

# Modeling the Health and Economic Impact of Reducing Cigarette Use in Minnesota



## ModelHealth™: Tobacco Minnesota

The damaging health and economic effects of tobacco use are well-established. More than 6,000 Minnesotans die each year as a result

of tobacco use.<sup>1</sup> Additionally, the annual cost of smoking in Minnesota is estimated to be more than \$7 billion: \$3.19 billion in direct health care costs and \$4.3 billion in lost productivity.<sup>2</sup>

Minnesota has been at the forefront of tobacco control, including being the first state to enact clean indoor air legislation, one of a few states that taxes e-cigarettes as tobacco products, and one of the first to sue tobacco companies. That tobacco lawsuit established ClearWay Minnesota<sup>SM</sup> in 1998 to implement tobacco control programs and fund research. During ClearWay Minnesota's tenure, the adult smoking prevalence in Minnesota fell from 21.8 percent in 1997 to 15.2 percent in 2016.<sup>3</sup> This 30 percent decline in smoking prevalence in less than 20 years is a significant public health achievement. Prior studies have estimated lives lost from tobacco along with the cost of smoking. The prevented heart attacks, cancers, tobacco-related deaths and medical expenses resulting from a decline in tobacco use have not been counted until now.

## **Part I: A 20-Year Retrospective Look**

### **Study Methods**

This study uses a simulation model to quantify health and economic gains to help account for the impact of tobacco control programming and inform future decisions. Researchers at HealthPartners Institute and ClearWay Minnesota conducted a study based on HealthPartners' previous work in developing a nationally recognized model, ModelHealth™: Tobacco. This simulation model uses

databases and evidence-based research to simulate lifetime changes in smoking status on a person-by-person basis. The model used a simulation of 1.3 million individuals to estimate changes in rates of smoking-attributable disease, death, medical care spending and lost productivity from reduced cigarette smoking. A constant prevalence scenario was created to simulate the tobacco harms that would have occurred had smoking prevalence stayed at 1997 levels. Those harms were compared to a scenario with actual prevalence in Minnesota from 1998 to 2017.

### **Results**

The simulation model predicts that reducing cigarette smoking from 1998 to 2017 has prevented 4,560 cancers, 31,691 hospitalizations for cardiovascular and diabetes, 12,881 respiratory disease hospitalizations and 4,118 smoking-attributable deaths. Minnesotans spent an estimated \$2.7 billion less in medical care and gained \$2.4 billion in worker productivity (inflation adjusted to 2017 U.S. dollars) (Table 1).

