes, had contributed substantially to reduced smoking prevalence (cite). Taxes, smoke-free air laws, mass-media campaigns, cessation treatment policies and youth-access enforcement all contributed to the decline in smoking prevalence and also saved lives. Taken together, these policies had reduced smoking prevalence by almost 30 percent. The model also found that stronger, future policies would further reduce Minnesota's smoking rate and prevent additional deaths.

Since 2011, Minnesota has continued to advance policies that further reduce the harms of tobacco. These have included a significant tax increase in 2013, continued funding for mass media campaigns and significant advancements in cessation treatment policies. In 2018, research and public affairs staff at ClearWay Minnesota worked with Dr. Levy to update the model to further understand the impact past and future policies play in reducing smoking prevalence.

The Study Methods

The SimSmoke Model projects smoking prevalence and smoking-attributable deaths over time and estimates the impact of tobacco control policies on those rates. Inputs for the model include population parameters (age, gender, death rates and fertility rates), smoking status (prevalence, initiation and cessation rates, and relative smoking mortality risks), and policy effects based on reviews of the literature and advice from expert staff. Transitions over time are examined using a mathematical Markov process to project population change through fertility and deaths, and to project smoking rates through

initiation and cessation. Once run, the model was calibrated and validated against surveys of Minnesota smoking rates.

While the original and the updated model were similar, there are differences. Notably, the policies and parameters were expanded from the original model and their impacts on initiation and cessation were updated to reflect current knowledge. This study also included the impacts of policies on smokeless tobacco in addition to cigarettes. Because of the changes, the models are not directly comparable.

Impact of Tobacco Control Policies through 2017

The current Minnesota SimSmoke model demonstrates that policies continue to have a big impact on driving down smoking rates. Policies modeled included tax, smoke free air, tobacco control funding, marketing restrictions, health warnings, cessation treatment policies and youth access restrictions. Two of these policies – health warnings and marketing restrictions – had minimal impacts. These two federal level policies have not changed significantly over the study time period and are not policies that can be adjusted at the state level.

Between 1993 and 2017, Minnesota SimSmoke estimates a 41 percent decline in smoking prevalence relative to trends that would have occurred if tobacco control policies had not been implemented. In terms of the relative contribution of each policy to this reduction, we see that taxes are the biggest driver of change, accounting for 66 percent of the overall decline (See Figure 1). Taxes and smoke-free air-account for over three quarters of the prevalence decline. Media, cessation treatment and youth access are additional drivers of change. These policies work together as part of a comprehensive tobacco control program, creating necessary and critical synergy. For example, mass-media campaigns educate and raise awareness of the need for tobacco control policies as well as change social norms. Cessation treatment coupled with cessation media campaigns are needed to support those who are motivated to quit smoking as a result of increased prices and smoke-free spaces.

Impact of Future Policies

We modeled the impact of a future \$1.50 tobacco tax increase if implemented in 2021 and a statewide tobacco 21 policy passed in 2020. These policy advances, along with continued investment in tobacco control, would result in an additional 5.4 percent relative decline in the smoking rate by 2025 and an additional 11.6 percent relative decline in the smoking rate compared to the projected 2040 smoking rates were such policies not implemented.

The importance of maintaining tobacco control funding was underscored in the model. While tax increases and raising the minimum purchase age from 18-21 were shown to have substantial effects, the impact would be largely negated by reducing tobacco control funding for comprehensive prevention and cessation programs that include mass media, quitting services and future policy advancements. The model predicts that 1,012 lives would be saved by 2040 with new policies and continued funding, while new policies without funding would result in an additional 323 tobacco-related deaths in Minnesota.

Conclusion

MN SimSmoke has demonstrated that tobacco control policies work to reduce smoking prevalence and tobacco-related mortality. Increasing the price of tobacco and implementing smoke-free policies continue to show the greatest impact. The model illustrates that complimentary programs and policies, that support quit attempts and that change social norms also play an important role.

As we look to the future, additional policy efforts have strong potential to reduce tobacco prevalence and smoking-attributable deaths even further. While additional price increases and raising the legal purchasing age of tobacco products would further drive down smoking rates, these advances would be negated without state funding to support a comprehensive program that includes cessation services, media campaigns and future policy advancements. Continued investment in these areas is crucial to realizing these projected gains and improve the quality of life for all Minnesotans.

¹Levy DT, Boyle RG, Abrams DB. The role of public policies in reducing smoking: the Minnesota SimSmoke tobacco policy model. *Am J Prev Med.* Nov 2012;43(5 Suppl 3):S179-186.

²Levy DT, Meza R, Zhang Y, Holford TR. Gauging the Effect of U.S. Tobacco Control Policies From 1965 Through 2014 Using SimSmoke. *Am J Prev Med.* Apr 2016;50(4):535-542.