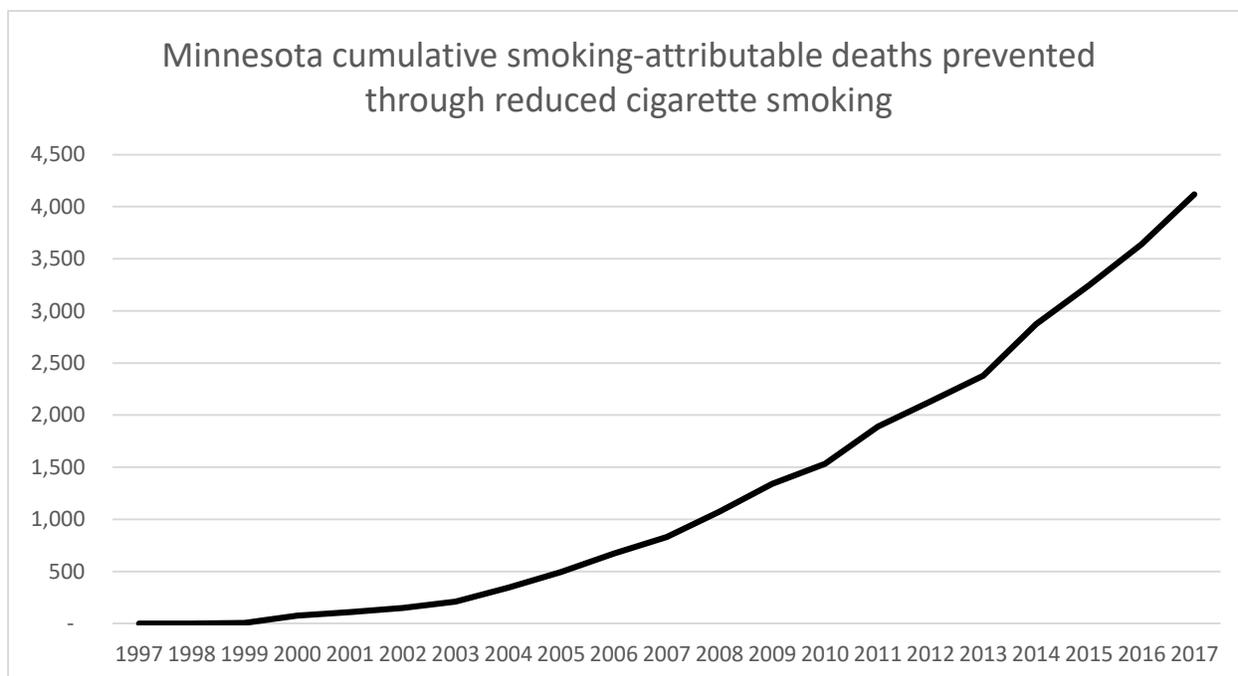
### **Conclusions**

ClearWay Minnesota's investment in comprehensive tobacco control measures has driven down smoking rates, saved billions in medical care and productivity costs, and prevented tobacco-related deaths and diseases among Minnesota residents. Notably, during the last five years of the 20-year timeline, the effects are four times higher than during the first five years. Additional gains are possible in coming decades through maintaining and expanding evidence-based tobacco control policy. The benefits of prevention and cessation accrue gradually, so these numbers will grow as people who quit smoking or never started live longer and enjoy better health.

<sup>1</sup>BCBSM 2017 Healthcare Costs and Smoking in Minnesota

<sup>2</sup>BCBSM 2017 Healthcare Costs and Smoking in Minnesota

<sup>3</sup>Behavioral Risk Factor Surveillance System  
[http://nccd.cdc.gov/s\\_broker/WEATSQL.exe/weat/index.hspl](http://nccd.cdc.gov/s_broker/WEATSQL.exe/weat/index.hspl). Accessed November 9, 2015.



**Table 1: Cumulative impact of reducing smoking prevalence, Minnesota 1998 to 2017**

<b>Outcome</b>	<b>Constant Prevalence Scenario</b>	<b>Realized Prevalence Scenario</b>	<b>Difference</b>
<u>Youth</u> smoking prevalence, ages 9-17 <sup>a</sup>	13.7%	4.3%	-9.4%
<u>Adult</u> smoking prevalence, ages 18+	23.5%	13.5%	-10.0%
Person-years of cigarette smoking, all ages	19,717,413	14,167,908	-5,549,505
SA cancers	175,533	170,974	-4,560
SA CVD and diabetes hospitalizations	1,507,229	1,475,538	-31,691
SA respiratory disease hospitalizations	452,004	439,123	-12,881
SA deaths	186,555	182,437	-4,118
SA medical costs (millions of 2017 \$US)	29,829	27,172	-2,657
Productivity (millions of 2017 \$US)	4,807,088	4,809,466	2,378

SA = Smoking-attributable. CVD = Cardiovascular disease

<sup>a</sup>Youth rates in the model in all youth 9-17 and reflect a lower overall prevalence than the rates reported elsewhere for middle and high school students.

# Modeling the Health and Economic Impact of Reducing Cigarette Use in Minnesota

## **Part II: A 20-Year Prospective Look**

### **Study Methods**

We also extended our prior analysis to quantify the potential benefits to Minnesotans over the next 20 years (2018-2037). The analysis captures the continued benefits of already having reduced smoking prevalence during 1998-2017, as well as the potential benefits from two scenarios of future prevalence rates: extending the prevalence trends observed in 1998-2017 (“Extended Prevalence Scenario”) and accelerating those prevalence trends to obtain an adult prevalence rate of 5 percent in 2037 (“Accelerated Prevalence Scenario”). To determine the health and economic impact of these potential scenarios, we compared them to the hypothetical scenario in which the prevalence of smoking in Minnesota remained at 1997 rates (“Constant Prevalence Scenario”).

### **Results**

The simulation model predicts that from 2018-2037, the Extended Prevalence Scenario will result in a reduction in the occurrence of smoking attributable diseases such as cancer cases by 12,298; cardiovascular disease and diabetes hospitalizations by 72,208; respiratory disease hospitalizations by 31,913; and smoking-attributable deaths by 14,063 compared to a scenario in which cigarette smoking remained at 1997 levels. In addition, this scenario also reduces smoking attributable medical spending by \$10.2 billion (measured in 2017 US dollars), and increases productivity by \$9.4 billion compared to a scenario in which prevalence had stayed at 1997 rates (Table 2).

The benefits are larger, as expected, when adult prevalence is calibrated to decrease to 5 percent in 2037 for the Accelerated Prevalence Scenario, which represents what might be achieved if tobacco control policies are intensified from current levels. The simulation predicts that 15,635 SA deaths would be prevented, \$11.5 billion less would be spent on SA medical care, and productivity would increase by \$10.2 billion (Table 2).

### **Conclusions**

If reductions in smoking prevalence follow recent trends, by the year 2037, 14,063 smoking-attributable deaths could be prevented, smoking-attributable medical spending could be reduced by \$10.2 billion, and productivity could increase by \$9.4 billion compared to if prevalence had stayed at 1997 rates. These estimates are approximately four times higher than the gains we estimated for the earlier 20-year period between 1998-2017, as would-be-smokers age into years of greater disease risk and many former smokers experience larger reduction in tobacco disease risks from having quit many years earlier.

The full extent of these estimated gains can only be realized if tobacco control policy in Minnesota during the next 20 years is of similar innovation and intensity to the prior 20 years. The simulation results show that additional gains might be realized with a more aggressive tobacco control policy that further reduces adult tobacco prevalence to 5 percent by 2037.

**Table 2. Results summary. Predicted cumulative impact of reducing smoking prevalence, Minnesota 2018 to 2037**

Outcome	Constant Prevalence Scenario	Extended Prevalence Scenario	Accelerated Prevalence Scenario	Scenario Comparisons		
				Extended – Constant	Accelerated – Constant	Accelerated – Extended
Youth smoking prevalence, ages 9-17	13.6%	1.0%	1.0%	-12.7%	-12.7%	0.0%
Adult smoking prevalence, ages 18+	22.2%	7.6%	5.0%	-14.6%	-17.2%	-2.5%
Person-years of cigarette smoking, all ages	21,420,638	9,281,174	7,471,058	-12,139,464	-13,949,580	-1,810,116
SA cancers	236,718	224,420	222,824	-12,298	-13,894	-1,596
SA CVD and diabetes hospitalizations	2,028,541	1,956,333	1,942,394	-72,208	-86,147	-13,939
SA respiratory disease hospitalizations	610,655	578,742	573,556	-31,913	-37,099	-5,186
SA deaths	266,216	252,154	250,581	-14,063	-15,635	-1,572
SA medical costs (millions of 2017 \$US)	32,264	22,067	20,766	-10,198	-11,498	-1,300
Productivity (millions of 2017 \$US)	5,265,706	5,275,078	5,275,865	9,372	10,159	787

SA = Smoking-attributable. CVD = Cardiovascular disease.